ENVIRONMENTAL SCOPING DOCUMENT

Wagerup Refinery Unit 3

EPA Assessment No. 1527

for

Alcoa World Alumina Australia

ENVIRON

ENVIRON Australia Pty Ltd
Suite 7, The Russell Centre
159 Adelaide Terrace
East Perth WA 6006
Australia

Telephone: +618 9225 5199
Facsimile: +618 9225 5155

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EXECUTIVE SUMMARY

The Proposal

Alcoa World Alumina Australia (Alcoa) proposes to expand its existing Wagerup alumina refinery through completing the construction of a third production unit (the "Proposal"). The third production unit would increase the total alumina production capability of the refinery to approximately 4.7 million tones per annum (Mtpa). The Wagerup refinery has environmental approvals for 3.3Mtpa, and the current operating licence allows an annual alumina production of 2.35 Mtpa, which may increase to 2.5 Mtpa subject to certain conditions being met.

Key Proposal Characteristics

The Proposal will include the completion of a third production unit, review of the residue drying area (RDA) layout, increase in transportation activities and upgrade of the overland conveyor from the Willowdale bauxite mine. The key characteristics of the Proposal are summarised in Table E1.

Table E1. Key Proposal Characteristics

Characteristic	Units	Current Refinery	Expanded Refinery
Alumina Production	Mtpa	2.35	4.7
Refinery Operations		Continuous operation	Continuous operation
Bauxite Mine		Continuous operation	Continuous operation
Bauxite Mining Rate	Mtpa	9.0	18.0
Project Life	yrs	>60	>40
Capital Investment	A$	-	1.5 billion
Refinery Footprint	Ha	183	183
Construction Period	months	-	30
Workforce (peak construction)	persons	-	1000
Workforce (operation) (Refinery + mine)	persons	900	1050
Bauxite Residue	Mtpa	4.8	9.6
Noise		Section 17 application under the *Protection (Noise) Regulations 1997* is being considered by the Minister for Environment	Proposal will meet applicable Noise Regulations on a stand alone basis
Greenhouse Gases	tpa	1,522,000	2,520,000
Greenhouse gas emission intensity	$kgCO_2/t$ alumina	651	566
RAW MATERIALS			
Caustic Soda	tpa	141,000	282,000
Lime	tpa	110,000	200,000
Water	MLpa	4,800	9,140

Existing Environment

The Proposal lies within three distinct geomorphic divisions. From west to east these are:

- Pinjarra Plain (residue drying areas);
- Ridge Hill Shelf (refinery); and
- Darling Plateau (mining area).

The area is characterised by a Mediterranean climate with cool wet winters and warm dry summers. Annual rainfall in the vicinity of the Wagerup Refinery averages 1,050 mm. Rainfall in the mining area is slightly higher. Most rainfall and runoff occurs during the months of May – September.

The primary emissions released from the Wagerup refinery include NO_x, CO, SO_2, particulates, VOCs, and trace levels of metals. VOC emissions are believed to be the cause of the characteristic odour associated with the refinery and are caused by the breakdown of organic material contained in the bauxite, additives to the liquor stream and in by-products of fuel combustion processes.

The main sources of noise from the refinery are associated with its operation and transportation (road and rail). The refinery does not comply with the noise regulations for a relatively small proportion of the time and subsequently, Alcoa is seeking a variation to the allowable noise limits for the refinery.

Alcoa sources the majority of its water for the Wagerup operations from three surface water locations; Yalup Brook, Black Tom Brook and Harvey River.

Stakeholder Involvement

Alcoa has commenced a comprehensive stakeholder involvement process for the proposed expansion of its Wagerup refinery. Alcoa has held initial discussions with the local community, and it has been agreed an expanded Wagerup Community Consultative Network (CCN) will be the Stakeholder Reference Group for this Proposal, with working groups assessing key environmental issues.

This framework will facilitate the level of participation required to ensure the community and other stakeholders have the opportunity to provide direct and meaningful input into the ERMP development process. This is seen as an important mechanism to help build community confidence and trust in the process, and to allow useful community input into project development

The Stakeholder Involvement Program is outlined in Section 7.2.

Scope of Work

The following Scope of Work identifies a range of studies that will be required to gain an understanding of the receiving environment, potential environmental impacts, and to develop appropriate management strategies. Critical to the success of the Proposal are the studies associated with air quality, noise emissions and water supply. Further detail is provided in Table 3 and Section 6 of this document. The proposed Scope of Work includes identification of existing information and project specific studies required for input into the ERMP process, including:

- Terrestrial Flora And Vegetation;
- Specially Protected (Threatened) Fauna;
- Air quality - Refinery gaseous and particulate emissions;
- Air quality - RDA/cooling ponds gaseous and particulate emissions;
- Air quality - construction dust emissions;
- Greenhouse Gas Emissions;
- Groundwater Quality;
- Surface Water Quality;
- Liquid and Solid Wastes;
- Noise;
- Water Supply;
- Archaeological Heritage and Ethnographic Issues;
- Public Safety Risk;
- Visual Impact; and
- Transport.

An ERMP document will be prepared by a lead consultant in conjunction with the proponent and sub-consultants involved in the various studies mentioned above. This document will be prepared in accordance with:

- EPA Guidelines for Preparing a Public Environmental Review/Environmental Review and Management Programme (EPA, 2002); and
- EPA Guidance for the Assessment of Environmental Factors, Implementing Best Practice in proposals submitted to the Environmental Impact Assessment process (EPA, 2003).

The ERMP will describe the proposal and the receiving environment in detail, outline the potential impacts of the proposal on the environment, identify proposed management strategies to ensure those environmental issues are managed, develop management plans for critical environmental issues and demonstrate that the Proposal can be managed in a way that is environmentally acceptable.

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ENVIRONMENTAL SCOPING DOCUMENT
Wagerup Refinery Unit 3
EPA Assessment No. 1527
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1. INTRODUCTION

1.1 PURPOSE OF SCOPING DOCUMENT

An Environment Referral, which broadly described the Wagerup refinery third production unit (Proposal), the regional environment, likely impacts and proposed management measures, was submitted to the Western Australian Environmental Protection Authority (EPA) on 15th June 2004. The EPA advertised the level of assessment for the Proposal as a Public Environmental Review (21st June 2004) and on appeal the level of assessment was set at an Environmental Review and Management Programme (ERMP) on 16th July 2004.

This Environmental Scoping Document has been prepared, as required for projects with an ERMP level of assessment, under Part IV Division 1 of the *Environmental Protection Act* 1986. The purpose of this document is to provide a basis of understanding with the EPA regarding the assessment of this proposal as well as providing an indicative timeline for the assessment. This document provides:

- a summary of the potential environmental impacts,;
- proposed Scope of Works for the studies required to support the ERMP;
- summary of applicable legislation, guidelines and standards;
- an outline of a stakeholder involvement program;
- project and assessment schedule; and
- information on the ERMP study team and peer review mechanisms.

1.2 THE PROPOSAL

Alcoa World Alumina Australia (Alcoa) proposes to expand its existing Wagerup alumina refinery through completing the construction of a third production unit. Expansion at Wagerup is one of several world-wide options currently being studied by Alcoa to provide additional capacity to meet increased global demand for alumina. The third unit would further improve the environmental efficiency of the Wagerup refinery and provide substantial economic benefits to the region, the State of Western Australia and the Commonwealth of Australia. Implementation

of the expansion program would involve further investment of about A$1.5 billion by Alcoa in its Wagerup facilities. It would increase production to a total of 4.7 million tonnes per annum (Mtpa) and increase the value of WA exports by over A$550 million per year.

1.3 THE PROPONENT

Alcoa World Alumina Australia, the Proponent for the Wagerup Refinery Unit Three, is one of 25 Alcoa Inc. business units, and is a trading name of the unlisted public company, Alcoa of Australia Limited. The principal shareholders of Alcoa of Australia Limited are:

- Alcoa International Holdings Company (60%); and
- Alumina Limited (40.0%) (previously WMC Ltd).

Alcoa is the world's leading producer of alumina. Alcoa's alumina refineries at Kwinana, Pinjarra and Wagerup have a combined annual production capacity of 7.8 million tonnes (Mt), equivalent to some 13% of world demand.

Environmental management is a high priority for Alcoa in all aspects of its operations, as reflected in Alcoa's Sustainability Principles (Refer Appendix A). Accordingly, Alcoa has developed and implemented a comprehensive Environmental Management System (EMS) for the Wagerup refinery, which was certified to the International Standards Organisation 14001 EMS Standard in February 2001.

Address of Proponent

Alcoa World Alumina Australia
Wagerup Refinery
South Western Highway
PO Box 84
Wagerup WA 6215

Key Contacts

Alcoa World Alumina Australia
David Hanham
Wagerup Three Project Environment and Health Manager
PO Box 252
Applecross WA 6953
Telephone: (61 8) 9316 5111
Fax: (61 8) 6316 5800
Email: david.hanham@alcoa.com.au

1.4 PROJECT BACKGROUND

Alcoa's Wagerup alumina refinery and its associated bauxite residue drying areas (RDAs) are located 120 kilometers south of Perth, two kilometers north of Yarloop and approximately seven kilometers south of Waroona. The refinery is located close to the foot of the Darling Scarp and is separated from the RDAs by the South West Highway and the Perth-Bunbury railway line (refer Figure 1). Bauxite is supplied to the refinery by overland conveyor from the Willowdale Mine located 15 kilometers to the east. Caustic soda used in the refining process is imported, and alumina produced at Wagerup is shipped via the Alcoa shipping terminal at Bunbury. Transport between the refinery and the port is by rail.

1.5 PREVIOUS ENVIRONMENTAL APPROVALS

Wagerup refinery was first granted State government approval in 1978 under the *Alumina Refinery (Wagerup) Agreement Act 1978* and *Acts Amendment 1978*. The approval was for a production capacity of up to 2 million tonnes per annum (Mtpa). The first production unit was commissioned in 1984 and had a capacity of 670,000 tpa which was expanded to 840,000 tpa in 1988.

Alcoa's Mineral Lease 1SA (ML1sa), which encompasses an area in the Darling Range from east of Perth to east of Bunbury (refer Figure 2), was granted in 1961 under the Alumina Refinery Agreement Act 1961. Alcoa's Willowdale bauxite mining operations and the Wagerup refinery are located just south of the central portion and on the western parts of the mineral lease. Alcoa has approval to mine within ML1sa subject to submitting draft five year mine plans and associated environmental management programmes to the State's Mining and Management

Programme Liaison Group (MMPLG), on an annual basis. Details of the MMPLG process is provided in section 1.6. The EPA has advised that operations that are managed by the MMPLG process in ML1sa are addressed by an existing approval process and should not be included in the ERMP.

In 1989, Alcoa was granted approval to expand production from 840,000 Mtpa to 1.5 Mtpa. The expansion involved the construction of a second production unit which required formal assessment in the form of a Consultative Environmental Review (CER).

In 1995, Alcoa was granted further approval for a third production unit, increasing the maximum capacity from 1.5 Mtpa to 3.3 Mtpa. This expansion was also formally assessed via a CER. An upgrade of the refinery commenced in 1998-99 taking the total alumina production capability to approximately 2.2 Mtpa.

The current operating licence allows an annual alumina production of 2.35 Mtpa which may increase to 2.5 Mtpa subject to certain conditions being met. Through the implementation of process improvements the refinery could achieve the maximum annual alumina production allowed under the current operating licence without the proposal.

Alcoa has a Long-Term Residue Management Strategy (LTRMS) in place for each of its Western Australian refinery sites, including the Wagerup refinery. The purpose of the LTRMS is to: identify the future RDA requirements for each refinery; ensure that the location and design of new areas is optimised; reduce environmental impacts; consider long-term land use issues; and to outline a closure strategy for the residue drying areas. The LTRMS is prepared through consultation with the local community, local government and the Residue Planning Liaison Group (RPLG), which was set up in 1992 to provide advice on residue management issues. The RPLG comprises representatives of government agencies and is chaired by the DoIR. The LTRMS is submitted to the Minister for the Environment for endorsement and was first endorsed in 1996. A review of Wagerup refinery's future requirements and long-term alternatives for residue was undertaken in 2001.

1.6 MINE PLANNING AND MANAGEMENT

1.6.1 Mining and Management Programme Liaison Group

The MMPLG provides advice to the Minister for Resources Development on the environmental acceptability of proposed long term mining areas within the existing approved Mineral Lease 1sa.

