Decision Report

Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number	W6117/2018/1
Applicant	BHP Billiton Nickel West Pty Ltd
ACN	004 184 598
File Number	DER2018/00072
Premises	Kwinana Nickel Refinery 270 Patterson Road KWINANA BEACH WA 6167 Legal description - Lot 5 on Plan 18088 Patterson Road, KWINANA BEACH Certificate of Title Volume 2210 Folio 520
Date of Report	13 July 2018
Status of Report	Final

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1. Definitions of terms and acronyms

In this Decision Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
Decision Report	refers to this document.
Delegated Officer	an officer delegated under section 20 of the EP Act.
Department	means the Department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
m^3	cubic metres
PLNSP	Powder Leach Nickel Sulfate Plant
PM	particulate matter
PM_{10}	particulate matter that is smaller than 10 microns (µm) in diameter
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Risk Event	as described in *Guidance Statement: Risk Assessment*
tpa	means thousand tonnes per annum
TSP	total suspended particulates
$µg/m^3$	micrograms per cubic metre

2. Purpose and scope of assessment

On 9 January 2018 BHP Nickel West lodged a works application for the construction of a Powder Leach Nickel Sulfate Plant (PLNSP) on its Kwinana Nickel Refinery (KNR). The Applicant has also sought approval to "commission" and operate the new works upon completion of the works.

This report assesses the application and makes a determination to grant the application, subject to conditions.

2.1 Application details

The documents that form the application and Departmental Guidance Statements that have informed assessment of the application are set out in Attachment 1. The proposed PLNSP uses a chemical manufacturing process with a design throughput greater than the threshold specified in the EP Regulation. As such, the proposed works would make the premises prescribed (Category 31: Chemical manufacturing) under the EP Regulations in their own right. Also the proposed works trigger section 53 of the EP Act that requires them to be done in accordance with regulatory approval, principally because the works create five additional emission points for waste gases to be emitted to the atmosphere.

3. Background

The Applicant has since 1970 operated a nickel refinery in Kwinana (Category 44, Metal smelting or refining) and is the holder of an EP Act Licence for the premises (L8437/2010/3). The location of the KNR and the proposed works within the City of Rockingham are shown in Attachment 1, Maps 1 and 2. The Refinery is located within the Kwinana Industrial Area (KIA) near to other chemical manufacturing and heavy industrial sites.

The KIA is surrounded by a buffer, comprising native vegetation separating it from residential areas. The Applicant has advised that the KNR site is separated from Rockingham by a distance of 1.6 km to the south west, Hillman by a distance of 2.6 km to the south and Medina and Calista by a distance of 3.1km to the east.

The operations at KNR include the manufacture of hydrogen, hydrogen sulphide and ammonium sulfate to support nickel refining processes. The site also has workshops and administration areas. Utilities to support the site include a wastewater treatment plant, chemicals stores and a tailing storage facility in Baldivis. KNR uses natural gas for heating purposes, sources ammonia and sulfuric acid from nearby industries and supplies ammonium sulfate to local fertiliser manufacturers.

4. Overview of the proposed works

4.1 Operational aspects

The Applicant has applied for a Works Approval to construct a PLNSP to produce 22,000 tpa of nickel sulfate within the existing Refinery site.

The PLNSP consist of the following main process areas:

- Nickel storage;
- Nickel leaching;
- Aeration, purification and Ion Exchange;
- Crystallisation, Dewatering and Drying;
- Material handling, Product bagging and Storage; and
- Utilities and plant services.

Nickel powder from the Refinery is to be delivered to the PLNSP and then transported to nickel storage batching bins located directly above the leaching plant. The nickel powder is then

deposited into the nickel leaching tanks as a batch process. Six leaching tanks are proposed, each with a mixing agitator and steam heating coils. The tanks are sealed and the off-gas from these tanks is extracted to a wet scrubber. Once the nickel has reacted with the sulfuric acid in the leaching tanks, the nickel sulfate liquor is then transported to the Aeration, purification and ion exchange process. Here the nickel sulfate liquor is cleaned and impurities are removed. Emissions from this process are captured and extracted via a wet scrubber to atmosphere.

After the nickel sulfate liquor is purified it is pumped to the Crystallisation process. Here the liquor is processed to generate crystalline nickel sulfate hexahydrate. The nickel sulfate hexahydrate crystals are then separated from the liquor and dried prior to be transported to the Material handling area were the product is stored in a storage silo. From here the product is bagged and stored prior to being transported off site for the clients. Potential dust emissions from some points in this process are being captured through an air extraction system that extracts the air via a baghouse filter to atmosphere.

