Government of Western Australia
Department of Water and Environmental Regulation

Decision Report

Application for Works Approval Amendment

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number	W5835/2015/1
Works Approval Holder	Iluka Resources Limited
ACN	008 675 018
File Number	DER2015/000690-1
Premises	North Capel Operations Yeardy Road CAPEL WA 6271 Legal description - Mining tenements M70/257, M 70/651 , M 70/959, M70/962, M70/970, M70/978, M70/990, M70/1083 and M 70/1128, M70/279, M70/386 & M70/1 082. As defined by the coordinates in Schedule 1 – Map Works Approval
Date of Report	14 January 2020
Date of Amendment	14/01/2020
Status of Report	Final

Contents

1 Purpose of this Document

This decision document explains how Department of Water and Environmental Regulation (DWER) has assessed and determined the application and provides a record of DWER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DWER's assessment and decision making under Part V of the *Environmental Protection Act 1986.* Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.

Works Approval amendment 2019

This amended descison report includes assessment for an aditional changes requested by the Works Approval Holder through a works approval amendment application lodged on 24 October 2019. The application details and assessments are addressed in section 7 of this document as such this decision report was amended to incorporate these changes.

In addition to this, the Delegated Officer has made minor format updates to the works approval and consolidated it with the amendments in an Amendment Notice issued in March 2018 (as detailed in the instrument log below).

Works Approval and works approval amendments issued to the Premises since 20/08/2015:

Instrument log table		
Instrument	**Issued**	**Description**
W5835/2015/1	20/08/2015	Works Approval issued for the construction of Synthetic Rutile (SR 1) stack.
W5835/2015/1	14/03/2018	Amendment Notice 1: Applicant initiated amendment to extend the expiry date of the Works Approval from 23/08/2018 to 23/08/2021.
W5835/2015/1	14/01/2020	On 25 October 2019 works approval amendment initiated by the applicant to change SR1 stack location and diameter of the stack exit gases.

2 Administrative summary

Administrative details		
Application type	Works Approval ☒ New Licence ☐ Licence amendment ☐ Works Approval amendment ☐	
Activities that cause the premises to become prescribed premises	**Category number(s)**	**Assessed design capacity**
	31 – Chemical manufacturing	380 000 tpa
Application verified Application fee paid	Date: 04/05/2015 Date: 15/05/2015	
Works Approval has been complied with Compliance Certificate received	Yes☐ No☐ N/A☒ Yes☐ No☐ N/A☒	
Commercial-in-confidence claim	Yes☒ No☐	
Commercial-in-confidence claim outcome		
Is the proposal a Major Resource Project?	Yes☐ No☒	
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986*?	Yes☐ No☒	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☐
Is the proposal subject to Ministerial Conditions?	Yes☒ No☐	Ministerial statement No:768 EPA Report No: 1244
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the *Environmental Protection Act 1986*)?	Yes☐ No☒ Department of Water consulted Yes ☐ No ☒	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes☐ No☒		
Is the Premises subject to any EPP requirements? Yes☐ No☒		