The role of the MMPLG is to:

- ensure that Alcoa's mine plans are developed and implemented, with due regard to the potential impacts of mining on the local community;
- co-ordinate environmental auditing of the Mine Management Plans (MMPs) submitted with Alcoa's draft mine plans;
- continue to oversee the development of rehabilitation completion criteria;
- employ best practice environmental management principles; and
- regularly review and, if necessary, revise the above criteria.

The MMPLG has representatives from the following State Government departments:

- Department of Industry and Resources (DoIR): Chair;
- Department of Industry and Resources (DoIR): Secretary;
- Department of Conservation and Land Management (CALM): rehabilitation and completion criteria;
- Department of Environment: air, noise and water pollution issues; and
- Water Corporation (WC): water quality issues.

Alcoa consults with the key land and resource management agencies, particularly CALM and the Water Corporation, before the draft plans are submitted. This allows any significant environmental issues to be identified early in the planning process. After committee review, discussion with Alcoa and other relevant parties, and joint field inspection of sensitive areas, the draft plans are modified as necessary and resubmitted. The MMPLG makes its recommendations on the revised plans to the Minister for Resources Development, who then approves the revised plans subject to appropriate conditions.

Implementation of the management programmes is monitored by the Mining Operations Group (MOG). MOG comprises representatives from CALM, the Water Corporation and DoIR. This group also reviews detailed aspects of the mining proposals at the two year plan stage. For example, the group considers clearing boundaries, the location and design of stream crossings, and haul road drainage and sediment control measures. The Convenor of MOG, the manager of CALM's Swan Region, is an ex-officio member of the MMPLG.

In addition to five year plans, Alcoa annually provides the MMPLG with preliminary ten year plans which show the general outlines of the areas which are most likely to be mined after the bauxite covered by the five year plan has been extracted. Conceptual 25 year mine plans are also submitted periodically for consideration by the MMPLG, usually at about five year intervals or when a major change in the direction of mining is proposed. These longer term plans are used to establish the boundaries within which future operations are likely to be located. They provide a framework for decisions on subsequent five year mine plans and allow state agencies to plan management operations, such as timber harvesting and fuel reduction burning, within and beyond the proposed areas of mining.

Mining is operated under existing approvals and the EPA has advised it is not within the scope of this ERMP. However it is recognised the issue is of interest to other stakeholders and may be included in aspects of stakeholder consultation.

2. PROPOSAL DESCRIPTION

2.1 PROPOSAL SUMMARY

The proposed expansion of the Wagerup refinery will involve new infrastructure and modifications to the existing refinery. Detailed specifications for the Proposal have not been finalized, as engineering design work will consider the output of the key studies outlined in this report, with the aim of reducing environmental impacts. The infrastructure requirements of the Proposal will include, but not be limited to, the following:

- Upgrading of water and power reticulation;
- Additional bauxite stacker and additional bauxite stockpiles;
- Additional ore reclaimer;
- One additional grinding mill;
- Three slurry storage tanks;
- Additional digestion unit;
- Two sand removal trains or equivalent;
- 36 precipitation tanks;
- Four assorted evaporation units;
- Upgrade of oxalate removal plant;
- Two additional calciners;
- Additional alumina bin;
- Additional raw water storage facility;
- Additional carbonate removal facility;
- Two additional boilers or a cogeneration facility;
- Extension to administration and amenities block;
- Various stock tanks and non-specific upgrades to other sections of the plant (eg oxalate, washers, thickeners);
- Expansion of residue drying areas; and
- Upgrade and extension of overland conveyor system.

The following table identifies the key characteristics of the Proposal.

Table 1: Key Characteristics of the Proposal

Characteristic	Units	Current Refinery	Expanded Refinery
Alumina Production	Mtpa	2.35	4.7
Refinery Operations		Continuous operation	Continuous operation
Bauxite Mine		Continuous operation	Continuous operation
Bauxite Mining Rate	Mtpa	9	18
Project Life	yrs	>60	>40
Capital Investment	A$	-	1.5 billion
Refinery Footprint	Ha	183	183
Construction Period	months	-	30
Workforce (peak construction)	persons	-	1000
Workforce (operation) (Refinery + mine)	persons	900	1050
Bauxite Residue	Mtpa	4.8	9.6
Noise		Section 17 application under the *Protection (Noise) Regulations 1997* is being considered by the Minister for Environment	Proposal will meet applicable Noise Regulations on a stand alone basis
Greenhouse Gases	tpa	1,522,000	2,520,000
Greenhouse gas emission intensity	$kgCO_2/t$ alumina	651	566
RAW MATERIALS			
Caustic Soda	tpa	141,000	282,000
Lime	tpa	110,000	200,000
Water	MLpa	4,800	9,140

2.2 REFINERY

The Wagerup refinery currently produces approximately 2.35 Mtpa of alumina. As with the majority of other commercial alumina refineries throughout the world, the Bayer process is used, which involves a number of key steps, including:

- Bauxite grinding;
- Slurry storage;
- Digestion;
- Clarification;
- Precipitation; and
- Calcination.

A simplified process flow diagram of the Bayer process used at the Wagerup refinery is presented in Figure 3.

2.2.1 Bauxite Grinding and Slurry Storage

Bauxite is ground to less than 1.5 mm particle size at the refinery, using semi-autogenous grinding mills (SAG mills), to ensure sufficient solid-liquid contact during the digestion phase. This improves the alumina extraction efficiency. A solution of hot concentrated sodium hydroxide (NaOH, i.e. caustic) liquor, bled from the recycled caustic liquor circuit, is added to the bauxite during grinding to produce a slurry. The slurry is pumped to a series of holding tanks prior to the next stage of the Bayer process. The purpose of the holding tanks is to allow for minor interruptions to the ground bauxite supply, blending of bauxite grade, and to allow the process of desilication (i.e. removal of silicate from the liquor) to commence.

2.2.2 Digestion

The bauxite slurry is pumped from the holding tanks to the digestion units where additional hot recycled caustic liquor is added to the ground bauxite slurry. The digestion process removes the hydrated alumina from other insoluble oxides by reacting it with sodium hydroxide according to the following reaction:

$$Al_2O_3.xH_2O + 2NaOH \rightarrow 2NaAlO_2 + (x+1)H_2O$$

The slurry leaves the digestion units containing the alumina in solution (often referred to as green liquor), and other undissolved ore solids.

2.2.3 Clarification

The clarification stage of the process separates the undissolved ore solids from the green liquor. This is achieved using large clarification vessels (mud thickeners), which allow the undissolved bauxite solids to settle out. These bauxite solids are then passed through a counter-current washing train (mud washers) using water to recover as much of the caustic as possible to enable it to be recycled back within the recycled caustic liquor circuit. The washed solids from the counter-current washing train is called process residue or red mud, and is pumped to the Residue Drying Area (RDA) (refer to Section 2.6).

Approximately halfway through the mud washing process the overflow stream is heated and added to a series of tanks with lime slurry. This is known as the causticisation process where a

portion of the sodium carbonate that is formed in the liquor is converted to sodium hydroxide. Without causticisation, the refinery would require large quantities of fresh caustic to be added to the liquor for the refinery to remain productive.

2.2.4 Organic Removal

Organic material is naturally present in bauxite ore and in some of the specialised chemicals added throughout the Bayer process (such as flocculants). This organic matter reacts to form various organic sodium compounds and, over time, the level of organics builds up in the recycled caustic liquor circuit, reducing the efficiency of precipitation (see section 2.2.5). These organic compounds can also adversely affect the formation of hydrate crystals and consequently result in the production of alumina with undesirable product quality.

The build up of organics is controlled in two ways. Firstly, sodium oxalate (the most significant organic) is concentrated and removed by a sequence of seeding, precipitating, and washing to produce a wet oxalate cake. This oxalate cake is currently being stored in a secure part of the residue drying area, while long term destruction/disposal alternatives are assessed.

Secondly, bulk organics destruction is achieved by bleeding a small liquor side stream to the liquor burning process. Here, the liquor is concentrated by evaporation, slurried with fine alumina dust, and combusted in a rotary kiln. The organics are oxidised, and the resulting sodium aluminate is returned to the liquor circuit.

2.2.5 Precipitation

Green liquor is passed to precipitation after being cooled via a heat exchange process. The heat from the green liquor is transferred to the cold spent liquor (i.e. liquor from which the alumina has been removed) that is returned to the start of the digestion process. The cooled liquor is seeded with small crystals of alumina tri-hydrate, which act as nuclei for more alumina tri-hydrate to precipitate. The seeded liquor is passed through a series of large precipitator vessels, where the crystals agglomerate and grow. When the hydrate slurry leaves the last precipitator vessels, it is classified (sorted) by size. The coarser particles are transferred to calcination, and the finer particles are thickened, filtered, and recycled to the start of the precipitation process as seed crystals. The spent liquor which is produced during the classification, thickening, and filtration processes is then recycled to the digestion process and used once more to dissolve fresh alumina.

2.2.6 Calcination

Calcination involves washing and drying the alumina hydrate, then heating it to about 1000 degrees Celsius to drive off chemically combined water. The final product is alumina (Al_2O_3) a dry, pure white, sand-like material, which is the feedstock for aluminium smelters. Particulate emissions from the calciners are currently controlled using an electrostatic precipitator on each calciner.

2.3 REFINERY WATER CIRCUIT

The Wagerup refinery operates a closed water circuit, which is supplemented for water losses. Water losses primarily occur as steam and moisture from the process, evaporation from water storage and residue surfaces and through water bound within the residue mud and sand. There is a relatively high portion of water retained within the residue after it has been "dry" stacked. Overall, the Wagerup refinery uses approximately two kilolitres (kL) of water per tonne of alumina product.

Make-up water is taken from three licensed surface water sources: Black Tom Brook, Yalup Brook and the Harvey River. In addition, rainfall runoff and water contained in the caustic soda and bauxite is added to the water circuit. Water is also purchased when required from Harvey Water. The RDAs have base drainage systems that collect residue leachate and rainfall infiltration. All rainfall runoff from the refinery, residue drying areas and process water ponds are transferred to the cooling pond or runoff water storage pond during winter and then used as make-up water for the refinery during summer. On average, total water storage in the residue area water circuit is approximately 3000 ML (averaged over 2002/3).

2.4 CARBONATION

Residue carbonation involves the pumping of CO_2 that would normally be emitted to the atmosphere into the residue prior to deposition in the RDAs. Trials have shown this to be an effective means of reducing residue pH and hence the hazardous nature of the residue, which is normally attributed to the high pH and corrosive nature of the entrained liquor. Carbonation is under consideration for the proposed refinery expansion.

It is anticipated that a number of operational benefits can de derived from residue carbonation including:

- Improved drying rates of the slurry;
- Reduced potential for dusting from the drying beds; and
- Reduction of Total Organic Carbon levels in the carbonated residue leachate by around 35% through biological activity within the underdrainage system.

The longer-term benefits associated with carbonation include:

- Reduced potential for long-term impacts on the clay and synthetic seals at the base of the RDAs;
- Improved drainage water quality with respect to eventual treatment and discharge on refinery closure;
- Providing a sink for CO_2, potentially reducing the overall refinery emissions by up to 4%; and
- Increased opportunities for slurry and dried residue re-use, primarily through the reduced hazardous nature of the residue.

The potential drawbacks of the carbonation process include:

- A small loss in alumina precipitated; and
- Increased carbonate return.

2.5 RESIDUE DRYING AREAS

The material remaining after the alumina has been extracted from the bauxite ore is commonly termed bauxite residue. The grade of Darling Plateau bauxite results in residue being produced at a rate of approximately two dry tonnes per tonne of alumina produced. Bauxite residue consists of caustic-insoluble components (i.e. haematite, quartz and titanite) which have passed through the Bayer process unaltered, precipitated silica and iron compounds, and residual quantities of caustic soda not recovered in the residue washing stage.

Currently the residue drying area covers approximately 546 hectares (to outer drain) of which 67 hectares are used for active drying areas, 12 hectares for the thickener bypass, 69 hectares for alkaline water storage and 32 hectares for fresh water storage. The Proposal will require an additional 80 to 100 hectares of active drying area and an additional fresh water storage area.

A larger active drying area is required due to the incremental increase in production, though the overall lifespan of the RDA would remain the same. The current 30 year layout option for residue drying areas was developed following stakeholder consultation. A range of layout options and research alternatives are being considered for the RDAs and these will form the basis for a

future review and consultation with stakeholders. This review will lead to an update of the LTRMS for Wagerup during 2005.

