



Application for works approval

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

Works approval number	W6607/2021/1
Applicant	Alcoa of Australia Ltd
ACN	004 879 298
File number	DER2021/000579
Premises	Wagerup Alumina Refinery Willowdale Rd WAROONA WA 6215 Legal description – Lot 700 on Plan 59305
Date of report	02/08/2022
Decision	Works Approval granted

1. Purpose and scope of assessment

Alcoa of Australia Limited (the applicant / Alcoa) proposes to implement an emissions reduction project at its Wagerup Alumina Refinery. An application for works approval was submitted under Division 3 Part V of the *Environmental Protection Act 1986* (EP Act) on 6 October 2021.

This report sets out the delegated officer's assessment of potential risk events arising from emissions and discharges during construction and operation of infrastructure relating to the prescribed activity. This approval does not provide authorisation for any operational changes or other works not directly or explicitly related to the infrastructure changes subject of this application.

In completing the assessment documented in this report, the department has considered and given due regard to its regulatory framework and relevant policy documents which are available at <https://dwer.wa.gov.au/regulatory-documents>.

2. Application details

2.1 Background

Alcoa operates the Wagerup Alumina Refinery located approximately 120 km south of Perth, between the rural townships of Hamel and Yaloo. It first commenced operation in 1984 and currently produces around 2.9 million tonnes per annum (Mtpa) of aluminum oxide (alumina) from bauxite ore transported to the premises via an overland conveyor from Alcoa's Willowdale bauxite mine, located approximately 15 km east of the refinery.

The refinery operates under multiple approvals including two State Agreement Acts, a Ministerial Statement (MS) issued under Part IV of the EP Act, a licence issued under Part V of the EP Act, and a noise approval issued under the EP Noise Regulations.

The department is currently conducting a risk-based review of this licence to ensure alignment with its regulatory framework.

Refinery production is currently limited to 2.9 Mtpa under the Part V licence (L6127/1983/15). Conditions 8-1 and 8-1A of MS 1157 includes provision for significant expansion works to increase refinery production up to 3.3 Mtpa and 4.7 Mtpa, respectively, as documented and described in the previous MS 728. Any application for expansion must be supported by a detailed design report that demonstrates a significant reduction in base emission rates from the refinery, particularly the peak and average emission rates of volatile organic compounds (VOCs) and odour from slurry storage tanks and the calciners.

Condition 8-5 of MS 1157 also includes provision for individual works that have the effect of reducing or offsetting air emissions from the existing refinery and that do not increase the production capacity of the refinery by more than 5%.

2.2 Application overview

Alcoa proposes to undertake an emissions reduction project at the existing refinery, that seeks to reduce VOC emission levels by 6.2% and odour levels by 0.98%. The emission reduction project will consider average emissions only and will not consider peak emissions.

The application is for the conduct of specified works only and does not seek as part of the application any production increase at this time. However, Alcoa has indicated this emissions abatement program is intended to support a future licence application for a production increase in line with the requirements of condition 8-5 of MS 1157. Alcoa has indicated that it does not intend for this project to trigger the requirements of condition 8-1.

The project involves capturing vapours from two of the four existing "25A" bauxite slurry storage tanks and redirecting them to the powerhouse boilers for thermal oxidation. This involves modifying the "25A-2" and "25A-4" tank vents and connecting them to the existing "35N" non-

condensable gas reticulation system, which requires:

- replacing the existing vent stacks on 25A-2 and 25A-4 with new stacks that include sampling ports that comply with AS 4323.1;
- installation of a 'knockout' pot (incorporating a mercury trap), to remove mud, excess moisture and mercury that has vapourised into the vapour stream, prior to entering the 35N system; and
- installation of ducting and valves between the 25A tank vents and a common header, where extraction pipework connected to tank stacks will dis-entrain water droplets and mud carries over from 25A-2 and 25A-4, the extraction pipework connects to a common header pipe discharging into a knock put pot and connects by pipework with a valve to the 35N system ducting.

2.2.1 Slurry storage tanks 25A-2 and 25A-4

The slurry storage tanks are used to raise the temperature of the slurry to enhance the desilication reaction and to provide an interface for surge capacity between mills and the digestion process. Building 25A has four identical cylindrical slurry storage tanks with conical bottoms, each with a maximum capacity of 3,500 kL. Bauxite slurry from the mills in building 25 enters the "25A-3" storage tank. The tanks run in series with the flow going from 25A-3 to "25A-1", to 25A-4 to "25A-2". The slurry leaves 25A-2 for the digestion process in building 30.

The heating of the slurry, together with the long holding time in 25A tanks provide favorable reaction conditions for desilication. The 25A tanks are not pressure vessels and air emissions from these tanks are currently directed to atmosphere through single point stacks. Alcoa propose to divert air emissions from 25A-2 and 25A-4 only to the powerhouse boilers 2 and 3 for thermal destruction, whilst the tanks are operational.

This diversion will require diverting air emissions from 25A-2 and 25A-4 and connecting them to the existing 35N system. To connect the existing tanks and direct the vented vapours into the existing 35N system, Alcoa will install ducting pipework, valving, replacement stacks, stack sampling points and a knockout pot with a mercury trap.

Vapours expected to be captured and directed from 25A-2 and 25A-4 to the 35N system include ammonia, acetaldehyde, acetone, benzene, 2-butanone, ethylbenzene, styrene, toluene, 1-2-4 trimethylbenzene, 1-3-5 trimethylbenzene and xylenes. Alcoa has indicated that it anticipates a redirection of the emissions from these two storage tanks will reduce emissions by 96%. Emissions from the remaining tanks 25A-1 and 25A-3 will continue to be vented to the atmosphere.

The existing vent stacks on 25A-2 and 25A-4 will be replaced by new stacks in the same location. The new stacks will include stack sampling ports designed and installed based on recommendations on *Australian Standards (AS) 4323.1:1995 Stationary Source Emissions – selection of sampling positions*.

2.2.2 35N system modifications

Modification of the existing 35N system will consist of installation of stainless-steel ducting and valves to allow the vapours from 25A-2 and 25A-4 to be captured transferred through the 35N system to the powerhouse boilers.