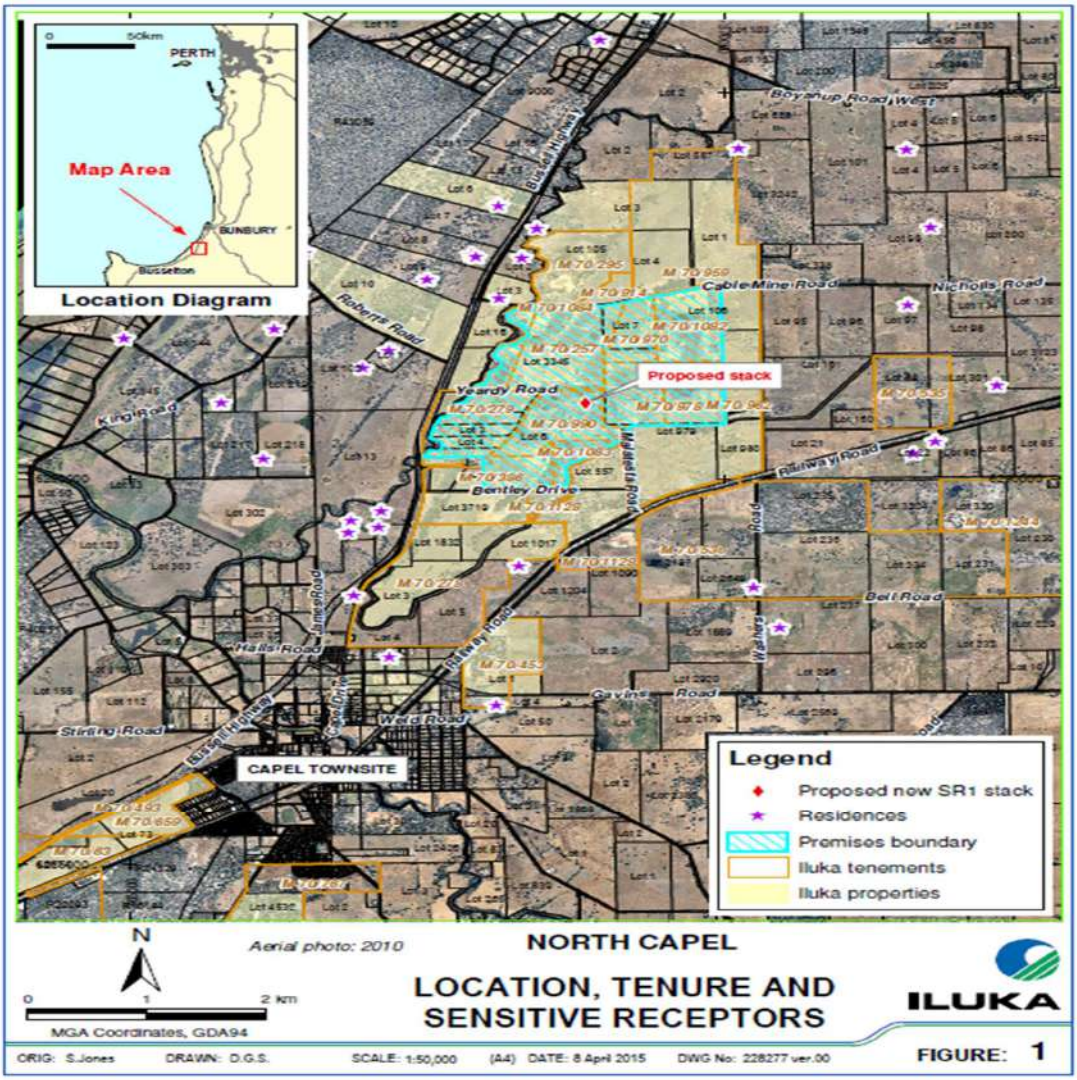
3 Executive summary of proposal and assessment

Iluka Resources Limited (the Works Approval Holder) North Capel Operations (the Premises) is a mineral sands processing facility located approximately 200 kilometres (km) south of Perth and 4.5 km north of Capel on Yeardy Road. The North Capel Processing Plant includes the North Capel Separation Mill (NCSM), two synthetic rutile production plants (SR1 and SR2) and associated residue disposal and water treatment facilities. Support processes include a co-generation plant, a char plant and the storage of process by-products.

This proposal relates to the synthetic rutile plants. In the SR plants, ilmenite is upgraded to synthetic rutile (SR). A rotary kiln is used to chemically convert (reduce) the iron oxides in the ilmenite to metallic iron, then impurities are removed using screening and magnetic separators. The reduced ilmenite is treated with ammonium chloride and aerated to 'rust' the metallic iron within the reduced ilmenite grain, converting it to fine iron oxides outside the original grain. The iron oxides are separated out using hydro-cyclones, then the porous, titanium rich SR particles are filtered and dried ready for sale. When producing some SR products, sulphur is added near the end of the kiln to convert manganese oxides and some of the remaining iron oxide in the ilmenite into manganese and iron sulphides, which are removed prior to filtering and drying, using concentrated sulphuric acid.

During the production of SR the kilns produce combustible gases which are burnt in high temperature chambers producing hot exhausts, which are a mixture of carbon dioxide, sulphur dioxide and water vapour. Particulates are then removed from the SR1 kiln gases by a wet scrubber and from the SR2 gases by an electrostatic precipitator. Wastes are then emitted to air via a number of stacks. Several changes to stack configuration have been made over time.

The Works Approval Holder proposes to install a new 110 metre (m) stack for the discharge of emissions from Synthetic Rutile Plant 1 (SR1). The proposed new SR1 stack will be located within the North Capel Processing Plant. Specifically, the new stack will be located near the SR1 plant, adjacent to the existing water treatment tanks. The closest residence is approximately 1.5 km north-west from the proposed new SR1 stack location (see Figure 1 and 2 below).