2.6 PROPOSAL JUSTIFICATION

Aluminium metal consumption is expected to grow steadily for the foreseeable future, given reasonable levels of world economic growth, and after taking increased aluminium recycling into account. Alumina is the feedstock for aluminium smelters, and as a low-cost alumina producer, and with secure access to substantial bauxite reserves, Alcoa's Wagerup refinery is well positioned to capture a share of this expanding market opportunity, which will further improve Alcoa's West Australian and global market competitiveness.

Wagerup refinery is recognised as one of the most technologically advanced and energy efficient, when compared to international and Western Australian alumina refinery benchmarks. The Proposal will provide direct economic benefits to the local community, State and the Peel region through increased Commonwealth and State royalties, 150 permanent Alcoa positions and 3000 direct and indirect employment opportunities.

The Proposal will entail a capital expenditure of around A$1.5 billion and is expected to earn approximately A$17 billion over 30 years in new export revenues.

2.7 ALTERNATIVES CONSIDERED

2.7.1 No Proposal Option

If this Proposal did not proceed, then it would represent a lost market opportunity, missed employment opportunities (direct and indirect), and reduced economic growth in the Peel region and the West Australian economy.

2.7.2 Proposal Alternative

The alternatives to the Proposal include:

- Establishment of a new refinery in Western Australia;
- Expansion at other alumina refineries within Western Australia; and
- Opportunities at other alumina refineries within the Alcoa World Alumina global system.

The major drivers in selecting Wagerup as the preferred option include the economic feasibility of upgrading the existing refinery to meet market demands, as well as recognition that Wagerup

possesses the most up-to-date technology and highest energy efficiency, when compared to international and Western Australian alumina refinery benchmarks.

The option for establishing a new refinery within Western Australia is not considered economically viable since establishment costs would be significantly higher, and there would be greater delays associated with development and construction. This would also result in a duplication of facilities that already exist at Wagerup, with resultant environmental impacts associated with land acquisition and clearing.

The option to expand capacity in other regions is under consideration by Alcoa. Alcoa believes Wagerup to be the most environmentally advanced alumina refinery in the world and the most suitable site for expansion. Expansion elsewhere is unlikely to provide the same opportunity to create more jobs, growth and business opportunities in the region and wider economy.

3. APPLICABLE LEGISLATION

State government approval for the Wagerup alumina refinery was granted in 1978 under the *Alumina Refinery (Wagerup) Agreement Act 1978* and *Acts Amendment Act 1978*. The refinery operates under Ministerial Conditions that relate to Environmental Reviews conducted for the facility since its interception in 1978. The Ministerial Conditions were updated in 1995 in response to a Consultative Environmental Review covering expansion of the refinery to 3.3 million tonnes per annum (Mtpa).

Additional environmental approvals and consents include the following:

- Environmental Licence and project Works Approval pursuant to Part V of the *Environmental Protection Act 1986*;
- Surface and groundwater licences pursuant to *Rights in Water and Irrigation Act 1914*;
- Dangerous Goods Licence pursuant to the *Explosives and Dangerous Goods Act 1961*;
- Annual approval of mine plans and associated management programs by the Minister for State Development on recommendation from the Mining and Management Program Liaison Group; and
- Development of a long-term residue management strategy (LTRMS) in consultation with the Residue Planning Liaison Group (RPLG) and endorsement of these plans by the Minister for Environment.

In addition to obtaining approval from the State Minister for the Environment, Alcoa also complies with legislation and regulations administered by a number of State Government bodies and also Commonwealth legislation.

3.1 STATE GOVERNMENT LEGISLATION

State legislation relevant to the Proposal includes the following:

- *Aboriginal Heritage Act 1972;*
- *Agriculture and Related Resources Protection Act 1976;*
- *Bush Fires Act 1954;*
- *Conservation and Land Management Act 1984;*
- *Environmental Protection Act 1986;*
- *Environmental Protection Regulations 1987;*
- *Environmental Protection (Noise) Regulations 1997;*
- *Environmental Protection (Controlled Waste) Regulations 2001;*
- *Explosives and Dangerous Goods Act 1961;*

- *Dangerous Goods (Transport) Act 1998;*
- *Dangerous Goods Regulations 1992;*
- *Dangerous Goods Safety Act 2002;*
- *Draft Contaminated Sites Bill 2000;*
- *Mining Act 1978;*
- *Land Administration (Amendments) Act 1997;*
- *Water Supply Sewage and Drainage Act 1912;*
- *Local Government Act 1995;*
- *Occupational Safety and Health Act 1984;*
- *Rights in Water and Irrigation Act 1914;*
- *Soil and Land Conservation Act 1945;*
- *Water Supply Sewage and Drainage Act 1912;* and
- *Wildlife Conservation Act 1950.*

Alcoa is also required to comply with local and State planning requirements as set out by the Department of Planning and Infrastructure (DPI). The proposal lies wholly within the existing facility boundary of the Wagerup alumina refinery and the intended land use for the Proposal is consistent with the land's current zoning.

Agreements and treaties that may affect the Proposal are:

- Montreal Protocol on Substances that Deplete Ozone;
- United Nations Framework Convention on Climate Change;
- National Greenhouse Response Strategy;
- National Strategy for Ecologically Sustainable Development;
- "Hope for the Future" - The Western Australian State Sustainability Strategy; and
- Greenhouse Strategy for Western Australia (in development).

The five-year plan for mining takes into account legislation and policies such as the *Western Australian Wildlife Conservation Act 1950, Conservation and Land Management Act 1984, Soil and Land Conservation Act 1945.*

Other

- Kyoto Protocol – not currently ratified by the Australian Government.

It has been determined by the EPA that the Proposal requires a formal level of environmental assessment, set as an ERMP. The process for submission and assessment of an ERMP is determined by EPA and is outlined below for this Proposal:

1. The Proponent refers the proposal to the EPA to set the level of assessment (an Environmental Referral for this Proposal was submitted on 15th June 2004);
2. The EPA determined initially the level of assessment at PER and advertised this decision and the length of the public review period on 21st June 2004;
3. On appeal the EPA advertised the level of assessment as an ERMP on 16th July 2004 and set a 10 week public review period;
4. The Proponent prepares an Environmental Scoping Document (this document) outlining the scope of works for the ERMP assessment;
5. The EPA agrees to the Environmental Scoping Document as a basis for the ERMP;
6. The Proponent undertakes studies to feed into the ERMP document;
7. The ERMP is prepared by the Proponent;
8. The ERMP is submitted as a final draft to the EPA for authorisation to release as a public document;
9. The Proponent responds to any submissions made on the Proposal at the end of the public review period;
10. The EPA undertakes an assessment of the ERMP and the Proponent's response to any submissions and makes a recommendation to the Minister for Environment;
11. The Minister for Environment publishes the EPA Report;
12. The Minister for Environment determines any appeals, and consults with the key Decision Making Authorities to seek agreement on whether or not, and in what manner the proposal may be implemented; and
13. The Minister for Environment issues a Statement determining if the Proposal may proceed, and details the conditions associated with the approval.

The anticipated schedule for this process is outlined in Section 8 of this Scoping Document.

Once approval for a Proposal is obtained under Part IV of the *Environmental Protection Act 1986*, licensing of construction and operations is required under Part V of the Act. This requires a Works Approval Application and Application for Licence to Operate to be submitted to the Department of Environment (DoE).

3.2 COMMONWEALTH GOVERNMENT LEGISLATION

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), an action requires approval from the Federal Environment Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance such as:

- World Heritage properties;
- Ramsar wetlands of international importance;
- Listed threatened species and communities;
- Migratory species protected under international agreements;
- Nuclear actions; and
- Commonwealth marine environment.

The Proposal is not considered to trigger the EPBC Act as no new threatened species or communities have been found nor have operational impacts significantly changed. The mine planning process is not altered and the mining lease is part of prior environmental approvals.

4. REGIONAL ENVIRONMENTAL SETTING

4.1 INTRODUCTION

The Wagerup alumina refinery has been in operation since 1984 and it is important to summarise the existing environment with respect to the natural environment and the critical key factors of the Proposal, in particular, air quality, noise emissions and water supply.

4.2 CLIMATE

The area is characterised by a Mediterranean climate with mild wet winters and warm dry summers. Annual rainfall in the vicinity of the Wagerup refinery averages 1050 mm, with 55% falling in winter. Rainfall in the mining area is approximately 20% higher and most rainfall and runoff occurs during the months of May – September.

4.3 EXISTING LAND USE

The refinery and residue operations are contained within freehold land owned by Alcoa. Land uses on the non-industrial land and on adjacent properties are primarily agricultural - mainly cattle grazing on dry land or irrigated pasture.

4.4 AIR QUALITY

The Wagerup refinery is the largest single industrial source of atmospheric emissions in the local area. The contribution of emissions to atmosphere from other sources include emissions associated with motor vehicles, agricultural activities, other industrial activities, wildfires or hazard reduction burning, and the use of domestic wood heaters. These sources are also significant contributors of particulates, oxides of nitrogen and volatile organic compounds on occasion.

The primary emissions released from the Wagerup refinery include NO_x, CO, SO_2, particulates, VOCs, and trace levels of metals. Emissions of NO_x, CO and SO_2 arise primarily from the combustion of natural gas and are released to atmosphere from the powerhouse boilers, calciners and liquor burner.

Emissions of particulates (or dust) are released from the calciners (in the form of alumina dust), and to a lesser extent the liquor burner. In addition, particulates are also released intermittently as a result of mining activities, windblown dust emissions from the bauxite stockpile area and the RDAs, and bulk materials handling and transport activities.

VOC emissions from alumina refineries are caused by the breakdown of organic material contained in the bauxite, additives to the liquor stream and in by-products of fuel combustion processes. During alumina refining, these organics are degraded and produce an extensive range of substances, some of which are volatile enough to be emitted to air. These VOC emissions are believed to be the cause of the characteristic odour associated with alumina refineries. The liquor burner is a source of VOC emissions, but due to the pollution control equipment in place these emissions are significantly reduced.

Metals such as mercury, arsenic and nickel are introduced into the Bayer process primarily through the trace amounts present in bauxite, and the current knowledge indicates that the majority of metals are recirculated within the caustic liquor stream or deposited with the residue. Notwithstanding this, trace amounts of various metals have been found to be present in emissions from various sources at the Wagerup refinery. Alcoa has been gaining an understanding of the mercury mass balance and emission sources for each of its Western Australian refineries with the goal of reducing emissions. In 2004 a pilot project to remove mercury from the Bayer process will be trialled at Wagerup and may lead to a significant reduction in mercury emissions.

Alcoa invested over A$25 million in capital costs associated with plant upgrades in 2002 to reduce odorous emissions in the calcination, digestion, evaporation and clarification areas of the Wagerup refinery and to reduce oxides of nitrogen emissions from the powerhouse. A formal evaluation of the works was undertaken during 2003 and all projects were found to have successfully reduced the targeted emissions.

4.5 NOISE

The main sources of noise from the existing operations are associated with refinery operations and transportation.

Noise from the refinery has been an ongoing challenge to Alcoa, leading to a major noise reduction program implemented in 1995 and another in 2000. Specialist noise consultants identified 12 key noise sources to be targeted, involving the expenditure of approximately $1,000,000 in 2000. The areas of the plant addressed in these projects were:

- Building 26 blower stack noise and casing breakout noise.
- Building 50 calciner blower inlet and discharge duct breakout noise.
- Building 51 dust collector blowers discharge noise.
- Building 44-2 vent blower stack and casing noise.

- Building 45 precipitator agitator gear noise.
- Building 44 vacuum blower inlet and discharge manifold noise.
- Building 48 hydraulic power pack noise from the kiln and cage mill drives.
- Building 48 cooler fan and piping noise.
- Building 45 control valve and flow noise.
- Building 30 steam noise.
- Building 50 low frequency blower inlet noise.
- Building 25 mill gearbox noise.

The noise reduction program resulted in a five dB(A) reduction in the overall refinery noise emissions at the boundary by the end of 2000.

The noise reduction measures have not enabled the Wagerup refinery to comply with the noise levels assigned by Regulation 8 of the Environmental Protection (Noise) Regulations 1997 (as amended) for a relatively small proportion of the time. Subsequently, Alcoa is seeking a variation to the noise emission levels assigned by Regulation 8, in accordance with Regulation 17 of the Regulations.

4.6 WATER SUPPLY

Alcoa sources the majority of its water for the Wagerup operations from three surface water locations; Yalup Brook, Black Tom Brook and the Harvey River.