The pipework connecting the tank vapours to the 35N system will be an incline section to a large bore pipe to assist in dis-entrapment of water droplets and mud carry over from 25A-2 and 25A-4. The existing drain legs on the 35N system will be added to or modified to assist with moisture removal from the 35N system.

2.2.3 Mercury trap and knock out pot

Mercury naturally occurs in the bauxite feed in variable concentrations. In the initial digestion process within the 25A tanks, some mercury has the potential to vaporise into the vapour

stream directed to the 35N system. A small quantity of mercury is expected to condense as the vapour from the 25A tanks cool on route to the knockout pot.

A knockout pot will be installed to remove excess mud and moisture from the vapour prior to entering the 35N system. A mercury trap is included in the knockout pot design, to facilitate the removal by a controlled waste contractor. The mercury will be disposed of at an offsite licensed disposal facility. Alcoa expect the quantity of condensed mercury to be about 0.5 kg/year, or less than 0.2% of the total mercury air emissions for the refinery.

2.2.4 Powerhouse boilers 2 and 3

The refinery powerhouse generates electricity and process steam (for process heating and generation of electricity) for the refining process by means of natural gas fired boilers (boilers 1, 2 and 3) and a gas turbine heat recovery steam generator.

Non-condensable gases from the digestion, evaporation, heat exchange and collected tank vapours from causticisation, liquor filtration and the 984Y mercury removal system, are diverted to boilers 2 and 3 to destroy their organic / VOC content, prior to atmospheric release. The reticulation system and fan that transports the gases to the boilers have operational controls that open/close valves on the air inlet to boilers 2 and 3. The system is either on or off.

The boiler stack emissions are monitored quarterly under licence L6217/1983/15. No modifications are required to the boilers as part of this proposal.

Alcoa consider the impact upon the boiler operation with the addition of the 25A-2 and 25A-4 vapours into the 35N system will introduce a hot, humid gas stream to the boilers. Some of this vapour is expected to condense within the 35N network and some at the boiler inlet plenum.

2.3 Commissioning and emissions verification

2.3.1 Commissioning

The existing 35N system will require a period of shutdown to allow new infrastructure to be tied into the existing system. The interruption in operation will be planned to ensure the system is offline for a maximum of 2 – 3 weeks.

Once the two 25A tanks are connected to the 35N system, Alcoa expects intermittent local venting from some of the other emissions sources on the network (i.e., digestion, evaporation, heat exchange, causticisation and green liquor filtrate tank).

2.3.2 Air quality verification

VOC and odour sampling is proposed from the boiler stacks with the 25A vents isolated from the 35N system to provide baseline emission rates and concentrations without contribution from the 25A tank vapours. The vent flow to the 35N system will then be restored and sampling repeated from the boiler stacks to determine the impact of the increased loading of VOCs on that process.

Flow measurements will also be conducted in the 25A-2 and 25-4 vents to confirm vapour extraction rates from the tanks – Alcoa expects there will be minimal flow from these tanks following implementation of the project.

The proposed stack testing during commissioning is summarised in Table 1.

Table 1: Proposed stack sampling during commissioning

Parameter	Method	Number of Samples					
		Vent flow from 25A to 35N isolated				Vent flow from 25A to 35N restored ²	
		Boiler 2 stack	Boiler 3 stack	25A-2 vent	25A-4 vent	Boiler 2 stack	Boiler 3 stack
Odour	AS/NZS 4323.3:2001	4	4	4	4	4	4
A & K ¹ (Aldehydes and Ketones)	USEPA SW846 Method 0011	4	4	4	4	4	4
Velocity, temperature, CO ₂ & O ₂ , moisture	USEPA methods 2, 3 and 4	4	4	4	4	4	4

Note 1: A&K will include acetaldehyde, acetone, and 2-butanone

Note 2: Flow measurements will also be conducted in the 25A-2 and 25A-4 vents to confirm the success of vapour extraction from the tanks.

2.4 Exclusions to this assessment

The following matters are out of the scope of this assessment, which as noted is focused on assessment and authorisation of infrastructure changes, and have not been specifically considered within the technical risk assessment detailed in this report:

- historical and existing air emissions and air emissions modelling;
- the adequacy of existing air emissions controls;
- health issues being experienced by residents near the refinery and links to existing refinery air emissions; and
- refinery production increases beyond the existing licensed capacity (2.9 Mtpa).

However, it should be noted the matters listed above would be considered within any licence amendment application. This works approval is related to category 46 activities only and does not offer the defence to offence provisions in the EP Act (see s.74, 74A and 74B) relating to emissions or environmental impacts arising from other activities, including those listed above.

3. Other approvals

3.1 Part IV of the EP Act

3.1.1 Ministerial Statement 1157 of 2021

In October 2018, the Minister for Environment (Minister) requested the Environmental Protection Authority (EPA) inquire into and report on a request by Alcoa to change several implementation conditions of MS 728 and MS 1069 to facilitate an increase in production at the refinery to 3.3 Mtpa without triggering the upper limit expansion of 4.7 Mtpa.

The EPA considered the information provided by Alcoa and noted there would be no net increase in VOC or odour emissions at the refinery for production up to 3.3 Mtpa, and that Alcoa would still be required to demonstrate appropriate emissions reductions through a comprehensive, targeted program as part of condition 8-1A.

In January 2021, the Minister issued a new statement, MS 1157, that retains the environmental requirements of the original conditions of MS 728 and supersedes MS 1069, and includes several changes to implementation conditions, including:

- updating the baseline data references in condition 8 to the Wagerup Refinery 2018 Emissions Inventory;
- splitting of conditions 8-1 and 9-1 into two sections to allow a staged approach for

expansion works at the refinery, including conditions 8-1 and 9-1 to increase production up to 3.3 Mtpa, and conditions 8-1A and 9-1A to increase production past 3.3 Mtpa to a maximum limit of 4.7 Mtpa;

- revised quantitative emission reductions for conditions 8-1 and 8-1A;
- inclusion of condition 8-1B to ensure Alcoa's VOC and odour emissions data is publicly available; and
- inclusion of definitions into condition 8-5 for the terms 'best practice' and 'significantly increase', where any proposal that would increase the assessed annual production capacity of the refinery by 5% or more of the capacity stated in the Part V licence, would trigger the requirements of condition 8-1 or 8-1A.