Under the current configuration SR1 kiln exhaust gases are directed to the existing 110m Synthetic Rutile Plant 2 (SR2) stack in combination with the SR2 kiln exhaust gases and SR2 dryer gases. SR1 dryer gases are currently emitted through a dedicated 35m stack. The installation of the new SR1 stack will allow the SR1 dryer exhaust gases and SR1 kiln exhaust gases to be redirected to the new separate stack, re-instating the original independent kiln exhaust gas configurations of the two SR plants. The current 35m SR1 dryer stack will be decommissioned.

The objective of the proposal is to improve operational control of the two SR plants, reduce the safety risks associated with SR1 and SR2 exhaust gases through the same stack, and to reduce odour impacts on the surrounding environment.

No new emission streams will be created through installation of the new stack and no change in process throughput will occur as a result of this proposal.

Commissioning and use of the stack is expected to commence shortly after completion of construction. Air quality is the key environmental factor for the proposal, specifically emissions of sulfur dioxide (SO_2), particulates, and odour.

4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987* and DWER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

DECISION TABLE			
Works Approval / Licence section	**Condition number** **W = Works Approval** **L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
Point source emissions to air including monitoring	W2 L2.2.1 – L2.2.7 L3.1.1 – L3.1.5 L3.2.1 – L3.2.4	DER's assessment and decision making are detailed in Appendix A.	Appendix A Application supporting documentation
Point source emissions to surface water including monitoring	N/A	No point source emissions to surface water are expected as a result of the proposed construction or operational aspects of the proposal.	Application supporting documentation
Point source emissions to groundwater including monitoring	N/A	No point source emissions to groundwater are expected as a result of the proposed construction or operational aspects of the proposal.	Application supporting documentation
Emissions to land including monitoring	N/A	No discharges to land are expected as a result of the proposed construction or operational aspects of the proposal.	Application supporting documentation

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
Fugitive emissions	N/A	Construction of the new stack has the potential to generate dust through vehicle movement and lift-off from exposed surfaces during dry and windy conditions. The nearest residence is approximately 1.5 km north-west from the proposed new SR1 stack location. Dust generated during construction will be managed as per dust generation from operational activities on the existing Premises, as described in the established dust management plan. Risk assessment*: Likelihood:* Unlikely*; Consequence:* Minor*; Risk:* Moderate No specific regulator controls are required under the Works Approval. The provisions of the *Environmental Protection Act 1986* apply.	Application supporting documentation *Environmental Protection Act 1986*
Odour	N/A	No odour emissions are expected as a result of the proposed construction. DWER's assessment and decision making regarding odour emissions during use of the new stack are detailed in Appendix A.	Application supporting documentation
Noise	N/A	No significant noise emissions are expected from this proposal. Some noise will be generated during the construction of the stack. The nearest residence is approximately 1.5 km north-west from the proposed new SR1 stack location. Construction noise will be managed under a Noise Management Plan for the construction in conjunction with the North Capel Noise Model. Risk assessment*: Likelihood:* Unlikely*; Consequence:* Minor*; Risk:* Moderate No specific regulator controls are required under the works approval. The provisions of the *Environmental Protection (Noise) Regulations 1997* apply.	*Environmental Protection (Noise) Regulations 1997*
Improvements	W3	An improvement condition has been included for the Works Approval Holder to submit a commissioning plan to the CEO prior to commencing commissioning of the Synthetic Rutile Plant 1 (SR1) New Stack.	N/A
Information	W4.1.1 – W4.1.4 W4.2.1	Conditions W4.1.1 – W4.1.4 requires the submission of compliance and commissioning documentation. Condition W4.2.1 requires notification to DWER for the commencement and completion of the 3 month commissioning period specified in condition W1.2.2.	N/A
Works Approval Duration	N/A	The Works Approval has been issued for a period 3 years to allow sufficient time for the project to be planned and constructed.	N/A

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
25/05/2015	Application advertised in West Australian (or other relevant newspaper)	No comments received	N/A
20/05/2015	Application referred to the Shire of Capel	No comments received	N/A
17/08/2015	Proponent sent a copy of draft instrument	Minor comments received	Comments incorporated in works approval

6 Risk Assessment

Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table 1: Emissions Risk Matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High

7 Amendment Application details - 2019

On 24 October 2019 Iluka Resources Limited (the Works Approval Holder) submitted an application to amend Works Approval W5835/2015/1.

The Application relates to a change to the location and internal stack tip diameter of the the synthetic rutile plant 1 (SR1) stack.

