



Review of Existing Premises

Part V, Division 3 *Environmental Protection Act 1986*

Licence Holder:	BHP Billiton Iron Ore Pty Ltd
ACN:	008 700 981
Licence Number:	L4513/1969/18
File Number:	DER2016/000596 DER2013/001083
Premises:	BHP Billiton Iron Ore Port Hedland Operations Nelson Point and Finucane Island Nelson Point Lease LGEI123403, Goldsworthy Rail Lease LGE M653978, Finucane Island Loop LGE I126342, Finucane Island Lease LGE J998595, PACE Wharf Lease K693809L, Utah Jild Lease K693814L, Harriet Point Lease K693808, Nelson Point Wharf Lease LGE I123400, Under Harbour Tunnel Lease K693815L, Finucane Island Substation Lease LGE G946533 PORT HEDLAND WA 6721
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Definitions

Term	Definition
AACR	Annual Audit Compliance Report
AER	Annual Environmental Report
Annual period	The inclusive period from 1 July until 30 June in the following year (as defined in the Existing Licence)
Category/Categories (Cat.)	categories of prescribed premises as set out in Schedule 1 of the EP Regulations
dB	decibel, a unit of measurement of sound level
dB(A)	A-weighted decibel, a unit of measurement of sound level weighted to reflect the frequency response of the human ear
Decision Report	this document
Delegated Officer	An officer under section 20 of the EP Act.
DEM	Dust Extinction Moisture
DWER	Department of Water and Environmental Regulation
DoH	Department of Health
ENRMP	Environmental Noise Reduction Management Plan
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
EP Regulations	<i>Environmental Protection Regulations 1987 (WA)</i>
FWRP	Freshwater Recycling Plant
HRA	Port Hedland Air Quality Health Risk Assessment for Particulate Matter (published by DoH, January 2016)
L _{A10}	A sound level exceeded for 10% of the time period over which the level is determined.
Licence Holder	BHP Billiton Iron Ore Pty Ltd
m ³	cubic metres
mbgl	metres below ground level
Minister	the Minister responsible for the EP Act and associated regulations

MS	Ministerial Statement
Mtpa	million tonnes per annum
NEPM	National Environmental Protection Measure
Noise Regulations	<i>Environmental Protection (Noise) Regulations 1997 (WA)</i>
OEPA	Office of the Environment Protection Authority
PM	Particulate Matter
PM10	particulate matter with an equivalent aerodynamic diameter of 10 micrometres (µm) or less.
Prescribed Premises	Premises prescribed under Schedule 1 to the EP Regulations
Premises	BHP Billiton Iron Ore Port Hedland Operations
Primary Activities	A defined in DWER's <i>Guidance Statement: Risk Assessments</i> to include the primary activities which fall within the description of the category of prescribed premises in Schedule 1 to the EP Regulations.
Review	This review of licence L4513/1969/18 for the BHP Billiton Iron Ore Port Hedland Operations
Risk Event	As described in <i>Guidance Statement: Risk Assessment</i>
TSP	Total Suspended Particulates
UD Regulations	<i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i>
µg/m ³	micrograms per cubic metre
WWTP	Wastewater treatment plant

1. Purpose and scope of assessment

This assessment of the licence for the BHP Billiton Iron Ore Port Hedland Operations (the Premises) was initiated by the Department of Environment Regulation (now Department of Water and Environmental Regulation, or DWER¹) as part of a wider review of Category 58 Premises within the Port Hedland port area. The purpose of these reviews is to apply a risk-based assessment approach consistent with DWER's *Guidance Statement: Regulatory Principles*.

¹ DWER was formed on 1 July 2017, through the amalgamation of the Department of Water (DoW), Department of Environment Regulation (DER) and the Office of the Environmental Protection Authority (OEPA). DER is only referred to in this Decision Report when discussing correspondence and reference documents issued by, or to the former department.

During the Review, BHP Billiton Iron Ore Pty Ltd (the Licence Holder) applied for an increase in bulk material loading throughput from 270 million tonnes of iron ore per annual period (Mtpa) to 290 Mtpa. This is planned to be achieved through further productivity based initiatives along with minor capital works. These works form part of the capital works proposed previously under the Licence Holder's Port Hedland Inner Harbour Debottlenecking (IHD) Project that have already been authorised under Works Approval W5792/2015/1.

The Licence Holder's amendment application has been taken into consideration as part of this Decision Report and Licence review.

2. Background

The Licence Holder operates six mine sites, two dedicated heavy haulage rail systems and two port facilities in the Pilbara Region in the northwest of Western Australia.

The Licence Holder maintains an Environmental Management System for its operations which is certified to ISO14001.

Licences for both Nelson Point and Finucane Island (licence numbers L4513 and L5445) were issued in the mid 1990's. Subsequent licences were reissued for the most part on an annual basis. The two facilities were amalgamated into the one Port Hedland Operations licence (L4513/1969/11) in November 2006 and Licence L5545/1968/6 was surrendered.

This Decision Report assesses the environmental risks of operating the prescribed premises categories at the throughputs identified in Table 1 below. In considering Category 58 activities at the Premises, this Decision Report assesses the risks associated with the Licence Holder's application to increase production throughput volumes from 270 Mtpa to 290 Mtpa.

Table 1: Prescribed Premises Categories in the existing licence

Classification of Premises	Description	Approved premises production or design capacity or throughput
Category 5	Processing or beneficiation of metallic or non-metallic ore: premises on which — (a) metallic or non-metallic ore is crushed, ground, milled or otherwise processed; or (b) tailings from metallic or non-metallic ore are reprocessed; or (c) tailings or residue from metallic or non-metallic ore are discharged into a containment cell or dam.	155 million tonnes per annual period
Category 54	Sewage facility: premises — (a) on which sewage is treated (excluding septic tanks); or (b) from which treated sewage is discharged onto land or into waters.	260.9 cubic metres per day
Category 58	Bulk material loading or unloading: premises on which clinker, coal, ore, ore concentrate or any other bulk granular material (other than salt) is loaded onto or unloaded from vessels by an open materials loading system.	270 million tonnes per annual period – increasing to 290 million tonnes per annual period
Category 61	Liquid waste facility: premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.	8,000 tonnes per annual period
Category 73	Bulk storage of chemicals etc.: premises on which acids, alkalis or chemicals that — (a) contain at least one carbon to carbon bond; and 1 000 m ³ in aggregate (b) are liquid at STP (standard temperature and pressure), are stored.	63,336 cubic metres in aggregate

3. Overview of Premises

3.1 Infrastructure

The infrastructure at the Premises, as it relates to Category 5, 54, 58, 61 and 73 activities, is detailed in Table 2 and with reference to the Site Plan (attached in the Revised Licence).

Table 2: BHP Billiton Iron Ore Port Hedland Operations infrastructure

Infrastructure		
Prescribed Activity Category 5		
<p>The Port Hedland Operation, consisting of both the Nelson Point and Finucane Island port facilities, is authorised under the Existing Licence to load up to 270 Mtpa of metallic (iron) ore to vessels, which is received via rail from the Licence Holder's inland mines. Once at the port, up to 155 Mtpa of the ore is unloaded through rail car dumpers and screened, sized and separated at one of three lump re-screening plants at Nelson Point (x2) and Finucane Island (x1) prior to stockpiling. Some ore is also blended in the stockpiles.</p> <p>A Temporary Screening Plant can also be mobilised between Finucane Island and Nelson Point to process smaller ore stockpiles that cannot be retrieved by reclaimers.</p>		
No.	Infrastructure	Map reference (refer to Licence)
1	Lump Rescreening Plants	Figure 3 and 4: Lump Rescreening Building 1, Lump Rescreening Plant No.2, LRP3
2	Temporary Screening Plant	Not shown (mobile)
Prescribed Activity Category 54		
<p>The Licence Holder operates sewage facilities at both the Nelson Point and Finucane Island operations. These facilities replaced historic infrastructure during the 2013 calendar year and have the capacity to treat a combined total of approximately 260.9 cubic metres per day (m³/day).</p>		
1	Nelson Point Wastewater Treatment Plant (WWTP)	NPI Sewerage Treatment Plant
2	Finucane Island WWTP	Waste Water Treatment Plant
3	Wastewater irrigation fields	Figure 1: L1, L2
Prescribed Activity Category 58		
<p>Ore is transferred either directly from rail car dumpers or reclaimed from the stockpiles at both Nelson Point and Finucane Island to iron ore ships by a large conveyor and ship loading system. Up to 270 Mtpa can be loaded using these open systems each year. The two ports; Nelson Point and Finucane Island, are linked by an underwater tunnel which allows ore to be transferred from Nelson Point to Finucane Island via a conveyor system.</p> <p>Berths G and H at Harriett Point, took the port capacity to 205 Mtpa. Berths E & F at Nelson Point were constructed as part of the Rapid Growth Project 6 (RGP6). Upgrades as part of the Port Hedland Inner Harbour Project (PHIHP) took the total port capacity to 240 Mtpa. Through further capital works and productivity based initiatives the Licence Holder will be capable of loading up to 290 Mtpa of iron ore.</p> <p>The ore handling operations at Nelson Point and Finucane Island are supported by a suite of dust suppression infrastructure such as wet scrubbers at transfer stations and car dumpers and maintenance/operations infrastructure including, but not limited to, belt wash stations at conveyors.</p>		

1	Ship loaders	Figure 3 and 4: Ship loader 1 to Ship loader 8 (inclusive)
2	Berths	Figure 3 and 4: 'A' Berth to 'H' Berth inclusive
3	Car dumpers	Figure 3 and 4: Car Dumper 1 to Car Dumper 5 (inclusive)
4	Stackers	Figure 3 and 4: Stacker No.5 to Stacker No. 12 (inclusive)
5	Iron ore stockpiles	Figure 3 and 4: 'A' Area, 'B' Area, 'F' Area, 'G' Area, 'H' Area, 'I' Area, 'K' Area, 'L' Area, 'M' Area, 'R' Area, 'S' Area, 'T' Area
6	Reclaimers	Figure 3 and 4: Reclaimer Nos. 5, 6, 7, 8 and 10
7	Water cannons	Not shown
8	Conveyors	Figure 3 and 4.
9	Transfer stations	Figure 3: TS1 – TS4, TS26, TS201, TS202, TS250, TS350, TS351, TS354, TS355, TS501 – TS505, TS513, TS515, TS560, TS563, TS602 – TS604, TS700, TS701, TS730, TS775, Figure 4: TS702, TS704, TS800, TS 801, TS807 – TS811, TS856, TS865, TS873, TS885, TS890, TS892, TS895 – TS897, TS901, TS910, TS911, TS913, TS914, TS950, TS952, TS981 – TS984
10	Mobile equipment eg. front end loaders	Not shown
Prescribed Activity Category 61		
<p>BHP Billiton Iron Ore's Port site produces an annualised volume of oily water of up to 8 ML/year from:</p> <ul style="list-style-type: none"> • Maintenance and servicing operations at the vehicle and locomotive workshops; • Stormwater egress into hydrocarbon storage areas; and • Drainage into sumps from vehicle and locomotive refuelling aprons. <p>Oily water at the Locomotive Service Shop is treated using a cyclonic separator package (Ultraspin Cyclonic Treatment System), consisting of a debris strainer, cyclone and decanted waste oil storage tank. There are also two triple-interceptor systems to treat stormwater from each of the west and east apron areas incorporating low and high flow outlets. Low flow stormwater and wash down water is pumped from the triple interceptors to the oily water separator (OWS) located further west along Nelson Point.</p> <p>The Nelson Point OWS is also used to treat hydrocarbon contaminated water from all other site operations. It is anticipated that the recently installed OWS will have sufficient capacity to treat water from all wash-down bays. The system can treat wastewater to achieve a Total Recoverable Hydrocarbon (TRH) content of 15 mg/L prior to being directed to the Nelson Point Freshwater Recovery Plant (FWRP). Dewatered sludge is disposed of offsite via a licensed contractor to an appropriate waste disposal facility</p> <p>Potentially hydrocarbon contaminated and sediment-laden stormwater from washdown sumps and oily water separators is further treated (through settlement of solids only) at one of two FWRPs for later</p>		

reuse around site. Surplus stormwater is discharged to the environment following treatment. The Nelson Point FWRP has final discharge points at W1 and W3 after settlement in three sedimentation ponds, while Finucane Island FWRP has a final discharge point at a constructed infiltration pond (W2). The requirement for the inclusion of Category 61 on the Licence is to allow for the transfer of liquid waste between Nelson Point and Finucane Island, which involves the transport of oily waste across areas accessible to other users. Therefore the Licence Holder requires controlled waste licensing for the transport of material which also requires a category 61 licence to satisfy r 39(1) of the *Environmental Protection (Controlled Waste) Regulations 2004*.

1	Freshwater Recovery Plants	Figure 3 and 4: FWRP, FWR Plant
2	Nelson Point oily water separator	Figure 1: P1
3	Discharge points	Figure 1: W1 – Nelson Point flop gate (discharge to Port Hedland Inner Harbour) W2 – Finucane Island gate (discharge to infiltration basin) L6 – FWRP Settlement Ponds

Prescribed Activity Category 73

In 2012, the Licence Holder conducted an inventory of hydrocarbon material stored onsite. The inventory revealed that, in total, 63,336 m³ of hydrocarbons is stored onsite and, subsequently, category 73 was included on the licence. The Main Fuel Farm at Nelson Point has a capacity of 62.6ML.

1	Main Fuel Farm (62.6ML)	Figure 1: F1
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Other infrastructure

1	Satellite fuel storage facilities located across Finucane Island and Nelson Point that have an approximate combined capacity to store 100 kL.	Not shown
2	Refuelling bays	Not shown
3	Plant 2 Wash Down Bay	Figure 1: L5

3.2 Exclusions to the premises

The following matters are out of scope of this assessment and have not been considered within the technical risk assessment detailed in this Decision Report:

- activities not directly related to Primary Activities, for example dredging;
- smaller storage facilities that do not significantly contribute to the overall volumes of hydrocarbon and chemicals stored onsite;
- individual wash-down bays; and
- individual refuelling areas.

Key Finding: The Delegated Officer notes the following:

- 1) Potentially contaminated stormwater from multiple wash-down and refuelling bays is pumped to oily water treatment facilities for removal of hydrocarbons before being directed to Freshwater Recovery Plants prior to reuse onsite or discharge to the

environment.

2) The Main Fuel Farm stores approximately 98.8% of total hydrocarbon and chemicals.

The Delegated Officer has determined that there are no anticipated emissions from wash-down and refuelling facilities during normal operation. Therefore the focus of the risk assessment, with regards to treated water discharges, will be at the Freshwater Recovery Plants.

The Delegated Officer has further determined that smaller hydrocarbon and chemical storage facilities present a negligible environmental risk during upset conditions when compared to storage at the Main Fuel Farm. Any hydrocarbons not contained within these areas are likely to be insignificant in volume and rapidly broken down in soils by bacteria. Storage at all facilities will need to satisfy the requirements of the *Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007*.

Discharges from wash-down, refuelling and minor storage facilities can be managed under the *Environmental Protection (Unauthorised Discharges) Regulations 2004* (UDRs).

3.3 Operational aspects

Ore processed at the Premises is sourced from a combination of mines, including Mt. Whaleback, Orebody 29/30, Yandi (Marillana Creek), Wheelarra Hill (Jimblebar), Orebody 18/23/25 and Mining Area C and Eastern Ridge. Ore is unloaded from trains at Nelson Point or Finucane Island through car dumpers, then either conveyed directly onto ships or, re-screened, sized and placed into stockpiles prior to ship loading. Reclaimers then scoop the ore from these stockpiles and transfer it via a conveyor and ship loader system to iron ore carriers for export.

The Licence Holder's port operations are an integrated ore handling system that includes unloading ore railed from the mines, re-screening, stockpiling (incorporating blending) ore to meet customer specifications, transferring, conveying, reclamation and loading of final ore product onto vessels.

4. Legislative context

Table 3: Relevant approvals and tenure

Legislation	Number	Subsidiary	Approval
<i>Iron Ore (Mount Newman) Agreement Act 1964</i> (WA)	No. 74 of 1964	BHP Iron Ore Pty Ltd	To approve an agreement relating to iron ore deposits at or near Mount Newman and related harbour developments.
<i>Iron Ore (Mount Goldsworthy) Agreement Act 1964</i> (WA).	No. 97 of 1964	BHP Iron Ore Pty Ltd	To approve an agreement relating to iron ore deposits at or near Mount Goldsworthy and related harbour developments.
Dangerous Goods Safety Act 2004	Dangerous Goods Licence DGS004828	BHP Iron Ore Pty Ltd	Approval for the storage of up to: <ul style="list-style-type: none"> • 63,340kL of class C1 combustible liquid (diesel fuel); • 3kL of compressed oxygen; • 6.48kL of liquefied petroleum gas (LPG); • 3kL of dissolved acetylene; and • 3kL of compressed gas (not otherwise specified).
Part IV of the EP Act (WA)	Statement Number 433	BHP Iron Ore Pty Ltd	Conditions for the upgrade of the Dust Management Program at

			Nelson Point and Finucane Island.
	Statement Number 740	BHP Billiton Iron Ore Pty Ltd	Conditions for the implementation of the Revised Dust Management Program for Finucane Island and Nelson Point Operations.
Part V of the EP Act (WA)	W5792/2015/1	BHP Billiton Iron Ore Pty Ltd	Port Hedland Inner Harbour Debottlenecking Project.
	W5611/2014/1		Installation of a temporary mobile screening plant.
	L4513/1969/18		Operation of the Premises.

4.1 Part IV of the EP Act

4.1.1 Background

The operations of the Premises have been the subject of assessments under Part IV of the EP Act and are subject to Ministerial Conditions under Ministerial Statements 433 and 740 (MS 433 and MS 740).

A third Ministerial Statement has been granted (Ministerial Statement 890) for the development of the Outer Harbour Development, which involves the construction and operation of stockyard infrastructure at Boodarie linked by conveyor to a piled jetty that extends approximately 4km in length. This Ministerial Statement has not been considered under this assessment as the Outer Harbour Development is not yet constructed.

4.1.2 Ministerial Statement 433

In July 1996, the Licence Holder undertook a Consultative Environmental Review for the upgrade of the Dust Management Program at Nelson Point and Finucane Island. Ministerial Conditions for dust management were issued on 14 November 1996 in MS 433. In August 2005, the Licence Holder notified the EPA of their intention to seek amendment to their Ministerial Conditions through revision of the Dust Management Program. The Licence Holder was advised that a change to the conditions could be progressed under Section 46 of the *Environmental Protection Act 1986*.

4.1.3 Ministerial Statement 740

The finalised Section 46 Amendment to MS 433 and revised Dust Management Program (entitled “Revision of the Dust Management Program for Finucane Island and Nelson Point Operations”) was submitted in September 2006. The revised Dust Management Program outlines the Licence Holder’s proposed dust management commitments, within the context of capacity expansions, expected to occur over the coming years and a commitment to continuously improve dust management. The amendments to dust management were approved by the Minister on 16 May 2007 in MS 740. The commitments made by the Licence Holder in the revised Dust Management Program had implications for the licence, particularly as they identify dust targets that provide the framework for continuous improvement.

On 9 July 2013, OEPA assessed a section 45C modification to update the dust monitoring site in MS 740 from the Hospital to the new Taplin Street monitoring site. This is the site that was selected as part of the Port Hedland Air Quality and Noise Plan.

4.1.4 Ministerial Statement 1070

On 6 January 2017 the Minister for Environment requested the EPA to inquire into and report on the matter of changing the implementation conditions of MS 433 and MS 740 under section 46 of the EP Act. The inquiry scope was limited to the matter of regulatory duplication between Parts IV and V of the EP Act.

On 6 November 2017 the EPA released Report 1608 which outlined the considerations of the

inquiry and a number of recommendations to the Minister for Environment. The inquiry primarily focused on the ability of DWER to regulate dust emissions from the Premises through Parts V and VI of the EP Act.

On 18 December 2017, the Minister for Environment published Ministerial Statement 1070 under Section 46 of the EP Act changing the implementation conditions of Ministerial Statements 433 and 740.

Condition 1 of Ministerial Statement 1070 deletes all implementation conditions of Ministerial Statements 433 and 740.

Condition 2 of Ministerial Statement 1070 states that the proposal may be implemented, subject to any licence issued to the proponent in relation to its operations on Finucane Island and Nelson Point, Port Hedland under Part V of the EP Act.

Key Finding: The Minister's determination to remove all implementation conditions from Ministerial Statements 433 and 740 has resulted in the Part V Licence (L4513/1969/18) being unconstrained by Part IV Ministerial Statement requirements.

4.1.5 EPA Bulletin No.2 – Port Hedland Noise and Dust

The EPA released Environmental Protection Bulletin No.2 – Port Hedland Noise and Dust, January 2009, as a result of concerns of health effects to residents within the town of Port Hedland from particulate matter smaller than 10 microns (PM₁₀) arising from sources such as dust. The EPA found that a coordinated government and industry approach to the development and execution of an integrated government and industry strategy (with explicit emission reduction strategies and explicit exposure reduction strategies) was required with strong and inclusive governance arrangements.

Environmental Protection Bulletin No.2 was replaced on 13 December 2016, by *Environmental Factor Guideline: Social Surroundings*, which broadly describes the information required for an Environmental Impact Assessment process under Part IV of the EP Act.

4.2 Port Hedland Dust Management Taskforce

The State Government established the Port Hedland Dust Management Taskforce (the Taskforce) in May 2009 to review existing reports and develop an integrated dust management plan for Port Hedland. The Taskforce is coordinated by the Department of Jobs, Tourism, Science and Innovation (DJTSI) and includes a range of industry and government members including DWER.

The Taskforce issued the *Port Hedland Air Quality and Noise Management Plan* (Management Plan) in 2010 to manage planning conflict between industrial growth and adjacent residential areas. The Management Plan was adopted by the Government and relevant to this report, recommended (DSD, 2010):

- adoption of interim air management criteria of 70µg/m³ (24-hour average) with allowance for 10 exceedances per calendar year at Taplin Street (residential street in Port Hedland); and
- the establishment of a State Environmental Policy for Port Hedland to monitor and manage noise using *Noise Regulation 17* exemptions where appropriate. This included the development of a cumulative noise model, defining the noise sensitive zones, clarifying planning measures and clarifying building standards.

4.2.1 2016 Report to Government

On 9 August 2017, the DJTSI released the *Port Hedland Dust Management Taskforce Report to Government (August, 2016)* (the Taskforce Report) for public comment. Recommendations

of the Taskforce Report applicable to DWER and the regulation of industry in Port Hedland include the:

- current interim guideline of 24-hour PM₁₀ of 70µg/m³ (+10 exceedances to accommodate natural events) continues to apply to residential areas of Port Hedland and that measures should be introduced to cap the number of permanent residents in dust affected areas of Port Hedland;
- implementation of a coordinated risk-based review and assessment for all port facilities in Port Hedland licensed under Part V of the EP Act;
- development and implementation of dust management guidelines for bulk handling port premises licensed under Part V of the EP Act;
- oversight of the ambient air quality monitoring network including data verification, storage and publication. The monitoring network will continue to be maintained and operated by the Port Hedland Industries Council (PHIC); and
- assessment of unacceptable noise levels and assess whether additional controls can be introduced as part of its coordinated risk-based review of all port facilities.