The delegated officer notes the works subject to this application is for specified works that aim to reduce or offset air emissions from the existing refinery.

For noting:

1. The works subject to this application will be assessed on its own merits, as a standalone emissions reduction project.
2. It is noted Alcoa intend on using this project to support future applications to increase refinery production. However, the outcomes of the department's assessment of this application do not provide any implied assurance, guarantee of future production increases at the refinery.
3. Expansion works, or further individual works that do not significantly increase the production capacity of the refinery, remain subject to the requirements of conditions 8-1, 8-1A or 8-5 of MS 1157 and future applications will be assessed on their merits.

4. Consultation

The application was referred to relevant public authorities and advertised for public comment on the department's website during November 2021.

4.1.1 Public authorities

The application was referred to the Department of Jobs, Tourism, Science and Innovation and the Shire of Waroona, who both advised they had no comment with respect to the application.

4.1.2 Public submissions

The application was referred to the Community Alliance for Positive Solutions Inc. (CAPS), who raised concerns about the application being used to legitimise Alcoa's activities in circumstances where it believes there is already an unacceptable environmental and social impact from the operation of the Wagerup Refinery. These concerns have been considered and are addressed in the decision summary (section 7) of this report.

Several other concerns were raised by CAPS in their submission that have been previously raised with respect to existing refinery operations, which go beyond the scope of the application and have not been considered as part of this assessment for the reasons stated above.

5. Modelling data

5.1 Air emissions assessment

5.1.1 Refinery emissions inventory

The 2018 emissions inventory (Alcoa 2020) and air quality model, which were endorsed by the EPA in 2020 as part of the recent section 46 enquiry (see section 3.1.1), and the 2020 health risk assessment (Katestone 2020), were used by Alcoa to form the basis of the emissions

estimates used for this project. The 2018 emissions inventory was scaled to 2.9 Mtpa to support the most recent increase in production capacity under the Part V licence.

5.1.2 Predicted changes

The predicted changes to total refinery emissions following implementation of the proposed works are summarised in Table 2. The redirection of the 25A-2 and 25A-4 slurry storage tanks point source air emissions for combustion within the powerhouse boilers 2 and 3 is predicted to reduce the total refinery emissions profile, with predicted decreases of about 0.98% for odour and 6.2% for VOCs.

Table 2: Predicted changes to air emissions

Type of emission	Total current emissions	Post project emissions	Post project emissions % change
Production (Mtpa)	2.90	2.90	0%
Odour (OU/s)	1,400,373	1,386,713	-0.98%
Total VOCs (g/s)	2.87	2.69	-6.2%
Combustion gases (g/s)	55.24	55.24	0%
Particulates (g/s)	3.90	3.90	0%

Note 1: i.e. with 25A-2 and 25A-4 emissions directed to the 35N system for thermal destruction.

The redirection of the 25A-2 and 25A-4 slurry storage tanks is predicted to result in a 96% total reduction in emissions from each of the tanks. The remaining 4% of emissions would occur as intermittent emissions from the tanks under abnormal operating conditions. The total VOC and odour emissions from the 25A slurry storage tanks are predicted to decrease overall by 38% and 7%, respectively.

Thermal oxidation is a common method for the destruction of combustible compounds including VOCs. The VOCs are destroyed by heating the compounds above the auto ignition temperature in the presence of oxygen. The gas-fed boilers (2 and 3) operate at temperatures greater than 1,200°C. The ignition temperatures of compounds listed in DWER technical review

DWER's review of the 2018 emissions inventory (Alcoa 2020) and air quality model identified that:

- the predicted reduction values for VOCs appear to be based on an assumption the emissions reduction project will reduce emissions from each of the 25A tanks by 96% and the remaining 4% would occur as intermittent emissions under abnormal operating conditions, however, it is unclear how average and peak emissions would be assessed for this scenario.

Table 3 Although it is expected that VOCs will thermally oxidise within the boilers, there is a small percentage of gases coming from the 35N system that bypass the boiler furnace via the rotary heater. This occurs in the current system. The percentage of gas flow that bypasses the boiler furnace has been conservatively estimated to be 15%. Resulting from this there may be a small increase (about 1%) of VOC emissions from Boilers 2 and 3.

The 25A slurry storage tanks and powerhouse boilers are not characterised sources of particulate emissions; therefore, no change is predicted. Similarly, combustion gases including nitrogen oxides and carbon monoxide are released from the powerhouse boilers, calciners, liquor burners and oxalate kiln, no changes expected in combustion gas emissions.

5.1.3 DWER technical review

DWER's review of the 2018 emissions inventory (Alcoa 2020) and air quality model identified that:

- the predicted reduction values for VOCs appear to be based on an assumption the emissions reduction project will reduce emissions from each of the 25A tanks by 96% and the remaining 4% would occur as intermittent emissions under abnormal operating conditions, however, it is unclear how average and peak emissions would be assessed for this scenario.

Table 3Alcoa's predicted overall net change in air emissions rates for pre and post implementation are shown within DWER technical review.

5.1.4 DWER technical review

DWER's review of the 2018 emissions inventory (Alcoa 2020) and air quality model identified that:

- the predicted reduction values for VOCs appear to be based on an assumption the emissions reduction project will reduce emissions from each of the 25A tanks by 96% and the remaining 4% would occur as intermittent emissions under abnormal operating conditions, however, it is unclear how average and peak emissions would be assessed for this scenario.

