Government of Western Australia
Department of Water and Environmental Regulation

Decision Report

Application for Works Approval

Part V Division 3 of the *Environmental Protection Act 1986*

Works Approval Number	W6393/2020/1
Applicant	Alcoa of Australia Limited
ACN	004879298
File Number	DER2020/000196
Premises	Pinjarra Refinery Lot 19 on Diagram 44739, Part of Lot 109 on Diagram 60089, Part of Lot 151 on Plan 10914, Lot 221 on Plan 302638, Lot 222 on Plan 302638, Part of Lot 251 on Plan 35963 and Lot 252 on Plan 35963 Southwest Hwy OAKLEY WA 6208
Date of Report	12/10/2020
Proposed Decision	Works approval granted

Chris Malley
Manager, Process Industries

An officer delegated by the CEO under section 20 of the EP Act

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1. Decision summary

This Decision Report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of an upgrade of the Oxalate Bioremoval Facility (OBF) by inclusion of a third bioreactor unit at the Alcoa Pinjarra Refinery (Premises). As a result of this assessment, Works Approval W6393/2020/1 has been granted for construction and time limited operation of the additional infrastructure at the OBF.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Decision Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at https://www.der.wa.gov.au.

2.2 Application summary and overview of Premises

On 23 March 2020, Alcoa of Australia Limited (Alcoa, the Applicant) submitted an application for a works approval to the Department of Water and Environmental Regulation (the department, DWER) under section 54 of the *Environmental Protection Act 1986* (EP Act). The application is to upgrade the OBF at the Premises by the construction of a third bioreactor unit.

The Premises is an alumina refinery, located approximately 90 kilometres south of Perth and 5.5 kilometres east of the town of Pinjarra. Bauxite is supplied to the Premises by overland conveyor from the Alcoa Huntly Mine located 23 km to the east. The Bayer process is used to refine bauxite to alumina.

Organic matter within bauxite breaks down in caustic liquor forming various carbon compounds, primarily sodium oxalate (oxalate), which are impurities in the Bayer process. Oxalate accumulates in the recycled caustic liquor circuit and impacts alumina product quality and yield, and is therefore extracted from the process for destruction or storage. The Premises currently uses two destruction methods, thermal destruction through an oxalate kiln and biological destruction through two bioreactor units at the OBF.

The process for oxalate treatment at the OBF involves pumping oxalate from the plant oxalate storage tank into a feed preparation tank where it is mixed with water to achieve required total alkalinity. A constant feed of oxalate is fed from the feed preparation tank to bioreactor units. Each bioreactor unit comprises a bioreactor tank containing naturally occurring alkaliphilic bacteria that convert oxalate to sodium bicarbonate under aerobic conditions. The bioreactor tanks are dosed with nutrients for biomass growth and production, and defoamer to reduce foam production from the process. Sodium bicarbonate and leachate are recovered from the process and are both re-used within the refinery. Air is supplied to the bioreactor tanks to maintain the aerobic conditions necessary for the bacteria to convert oxalate to sodium bicarbonate. Loss of air supply will result in gradual death of the aerobic mass and allow anaerobic degradation of oxalate producing hydrogen sulphide. Odour and gases captured from the bioreactor tanks are directed to a wet scrubber for treatment and are then discharged to air via a stack (Alcoa 2020).

The Applicant proposes to install a third bioreactor unit and upgrade some associated equipment at the OBF to increase the oxalate destruction capacity by approximately 22.5 tonnes per day (tpd), bringing the Premises total oxalate destruction capacity to approximately 130 tpd. The third bioreactor unit will enable surplus oxalate management and provide increased capacity for oxalate destruction due to a predicted increase in the generation of oxalate as a result of predicted increases in the organic levels in future bauxite supply. The additional destruction capacity will also reduce the reliance on oxalate storage facilities, outside of planned outages at the OBF. The OBF upgrade will comprise:

- a bioreactor tank, cooler and associated pipework connections to existing infrastructure;
- a bioreactor tank underflow pump and nutrient pumps;
- a wet scrubber system;
- extension of existing secondary containment bunding; and
- upgrades to bioreactor feed pumps, freshwater overflow pumps, cooling tower discharge pump, oxalate repulp pumps, the scrubber discharge pump and oxalate booster pump

The Premises relates to the category and assessed production capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which is defined in Works Approval W6393/2020/1. The infrastructure and equipment relating to the Premises categories and any associated activities which the department has considered in line with *Guidance Statement: Risk Assessments* (DER 2017) are outlined in Works Approval W6393/2020/1.