The Taskforce Report further considered changes to Town Planning Scheme No. 5 for Port Hedland's West End area. These changes include the creation of a Special Control Area to all areas west of McGregor and Lukis streets to rezone existing residential areas of the West End to mixed use and short stay accommodation areas (Figure 1). The objective of the Special Control Area is to prevent further permanent residential development west of Taplin Street and limit new sensitive land uses between Taplin and McGregor streets (Department of Planning, Lands and Heritage, 2017).

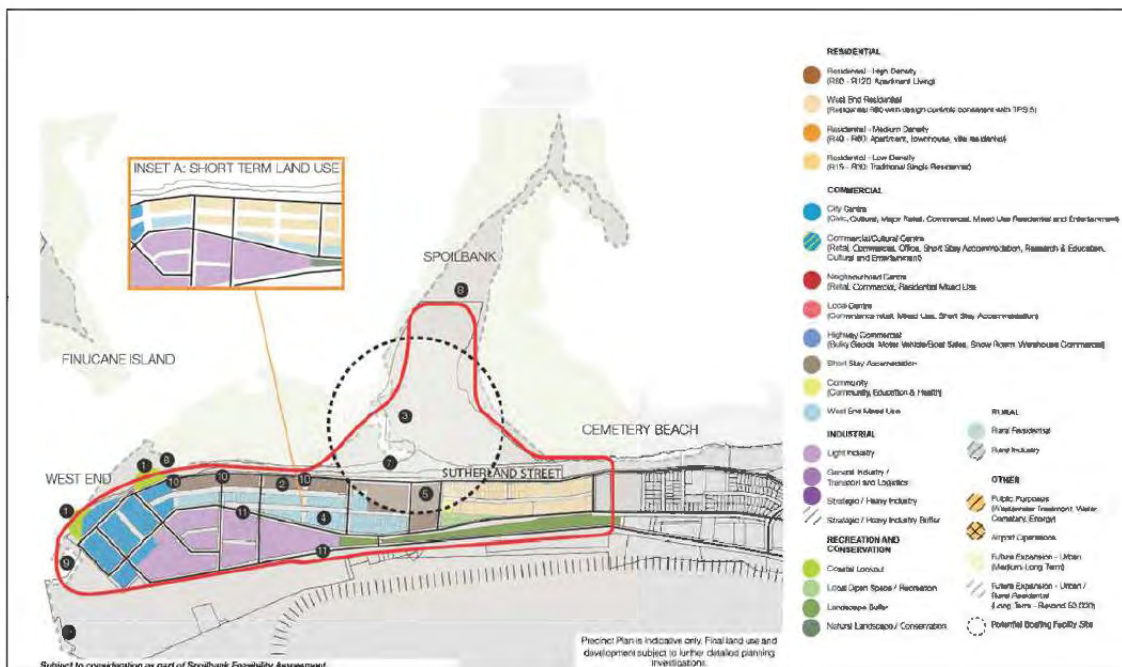


Figure 1: Proposed town planning scheme for Port Hedland's West End (Source: Town of Port Hedland, 2012)

4.2.2 Health Risk Assessment (HRA)

The Department of Health released the *Port Hedland Air Quality Health Risk Assessment for Particulate Matter* (HRA) in January 2016. The report provides the final health risk assessment for Port Hedland. The Department of Health also published the Port Hedland – Fact Sheet, which provide the summary findings of the study as follows:

- The HRA identifies that PM₁₀ concentration in ambient air decreases with increasing distance from the Port.
- During the period of the assessment, areas of Port Hedland closer to the port experienced dust exceedances (dust levels greater than 70µg/m³) more frequently than areas further away. The greatest number of exceedances in Port Hedland was recorded in the West End.
- Patterns of dust exceedances (dust levels greater than 70 µg/m³) dominate the West End of Port Hedland during the winter and spring. Dust sources during these periods are predominantly from the direction of the port and resources industry. However, bare earth such as the area known as the Spoilbank, regional dust storms and seasonal scrub fires also contribute to exceedances at particular times of the year and in response to certain meteorological conditions.
- The HRA confirms that there is sufficient evidence that increased levels of dust exposure can have an adverse impact on human health in Port Hedland over the long term. This is consistent with the broader scientific literature on the effects of dust on human health.
- The majority of the public health burden of dust in Port Hedland is associated with PM₁₀ concentrations over 70 µg/m³. These effects may be independent of any PM_{2.5} effects although this is not clear, due to the small population.
- Nevertheless, there is no immediate or acute health risk to the Port Hedland community – however the focus must now be on minimising peoples' exposure to dust.
- The number of affected individuals is very low, but only because the Port Hedland population is small (~5000 people).
- The HRA considered a number of dust exposure scenarios. One scenario of importance explores the health impact of the highest dust levels on the population. It asks the question: what adverse health outcomes are forecast if the whole population (~5000 people) of Port Hedland were exposed to the levels of dust experienced in the West End? The important health outcomes were predicted to be as follows:
 - Increase in long term mortality (premature death),
 - **1 additional death per year** in areas that frequently exceed 70 µg/m³
 - Cardiovascular disease
 - **1 additional death every 3 years** in areas that frequently exceed 70 µg/m³
 - Increase in hospital admissions associated with:
 - Respiratory disease for people over 65 years of age
 - **2 additional admissions per year** in areas that frequently exceed 70 µg/m³
 - Pneumonia and bronchitis.
 - **1 additional admission per year** in areas that frequently exceed 70 µg/m³
 - Increase in emergency room attendance for pre-existing respiratory conditions i.e. asthma, between 15 - 65 years of age
 - **3 additional admissions per year** in areas that frequently exceed 70 µg/m³

- Two other important exposure scenarios asked the questions what adverse health outcomes are forecast if the whole population (~5000 people) of Port Hedland were exposed to levels of dust :
 - not greater than 70 $\mu\text{g}/\text{m}^3$, and
 - not greater than 50 $\mu\text{g}/\text{m}^3$

The important health outcomes were predicted to be as follows:

- Increase in long term mortality (premature death),
 - **1 additional death every 3 years** for both scenarios.
- Cardiovascular disease
 - **1 additional death every 10 years** for both scenarios.
- Increase in hospital admissions associated with:
 - Respiratory disease for people over 65 years of age
 - **1 additional admission every 2 years** in areas not exceeding 70 $\mu\text{g}/\text{m}^3$
 - **1 additional admission every 3 years** in areas not exceeding 50 $\mu\text{g}/\text{m}^3$
 - Pneumonia and bronchitis
 - **1 additional admission every 4 years** in areas not exceeding 70 $\mu\text{g}/\text{m}^3$
 - **1 additional admission every 5 years** in areas not exceeding 50 $\mu\text{g}/\text{m}^3$
- Increase in emergency room attendance for pre-existing respiratory conditions i.e. asthma, between 15 - 65 years of age
 - **1 additional admission per year** for both scenarios.
- Based on the outcomes of these scenarios the HRA concluded that 70 $\mu\text{g}/\text{m}^3$ for PM_{10} provided a similar level of protection to the current population of Port Hedland as would the national standard for PM_{10} of 50 $\mu\text{g}/\text{m}^3$. This is because the population size and make-up influence the outcome; if the population were more than doubled and with more people that are more vulnerable, the health outcomes would be more prominent and demanding of more immediate regulatory control.
- The HRA recommended the dust levels (PM_{10}) should be managed so that 70 $\mu\text{g}/\text{m}^3$ is not exceeded in Port Hedland (except under exceptional circumstances).

The HRA considered the cumulative impact of all dust sources on the population of Port Hedland and the findings and recommendations apply to all industry and other sources of dust in Port Hedland. The information in this section should be read in conjunction with the HRA and the Department of Health's *Port Hedland – Fact Sheet* and not taken to apply solely to BHP's port operations.

Key Findings:

DWER has had regard to the proposed approach outlined in the Taskforce Report from Taskforce members and notes that it is currently being considered by the Government.

DWER will implement any future recommendations of the Government following consideration of the Taskforce Report which may include future reviews of the premises.

The Delegated Officer notes the findings of the HRA and the recommendation from the Department of Health that dust levels (PM_{10}) should be managed so that it does not exceed 70 $\mu\text{g}/\text{m}^3$ (except under exceptional circumstances such as natural events).

4.3 Contaminated Sites

Lot 3000 on Plan 51079 and Lot 125 on Plan 219861 (Finucane Island), Lot 6254 on Plan 35659 (Nelson Point) and Lot 370 on Deposited Plan 35619 known as the Port Hedland Port are all awaiting classification under the *Contaminated Sites Act 2003*.

Finucane Island has been registered with DWER's Contaminated Sites as a result of Potential Acid Sulfate Soils suggesting that works requiring excavation may need to be more carefully considered at this location. There are no proposed earthworks associated with the licence amendment application for 290 Mtpa.

4.4 Other Legislation

4.4.1 State Agreement Act

The Premises are held under the following State Agreement Acts:

- *Iron Ore (Mount Newman) Agreement Act 1964 (WA)*; and
- *Iron Ore (Mount Goldsworthy) Agreement Act 1964 (WA)*.

4.4.2 Department of Mines, Industry Regulation and Safety

The Inner Harbour is regulated by the Department of Mines, Industry Regulation and Safety (DMIRS) under the following legislation:

- *Mines Safety and Inspection Act 1994* and associated regulations; and
- *Dangerous Goods Safety Act 2004* and associated regulations.

4.4.3 Rights in Water and Irrigation Act 1914

Water is supplied by the Water Corporation from two pump stations known as Lot 954 (Nelson Point) and Lot 2519 (Finucane Island). BHBIO uses two Fresh Water Recovery Plants to supplement its water demands. The Licence Holder does not hold any *Rights in Water and Irrigation Act 1914* licences for activities at the Premises.

4.4.4 Noise Regulations

Environmental management of noise in Western Australia for fixed noise sources is regulated by DWER under the EP Act and Noise Regulations. These regulations specify maximum noise levels (assigned levels) that can be received at noise sensitive premises, commercial and industrial premises (Regulation 8). Rail noise is assessed with regard to the Western Australian Planning Commission's (WAPC) State Planning Policy 5.4 'Road and Rail Transport Noise and Freight Considerations in Land Use Planning' and is exempt from the Noise Regulations.

4.4.5 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the protection of matters of national environmental significance. This includes the protection of listed threatened species and listed migratory species from anthropogenic activities.

Six species of marine turtles have been identified within the vicinity of the Premises and are listed as matters of national environmental significance under the EPBC Act. See section 6.3.

4.5 Part V of the EP Act

4.5.1 Applicable Regulations, Standards and Guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations. DWER Guidance Statements which inform this assessment are:

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Land Use Planning (October 2015)*
- *Guidance Statement: Licence Duration (November 2015)*
- *Guidance Statement: Publication of Annual Audit Compliance Reports (May 2016)*
- *Guidance Statement: Decision Making (November 2016)*
- *Guidance Statement: Risk Assessment (November 2016)*
- *Guidance Statement: Environmental Siting (November 2016)*

4.5.2 Works Approval W5611/2014/1

Works Approval W5611/2014/1 was issued on 17 July 2014 to authorise the mobilisation of a temporary mobile screening plant to the Premises for the purposes of screening stockpiled fines material as part of a site cleanup initiative. The screening plant has a capacity of 350 tonnes per hour (tph). Ancillary equipment to the screening plant includes two front end loaders and two rear end tipping trucks.

Screened material will be trucked from the screening plant to be incorporated into the nearest live stockpile for reclamation and loading to vessels. On 25 May 2015 documentation was submitted to DER to demonstrate completion of works and compliance with the Works Approval W5611/2014/1, which is now inactive.

4.5.3 Works Approval W5792/2015/1

On 5 November 2015, DER issued Works Approval W5792/2015/1 to authorise upgrades to existing infrastructure, including expanding the Lump Rescreening Plant 2 (LRP2) on Finucane Island and route upgrades, which involves increasing conveyor speeds.

Works Approval W5792/2015/1 authorises the construction commissioning of route upgrades in the following two stages:

- **'Stage 1'** means construction of the following route upgrades:
 - Car Dumper 2 to Ship Loaders 5 and 6;
 - Car Dumpers 4 and 5 to Ship Loaders 7 and 8; and
 - Car Dumpers 4 and 5 to Stackers 9 and 10.
- **'Stage 2'** means construction of the following route upgrades:
 - Bucket Wheel Reclaimer 6 to Ship Loaders 5 and 6;
 - Car Dumpers 2 and 3 to Stackers 6 and 7;
 - Car Dumpers 2 and 3 to Ship Loaders 5 and 6;
 - Bucket Wheel Reclaimer 10 to Ship Loaders 7 and 8; and
 - Bucket Wheel Reclaimer 7 to Ship Loaders 7 and 8.

Further upgrades under Stage 2 include the replacement of Reclaimer 6 allowing a higher capacity (15,400tph, as opposed to 10,500tph) and the expansion of LRP2 from 6 to 8

screening bays, which will increase the screening capacity from 10,500tph to 13,500tph.

As part of route upgrades under Stage 1, dust fogging systems on select transfer stations (TS502, TS503, TS563, TS603 and TS775) and a noise wall on conveyor P10 were installed.

The Licence Holder has submitted a number of compliance documents providing notification of the completion of the majority of works associated with Stage 1. On 5 November 2017, the Licence Holder notified DWER that all works associated with Stage 1 had been completed.

4.5.4 Licence amendments

The existing licence version (L4513/1969/18) was last amended on 23 April 2015. This amendment was the result of an application by the Licence Holder for an increase in throughput at the port (Cat. 58) from 240 Mtpa to 270 Mtpa.

The Licences issued for the Premises since 22 November 2000 are provided in Table 4.

Table 4: Instrument log

Instrument log		
Instrument	Issued	Description
L4513/1969/18	23/4/2015	Amendment to increase capacity from 240 Mtpa to 270 Mtpa and allow the operation of the temporary screening plant and new oily water treatment system.
L4513/1969/18	7/11/2013	Licence reissue to REFIRE format.
L4513/1969/17	17/11/2012	Port Hedland Inner Harbour Project
L4513/1969/16	17/11/2011	Licence reissue
L4513/1969/15	17/11/2010	Licence reissue
L4513/1969/14	17/11/2009	Licence reissue
L4513/1969/13	17/11/2008	Licence reissue
L4513/1969/12	17/11/2007	Licence reissue
L4513/1969/11	17/11/2006	Licence L4513 and L5445 merged into one licence.
L4513/1969/10 L5445/1968/6	22/11/2005	Licence reissue
L4513/1969/9 L5445/1968/5	22/11/2004	Licence reissue
L4513/1969/8 L5445/1968/4	22/11/2003	Licence reissue
L4513/1969/7 L5445/1968/3	4/12/2002	Licence reissue
L4513/1969/6 L5445/1968/2	22/11/2001	Licence reissue
L4513/1969/5 L5445/1968/1	22/11/2000	Licence reissue

275 Mtpa Licence amendment application

On 10 March 2017, DER received a secondary application concurrent to the 290 Mtpa application aimed at authorising a smaller increase in production capacity prior to the end of the 2016/17 financial year. Production for the 2016/17 financial year was forecast to increase to between 265 and 275 Mtpa being beyond what was authorised in the licence.

Final Premises production volumes for the 2016/17 financial year reached 268 Mtpa.

Assessment of the application for 275 Mtpa was placed on hold at the request of the Licence Holder.

4.5.5 Compliance inspections and compliance history

There is no history of prosecution or formal statutory compliance or enforcement notices issued under the EP Act by DWER to the Licence Holder for the Premises.

DWER's Incident and Complaints Management System (ICMS) is the system used to record complaints received and potential non-compliances requiring investigation. Potential non-compliances and incidents recorded on the system since 2013 include:

- elevated PM₁₀ dust levels recorded at the Taplin Street monitoring site above interim air management criteria of 70µg/m³ (24-hour average);
- a pipe failure that resulted in a discharge to the Port Hedland Inner Harbour of approximately 2,000 to 5,000L of water from the FWRP launder;
- oily water spill of approximately 5,000 L from a wastewater tank near to the Locomotive Service Shop at Nelson Point. The spill was contained and no evidence of the spill reaching downstream water bodies;
- dust sprays not functioning properly on E/F berth;
- stormwater discharges exceeding Total Recoverable Hydrocarbon limits of 15 mg/L; and
- potential non-compliances with monitoring conditions on the licence (see below).

Compliance inspection

A compliance inspection conducted on 16 October 2014, identified no non-compliances with Licence conditions other than in relation to:

- Quarterly WWTP monitoring not being conducted at least 45 days apart on one occasion during Quarter 3 and Quarter 4. This was due to a safety incident that resulted in delays in monitoring for Quarter 3;
- Missing monitoring events during the reporting period for W1, W2 and W3 due to safety concerns and accessibility issues;
- Monitoring at L1 to L7 was not undertaken in March 2014 due to worker safety concerns.

Non-compliances only related to monitoring and were not found to have an environmental impact. A response to the inspection was received on 18 December 2014, acknowledging that contingency planning had been put in place to prevent missing monitoring events. The inspection was closed out on 28 January 2015.

Annual Environmental Reports

A requirement of the current licence is the submission of an Annual Environmental Report (AER), which includes an Annual Audit Compliance Report (AACR) by 28 October each year. Exceedances of ambient air quality targets at Taplin St are also reported in the AERs and AACRs each year (refer to Ambient Air Quality Monitoring section 4.6.2).

On 29 September 2017, the Licence Holder submitted an AER and AACR for the 2016/17 annual period. Compliance for this period has not been fully assessed at the time of finalising this Decision Report.

During the 2015/16 annual period the Licence Holder reported non-compliances with sampling requirements at the Nelson Point flop gate in October 2015 and at both wastewater treatment plants in June 2016. Sampling results at these locations during the remainder of the annual period demonstrated that each parameter sampled met targets applied in the Licence. No other non-compliances were identified.

Non-compliances were identified in the 2014/15 and 2013/14 AERs relating to the Licence Holder not complying with monitoring conditions and the exceedance of a licensed target for Total Suspended Solids at the Nelson Point WWTP irrigation field. However, prior to the end of the annual period target conditions had been removed and ongoing environmental impacts

are not anticipated.

The ability for the Licence Holder to achieve licence targets for dust controls to be operable when required is reported quarterly and discussed in below.

Quarterly Reporting - Dust control equipment availability

The Existing Licence requires the Licence Holder to target 90% availability of dust controls averaged over each month. The dust controls considered include boom sprays, dust collectors, belt wash station and bulk ore conditioning sprays. Availability this infrastructure is reported quarterly under the Existing Licence with the results of the 2016/17 annual period represented below:

- Quarter 1 – dust control equipment availability in July 2016 was 87% and 93% for August and September 2016;
- Quarter 2 – belt wash station availability in December 2016 was at 87% as a result of reduced water supply and upgrade works interference although overall availability over each month achieved the target;
- Quarter 3 – the overall availability target of 90% was met for the reporting period although continued water supply restrictions resulted in belt wash stations only being available 84% of the time; and
- Quarter 4 – overall availability was 88%, 87% and 88% for April, May and June 2017 respectively.

Over the 2016/17 annual period it was evident that belt wash stations were the least available equipment with approximately 86% availability over the annual period, increasing the risk of product carry back on the return conveyors. Bulk ore conditioning sprays were also consistently less available than other equipment, not reaching a 90% availability rate in 5 out of 12 months.

Ongoing limited water supply has been identified by the Licence Holder as the leading cause for not reaching availability targets. To rectify these issues the Licence Holder has commenced the upgrading of water lines across the Premises. Completion of works is due in March 2018 with ongoing works until that time expected to progressively increase the availability of dust control infrastructure.

4.5.6 Complaint History

The Department's ICMS is the database used to record and track complaints received by the Department. A review has been undertaken to identify the number and nature of complaints lodged with DWER for the previous five years (2012-2017) in relation to the Premises and Port Hedland's West End.

Table 5 outlines the number of complaints received by DWER in relation to dust from the Premises or port premises generally (where a specific premises has not been identified) within Port Hedland.

Table 5: Reported dust complaints 2012-2017

Reference	Date	Details
46779	06/10/2017	Complaint about the levels of dust in town attributable to BHP causing children to get sick.
46002	12/07/2017	Dust complaint with a report that baby was exposed to high dust causing wheeze
44845	26/04/2017	Dust complaint reported to be caused from BHP Port Operations and failure to apply dust suppression equipment
42987	20/11/2016	Dust complaint reported to be caused from BHP Port Operations stockpiles
42980	19/11/2016	Complaint about levels of dust at Port Hedland (generally)

42869	13/11/2016	Complaint reported new BHP stockpiles and potential for them containing asbestos
42865	13/11/2016	Complaint about 'thick' dust from new BHP stockpiles
42380	12/09/2016	Complaint received through Town of Port Hedland on dust levels from Port Operations
42226	22/07/2016	Complaint stated a 'dust cloud' over BHP Port Operations shiploader
40810	10/05/2016	Complaint stated that it was very dusty and the dust was originating from Finucane Island (BHP Port Operations)
38831	25/11/2015	Complaint received about dust levels generally being high within the west end of Port Hedland

Table 6 outlines the number of complaints received by DWER in relation to noise from the Premises over the previous five years.

Table 6: Reported noise complaints 2012-2017

Reference	Date	Details
45435	29/05/2017 – 6/06/2017	Report of excessive noise all night long from BHP Port Operations
45342	29/05/2017	Report of excessive noise all night long from rail dumper and trains
41087	29/05/2016	Report of excessive noise from BHP and construction work

Key Finding: There have been approximately 10 dust complaints and three noise complaints lodged with the Department over the previous five years which relate to allegations of excessive dust and noise. The complaints represent allegations, no offences were established and no enforcement action has been initiated by the Department.

4.5.7 Port Hedland site visit

In July 2016 and September 2017, DWER Officers visited the Premises and Port Hedland generally to inform this assessment and better understand dust sources and issues in the Port Hedland area. During this visit a number of external dust sources unrelated to the Licence Holder's operations were identified and include the following:

- Wedgefield: an industrial area located approximately 4.3 km south of the Premises, is likely to represent a significant source of dust in South Hedland and potentially Port Hedland. Although roads in the Wedgefield Industrial Estate are sealed, the large number of truck movements result in substantial volumes of dust being mobilised from the road's soft shoulders. Potentially significant contributors to fugitive dust within Wedgefield include the scrap metal yard, two asphalt plants, sand blasting operators and a number of operators that move equipment on bare earth hardstands. Many of these sites are non-prescribed premises and are not regulated by DWER under Part V of the EP Act.
- Other Port facilities: the following Category 58 operators within the Port Hedland Inner Harbour and are likely to contribute to ambient dust (discussed in further detail in section 6.1):
 - Fortescue Metals Group Limited (FMG);
 - Pilbara Ports Authority;
 - Roy Hill Infrastructure Pty Ltd; and
 - Dampier Salt, Port Hedland Port Operations.
- Local dust sources: In addition to surrounding industrial activities dust is likely to be generated from the vast areas of land surrounding Port Hedland townsite that are cleared for future development or are sparsely vegetated. The predominant soil type in

Port Hedland is red pindan sands, which due to its colour, may be appear similar to iron ore dust.