Table 3: Existing and predicted odour and VOC average emission rates from boilers and 25A tanks at 2.90 Mtpa

Current average emission rate to 2.90 Mtpa -pre project implementation					Predicted average emissions rates to 2.90 Mtpa - post project implementation			
Source	Boiler 2	Boiler 3	25A-2 tank vent	25A-4 tank vent	Boiler 2	Boiler 3	25A-2 tank vent	25A-4 tank vent
Stack height (m)	65.0	65.0	25.4	25.4	65.0	65.0	25.4	25.4
Measured odour (OU/s)	34702	20907	8570	8570	36101	22306	341	341
Ammonia (g/s)	0.13	0.12	0.46	0.46	0.20	0.20	0.018	0.018
Acetaldehyde (g/s)	9.30E-03	5.81E-03	1.07E-02	1.07E-02	1.11E-02	7.56E-03	4.28E-04	4.28E-04
Acetone (g/s)	2.64E-02	3.34E-02	9.01E-02	9.01E-02	4.11E-02	4.81E-02	3.59E-03	3.59E-03
BaP Equivalents (g/s)	N/A	N/A	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene (g/s)	3.88E-03	3.63E-03	1.09E-04	1.09E-04	3.89E-03	3.65E-03	4.33E-06	4.33E-06
2-Butanone (g/s)	6.20E-03	5.81E-03	9.72E-03	9.72E-03	7.79E-03	7.40E-03	3.87E-04	3.87E-04
Ethylbenzene (g/s)	0.00E+00	0.00E+00	8.62E-05	8.62E-05	1.41E-05	1.41E-05	3.43E-06	3.43E-06
Formaldehyde (g/s)	6.2E-03	5.81E-03	0.00E+00	0.00E+00	6.20E-03	5.81E-03	0.00E+00	0.00E+00
Styrene (g/s)	0.00E+00	0.00E+00	9.38E-06	9.38E-06	1.53E-06	1.53E-06	3.74E-07	3.74E-07

Toluene (g/s)	0.00E+00	0.00E+00	1.04E-03	1.10E-03	1.70E-04	1.70E-04	4.13E-05	4.13E-05
1,2,4 Trimethylbenzene (g/s)	0.00E+00	0.00E+00	1.10E-04	1.10E-04	1.80E-05	1.80E-05	4.38E-06	4.38E-06
1,3,5 Trimethylbenzene (g/s)	0.00E+00	0.00E+00	1.54E-04	1.54E-04	2.51E-05	2.51E-05	6.13E-06	6.13E-06
Xylenes (g/s)	N/A	N/A	9.67E-05	9.67E-05	1.58E-05	1.58E-05	3.85E-06	3.85E-06

Note: Red highlights are increases, blue highlights are decreases.

- it appears the current VOC emission reduction estimates are based on comparisons between 2002 – 2007 VOC measurements (highly conservative) and the latest VOC measurements from the 2018 emissions inventory (Alcoa 2020). The data from these programs are not directly comparable and consequently the emission reductions appear to be overestimated, and is possibly why the estimated percentage reduction of VOCs (~6%) differs from the percentage reduction in odour (~1%). This can be resolved if all 25A tanks are included in the proposed post-expansion stack testing program;
- monitoring of CO may provide useful information on the combustion efficiency of the powerhouse boilers. An increase in CO can indicate poor combustion efficiency, resulting in the release of partially combusted materials containing organic carbon, which may increase the emissions of particulates and VOCs;
- the proposed sampling method for VOCs (USEPA Method 0011) is different from sampling methods that have been historically used for VOC measurements at the refinery (i.e., USEPA Methods 18, M5). It is noted that target analytes measured using these methods are not the same, which could limit the comparability of current and future emissions data (e.g., data to be used for the VOC emissions reduction estimates). It is recommended that consistent sampling methods are used for VOCs (noting that Alcoa plans on not using the historic data for emission reduction estimates in isolation, but will use the proposed data collected to calculate emission reductions);
- it is noted the 25A-2 and 25A-3 tanks monitoring data are used in the emissions reduction calculations. It appears Alcoa has assumed that odour/VOCs emissions from the 25A-1, 25A-2 and 25A-4 tanks are the same, however, based on process information provided by Alcoa the emissions from these tanks are not all the same. It is therefore recommended all the 25A tanks are included in the proposed post-expansion stack testing program;
- it appears that pollutant levels, in particular VOCs and odour, emitted from the refinery are heavily reliant upon the 35N system, and there is an absence of a contingency plan for managing emissions during periods where the 35N system may be offline (noting Alcoa has recently proposed a dedicated RTO for emissions mitigation and that Alcoa considers this project to only target average emissions); and
- fugitive area source odour and VOC emissions (refer to Table 61 of the 2018 emissions inventory (Alcoa 2020)) are not included in the total site emissions breakdown. This will potentially result in offset percentage calculations being over estimated. Additionally, these odour measurements were undertaken using isolation flux-hood instrumentation, which can significantly underestimate emission rates. It is also unclear whether it is appropriate to omit these sources from the calculations.

5.2 Odour assessment

5.2.1 Odour field assessment

The emissions inventory (Alcoa 2020) data identifies 55 point and 12 fugitive odour sources. The emission reduction project is predicted to have an odour emission change from 25A-2 and

25A-4 slurry storage tank vents and powerhouse boilers 2 and 3 multiflue.

An odour field assessment (Strategen-JBS&G 2020) was undertaken to provide a baseline of odour impacts from the current refinery and operations using DWER Odour Guideline (2019). Odour plumes were tracked, and downwind odour intensity scale (between 0 to 6) and odour character were defined. Two separate assessment campaigns were undertaken with five assessors during July 2020. The campaigns were targeted during winter when prevailing meteorological conditions were conducive to potentially higher odour impacts. Winds from the north and south were preferred to assess odours potentially impacting Hamel and Yarloop areas.

Alcoa confirmed that the refinery processes that influence odour emissions were operating under stable conditions during the two assessment campaigns (except for the liquor burning facility which was offline for 3 days during the assessment period). Odour from the liquor burning facility is a relatively small contributor, less than 4% to the overall refinery odour emissions. Alcoa consider the absence of the liquor burning facility for the first assessment campaign was unlikely to materially impact on the extent of odour impacts observed.

5.2.2 Results

A total of 660 measurement cycles were conducted over the two campaigns. All odour intensities recorded were below an odour intensity of 4 (strong odour). The conclusions from the odour field assessment were:

- Refinery odours were detected at 2 to 3 km from the refinery operating area.
- Odours detected at those locations were predominately scored an odour intensity of 1 (very weak odour) and 2 (weak odour).
- Odours from the RSA were limited to 1 km from the nearest active area.
- The intensity of odour rapidly decreased with increased distance from the refinery under unstable atmospheric conditions.
- Odour emitted during inversion events where calm to low wind speeds occurred tended to be more significant at locations closer to the refinery, with stronger and more consistent winds required to drive odours further from the sources.
- A comparison of odour observations reports from the 2015 Envall study (*Alcoa Wagerup: Wagerup Odour and VOC Monitoring and Modelling Plan Field Odour Surveys*, was carried out from 18 June to 20 July 2015 as a vacuumed pump exhaust project) and this Odour field assessment suggests no significant change in the spatial extent of odour impacts has occurred since that time.