Table 2: Documents and information used during the amendment application assessment process

Document/information description used for assessment	Date of document
North Capel Operations: SR1 New Stack – Works Approval Application Supporting Information: Document Number: 1730663 *'Iluka Resources Limited North Capel Operations: Synthetic Rutile Plant 1 (SR1) New Stack Works Approval Application Supporting Information - April 2015'*	15 May 2015
Re: SR1 Stack Position - *Let_Iluka_2019_July30*.pdf - email	30 July 2019
DWER Application form: Application form: works approval, licence, renewal, amendment, or registration (v11, Feb 2019) RE: IMPACT OF DECREASING STACK TIP DIAMETER OF THE NEW SR1 MAIN STACK: Let_Iluka_2019_Oct22 – Air Assessment	24 October 2019

7.1 Application purpose and background

Works Approval W5835/2015/1 was issued on 20 August 2015 for the installation and operation of a new 110 metre high Synthetic Rutile Plant (SR1) plant stack at the Iluka North Capel Processing Plant.

The orginal design for SR1 stack was detailed in the Air Assessment Consultant's report 2015 *Iluka Resources Limited North Capel Operations Synthetic Rutile Plant 1 (SR1) New Stack Works Approval Application Supporting Information April 2015, Rev 0* – dated 21 April 2015. The following environmentally relevant specifications were provided for the approved SR1 stack (as per W5835/2015/1):

- Location: 368832mE and 6290983mN MGA Zone 50 GDA 1994
- Internal stack tip diameter: 2.52 m
- Average volumetric flow rate: 21 m³/second

7.1.1 Amendment Description

The Works Approval Holder proposes to relocate the proposed location of SR1 as shown in Figure 2 and install it with a smaller internal tip diameter. The Works Approval Holder submitted with the application a letter from their consultant – (*Let_Iluka_2019_July30 – Air Assessment)* advising that the new location of the stack, 40m SSW, would slightly decrease the predicted ground level concentrations at the locations where previous highest offsite concentrations were predicted.

The Works Approval Holder provided the following reasons for the proposed change to the stack location:

- the SR1 stack will be 40 meters further from the existing SR2 stack source to prevent overlaping plumes;
- that the two stacks (SR1 and SR2) will not be 'in line' (overlap) as much towards the receptors to the WNW direction where the highest ground level concetrations were predicted in the air emission modelling;
- a slight decrease in ground level concetrations of Particulates and SO_2;
- impact of SO_2 and particulate emissions at the sensive receptors are predicted to be well below NEPM guidelines; and
- the SR1 stack will be close to the redundent SR1 dryer stack and there will be no overlapping of plumes.

The Works Approval Holder proposes the following new environmentally relevant specifications of the SR1 Stack:

- Location: 368794mE and 6290960mN MGA Zone 50 GDA 1994 (technical drawing provided within Attachment 2).
- Internal stack tip diameter: 1.9 m
- Volumetric flow rate: Nominal 18 m³/sec, Max 21 m³/sec (actual dry flow rates at 0°C)
- Velocity flow rate: Nominal 16 m/sec, Max 22 m/sec.

Decision

On the basis of the information provided and the previous assessment, the Delegated Officer formed the view that the relocation and decrease in internal stack tip diameter is unlikely to alter the previously determined air emissions risk profile for SR1.

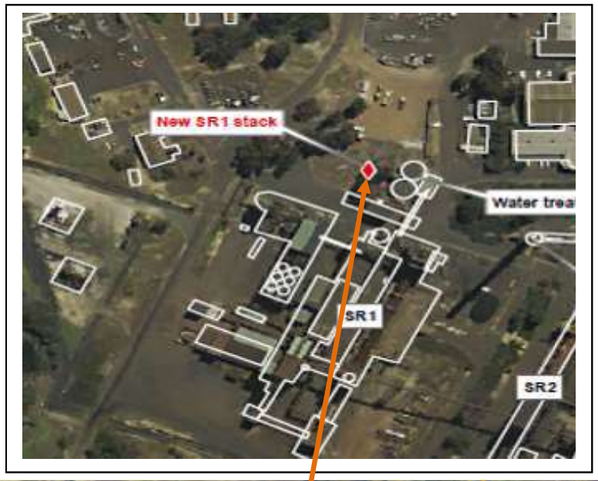
In accordance with Section 59 of the EP Act, the Delegated Officer has granted amendments to the works approval. Details of the amendments are set out in the form of an amended works approval.