2.3 Part IV of the EP Act

2.3.1 Ministerial Statement 646

The Premises operates under Ministerial Statement (MS) 646, which was granted by the Minister for Environment on 3 March 2004 for the Pinjarra Refinery Efficiency Upgrade (PREU). MS 646 states the proposal is for "*the construction and operation of an upgraded seed filtration facility and associated plant in order to increase the alumina production at the Pinjarra Refinery, South West Highway, Pinjarra to approximately 4.2 million tonnes per annum.*"

MS 646 was last amended pursuant to section 45C of the *Environmental Protection Act 1986* (EP Act) on 21 September 2015, which included an increase in the alumina production capacity to 5 million tonnes per annum.

The Delegated Officer determined that MS 646 is not a relevant consideration to this assessment of the OBF third bioreactor.

2.4 Other relevant approvals

2.4.1 Department of Jobs, Tourism, Science and Innovation (DJTSI)

The *Alumina Refinery (Pinjarra) Agreement Act 1969* and *Alumina Refinery Agreements (Alcoa) Amendment Act 1987* apply to the Premises. The department has consulted with DJTSI on the Application, and it has been determined that these agreement acts do not impact on the Applicant's ability to implement the proposal, subject to other approvals.

2.4.2 Department of Mines, Industry, Regulation and Safety (DMIRS)

DMIRS is the primary regulatory authority for regulating public health risks associated with the storage and handling of dangerous goods and major hazard facilities. The Application states that amendments will be sought to the Applicant's current Dangerous Goods Licence, DGS004240, prior to operating the third bioreactor tank and associated pipework. The amendment to the Dangerous Goods Licence will be supported by a review by an accredited Dangerous Goods Consultant.

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guidance Statement: Risk Assessments* (DER 2017).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during construction and operation of the third bioreactor unit, which have been considered in this Decision Report, are detailed in Table 1. Table 1 also details the control measures the Applicant has proposed to assist in controlling these emissions, where necessary.

Table 1: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Civil works may generate minor dust from construction of roads and bunding	Air/windborne pathway	Dust management to be included in the Construction Management Plan. Employees will undertake Environmental Awareness Training. Dust is managed internally through daily monitoring of High Volume Samplers and current licence conditions set out in L5271/1983/14 relating to implementation of dust control measures to minimise dust emissions, ambient monitoring and reporting of target exceedances.
Noise	Use of mobile equipment and lifting equipment Earthworks to construct bunding and roads	Air/windborne pathway	Construction Management Plan to include noise management in accordance with *Australian Standard (AS) 2436-2010 Guide to noise and vibration control on construction, demolition and maintenance sites section 4*. Construction is planned for the daytime only. Prefabrication of some equipment and infrastructure will occur offsite to minimise on site activity.
Commissioning and operation			
Oxalate dust	Oxalate spilled from the bioreactor tank which dries forming a caustic white powder.	Air/windborne pathway	Oxalate is in slurry form and treated via a wet process minimising likelihood of dust generation. Operating procedures and tank level management systems will be instated to minimise the likelihood of spillage occurring. Tank emergency overflows will be routed to the existing sump pump within the secondary containment bund. Spill clean-up and incident response procedures will be instated.
Noise (see section 3.1.5)	Normal operation of equipment and new equipment upset conditions creating noise (e.g. issues with pumps)	Air/windborne pathway	Equipment specification to vendors including verification monitoring performed by vendor. Alcoa Engineering Standard *Noise Levels of Stationary Equipment* 83 dB(A) at 1 m for new equipment.
Odour and gaseous emissions to air	Bioreactor tank. Vapours from the tank are discharged via a	Air/windborne pathway	Bioreactor tank will have lids and vents to capture and treat odour and gaseous emissions through a wet scrubber system before discharging via the