- Spoil grounds from the dredging of the Port Hedland to the north (Spoilbank Marina) and south of Port Hedland may contribute to ambient dust.

A portion of PM recorded at monitoring sites (including Taplin Street) may also be attributed to sea salt spray.

Key Finding: There are many sources of dust within the Port Hedland air-shed including sources from non-prescribed and prescribed premises which are likely to contribute to dust levels and may be perceived as originating from operations within the Premises.

4.6 Air Quality Modelling and Monitoring

4.6.1 Air quality modelling

In support of the Application, the Licence Holder submitted an air quality dispersion modelling report completed by Pacific Environment Limited (PEL, 2016). PEL's report compared modelling results for a 270 Mtpa throughput scenario (representing the currently approved operations) with the proposed 290 Mtpa throughput scenario.

The PEL report was presented using the AERMOD dispersion model which included key dust emission sources and site representative meteorological data from 2013 used to predict the ground level concentrations of PM₁₀ at selected receptors. The model option and assumptions used were stated as being the same as the Port Hedland Industries Council (PHIC) Cumulative Air model (CAM).

Key dust sources

Key dust emission sources and site specific dust emission rates were used in the dispersion model. The specific emission rates were developed through a series of dust measurement programs undertaken at the Premises since 2001 and reported to have included site measurements undertaken during various meteorological conditions for the full range of ore types handled at various ore moisture levels.

The key emission sources identified in the modelling report included:

- Stockpiles and wind erosion;
- open area wind erosion;
- stackers; and
- Lump Rescreening Plants.

Figures 2 and 3 showing box and whisker plots have been produced by DWER based on the sources and emission rates used by PEL in the air quality model for Finucane Island and Nelson Point respectively. The box and whisker plots illustrate which sources dominate the upper and lower percentile emissions in terms of emission rate (grams per second) and show source emissions only (i.e. do not indicate the contribution of sources to ground level concentrations).

Fugitive emissions as a result of vehicle movements along unsealed roads were omitted from each figure as they presented a smaller source of emissions relative to other sources (including emissions from open (unsealed) areas).

Based on the box and whisker plot for Finucane Island Table 7 includes the emission sources with an upper quartile emission rate of above 1g/s, chosen to identify the greatest emission sources from those identified in the model.

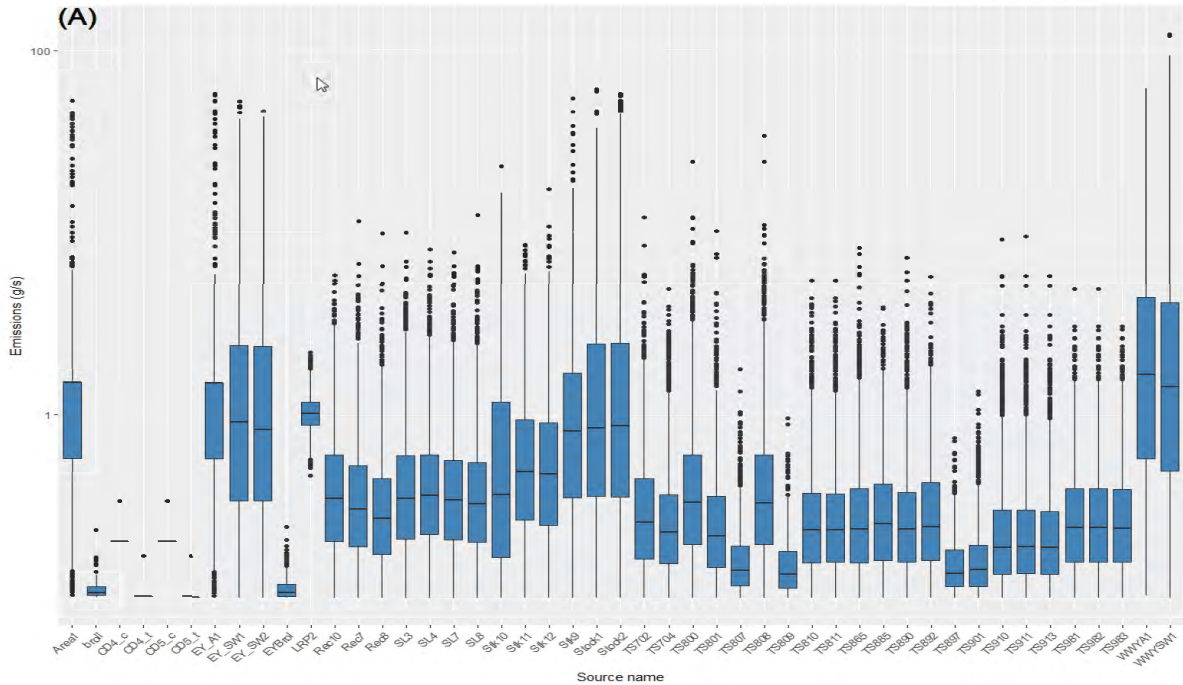


Figure 2: Box and whisker plot of Finucane Island sources excluding vehicles¹

Note 1: The boxes represent the 25th to 75th percentile (interquartile) range. The whiskers (lines) indicate the maximum and minimum values that are not greater than 1.5 times the interquartile range. Extreme values are represented as dots.

Table 7: Key model emission sources at Finucane Island (upper quartile above 1g/s)

Reference	Name and location
Area 1	Western Stockyard, open area wind erosion
EY-A1	Eastern Stockyard, open area wind erosion
EY-SW1	Eastern Stockyard, stockpile wind erosion
Stock1	Western Stockyard, stockpile wind erosion 1
Stock2	Western Stockyard, stockpile wind erosion 2
EY-SW2	Eastern Stockyard, stockpile wind erosion
WWYA1	Western Stockyard, stockpile wind erosion 1 (new yard to the west of WWY)
WWYSW1	Western Stockyard, stockpile wind erosion 1 (new yard to the west of WWY)
LRP2	Western Stockyard, Lump Rescreening Plant No.2
Stk-10	Western Stockyard, stacker 10
Stk-9	Western Stockyard, stacker 9

As shown in Figure 2, wind erosion from open areas and stockpiles accounts for the greatest number of sources with an upper quartile above 1 g/s at Finucane Island. Key sources from the open materials handling system infrastructure include the Lump Rescreening Plant number 2 and stackers 9 and 10. A total of 11 sources have been identified as having an upper quartile above 1 g/s emission rate.

Based on the box and whisker plot for Nelson Point (Figure 3), Table 8 includes the emission sources with an upper quartile emission rate of above 1g/s.

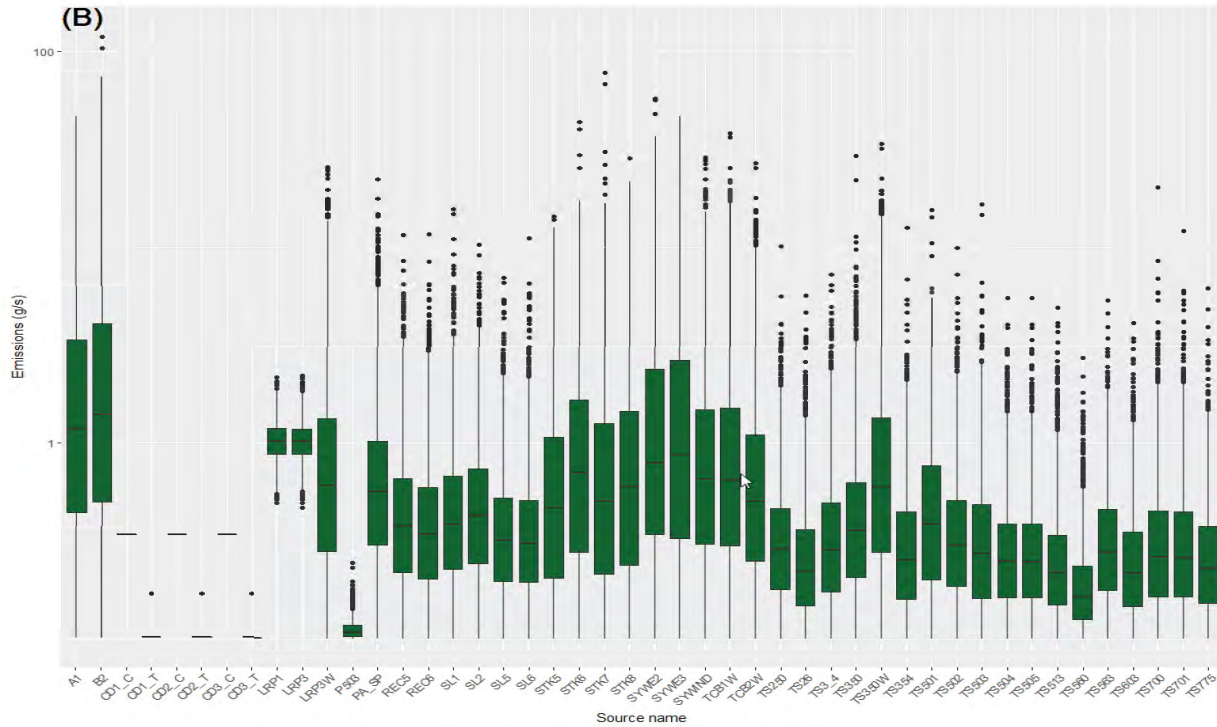


Figure 3: Box and whisker plot of Nelson Point sources excluding vehicles

Table 8: Key model emission sources at Nelson Point (upper quartile above 1g/s)

Reference	Name and location
A1	Stockpile wind erosion in “A” area
B2	Stockpile wind erosion in “B” area
SYWE2	Wind erosion south yard stockpiles 2
SYWE3	Wind erosion south yard stockpiles 3
SYWND	Open area wind erosion in South Yard
TCB1W	Tertiary Crushing Building No.1 – wind erosion
TCB2W	Tertiary Crushing Building No.2 – wind erosion
LRP3W	Tertiary Screening Building 2 – wind erosion
TS350W	Transfer Station 350 – wind erosion
LRP1	Lump rescreening plant 1
LRP2	Lump rescreening plant 2
STK5	Stacker 5
STK6	Stacker 6
STK7	Stacker 7
STK8	Stacker 8

As shown in Figure 3, wind erosion from open areas, stockpiles and infrastructure account for the majority of sources with an upper quartile above 1 g/s at Nelson Point. Key sources from the open materials handling system infrastructure include the Lump Rescreening Plant 1 and 2 and stackers 5, 6, 7, and 8. A total of 15 sources have been identified as having an upper quartile above 1 g/s emission rate.

Emission controls considered in the model

The PEL report included a number of existing and proposed additional controls to reduce dust emissions from key sources at the Premises. These controls include:

- 90% availability of wet scrubbers at transfers and Lump rescreening plant
- 90% availability of water sprays on stackers, reclaimers and ship loaders
- An improvement in the availability of belt wash stations and internal fogging system from 75% to 90%
- Reduction in the stacker drop height
- Wet scrubber on Transfer Stations TS26 (located at Nelson Point) and TS800 and TS808 (located on Finucane Island)
- New fogging systems, accounting for a 40% reduction, fitted to the following transfer stations:
 - TS775
 - TS502
 - TS563
 - TS603
 - TS503
- A direct ship ore (DSO) of 44% was applied with approximately 125 million tonnes per annum of ore directly shipped.
- Additional road sealing and coarse material application along sections of roads (within zones 3, 4 and 5) at Nelson Point.
Note - During the assessment of the Licence Holder's application, DWER was advised that works to seal zones 3, 4 and 5 had been completed.
- 100% availability and efficiency of the wet scrubbers at rail car dumpers.

Dust emission predictions

A review of the total emissions estimates based on the PEL air quality model has been undertaken by DWER to determine total emissions rates from both scenarios and the emission rate per tonne of iron ore handled at the premises. This is shown in Table 9.

Table 9: Predicted emission rates

Statistic	270 Mtpa	290 Mtpa
Total emissions (Kg/Year)	755,899	757,384
Emission per tonne of material handled (g/T)	2.8	2.6

As shown through the table, total predicted emissions have increase slightly by 0.2% (1,485 Kg/Year) for the 290 Mtpa scenario. However, for the same scenerio there has actually been a reduction of 0.2 grams per tonne of iron ore handled at the Premises as a result of the emission controls proposed, representing an improvement of approximately 8%.

Dust concentrations at Taplin Street

The modelled 24-hour PM₁₀ statistics for the 270 Mtpa and 290 Mtpa throughput scenarios at Taplin Street, with emissions controls applied at the Premises, both with and without background concentrations, are shown through Table 10.

Table 10: Statistics from Model Calculations for PM₁₀ Ground Level Concentrations at Taplin Street (µg/m³)

Statistic	270 Mtpa in isolation	270 Mtpa with background*	290 Mtpa in isolation	290 Mtpa with background*
Maximum	23	187	22	185
99 th percentile	19	58	19	60
95 th percentile	13	43	14	44
90 th percentile	12	41	11	40
70 th percentile	8	33	8	33
Average	6.1	28	6.2	28
Excursions >70µg/m ³	0	1	0	1

*background includes all non-port related emission sources

As shown in Table 10, there is calculated to be a 0.1 µg/m³ increase in the average dust concentration at Taplin Street from the 20 Mtpa increase. This represents an approximate 2% increase in the modelled in-isolation annual concentration at Taplin Street. However, the modelled annual average concentration at Taplin St remains unchanged when background air quality data is included. The modelling predicts only one exceedance of the short term criteria at Taplin Street, which is due to a single high background concentration. There is a 1 µg/m³ increase in the 95% percentile concentration. All other concentration statistics are the same as or less than the 270 Mtpa scenarios.

The modelled 24-hour PM₁₀ statistics for the 270 Mtpa and 290 Mtpa cumulative concentrations at Taplin Street are shown in Table 11.

Table 11: Modelled number of exceedance of the short term PM₁₀ criterion at Taplin Street with cumulative sources (µg/m³)

Statistic	270 Mtpa	290 Mtpa
Excursions >70µg/m ³	8	8

As shown in Table 11 there are no changes to the predicted number of exceedances for the modelled cumulative scenarios for 270 Mtpa and 290 Mtpa for the criterion at Taplin Street.

In addition, the annual target at Taplin Street of 30 µg/m³ is reported as being met for the proposed 290 Mtpa scenario when cumulative emissions and coarse estimations of background air quality data are included.

Key Finding: The Delegated Officer has reviewed the PEL modelling report submitted with the Application (PEL, 2016) and considers that:

1. The modelling results are based on the application of current and additional dust abatement measures.
2. While total emissions increase by 0.2%, predicted emissions per tonne of iron ore handled are reduced by approximately 8%.
3. While the model predicts that the maximum short term concentration at Taplin Street will reduce as a result of the additional dust abatement measures, the model also predicts that annual average ground-level concentrations will increase by 0.1 µg/m³ (or less than 2% increase in concentrations).

4. It is unlikely that the small emissions decreases or increases estimated by the modelling are statistically significant or the change in emissions will be discernible when comparing concentration statistics from ambient monitoring data.

Limitations of air quality modelling

It is important to note that air quality modelling represents a simplification of the actual physical conditions and modelling is inherently uncertain in its ability to accurately estimate ground level concentrations of particulate matter. Real world dust concentrations are also impacted by many other sources that are not included in the modelling and variations in emissions simply due to day to day variations in weather conditions can be much larger than incremental changes in the Licence Holder's emissions.

In addition, estimates of emissions used in modelling are themselves based on calculations rather than direct measurements of emissions. While the Licence Holder did in some cases conduct emissions model calibration through particulate testing, the limited number of measurements that are taken at the time of testing means that emissions estimates may not account for the variation in emissions. Modelling is useful, however, for comparing scenarios and determining the relative change in emissions under those scenarios.

It is clear that the modelled exceedances of the interim guideline measure detailed in Table 11 do not correspond to the actual exceedances experienced in the last four years, which are higher than estimated. This is possibly a consequence of limited information on background concentration estimates that also include fugitive emissions from non-port sources including both natural and anthropogenic sources and can be highly variable from year to year. Historical monitoring indicates that these natural and anthropogenic sources may significantly contribute to the high ambient PM₁₀ concentrations experienced at Port Hedland.

Finally, it is important to note that modelling conclusions are based on an analysis of concentrations at Taplin Street, which is located approximately 2.5-3km from the extreme West End of Port Hedland (water line). Concentrations at other sensitive land users in the West End and located closer to key emission sources are expected to be greater.

4.6.2 Ambient air quality monitoring

Ambient air quality monitoring is undertaken in Port Hedland through a number of monitoring stations within the Town of Port Hedland shown in Figure 4. Monitoring is coordinated through PHIC and real-time monitoring reported on their website. PHIC is comprised of a number of industry members including BHP, FMG, PPA, and Roy Hill.

In addition to real-time reporting, an annual air quality monitoring report is published which includes results of ambient air quality monitoring and an assessment of compliance with the interim guideline criterion at Taplin Street (PM₁₀ 24-hour average value 70 µg/m³).

A summary of Taplin Street exceedances is provided below as reported by PHIC.

- 2012-2013 period - 17 exceedances at Taplin Street monitoring station with two reported to be attributed to industry;
- 2013-2014 period - six exceedances at Taplin Street with three reported to be attributed to industry;
- 2014-2015 period - 10 exceedances at Taplin Street with seven reported to be attributed to industry;
- 2015-2016 period - 10 exceedances at Taplin Street with five reported to be attributed to industry; and
- 2016-2017 period - three exceedances at Taplin Street with two reported to be attributed to industry.



Figure 4: PHIC monitoring locations in Port Hedland (PHIC, 2016)

Further detailed review of ambient air quality monitoring at other locations from 2013 to 2017 is presented in Table 12.

Table 12: Number of days above NEPM and interim guideline values for PM₁₀ recorded by PHIC ambient monitoring network – 2013 - 2017¹

Monitoring Station	24hr PM ₁₀ criteria (µg/m ³)	Days above guideline values				
		FY 2012/13	FY 2013/14	FY2014/15	FY2015/16	FY2016/17
Richardson St	50	74	50	79	39	90
	70	23	9	11	Unknown	Unknown
Kingsmill St	50	89	98	156	112	83
	70	29	19	50	Unknown	Unknown
Taplin St	50	48	48	55	48	27
	70	17	6	10	10	3
Neptune PI	50	25	25	67	43	29
	70	11	8	14	Unknown	Unknown

Note 1: The regulatory reference point for ambient air quality in Port Hedland is currently the interim PM₁₀ criteria (70µg/m³ over a 24 hour averaging period + 10 exceedances) at Taplin Street (refer to section 4.2.2). The Licence Holder is not required to report against NEPM criteria in the existing Licence however, it has been included as a point of reference to inform the assessment.

As shown in the above table and with reference to Figure 5, the number of exceedances of the interim guideline generally increased with proximity to the West End. For example, in the 2014-2015 annual period there were 50 occurrences at Kingsmill St where PM₁₀ averaged greater than 70 µg/m³, and 156 occurrences greater than the NEPM guideline of 50 µg/m³ over a 24-hour period. By comparison at Taplin St, there were 10 exceedances of the interim guideline (70µg/m³) and 48 exceedances of the NEPM guideline (PHIC, 2016).

In addition, as part of the HRA it was noted that monitoring which was undertaken from 2011-2014 concluded that PM₁₀ levels at Port Hedland's West End (Taplin, Kingsmill and Richardson Streets) were higher than areas further to the east of Taplin Street. For the 2011-2014 period PM₁₀ levels were found to be above the interim guidance of 70 µg/m³ (24-hour average) at 16% of the sampled days, compared with 3% and 2% at South Hedland and Yule River respectively shown in Figure 5.

Seasonal variation

In order to understand seasonal variation a review was conducted of average daily PM₁₀ concentration at Taplin Street each month during the 2017 annual period and is shown in Figure 6.

As shown in Figure 6 there is a wide seasonal variation over the year for dust concentrations with the lowest daily average recorded in July (at 24.0 µg/m³) and the highest recorded in January (at 41.9 µg/m³). Over the entire 2017 annual period the average daily PM₁₀ concentration was 31.3 µg/m³ with only minor variation from other years as shown. The data shows a reduction in the annual average dust levels recorded at Taplin St over the last four years.

Limitations of the ambient monitoring network

It is important to note that the siting of some PHIC air monitoring equipment may not satisfy Australian/New Zealand Standard 3580.1.1: Guide to siting air monitoring equipment. For example, the ambient air monitor at Neptune Street is located within a few metres of two

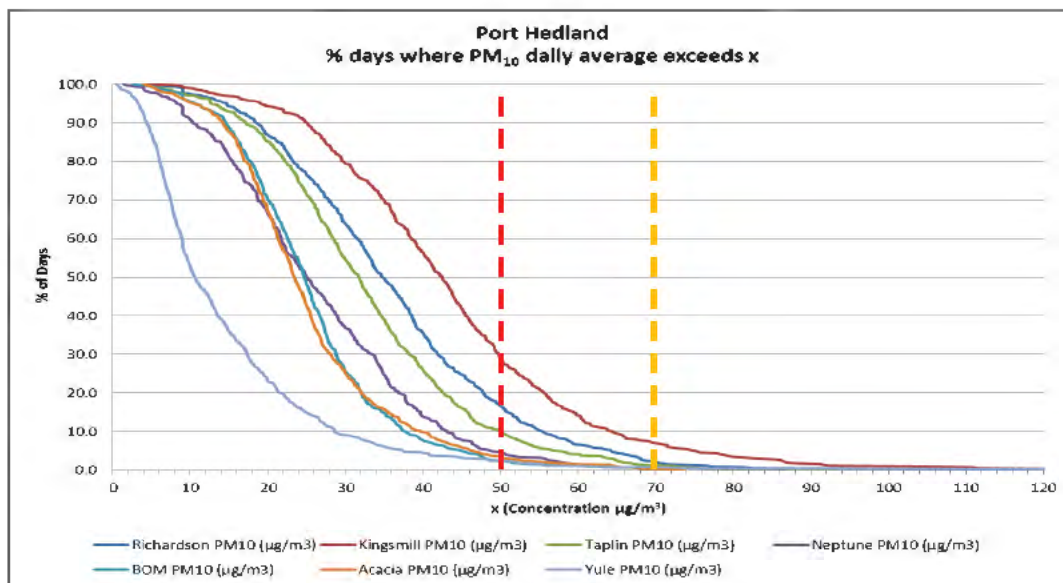


Figure 5: Percentage of days above daily 24-hour average concentrations of PM₁₀ for 2012-2013 inclusive (minus regional background and Wedgefield data) (HRA, 2016).