The installation and commissioning of equipment required to extract winter runoff from the Harvey River (Drain) was completed by October 2003. This system enables the abstraction of lower quality, winter run-off from the Harvey River (Drain), instead of using much higher quality hills runoff, having environmental benefits for the lower Harvey River (Drain) and to a lesser extent the Harvey estuary. It allows the available hills runoff to be used as environmental flow, thereby potentially reducing nutrient levels in downstream water bodies.

The Harvey River allocation replaced the licensed allocation from the Samson Brook South Drain and reduced the allocation from Black Tom Brook. The current water surface licence allocations and the volumes abstracted by Alcoa in 2003 are presented in Table 2.

Table 2: Surface Water Licence Allocations and Abstraction Volumes for 2003.

Licence No.	Catchment Location	Expiry	Licensed Abstraction Volume (ML/year)	Volume Abstracted by Alcoa in 2003 (ML/year)
99246	Black Tom Brook	30/06/2007	2500	1370
97472	Yalup Brook	30/06/2007	1600	962
151027	Harvey River Drain	30/06/2007	4400	900

NOTES:

1. Water can only be abstracted from the Harvey River (Drain) between May and October.

2. The volume of water shown in the table as being abstracted under licence 99246 also includes some water that was abstracted under a previous licence (licence no. 97471) that expired on 30 June 2003.

3. The metered water volume abstracted from the Harvey River (Drain) under licence 151027 was 700ML. It is estimated that an additional 200ML was abstracted during the commissioning phase of the pump station.

4. In addition to the above abstraction volumes Alcoa purchased 600ML of water during 2003.

Water conservation initiatives undertaken in 2003 as part of the water conservation plan concentrated on reducing the volume of water used for dust suppression. These initiatives included:

- Using wood chips sourced from a local Yarloop timber mill and blue metal on areas at residue operations instead of water;
- Use of waste oil for dust suppression on internal residue roads instead of water;
- RDA bank stabilisation with tar and bitumen; and
- Ripping of residue drying areas during summer to expose wet mud to lower the water usage required for dust suppression of the mud surfaces.

4.7 ARCHAEOLOGICAL HERITAGE AND ETHNOGRAPHIC ISSUES

The Proposal requires new refinery infrastructure which are contained within the existing plant area and do not impinge on any known sites of Aboriginal ethnographic or archaeological significance. The RDA (current and expanded areas) has been subject to prior surveys and will not impact on any known sites of Aboriginal ethnographic or archaeological significance.

5. ENVIRONMENTAL FACTORS

A summary of the potential environmental issues and management measures was presented in the Environmental Referral for the Proposal. Through the Environmental Referral document and preliminary discussions with the decision making authorities, the environmental factors critical to the success of the Proposal are the studies associated with; air quality, noise emissions and water supply. Table 3 summarises the environmental factors and issues that will be considered in the assessment of the environmental impacts of the Proposal. These are:

- Terrestrial Flora and Vegetation;
- Specially Protected (Threatened) Fauna;
- Surface and Groundwater Quality;
- Gaseous and Particulate Emissions – Refinery, RDA's and Cooling ponds;
- Dust Emissions - Construction Phase;
- Greenhouse Gas Emissions;
- Noise and Vibration;
- Water Supply;
- Solid and Liquid Wastes;
- Hydrocarbons and Hazardous Materials;
- Archaeological Heritage and Ethnographic Issues;
- Public Health and Safety Risk;
- Visual Impact; and
- Road and Rail Transport

The table also includes reference to the EPA's objectives in relation to the issues, the potential impacts, current investigations, additional investigations required and applicable standards and guidelines. The Scope of Works for the investigations identified in Table 3 are detailed in Section 6 of this report. The Scope of Works outlines the purpose and the key tasks for each of the proposed studies.

Table 3: Key Environmental Factors for Assessment of the Proposal

Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Current Investigations	Additional Investigations	Applicable standards, guidance and policies
Integration						
Biodiversity	Wagerup refinery, RDA's and cooling ponds	To avoid adverse impacts on biological diversity, comprising the different plants and animals and the ecosystem they form, at the levels of genetic, species and ecosystem diversity.	Significant species or communities may be affected by land clearing or operational impacts.			▪ EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection.
Sustainability	The Proposal Area and adjacent areas potentially affected by the Proposal	To ensure, as far as practicable, that the proposal meets or is consistent with the sustainability principles in the *National Strategy for Ecologically Sustainable Development (Cmwlth 1992).*	Poor design and management of a development could result in unacceptable economic, environmental and social impacts. Conversely, protection of the environment and social values needs to take into consideration economic constraints.		Sustainability assessment of the Proposal	▪ National Strategy for Ecologically Sustainable Development (Govt. of Australia 1992). ▪ Hope for the future: The Western Australian State Sustainability Strategy (Govt. WA, 2003). ▪ EPA Guidance Statement No. 55. Implementing Best Practice in proposals submitted to the Environmental Impact Assessment process.
Biophysical						
Flora and Vegetation	Wagerup refinery, RDA's and cooling ponds	To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.		Previous surveys (2002) have identified mainly cleared farmland and small pockets (less than 0.5ha in total) that may be impacted by the expansion of the RDA and cooling ponds.	Alcoa will review existing information to assess the potential for impact on flora and vegetation.	▪ EPA Position Statement No. 2: Environmental Protection of Native Vegetation in Western Australia. ▪ EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection.
Fauna - Specially Protected (Threatened) Fauna	Wagerup refinery, RDA's and cooling ponds	Protect Specially Protected (Threatened) Fauna species and their habitats, consistent with the provisions of the *Wildlife Conservation Act 1950.*		Previous surveys (2002) have cleared the future RDA areas of containing any rare or endangered species.	Alcoa will review existing information to assess the potential for impact on rare or endangered flora and vegetation.	▪ EPA Draft Guidance Statement No. 56: Terrestrial fauna surveys for Environmental Impact Assessment in Western Australia.

Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Current Investigations	Additional Investigations	Applicable standards, guidance and policies
Pollution Management						
Air Quality - Refinery Gaseous and Dust Emissions	Surrounding residential premises within proximity to the Wagerup refinery	To ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses, by meeting statutory requirements and acceptable standards.	Increased production could result in increased gaseous and particulate emissions. Alcoa has given a commitment that there will not be an increase in dust, odour or, short and long term emission impacts on residents	Detailed ambient air quality monitoring	Quantitative Health Risk Assessment (QHRA) through: • Quantify ambient emissions from point and fugitive sources; • Undertake air dispersion modelling to determine potential ground level concentrations (GLC's) and impacts from the refinery and RDA/cooling pond (cumulative); • Preparation of the QHRA (refer Section 6.2.2 for more detail); and • Independent review of the Quantitative Health Risk Assessment. Study short-term exposure events through: ▪ Predict short-term exposures events using TAPM model combined with CSIRO analysis of peak/mean ratios; ▪ Measuring long-path OPSIS identifying any spikes in VOC concentrations if plume grounding occurs in sample area; ▪ Mobile GCMS deployed to evaluate compounds in real-time that may contribute to reported health and odour complaints; ▪ Investigate potential for short-term exposures and any potential health implications; ▪ Statistical analysis of relevant historical data; ▪ Comparison to available standards; ▪ Analysis of health complaints; and ▪ Correlation of climatic and process information against measured or predicted short-term exposure events. Study odour emissions through; ▪ Establishing baseline odour emissions for existing facility; and ▪ Modelling to predict odour dispersion from the refinery (cumulative with RDAs).	• EPA Guidance Statement No. 15: Emissions of Oxides of Nitrogen from Gas Turbines • EPA Draft Guidance Statement No. 3: Separation Distances between Industrial and Sensitive Land Uses. • EPA Guidance Statement No. 47: Assessment of Odour Impacts from New Proposals. • NEPC (1998) Ambient Air Quality National Environment Protection Measure. • Guidelines for assessing human health risks from environmental hazards (2002) Department of Health and Ageing and enHealth Council.
Air quality –RDA and Cooling Ponds, Gaseous and Dust	Surrounding residential premises within	To protect surrounding residents such that gaseous and particulate emissions will not adversely	Increased production of bauxite residue could result in increased air emissions	Regular monitoring of ambient dust levels of the Residue Drying Areas.	Study to characterise and determine gaseous and particulate emissions from the RDA and cooling ponds through:	▪ EPA Draft Guidance Statement No. 3: Separation Distances between Industrial and Sensitive

Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Current Investigations	Additional Investigations	Applicable standards, guidance and policies
emissions	proximity to the Wagerup refinery	affect their welfare and amenity or cause health concerns.	Alcoa has given a commitment that there will not be an increase in dust, odour or, short and long term emission impacts on residents		▪ Characterise and monitor VOC and related gaseous emissions; ▪ Model particulate and gaseous emissions to determine ground level concentrations (GLC's); and ▪ Integrate with GLC's from the refinery modeling for input into QHRA (cumulative). Study odour emissions for RDA and cooling ponds through: ▪ Establishing baseline odour emissions; and ▪ Modelling to predict odour dispersion from expansion (cumulative with refinery).	Land Uses. ▪ EPA Guidance Statement No. 47: Assessment of Odour Impacts from New Proposals.
Air Quality – Bunbury Port	Surrounding residential premises within proximity to the Bunbury Port	To ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses, by meeting statutory requirements and acceptable standards.	Increased production could result in an increase in dust emissions.		• Establish baseline dust impacts • Assess potential impacts and management strategies for the Proposal.	• EPA Draft Guidance Statement No. 3: Separation Distances between Industrial and Sensitive Land Uses.
Air quality – Construction Dust	Surrounding residential premises within proximity to the Wagerup refinery	To protect the surrounding residents such that dust emissions will not adversely impact upon their welfare and amenity or cause health problems and meet the requirements in EPA Policies, Guidelines and Criteria for EIA No 18, *Air Quality Impacts from Development Sites*.	Dust emissions arising from construction activities may have the potential to adversely affect human health, visual amenity, and the surrounding vegetation and fauna. The generation of dust during construction also has a nuisance value.		Assess water requirements and dust control methods to be employed during the construction phase.	▪ EPA Guidance Statement No. 18 Prevention of Air Quality Impacts from Land Development Sites.
Greenhouse Gas Emissions	Statewide and global airshed environments	To minimise emissions to levels as low as practicable on an on-going basis. To ensure that potential	Increase in greenhouse gas emissions through: ▪ combustion of fuels ▪ Increased production capacity	Identification of greenhouse abatement measures as part of Alcoa's commitment to the Greenhouse Challenge Program and quantification of potential greenhouse gas savings or management initiatives.	Assessment of greenhouse gas emissions from the Proposal. Assess opportunities for offsetting or managing greenhouse gas emissions.	▪ EPA Guidance Statement No. 12 for Minimising Greenhouse Gas Emissions. ▪ EPA Position Statement No. 9, Environmental Offsets

Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Current Investigations	Additional Investigations	Applicable standards, guidance and policies
		greenhouse gas emissions from proposed projects are adequately addressed and best practicable measures and technologies are used in Western Australia to minimise Western Australia's greenhouse gas emissions.				(Preliminary).
Groundwater Quality	Groundwater within the zone of hydrological influence of RDAs and refinery operations	To maintain the quality of groundwater so that existing and potential uses, including ecosystem maintenance, are protected.	Potential contaminant sources of surface and groundwater pollution include: • Alkalinity; • Metals; • Sediment; • Nutrient from sewerage and grey water; • Hydrocarbons • Chemical agents and cleaners; and • Solid Wastes	Six monthly monitoring of groundwater bores in vicinity of refinery and RDA's. To investigate the potential for groundwater contamination in accordance with the new Contaminated Sites Legislation.	Assess potential impact on groundwater (level and quality) in the vicinity of the refinery and RDA's from the Proposal.	▪ ANZECC/ARMCANZ 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality.
Surface Water Quality	Surface water resources including natural waterways within the zone of influence of RDA and refinery operations	To retain the integrity, functions and environmental values of protected wetlands, and to ensure that EPP lakes are protected and their key ecological functions are maintained. To maintain the integrity, functions and environmental values of rivers and ephemeral streams, and to ensure that alterations to surface drainage do not adversely impact native	Potential sources of surface and groundwater pollution include: • Sediment; • Sewerage and grey water; • Hydrocarbons; • Chemical agents and cleaners; and • Solid Wastes	Monitoring at 19 surface water locations around the refinery and RDA's.	Assess potential impact on surface water flow and quality in the vicinity of the refinery and RDA's from the Proposal. Assess the ability of the refinery drainage system to cope with any increased run-off waters.	▪ ANZECC/ARMCANZ 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Current Investigations	Additional Investigations	Applicable standards, guidance and policies
		vegetation.				
Liquid and Solid Wastes (other than bauxite residue)	Wagerup Refinery	To ensure that liquid and solid wastes do not affect groundwater or surface water quality, nor lead to soil contamination. Ensure that the generation of all wastes follows consideration of waste reduction in accordance with the waste hierarchy of reduction, reuse, recycling, treatment, and disposal.	The inappropriate storage and disposal of wastes can lead to environmental problems including: ▪ the contamination of ground or surface waters; ▪ flammable hazards; ▪ the creation of nuisance conditions such as offensive odours or wind-blown waste; and ▪ encouragement of vermin such as feral cats and foxes. Some construction wastes will be generated. There will be little change in the generation of operational waste other than bauxite residue.	Continue to investigate waste recycle opportunities to minimise waste disposal requirements.	Review existing management practices and procedures for solid and liquid waste with respect to the Proposal. Identify waste reduction opportunities through the engineering design phase.	▪ Explosives and Dangerous Goods Regulations, 1992
Noise - Refinery	Wagerup refinery and overland conveyor	To comply with statutory requirements on a stand alone basis.	<u>Construction Noise</u> Construction activities will occur during daylight hours and principally during weekdays. Using standard construction plant, noise emissions may be detectable above existing background at sensitive premises. <u>Operational Noise</u> Potential exceedence of the noise regulations without suitable noise attenuation measures. Alcoa has given a commitment that there will not be an increase in	Refinery baseline noise emissions have being defined previously.	A noise study will be conducted to quantify, model and assess noise impacts from the expanded Refinery and overland conveyor. The Regulation 17 variation for the existing refinery will be incorporated into the ERMP. Investigate noise reduction controls and measures for the Proposal.	▪ Environmental Protection (Noise) Regulations 1997.

Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Current Investigations	Additional Investigations	Applicable standards, guidance and policies
			noise impacts on residents.			
Noise –Bunbury Port	Bunbury Port, rail loading/unloading facilities	To comply with statutory requirements .	Increased wagon movements.		The noise study will identify and assess noise impacts from the proposal on Bunbury Port.	▪ Environmental Protection (Noise) Regulations 1997.
Water Supply	Wagerup refinery	To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected.	Potential increase in surface water use and water harvesting.	Surface water usage is determined through flow and pumping stations. Environmental water requirements for the Yalup and Samson Brook have been assessed	A water supply study will be undertaken to determine: ▪ water requirements of the Proposal ▪ available water sources; ▪ potential impacts of increased abstraction at these sources, including environmental water requirements, if required; and ▪ water use reduction strategies.	▪ Water and Rivers Commission (2000). Environmental Water Provisions Policy for Western Australia: Statewide Policy No. 5 ▪ Water and Rivers Commission (1998). Proposed Harvey Basin Water Allocation Plan: Water Resource Allocation and Planning Series No.14.
Social Surroundings						
Archaeological Heritage and Ethnographic Issues	Wagerup refinery and RDAs	To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.	Construction without due consideration for heritage sites may result in the loss of these sites. The refinery and RDAs are located within the existing refinery areas and do not impinge on any sites of Aboriginal ethnographic or archaeological significance.	The refinery and RDAs (current and proposed) have been subject to surveys for sites of Aboriginal ethnographic or archaeological significance. The refinery component of the proposal is located within the existing plant boundary. The RDA's will not impinge on sites of Aboriginal ethnographic or archaeological significance.	No additional studies are required.	▪ EPA Draft Guidance Statement No. 41: Assessment of Aboriginal Heritage ▪ Department of Environment, Interim Industry Guide to Community Involvement, December 2003
Public Safety Risk	Wagerup Refinery and public areas in proximity to refinery operations	To ensure that risk from the proposal is as low as reasonably achievable and complies with acceptable standards and EPA criteria including Guidelines	There are quantifiable health risks involved with natural gas and diesel fuels used for power generation purposes, stored energy in the form of compressed air or	Review existing risk assessment information for Wagerup.	Undertake a safety risk assessment of the Proposal to ensure there is no unacceptable risk to public safety.	

Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Current Investigations	Additional Investigations	Applicable standards, guidance and policies
		and Criteria for EIA No. 2, *Guidance for Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant* (EPA, 2000a).	hydraulic systems in upgraded refinery components, stored hydrocarbons and other hazardous and dangerous goods that have the potential to impact on public and occupational health. The site does not exceed the specified 'threshold quantities' for the storage and processing of dangerous goods that would trigger its identification as a major hazard facility.			
Visual Impact	Refinery operations and RDA's	Visual amenity of the area adjacent to the Proposal should not be significantly impacted by the proposal.	Infrastructure requirements for the proposal have the potential to affect the visual amenity of the surrounding area. Operating hours are expected to continue on the basis of 24 hour shifts therefore requiring the use of night lighting. Light overspill and 'halo' effects have the potential to affect the amenity of nearby residents at night.	A visual screening plan is under development for Wagerup.	A visual impact study undertaken to identify visual impacts from the Proposal (refinery and RDA) and assess visual screening options.	

Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Current Investigations	Additional Investigations	Applicable standards, guidance and policies
Transport	Overall Proposal	Ensure that transportation and storage of fuels/chemicals complies with the Australian Dangerous Goods Code. Ensure that roads are maintained and road traffic managed to meet an adequate standard of level of service and safety. Ensure the requirements of Main Roads of Western Australia are met.	Hazards to the public range from direct (collision) to indirect (road damage from heavy vehicle use). The construction phase would result in increased traffic on roads.	Traffic counts have been conducted for noise monitoring purposes.	A logistical analysis will be undertaken to quantify the likely increase in vehicular movements (road and rail) and to assess the implications on public amenity and safety. Changes to train movements (frequency and length) from the proposal will be identified. Noise emissions from a typical train pass-by will be measured. Issues and suggestions related to noise outside of Alcoa's management control will be registered. Identify practicable methods to manage noise emissions from the proposal.	▪ Environmental Protection (Noise) Regulations 1997 ▪ EPA Statements for EIA No. 14 (Version 3) Road Rail and Transport Noise (Draft 10/5/00) ▪ EPA Draft Guidance For Assessment Of Environmental Factors No. 8 - Environmental Noise.

6. SCOPE OF WORKS FOR ERMP

The following Scope of Works addresses the key factors likely to influence the Proposal. The Proponent is forming a team of specialist consulting firms and individuals to assist in undertaking the identified work and optimising the Proposal. The consultants chosen will be selected for their specialist abilities, expert knowledge and experience of the Proposal area and/or issues.

Alcoa has a policy for open, transparent and interactive consultation with the State's Decision Making Authorities (DMAs) and invites their representatives to be actively involved. Alcoa also has a well established network within the local community and will be actively engaging the community to provide feedback on the critical environmental factors.

6.1 PROPOSAL SUSTAINABILITY ASSESSMENT

6.1.1 Purpose

An assessment of the sustainability of the Proposal against Alcoa's Sustainability Principles will be conducted. The assessment will also consider the broad principles outlined in the West Australian State Sustainability Strategy.

6.1.2 Scope

Alcoa will assess the economic, environmental and social implications of the Proposal with respect to Alcoa's Sustainability Principles and the objectives of the Western Australian State Sustainability Strategy. Community involvement is integral to developing a common vision for the community and Alcoa. This will be achieved through the development and implementation of action plans to achieve the company's Sustainabilty Principles.

The EPA Guidance Statement No. 55 for implementing best practice in proposals submitted to the environmental assessment process will also be referred to. Similarly, representatives from the key DMA's will be consulted during this process to help guide and participate in this assessment and its outcomes.

6.2 AIR QUALITY

6.2.1 Purpose

To quantify the emissions from the existing refinery, RDAs and cooling ponds and to assess the potential impact of the proposal on air emissions. The cumulative impacts of the expanded refinery and RDAs will be modelled with the output used as input into a Quantitative Health Risk Assessment (QHRA).

The potential for short-term exposures and any associated health impacts will also be investigated.

Quantify baseline odour emissions from the existing refinery, RDAs and cooling ponds and assess the potential impact of the proposal through modelling.

The ERMP will include a summary of the previous examinations into reported health effects from refinery emissions. The ERMP will also include a description of the process and methodology for a survey of health status within the local community. This proposed survey aims to increase the information base on community health status in the immediate area. Subject to approval being granted for the project, the survey would be completed prior to the commissioning of Unit 3. This would allow a follow up survey to be conducted after Unit 3 is in operation

6.2.2 Monitoring, Modelling and QHRA

Alcoa has an existing air quality monitoring program at the Wagerup refinery to determine baseline emissions. The proposed studies will involve expanding the current monitoring program to better define baseline emissions. This will be achieved through:

- Further quantify ambient impacts of emissions from point (refinery) and fugitive sources (refinery, RDAs and cooling ponds) through an intensive ambient monitoring program; and
- Establish baseline odour emissions and predict odour emissions from the proposal (cumulative – refinery, RDAs and cooling ponds).

Air dispersion modelling will be undertaken by CSIRO for the refinery using the TAPM model. TAPM will be refined to better predict the meteorological conditions experienced at the Wagerup refinery. Modelling of emissions from the RDAs and cooling ponds will be conducted using the AUSPLUME or ISC3 models (selected following discussions with the Department of Environment). Both model outputs will be integrated into a consolidated data file to produce cumulative impacts of the proposal as required inputs into the QHRA.

Monitoring data and the results of the air quality dispersion modelling will provide input into a QHRA. Similar methods as were applied for the QHRA for the Alcoa Pinjarra Refinery Upgrade will be adopted which included an assessment of a suite of substances, including particulates, products of combustion, organic compounds (e.g. aldehydes, ketones, aromatics and organosulphides), metals and other compounds (e.g. PAHs, ammonia). This will involve an assessment of impacts on sensitive receptors based on acute and chronic exposure rates, likely and peak emission rates, estimation of ground-level concentrations, and comparison of these levels against health-based guidelines agreed with relevant regulatory authorities. The QHRA methodology and conclusions will be reviewed by an independent expert, with outcomes considered by Alcoa, the community via the consultation process and relevant state government environmental and health regulatory agencies.

A study will be undertaken to establish baseline odour emissions and use modelling to predict odour dispersion from the refinery, RDAs and cooling ponds.

6.2.3 Short-term Exposure Events

Discussions between Alcoa, regulatory authorities and members of the local community have identified a need to evaluate the potential implications of short-term emission exposures which may occur at the scale of a few minutes. This recognises community reports that emissions

believed to be emanating from the refinery are sometimes noticeable for only a few minutes before disappearing. There is speculation that this may be due to unusual plume grounding which occurs under certain atmospheric conditions.

Investigations being undertaken for the ERMP will include an assessment of the potential for short-term emission exposures and related community health implications. The elements of this integrated evaluation are described below.

Prediction of short-term emission exposures

In addition to the one hour TAPM modelling, the CSIRO has been commissioned to undertake a specific analysis of short-term (3 – 10 minutes) variations in air pollutant concentrations due to plume ground level impacts. This will involve evaluation of the relationship of peak short-term events to the one-hourly periods they occur within, combined with analysis of the continuous NO_x and CO data records at Boundary Road and Upper Dam sites. This will be conducted for the main types of meteorological conditions identified by CSIRO that lead to higher short-term exposures occurring. This extension of traditional air dispersion modelling will allow an assessment of the potential health and amenity implications of peak concentrations in addition to the quantitative one hour and lifetime assessments in the QHRA.

Analysis of expanded ambient monitoring program

The current ambient monitoring program has been expanded to include instantaneous long-path OPSIS measurement of a suite of ambient VOC concentrations. This allows measurement of spikes in VOC concentrations should plume grounding occur within the sampling area. Mobile GCMS equipment has also been deployed for rapid response to community complaints as a mechanism for real-time evaluation of compounds contributing to reported impacts from short-term emission exposures.

Statistical analysis of historical data set

Statistical analysis of the 2002 and 2003 data sets to evaluate any relationship between climatic conditions, NOx, and particulate concentrations.

Comparison to available standards

Measured and predicted short-term concentrations of refinery emitted substances will be evaluated against internationally accepted health criteria and guidelines.

Analysis of health complaints data

Community complaints have been recorded since 2001 and now represent an extensive data base covering reported odour, noise and health impacts. In the case of health complaints the information collected includes the symptoms reported by the community member at the time of the complaint. An evaluation of this information against the information described above will be undertaken as part of the ERMP preparation.