Works Approval Holder's comments

The Works Approval Holder was provided with Draft amended Decision Report and darft consolidated issued Works Approval on 4 December 2019. The Works Approval Holder provided comments on 8 January 2020 and are summerised below.

Works Approval Holder's comments – 8 Janauray 2020	DWER decsion
Iluka would also like to advise that Figure 2 on Page 5 of the "W5835 Iluka N Capel - draft amended decision report" is referring to the previous location of the "New SR1 stack" and not the new location. Can this be amended as per that shown in the "W5835 Iluka N Capel Plant - draft amended works approval" document.	Figure 2 was removed in the final Decision Report.
Further to the previous email. It has been noted that the end date for the Works Approval has been set at 23/08/2021. Is it possible to have the standard three year duration starting from now? That is, ending January 2023. Given that the start date for the proposal has yet to be decided, and approved, one and half years may not be enough time.	DWER advises the Works Approval Holder that the expiry of issued Works Approval could not be changed at this stage. The issued Works Approval was previously extneded in August 2018. DWER advises the Works Approval Holder to apply for amendment closer to expriy date on 23/08/2021.

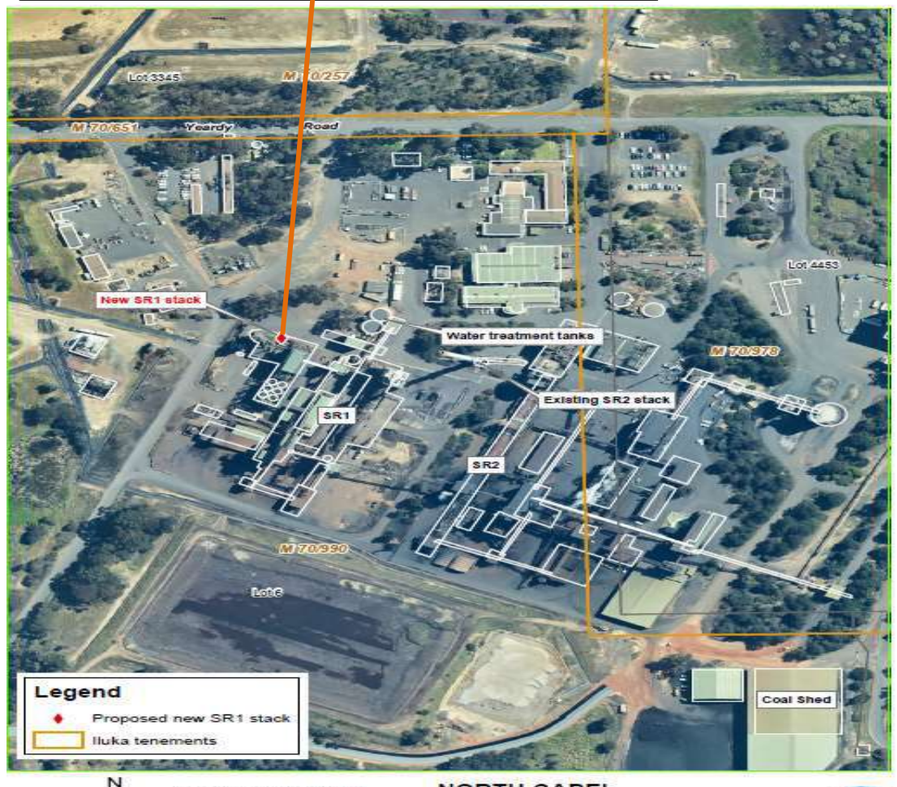
Figure 1: Previous proposed location for SR1 stack (2015)



Previously proposed location coordinates:
368,832mE and
6,290,983mN
MGA Zone 50

Figure 2: New proposed location for SR1 stack (2019)

New proposed location coordinates:
368,794mE and
6,290,960mN
MGA Zone 50
GDA 1994



Appendix A

Point source emissions to air including monitoring

No new emission streams will be created through installation of the new stack and no change in process throughput will occur as a result of this proposal. However the new stack will change the characteristics of the emission points (i.e. location, gas flow and height of release). Table 1 below details the current and proposed emission pathways associated with SR1 and SR2.