Emission	Sources	Potential pathways	Proposed controls
(volatile organic compounds (VOCs), ammonia and hydrogen sulfide during upset conditions)	wet scrubber and stack. Loss of aerobic microbial activity due to air flow or nutrient supply issues to the tank can result in hydrogen sulfide emissions as a result of anaerobic degradation of oxalate. Lack of water supply to the wet scrubber can impact availability for reduction of ammonia emissions.		existing stack. The wet scrubber will have feed interlocks on the flow rate and on the induced draft (ID) fan status. The process feed valve will be closed if the water supply to the scrubber drops below 1 kL/hr or if the wet scrubber fan is not running. Engineering controls will be instated to minimise the potential for hydrogen sulfide emissions. Monitoring of pH , dissolved oxygen, temperature and feed rate will assist maintenance of aerobic conditions. Process control system logic and alarms installed on the unit to alert operators to process excursions.
Mercury emissions to air	Bioreactor tank. Trace amounts of mercury contained in oxalate material which could be entrained in the vapours discharge via the wet scrubber stack.	Air/windborne pathway	Bioreactor tanks will have lids and vents to capture and treat gaseous emissions through a wet scrubber system before exiting through the stack.
Contaminated stormwater	Stormwater within the OBF area as a result of pump failures (overflows), spills, loss of containment or leaking equipment, pipes or tanks.	Direct discharge to land and infiltration to groundwater and/or overland flow to surface water	Existing bund at the OBF will be extended to include the third bioreactor unit infrastructure. The extended bund will comply with the *Dangerous Goods (Storage and Handling of Non-explosives) Regulations 2007*. It will be designed to contain at least 110% of the largest storage vessel or interconnected system and at least 25% of the total volume of all substances stored. Sumps within the bunded area allow for collection of spilled material for return to the feed preparation tank or product tank and there will be sealed areas surrounding the facility. Maintenance inspections and internal vessel inspection of liners to be conducted and operating procedures instated. The Premises operates in a closed-circuit stormwater system. Any loss of containment from the OBF will report to the refinery stormwater system network which reports to the RSA. Pipework will be permanently built into the bioreactor. A Dangerous Goods Consultant will review the design of the proposed bioreactor unit against relevant codes of practice such as *AS3780 Storage and Handling of Corrosive Substances.* Bottom of bioreactor tank will be flat and manufactured from stainless steel to prevent corrosion. Internal management processes to clean up released materials.
Environmentally hazardous substances including oxalate slurry, sodium oxalate solution, process effluent, defoamer, magnesium sulphate, phosphorous and nitrogen	Leaks from pipework or equipment when transferring material from or to process storage tanks. Loss of containment/spills from the bioreactor tank. (NOTE loss of containment from existing tanks is excluded as a source as the infrastructure has previously been subject to risk assessment for W4915/2011/1)		

3.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), the Delegated Officer has excluded employees, visitors and contractors of the Applicant from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 2, Table 3, and Figure 1 below provide a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the proposed works *(Guidance Statement: Environmental Siting* (DER 2016)).

Table 2: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	**Distance from proposed works**
Residential Premises	R1 (approximately six dwellings) is approximately 5 km south R2 (single dwelling) is approximately 2.7 km northeast R3 (North Pinjarra, multiple dwellings) is approximately 6 km northwest R4 (petrol station, single dwelling) is approximately 6.8 km west northwest R5 (Pinjarra township, multiple dwellings) is approximately 6.7 km west
Environmental receptors	**Distance from proposed works**
Geomorphic Wetlands Swan Coastal Plain	Conservation category wetland is approximately 2.5 km east and 4.5 km northwest Multiple Use category wetland is approximately 1.5 km north and 2.6 km southwest
Parks and Wildlife managed lands and waters	Marrinup State Forest is approximately 1.4 km east
Waterways Conservation Areas	Peel Inlet Management Area is approximately 6.6 km west
Peel Harvey Environmental Protection Policy (EPP)	Incorporates all parts of the Premises and surrounding areas
Threatened Ecological Communities and Priority Ecological Communities	Proposed area of works is within a Banksia Woodlands of the Swan Coastal Plain buffer
Waterways Conservation Act 1976 - Peel Inlet Management Area	Peel Inlet Management Area is located approximately 6.9 km west northwest

3.1.3 Groundwater and water sources

A description of ground and surface water resources is provided in Table 3.

Table 3: Groundwater and water sources

Groundwater and water sources	**Distance from the proposed works**	**Environmental value**
Public drinking water source areas (PDWSA)	Priority 1 South Dandalup Pipehead Dam Catchment Area (SDPDCA) is approximately 2.1 km east	The SDPDCA is a Priority 1 PDWSA, meaning that it is managed to ensure there is no degradation of the quality of the drinking water source with the objective of *risk avoidance*.
Major	Murray River is approximately 6.8	The Murray River is within the Peel Harvey EPP area

Groundwater and water sources	Distance from the proposed works	Environmental value
watercourses/ waterbodies	km west	and discharges into the Peel Estuary.
	South Dandalup River is approximately 3.2 km north	The South Dandalup River is within the Peel Harvey EPP area and discharges into the Peel Estuary.
	Oakley Brook is approximately 4.5 km south	Oakley Brook is a major tributary of the Murray River and provides some stock water on private land downstream of the Premises. Lower Oakley Pumpback and Oakley Brook Detention Dam are sources for the refinery process water supply.
	Barritt Brook is approximately 1.7 km north	Barritt Brook is a major tributary of the Murray River and provides some stock water on private land downstream of the Premises. Barritt Brook Detention Dam is a source for refinery process water supply.
	Drains approximately 300 m west	Drains in paddocks adjacent to the Oxalate Bioremoval Facility may discharge to the Barritt Brook Detention Dam.
Groundwater	Typically less than 5 m below ground level (BGL) (superficial aquifer)	Localised elevated concentrations of alkaline salts have been detected within the Premises and RSA in the upper and lower superficial formations since the 1980s, relating to historical construction and operational practices and engineering standards at that time.
	Superficial aquifer is 0 – 15 m BGL	Source for local and regional water supplies for potential domestic, stock and irrigation purposes.
	Leederville aquifer is 10 – 120 m BGL	Source for local and regional water supplies for potential domestic, stock, irrigation and industrial purposes.
	Catamarra aquifer is 3 – 120 m BGL	Primary source of the process water and potable water supplies. Contains groundwater resources that may be accessed by other users in the region for domestic, stock, irrigation and industrial water supplies.
Rights in Water and Irrigation Act 1914 (RiWI Act)	The refinery operational area, including the location of the OBF, is within one surface water catchment and the irrigation districts associated with that catchment. The area is proclaimed under the RiWI Act as: • Murray River System	The Murray River is a major drainage pathway for the region, and is fed by sub-catchments draining the foothills. The Murray River ultimately drains into the Peel-Harvey Estuary.