This proposal is predicted to have the following emissions and discharges, as shown in Table 2.

Table 2: Sources and controls of emissions and discharges

Source/description	Emission/discharge	Controls
Nickel powder delivery through conveyors and handling system	Nickel powder to atmosphere	Bag filter(s)
Leaching of the nickel in sulfuric acid	Nickel sulfate vapours to atmosphere	Scrubber
Leach train scrubber waste water bleed	Water with nickel sulfate	Wastewater transferred to main plant.
Aeration and filtration	Nickel sulfate vapours to atmosphere	Scrubber
Aeration and filtration scrubber wastewater bleed	Water with nickel sulfate	Wastewater transferred to main plant.
Aeration and filtration Seed Recycle Slurry Tank waste bleed	Wastewater with filtered out impurities	Wastewater transferred to main plant.
Ion Exchange and Filtration, Regen waste bleed	Wastewater with filtered out impurities	Wastewater transferred to main plant.
$Ni(OH)_2$ production waste bleed	Wastewater	Wastewater transferred to main plant.
Crystalliser	Nickel sulfate vapours to atmosphere	Scrubber
Crystalliser waste bleed	Wastewater	Wastewater transferred to main plant.
Final Product Handling and Bagging	Nickel sulfate particulates to atmosphere	Bag filter(s)

The Applicant has indicated that the wastewater will be processed within the existing treatment plant and that no changes are required to treat the additional wastewater from this proposal. All solid waste will either be processed within the existing plant or removed off site by contractors for reuse/disposal.

A process flow chart is presented in Attachment 1.

5. Legislative context

5.1 Other relevant approvals

5.1.1 Planning approvals

Applicant advised on 10 July 2018 that the Metro South-West Joint Development Assessment Panel approved the Application for Planning Approval on 1 June 2018, subject to conditions.

5.2 Part V of the EP Act

5.2.1 Applicable regulations, standards and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations. As mentioned earlier, the PLNSP is a Category 31 activity (Chemical manufacturing) and it also triggers section 53 of the EP Act as it creates additional emission point for wastes to be emitted to the atmosphere.

5.2.2 Works approval and licence history

Table 3 summarises the works approval and licence history for the premises.

Table 3: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
L8437/2010/3	30/10/2015	Licence reissued
L8437/2010/3	29/04/2016	Notice of amendment of licence expiry dates Section 59B(9) and Section 59(1)(k) Environmental Protection Act 1986 Licenced Prescribed Premises Licence duration extended to 30 October 2021

6. Modelling

6.1 Air emissions

The Applicant provided with the application modelling results of predicted air emissions at ground level at the nearest sensitive receptors after the completion of the works. The modelling results are presented in Table 4.

Table 4: Air emissions modelling results

Parameter	Period	PLNSP in isolation in ug/m^3	Refinery plus PLNSP as a whole in ug/m^3
TSP	24 hour	1	2
PM10	Annual	0.0030	0.01
Total nickel	24 hour	0.029	0.094
Total nickel	Annual	0.0019	0.0064

The air emissions modelling was reviewed and deemed sufficient to allow for the assessment of the Application.

6.2 Noise emissions

The Applicant also provided a noise modelling report with the application. The report was prepared by SVT engineering consultants. The noise modelling examined noise impact at noise sensitive receptors from the proposed works in isolation and in the context of the Refinery as a whole. The noise sensitive receptors that were chosen are the same as those in the Kwinana Industries Council (KIC) Cumulative Noise Model (KIC Kwinana Acoustic Model 2010, Herring Storer Acoustics, reference 12877-2-10086). The main focus of the assessment of noise emissions is the night time noise impact as this is the period that has the lowest assigned noise levels at the sensitive receptor and historically also causes the majority of complaints from residents if noise levels are too high.

Table 5 shows the Noise sensitive receptors with the assigned noise levels and the predicted noise levels at night time.