Table 1 – Kiln emission pathways (current and proposed)

Emission point	Current emission source	Proposed emission source
SR2 Main Stack (110m)	SR2 kiln SR2 dryer SR1 kiln	SR2 kiln SR2 dryer
SR1 New Stack (110m)	N/A	SR1 kiln SR1 dryer
SR1 Dryer Stack (35m)	SR1 Dryer	N/A

The proponent has modelled the potential effects on air quality of emissions to air from the new stack configuration using the United States Environmental Protection Agency's (USEPA) regulatory air quality dispersion model (AERMOD), which is accepted by DER as a suitable model. The way in which the proponent has used the dispersion model, the selection of input data, and the assumptions made have been reviewed and DER is satisfied that the modelling presents reliable conclusions on the predicted ground level concentrations of emissions. Meteorological data primarily derived from North Capel, with emissions derived from continuous emissions monitoring (CEMS) and periodic stack testing have been used in the model.

The results of the modelling are presented in the Tables 2 - 4 below and represent the maximum ground level concentrations predicted by the dispersion modelling.

Table 2 - Predicted Ground Level SO_2 Concentrations

Averaging Period	Criteria ($\mu g/m^3$) (1)	Required Statistic	Maximum Concentration ($\mu g/m^3$)			Percent of Criteria (%)		
			Outside Plant Boundary	Most Affected Residence	Social Club	Outside Plant Boundary	Most Affected Residence	Social Club
Existing - Using Probability Distribution of Emissions								
1-hour	570	Once Exceeded	392	185	200	69	32	35
1-hour	570	Twice Exceeded	385	175	195	68	31	34
1-hour	350	99.9th	330	125	150	94	36	43
24-hours	228	Once Exceeded	88	49	75	39	21	33
Annual	60	Average	4.9	2.0	3.6	8	3	6
Existing - 100th Percentile Emission Modelled as a Constant Emission – Maximum Emissions Continuously								
1-hour	-	Maximum	550 (2)	310 (2)	330 (2)	-	-	-
Future - Using Probability Distribution of Emissions								
1-hour	570	Once Exceeded	249	220	248	44	39	44
1-hour	570	Twice Exceeded	240	195	235	42	34	41
1-hour	350	99.9th	200	145	195	57	41	56
24-hours	228	Once Exceeded	77	59	71	34	26	31
Annual	60	Average	3.3	1.9	3.1	6	3	5
Future - 100th Percentile Emission Modelled as a Constant Emission – Maximum Emissions Continuously								
1-hour	-	Maximum	523 (2)	400 (2)	500 (2)	-	-	-

Notes:
1) Criteria are the NEPM standards. The 1-hour standard has a goal of no more than one day of exceeding the standard.
2) These concentrations are predicted by modelling at the maximum emission rates for both stacks for three years. As the probability of occurrence of maximum emissions from the main stack at 291g/s is only 0.0001 the likelihood of maximum emissions occurring at the same time as the worst case dispersive conditions is in essence negligible.

Table 3 - Predicted Ground Level Particulate Concentrations

Pollutant	Averaging Period	Criteria (µg/m³)	Required Statistic	Maximum Concentration (µg/m³)			Percent of Criteria (%)		
				Outside Plant Boundary	Most Affected Residence	Social Club	Outside Plant Boundary	Most Affected Residence	Social Club
Plant Alone									
Existing Plant									
PM_{10}	24-hours	50	Maximum	10	2.3	5	20	5	10
$PM_{2.5}$	24-hours	25	Maximum	3.8	0.95	1.9	15	4	8
	1-year	8	-	0.42	0.11	0.22	5.3	1.4	2.8
Future Plant									
PM_{10}	24-hours	50	Maximum	10	2.3	5	20	5	10
$PM_{2.5}$	24-hours	25	Maximum	3.4	0.9	1.8	14	4	7
	1-year	8	-	0.44	0.12	0.24	5.5	1.5	3.0
Including Background									
Existing Plant									
PM_{10}	24-hours	50	Maximum	29.6	21.9	24.6	59	44	49
$PM_{2.5}$	24-hours	25	Maximum	10.9	8.05	9.0	44	32	36
	1-year	8	-	6.52	6.21	6.32	82	78	79
Future Plant									
PM_{10}	24-hours		Maximum	29.6	21.9	24.6	59	44	49
$PM_{2.5}$	24-hours	25	Maximum	10.5	8.0	8.9	44	32	36
	1-year	8	-	6.54	6.22	6.34	82	78	79

Notes: Background concentrations are 19.6 µg/m³ (PM10 24-hour), 7.1 µg/m³ ($PM_{2.5}$ 24-hour) and 6.1 µg/m³ ($PM_{2.5}$ annual average).