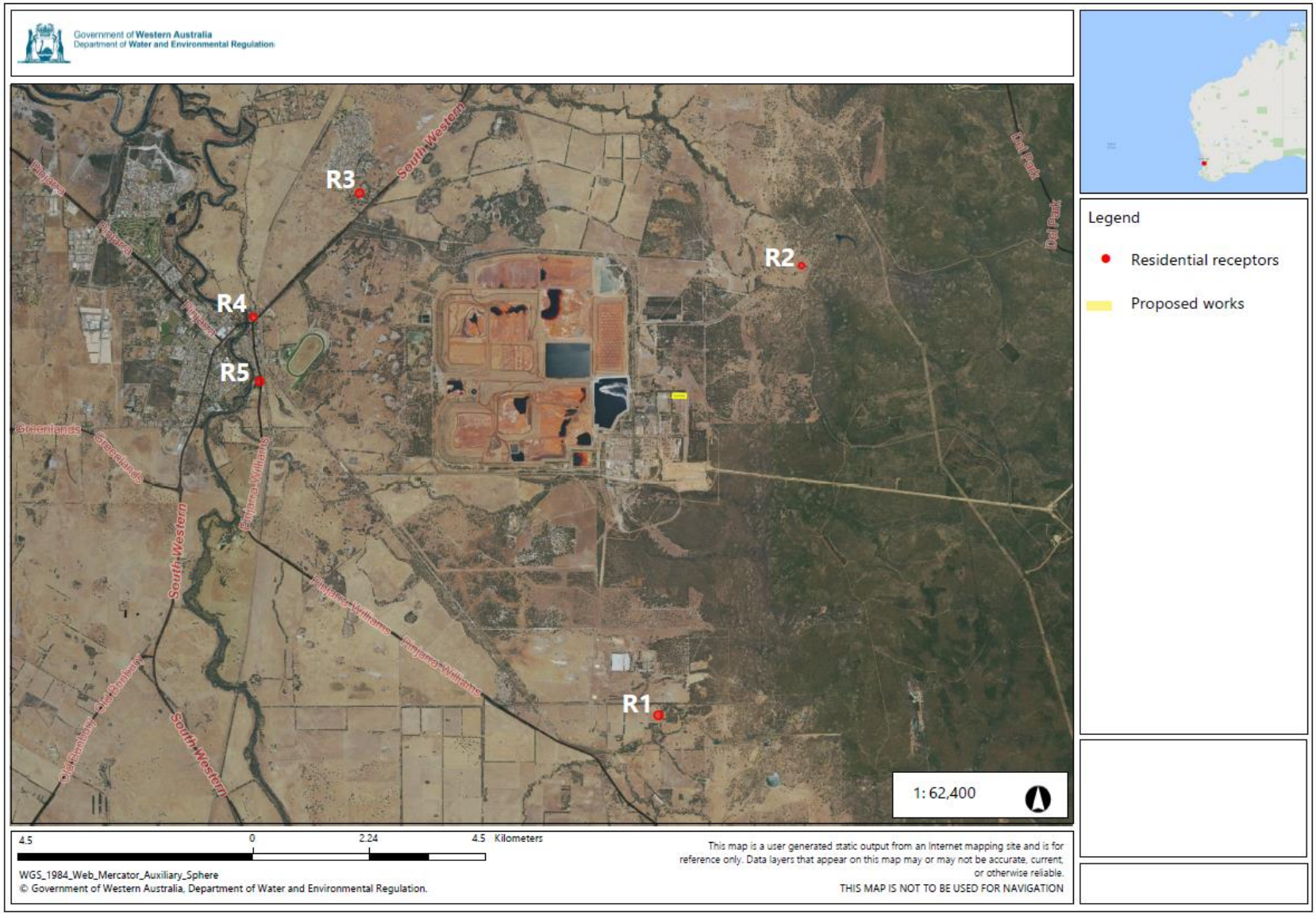

Figure 1: Distance from proposed works to sensitive residential receptors

3.1.4 Contaminated sites

The Delegated Officer notes the Premises (including the OBF area) has an existing classification of 'Possibly contaminated – investigation required' under the *Contaminated Sites Act 2004* (CS Act). Construction and operation of the proposed third bioreactor unit is not expected to impact ongoing processes under the CS Act.