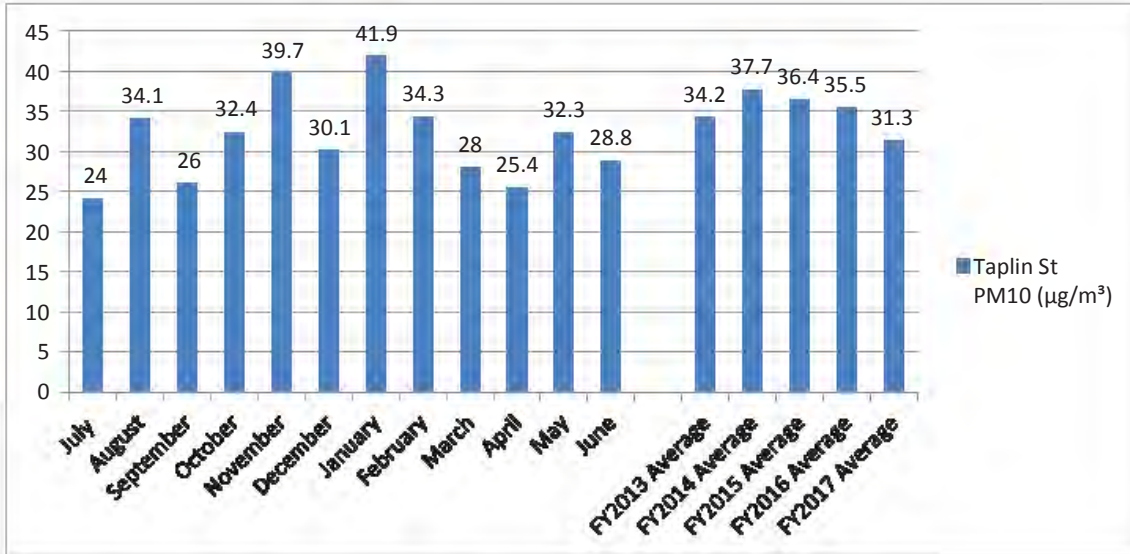


Figure 6. Average daily PM₁₀ concentration at Taplin Street (BHPBIO, 2017)

dwelling and a 1.8 m tall fence, which may restrict airflows in the vicinity of the monitor inlet or absorb some particulate matter affecting results. Other monitors are also located in residential areas with obstructions within close proximity to the monitor potentially limiting the reliability of data. However, it is understood that there are often significant constraints with regard to availability of land or other tenure issues when selecting suitable monitoring locations. It is considered the monitoring network is generally satisfactory with regard to both the methods and equipment used.

4.6.3 Ambient air quality and throughput

To understand the relationship between ambient dust concentrations and volume of material handled at the Premises, a review of annual average PM₁₀ concentrations and throughput has been undertaken from 2011 until 2016 and is shown in Figure 7.

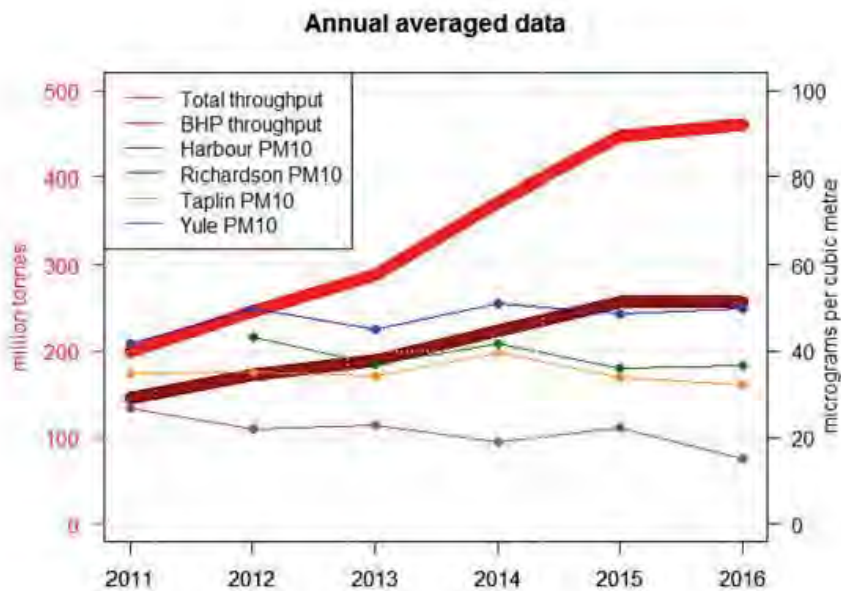


Figure 7. Port Hedland Port and BHP Billiton Iron Ore annual throughput versus annual averaged PM₁₀ concentrations

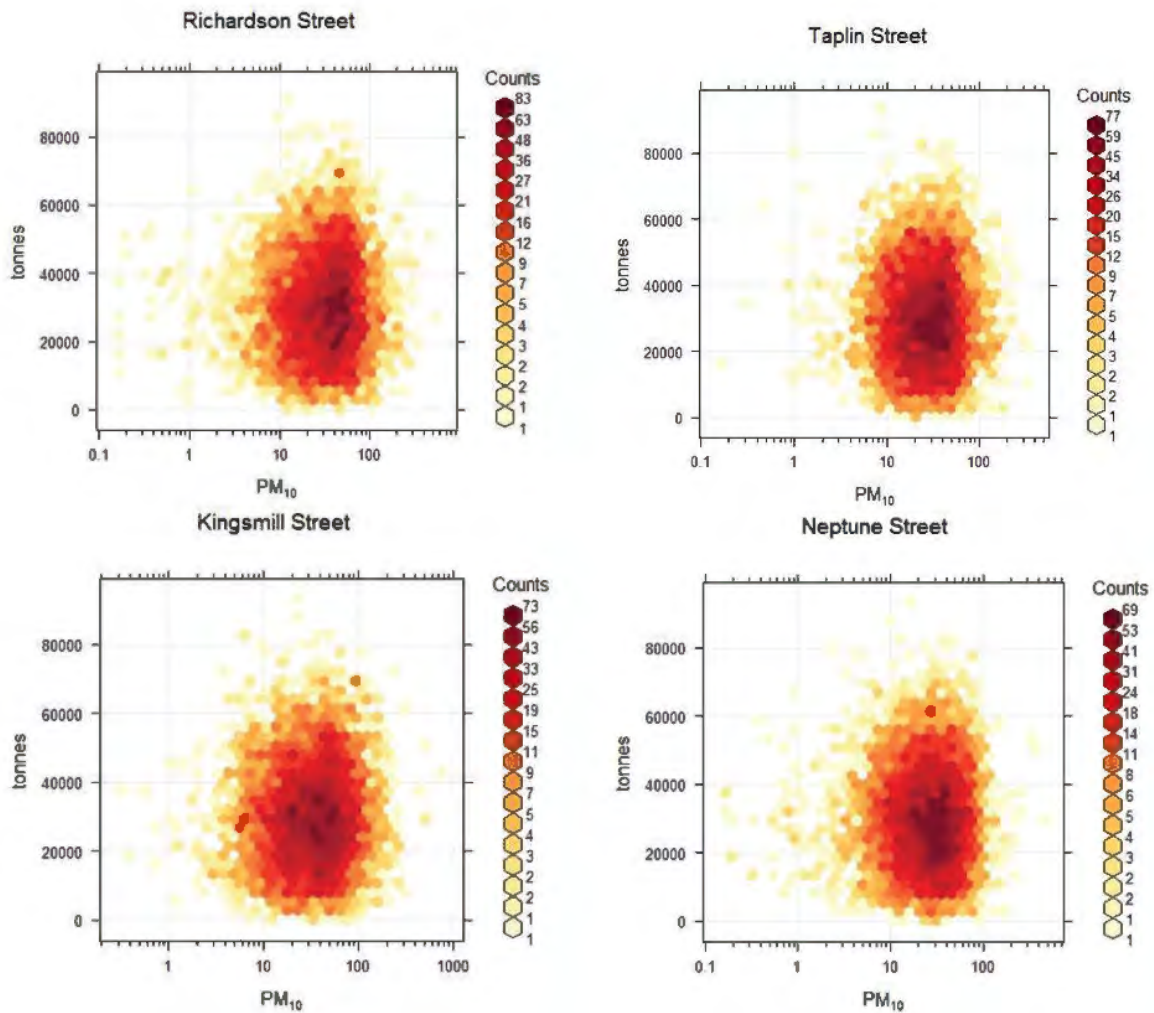


Figure 8. Hourly PM₁₀ readings against hourly throughputs

A clear correlation between the volume of materials exported and ambient PM₁₀ concentrations is not evident from the monitoring data. As shown, annual average PM₁₀ concentrations at Taplin Street have declined since FY2014 despite the total volume of exported material in Port Hedland increasing by 23.7% and the total volume of BHP-loaded iron ore increasing by approximately 26.0% over the same period.

Further analysis was undertaken to investigate if there is any link between hourly tonnages of ore handled at the Premises and hourly ambient PM₁₀ concentrations monitored at Kingsmill Street, Richardson Street, Taplin Street and Neptune Place. Figure 8 below shows that there is no apparent correlation between hourly tonnages and ambient PM₁₀ concentrations

Key finding: The Delegated Officer has compared ambient air quality data against the Licence Holder's throughput volumes and considers that there is no clear correlation between the throughput and annual average PM10 concentrations.

4.6.4 Boundary Monitoring

The Licence Holder operates a series of monitors at the locations illustrated in Figure 9 to record the concentrations of dust at the Premises boundary.

Data collected at boundary monitoring sites includes particulate matter and wind strength and direction. Rainfall data is collected at the meteorological station. The objective of boundary dust monitoring is to provide real time data to assist with the identification and management of dust emissions from the Licence Holder's Premises and to identify background sources that may contribute to high ambient dust concentrations.

4.6.5 Dust forecasting tools and live monitoring

The Licence Holder operates a meteorological forecasting and dust modelling system to predict adverse weather conditions for the following 48 hours. The dust forecasting tool depicted in Figure 10 identifies the likely movement and estimated concentration of dust emitted from the Premises at different intervals throughout the 48 hour period based on consideration of predicted wind speeds, wind directions and temperature inversions.

This forecasting tool is run daily with the objective of providing the Licence Holder sufficient time to implement a number of dust management measures as described in section 7.4.5 with a focus on areas of greater dust risks.

In addition to dust forecasting, live boundary monitoring is undertaken using a network of monitors placed within the Premises boundary and throughout Port Hedland (Figure 11) to provide the Licence Holder an overview of real-time (10-minute averaging period) ambient dust conditions. Average and time weighted average PM₁₀ monitoring is also undertaken at Taplin Street to determine compliance with the 24-hour averaging period target of 70µg/m³.

Dust influence arcs (wind arcs) are used to identify the likely source of emissions detected at each of the monitoring stations.

Based on live monitoring data the Licence Holder can react to unforeseen dust events by implementing controls identified in section 7.4.5.

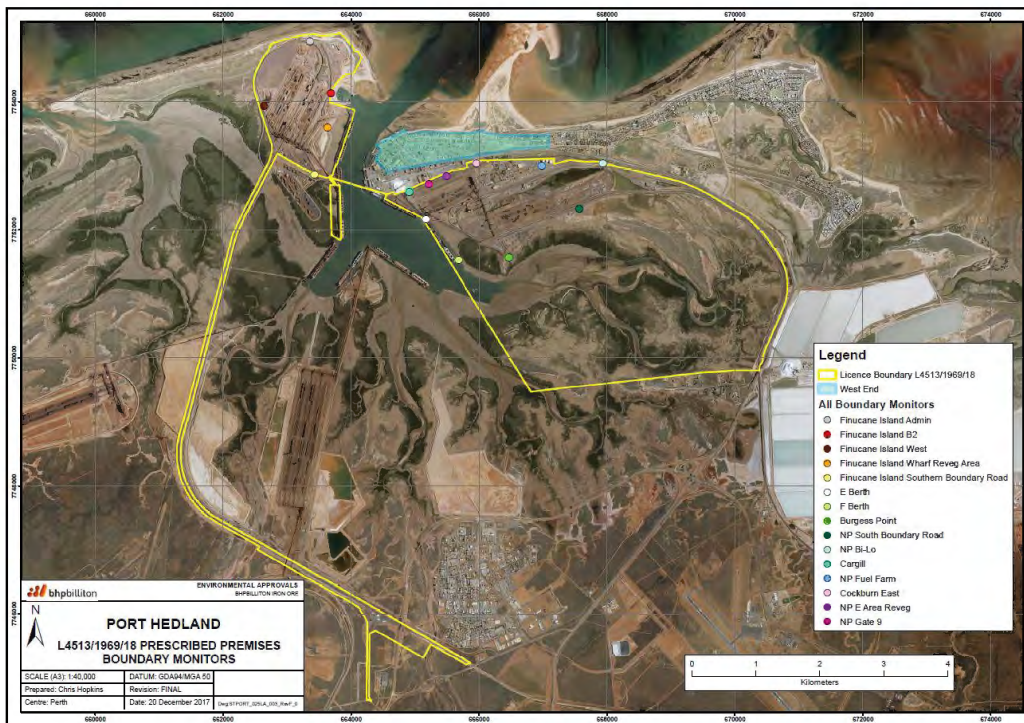


Figure 9. Map of Boundary Monitoring Network Site Locations



Figure 10. Screenshot of forecast plume modelling



Figure 11. Screenshot of real-time dust results

4.7 Air Quality and Amenity

The Australian Concise Oxford Dictionary defines amenity to be the pleasant or useful features or overall pleasantness of a place. As such, the assessment of amenity is intrinsically subjective and it is best assessed against community expectations, reasonably held for that community and at that point in time.

In the context of air quality, amenity impacts are caused by elevated levels of particulate matter or other air pollutants. Katestone (2011) report that commonly identified amenity impacts include:

- short-term reduction in visibility. For example a visible plume may adversely affect the aesthetics of the environment such as scenic view;

- buildup of particulate matter on surface within buildings resulting in increased cleaning;
- soiling of laundry being dried in the open air; and
- buildup of particulate matter on roofs which can flush into rainwater tanks potentially affecting quality (taste) of drinking water or tank capacity.

The most commonly used parameters to measure amenity impacts are Total Suspended Particulates (TSP) and dust deposition. TSP refers to all dust particulates that are suspended in the air, including coarser fractions, while dust deposition refers to the amount of dust deposited over a set period and area.

There are no site specific criteria for TSP or dust deposition criteria that have been established or adopted for the Port Hedland area and no monitoring of these parameters for amenity is currently conducted by PHIC or existing Part V Licence Holders in Port Hedland.

When viewing the amenity criteria of other environmental regulators around the world (Table 13) it is evident that there is significant variability in criteria. This is due to a number of factors including the baseline, or background dust levels in each regional area varying greatly as well as the sensitivities and expectations of local receptors in relation to dust.

Table 13: Dust deposition criteria used in other jurisdictions

Jurisdiction	Standard/objective	Comment
Quebec, Canada	7.5 tonnes/km ² /month (7.5g/m ² /month)	None
Alberta, Canada	53 mg/100cm ² /month (5.3 g/m ² /month)	In residential and recreation areas
	158 mg/100 cm ² /month (15.8 g/m ² /month)	In commercial and industrial areas
New South Wales, Australia	2g/m ² month	Incremental. 2 g/m ² /month corresponds to 67 mg/m ² /day
	4 g/m ² /month	Total. 4 g/m ² /month corresponds to 133 mg/m ² day
Germany	0.35 g/m ² /day (10.5 g/m ² /month)	Deposition value of PM10 for the protection against nuisance or significant disadvantage due to dust fall (non-dangerous dust)

Source: (p. 150, Katestone, 2011)

To measure the baseline dust deposition level, it is necessary to measure dust levels without the influence of industry operations in the area. For this to be possible, dust deposition monitoring at background sites is generally required. With regard to TSP, an appropriate trigger value for TSP that identifies the point at which amenity is likely to be impacted has not been defined for Port Hedland.

Other measures commonly used to assess amenity impacts include community surveys and complaint information.

Key finding: The Delegated Officer has considered amenity and reviewed criteria used in other jurisdictions and has found:

- 1) amenity is intrinsically subjective and linked to a particular community's expectations at a particular point in time;
- 2) there is significant variation between criteria used across other jurisdictions;
- 3) there are no site specific amenity criteria established or adopted for Port Hedland or for the coastal Pilbara region of Western Australia; and
- 4) the community expectations in Port Hedland, the Pilbara region and the north west of Australia may be different to other parts of Australia and the world.

4.8 Interim Boundary Targets

Ambient concentrations measured at the BHP boundary monitors were analysed by PEL in 2014, to assist the Licence Holder in understanding the correlation between ambient air quality at the Premises boundary and exceedances of the interim guideline criterion for PM₁₀ at Taplin Street. The analysis was based on monitoring results at boundary air quality monitors and the Taplin Street air quality monitor over the 17 month period between December 2012 and April 2014 (PEL, 2014).

It was observed that ambient air quality at boundary monitors on Finucane Island had a low correlative effect on exceedances of interim criteria at Taplin Street. Therefore theoretical targets were calculated for the same criteria at Richardson Street. It was found that PM₁₀ in concentrations of 230µg/m³ over a rolling 24-hour averaging period at the Finucane Island B1 monitor may result in ambient concentration of PM₁₀ at Richardson Street exceeding 70µg/m³ (PEL, 2014).

PEL identified a greater correlation between boundary monitors at Nelson Point and Taplin Street. For interim criteria at Taplin Street to be exceeded as a result of Primary Activities conducted at Nelson Point it was likely that monitors along the northern boundary of Nelson Point would need to, on average, exceed 145µg/m³ over a rolling 24-hour averaging period (PEL, 2014).

PEL noted that interim targets for boundary monitors may guide the implementation of adaptive management measures but the following limitations restrict their level of accuracy:

- The data period not necessarily reflecting the long term general conditions and variability;
- Limited upwind monitors limiting the ability to determine the contribution from third party operators; and
- High variability in background concentrations indicating that the concentration at Taplin Street is very dependent on background concentrations.

4.9 Noise Monitoring

The Licence Holder reports that noise monitoring has been undertaken at Premises bi-annually since 2008. Based on noise modelling and monitoring undertaken it is known that operational noise emissions from the operations are higher than the assigned noise levels specified in the Noise Regulations.

To reduce noise in the longer term, the Licence Holder has developed an Environmental Noise Reduction Management Plan (ENRMP) that includes the following noise objectives:

- reduce noise to As Low As Reasonably Practicable (ALARP), acknowledge growth, and where reasonably possible, comply with the requirements of the Noise Regulations (seeking exceptions if necessary);
- where it is not practicable to comply with the Noise Regulations, ensure continuous improvement is facilitated through Noise Reduction Management Plans; and
- ensure new plant and infrastructure being planned for the Port facilities, particularly prescribed plant as defined by the EP Act, complies with the Noise Regulations.

To assess the change in noise emissions from the Licence Holder's current port operations with the inclusion of Port Hedland Inner Harbour Project (PHIHP), an operational noise assessment was conducted and an ALARP assessment then conducted to determine where best noise mitigation measures could be used.

The Licence Holder has also reported to have developed a detailed noise model for the Premises which include the changes proposed in the 290 Mtpa licence amendment. The

model contains a total of 385 sources and is used to predict noise levels in and around Port Hedland.

Predicted noise levels for site equipment were calculated at receivers in West End (including Hospital), Pretty Pool and South Hedland. It was identified that the most significant noise levels at the hospital will be generated by Reclaimer 5, stacker drives P29 and P10 and conveyor P14, which are all located in the Stockyard Area F and individually are predicted to be heard at 43.4 dB(A). Receptors further east at Brearley Place, for example, are more likely to be impacted by conveyors, drives, reclaimers and stackers operating in the South Yard. As the Premises operates continuously, exceedances of the Noise Regulations are most likely to occur during night-time hours (i.e. 10pm-7am) where L_{A10} when the assigned levels for residential areas are 35 dB(A), and weather conditions are more conducive to noise propagation through the atmosphere.

The Licence Holder has a dedicated community contact line where complaints from the community are identified, reported and investigated. This will enable corrective measures to be undertaken and will assist in the continuous improvement in managing noise.

Key Findings: The Delegated Officer has reviewed noise modelling and monitoring information and found the following:

- 1) The location of residential areas in close proximity to industrial development has resulted in land use conflicts for noise.
- 2) In February 2014, SVT Engineering Consultants (SVT) was commissioned by the then DER and PHIC to undertake a cumulative environmental noise study (Port Hedland Cumulative Environmental Noise Study) involving the modelling of the scenarios of current and future operations within the Port Hedland area. The study found that for most facilities investigated the current noise level in Port Hedland exceed the Noise Regulations (SVT, 2014).
- 3) In its 2014 Annual Environmental Report, the Licence Holder acknowledges that noise levels from the Premises, and other activities within the Port Hedland port, exceed assigned noise levels (BHPBIO, 2014b).
- 4) The need for a long term strategy for managing noise impacts has been identified in the Taskforce Report, which subject to the endorsement by Government will be implemented by DWER.

4.10 Discharge monitoring

Under the Existing Licence the Licence Holder is required to submit monitoring data from all discharges to land and the Port Hedland Inner Harbour as part of annual reporting requirements. Discharge monitoring points are described in Table 14 and depicted in Figure 12 below.

Table 14: Discharge monitoring points

Emission point reference (as depicted in Figure 12)	Description	Source including abatement
W1	Nelson Point flop gate – direct discharge to the marine environment	Site stormwater via the Nelson Point FWRP
W2	Finucane Island gate – discharge to an infiltration basin	Site stormwater via the Finucane Island FWRP
W3	LSS lake drain – downstream monitoring point (manmade lake)	Site stormwater via the Finucane Island FWRP and L5/L6
L1	Wastewater irrigation area	Treated effluent from the Nelson Point WWTP
L2	Wastewater irrigation area	Treated effluent from the

		Finucane Island WWTP
L3	Finucane Island FWRP	Site stormwater
L4	Nelson Point FWRP	Site stormwater
L5	Plant 2 Washdown Bay	Washdown bay via triple interceptor
L6	Drainage channel to lake	Surplus water via the Nelson Point FWRP and sedimentation ponds
L7	Nelson Point lake outflow	Surplus water via the Nelson Point FWRP and L6



Figure 12 Emission points on the Existing Licence

Key finding: As authorised under the Existing Licence, treated stormwater is discharged directly to the Port Hedland Inner Harbour at the Nelson Point Flop Gate (W1), and indirectly via settlement pond overflows (L6).

The Delegated Officer notes that these are the ultimate discharge locations from the two FWRP's (L3 and L4) and wastewater quality prior to these points does not necessarily represent the quality of water entering the environment.

4.10.1 Site stormwater and washdown water

During the 2015/16 reporting period the Licence Holder monitored TRH concentrations of surplus water from the FWRPs and at downstream monitoring points. Direct discharges to the Port Hedland Inner Harbour at the Nelson Point Flop Gate, depicted in Figure 12 as "W1", contained very low concentrations of hydrocarbons that were typically near or below detection level of 0.45mg/L. Indirect discharges to the marine environment at "L6" were similarly low

(BHPBIO, 2016). The highest recorded TRH levels in discharges at W1 and L6 were 3.10mg/L and 1.30mg/L respectively, both recorded during a monitoring event on 19 February 2016.