Climatic & process information

Each of the measured or predicted parameters described above will be correlated against climatic data and key refinery process parameters, including major plant changes, shutdowns and production rate.

6.2.4 Decision-making framework

The above sections (6.2.2 and 6.2.3) describe the process of data collection that enables estimation of ground-level emission concentrations (at long and short-term timescales) and their potential health implications. This information then enables responses to be determined so Alcoa can meet its commitment that there will be no increase in dust, odour or, short and long term emission impacts on residents from the refinery and mining operations.

In the event that the investigations indicate a likelihood of increased impacts on neighbouring communities from particulates, odour, or short/long-term exposures, modifications will be necessary for the Proposal to proceed. In the case of most airborne emissions three general options may be available to offset potential impacts:

- additional works to reduce emissions;
- increased dispersion; or
- increased separation between source and receptors.

The potential use of each option, or a combination thereof, will be part of the community and Government consultation during ERMP preparation to ensure that, should the Proposal proceed, it will be able to demonstrate compliance with Alcoa's commitments regarding Proposal sustainability. Participation in the consultation process by Alcoa, the local community and government agencies will be important to ensure common understanding of the issues, confidence in the process and a sustainable outcome.

6.3 GREENHOUSE GAS EMISSIONS ASSESSMENT

6.3.1 Purpose

To estimate the Proposal's greenhouse gas emissions and determine appropriate measures to decrease the intensity of greenhouse gas emissions per tonne of alumina produced. The ERMP will also assess strategies for offsetting or managing these greenhouse gas emissions in this context.

6.3.2 Scope

Through Alcoa being a signatory to the Greenhouse Challenge program since 1997, the baseline greenhouse gas emissions for the existing Wagerup operations are well documented. The engineering design team will review the consumption of fossil fuels and other factors (eg. energy efficiency) to estimate the total greenhouse gas emissions from the Proposal and will investigate

options during the design phase to reduce greenhouse gas emissions. The findings will be utilised to calculate the expected kilograms of carbon dioxide equivalent per tonne alumina for the Proposal, and compared to other similar projects in Australia and worldwide.

The study will identify and assess opportunities for offsetting or managing greenhouse gas emissions from the Proposal.

This study will be undertaken in accordance with the EPA Guidance Statement No. 12 on Minimising Greenhouse Gases, EPA Preliminary Position Statement No. 9 on Environmental Offsets, Greenhouse Challenge and Alcoa's Climate Change Implementation Plan.

6.4 GROUNDWATER QUALITY

6.4.1 Purpose

To identify the potential for the Proposal to impact on groundwater in the vicinity of the refinery and RDAs.

6.4.2 Scope

No groundwater abstraction is required for the Proposal or undertaken for the existing Wagerup operations. Alcoa has an extensive network of groundwater monitoring bores that are monitored on a six monthly basis. A trend analysis will be undertaken to assess historical changes in groundwater quality in the vicinity of the refinery and RDAs.

Alcoa is currently in the process of identifying any contaminated sites as required by the new WA Contaminated Sites Legislation. Identified sites will be ranked according to risk and remediation undertaken, where required. Where appropriate, remediation measures will be developed in discussion with the DoE.

An assessment of the Proposal will be undertaken to ensure that facilities are designed, constructed and operated in accordance to best practice standards and to minimise the potential for future groundwater impact. The existing Long Term Residue Management Strategy (LTRMS) process will address potential groundwater issues associated with the RDAs.

6.5 SURFACE WATER QUALITY

6.5.1 Purpose

This study will identify the potential for the Proposal to impact on surface water quality in the vicinity of the refinery and RDAs and the ability of the refinery drainage system to cope with the increased run-off waters.

Water supply requirements are discussed in section 6.8.

6.5.2 Scope

Alcoa has a network of surface monitoring sites to assess surface water quality and flow rates in the vicinity of the refinery and RDAs. These data will be used to perform a trend analysis to assess historical changes and potential impact on surface waters in the vicinity of the refinery and RDAs from the Proposal.

The study will also:

- Assess the ability of the refinery drainage system to cope with the increased run-off waters;
- Identify watercourses and types of surface water flow impacted by changes in the refinery , RDA layout and water storage areas; and
- Provide advice to the engineering design team with regards to location and drainage design.

6.6 LIQUID AND SOLID WASTES OTHER THAN BAUXITE RESIDUE

6.6.1 Purpose

To identify existing management practices and procedures for liquid and solid wastes and to minimise the potential impact of the Proposal on the natural environment.

6.6.2 Scope

A review of the Refinery's existing management practices and procedures for liquid and solid wastes will be undertaken and any additional requirements for the Proposal identified. The study will assess wastes under the following categories:

- Hazardous waste (as classified under the *Australian Dangerous Goods Code 2000*);
- Low Hazard waste (may be contaminated with, or contain traces of hazardous waste);
- Putrescible waste;
- Inert waste (excluding putrescible waste);
- Special wastes (asbestos, leaded paints, fluorescent tubes); and
- Scrap/salvage.

Waste reduction opportunities will be assessed with the engineering design team in accordance with the hierarchy of reduction, reuse, recycling, treatment and disposal.

6.7 NOISE ASSESSMENT

6.7.1 Refinery and Overland Conveyor

6.7.1.1 Purpose

To assess the potential impact of the Proposal on noise sensitive premises and identify noise reduction measures.

6.7.1.2 Scope

A noise study will be undertaken to:

- Establish noise immission design criteria in accordance with the *Environmental Protection (Noise) Regulations 1997*.
- Review baseline noise emission and immission data for the existing refinery and overland conveyor;
- Identify the influencing climatic and physical parameters affecting propagation of noise;
- Identify noise sources for the Proposal and predicted noise emission levels through the engineering design team;
- Undertake noise modelling under worst-case and average-case environmental conditions for the Proposal (cumulative impacts); and
- Work with the engineering design team to identify noise reduction measures, through:
    - Design;
    - Equipment selection and location; and
    - Engineering noise controls.

Alcoa has given a commitment that there will be no increase in noise impacts on residents from the refinery and mining operations.

Standards and assessment criteria that may be relevant to the Proposal includes:

- Regulation 13 of the Environmental Protection (Noise) Regulations 1997;
- EPA Draft Guidance For Assessment Of Environmental Factors No. 8 - Environmental Noise; and
- Environmental Protection (Noise) Regulations 1997.

6.7.2 Alcoa facilities at Bunbury Port

6.7.2.1 Purpose

To assess the potential impact of the Proposal on noise emissions at Alcoa's Bunbury Port operations.

6.7.2.2 Scope

Undertake a noise study to:

- Determine baseline noise emissions for Alcoa operations at Bunbury Port;
- Identify the influencing climatic and geophysical parameters;
- Identify noise sources for the Proposal; and
- Identify practicable methods to manage noise emissions from Alcoa facilities.

Standards and assessment criteria that may be relevant to the Proposal includes:

- Regulation 13 of the Environmental Protection (Noise) Regulations 1997;
- EPA Draft Guidance For Assessment of Environmental Factors No. 8 - Environmental Noise; and
- Environmental Protection (Noise) Regulations 1997.

6.8 WATER SUPPLY

6.8.1 Purpose

To determine the Proposal demand and the availability of water for project construction and operation, the sustainability of this identified resource for the proposed use, and means through which water use can be minimised.

6.8.2 Scope

Alcoa sources the majority of its water for the Wagerup operations from three surface water locations. Alcoa currently has Licences to Take issued by the Waters and Rivers Commission for:

- Yalup Brook – 1600 ML,
- Black Tom Brook – 2500 ML
- Harvey River – 4400 ML between May and October only.

The study will:

- identify the water requirements for the Proposal through consultation with the engineering design team and mining operations;
- review the existing data to assess the impact of the current abstraction of water on the environmental water requirements (EWR) for the local catchments and Lower Harvey River;
- assess the potential impact of increasing abstraction from the Harvey River on the ecological health of the Lower Harvey River and determine the EWR at point of abstraction;
- assess the hydrographic impacts of increasing abstraction from the Harvey River; and
- identify opportunities to improve water use efficiencies.

The study will be conducted in consultation with the DoE, Water Corporation and other water users in the area.

This work will be conducted with reference to the Water and Rivers Commission Proposed Harvey basin Surface Water Allocation Plan WRAP 14, 1998; and the principles of the Water and Rivers Commission (now Department of Environment) Statewide Policy No. 5 (Environmental Water Provisions for Western Australia).

6.9 PUBLIC SAFETY RISK

6.9.1 Purpose

To assess the risk to public safety from the Proposal.

6.9.2 Scope

A public safety risk assessment of the Proposal will be undertaken incorporating:

- Review of existing safety management systems;
- Identification of hazards;
- Safety Assessment for potential major incidents; and
- Assessment of control measures to manage identified hazards.

6.10 VISUAL IMPACT

6.10.1 Purpose

To assess the visual impact of the Proposal.

6.10.2 Scope

Undertake a review of current visual screening practices at the Wagerup refinery, assess potential visual impacts associated with the Proposal and identify screening opportunities. Liaison will occur with the engineering design team to minimise visual impacts from the refinery during the design phase. Through the stakeholder working groups, the community will be involved in identifying visual screening opportunities to minimise the visual impact of the Proposal.

6.11 TRANSPORTATION

6.11.1 Purpose

To identify the changes to rail and traffic movements from the Proposal.

6.11.2 Scope

A logistical assessment of the Proposal will be undertaken to identify the existing traffic movements (road and rail) from the Wagerup refinery. The study will quantify the increase in traffic movements both during construction and operation and outline the impacts for existing road and public infrastructure. Any implications for public amenity and safety will be highlighted. Options for rationalising road freight to rail will be considered.

The study will also undertake the following:

- Identify changes to train movements (frequency and length) from the proposal;
- Noise emissions from a typical train pass-by will be measured.
- Issues and suggestions related to noise outside of Alcoa's management control will be registered.

Standards and assessment criteria that may be relevant to the Proposal includes:

- EPA Statements for EIA No. 14 (Version 3) Road Rail and Transport Noise (Draft 10/5/00);
- EPA Draft Guidance For Assessment Of Environmental Factors No. 8 - Environmental Noise; and
- Environmental Protection (Noise) Regulations 1997.

6.12 PREPARATION OF ERMP

The ERMP document will be prepared in accordance with the EPA Guidelines for Preparing and Public Environmental Review/Environmental Review and Management Programme (EPA, 2002).

The ERMP will describe the proposal and the receiving environment in detail, outline the potential impacts of the proposal on factors of the environment, identify proposed management strategies to ensure those environmental factors are protected, present management plans for critical environmental factors and demonstrate that the Proposal can be managed in a way that is environmentally acceptable.

6.13 ENVIRONMENTAL MANAGEMENT PLANS

Within the ERMP text broad management measures and strategies will be identified to mitigate and minimise environmental impacts. To detail how the key environmental factors and associated impacts of the Proposal will be managed, specific Environmental Management Plans (EMP) will be prepared.

Wagerup Refinery has a comprehensive range of environmental management practices and procedures which are part of the on-site, quality assured Environmental Management System (EMS). The EMP's for the proposal will incorporate or reference the existing operational management procedures to ensure potential impacts from the expansion are minimised.

A key environmental factor for the proposal is air quality. To ensure that Alcoa can meet its commitments with respect to air emissions, an air quality management plan (AQMP) will be prepared. The AQMP will address the following aspects:

- Description of major emission sources and pollution control equipment;
- Outline of emission criteria for major emission sources;
- Monitoring of emission sources during performance verification of the expansion works;
- Outline any programs that aim to reduce specific compounds; and
- Ongoing emission source monitoring.

The AQMP will not address Greenhouse gas emissions as this will be addressed in a separate greenhouse gas management plan.

In addition to the AQMP the following management plans will be prepared:

- Noise Control Strategy;
- Leak and Spill Management Plan;
- Waste Management Plan (not residue); and
- Water Supply Management Plan.

The remaining environmental factors will be addressed through a single EMP outlining specific management strategies or through existing environmental management programs to minimise potential environmental impacts.

The EMP's are not considered to be static documents and will evolve and change over time. Draft copies of the EMP's will be submitted as an appendix in the ERMP, but the environmental management strategies and procedures may change during project design, in consultation with specialist consultants, DMA's and through the stakeholder involvement process.