5.2.3 DWER technical review

Whilst the department is supportive of the proposed infrastructure changes at the refinery, which are designed to reduce odour and aide emissions sampling, the approach taken in the odour field assessment (Strategen-JBS&G 2020) to assess the changes to refinery emissions is considered to be too simplistic and there are a number of issues present with the data and calculations as submitted, including:

- a net reduction in odour emissions resulting from the emission reduction project is calculated for average emissions only. Notwithstanding, the net odour emissions reduction for the site is likely to be difficult to accurately validate owing to the uncertainties inherent in odour emission rate measurements, the apparently high variable nature of emissions from the various odour sources and the number of sources that have poorly characterised emissions; and
- the estimated 0.98% site-wide average odour emissions reduction has large associated uncertainties (odour emission rate measurements and verification to be conducted as per the environmental commissioning plan will address some, but not all, of this uncertainty), making accurate verification of the offsets required under MS 1157 difficult to achieve.

6. Risk assessment

The department assesses the risk of emissions from prescribed premises and identifies the potential source, pathway, and impact to receptors in accordance with the *Guideline: Risk Assessments* (DWER 2020a).

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.

6.1 Source-pathways and receptors

6.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this decision report are detailed in Table 4 below. Table 4 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 4: Proposed applicant controls

Emission	Sources	Potential pathways and impacts	Proposed controls
Construction			
Noise	Construction and installation works	Air/windborne pathway causing impacts to amenity	No controls specified.
Operations and commissioning			
Odour VOCs	Vapors from the slurry storage tanks	Air/windborne pathway causing impacts to amenity	<p>Slurry tank 25A-2 and 4 vapours are being diverted to the boilers, via the 35N system, for thermal destruction</p> <p>Addition of a seal pot with level monitoring and control room alarms.</p> <p>Block valve does not open until boiler is at operating above 1200°C</p> <p>Non condensable gases are not introduced to boilers until online and operating normally / stable.</p> <p>Drain legs being installed to reduce fugitive emissions.</p> <p>Four stack sampling for odour, acetaldehyde, acetone, 2-butanone, velocity, temperature, carbon dioxide, oxygen, and moisture for the following:</p> <ul style="list-style-type: none"> Vent flow from 25A to 35N isolated, for boilers 2 and 3 and vent 25A-2 and 25A-4. Vent flow from 25A to 35N restored for Boilers 2 and 3. <p>Odour testing in accordance to AS/ANS 4323.3:2001 of 25A-2 and 25A-4 slurry storage tanks.</p>

Emission	Sources	Potential pathways and impacts	Proposed controls
Noise			Predicted fan noise in the new ducting are 56 dB(A) at 1m from the duct.
Condensate mercury	Residual mud and condensate within the 35N system from the diversion of vapours from the slurry storage tanks to the powerhouse boilers.	Leaks and spills contaminating soil and infiltrating and contaminating groundwater.	Designed mercury trap (collection point) in knockout pot to collect mercury. Mercury removed by controlled waste contractor, Mercury is disposed off-site at a licenced disposal facility.

Receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020a), the delegated officer has excluded the applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies and is provided for under other state legislation.

Table 5 below provides a summary of potential human receptors that may be impacted because of activities upon or emission and discharges from the proposed works.

Table 5: Sensitive human and environmental receptors

Human receptors	Distance from prescribed activity
Seven private residential dwellings	1.7 to 4.1 km from the source on the premises
Hamel town site	4.2 km north from the source on the premises
Yaloop town site	3.4 km south from the source on the premises

6.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020a) for each identified emission source and consider potential source-pathway and receptor linkages as identified in Section 6.1. 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 6.1), 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 6.

Works approval W6607/2021/1 that accompanies this decision report authorises construction and time-limited operations. The conditions in the issued works approval, as outlined in Table 6 have been determined in accordance with *Guidance Statement: Setting Conditions* (DWER 2020b).

Table 6: Risk assessment of potential emissions and discharges from the premises during construction, commissioning, and operation