4.10.2 Wastewater

The performance of the WWTPs dictates the quality of effluent discharged to the irrigation fields. The Licence Holder's monitoring results shown in Table 15 indicate that effluent was treated to a quality that met the *Australian Guidelines for Sewerage Systems* (ANZECC and ARMCANZ, 1997) in the 2016 annual period for secondary treatment systems.

Table 15: Effluent quality in the 2016 annual period

Sample Point	Finucane Island WWTP 2016 Average (L2)	Nelson Point WWTP 2016 Average (L1)	Australian Guidelines for Sewerage Systems ¹
pH	8.65	8.15	-
BOD (mg/L)	<5	<5	20-30
Total Suspended Solids (mg/L)	15.50	12.00	25-40
Total Nitrogen (mg/L)	7.87	8.70	20-50
Total Phosphorus (mg/L)	4.10	1.73	6-12
Free Chlorine (mg/L) ¹	0.18	0.13	-
<i>Escherichia coli</i> (cfu/100mL) ^{1,2}	1.67	2.00	<10 ²
Total Nitrogen loading rate (kg/ha/year)	2.904	27.912	N/A
Total Phosphorous loading rate (kg/ha/year)	1.545	5.451	N/A

Note 1: Data from 2015 reporting period.

Note 2: *E. coli* has been assessed against Australian Guidelines for plants that include disinfection whereas all other parameters have been compared with recommended treatment qualities for secondary treatment systems.

5. Consultation

DWER referred BHP's 290 Mtpa Application on 18 October 2016 to a number of direct interest parties including community stakeholders and government agencies. The Application was also publicly advertised in *The Northwest Telegraph* newspaper on 19 October 2016 and in *The West Australian* on 17 October 2016. The Application was made available for review at the Department's website.

DWER later referred BHP's additional application to increase authorised production volumes to 275 Mtpa to the same stakeholders and government agencies on 31 March 2017. The 275 Mtpa Application was also publicly advertised in *The Northwest Telegraph* newspaper on 5 April 2017 and in *The West Australian* on 3 April 2017 and made available for review at the Department's website.

290 Mtpa Application

A total of 16 individuals and associations and five government agencies made submissions on the 290 Mtpa Application, with a total of 29 separate submissions being made. There were 12 submissions objecting, three indicating conditional support and four which supported or did not object to the Application, while the remaining submissions did not clearly indicate support or objection.

275 Mtpa Application

A total of 15 individuals and associations and four government agencies made submission on the 275 Mtpa Application, with a total of 20 separate submissions being made. There were 10

submissions objecting and six supporting or not objecting to the Application. The remaining submissions did not clearly indicate support or objection.

Both Applications resulted in submitters raising a number of common issues. These broadly fit within the following themes:

- DWER’s regulatory process and framework;
- concerns about impacts to health;
- concerns about impacts to amenity;
- regulatory controls which should or could be used to reduce dust levels; and
- impacts to land use planning.

In addition, there were two detailed reports submitted relating to a dust monitoring campaign undertaken and estimated economic impacts to businesses and properties in the West End. The matters and statements raised including the reports submitted are summarised in Appendix 3.

DWER has considered of all of the matters raised which is detailed in a stakeholder and community summary in Appendix 3. With the exception of relevant public authorities, the name of submitters has been kept anonymous.

6. Location and siting

6.1 Siting context

The Premises is located on the coast, adjacent to the town of Port Hedland. The Port of Port Hedland is currently the world’s largest volume port for bulk materials export and is utilised for the bulk loading of material, predominantly iron ore.

The Licence Holder has an approved Premises production or design capacity of 270 Mtpa with four berths at Nelson Point and four berths at Finucane Island, and is proposing to increase throughput volumes to up to 290 Mtpa. Nelson Point and Finucane Island are located on opposite sides of the harbour and are connected by a 1.16km tunnel that runs under the harbour and carries ore from Nelson Point to Finucane Island via a conveyor system.

Table 16: Current port operators within Port Hedland








Operator	Bulk Granular Material	Scale of operation
BHP Billiton Iron Ore	Iron Ore	Allocated capacity 270 Mtpa (290 Mtpa proposed) Four berths at Nelson Point and four berths at Finucane Island
Fortescue Metals Group	Iron Ore	Allocated capacity 175 Mtpa Five berths at Anderson Point
Roy Hill (not yet fully commissioned)	Iron Ore	Allocated capacity 55 Mtpa Two berths at South West Creek
Utah Point facility (Pilbara Ports Authority)	Iron Ore, Manganese, Chromite	Allocated capacity 21.35 Mtpa Single berth at Utah Point
Eastern Operations (Pilbara Ports Authority)	Copper concentrate	Throughput approximately 500,000 tonnes per annum Two berths in Port Hedland (Berth 1 and 2)

Dampier Salt	Salt	Allocated capacity 75,000 tonnes per day (average loading rate 14.6 Mtpa) Single berth (Berth 3) leased from Pilbara Ports Authority
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6.2 Residential and sensitive premises

The distances to residential and sensitive receptors are as follows:

Table 17: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity	Location as depicted in 3
Esplanade Hotel – located north east of nearest emission point	Distance from nearest stockyard = approximately 760 m Distance from nearest ship loader = approximately 490 m	
Closest resident ¹ to ship loader – Wedge Street (zoned 'Town Centre')	Approximately 730 m	
Closest resident ¹ to stockyard – Grove Street (Residential zone)	Approximately 620 m	
Closest resident to bulk fuel storage – corner of Anderson and Taplin Streets	Approximately 230m	
Richardson Street (nearest ambient monitoring site)	Distance from nearest stockyard = approximately 1,080 m Distance from ship loader = approximately 700 m	
Kingsmill Street (ambient monitoring site)	Distance from nearest stockyard = approximately 860 m Distance from nearest ship loader = approximately 1,500 m	
Taplin Street (ambient monitoring site) (Residential zone)	Distance from nearest stockyard = approximately 940 m north Distance from nearest ship loader = approximately 2,600 m	

Note 1: A number of residential dwellings are located closer to the boundary of the Premises. However, these dwellings are located in areas zoned for industrial development and light industry under the Town of Port Hedland Town Planning Scheme No. 5 and are therefore considered as 'non-conforming uses', which do not represent sensitive land uses.



Figure 13: Port Hedland's West End and approximate location of receptors

6.3 Specified ecosystems

The harbour has been constructed within a tidal creek system that extends inland up to 10 km and experiences tide changes of up to 6 m. The Port Hedland harbour is located in the creek system and as a result significant areas around the tidal creek have been disturbed through dredging of harbour channels and other port facilities. Current and future increases in port facilities could result in further disturbance. Environmentally significant mangrove communities still populate a significant part of the harbour. These environments provide habitat for juvenile sea turtles and migratory birds during the summer months.

6.3.1 Environmental Setting

The Premises is situated within the semi-arid Pilbara region adjacent to the town of Port Hedland. Port Hedland temperatures are warm to hot with average maximum mean temperatures of 36 degrees Celsius (°C) in summer and 28°C in winter (BoM, 2017). Port Hedland's average annual rainfall is 313.5 mm with the majority falling from December to June. There is large inter-annual variation in rainfall resulting from tropical cyclones developing over the north of Australia and scattered thunderstorms. Annual evaporation rates in the Pilbara greatly exceed the mean annual rainfall and are very high compared to other coastal areas of Western Australia (Luke, et. al, 2003). Winds in Port Hedland vary in direction and strength seasonally. The windiest conditions are usually during the summer, prevailing from the northwest.

The Nelson Point site lies on shallow superficial marine/alluvial deposits, underlain by marine mud/sand/conglomerates. The former East Creek was previously reclaimed during construction of port facilities and, therefore, no significant drainage lines occur within this area. An unconfined groundwater, influenced by tidal fluctuations is present at shallow depths (1.3 – 4.6 m below ground level) throughout Nelson Point.

The distances to specified ecosystems are shown in Table 18.

Table 18. Specified ecosystems

Specified ecosystems	Distance from the Premises
Port Hedland harbour – marine ecosystem	Within and directly adjacent to the premises boundary. Moderate level of ecosystem protection*
Public Drinking Water Source Area (PDWSA)	The Premises is not located within a PDWSA
RAMSAR wetland	No RAMSAR wetlands are located within a 30km radius of the Premises.
Geomorphic Wetlands	No geomorphic wetlands are located within a 30km radius of the Premises.
Parks and Wildlife tenure	No Parks and Wildlife managed lands are located within a 30km radius of the Premises.
Threatened Ecological Communities and Priority Ecological Communities	There are no threatened ecological communities and priority ecological communities within a 30km radius of the Premises. However, a number of sitings have been made of a Threatened (Vulnerable) reptile species is located approximately 500m from the Premises.
Declared Rare flora	There are no declared rare flora species recorded within a 30km radius of the Premises. However a Priority 3 species is located approximately 4.5km southwest of Primary Activities on Finucane Island.
Other relevant ecosystem/biological values	Distance from Prescribed Premises
Mangrove community (high value ecosystem)#	There are six species of mangroves found in the Port Hedland Harbour. The occurrence of mangrove communities within the Premises is considered to be consistent with distribution patterns observed in similar environments in the Pilbara region. The intertidal mangrove communities provide habitat to a wide range of bird and bat species and marine invertebrates.
Turtle nesting grounds (listed under the EPBC Act)	Nesting grounds are located at Cemetery Beach and Pretty Pool, approximately 3km and 6.6km from Nelson Point shiploaders.
Migratory birds (listed under the EPBC Act)	Migratory birds have been sited within and near to the Premises boundary.

*Department of Environment, 2006
#EPA (2001)

6.4 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 19.

Table 19. Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental Value
Groundwater is considered brackish	At Finucane Island the depth to groundwater varies between 1 – 13 mbgl (based on information within works approval W5105/2011/1). There is significant variation in groundwater depths near the coast that is driven by tidal	Water is not used for potable or industrial use. Groundwater system linked to marine ecosystem with mangrove communities running along the premises boundary.

	<p>movement.</p> <p>At Nelson Point the depth to groundwater is approximately 1.3 to 4.6 mbgl.</p> <p>No bores are located within 1 km of premises (based on available GIS dataset –WIN Groundwater Sites).</p>	
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6.5 Meteorology

6.5.1 Wind direction and strength

The following wind rose (Figure 14) provides the annual wind direction and strength for this period at Port Hedland. Moderate westerly to north-westerly flows are predominant between December and January, with prevailing wind directions shifting to north and north-westerly from September to November and February to March as seasonal wind conditions change. Calmer wind conditions exist during the months of April to August when south and south-westerly winds become more common although north-west to north-east winds prevail (BoM, 2017).

Less common southwest to southerly winds occurring approximately 13% of the year place Taplin Street downwind of the Licence Holder’s Nelson Point operations. Based on Bureau of Meteorology data, these conditions have been more commonly detected during morning observations in the shoulder seasons of May to March and September and October (BoM, 2017).

Being a coastal town in a warm climate, Port Hedland is prone to temperature inversions whereby the air near to the ground level is warmer than the atmosphere directly above. This is



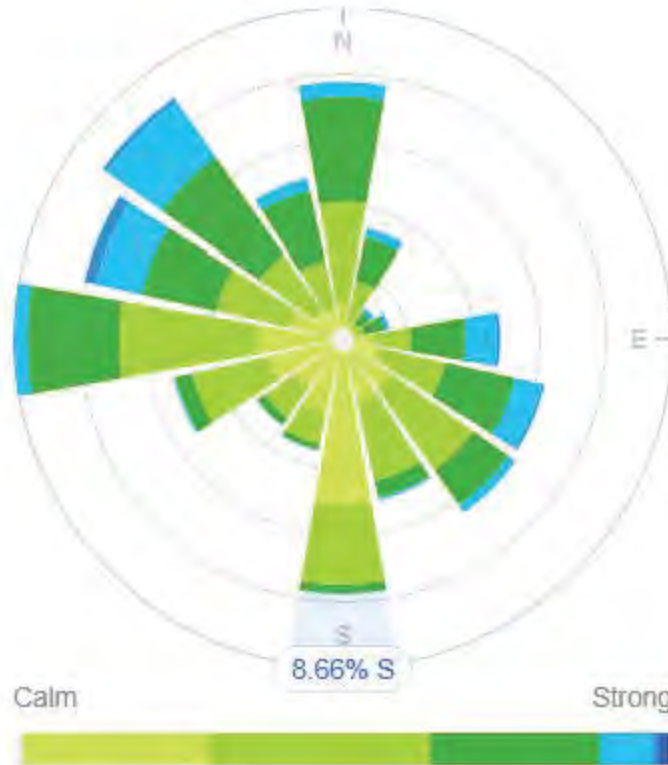


Figure 14

Figure 14: Five year average wind direction and speed, Port Hedland (WillyWeather, 2017)

the result of the earth’s surface being warmer than the heat from solar radiation, which most commonly occurs at evening/night time when wind speeds are low. Temperature inversions prevent normal atmospheric convection resulting in the warmer air, and the particulates within it, remaining near to ground level as the cooler, denser air acts as a cap that prevents dispersion.

6.5.2 Regional climatic aspects

Port Hedland is located in a semi-arid environment. Rich mineral content is reflected in the red soil and dust (See HRA page 12). The Port Hedland region has dominant annual wind direction consisting of north-westerly during the summer months and south-easterly during the winter months.

6.5.3 Rainfall and temperature

The Bureau of Meteorology (BoM) provides the mean rainfall and mean maximum temperature for Port Hedland (mean maximum temperature 1948 to 2017 and mean rainfall 1942 to 2017). The Port Hedland region is hot to warm all year round with rainfall predominantly over December to June.

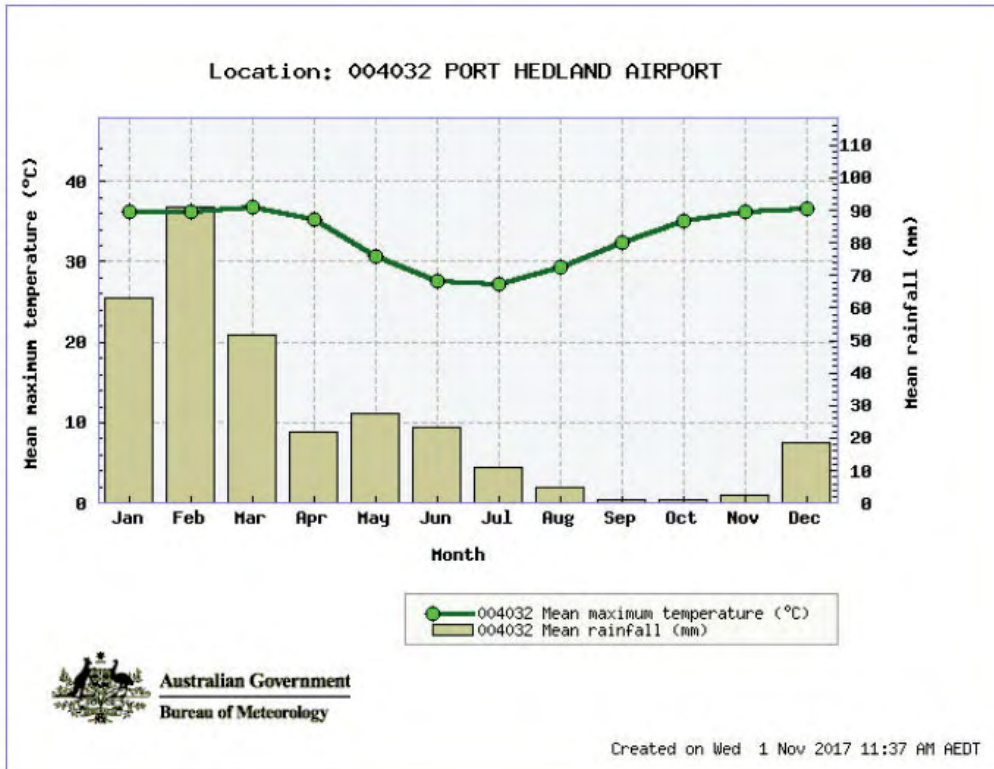


Figure 15. Mean temperature and rainfall Port Hedland (BoM, 2017)

7. Risk Assessment

7.1 Confirmation of potential impacts

Identification of key potential emissions, pathways, receptors and confirmation of potential impacts are set out in Table 20 below. Table 20 also identifies which potential emissions will be progressed to a full risk assessment. Some potential emissions/impacts may not receive a full risk assessment where a potential receptor or pathway cannot be identified or where the emission/impacts are regulated under a Ministerial Statement.

Table 20: Identification of emissions, pathway and receptors

Sources/Activities	Risk Events				Continue to detailed Risk Assessment?	Reasoning	
	Potential Emissions	Potential Receptors	Potential Pathway	Potential Adverse Impacts			
Category 5 Processing or beneficiation of metallic or non-metallic ore	Screening, sizing and blending of ore at the Lump Rescreening Plants (3) and Temporary Screening Plant. The Licence Holder operates at the premises 24 hours a day. However, the Temporary Screening Plant operates only in daylight hours.	Dust	Closest zoned residential premises – 620 m to the north east.	Air/wind dispersion	Impact on health – potentially includes respiratory problems.	Yes	Refer to section 7.4.
	Noise	Impact on amenity – visible dust leaving the Premises and dust fallout onto cars, businesses and recreational areas.			Yes	Refer to section 7.5	
Category 54 Sewage facility	Site wastewater is directed to one of two wastewater treatment plants at Nelson Point and Finucane Island.	Treated wastewater that is elevated in nutrients and suspended solids is discharged to land via irrigation.	Vegetation within the discharge area. Groundwater	Direct discharge via authorised points L1 and L2.	Land and groundwater contamination. Reduction in ecosystem health	Yes	Refer to section 7.8
		Elevated nutrients in groundwater flowing to the marine environment.	Benthic, mangrove and seagrass communities in the Port Hedland Inner Harbour.	Seepage to groundwater	Eutrophication of localised marine waters.	Yes	Refer to section 7.8
		Odour	No residences or other sensitive receptors in proximity to WWTP. The nearest resident to the Nelson Point WWTP (L1) is 1.35 km north and approximately 1.8 km from the Finucane Island WWTP (L2).	Air/wind dispersion	None	No	No receptor present and small volumes of wastewater treated within enclosed tanks.
Category 58 Bulk material loading or unloading	Up to 290 Mtpa of iron ore across eight berths loaded into the ship's hold via conveyor boom. Ore is stockpiled, handled and moved at multiple times in the process for example at car dumpers, stackers, reclaimers, conveyors and transfer points. The Licence Holder operates at the premises 24 hours a day.	Fugitive dust from the end of the conveyor boom and the updraft created within the ship's hold as ore displaces air.	Esplanade Hotel – located approximately 490 m north of the nearest ship loader. Closest zoned residential premises – 910 m to the northeast of the nearest ship loader.	Air/wind dispersion	Impact on health – potentially includes respiratory problems. Impact on amenity – visible dust leaving the Premises and dust fallout onto cars and homes.	Yes	Refer to section 7.4
		Noise from the operation of the boom conveyor and the impact of ore when it is loaded into the ship.			Impact on amenity.	Yes	Refer to section 7.5
		Discharges to surface water from the berth.	Benthic, mangrove and seagrass communities in the Port Hedland Inner Harbour.	Spillages to harbour waters.	Reduction in accessibility to sunlight for marine ecosystem which may limit photosynthetic function.	Yes	Refer to section 7.6
		Light emissions from the premises – berth and ship loader	Fiat back turtles (<i>Natator depressus</i>) nest at Cemetery Beach and Pretty Pool. In addition three other turtles visit Port Hedland waters. Cemetery Beach is located app 3.75km from the berth at Finucane Island.	Artificial light from elevated sources at the Premises are approximately 4km away.	Hatchlings have the potential to be impacted by artificial light as it can cause them to become disorientated and change natural behaviors (guided by light).	No	Berth and ship located at the Premises located almost 4km from receptor and are not expected to significantly impact the behaviours of hatchlings.
Category 61 Liquid waste facility	Wash-down water and stormwater from fuel/chemical storage facilities is collected in sumps before being ultimately pumped to one of two FWRPs. Treated water is then re-used in the plant or discharged as surplus.	Discharges to land	Native vegetation (nearby mangrove community)	Direct discharges from the Finucane Island FWRP (L3) to the Finucane Island gate (W2) being transported to the receptor via groundwater flows.	Potential contamination of soil and groundwater	Yes	Refer to section 7.7

Risk Events					Continue to detailed Risk Assessment?	Reasoning
Sources/Activities	Potential Emissions	Potential Receptors	Potential Pathway	Potential Adverse Impacts		
Category 73 Bulk storage of chemicals etc.	Hydrocarbons (diesel) stored in closed holding tanks at the Main Fuel Farm at Nelson Point (62.6 ML) and other smaller facilities located across Fiuuacane Island and Nelson Point.	Direct spills during refuelling and seepage from containment infrastructure.	Vegetation within the discharge area. Marine environment	Spills directly to land. Runoff into nearby drainage channel that leads to the marine environment.	Soil contamination. Reduction in ecosystem health and water quality	Yes Refer to section 7.9
		Stormwater and minor spills captured within the Main Fuel Farm being discharged to the marine ecosystem.	Benthic, mangrove and seagrass communities in the Port Hedland Inner Harbour.	Discharge from oily water separators to the Nelson Point flap gate (W1) and Locomotive Service Shop (LSS) lake drain (W3) via settling ponds and a manmade drainage channel.	Discharges waters with sediment-laden or hydrocarbon contaminated water may impact the health of marine ecosystems. There is also the potential for the mangrove community to be impacted by sedimentation.	Yes Refer to section 7.6
		Odour emissions from refuelling stations and where gases are vented during storage tank refilling.	Closest zoned residential premises to – within 230 m to the north.	All-wind dispersion	Amenity impacts.	Yes Refer to section 7.10

7.2 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 21 below.

Table 21: 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 22 below.

Table 22: 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	<ul style="list-style-type: none"> on-site impacts: catastrophic off-site impacts local scale: high level or above off-site 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> on-site impacts: high level off-site impacts local scale: mid level off-site 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> on-site impacts: mid level off-site impacts local scale: low level off-site impacts wider scale: minimal Specific Consequence Criteria (for environment) are at risk of not being met 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> on-site impacts: low level off-site impacts local scale: minimal off-site impacts wider scale: not detectable Specific Consequence Criteria (for environment) likely to be met 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> on-site impact: minimal Specific Consequence Criteria (for environment) met 	<ul style="list-style-type: none"> 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*

“on-site” means within the prescribed premises boundary.

7.3 Acceptability and Treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk Treatment Table below:

Table 23: Risk Treatment Table

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk Event will not be tolerated. DWER may refuse application.
High	May be acceptable. Subject to multiple regulatory controls.	Risk Event may be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk Event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled	Risk Event is acceptable and will generally not be subject to regulatory controls.

7.4 Risk Assessment – Dust

7.4.1 Description of Risk Event

Fugitive dust generated from vehicle movements on gravel roads, stockpiling and handling of ore at the Premises which migrates to Port Hedland residences and other sensitive land users at sufficient concentrations to cause health and amenity impacts.