7. STAKEHOLDER CONSULTATION

7.1 CONSULTATION TO DATE

A key focus of the Proposal is to facilitate broad community and Government support for the proposal. Alcoa is committed to ensuring it understands and addresses the needs of all key stakeholders of its Wagerup operations including local neighbours and community groups and employees, through an effective and ongoing engagement process.

Alcoa has commenced communication and consultation with employees at the refinery and mine, and with local community groups and neighbours. Personalised letters have been sent to local neighbours in the towns of Yarloop, Waroona, Coolup, Cookernup, Hamel, Harvey, Brunswick Junction and Pinjarra, outlining the proposal and the environmental commitments made.

Additional meetings have been held with local suppliers and businesses to engage them in the project and Alcoa is involving local stakeholder groups, such as the Wagerup Community Consultation Network (CCN), in developing an engagement process to discuss environmental parameters.

7.2 CONSULTATION PROCESS

The current CCN, which includes local neighbours, community members and business, will undertake the role of a Stakeholder Reference Group (SRG) for the Proposal. The CCN will have broad representation from local stakeholders, including Wagerup neighbours, local businesses, special interest groups, employees, local government and Alcoa management.

The proposed consultation framework for the ERMP is shown in Figure 4. The CCN will be the lead reference group and in addition working groups will be formed to target specific environmental issues. It is intended that designated working groups will review all key components of the environmental assessment documentation prior to submission to the EPA.

This framework will facilitate the level of participation required to ensure the community is engaged and can provide input into the ERMP content and process. This is seen as an important mechanism to build community confidence and trust and to ensure community input into project development

Meetings will be independently facilitated and key technical reports such as air quality, health risk assessment and noise evaluations will be subject to independent expert review, with the experts having been selected in liaison with the CCN and working group participants.

The proposed consultation framework has evolved from the model used for the successful Pinjarra Refinery Efficiency Upgrade and has been enhanced to meet the specific needs of the community and the environmental approvals process.

The style of consultation is consistent with the EPA and DoE joint publication, Interim Industry Guide to Community involvement (December 2003). Alcoa will use a spectrum of community involvement, from "inform" through to "collaborate".

8. PROPOSAL AND ASSESSMENT SCHEDULE

The following schedule is proposed for the assessment of environmental impacts of the Proposal. A number of the tasks, particularly the investigations, report preparation and review will be run in parallel to each other to achieve the timeframes required for the Proposal. The timetable is contingent on key information being available for each stage of the study, and smooth development of other aspects of the Proposal, such as engineering design and land access.

Table 4. Proposed Assessment Schedule

Task	Commencement	Completion	Approximate Duration
Preparation of Environmental Referral	May 04	June 04	4 weeks
EPA sets level of assessment	June 04	June 04	2 weeks
Appeal period	July 04	July 04	2 weeks
Resolution of appeals	July 04	Aug 04	2 weeks
Environmental Studies and Investigations	Aug 04	Dec 04	5 months
Stakeholder Consultation	Aug 04	Jan 05	6 months
ERMP preparation	Aug 04	Jan 05	6 months
Peer Review	Nov 04	Jan 05	3 months
Submission of ERMP to EPA Service Unit	Dec 04	Feb 05	3 months
Public Review of ERMP	March 05	May 05	10 weeks
Summary of Submissions and Proponent Response			
Preparation of the EPA Report & Recommendations by EPA Service Unit	May 05	July 05	4 weeks
EPA Report to Minister	July 05	July 05	1 day
Appeal Period on EPA Report	July 05	July 05	2 weeks
Ministerial Approval	Aug 05	Aug 05	4 weeks
Preparation of Notices of Intent/Works Approval Applications (NOIs/WAAs)	Feb 05	Aug 05	7 months
Commencement of Construction	August 05	Dec 07	30 months

9. STUDY TEAM AND PEER REVIEW

9.1 STUDY TEAM

The environmental impact assessment of the Proposal will be undertaken by an experienced team of specialist consultants and Alcoa personnel. The Proponent is specifically selecting specialised consultants that have extensive experience in their respective study areas and are recognised for their professionalism.

The management of the study team is one of overall strategic understanding by all team members and integration between members and their respective areas of study. This will help to ensure an optimal Project with the best possible environmental, engineering and economic outcomes is achieved. The Proponent's final decisions on Proposal design and management commitments will recognise and rely on the specialist advice it receives from its consultants. The Proponent is actively involved throughout the environmental assessment process to ensure 'ownership' and ultimate responsibility and accountability is retained by the company and its management.

The Proponent will select a lead consultant, to provide the Proposal with strategic environmental advice, co-ordination of environmental studies, management of approvals process and preparation of environmental documentation required for the State EIA process including the ERMP.

9.2 PEER REVIEW

In consultation with the DoE and other relevant DMA representatives suitable peer reviewers will be selected to review the key technical studies. This will provide the community with a high level of confidence in environmental investigations for the Proposal.

10. EXISTING STUDIES AND OTHER REFERENCES

The following studies and references are of relevance to the Proposal

Alcoa, 2003. *Wagerup Refinery and Bauxite Residue Operations Triennial Environmental Review 2000 - 2002*. Alcoa, 2003.

Alcoa, 2003. *Wagerup Refinery and Bauxite Residue Operations Annual Environmental Review*. Alcoa, March 2004 1st Edition.

Atkins, K.J. (2003). Declared Rare and Priority Flora List for Western Australia. Prepared by the Department of Conservation and Land Management, 16 April 2003.

Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (ANZECC/ARMCANZ) (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000.

Environmental Protection Authority (1998). Draft Guidance Statement No. 8: Environmental Noise. June 1998.

Environmental Protection Authority (1999). Draft Guidance Statement No. 26: Management of Surface Run-off from Industrial and Commercial Sites. March 1999.

Environmental Protection Authority (2000). Position Statement No. 2: Environmental Protection of Native Vegetation in Western Australia. December 2000.

Environmental Protection Authority (2001). Draft Guidance Statement No. 41: Assessment of Aboriginal Heritage, August 2001.

Environmental Protection Authority (2002). Guidance Statement No. 12 for Minimising Greenhouse Gas Emissions. October 2002.

Environmental Protection Authority (2002). Guide to Preparing an Environmental Scoping Document. EPA, June 2002.

Environmental Protection Authority (2003). Guidance Statement No. 55. Implementing Best Practice in proposals submitted to the environmental impact assessment process. December 2003.

Department of Environment (2003). Interim Industry Guide to Community Involvement. December 2003.

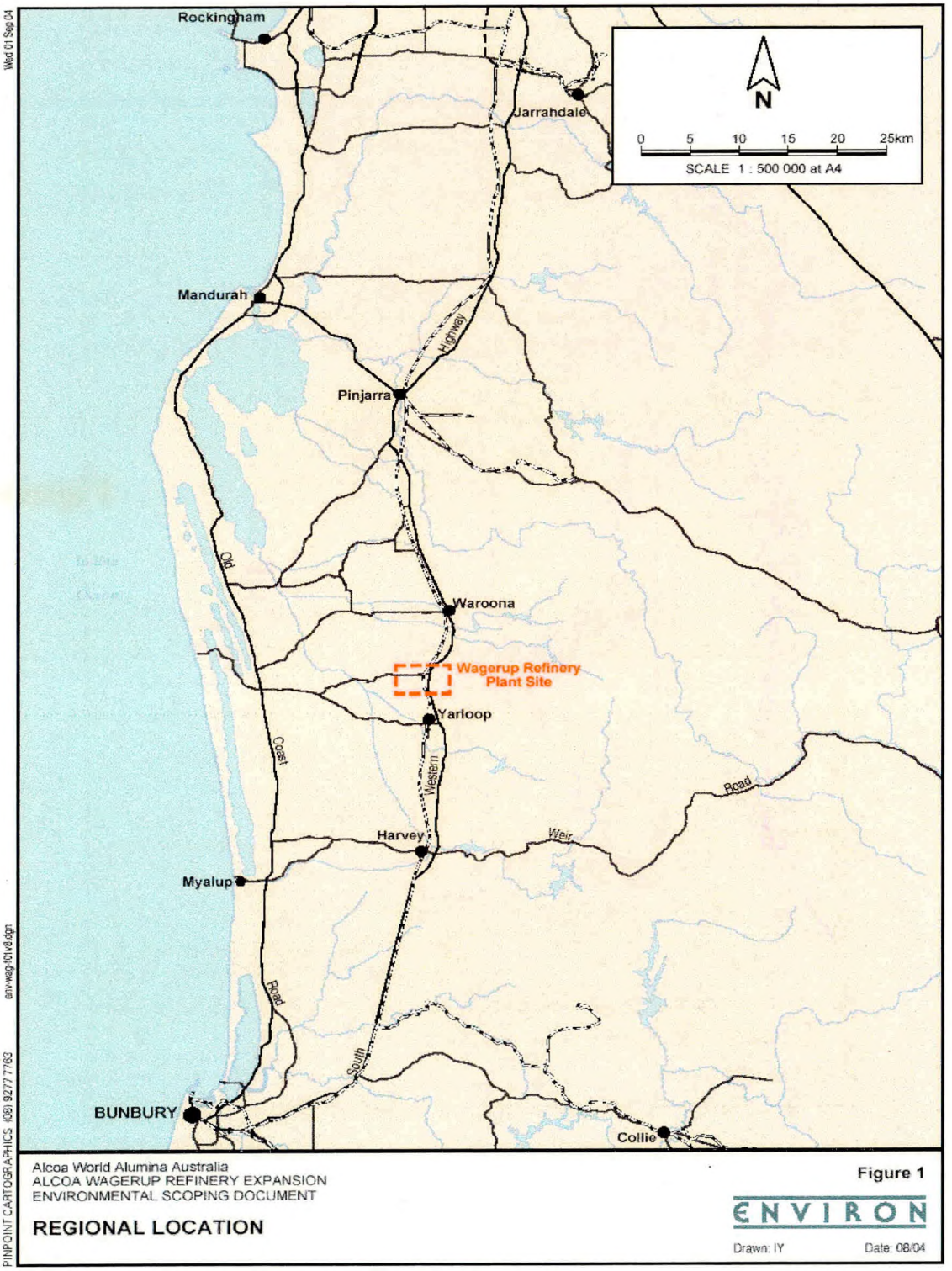
Government of Australia (1992). National Strategy for Ecologically Sustainable Development.

Government of Western Australia (2003). Hope for the future: The Western Australian State Sustainability Strategy

National Environment Protection Council (NEPC) (1998). National Environment Protection Measure for Ambient Air Quality. NEPC, June 1998.

Water and Rivers Commission (2000). Environmental Water Provisions Policy for Western Australia: Statewide Policy No. 5