3.1.5 Noise impact assessments

To support the application for W6393/2020/1 for the upgrade of the OBF by inclusion of a third bioreactor unit, Alcoa included a noise impact assessment (NIA) inclusive of modelling with its application. The worst-case modelled noise levels at noise sensitive receptors from the NIA are shown in Table 4 below.

Table 4: Worst-case predicted noise levels, before and after the OBF upgrade

Receiver	Night-Time L_{A10} Assigned Level	Predicted Results dB(A)					
		Entire Facility Levels			BOD Contribution		
		Base Model	Updated Model	Diff.	Base Model	Updated Model	Diff.
R1	36	35.9	35.9	0.01	11.6	13.1	1.5
R2	35	40.7	40.8	0.05	26.4	27.6	1.2
R3	35	33.5	33.5	0.01	12.6	14	1.4
R4	37	33.3	33.3	0.01	9.5	11.3	1.8
R5	35	34.1	34.1	0.01	8.5	10.5	2.0

Review of the NIA and its modelling found it to be reliable and the conditions, inputs and assumptions of the modelling consistent with previous noise modellings for the Pinjarra Refinery. The noise sources selected for the proposed OBF upgrade and their sound power levels did not seem unreasonable.

The Delegated Officer noted that the noise contribution from the existing OBF in isolation is significantly lower than that of the existing refinery in total. The proposed additional bioreactor unit is expected to marginally increase the noise emissions from the OBF. Overall noise emission levels from the refinery are expected to only increase from 0.01 to 0.05 dB at the five closest assessed noise sensitive receptors.

The Delegated Officer therefore agreed with the following conclusions in the NIA:

1. OBF upgrade noise emissions are not expected to contribute measurable to the existing noise levels at the selected noise receiver locations;
2. Predicted noise from new and modified equipment associated with the upgrade is not expected to contribute to any exceedance of the assigned levels; and
3. Any intrusive or dominant characteristics associated with the upgrade is not expected to protrude sufficiently above ambient levels to be discernible at noise sensitive receptors surrounding the refinery.

However, the NIA outcomes including the marginal noise increases have been considered in the context of the existing whole of site noise emissions profile. On 11 April 2019, Alcoa met with DWER to discuss strategies around baseline refinery noise exceedances at sensitive receptors. Alcoa's baseline noise model indicates exceedance or marginal compliance of assigned levels at nearby receptors which has been validated through noise monitoring investigations in August and September of 2018 under MS 646. Potential exceedances of assigned levels have been identified at receptors R2 and R5.

The Delegated Officer has considered the presence of potential noise exceedances evident in Alcoa's baseline modelling and noise monitoring. It is noted that the OBF upgrade is predicted to increase noise at R2 (0.05 dB increase) and R5 (0.01 dB increase).

The Delegated Officer took into account the NIA and accepted that the increase in noise was acceptable on the basis of the three NIA conclusions listed above.

It is expected that Alcoa works towards further investigation and resolution of potential noise exceedances at several of its nearest noise sensitive receptors. Future applications for works should not be on the basis of expected increases in the site noise contribution while potential noise exceedances exist.

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 5.

Works Approval W6393/2020/1 that accompanies this Decision Report authorises construction and time-limited operations. The conditions in the issued Works Approval, as outlined in Table 5 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the third bioreactor unit at the OBF i.e. oxalate destruction activities. A risk assessment for the operational phase has been included in this Decision Report, however licence conditions will not be finalised until the department assesses the licence application.

Table 5: Risk assessment of potential emissions and discharges from the Premises during construction and operation