7.4.2 Identification and general characterisation of emission

The DoH HRA identified iron oxide as the major component of dust arising from port and commercial operations in Port Hedland. However, as measured levels of iron-oxide were found to be below the health based guideline values the HRA focused on the contribution of iron oxide to total particulate matter levels (as PM₁₀). As the HRA's indicative health guideline value for exposure to iron oxide is 120 µg/m³ over a 24-hour averaging period, and greater than the guideline value for PM₁₀ (70 µg/m³, refer to section 7.4.4), the HRA focused on health impacts from total particulate matter (as PM₁₀).

Fugitive dust emissions from handling and movement of iron ore include points where ore is dropped from height such as at transfer points, car dumpers and where stackers deposit ore onto stockpiles, or where stockpiled ore is reclaimed.

The amount of dust generated at the Premises is a result of a number factors or variables including ore throughputs, the way that ore is handled at the premises and the moisture content of the ore and the meteorological conditions. The Licence Holder is proposing to increase exports from 270 Mtpa to 290 Mtpa, representing an increase in throughput of 7.4% which could therefore result in a potential increase in dust emissions. With the application to increase authorised iron ore throughputs at the Premises, the tonnages of bulk material authorised for handling at all Port Hedland ports (refer to section 6.1) equates to 556.45 Mtpa. Therefore throughputs at the Premises will represent over half of all bulk material handling in Port Hedland (52.1%).

7.4.3 Description of potential adverse impact from the emission

Iron oxide is not considered toxic or carcinogenic. The HRA found that there is no clear evidence of a causal link between iron-oxides and diseases. However, ambient dust particles smaller than 10 micrometres (PM₁₀) has the ability to be drawn deep within the lungs and is

associated with both respiratory and cardiovascular health impacts following both long and short term exposures. Long term repeated exposure can be much more detrimental than short term sporadic exposure. The most severe potential effects are reduced life expectancy due to long-term exposures.

The HRA (see page 30) summarised the findings of a comprehensive and detailed hazard assessment by Toxikos of PM₁₀ health effects in Port Hedland resulting in increases in:

- daily mortality;
- hospital admissions associated with respiratory disease, cardiovascular disease and pneumonia and bronchitis; and
- emergency room attendance for pre-existing respiratory conditions.

For Port Hedland, the HRA found that modelling scenarios indicated that the level of risk between PM₁₀ concentrations of up to 50µg/m³ (NEPM standard) and PM₁₀ concentrations up to the interim guideline of 70µg/m³ was not discernible for the current population levels in Port Hedland, in part due to the town's small population. The HRA concluded that the interim guideline of 70µg/m³ should provide adequate protection of health and wellbeing (see 4.2.2).

7.4.4 Criteria for assessment

The *Port Hedland Air Quality and Noise Management Plan 2010*, specifies an interim air quality guideline of 24-hour average PM₁₀ of 70µg/m³ (with allowance for 10 exceedances per calendar year²) for residential areas east of Taplin Street.

The HRA recommendation in relation to air quality guideline is to '*apply the current interim guideline of 24-hour PM₁₀ of 70 µg/m³ (+ 10 exceedances to accommodate natural events) in residential areas of Port Hedland within a reasonable time frame that allows for local dust sources to be identified and managed (i.e. the spoil bank). A period of 5 years is suggested*' (HRA, 2016, p. 36). Further that this recommendation is reflected in the *Port Hedland Dust Management Taskforce Report to Government, 2016*, which is currently being considered by Government.

DWER has applied the *Port Hedland Air Quality and Noise Management Plan 2010* interim guideline at Taplin Street, noting that this may be subject to change in the future following the Government's consideration of the *Port Hedland Dust Management Taskforce Report to Government, 2016*.

There are no current specific amenity criteria relevant to the Port Hedland community to quantify the point at which amenity impacts may be perceived (refer to section 4.7). Alternative criteria used will consider complaints (number and nature) together with stakeholder and community submissions.

7.4.5 Licence Holder controls

The Licence Holder has provided the following dust management plans which document how fugitive dust emissions from the Premises are being managed:

- BHP Billiton, Procedure: Port Dust Management Manual;
- BHP Billiton, Procedure: Minimising Port Operations Dust Generation; and
- BHP Billiton, Procedure: Respond to High Dust Alarm.

² The interim performance target is a cumulative reduction target, designed to apply to all industry in Port Hedland. Exceedances relating to regional bushfire smoke and dust storms are not considered part of cumulative target exceedances. Exceedance data are only adjusted for bushfires and dust storms where all monitors are affected, including South Hedland and Yule River (HRA, 2016).

This assessment has reviewed these dust management plans which contain the controls set out in Table 24 below.

Table 24: Licence Holder’s controls for fugitive dust emissions

Site Infrastructure	Description	Operation details
Controls for dust		
Ship loader	Conveyor booms capable of loading up to 290 Mtpa	Water spray system operated at the tripper chute and at the end of the conveyor boom. A deflector surrounds the discharge point for the conveyor boom.
Stockyard	Boom sprays and dust hoods on all stackers	Sprays operated depending on ore type and its potential for dust generation ¹ . Stacker lowered to reduce the drop height to the stockpile.
	Water cannons located approximately every 25 m along stockpiles	Routinely operated. Operated depending on ore type and its potential for dust generation ¹ . Operated during high dust events when visible dust is being generated.
	Water sprays on all Bucketwheel Reclaimers	Sprays operating whenever the Bucketwheel Reclaimers are in operation. Sprays are strategically located around each Bucketwheel Reclaimer.
Conveyor	Open Bulk ore conditioning sprays operated at inflow and outflow systems	Sprays are turned on incrementally depending on the route selected and the ore type. Fitted with a belt scraper and washer to prevent carry-back ore on the underside of the conveyor belt.
Transfer stations	Enclosed	Dust laden air is removed to a wet scrubber. Rubber curtains used at the entry of head chutes and exit point of the impact area. A rubber skirt is also fitted to the rear of the impact area to form a seal.
	Fog systems	Operated at entry and exit points of conveyor chutes, close to where dust is produced. In-chute fogging systems located on select transfers stations
Lump Rescreening Plants (LRP)	Rescreening of Lump ore	Dust laden air is removed to a wet scrubber when operational. Sealed doors on conveyor access chutes. Canvas dust covers placed over screen housings. Pre-screening lump products on Finucane Island during forecast High or Extreme Dust Risk Periods is avoided.
Temporary screening plant	Screening of stockpiled material	Chemical surfactant is applied to stockpiles and open areas as required.

Site Infrastructure	Description	Operation details
		Operated during daytime hours to reduce the impact of prevailing wind conditions on sensitive receptors.
Car dumpers	Partially enclosed	Dust laden air is removed to a wet scrubber.
Sealed roads	Sealed	Road sweepers operate on trafficable areas including roads, turn around points and berths.
Unsealed roads and open areas	Covered with gravel	Use of water carts or dust suppressing chemicals. Vehicle speed restrictions set at 40 km/hr
Monitoring		
Dust monitors	Real time boundary dust monitoring network	Continuous monitoring. High dust alarms are triggered when readings at the Taplin St BAM monitors record elevated dust levels and the monitor is downwind of Licence Holder activities. These alarms currently trigger a visual review of Premises activities to see if dust is being emitted.
Controls for fugitive dust		
Moisture content of material	Ore moisture is targeted above DEM where possible. Product moisture analysis conducted at sampling stations prior to ship loading. Mine production moisture data supplied with each train load.	
Spilt material	High pressure hoses are used to clean spillage build ups in difficult to reach areas such as transfer stations and chutes. Vacuum trucks are used to remove spilt material from operating equipment where water cleaning cannot occur. Skid steers are used to remove larger amounts of spilt material where front end loaders cannot safely operate.	

Note 1: The potential for dust generation is currently determined by visual observation of dust lift-off at the mine site.

For unsealed roads and open areas it is considered that the use of water carts or chemical dust suppressants offers only temporary mitigation of dust and is less effective in hot, dry and/or windy conditions. During the assessment of the Licence Holder's application, DWER was advised that further works to seal large open areas of the Premises had been completed.

Each ore product stream requires varying degrees of conditioning (which may include adding moisture) to help reduce the potential for dust generation. For moisture these concentrations are termed dust extinction moisture (DEM). The products are tested to determine the DEM and flow problem moisture (FPM) every quarter, to define an optimal moisture operating range. Table 25 below shows the average DEM and FPM for each product from FY17.

Should product moisture exceed the transportable moisture limit (TML) for a particular type of ore, the ore can liquefy in the ship's hold presenting safety concerns and issues at the point of unloading. At the Premises, high moisture contents may also prevent flow on conveyor belts and through transfer stations onsite (FPM level). The optimal moisture content is between the DEM and the FPM level.

Moisture control of ore received at the Premises is largely dependent upon the ability to effectively condition ore at the mines as it is crushed and screened. The Licence Holder has

advised that management controls for ores received at the Premises with a moisture content below the DEM level include blending with other ores to increase moisture content and applying moisture directly to the ore using bulk ore conditioning sprays on conveyors. In addition, higher risk products can be stockpiled on Finucane Island, away from residential dwellings while some trainloads are able to be stored temporarily 30 km south of Port Hedland at Mooka prior to being direct loaded thereby avoiding stockpiling and re-handling.

Table 25: Average Dust Extinction Moisture and Flow Problem Moisture levels for each ore handled (FY17)

Average FY17 Lump DEM, Fines DEM and Fines FPM for each product			
Ore Material	Lump Dust Extinction Moisture (DEM) (%)	Fines Moisture Operating Range	
		Fines DEM (%)	Flow Problem Moisture (FPM) (%)
Newman	3.0	4.2	6.5
Yandi	N/A	6.0	8.5
MAC	3.0	4.6	7.7
Jimblebar	3.0	4.8	7.6

The Licence Holder is notified from the mine site of the moisture content of each trainload of product before being railed to Port. However, results from moisture content sampling undertaken at the mine sites are generally not able to be received until after approximately 48 hours after testing. Therefore the Licence Holder currently relies on the communication of visual observations of dust lift-off at train load out facilities at the mine to determine whether the ore is managed as a higher risk product.

The Licence Holder targets a dust control infrastructure availability of 90% to encourage the rapid maintenance or repair of equipment used to limit dust emissions. Dust control infrastructure availability refers to the availability of equipment used to prevent or suppress fugitive emissions such as the dust collectors, belt wash stations, sprays and foggers described above (refer to sections 4.5.5 and 4.6.1).

7.4.6 Key findings

1. the HRA identified that the major constituent of ambient dust from port and commercial operations in Port Hedland is iron oxide with particulate matter as PM₁₀ being the key parameter of concern;
2. a number of factors or variables influence the amount of dust generated at the Premises including throughput, the method of ore handling, moisture content of the ore and the meteorological conditions;
3. throughputs at the Premises represent over half over of all Port Hedland throughputs making it the largest port operation in the area;
4. sensitive land users in the West End are likely to be exposed to higher ambient dust concentrations than those east of Taplin Street;
5. the HRA recommends the continued application of the interim guideline level of 70µg/m³ (+ 10 exceedances per year) to all residential areas of Port Hedland;
6. there has been a number of dust complaints received by DWER relating to dust with the majority being received within the last year and a number of submissions made in relation to amenity concerns and impacts; and
7. dust impacts on amenity were not addressed through the HRA or Taskforce Report for non-residential sensitive land users of the West End. The risk of amenity impacts to those commercial, entertainment and short-stay accommodation receptors within the West End must be considered.

7.4.7 Consequence

The Delegated Officer considers that dust emissions from the handling of iron ore at the Premises (including through the increase to 290 Mtpa) contributes to ground level dust concentrations of PM₁₀ in the West End of Port Hedland.

Based on historical monitoring data it is clear that the cumulative PM₁₀ consequence criterion (70µg/m³ at Taplin Street over a 24-hour period) has the potential to be exceeded. In addition, dispersion modelling results indicate that the Premises will contribute to ground level concentrations of PM₁₀ at Taplin Street and that cumulative levels of PM₁₀ will be similar following the throughput increases.

The Premises contributes to cumulative concentrations of PM₁₀ and that cumulative concentrations of PM₁₀ may exceed specific consequence criteria and may result in adverse health effects to the community requiring medical treatment. The consequence rating is therefore **major**.

The Delegated Officer considers that there may be a high level of impact to amenity experienced by residents and businesses in the West End as a result of dust levels. It is considered that the Premises will contribute to cumulative levels of dust in the West End of Port Hedland. Therefore the consequence of impacts to amenity from fugitive dust emissions is rated as **major**.

7.4.8 Likelihood of consequence

The Delegated Officer has determined, based upon exceedances of the 70µg/m³ guideline concentration at the Taplin Street monitor (PHIC, 2016) and through the dispersion modelling provided by the Licence Holder, the likelihood of the Licence Holder contributing to dust emissions reaching receptors at sufficient concentrations to cause health impacts is **likely**.

In addition, the Delegated Officer has determined the likelihood of impacts to amenity occurring in the West End to be **likely** as justified by complaints lodged with the Department

and submissions received (refer to Appendix 3).

7.4.9 Overall rating of dust impacts

The Delegated Officer has compared the consequence and likelihood ratings described above with the Risk Rating Matrix (Table 21) and determined that the overall rating for the risk of health and amenity impacts occurring as a result of dust emissions from the Premises is **High**.

7.5 Risk Assessment – Noise

7.5.1 Description of Risk Event

Noise emissions from the Premises significantly contributing to exceedances of assigned levels at sensitive receptors causing impacts to amenity.

7.5.2 Identification and general characterisation of emission

Noise is generated from normal operations onsite including noise from rail car movements (including car dumping), reclaimers, front end loaders, screening and from product movement through conveyors, stackers and reverse alarms.

Wheel squeal and shunting from train movements may also contribute to noise generated from the Premises although noise from trains is not covered under the Noise Regulations. Therefore rail operations have not been considered as a source of noise for the purposes of this risk assessment.

The Port Hedland Cumulative Environmental Noise Study (SVT, 2014) identified that under worst case conditions, noise exceedances are likely to occur across the West End between 2200 and 0700 hours. These worst case conditions were considered to be wind in the direction of residents at 3 m/s, humidity at 50% and temperatures at 15 °C (SVT, 2014).

Where assigned noise levels are exceeded, those contributors that emit noise to levels within 5dB of the assigned level are determined to be significant contributors to ambient noise in accordance with regulation 7(2) of the Noise Regulations. The Port Hedland Cumulative Environmental Noise Study (refer to section 4.6.3) found that the Premises exceeds a value of 5dB below that assigned noise level at the identified receptor points under worst case meteorological conditions (SVT, 2014).

7.5.3 Description of potential adverse impact from the emission

Noise has the potential to impact on the amenity of the receptor. The Port Hedland Operations is a 24/7 operation and therefore noise is continuous but variable at receptors depending on a number of factors such as meteorological conditions, the location of operating equipment and cumulative noise sources. Where assigned noise levels are exceeded regularly health impacts may arise from stress and/or lost sleep.

7.5.4 Criteria for assessment

The criteria for noise are detailed in the Noise Regulations and in Table 26 below.

Table 26: Assigned noise levels

Type of premises receiving noise	Time of day	Assigned level (dB)		
		L _{A 10}	L _{A 1}	L _{A max}
Noise sensitive premises: highly sensitive area eg. Residential areas on Withnell Street and	0700 to 1900 hours Monday to Saturday	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and	40 + influencing factor	50 + influencing factor	65 + influencing

Grove Street (910m and 620m respectively)	Public holidays			factor
	1900 to 2200 hours all days	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + influencing factor	45 + influencing factor	55 + influencing factor
Commercial premises eg. Esplanade Hotel (490 m away)	All hours	60 + influencing factor	75 + influencing factor	80 + influencing factor
Industrial and utility premises eg. Pilbara Ports Authority's Eastern Operations, Wedgefield	All hours	65 + influencing factor	80 + influencing factor	90 + influencing factor

7.5.5 Licence Holder controls

The Licence Holder has developed an Environmental Noise Reduction Management Plan (ENRMP) which aims to:

- reduce noise to as low as reasonably practicable, acknowledging growth, and, where reasonably practicable, comply with the requirements of the Noise Regulations (including seeking an exemption, if necessary);
- where it is impracticable to comply with Noise Regulations, ensure continuous improvement is facilitated through this ENRMP;
- ensure that new plant and infrastructure planned for the Port facilities particularly Prescribed activities (as defined by the EP Act), complies with the Noise Regulations, where land use planning constraints allow; and
- comply with the Western Australian Planning Commission's State Planning Policy 5.4, Road and Rail Transport Noise and Freight Considerations in Land Use Planning where land use planning constraints allow.

The ENRMP includes the specific noise controls shown in Table 27 below:

Table 27: Licence Holder's proposed controls for noise

Controls	Description
Siting	Equipment that is known to emit noise predominately in one direction shall, where possible, be orientated so that the noise is directed away from noise-sensitive areas.
Engineering	Implementation of engineering designs and controls to reduce operational noise including enclosing, shielding, installing low noise equipment and performing regular maintenance on equipment. Cladding is also used to dampen noise from equipment.
Mobile plant equipment	Regular maintenance of mobile equipment. Where machines are fitted with engine covers, these are kept closed when the machine is in use.

Monitoring	An ongoing noise monitoring program is undertaken with monitoring taking place biannually around February and August each year.
Proposed engineering controls¹	Equipment
Drive shielding	Conveyors: P350, P503, P505, P29, P10
Drive replacement and shielding	Conveyors: P351, P355
Replace drive coupling or shielding	Bucket Wheel Reclaimer 5 – Bucket Drive
Hybrid low noise idlers	Conveyors: P350, P501, P503, P504 (Stacker 6), P515, P700, P802, P804, P505, P510, P511, P512, P701, P704, P705, P801, P809, P812, P815, P862, P889, P891, P16

Note 1: With the exception of installing noise shielding on conveyor drive P10 at Nelson Point, all proposed engineering controls form part of the Licence Holder's application to upgrade infrastructure associated with the IHD Project authorised under Works Approval W5792/2015/1.

7.5.6 Key findings

1. The Premises is a significant noise source in the area.
2. The greatest impacts are likely to be experienced by residents at West End.
3. The months of May to November have the highest incidence of low winds and cooler ground temperatures (BoM, 2016). Therefore it is these months, during overnight and early morning hours, where noise exceedances are most likely.
4. Increases to iron ore throughput from 270 Mtpa to 290 Mtpa may result in more frequent use of noise generating infrastructure.
5. The draft Taskforce Report recommends that DWER assesses unacceptable noise levels and assesses whether additional controls can be introduced.
6. Current cumulative noise levels in Port Hedland exceed the Noise Regulations and in most areas near to the Premises, compliance will not be possible (SVT Consultants, 2014).

7.5.7 Consequence

Due to the scale of operations the Premises is expected to be a significant contributor to cumulative noise emissions in the West End of Port Hedland. The Delegated Officer has determined that Premises activities may have a mid-level impact to amenity in the local area. The consequence of noise emissions has been rated as **moderate**.

7.5.8 Likelihood of consequence

The Delegated Officer has determined that, based on the proximity of the Premises to sensitive receptors, noise emissions may impact upon sensitive receptors at some times. Therefore, the Delegated Officer considers the likelihood of impacts from noise emissions to be **possible**.

A rise in throughput volumes may increase the likelihood of noise exceedances by increasing

the amount of infrastructure operating at any given time. However, the risk event is not expected to occur in most circumstances and the likelihood remains as possible following increased throughput volumes.

7.5.9 Overall rating of noise impacts

The Delegated Officer has compared the consequence and likelihood ratings described above with the Risk Rating Matrix (Table 21) and determined that the overall rating for the risk of impacts from noise emissions is **Medium**.

Cumulative noise emissions currently exceed the Noise Regulations and compliance will not be possible. Subsequently alternative regulatory strategies which include Regulation 17 or percent-based Regulation 17 will be required in order to define new assigned noise levels in the Port Hedland area. As the risk rating of noise impacts is not 'High' or 'Extreme', DWER will consider an alternative regulatory strategy once the recommendations of the Taskforce Report are finalised.

7.6 Risk Assessment – discharges to marine waters

7.6.1 Description of Risk Event

Discharges of sediments and hydrocarbons to the Port Hedland Inner Harbour via FWRP discharge points or from the berth, causing increased turbidity and/or hydrocarbon contamination of the marine environment.

7.6.2 Identification and general characterisation of emission

Stormwater and minor spills trapped within the Main Fuel Farm and vehicle wash-down bay water is collected in a sump that is then taken to an oily water separator before being directed to the Nelson Point FWRPs prior to reuse or disposal to the environment. In addition water that is washed down from difficult to reach areas of the plant, belt wash sprays used to clean conveyor belts. The main contaminants within surplus water from the FWRPs are therefore likely to be sediment.

Point source discharges to water from the Premises are authorised under the Existing Licence at two points that feed directly into the Port Hedland Harbour. A third surface water discharge point listed in previous licences is in fact a discharge to land as surplus treated water from the Finucane Island FWRP is discharged to a manmade feature that acts as an infiltration and evaporation basin. Discharges to this point are assessed in section 7.7.

7.6.3 Description of potential adverse impact from the emission

Seagrasses and benthic communities that include turfing algae and macro algae are present in subtidal areas where light is able to reach the seabed (Port Hedland Port Authority, 2013). In addition, mangrove communities exist in the extensive intertidal flats that surround the Port and are important in order to maintain nutrient cycles and productivity of the coastal zone (Department of Environment, 2006).

Ore from the Premises is relatively inert, insoluble in water and is not likely to significantly increase the toxicity of the marine environment if allowed access. However, the discharge of stormwater at the authorised discharge points may increase turbidity and prevent access to light for benthic and nearby mangrove communities. The large tidal movements in the region give rise to the potential for deposition of sediment and oil on mangrove communities, which in turn can block individual plant's stomata and reduce its ability to exchange gases (National Research Council of the National Academies, 2003). Without adequate controls in place this can result in inhibited growth and under extreme circumstances, vegetation death.

The Port Hedland Inner Harbour is highly modified and zoned for heavy industrial use. Discharges of sediment from point source emissions are likely to represent a small

contribution to the overall suspension of solids within the harbour, which monitoring data suggests is only likely to occur during periods of heavy rainfall (BHP, 2014b). In addition to naturally occurring suspension through tidal patterns, shipping movements, dust deposition, and discharges from other operators in and around the port are all expected to have some cumulative impact on the level of suspended solids with shipping movements also likely to increase TRH concentrations in ambient waters.

As the marine environment has already been exposed to extensive maintenance dredging and shipping movements, the remaining existing benthic communities that live in the shallows of the Port Hedland Harbour are likely to be resilient to minor increases in turbidity at port locations. Negligible increases in ambient TRH concentrations are expected assuming the continued level of treatment at oily water separators. When investigating the consequences of dredging projects at Port Hedland Port, the mortality threshold of mangrove communities to sediment was assumed to be 100mm of settled solids based on the species present, scientific literature, and a review of previous stressors from dredging projects (Worley Parsons, 2010). This indicates a high tolerance of mangrove communities to sedimentation.