Table 5: Noise modelling results

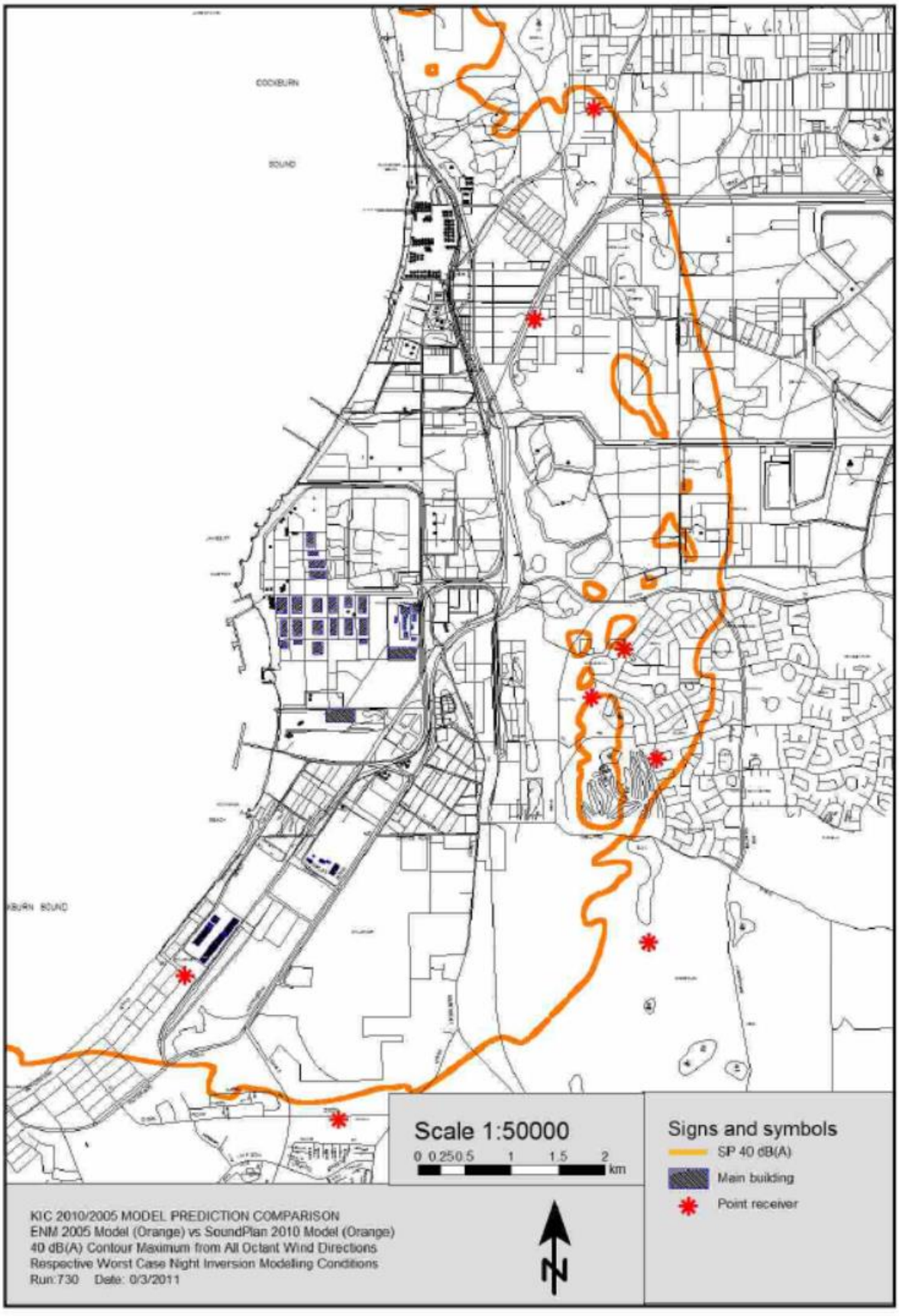
Noise sensitive receptor	Assigned noise level* (L_{A10} dB(A))	Predicted Levels (dB(A))			Change
		Existing Premises	PLNSP in separation	Final Premises	
Hillman	38	36.3	25.0	36.6	0.3
North Rockingham	38	30.9	19.8	31.2	0.3
Leda	37	33.5	21.5	33.8	0.3
Calista	35	33.0	20.8	33.3	0.3
Medina	39	31.9	19.6	32.1	0.2

** The assigned noise levels that are presented in Table 5 have been selected as the lowest assigned noise levels presented in Tables 3-2 and 5-1 of the SVT Noise modelling report (as there were some discrepancies between these tables, without an explanation of why there were discrepancies).*

The KIC cumulative model from 2010 was verified with noise monitoring and the modelling has provided a reasonable accurate picture of the noise impact on residential areas surrounding the KIA. Figure 1 shows the cumulative noise model impact of the 40 dB(A) contour surrounding the KIA. As can be seen in that figure, noise impact at Calista, Medina, Leda, North Rockingham and most likely also Hillman were at that time identified to be above the assigned noise levels. As such any site that causes noise impacts at these locations higher than the assigned noise level -5 dB(A) is a significant contributor.