Risk event					Risk rating ¹ C = consequence L = likelihood	Conditions ² of works approval	Reasoning
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls			
Construction works							
Construction and installation of duct pipe work, valving, replacement stacks, stack sampling point and knockout pot for the connection of the existing 25A 2 and 25A 4 tank vents into the existing 35N system	Noise and fugitive dust	Air/windborne pathway causing impacts to amenity	Seven private residences 1.7 to 4.1 km away, townsites of Yarloop located 3.4 km, Hamel 4.2 km and Waroona 6.3 km away from the refinery source.	No controls	Local scale minimal to amenity C = Slight Risk event will probably not occur in mist circumstances L = Unlikely Low Risk	No conditions	The delegated officer considers there is sufficient separation in place (>1.7 km to nearest human receptor, >3.4 km to nearest town), and therefore does not reasonably foresee that noise and dust from construction works will impact on the amenity or health of off-site human receptors.
Commissioning and time limited operations/full operations							
Vapors from the slurry storage tanks being directed to the powerhouse boilers for thermal destruction.	Odour	Air/windborne pathway causing impacts to amenity	Seven private residences 1.7 to 4.1 km away, townsites of Yarloop located 3.4 km, Hamel 4.2 km and Waroona 6.3 km away from the refinery source.	Applicant will complete four sampling events for odour for the boiler 2 and 3 and 25A-2 and 25A-4 in accordance with AS/ANS 4323.3:2001. Operational procedures for the 35N reticulation, tank levels and boilers will be implemented and a seal pot with alarms and drain legs on the 35N system will be installed. Refer to Table 4.	Low level impact to amenity C = Minor Risk event will probably not occur in mist circumstances L = Unlikely Medium Risk	Condition 1 Condition 6 Condition 7 Condition 7	Alcoa has predicted that total refinery odour emissions will decrease by 0.98% due to the diversion of vapours from slurry storage tanks 25A-2 and 25A-4 to boilers 2 and 3 for thermal destruction. Whilst the delegated officer is supportive of the emissions reduction project, it is considered the estimated site-wide average odour emissions reduction has large associated uncertainties which are inherent in odour emission rate measurements. The delegated officer notes Alcoa has proposed to conduct odour emission rate measurements and verification during the environmental commissioning phase, however, considers accurate verification of any actual reduction in odour emissions is going to be difficult to achieve owing to said uncertainties, in addition to the apparently high variable nature of emissions from the various odour sources and the number of sources that have poorly characterised emissions. As the emissions reduction project is not being used to actively support any increases in refinery production at this time, the delegated officer is of the view the project is acceptable as there will be no net increase in odour emissions (may result in slight reduction) and therefore will not increase the existing risk profile of air emissions at the premises. The odour emission rate measurements and verification conducted during environmental commissioning will be reviewed by the department, to determine the effectiveness of the proposed changes to the venting of the 25A-2 and 25A-4 slurry storage tanks and for the accuracy and reliability of this data in comparison to the predicted 0.98% reduction in site-wide odour emissions.
	VOCs combustion gases and metals				Low level impact to amenity C = Minor Risk event will probably not occur in mist circumstances L = Unlikely Medium Risk	Condition 1 Condition 6 Condition 7 Condition 7	Alcoa has predicted that total refinery VOCs emissions will decrease by 6.2% due to the diversion of vapours from slurry tanks 25A-2 and 25A-4 to boilers 2 and 3 for thermal destruction. Whilst the delegated officer is supportive of the emissions reduction project, the prediction approach taken by Alcoa to assess changes to VOC emissions appears to be too simplistic and therefore the accuracy of the emission reduction estimations is uncertain. It appears the estimations are based on comparisons between the 2002-2007 VOC measurements (highly conservative) and the 2018 emissions inventory (Alcoa 2020), in which these datasets are not directly comparable and consequently the emissions reductions appear to be overestimated. It is also unclear how average and peak emissions have been accounted for. The delegated officer notes Alcoa has proposed to conduct validation stack testing both before and after the changes to vent flow to the 35N system during the environmental commissioning phase. It is recommended that any emissions reduction verification program includes verification at several production levels, including final approved throughput. As the emissions reduction project is not being used to actively support any increases in refinery production at this time, the delegated officer is of the view the project is acceptable as it may reduce VOC emissions, and therefore will not increase the existing risk profile of air emissions at the premises. The VOC measurements and verification conducted during environmental commissioning will be reviewed by the department, to determine the effectiveness of the proposed changes to the venting of the 25A-2 and 25A-4 slurry storage tanks and for the accuracy and reliability of this data in comparison to the predicted 6.2% reduction in site-wide odour emissions.
	Noise			No controls	Local scale minimal to amenity C = Slight Risk event will probably not occur in mist circumstances	No conditions	Predicted noise levels from the fan noise in the ducts are expected to be below 60 dB(A) at 1 m from the duct. These levels are insignificant and would not increase noise above the current operating noise levels of the refinery. The delegated officer does not reasonably foresee significant changes to existing noise levels from implementation of the project.

Risk event					Risk rating ¹ C = consequence L = likelihood	Conditions ² of works approval	Reasoning
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls			
					L = Unlikely Low Risk		
Residual mud and condensate within the 35N system from the redirection of vapours from the slurry storage tanks being diverted to the powerhouse boilers	Condensate mercury in a slurry waste	Leaks and spills contaminating soil and infiltrating and contaminating groundwater	Murray Groundwater below the premises with 14 groundwater users issued under the <i>Rights to Water and Irrigation Act 1914</i> , located within a 5 km radius from the source within the premises	Applicant will install knockout pot to collect mercury. Remove mercury by specialised controlled waste contractor and dispose off site at a licensed disposal facility. Refer to Table 4.	Low level impact to environment C = Minor Risk event will probably not occur in mist circumstances L = Rare Low Risk	Condition1 Condition 6	Alcoa has predicted about 0.5 kg/yr of mercury will be collected by a mercury trap included in the knockout pot design, for removal off-site by a licensed controlled waste contractor. The delegated officer does not consider this amount to be significant or something that warrants site specific regulation beyond the existing Controlled Waste regulations.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk Assessments* (DWER 2020).

Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department. Conditions 2, 3, 4, 5, 8,9,10,11,12 and 13 are administrative and reporting conditions.

7. Decision

The delegated officer is supportive of the proposal, which is aimed at reducing odour and VOC emissions from refinery operations, on the grounds it will not result in any net increase in emissions or increase the existing risk profile of air emissions at the premises.

The delegated officer considers there is environmental merit in the project, which involves redirecting vapours from two of the four existing 25A bauxite slurry storage tanks to the powerhouse boilers for thermal reduction, which may result in a reduction in odour and VOC emissions from this infrastructure below existing levels. The following is noted:

- the proposed changes are isolated and will not affect other refinery emission sources, as there are no interconnections between the 25A tanks and other individual processes;
- the boiler operational temperature is above 1,200°C and is already used for thermal destruction of VOCs and odour from other emission sources;
- construction and installation works will cause a short interruption (up to 3 weeks) to operations, where there may be increased intermittent local venting from some of the other emissions sources on the network, however this is not considered to be significant; and
- emissions reduction verification will be conducted by Alcoa during environmental commissioning, to verify the predicted emissions reductions.

The delegated officer is concerned the prediction approach used by Alcoa to assess changes to VOC emissions is too simplistic and therefore the accuracy of the emissions reduction estimates is unclear and may result in the emissions reduction being overestimated. In addition, there are concerns that accurate verification of any reduction in odour emissions may be difficult to achieve, owing to the large associated uncertainties inherent in odour emission rate measurements. However, this may be addressed, in part, by potential improvements in direct quantification of emissions. Alcoa is advised to consider other concerns with the proposed emissions reduction verification program raised in sections 5.1 and 5.2, such as conducting sampling at several production levels and ensuring that consistent sampling methods are used with clear data quality objectives.

However, the delegated officer notes the outcomes of the project are not being used to actively support any increases in refinery production at this time. The accuracy and reliability of any data gathered as part of this project, in terms of validating any reduction or offsetting of air emissions from the existing refinery, will need to be clearly demonstrated as part of any future licence application.