Risk Event					Risk rating[1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions[2] of works approval	Reasoning and justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Construction								
Use of mobile equipment and lifting equipment. Earthworks to construct bunding and roads over existing sealed areas.	Dust	Air/windborne pathway causing impacts to health and amenity.	• Residential premises 2.7 - 6.8 km south, northwest and northeast • Pinjarra townsite 6.7 km west	Refer to section 3.1.1	C = Slight L = Possible **Low Risk**	Y	N/A	The Delegated Officer does not expect significant dust impacts during the construction phase, taking into considering the size, scale and scope of works and the distance to the nearest receptor. The premises is subject to existing dust controls including ambient monitoring and ambient limits through its existing licence (A1 and A2) and therefore the Delegated Officer considers the risk associated with dust emissions to be low.
	Noise			Refer to section 3.1.1	C = Minor L = Rare **Medium Risk**	Y	N/A	Refer to section 3.1.5 for further details relating to the assessment of noise emissions.
Operation **(including steady-state and time-limited operations)**								
Normal operation • Biological treatment of sodium oxalate	Oxalate dust (resulting from drying of spilled oxalate)	Air and wind dispersion could cause oxalate dust to deposit on nearby native vegetation, potentially causing harm to plants due to its caustic nature.	• Marrinup State Forest approximately 1.4 km east	Refer to section 3.1.1	C = Minor L = Rare **Low Risk**	Y	Condition 1 (construction requirements) **Condition 2-3 (compliance reporting)** Condition 6 (operational requirements)	The Delegated Officer notes that oxalate is fed into the bioreactor unit as a slurry and is treated using a wet process and therefore does not expect that oxalate dust emissions will occur from the operation of the OBF. Dust emissions may occur if slurry is spilled from the process and dries out. Due to the applicant's controls relating to clean up of spills and tank level management, and existing dust control and ambient monitoring conditions on the premises licence L5271/1983/14, the Delegated Officer considers the risk associated with oxalate dust emissions to be low.
		Air and wind dispersion could cause impacts to health and amenity.	• Residential premises 2.7 - 6.8 km south, northwest and northeast • Pinjarra townsite 6.7 km west		C = Minor L = Rare **Low Risk**			
	Noise	Air/windborne pathway causing impacts to health and amenity.		Refer to section 3.1.1	C = Minor L = Rare **Low Risk**	Y	Condition 1 (construction requirements) **Condition 11 and 13 (noise verification and reporting)**	Refer to section 3.1.5 for further details relating to the assessment of noise emissions. The Delegated Officer has accepted the marginal increases in noise on the basis that it is not expected to have a discernable impact of the existing noise emissions profile. The risk of noise is low risk if the applicant achieves predicted noise outcomes associated with the infrastructure and equipment.
	Point source mercury emissions to air Trace amounts of mercury contained in oxalate material emitted via vapours from bioreactor tanks.	Air/windborne pathway causing impacts to health.		Refer to section 3.1.1	C = Slight L = Rare **Low Risk**	Y	N/A	The Delegated Officer had regard to mercury balance work conducted by the applicant in 2011 for the Pinjarra Refinery OBF, which concluded that due to mercury remaining predominantly within the liquor circuit and solids in the process, there would be no measurable effect on the level of mercury emissions to air from the refinery. The Delegated Officer therefore determined the risk associated with mercury emissions from the operation of the bioreactor unit to be low.
	Point source odour and gaseous emissions to air (VOCs and ammonia)	Air/windborne pathway causing impacts to health and amenity.		Refer to section 3.1.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 1 (construction requirements) **Condition 2-3 (compliance reporting)** Condition 6 (operational requirements) **Condition 4-5, 7 and 11-12 (time limited operation and reporting)** **Conditions 8– 10 (monitoring)**	Odour and ammonia modelling were previously conducted for the initial works approval application for the OBF (W4915/2011/1). Predicted concentrations at nearby receptors were insignificant (<5% of the relevant criteria) including with open tanks. The normal operation of the third bioreactor unit is predicted to result in an insignificant increase to ammonia (0.03%) and VOC/odour emissions (0.02%) from the refinery due to the bioreactor tank being enclosed with all vapours being directed via a vent to a wet scrubber system for treatment and discharge via a stack. The bioreactor will take a period of time to reach a steady state of operation dependent on the growth rate of bacteria. During this time emissions may be elevated however will be treated via the wet scrubber to ensure they are minimised. Biomass from the existing OBF will be used as an inoculum in the new bioreactor tank to reduce the time required for the new reactor to reach steady state production. The Delegated Officer considered it necessary to include conditions allowing for time limited operation of the OBF upgrade, and reporting of the outcomes of the time limited operation to allow the third bioreactor unit a period of operational time to achieve steady-state production. A sampling program will be required once the new bioreactor reaches steady state in order to confirm the emission profile of the new facility. The Delegated Officer has therefore included monitoring to be completed after steady state is achieved. Monitoring methods are specified to ensure representative sampling and analysis is undertaken. The results of the monitoring are required to be included in the time limited