Figures



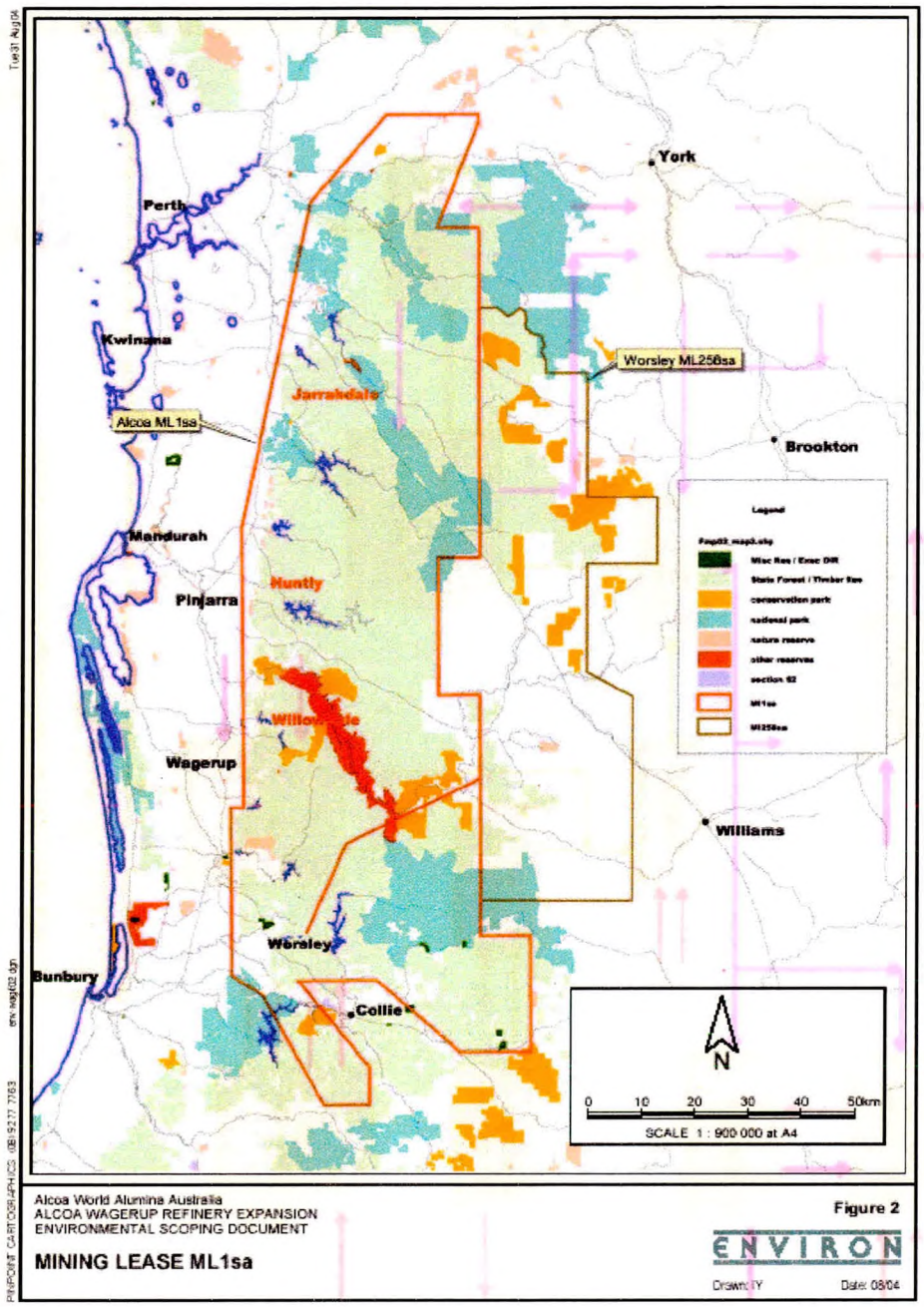
Alcoa World Alumina Australia
ALCOA WAGERUP REFINERY EXPANSION
ENVIRONMENTAL SCOPING DOCUMENT

REGIONAL LOCATION

Figure 1

ENVIRON

Drawn: IY Date: 08/04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Pinjarra
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Williams
Worsley
Bunbury
Collie
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SCALE 1 : 900 000 at A4
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ALCOA WAGERUP REFINERY EXPANSION
ENVIRONMENTAL SCOPING DOCUMENT
MINING LEASE ML1sa
Figure 2
ENVIRON
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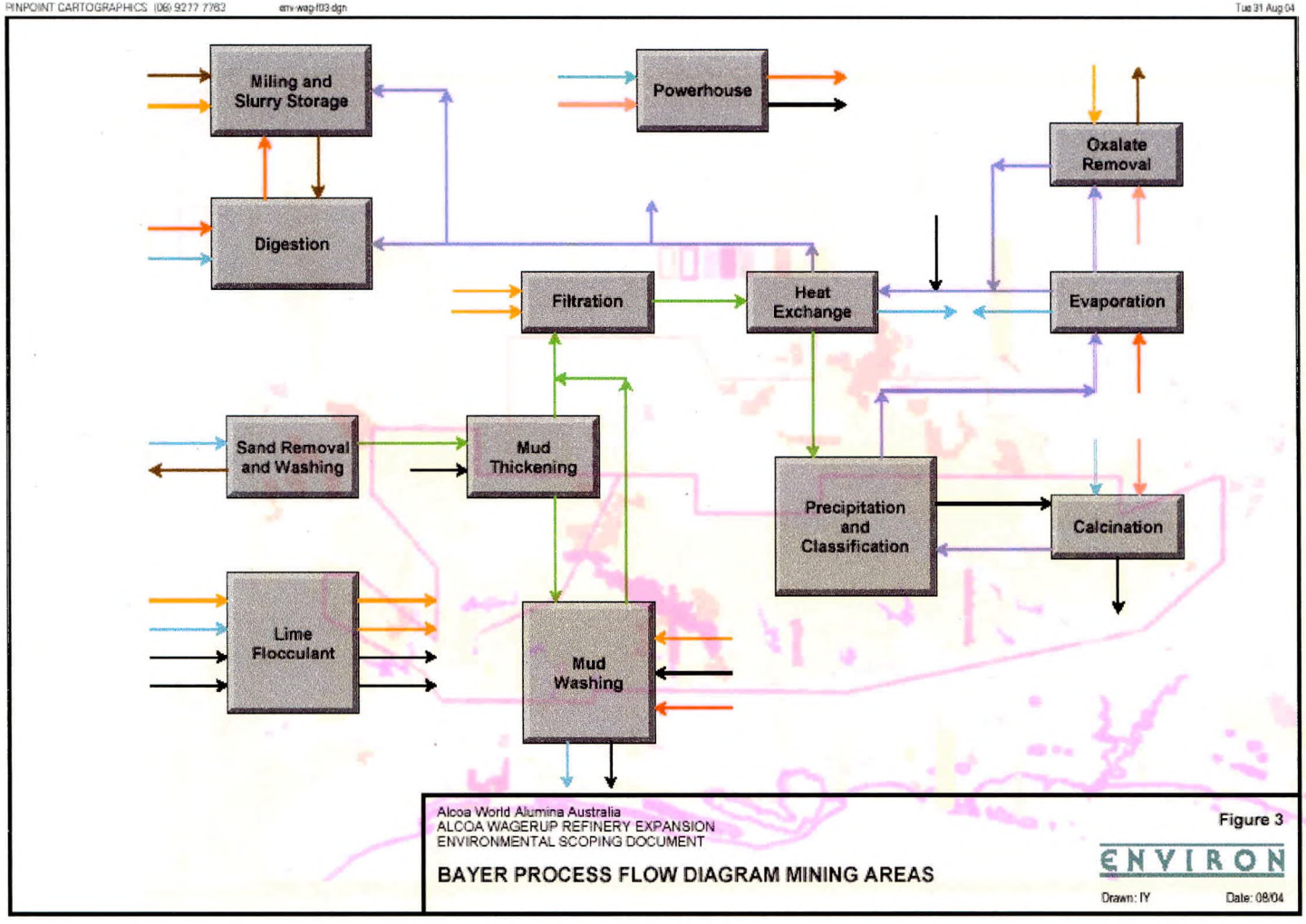
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Powerhouse
Oxalate Removal
Digestion
Filtration
Heat Exchange
Evaporation
Sand Removal and Washing
Mud Thickening
Precipitation and Classification
Calcination
Lime Flocculant
Mud Washing
Alcoa World Alumina Australia
ALCOA WAGERUP REFINERY EXPANSION
ENVIRONMENTAL SCOPING DOCUMENT
Figure 3
BAYER PROCESS FLOW DIAGRAM MINING AREAS
ENVIRON
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Date: 08/04

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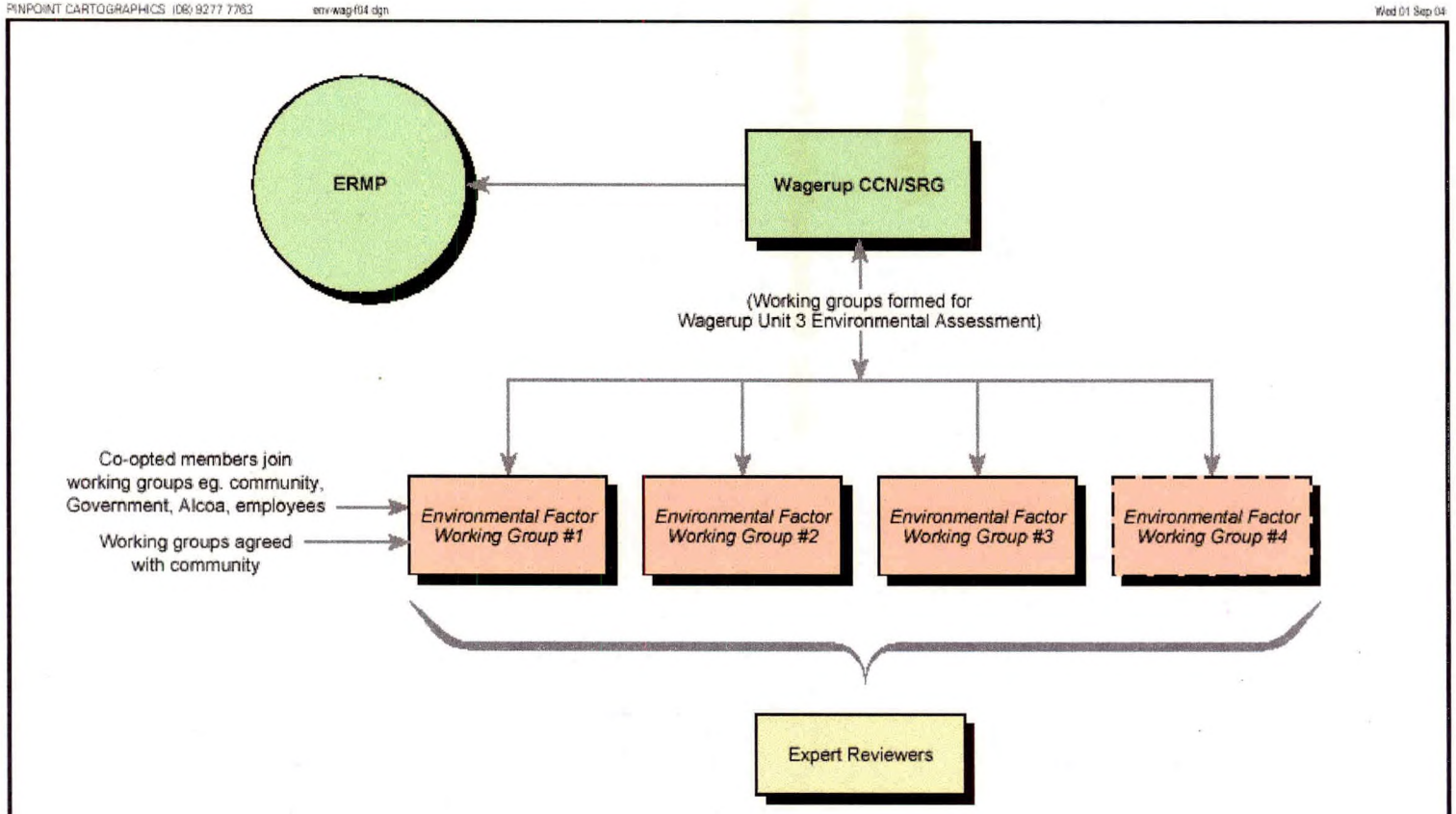

Alcoa World Alumina Australia
ALCOA WAGERUP REFINERY EXPANSION
ENVIRONMENTAL SCOPING DOCUMENT

STAKEHOLDER INVOLVEMENT FLOWCHART

Figure 4

ENVIRON

Drawn: IY Date: 08/04

Appendix A

Alcoa Sustainability Principles

ALCOA SUSTAINABILITY PRINCIPLES

Respect & Protect People

We listen to, and respect the views of our workforce and the communities wherever we operate, and we formulate partnerships that strengthen our interdependence and improve well-being.

Building Community Experience and Well-being

Our operations contribute to improved quality of life and build skills, knowledge and experience in the communities with which we interact, while respecting the significance and diversity of their culture and heritage.

Long-term Economic Benefit

Our operations deliver economic benefits to the regions and States in which they operate, to the nation, and to society in general. Our operations foster economic growth, generate wealth for the community, provide commercial returns to our shareholders and contribute to long-term economic health.

Efficient Resource Use & Cleaner Production

We use natural resources wisely and manage our environmental impacts to the benefit of the full range of our stakeholders by employing leading technology and best practice management, and by encouraging responsible design, use, recycling and disposal of our products.

Ecological Integrity & Biodiversity

Our operations maintain or enhance biological diversity and the fabric of ecological integrity in the environments in which we operate.

Meeting the Needs of Current and Future Generations

We take a long-term approach to our activities, and work in partnership with communities and governments to meet the needs and desires of today without compromising the ability of future generations to satisfy their own needs.

Stakeholder Involvement

We work with our communities, employees, customers, shareholders and suppliers to achieve outcomes and make decisions of mutual benefit. We report regularly to all our stakeholders on the sustainability performance of our operations.

Accountability & Governance

We practice ethical business governance, are accountable for our actions, continually improve our performance and integrate environmental, social and economic considerations in our decision-making