The delegated officer also notes this project has been assessed on its own merits and the outcomes do not provide any implied assurance or guarantee of future production increases at the refinery, which would be subject to a licence amendment application and a full merit and technical based assessment.

The delegated officer has considered concerns raised by CAPS, that any approval may not consider the broader environmental and social impacts of the refinery. However, the delegated officer must only consider risks of emissions or discharges arising specifically from, or in directly connected to the proposed infrastructure changes, subject of the works approval application. The broader issues regarding site wide environmental and/or social impacts are considered through either Ministerial Statement processes under Part IV of the EP Act or under Part V through a licencing or licence amendment process.

7.1.1 Works approval and licence amendment

Works Approval W6607/2021/1 that accompanies this report authorises construction and installation works only. The conditions in the issued works approval, as outlined in the above risk table have been determined in accordance with the *Guideline: Setting Conditions* (DWER 2020b).

A licence amendment is required to authorise ongoing emissions associated with the redirection of the 25A tank vapours. A risk assessment for the operational phase has been included in this report, however licence conditions will not be finalised until the department assesses the licence application. Conditions will be imposed to ensure day-to-day operations do not pose an unacceptable risk of impacts to on- and off-site receptors, and to address the concerns raised in public submissions.

7.1.2 Applicant comments on draft decision

The applicant was provided with drafts of the works approval and this report on 9 May 2022 and provide comment on 29 June 2022, those comments are outlined in Appendix 1. Alcoa were provided an updated draft and advised of no further comments on 29 July 2022.

8. Conclusion

Based on this assessment, it has been determined the issued works approval will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

9. References

1. Alcoa of Australia (Alcoa) 2020. *2018 Wagerup Refinery Emissions Inventory*, prepared for August 2019 section 46 review of conditions.
2. Department of Water and Environmental Regulation (DWER) 2020a, *Guideline: Risk Assessments*, Perth, Western Australia.
3. DWER 2020b, *Guideline: Setting Conditions*, Perth, Western Australia.
4. DWER 2019, *Guideline: Odour emissions*, Perth, Western Australia.
5. JBS&G Australia Pty Ltd (Strategen-JBS&G) 2020. *Odour Field Assessments – Wagerup Refinery*, report prepared for Alcoa, November 2020.

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

Condition	Summary of applicant's comment	Department's response
Decision Report comments		
Section 2.1	Current production in licence is 2.9 Mtpa, 2.4 Mtpa is an historical figure	DWER notes and correct the typo
Section 2.2	Installation of ducting and valves will occur between the new 25A tank vents and a common header rather than the 35N system.	DWER notes and update the decision report.
Section 2.3.2 Table 1	4A and K should read A and K	DWER notes and update the decision report.
Section 5.1.2	Several repeating paragraphs and incomplete sentence and Alcoa are unsure about the phrase Table 3 are between 192 and 538°C.	DWER notes this and has fixed the editing errors. 192 and 537°C refers to the combustion temperatures of the compounds (air emissions) listed in Table 3.
Section 5.1.2 and 5.1.3	Alcoa seeks clarification on how peak versus average emissions will be treated. Alcoa does not propose to reduce peak emissions, only average emissions for this project. Alcoa has assumed peak emissions occur when the 35N system is offline and all 25-A tanks vapours are emitted from tank vents.	DWER notes this information, and has added this information in section 2.2
Section 5.1.3 Table 3	Table 3 contains numerical errors.	DWER notes and updated Table 3 typo errors.
Section 5.1.3	Alcoa seeks clarification on VOC emission reduction estimates. VOC emission estimates are based on 2018 emission inventory. The data for the inventory relevant to 25A is based on monitoring between 2002 and 2007. The estimated percentage reductions for VOC differ from odour. Because the emission from the 25A-2 and 25A-4 represent a higher portion of the total refinery VOC than odour emissions. This is not related to whether all tanks are included in the proposed post expansion stack testing program.	DWER notes this information, however it is up to Alcoa to demonstrate emission reduction. Alcoa has assumed that odour/VOCs emissions from the 25A-1, 25A-2 and 25A-4 tanks are the same, however, based on process information provided by Alcoa (from the data Alcoa refers to) the emissions from these tanks are not all the same. It is therefore recommended all the 25A tanks are included in the proposed post-expansion stack testing program to demonstrate emission levels and changes.
Section 5.1.3	Alcoa seeks clarification on the proposed sampling method for VOCs. Alcoa proposes to use USEPA SW846 Method 0011 and not the historically used USEPA Method 18. Alcoa notes the methods are different but considers that Method 0011 is more accurate. Alcoa will not use the historic data to calculate emission estimates in isolation and will use data from the proposed sampling program to calculate emission	DWER notes this information. It is up to Alcoa to demonstrate that emission reductions have been reduced using accurate data. Should Alcoa use data from differing methods, it is up to Alcoa to demonstrate that acceptable methods and analysis has been applied when using this data.

Condition	Summary of applicant's comment	Department's response
	reductions.	
Section 5.1.3	Alcoa seeks clarification on sampling of all 25A tanks.	See responses above.
Section 5.1.3	Alcoa seeks clarification on fugitive area source odour and VOC emissions. Fugitive area source emissions are not included within this project. An independent program measuring VOCs will be incorporated into the existing emission inventory and results provided to DWER in time.	DWER notes this information but cannot comment on information not submitted.
Section 5.2.3	Alcoa seeks clarification around measurement uncertainty about odour.	DWER notes this information. DWER roles is to assessment information submitted, not to provide advice on the measurement of emissions. Alcoa should seek clarification from a suitably qualified person independent from the process.
Section 6.1.1 Table 4 VOCs	In relation to Condition 6 Table 2 Item 4(a). Alcoa requests "temperature" is substituted with "conditions: in the statement "block valve does not open until boiler is at operating temperature"	DWER notes this and updates the decision report
Section 6.2 Table 6 VOC combustion gases and metals and Section 7	Alcoa seeks clarification of relationship of 25A tank emission with production. It has been documented in the Emission Inventory that emissions from non-combustion sources (25A tanks) do not vary with production.	The production levels refer to normal operation and peak operation levels. It is noted in the past that community odour emission complaints can be related back to peak emission production episodes. It is noted that emissions from non-combustion sources (25A tanks) do not vary with production.
Works approval comments		
Condition 1 Table 1 Item 1(b)	Alcoa prefer stack height is linked to relative level rather than above ground. These changes do not change the stack height.	DWER notes and updated condition.
Condition 1 Table 1 Item 1 (c)	Alcoa does not agree to the term periodic testing. While the sample ports will be installed as per AS4323.1 where practicable, sampling of these draft vented stacks may require method variations to complete sampling due to the low flow nature. Alcoa proposed the inclusion of the phase 'where practicable' rather than 'to allow periodic stack testing to occur.	DWER notes and refuses this request. Periodical is not enforceable, or outcome based. See DWERs Guidance Statement-Setting Conditions (2015)
Condition 1 Table 1 Item 2	Boiler 1 is incorrectly references.	DWER notes and updated condition.
Condition 4	Alcoa can not comply with this condition for TLO. In the construction methodology the plan is to lower the operating level of the tanks but not remove the tanks from the circuit. TLO would be triggered during construction and not after the environmental	DWER notes Alcoa's concerns. However, upon installing the new equipment their must be a stop and start phase to review the effectiveness of the new equipment. A pause in using the