Table 4 - Predicted H_2SO_4 and Cadmium Concentrations for the Future Plant

Pollutant	Impact Assessment Criteria			Predicted Concentration (µg/m³)		Percentage of Criteria (%)	
	Concentration (µg/m³)	Averaging Period and Statistic	Source	Plant Boundary	Most Affected Residence	Plant Boundary	Most Affected Residence
Sulphuric Acid	99.9th 1-hour	18	NSW	16	12	89	67
Sulphuric Acid	1-hour Max	120	OEHHA	21	16	17.5	13.3
Cadmium	99.9th 1-hour	0.018	NSW	9.0E-03	3.0E-03	50	16.7
Cadmium	Annual	0.005	OEHHA	2.5E-04	5.0E-05	5.0	1.0

Emission Risk Assessment – Operations

Emission Description

Emission: Particulate matter (PM) from the existing SR2 main stack and SR1 new stack.

Impact: Potential reduction in local air quality potentially below the ambient standard in the National Environmental Protection (Ambient Air Quality) Measure that allows for the adequate protection of human health and well-being. Potential nuisance/annoyance impacts on near-by residences due to deposition of dust on property. Possibility of smothering effects on vegetation from deposition on the ground.

Controls: The existing SR1 plant abatement equipment (wet scrubbers) and procedures will continue to be utilised when emissions are directed to the new stack. There will be no changes to the abatement equipment or procedures used on the SR2 plant or other associated processes.

Risk Assessment

Particulate modelling of existing and proposed emissions predicted that PM concentrations for the existing plant are well below the assessment criteria at the most affected resident, contributing a maximum 5% of the NEPM PM_{10} 24-hour standard. At the plant boundary the contribution is 20%, which occurs at the boundary to the SE approximately 200 m from the stacks. The proposed stack configuration results in little change in the predicted concentrations (see Table 3). Site monitoring data shows that the greatest contribution to ground level concentrations for PM comes from other low level sources on site (primarily the NCSM stack). These emissions continue to be regulated through the existing Licence.
Consequence: Minor
Likelihood: Unlikely
Risk Rating: Moderate

Regulatory Controls
No specific controls are considered necessary for the Works Approval. Licence L4557/1986/19 contains regulatory controls regarding dust emissions, including emissions limits. These will be applied to the new stack once commissioning is complete. Improvement Requirement IR1 (Works Approval condition 3.1.1) requires the Works Approval holder to prepare and implement a commissioning plan and submit a commissioning report (Works Approval condition 4.1.3). DER will review the commissioning report prior to amending the Licence to include the new stack to ensure that the data presented is consistent with the assumptions made in the assessment for this proposal.

Residual Risk
Consequence: Minor
Likelihood: Unlikely
Risk Rating: Moderate

Emission Description
Emission: Sulfur dioxide (SO_2) emissions from the existing SR2 main stack and SR1 new stack.
Impact: Potential reduction in local air quality potentially below the ambient standard in the NEPM that allows for the adequate protection of human health and well-being.
Controls: Process controls only (e.g. control and monitoring of sulfur inputs in to the kilns). Continuous monitoring of SO_2 is carried out on the SR2 main stack. No changes to the management of SO_2 are proposed through this Works Approval application.

Risk Assessment
The modelling has predicted that ground level SO_2 values outside the plant boundary will decrease, but at the nearest residence the concentration will increase slightly (from 32% to 39% of the 1-hour NEPM standard (see Table 2)). This has been attributed to the existing stack being at the same height as the proposed 110m stack, resulting is an interaction between the two plumes. The decrease at the plant boundary is also due in part to the diversion of the SO_2 emissions from the 35m SR1 dryer stack to the new 110m stack, which has better dispersion. The increase at distance has also been attributed to the emissions modelled for the future case being overstated due to the higher than expected process sulphur content inputs used within the data set.
Consequence: Moderate
Likelihood: Possible
Risk rating: Moderate

Regulatory Controls
No specific controls are considered necessary for the Works Approval. Licence L4557/1986/19 contains regulatory controls regarding SO_2 emissions, including continuous monitoring. These will be applied to the new stack once commissioning is complete. Improvement Requirement IR1 (Works Approval condition 3.1.1) requires the Works Approval holder to prepare and implement a commissioning plan and submit a commissioning report (Works Approval condition 4.1.3). DER will review the commissioning report prior to amending the Licence to include the new stack to ensure that the data presented is consistent with the assumptions made in the assessment for this proposal.