7.6.4 Criteria for assessment

The Premises is located within the Port Hedland Inner Harbour, which has been characterised by the Department of Environment’s (2006) *Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives* as requiring a moderate level of ecological protection. There are no relevant criteria available for maximum sediment values in a disturbed and tidal environment such as the Port Hedland Inner Harbour.

7.6.5 Licence Holder controls

This assessment has reviewed the controls set out below. Emission points referred to in Tables 28, 29 and 30 are depicted in the Premises Map provided in Schedule 1 of the Revised Licence.

Table 28: Licence Holder controls – stormwater management

Controls for stormwater management	
Stormwater infrastructure for operational areas.	<p>Stormwater from other operational areas at both Finucane Island and Nelson Point is captured on land directed to stormwater retention basins.</p> <p>Captured stormwater that has potentially been contaminated with hydrocarbons and water from the wash-down of infrastructure is transferred to oily water separators for treatment prior to treated water being directed to the FWRPs.</p> <p>FWRPs use a centrifuge to remove sediment from captured water. Water is tested to have a TRH concentration of below 15mg/L prior to discharge.</p> <p>Sludge from the FWRPs is stored onsite to be reprocessed for shipping.</p>
Water discharge	<p>Surplus treated stormwater from the Nelson Point FWRP (L4) is permitted to be discharged to water at the following locations:</p> <ul style="list-style-type: none"> • LSS lake drain (W3), which is the final discharge point following settlement in three ponds that overflow (L6) to a manmade drainage channel and basin. • Nelson Point flop gate (W1), a direct discharge point to the Port Hedland Inner Harbour and of stormwater after treatment at the Triple Interceptor.

Stormwater infrastructure for A Berth to H Berth	Berth is designed to prevent direct drainage of stormwater into the marine environment through bunding.
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Table 29: Licence Holder controls – spillage management

Management Control	Description
Spillage clean up	<p>Any spills around site contained and cleaned up:</p> <ul style="list-style-type: none"> • Road sweepers are used on roads and other sealed areas. • Skid steers used to remove larger amounts of spillage from close to or below structures where front end loaders cannot safely be operated. • Hosing down infrastructure where mechanical methods of clean-up are not practicable. • Vacuum trucks are present to clean out sump pump pits if excess spill fills the sump, blocking the pump and causing water to overflow.

Table 30: Licence Holder controls – monitoring for emissions to surface water

Monitoring	Description
Monitoring	An emission monitoring program is currently undertaken to monitor TRH concentrations only. Monitoring points are located at the Nelson Point FWRP, and when water is flowing at W1, W3, L6 and L7.

7.6.6 Key findings

<ol style="list-style-type: none"> 1. Locations W3, L5 and L7, on the Existing Licence are no longer considered points of discharge to the environment for the purposes of risk assessment (refer to section 4.10). 2. Although minor diffuse discharges around site may occur in other areas, bunding and site layout prevents discharges of contaminated stormwater beyond these locations. 3. Maintenance dredging, which is not within the scope of this Review (and outside of the prescribed premises activities), occurs approximately every four years, and is expected to pose a higher long-term sedimentation risk compared to stormwater discharges. 4. Point source discharges are expected to represent only a small contribution to overall levels of suspended solids and a negligible contribution to TRH concentrations within the Port Hedland Inner Harbour, assuming continued effective treatment of captured water at the FWRPs and oily water separators. 5. Receptors of potential contaminated stormwater discharges are seagrasses and benthic communities in the marine environment, and mangrove communities in the surrounding mudflats. Given the continued presence of these ecosystems within the Port Hedland Inner Harbour and surrounding mudflats, receptors have adapted high tolerances to sedimentation and are expected to be resilient to ongoing discharges.
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7.6.7 Consequence

The Delegated Officer has determined that, in the event of stormwater discharges to the marine environment occurring, the potential harm to marine receptors and mangrove communities will be minimal. Therefore, the Delegated Officer considers the consequence of stormwater discharges to the marine environment to be **slight**.

7.6.8 Likelihood of consequence

The Delegated Officer has determined that the likelihood of stormwater discharges to the marine environment resulting in contamination of the marine environment may only occur in exceptional circumstances. This is, in part, due to the ability of the FWRP's to treat contaminated water. Therefore, the Delegated Officer considers the likelihood of stormwater discharges to the marine environment to be **unlikely**.

7.6.9 Overall rating of stormwater discharges

The Delegated Officer has compared the consequence and likelihood ratings described above with the Risk Rating Matrix (Table 21) and determined that the overall rating for the risk of stormwater discharges to the marine environment is **Low**.

7.7 Risk Assessment – discharges to land (FWRP)

7.7.1 Description of Risk Event

Discharges of hydrocarbon contaminated and/or sediment-laden liquid waste received from Nelson Point to land, where the liquid waste then migrates through groundwater toward the adjacent mangrove community, potentially impacting on growth and survival.

7.7.2 Identification and general characterisation of emission

The majority of water from the Nelson Point and Finucane Island FWRP's is reused onsite for the purposes of dust suppression with the remaining surplus water being discharged to sedimentation basins, prior to manmade infiltration and evaporation basins (depicted as W2 and L6 in Figure 12).

As the pathway to the receptor involves infiltration to groundwater, sediment is not considered a contaminant of concern in the emission. All sediment is expected to remain within the sedimentation basins at Nelson Point and Finucane Island.

Recovered hydrocarbons from all oily water separators are removed from site by a controlled waste contractor.

7.7.3 Description of potential adverse impact from the emission

Hydrocarbon discharges to land have the ability to contaminate soils, restricting oxygen and in turn the ability for vegetation growth. In large enough quantities hydrocarbons may runoff to the marine environment via groundwater seepage.

No Priority or Threatened Ecological Communities exist in the vicinity of the discharge point, which is also at a sufficient distance to the marine environment to allow bacteria breakdown of minor hydrocarbons avoiding ongoing seepage through groundwater. Groundwater below the point of discharge is saline and is not currently extracted for human use.

7.7.4 Criteria for assessment

There are no relevant criteria available for hydrocarbons discharged to disturbed land.

7.7.5 Licence Holder controls

This assessment has reviewed the controls set out in Table 31 below.

Table 31 Licence Holder controls for wastewater management

Wastewater treatment		
Site Infrastructure	Description	Operation details
Finucane Island FWRP	Discharge to land	Water treatment to remove sediment. Freshwater is recovered for use on site in dust suppression and ore processing.
Monitoring	Description	
Monitoring – Discharges from the Finucane FWRP	An emission monitoring program is currently undertaken on a monthly basis to monitor TRH concentrations at the FWRP and infiltration basin (W2).	

7.7.6 Key findings

1. The trigger values included in the Licence Holder controls are considered adequate to prevent impacts from liquid waste discharges at Finucane Island. The only liquid waste accepted at Nelson Point Operations is hydrocarbon contaminated stormwater captured from Finucane Island. The Licence Holder does not accept liquid waste from beyond the Premises.

7.7.7 Consequence

The Delegated Officer has determined that liquid waste discharges from the Finucane Island FWRP are going to have negligible offsite impacts on mangrove communities as sediment will be captured within a basin prior to seepage to the marine environment. In addition, stormwater from the Nelson Point FWRP and oily water separators is expected to be sufficiently treated to capture sediments and maintain hydrocarbons well below 15mg/L TRH prior to discharge to land.

Therefore, the Delegated Officer considers the consequence of discharges from the FWRPs to be **slight**.

7.7.8 Likelihood of consequence

Based on the type of liquid waste received, the Delegated Officer has determined that liquid waste discharges to the environment from both FWRPs will only result in impacts to mangrove communities in exceptional circumstances. Therefore, the Delegated Officer considers the likelihood to be **rare**.

7.7.9 Overall rating of discharges to land from the FWRPs

The Delegated Officer has compared the consequence and likelihood ratings described above with the Risk Rating Matrix (Table 21) and determined that the overall rating for the risk of discharges to the environment from the FWRPs is **Low**.

7.8 Risk Assessment – Discharges from the WWTPs

7.8.1 Description of Risk Event

Discharges to land from the WWTPs infiltrating to groundwater, resulting in adverse health impacts for nearby sensitive ecological receptors on land and in the marine environment.

7.8.2 Identification and general characterisation of emission

Treated effluent is discharged to one of two irrigation fields at either Nelson Point or Finucane Island WWTPs. Sewage received at the WWTPs is treated using a sequencing batch reactor that includes a chlorine contact chamber for disinfection. Discharge of treated effluent on Finucane Island is by drip irrigation to a reclaim spoil mound approximately 3 m tall. Any runoff is diverted via a stormwater collection drain to an infiltration basin adjacent to the WWTP. Conversely effluent treated at the Nelson Point WWTP is sprinkler irrigated to a bunded irrigation field located within 30 m of a mangrove community.

The performance of the WWTPs during the 2016 annual period is summarised in section 4.10.2.

7.8.3 Description of potential adverse impact from the emission

The risk associated with the irrigation of nutrient-rich wastewater to land is the promotion of invasive plant species that are able to more readily absorb nutrients, potentially reducing the value of the local environment. However, there are no known priority or threatened ecological communities present at either irrigation field, nor have any threatened fauna been identified.

In terms of hazards relating to the infiltration of nutrient-rich wastewater to groundwater, seepage is likely to be expressed in the marine environment at the intertidal zone of the Port Hedland Harbour. The expression of groundwater with elevated nutrients into the mudflats of the Port Hedland Harbour may promote localised algal growth, but this is likely to be absorbed by mangrove communities. Conversely though, water with high Biochemical Oxygen Demand (BOD) can reduce the oxygen availability for the benthic and mangrove communities, potentially limiting growth and survival rates.

The Nelson Point WWTP (L1) irrigation field is situated on a reclaimed area near to mangrove communities of the Port Hedland Harbour located south east of F Berth, beyond the dredged zone and within the intertidal zone. Without the existing ongoing maintenance of the WWTP there is the potential for nutrients to enter the marine environment resulting in localised reduction of oxygen available to benthic and mangrove communities.

Unlike L1, the Finucane Island irrigation field (L2) is separated from the marine environment by an environmental berm bordering a significantly disturbed section of the Port Hedland Harbour that is unlikely to support significant benthic communities. Additionally, there are high evaporation rates in Port Hedland, and vegetation is already present within the irrigation areas that would likely absorb much of the treated effluent.

Impacts to vegetation are expected to be localised to the irrigation fields, which are located on reclaimed areas. The small section of mangrove species adjacent to the L1 irrigation field may be impacted from the seepage of groundwater contaminated with elevated levels of nutrients should the WWTP not be effective in its treatment of effluent. Discharges are not likely to result in the loss of any protected flora species.

7.8.4 Criteria for assessment

The most relevant guidance material for WWTP effluent disposal to land is the 1997 ANZECC/ARMCANZ Australian Guidelines for Sewerage Systems – Effluent Management. For the irrigation of treated effluent to land, these guidelines recommend a minimum of secondary treatment. Secondary treatment is defined by the guidelines to involve “a level of

treatment that removes 85 per cent of BOD and suspended solids”. In terms of sampling frequencies, for small plants (between 0.5 – 3 megalitres per day) the guidelines recommend a minimum of quarterly sampling.

The Effluent Management Guidelines provide a list of typical effluent qualities following various levels of treatment. These are provided in Table 32 below against the expected effluent quality from the WWTPs at the Premises.

Table 32: Typical effluent qualities (expected performance) of WWTPs against Effluent Management Guidelines

Parameters (including units)	Targeted Effluent Quality of the WWTPs ¹	Effluent Management Guidelines ²
Biochemical Oxygen Demand (mg/L)	<20	20-30
Total Suspended Solids (mg/L)	<10	25-40
Total Nitrogen (mg/L)	<10	20-50
Total Phosphorus (mg/L)	<0.5	6-12
<i>Escherichia coli</i> (cfu/100mL)	100	10 ⁵ – 10 ⁶

Note 1: Refer to section 4.10.2 for effluent quality recorded during monitoring.

Note 2: ANZECC/ARMCANZ, 1997

7.8.5 Licence Holder controls

This assessment has reviewed the controls set out in Table 33 below.

Table 33: Licence Holder’s proposed controls for discharges to land from the WWTPs

Wastewater treatment			
Site Infrastructure	Description	Operation details	Reference to plan (Attachment 1)
Nelson Point and Finucane Island WWTPs	Irrigation of up to 260.9 m ³ per day of treated wastewater to irrigation fields at Nelson Point (7.6 ha) and Finucane Island (10.2 ha).	Wastewater is treated to meet Australian Guidelines for Sewerage Systems (ARMCANZ and ANZECC, 1997) prior to irrigation. Tanks are inspected to ensure that they have sufficient capacity. Sludge is removed by a licensed contractor for offsite disposal regularly.	Premises map L1 and L2
Monitoring	Description		
Monitoring – WWTP discharge to land	A surface water monitoring program is undertaken on a quarterly basis with reference to the ANZECC and ARMCANZ recommended treatment guidelines.		

7.8.6 Key findings

1. There are no known priority or threatened ecological communities present at either of the point sources of the discharges.
2. Any impacts to vegetation are likely to be largely restricted to the irrigation fields.

3. The predicted impact to the marine environment from irrigating treated wastewater to L2 is lower than that from irrigating treated wastewater to L1.
4. Effluent is currently treated to a high quality compared to the ANZECC guidelines, prior to being discharged to the irrigation fields.
5. Nutrient concentrations within current treated effluent at L1 are lower than chemical stressor trigger values for slightly disturbed estuary ecosystems in the North West (ANZECC and ARMCANZ, 2000a) at the point of discharge to land.

7.8.7 Consequence

In cases where discharges to land from the WWTPs occur, the Delegated Officer has determined that the onsite impacts to sensitive ecological receptors would be low or minimal, and offsite local impacts would be minimal. Therefore, the Delegated Officer considers the consequence of discharges to land from the WWTPs to be **minor**.

7.8.8 Likelihood of consequence

The Delegated Officer has determined that the likelihood of wastewater discharges to land impacting the marine environment, particularly at location L1, is only expected to occur under exceptional circumstances as a result of treatment processes. Therefore, the Delegated Officer considers the likelihood of ecological impacts from discharges to land from the WWTPs to be **rare**.

7.8.9 Overall rating of direct discharges from the WWTPs

The Delegated Officer has compared the consequence and likelihood ratings described above with the Risk Rating Matrix (Table 21) and determined that the overall rating for the risk of discharges to land for the WWTPs is **Low** based on Licence Holder controls.

7.9 Risk Assessment – Hydrocarbon discharges during upset conditions

7.9.1 Description of Risk Event

Discharges to land of hydrocarbons from the failure of the hydrocarbon storage tanks causing contamination of soil and potential infiltration to groundwater, resulting in adverse impacts to the health of sensitive ecological receptors (fauna and flora).

7.9.2 Identification and general characterisation of emission

The Licence Holder has the capacity to store 62,600m³ in aggregate of hydrocarbons at three storage tanks located on the northern boundary of the premises at Nelson Point and 63,336m³ in aggregate across the Premises. DWER considers that the key hazard associated with the bulk storage of hydrocarbons is tank failure during upset conditions.

Minor spills and discharges of hydrocarbons are not considered through this risk assessment as they can be regulated through other legislation such as the UDRs.

7.9.3 Description of potential adverse impact from the emission

Significant discharges could lead to the contamination of soil and groundwater, which has the potential to seep through to the marine environment. The area surrounding the bulk fuel storage is heavily disturbed from clearing and does not support native vegetation. The closest environmental receptor that may be impacted by hydrocarbon discharges is the wildlife that visit the Nelson Point infiltration and evaporation basin, located 200 m to the south.

Although a manmade ecosystem, the Nelson Point infiltration and evaporation basin is

frequented by migratory birds when inundated and contains some mangrove vegetation. Should hydrocarbons then run off to the marine environment there is also the potential for impacts to the larger mangrove communities approximately 1 km to the south. These impacts may include reduced plant health, stunted growth and in severe cases death through the prevention of transpiration at a cellular level and photosynthesis.

Groundwater in the area is saline and is not used for potable or industrial purposes. However, this does not take into account ecological receptors that have adapted to depend on the saline groundwater, such as the nearby mangrove communities. In addition, significant spills may impact the ability for recovery of contaminated soils and the ability for future rehabilitation. Significant spills may also result in the seepage of hydrocarbons to the marine environment via groundwater exchange if not fully captured.

7.9.4 Criteria for assessment

DWER has not specified an assessment criteria for the discharge of hydrocarbons the result of tank failure. Given the anticipated large quantities of hydrocarbons that would be discharged during the risk event, it is expected that any guideline criterion would be exceeded prior to cleanup.

7.9.5 Licence Holder controls

The three storage tanks are located within impermeable bunding capable of storing 110% of the largest tank. Diesel is stored in accordance with specifications of *Australian Standard 1940: The storage and handling of flammable and combustible liquids*. Refuelling areas have the ability to contain minor spills through the use of impermeable aprons that have a provision for collection of spills (BHPBIO, 2010).

7.9.6 Key findings

1. The diesel fuel is stored in accordance with the relevant Australian Standards.
2. The area immediately surrounding the storage tanks is considered to be heavily disturbed, and contains no native vegetation.
3. No bores are located within 1 km of premises and groundwater is considered brackish.
4. The nearest sensitive environmental receptors are the migratory birds and mangrove habitats at Nelson Point infiltration and evaporation basin.
5. Existing infrastructure is expected to contain much of a spill and restrict any overflow to the disturbed area immediately surrounding the storage tanks.
6. The remediation of any potential contaminated soils or waters will be managed under the *Contaminated Sites Act 2003*.

7.9.7 Consequence

In the event of a tank failure, the Delegated Officer has determined that there is likely to be high-level onsite impacts that may result in contamination of groundwater and surface waters through runoff and/or groundwater expression. Therefore, the Delegated Officer considers the consequence of hydrocarbon discharges to land to be **major**.

7.9.8 Likelihood of consequence

A discharge of hydrocarbons will most likely be captured within containment bunding maintained by the Licence Holder. Any discharge beyond this must traverse a vegetated, man-made drainage channel prior to running off into the Nelson Point infiltration and

sedimentation basin, or being expressed into the marine environment via groundwater.

Therefore the Delegated Officer has determined that the likelihood of hydrocarbon discharges to land occurring will only occur in exceptional circumstances. Therefore, the Delegated Officer considers the likelihood of hydrocarbon discharges impacting the marine environment to be **rare**.

7.9.9 Overall rating of hydrocarbon discharges

The Delegated Officer has compared the consequence and likelihood ratings described above with the Risk Rating Matrix (Table 21) and determined that the overall rating for the risk of hydrocarbon discharges to land and the marine environment is **Medium**.

7.10 Risk Assessment – Odour

7.10.1 Description of Risk Event

Emissions of odour from the venting and filling of fuel storage tanks, causing adverse impacts for the amenity of nearby sensitive residential receptors.

7.10.2 Identification and general characterisation of emission

Odour emissions from diesel storage and refuelling are expected throughout operations.

7.10.3 Description of potential adverse impact from the emission

Refuelling activities are spread throughout the site and may on occasion occur within 230 m of residential receptors suggesting that odours from refuelling may be experienced in Port Hedland's West End at some time. Despite this though, no odour complaints have been received by DWER in relation to odour emitted from the Premises since the 2013/14 annual period.

Odour has the potential to negatively impact amenity for people. Impacts are likely to be greatest during periods of low wind speeds in a west/southwest direction. Any amenity impacts from odours are likely to be experienced for short periods during filling of large storage tanks. During these times odour is likely to dissipate rapidly from the source and significantly reduce in intensity at distance.

7.10.4 Criteria for assessment

As measuring odour is a highly subjective activity, there are no established scientific guidelines for measuring and assessing it.

7.10.5 Licence Holder controls

There are no Licence Holder controls in place regarding odour.

7.10.6 Key findings

1. A source of odour emissions is hydrocarbon fuel storage and various refuelling activities carried out throughout the Premises.
2. Despite the closest potential receptors being only 230 m away from potential odour sources, no complaints about odour have been received.
3. Any amenity impacts are likely to be short-term in nature only.

7.10.7 Consequence

If odour emissions occur, the Delegated Officer has determined that the resultant negative

impacts on local amenity will be minimal. Therefore, the Delegated Officer considers the consequence of odour emissions to be **slight**.

7.10.8 Likelihood of consequence

The Delegated Officer has determined that the odour emissions could occur at some time although the likelihood of odours being significant enough to result in impacts to amenity will probably not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of the risk event to be **unlikely**.

7.10.9 Overall rating of odour

The Delegated Officer has compared the consequence and likelihood ratings described above with the Risk Rating Matrix (Table 21) and determined that the overall rating for the risk of emissions of odour is **Low**.

7.11 Summary of Acceptability and Treatment of Risk Events

A summary of the risk assessment and the acceptability or unacceptability of the risk events set out above with the appropriate treatment and control are set out in Table 34 below. Controls are described further in section 8.

Table 34: Risk assessment summary

	Description of Risk Event			Summary of Licence Holder controls	Risk Rating	Acceptability with controls (conditions on instrument)
	Emission	Source	Pathway/ Receptor (Impact)			
1.	Dust	Stockpiles, stacking, reclaiming, conveyors and ship-loading	Air/wind to sensitive receptor causing: <ul style="list-style-type: none"> health impacts from inhalation of dust; and amenity impacts through dust deposition and plumes. 	Maintenance of moisture content, water cannons, misters and conditioning sprays, stacker height, belt wash and scrapers.	Major consequence Likely likelihood High Risk	Acceptable, subject to Licence Holder controls, outcome-based controls and additional site specific controls conditioned.
2.	Noise	Car dumpers, conveyors, conveyor drives, stackers, reclaimers, screening plants, ship loaders	Air/wind to sensitive receptor causing impact to amenity.	Shielding of conveyor drives and hybrid low noise idlers on conveyors.	Moderate consequence Possible likelihood Medium Risk	Subject to application of alternative regulatory strategy through the Taskforce Report.
3.	Discharges to marine waters	Site stormwater and contaminated wash-down water	Direct discharge from infrastructure, causing hydrocarbon contamination, and increased sedimentation and turbidity.	Freshwater Recovery Plants Oily water separators Sedimentation ponds	Slight consequence Unlikely Low Risk	Acceptable, subject to Licence Holder controls conditioned.

	Description of Risk Event			Summary of Licence Holder controls	Risk Rating	Acceptability with controls (conditions on instrument)
	Emission	Source	Pathway/ Receptor (Impact)			
4.	Discharges to land (FWRPs)	Site stormwater and contaminated wash-down water	Direct discharge from infrastructure, adversely impacting soil and groundwater quality.	Sedimentation ponds	Slight consequence Likely Medium Risk	Acceptable, subject to Licence Holder controls conditioned.
5.	Discharges from the WWTPs	Treated effluent from the (2) wastewater treatment plants	Seepage of nutrient-rich waste at irrigation fields, leaching into groundwater and adversely impacting terrestrial and marine receptors.	WWTPs Vegetated irrigation fields	Minor consequence Rare likelihood Low Risk	Acceptable, subject to Licence Holder controls conditioned.
6.	Hydrocarbon discharges during upset conditions	Serious failure of the fuel storage tanks	Seepage to groundwater and eventually to surface waters.	Bunding, impermeable aprons for containment and clean-up.	Major consequence Rare likelihood Medium risk	Acceptable, subject to Licence Holder controls conditioned.
7.	Odour	Diffuse gaseous emissions from fuel storage and refuelling operations	Air/wind to sensitive receptors causing decreased amenity.	Closed/vented storage tanks.	Slight consequence Unlikely Low Risk	Acceptable, with no regulatory controls required.