Condition	Summary of applicant's comment	Department's response
	compliance report. Alcoa considered rewording TLO to include " <i>immediately upon installation/removal of any of the infrastructure</i> ".	new infrastructure will not stop or prevent the operations of the existing infrastructure conditioned in existing licence.
Condition 5	Alcoa believes that the condition will shut the refinery down if a licence is not granted within 120 days and exposes Alcoa to significant risk.	DWER notes Alcoa's concerns. This is a standard DWER reporting condition that provides 120 days of operation under TLO <u>or</u> until a licence is issued. The refinery will not be required to be shut down if DWER does not issue a licence within 120 days. However, based on Condition 7 reporting requirements request (see below) DWER has agreed to change TLO to 300 days of operations to ensure time there is adequate time to complete the air emission verification plan.
Condition 6 Table 2 Item 1	Alcoa cannot comply as the air quality verification plan requires sampling emissions with vapours not directed to the 35N and the condition does not allow for maintenance of connecting infrastructure including boilers. Alcoa recommends that the condition is changes and the phrases added " <i>except when required for sampling or any part of the connecting system is under maintenance.</i> "	DWER agrees and updated the condition.
Condition 6 Table 2 Item 3 (a)	The knockout pot with a mercury trap is connected to the 25A tanks prior to the 35N connection. This should be changed in the condition.	DWER agrees.
Condition 6 Table 2 Item 3 (b)	The risk assessment consider mercury as a low risk, Alcoa complies with all controlled waste movements and requests that the item is removed as all legal requirements are captured under <i>the Environmental Protection (Controlled Waste) Regulation 2004</i> and requests that the condition is removed.	DWER notes this information and will remove the condition and add a footnote to the table referring to the <i>Environmental Protection (Controlled Waste) Regulations 2004</i> .
Condition 6 Table 2 Item 4 (a)	Alcoa requests that the condition is removed as they cannot comply as Alcoa does not directly measure the temperatures in the boilers. Alcoa considers that the 35N system an approval system that does not consider additional controls at the boiler. The boiler burner management system monitors operations and detects if unhealthy combustion conditions and automatically shuts the VOC feed block valve.	DWER notes this request, but Alcoa has not provided sufficient information to define and measure what unhealthy combustion is. The temperature requirement will remain.
Condition 6 Table 2 Item 4 (b)	Alcoa believes that this condition intent is to shutdown the 35N system rather than the boilers and requests that 21 days can be non-consecutive and does not include normal maintenance activities that are already conditioned in the licence.	DWER agrees that the 35N system shall be shutdown rather than the boilers and will revise this condition within Table 2 Item 2 (b). DWER does not agree to changing the 21 days, a valid reason was not provided.
Condition 6 Table 2 Item 4	Boilers1 and 2 should be changed to Boilers 2 and 3.	DWER will change the typo.

Condition	Summary of applicant's comment	Department's response
Condition 7	Alcoa does not consider that 150 days (120 and 30) days sufficient time to implement the air quality verification plan and assess performance given the complexity of the plan, staff shortages from stack testing contractors and supply chain shortages of the required agents to complete testing. Alcoa recommends that '300 calendar days of the installation of the equipment listed in Table 1, or 30 days before the expiration date of the works approval, whichever is sooner'.	DWER note this request. DWER has considered the current lack of technical staff, and equipment / supply shortages and agrees to update Condition 5 (a) to reflect the 300 days of TLO operations. This is 300 days TLO and 30 days to submit a report on the TLO operations.
Condition 8 (b) (ii)	Alcoa will not be testing 25A-1 and 25A-3 as part of this works approval. The emissions will not change and are not part of the proposed emission reduction project.	DWER notes this information and will remove references to 25A-1 and 25A-3 in the condition. However, it is up to Alcoa to demonstrate emission reduction. Alcoa has assumed that odour/VOCs emissions from the 25A-1, 25A-2 and 25A-4 tanks are the same, however, based on process information provided by Alcoa (from the data Alcoa refers to) the emissions from these tanks are not all the same. It is therefore recommended all the 25A tanks are included in the proposed post-expansion stack testing program to demonstrate emission levels and changes.
Condition 8 (b) (iv)	Alcoa believes that the condition should refer to the mercury trap and not the knockout pot. The knockout pot itself does not collect mercury. The amount of mercury collected in the trap does not reflect the performance of the knockout pot.	DWER notes this information and will modify the condition to reflect the amount of mercury collected in the mercury trap and the performance of the knockout pot.
Condition 9	Alcoa request to have the complaints condition removed as they record complaints through their existing licence and this is a duplication.	DWER agrees.
Schedule 1 map	Alcoa request the map in Schedule 1 is replaced with a map that was used in works approval W6104/2017/1.	DWER notes this information. The premises map must outline the premises and where the proposed works will occur within the premise. Alcoa's preferred map is busy and does not clearly identify the area of the proposed works. Alcoa's map will not be included.
Schedule 1 Figure 2 Site layout map	Alcoa provided a site layout map	DWER will include the site layout map.