Residual Risk
Consequence: Moderate

Likelihood: Possible
Risk rating: Moderate

Emission Description
Emission: Volatile Organic Compounds (VOC), inorganic compounds and metals from the existing SR2 main stack and SR1 new stack.
Impact: Potential health impacts for residents of nearby receptors.
Controls: Process controls only. Due to the negligible predicted change in emissions (that are currently well below their respective assessment criteria) no additional management of these emissions is proposed.

Risk Assessment
The predicted concentrations for inorganics, Volatile Organic Compounds (VOCs) and metal concentrations were well below the model screening levels (see Table 4). For the proposed new stack configuration, assuming that the existing main stack emissions are split equally between the old and new 110m stacks, cadmium concentrations are predicted to increase slightly, whilst sulfuric acid (H_2SO_4) concentrations increase to 67% of the criteria at nearest residence and 89% at plant boundary. This increase is attributed to the lower plume exit velocities for the two 110m stacks when the SR1 kiln emissions are taken out of the existing 110m stack.
Consequence: Moderate
Likelihood: Possible
Risk rating: Moderate

Regulatory controls
No specific controls are considered necessary for the Works Approval and additional management actions have been proposed. Condition 2.2.7 in the current Licence prohibits the Licensee from venting acid leach gas (the primary source of H_2SO_4 emissions) unless it is necessary for the safe operation of the Premises. Licence condition 5.2.3 also requires the Licensee to report acid leach gas venting on a monthly basis. Improvement Requirement IR1 (Works Approval condition 3.1.1) requires the Works Approval holder to prepare and implement a commissioning plan and submit a commissioning report (Works Approval condition 4.1.3). DER will review the commissioning report prior to amending the Licence to include the new stack to ensure that the data presented is consistent with the assumptions made in the assessment for this proposal.

Residual Risk
Consequence: Moderate
Likelihood: Possible
Risk rating: Moderate

Emission Description
Emission: Odour emissions from the existing SR2 main stack and SR1 new stack
Impact: Nuisance/annoyance impact for local residents.
Control: The proponent states the proposal is expected to improve odour emissions from the site. Any future complaints received will be managed in accordance with site's incident management system which includes investigation of the issue to understand the root cause of the odour and identify actions to prevent reoccurrence where possible.

Risk Assessment
Indicative predictions of the likely odour levels were conducted using estimated odour emissions which have been derived by dividing the emission rates of the various emission species by their respective odour thresholds. The modelling indicated that the existing odour levels at the most affected residences are 64% of the 99.5th percentile odour criterion, with this just exceeded to the south-east of plant for several hundred metres. Of the sources, the existing smaller SR1 dryer stack is predicted to be the largest contributor. With the new 110m stack, the modelling showed that there will be a reduction in odour levels due to the removal of the existing 35m SR1 dryer stack as a source. At the most affected residences, the odours are predicted to reduce to 40% of the criteria and at the plant boundary to 72% of the criteria.
Consequence: Minor
Likelihood: Possible

Risk rating: Moderate

Regulatory controls
DER does not consider the odour modelling as critical for assessment of odour due to the limitations in the modelling assumptions and significant inconsistencies between the odour modelling contour results and the odour footprint. DER has records of complaints approximately 5km from the stacks; as such the modelling footprint significantly underestimates the complaint footprint. Emission data also shows significant levels of SO_2, hydrogen sulfide (H_2S) and Carbonyl Sulphide (COS) at the SR2 main stack and SR1 dryer stack. From an odour point of view, such high emission levels for compounds which have a very low odour detection threshold are a risk in regards to odour detected at ground level. Non-routine operations were also excluded from the modelling assessment because they were deemed rare or to occur for short periods of times. It should however be noted that under non-routine and upset conditions (especially during start-up periods and thermal oxidiser break-down events) there can be large volumes of untreated air emitted that are more likely to generate ground level odour impacts.

Improvement Requirement IR1 (Works Approval condition 3.1.1) requires the Works Approval holder to prepare and implement a commissioning plan and submit a commissioning report (Works Approval condition 4.1.3). DER will review the commissioning report prior to amending the Licence to include the new stack to ensure that the data presented is consistent with the assumptions made in the assessment for this proposal.

Given that the new stack configuration is unlikely to increase the risk of odour impacts from the site, odour impacts and complaints will continue to be managed through the existing Licence. If required additional controls can be implemented through a licence amendment. This could include the requirement for an Odour Management and Monitoring Plan (OMMP), which could include actions for non-routine emission management and control measures that can be implemented to monitor and minimise the risk of upset conditions on ambient air quality at sensitive receptors.

Risk Assessment
Consequence: Minor
Likelihood: Possible
Risk rating: Moderate