Risk Event					Risk rating[1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions[2] of works approval	Reasoning and justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
								operations report.
Upset conditions – loss of aerobic microbial activity • Air flow or nutrient supply issues can lead to anaerobic degradation of oxalate *Upset conditions – wet scrubber not available* • Wet scrubber water supply issues (nozzle blockages, pump supply failure or control valve failure)	Odour and gaseous emissions to air (VOCs, ammonia and hydrogen sulphide)			Refer to section 3.1.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 1 (construction requirements) **Condition 2-3 (compliance reporting)** Condition 6 (operational requirements)	Upset conditions resulting in loss of aerobic microbial activity may result in increased ammonia and odour emissions, and generation of hydrogen sulfide. Microbial activity is impacted by pH of the system, oxygen/air supply, temperature and nutrient availability. The applicant has proposed process controls which will be monitored and alarmed to ensure the OBF remains within optimal process parameters for aerobic microbial activity.
Upset conditions - loss of containment • Pump failure, spills, loss of containment, overflow leaking equipment, pipes, pumps and tanks • Biomass transfer into bioreactors	• Contaminated stormwater • Environmentally hazardous substances including oxalate slurry, sodium oxalate solution, process effluent, defoamer, magnesium sulphate, phosphorous and nitrogen	Direct discharge to land and infiltration to groundwater and/or overland flow to surface water could have adverse impacts on beneficial uses. This may have adverse impacts to ecosystem health and surface water users.	• Superficial and Catamarra aquifer < 5 m BGL • Brooks 1.7 km – 5.1 km north and south • Drain 300 m west • Murray River 6.8 km west • wetlands 1.5 – 4.5 km west	Refer to section 3.1.1	C = Minor L = Rare **Low Risk**	Y	Condition 1 (construction requirements) **Condition 2-3 (compliance reporting)** Condition 6 (operational requirements)	The Delegated Officer had regard to the size, scale and location of the OBF upgrade infrastructure. Loss of containment events would be expected to be low volume and short-term duration events confined to the immediate area around the OBF. The Delegated Officer considers the applicant's proposed process controls and secondary containment bunding will minimise the likelihood of containment loss outside of the facility. The Delegated Officer considers existing licence conditions relating to containment and recovery of containment losses apply to chemicals and hydrocarbons but not specifically process materials/effluent, therefore the applicant's controls to minimise the risk of loss of containment events are included as construction and operational conditions in the works approval. The OBF is located within an existing licensed premise which includes groundwater and surface water monitoring requirements therefore the Delegated Officer does not consider any additional ambient monitoring to be required relating to the OBF upgrade.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guidance Statement: Risk Assessments* (DER 2017).

Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

4. Consultation

Table 6 provides a summary of the consultation undertaken by the department.

Table 6: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website (7/05/20)	None received	N/A
Local Government Authority (Shire of Murray) advised of proposal (12/05/20)	None received	N/A
Department of Jobs, Tourism, Science and Innovations (DJTSI) advised of proposal (12/05/20)	DJTSI replied on 22/05/2020 advising that the proposal has been noted, and that DJTSI have no comment to make.	N/A
Applicant was provided with draft documents (28/08/20)	Applicant replied on 21/09/20 (see Appendix 1)	See Appendix 1

5. Conclusion

Based on the assessment in this Decision Report, the Delegated Officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

References

1. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
2. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
3. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Environmental Protection Authority (EPA) 2004, *Ministerial Statement 646 (Pinjarra Refinery Efficiency Upgrade)*, Perth, Western Australia.
5. Wood 2019a, *Pinjarra Refinery Noise Model Design and Verification Report*, Perth, Western Australia.
6. Wood 2019b, *Pinjarra Biological Oxalate Destruction Plant Upgrade Noise Assessment*, Perth, Western Australia.
7. Alcoa 2020, *Works Approval Application, Supporting information - Pinjarra Alumina Refinery Oxalate Bioreactor Facility Upgrade,* Perth, Western Australia.
8. Alcoa 2011, *Works Approval Application, Supporting Information - Pinjarra Alumina Refinery Oxalate Bioremoval Facility,* Perth, Western Australia.

Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	Delegated Officer response
Cover page	Alcoa noted an administrative error in the Prescribed Premises table whereby the incorrect annual production capacity for Category 46 (4.5 Mtpa) was input.	Corrected to state 5.0 Mtpa.
Condition 1 (Table 1)	Regarding requirement 1, Alcoa clarified the infrastructure and equipment that will be contained within the expanded bund, and that which will be contained in existing sealed areas or bunds.	Corrected.
	Alcoa suggested clarification of requirement 2, noting that the third bioreactor tank itself is not a source of noise, and therefore if the requirement is to remain, it should specifically relate to the installed tank agitator. Alcoa also requested the term 'sound pressure level' be used in place of 'noise level' throughout the instrument.	Accepted. Condition 1 amended to reflect sound pressure level limits specific to the installed tank agitator. Accepted the change of 'noise level' to 'sound pressure level' throughout the instrument, noting that it does not alter the requirements of the works approval it is associated with.
	Regarding requirement 3, Alcoa provided information requested by DWER relating to vent stack height and location, and specifications of the wet scrubber system.	Noted. Information added to condition.
Conditions 2, 3, 4, 5 and 13(d)	Alcoa requested conditions referring to compliance reporting of infrastructure and time limited operations be reworded to authorise them to submit one Environmental Compliance Report encompassing whole of works (third bioreactor unit), rather than one for each item of infrastructure.	Accepted. Acknowledged that individual reports are not required for each item of infrastructure, and therefore the relevant conditions have been reworded to reflect this.
Condition 7	Alcoa states that wording of condition 7 is vague and suggested alternative wording.	Partly accepted. The condition forms part of the department's internal conditions library which consists of conditions that have been subject to review. However, noting Alcoa's comments, some minor wording change was made to address the concerns with ambiguity.
Condition 8	Alcoa noted that the emissions from the wet scrubber vent stack are likely to be very low based on monitoring undertaken previously for the existing bioreactor wet scrubber vent stacks. Alcoa considers it reasonable and appropriate to undertake steady-state emissions monitoring, however, does not support ongoing routine monitoring after time limited operations are completed.	Noted. As per Table, the sampling is to confirm the expected emissions profile during time limited operations phase. Risk assessment does not point to a need for ongoing air emissions monitoring, consistent with the existing bioreactors. However, the department will take into account the results of monitoring