The Delegated Officer considers that there may be a reasonable chance that the PLNSP in context of the Refinery as a whole may cause noise to rise above the assigned noise level in Hillman. The Delegated Officer is also aware that the Industries in Kwinana have since 2010 reduced noise emissions and that the Kwinana Industries Council is preparing to update the 2010 noise study.

Figure 1 – 40dB(A) noise modeling contour for worst case night time in KIA



7. Consultation

The Application was advertised for public comment on 12 February 2018. No comments were received.

8. Location and siting

8.1 Residential and sensitive Premises

The distances to residential and sensitive receptors are detailed in Table 6.

Table 6: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Residential premises North Rockingham	Approximately 1.6km to the south - south west
Residential premises Hillman	Approximately 2.6km to the south
Community recreation area (Wells Park)	Approximately 600m to the west - north west

9. Risk assessment

9.1 Determination of emission, pathway and receptor

In undertaking its risk assessment, DWER has identify all potential emissions pathways and potential receptors to establish whether there is a Risk Event which requires detailed risk assessment.

The identification of the sources, pathways and receptors to determine Risk Events are set out in Table 7 and Table 8 below.

Table 7: Identification of emissions, pathway and receptors during construction

Risk Events					Continue to detailed risk assessment	Reasoning
Sources/Activities	**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Construction of infrastructure	Noise	Residential premises in North Rockingham and Hillman	Air / wind dispersion	Amenity	No	Construction is not expected to have any noticeable impact on residents in North Rockingham because of the separation distance. The *Environmental Protection (Noise) Regulations 1997* apply.

Table 8: Identification of emissions, pathway and receptors during operation

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Operation of the PLNSP	Dust from the bag house filters	Nickel powder and nickel sulfate powder	Residential premises and recreation area	Air	Health impacts and amenity impacts	Yes	See under 9.4
	Aerosols from the scrubbers	Nickel sulfate aerosols	Residential premises and recreation area	Air	Health impacts	Yes	See under 9.4
	Noise from the PLNSP	Noise	Residential premises and recreation area	Air	Nuisance / Health impacts	Yes	See under 9.5
	Wastewater and chemicals	Spills	Soil underneath the premises and groundwater	Direct discharge	Contamination of soil and groundwater	No	Wastewater will be managed within the existing wastewater treatment system and chemicals are stored in accordance with a dangerous goods licence. As such the Delegated Officer believes that no further assessment is required.

9.2 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 9 below.

Table 9: Risk rating matrix

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 10 below.

Table 10: Risk criteria table

Likelihood		**Consequence**		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		**The following criteria has been used to determine the consequences of a Risk Event occurring:**		
			Environment	**Public health* and amenity (such as air and water quality, noise, and odour)**
Almost certain	The risk event is expected to occur in most circumstances	Severe	• **onsite impacts**: catastrophic • **offsite impacts local scale**: high level or above • **offsite impacts wider scale:** mid-level or above • Mid to long-term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **onsite impacts**: high level • **offsite impacts local scale**: mid-level • **offsite impacts wider scale**: low level • Short-term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid-level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	• **onsite impacts**: mid-level • **offsite impacts local scale**: low level • **offsite impacts wider scale**: minimal • Specific Consequence Criteria (for environment) are at risk of not being met	• **Adverse health effects:** low level or occasional medical treatment • Specific Consequence Criteria (for public health) are at risk of not being met • **Local scale impacts:** mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• Specific Consequence Criteria (for public health) are likely to be met • **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	• **onsite impact**: minimal • Specific Consequence Criteria (for environment) met	• **Local scale**: minimal to amenity • Specific Consequence Criteria (for public health) met

^ Determination of areas of high conservation value or special significance should be informed by the *Guidance Statement: Environmental Siting.*

* In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines.*

"onsite**"** means within the Prescribed Premises boundary.