Condition	Summary of applicant's comment	Delegated Officer response
		during time limited operations.
Condition 12	Alcoa requested the word 'infrastructure' be replaced with '3rd Bioreactor Unit reaching steady state'.	As above, the condition is a standard wording from the departments condition library. It is noted that to alter the wording of condition 12 in the manner requested would result in inconsistency with other standardised conditions including condition 1. No change was made to condition 12.
Figure 4	Alcoa highlighted the location of the wet scrubber vent stack as requested by DWER.	Location of wet scrubber vent stack added to Figure 4.
Schedule 2	Alcoa provided the approximate locations of the pumps as requested by DWER.	Location of pumps added to Schedule 2.

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)					
Application type					
Works approval	☒				
Licence	☐	Relevant works approval number:		None	☐
		Has the works approval been complied with?		Yes ☐ No ☐	
		Has time limited operations under the works approval demonstrated acceptable operations?		Yes ☐ No ☐ N/A ☐	
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?		Yes ☐ No ☐	
		Date Report received:			
Renewal	☐	Current licence number:			
Amendment to works approval	☐	Current works approval number:			
Amendment to licence	☐	Current licence number:			
		Relevant works approval number:		N/A	☐
Registration	☐	Current works approval number:		None	☐
Date application received		23 March 2020			
Applicant and Premises details					
Applicant name/s (full legal name/s)		Alcoa of Australia Limited			
Premises name		Pinjarra Refinery			
Premises location		Lot 19 on Diagram 44739, Part of Lot 109 on Diagram 60089, Part of Lot 151 on Plan 10914, Lot 221 on Plan 302638, Lot 222 on Plan 302638, Part of Lot 251 on Plan 35963 and Lot 252 on Plan 35963 Southwest Hwy, OAKLEY WA 6208			
Local Government Authority		Shire of Murray			
Application documents					
HPCM file reference number:		DER2018/001042-3			
Key application documents (additional to application form):		Works Approval Application, Supporting information - Pinjarra Alumina Refinery Oxalate Bioreactor Facility Upgrade			
Scope of application/assessment					
Summary of proposed activities or changes to existing operations.		Construction of a third bioreactor unit at the Oxalate Bioremoval Facility.			

Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Prescribed premises category and description	Assessed production or design capacity
Category 46: bauxite refining	5 Mtpa

Legislative context and other approvals

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes ☐ No ☒	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☐
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ☒ No ☐	Ministerial statement No: 646 EPA Report No: 1122
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ☐ No ☒	Reference No: N/A
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes ☒ No ☐	Certificate of title ☒ General lease ☐ Expiry: Mining lease / tenement ☐ Expiry: Other evidence ☐ Expiry:
Has the applicant obtained all relevant planning approvals?	Yes ☐ No ☐ N/A ☒	Project within existing Alcoa Alumina refinery on Alcoa owned land – additional planning approval not required.
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes ☐ No ☒	CPS No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes ☐ No ☒	No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes ☐ No ☒	Licence / permit not required.
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes ☐ No ☒	Name: N/A Type: Has Regulatory Services (Water) been consulted? Yes ☐ No ☐ N/A ☒ Regional office:

Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes ☐ No ☒	Name: N/A Priority: N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)? Yes ☐ No ☐ N/A ☒
Is the Premises subject to any other Acts or subsidiary regulations (e.g. *Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx*)	Yes ☒ No ☐	*Alumina (Pinjarra) Agreement Act 1969* *Alumina Refinery Agreements (Alcoa) Amendment Act 1987* *Dangerous Goods Safety Act 2004*
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes ☒ No ☐	Peel Harvey Environmental Protection Policy
Is the Premises subject to any EPP requirements?	Yes ☐ No ☒	No discharges to water
Is the Premises a known or suspected contaminated site under the *Contaminated Sites Act 2003*?	Yes ☒ No ☐	Classification: possibly contaminated – investigation required (PC–IR) Date of classification: 9 June 2016