8. Regulatory Controls

8.1 Summary of Controls

A summary of regulatory controls determined to be appropriate for the Risk Events is set out in Table 35. The risks are set out in the assessment in section 7 and the controls are detailed in this section. DWER will determine controls having regard to the adequacy of controls proposed or currently implemented by the Licence Holder. The conditions of the Revised Licence will be set to give effect to the determined regulatory controls.

Table 35: Summary of regulatory controls to be applied

		Controls (see corresponding section number for details)				
		8.2 Bulk Granular Material Specifications	8.3 Infrastructure and Equipment	8.4 Moisture Content Monitoring and Management	8.5 Dust Monitoring and Management	8.6 Wastewater and Washwater Monitoring and Limits
Risk Items (see risk assessment in section 7)	Dust emissions from handling, storage and movement of iron ore	•	•	•	•	
	Noise from infrastructure and operations	An alternative regulatory strategy will be required following the finalisation of Taskforce Report recommendations (refer to section 4.2.1).				
	Discharges to marine waters from contaminated stormwater sources		Low risk. •			Low risk. •
	Discharges from the FWRPs and infiltration to groundwater		•			•
	Discharges from the WWTPs and infiltration to groundwater		Low risk. •			Low risk. •
	Hydrocarbon discharges during upset conditions		•			
	Odour emissions from refuelling stations and storage tanks	Low risk.				

8.2 Bulk Granular Material Specifications

8.2.1 Handling limits and requirements

Limits have been placed on the Licence to restrict the cumulative volume of iron ore handled at the Premises over an annual period. Of this material handled, the Licence Holder will be required to load no less than 45% of iron ore directly from the car dumper to the shiploader. Direct shipped ore is ore that will not be stockpiled, stacked or reclaimed.

The volume limits are applied following the licence amendment application submitted to increase throughput at the Premises. Minimum direct shipping requirements have been set to 31 December 2020 only. Following this date it is anticipated that the Licence Holder will be in the position to accurately monitor the moisture content of iron ore as it arrives to site and achieve a minimum 90% compliance rate for moisture to be at, or above the DEM level for each product (refer to section 8.4). The Licence Holder will continue to direct ship a proportion of iron ore following 2020, as required to meet production targets.

Reporting requirements have been applied to the Licence for occasions where the Licence Holder loads over 1,012,000 tonnes of iron ore into vessels in a single day (refer to section 8.5).

Based on the Licence Holder's activities, the close proximity of sensitive receptors to the Premises and the current high levels of dust within the airshed, the risk from fugitive dust have been demonstrated to be high.

In direct response to the high risk of impacts from dust, and noting that a direct ship ore annual average of 45% has been used as a key dust mitigation strategy within the Licence amendment application (supporting documentation), DWER has determined that volume limits and minimum direct shipping volume requirements must be applied to the Licence. While the gross throughput may not always directly correlate to emissions it is considered a factor that is appropriate to use as a control based on the level of risk.

It is considered that direct shipping ore results in the elimination of many significant dust sources/activities such as stockpiles, reclaimers and stackers. Double handling of ore can not only contribute directly to emissions but also indirectly by reducing moisture content of ore which may result in emissions in later handling phases. In addition direct ship ore has been used as a key control/operational input into the dispersion modelling provided as part of the licence amendment application.

8.2.2 Stockpile restrictions

Stockpile restrictions have been placed on the Licence to limit the time that iron ore is held at the Premises without the Licence Holder being required to apply additional measures to suppress dust. A restriction of 6 week maximum hold time per static stockpile has been applied to the Licence. A static stockpile refers to any Iron Ore stockpile that has been stacked and not reclaimed for a period of six weeks or more. Following this 6 week hold time either a physical barrier or stabilising chemical must be applied to the outer layer of the stockpile or the Licence Holder must be able to demonstrate that the stockpile has a moisture content above the DEM level. An additional condition has been applied to prevent the movement of stockpiles for the purpose of avoiding the time based restriction.

The stockpile restrictions have been applied following the licence amendment application submitted to increase throughput at the Premises. The application of physical barriers or chemical stabilising material is in replacement of the standard operating procedure to apply water to stockpiles via water cannons. Further, the condition does not apply where the Licence Holder can demonstrate that the moisture content of stockpiled material is at or above the specified DEM level therefore reducing the risk of dust emissions.

Based on the licence amendment application and air quality dispersion model, emissions from stockpiles and wind erosion were identified as a key emission source representing the majority of sources with an upper quartile emission rate of above 1g/s at the Premises. Without additional and sufficient control the longer the period that material is stockpiled at the Premises the greater the likelihood of increased emissions. In addition it is considered, the operation of water cannons on stockpiles may not always be sufficient to increase the moisture content of the stockpile outer layer, particularly in dry and windy weather.

Due to the high risk of dust from the Premises it has been determined that restricted holding times on stockpiles should be applied to the Licence unless further management actions are employed to prevent fugitive emissions.

8.3 Infrastructure and Equipment Controls

8.3.1 Further works

A number of further works are required to be undertaken at the Premises, as follows:

- installation of moisture analysers for the in-load circuit to determine the moisture content of iron ore accepted at the Premises; and
- the relocation of BAM monitor Finucane Island B1 – Temp to the western side of

Premises operations (renamed Finucane Island West).

The installation and commissioning of on-line moisture analysers on Car Dumpers 1-5 will be required by 30 December 2018 in order to help determine the moisture level of iron ore accepted at the Premises. Once installed the Licence Holder will be required to commission the on-line moisture analysers and compare moisture content data generated by the analysers with samples tested at the ship loader. A comparison of moisture content analysis will need to be made with ore that is direct shipped only to avoid measuring the difference between the moisture content of ore received to that which has potentially lost moisture through the handling process at the Premises. The Licence Holder will be required to submit a commissioning report that verifies the accuracy of online moisture content analysers.

The DWER *Guidance Statement: Setting Conditions* outlines that conditions of Licences must be valid and enforceable. In order to comply with proposed conditions relating to management actions for the handling and storage dry material (or Iron Ore below the specified DEM level), the Licence Holder must be capable of operating moisture analysers by 31 December 2018. Further details on moisture content requirements and specified management actions are detailed in section 8.4.

The relocation of the Finucane Island B1 – Temp BAM monitor to an upwind location on the west side of Premises operations allows for background air quality assessment to be undertaken during trigger events for high ambient dust levels at boundary monitors and Taplin Street.

8.3.2 Dust Management

The following environmental controls, infrastructure and equipment must be maintained and operated onsite for dust management:

- wet scrubbers operating at car dumpers and lump rescreening plants;
- belt wash sprays and belt scrapers on conveyors;
- selected transfer stations equipped with wet scrubbers and partially enclosed with rubber curtains, skirtings, fogging sprays and in-chute fogging systems;
- sprays on reclaimers and stackers;
- stacker height to be lowered during operation;
- stockpile cannons operated prior to reclaiming and as required to prevent visible dust lift off;
- operation of water carts on unsealed roads.

Dust control infrastructure must be available for operation for at least 90% of the time at which material handling infrastructure is in use.

The Licence Holder currently operates dust extraction equipment and wet scrubbers at transfer stations, car dumpers and rescreening plants, reducing the amount of fugitive dust from these sources. Many of the controls listed above are existing at the Premises. Air quality modelling to support the application indicates that wet scrubbers at car dumpers and lump rescreening plans operate at 100% efficiency. This is considered unlikely to be correct however the magnitude of dust emissions from wet scrubbers during periods of breakdown or failure is considered to have low significance.

The existing and proposed Licence Holder controls listed above act to contain dust at the source and have been determined to be necessary based on the high level of risk associated with dust emissions from Primary Activities. Placing these controls on the Licence requires the continued use of dust abatement infrastructure and equipment and ensures regulatory oversight, by requiring records to be kept to demonstrate the availability of dust control

infrastructure.

8.3.3 Spill Management

The following environmental controls, infrastructure and equipment should be maintained and operated onsite for spill management:

- vacuum trucks used to remove spilt material from operating equipment;
- road sweepers to operate on sealed roads including turnaround points and berths;
- skid steers and front end loaders to remove larger ore spills; and
- maintenance of existing bunding surrounding bulk storage facilities.

The Licence Holder will be required to remove spilt material from surfaces under wharf conveyors and shiploaders on a daily basis when operating to prevent discharges to the marine environment.

8.3.4 Washwater and Stormwater Management

The following environmental controls, infrastructure and equipment should be maintained and operated onsite for washwater and stormwater management:

- hydrocarbon contaminated water from wash-down bays is treated at either the Nelson Point Oily Water Separator or Triple Interceptor;
- Finucane Island and Nelson Point Freshwater Recovery Plants (L3 and L4 respectively) strip water of sediments prior to reuse onsite or discharge to:
 - W1 – Nelson Point flop gate;
 - W2 – Finucane Island gate; and
 - W3 – LSS lake drain via settling ponds and overflow to drainage (L6) and the Nelson Point lake outflow (L7).

Specified infrastructure requirements are derived from those currently undertaken by the Licence Holder.

The infrastructure and equipment is currently used by the Licence Holder and is considered necessary based on the materials handled and the risk to the marine ecosystem. The condition requires the continued use of the infrastructure and equipment and ensures regulatory oversight.

8.4 Moisture Content Monitoring and Management

The amended Licence requires the DEM level to be known for all in-loaded Iron ores and all out-loaded Iron ores. The Licence Holder is required to obtain the specific DEM level numbers for each Iron ore product on a quarterly basis.

Moisture content monitoring requirements have been applied to the Licence for all iron ore out-loaded at the shiploaders. The Licence Holder will be required to monitor the moisture content of iron ore received at the Premises by 31 December 2018, following the installation and commissioning of online moisture analysers at Car Dumpers 1 to 5, as described in Section 8.3 above.

Until such a time as moisture analysers at Car Dumpers 1 to 5 are fully commissioned, the Licence Holder will be required to manage the risk of dust emissions at stockpiles where the moisture content is unknown.

A limit has been set requiring the Licence Holder to ensure that at least 95% of all ore out-loaded at the Premises has a moisture content at or above the DEM level, averaged over each calendar month.

By 31 December 2020, the Licence Holder is required to maintain a compliance rate of 90% of all ore in-loaded at the Premises has a moisture content at or above the DEM level, averaged over each calendar month.

The operation of dust control equipment such as chute foggers and shiploading sprays will continue to be required when transporting all material and at an availability rate of 90%.

The moisture content of iron ore at the time of out-loading is currently monitored as a requirement of sale to the customer, and to ensure that the moisture content falls below the Transportable Moisture Limit to meet international maritime safety standards.

The Licence Holder has committed to improving its ability to measure and manage the moisture content of all iron ore products across its supply chain (mine to port) by 31 December 2020. Forward projected requirements for the Licence Holder to achieve 90% of all in-loaded product having a moisture content greater than the product's DEM level are based on Licence Holder commitments.

As iron ore received at the Premises is stockpiled in an open environment before being reclaimed for shiploading, the moisture content is expected to decrease during handling and exposure to the predominantly hot and dry climate of Port Hedland. Therefore analysis of moisture content at the shiploader is necessary to identify the potential causes for reductions in moisture across all products and for different handling methods.

Moisture content data of material received at the Premises is currently received from sampling undertaken at the mine site, and the sampling may not be compliant with Australian Standards for moisture analysis and therefore reliability cannot be assured in all cases. In addition, the Premises does not receive moisture content information for up to 48 hours from when the material has left the mine. As the rail journey can take approximately 8 hours, material may be stacked, stockpiled, reclaimed, rescreened and loaded onto a vessel prior to the Licence Holder having knowledge of the material's moisture content. For dust management to be effective, the moisture content must be known upon receipt of the product.

The DEM values for each product in-loaded and out-loaded must also be known to accurately compare with moisture contents and identify products that present the greatest potential to generate dust. For blended products, the final product DEM level is expected to be different to the DEM level for each individual product that is in-loaded. DWER considers that the maintenance of product moisture content above the DEM level to be a primary means of controlling dust.

As the Licence Holder is also the occupier of the mine sites from which ore is received at the Premises, the Licence Holder has the ability to control the level of moisture of the ore. Minimum moisture content limits at the in-load are deemed valid and necessary to reduce the risk of fugitive emissions.

8.5 Dust Monitoring and Management

Monitoring will be required along the Premises boundary and at point source dust emission locations. Access to ongoing boundary monitoring data for ambient air quality must be made available to DWER upon request.

The Licence Holder will be required to monitor PM₁₀ at a number of boundary monitors to investigate the source/s of dust. Of these monitors, the Licence Holder will be required to take management action against high dust levels at two monitors along the eastern boundary of Finucane Island and three at the northern boundary of Nelson Point. Management actions will only be triggered where wind conditions place sensitive land users downwind of Premises activities and ambient dust levels remain above hourly averaged PM₁₀ levels.

Management actions will only be triggered when boundary monitors measure high short-term periods of ambient dust (as PM₁₀) and wind is in a direction that will most likely place sensitive land users downwind of Primary Activities. Separate wind arcs have been selected for

Finucane Island, Nelson Point and Taplin Street. Exclusions to management actions have been made available to take into consideration regional dust events and bushfires that may not be contributed to by Licence Holder activities.

Licence controls for dust management actions have been developed to only apply to five boundary monitors nearest to receptors, specified activities and iron ore properties that present the greatest risk to sensitive land users as identified through emissions estimates in the air quality model.

Dust management actions include the operation of stockpile water cannons on higher rotation and bulk ore conditioning sprays on all dry product (or iron ore with an unknown moisture content level). Management actions only apply to those ore handling activities that are upwind of sensitive receptors. A trigger investigation will also need to be carried out by the Licence Holder to identify possible sources of dust within the premises and address them appropriately. Examples of appropriate management action additional to those required by the Licence may include, but not be limited to, the operation of the mobile fogging cannon, ceasing iron ore handling or changing the method/rate of handling.

No annual or quarterly reporting on the implementation of management actions is required although the Licence Holder will be required to record incidence of triggered actions to remain compliant with record-keeping conditions. Similarly monitoring at other existing boundary monitors will be required to continue the measurement of PM₁₀ and will be used for investigative purposes. Australian guidelines shall be used to guide the methodology of boundary monitor operations.

To better understand the contribution of point source emissions at rescreening plants, car dumpers and select transfer stations the Licence Holder will also be required to monitor wet scrubber stack emission rates (for particulate matter) during the loading of all iron ore products. Results of point source emissions testing will need to be provided as part of annual reporting. No management actions are associated with stack emissions monitoring under the amended Licence.

Ambient dust trigger criteria have been applied to recognise existing short term trigger levels implemented by the Licence Holder through live dust monitoring. Where high dust levels are permitted to continue, the risks of both amenity impacts to sensitive receptors in the West End and interim health criteria being exceeded at Taplin Street increase.

The risk of impacts from dust has been assessed as 'High' to sensitive land users in the West End. In accordance with DWER's *Guidance Statement: Setting Conditions*, DWER has determined it necessary to apply these management conditions to reduce the risk from dust.

Additional monitoring conducted at wet scrubber stacks will assist in identifying the effectiveness of dust mitigation infrastructure at locations assessed as being significant dust sources in emissions estimations (refer to section 4.6.1).

8.5.1 Quarterly Event Reporting

The Licence Holder will continue to be required to notify DWER of events where the Taplin Street community air quality monitor identifies that PM₁₀ exceeds 70µg/m³ over a 24-hour period. Further reporting will be required on a quarterly basis to notify DWER of the following events:

- Throughputs of iron ore out-loaded at the Premises being greater than 1,012,000 tonnes in any 24 hour period (12am to 12pm);
- Reportable Events as a result of trigger criteria dust boundary monitors.

Reportable Event Criteria for Finucane Island boundary monitors have been applied based on the analyses of ambient PM₁₀ concentrations at boundary monitors and PM₁₀ concentrations at Richardson Street in the West End. The Nelson Point reportable criteria were based on

results from the analysis of influence of ambient concentrations at Nelson Point boundary monitors on the Taplin Street ambient air quality monitor (refer to section 4.8).

As a minimum the Licence Holder will need to provide on a quarterly basis the following information for the period where Reportable Events occurred:

- (a) meteorological data throughout the day;
- (b) graphical representation of PM₁₀ concentrations at boundary monitors throughout the day;
- (c) air quality data from other community monitors and the Yule and BoM (background) monitors;
- (d) the moisture content of ore handled at each shiploader in comparison to the DEM level for each product;
- (e) whether product was direct shipped or stockpiled; and
- (f) a summary of operations, including total amount of ore handled, relative volumes of ore blends and products, activities being undertaken and the age of stockpiles.

Boundary monitoring data is only required for those monitors that are placed upwind of sensitive receptors at West End or Taplin Street during each event.

Given the absence of a correlation between air quality at boundary monitors and those air quality monitors at the location of sensitive land users, DWER has determined that interim boundary targets should be used as triggers for further reporting only. Similarly the limited understanding of the correlation between daily throughputs and dust levels at nearby receptors has instigated the requirement for further investigation.

Information provided for each event will assist DWER to identify the possible source, or sources of dust, which will assist in future risk-based decision making.

8.6 Wastewater and Washwater Monitoring and Limits

Monitoring of wastewater at each discharge point will continue to ensure that impacts from nutrients and hydrocarbons are not significant.

8.6.1 Monitoring Reports – WWTPs

Previous monitoring for wastewater discharges was required quarterly. Monitoring frequencies have been reduced as part of this amendment due to the assessed lowered risk associated with discharging nutrient-rich wastewater to land.

Annual monitoring will still need to be conducted in accordance with AS/NZS 5667.10 with all samples submitted to a laboratory with current NATA accreditation.

Due to the strong performance of both WWTPs to remove nutrients and lower the BOD of effluent, seepages to the marine environment are expected to dilute rapidly in groundwater and fall well below Australian Water Quality Guidelines for Fresh and Marine Water Quality in slightly disturbed ecosystems (ANZECC and ARM CANZ, 2000). DWER will continue to monitor the performance of the Nelson Point and Finucane Island WWTPs to ensure that the risk of impacts to the inshore marine environment does not increase.

Limits will be applied to the nutrient concentration of discharge from L1 and L2 in line with ANZECC and ARM CANZ Guidelines for slightly disturbed inshore marine environments in Australia's northwest.

8.6.2 Discharges to land and water from FWRPs

Previous requirements of the Licence to conduct quarterly discharge monitoring for TRH have been removed for monitoring locations downstream of the initial discharge point.

Monitoring of water quality from the Nelson Point and Finucane Island FWRP will continue at a quarterly frequency to ensure the performance of water treatment systems and ascertain compliance with Licence limits for TRH at L3 and L4.

As there is a direct discharge to the marine environment, discharge points W1, W2 and L6 will still be noted on Licence figures. The effective treatment of washwater and wastewater at FWRPs will guarantee the quality of water flowing through other monitoring points at W1 to W3 and L5 to L7 assuming no external input.

9. Appropriateness of Licence Conditions

The conditions in the Issued Licence in Attachment 1 have been determined in accordance with DWER's *Guidance Statement: Setting Conditions*.

DWER's *Guidance Statement: Licence Duration* has been applied and the Issued Licence expires on 16 November 2030.

Condition Ref	Grounds
Emissions Condition 1	This condition is valid, risk-based and consistent with the EP Act.
Bulk Granular Material Specifications Conditions 2 to 7	These conditions are valid, risk-based and contain appropriate controls (see section 7 of this decision report).
Infrastructure and Equipment Conditions 8 to 15	
Moisture Content Monitoring and Management Conditions 16 to 20	
Dust Monitoring and Management Conditions 21 to 25	
Wastewater and Washwater Monitoring and Limits Conditions 26 to 27	
Record-keeping Conditions 28 to 31	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.

DWER may review the appropriateness and adequacy of controls at any time, and that following a review, DWER may initiate amendments to the licence under the EP Act.

10. Licence Holder's comments

The Licence Holder was provided with the draft decision report and draft licence on 4 December 2017 and 19 January 2018. A summary of comments and DWER responses are provided in Appendix 2.

11. Conclusion

This assessment of the risks of activities on the premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this decision report (summarised in Appendix 1).

This assessment was also informed by a site visit by DWER officers in July 2016 and again in September 2017.

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

Danielle Eyre
Senior Manager, Resources Industries
Regulatory Services (Environment)
Delegated Officer under section 20 of the *Environmental Protection Act 1986*

16/02/2018

Appendix 1: Key Documents

	Document Title	In text ref.	Availability
1.	ANZECC and ARMCANZ (1997) <i>Australian Guidelines for Sewerage Systems, Effluent Management</i> . National Water Quality Management Strategy.	ANZECC and ARMCANZ, 1997	Accessed at: https://www.environment.gov.au/system/files/resources/e52e452b-a821-4abe-9987-23988790e353/files/sewerage-systems-effluent-man-paper11.pdf
2.	ANZECC and ARMCANZ, 2000, <i>Australian Water Quality Guidelines for Fresh and Marine Water Quality (Volume 1)</i> . National Water Quality Management Strategy.	ANZECC and ARMCANZ, 2000a	Accessed at: https://www.environment.gov.au/system/files/resources/53cda9ea-7ec2-49d4-af29-d1dde09e96ef/files/nwqms-guidelines-4-vol1.pdf
3.	ANZECC and ARMCANZ, 2000, <i>Australian Water Quality Guidelines for Fresh and Marine Water Quality (Volume 2)</i> . National Water Quality Management Strategy.	ANZECC and ARMCANZ, 2000b	Accessed at: https://www.environment.gov.au/system/files/resources/e10f8ee3-54b4-4e90-8694-50b6a3194b9d/files/nwqms-guidelines-4-vol2.pdf
4.	Australian Bureau of Statistics (2017) 2016 Census QuickStats – Port Hedland (T)	ABS, 2017	Accessed at: http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/LGA57280
5.	BHPBIO (2017) <i>BHP Billiton Iron Ore Pty Ltd Annual Environmental Report: July 2016 – June 2017</i> .	BHPBIO, 2017	DWER record (A1541898)
6.	BHPBIO (2017) Dust Control Availability Report: Quarter 4 FY17 (1 Apr 2016 – 30 Jun 2017)	N/A – refer to section 4.5.5	DWER record (A1487262)
7.	BHPBIO (2016) Dust Control Availability Report: Quarter 3 FY17 (1 Jan 2017 – 31 Mar 2016)	N/A – refer to section 4.5.5	DWER record (A1411550)
8.	BHPBIO (2016) Dust Control Availability Report: Quarter 2 FY17 (1 Oct 2016 – 31 Dec 2016)	N/A – refer to section 4.5.5	DWER record (A1154340)
9.	BHPBIO (2017) Dust Control Availability Report: Quarter 1 FY17 (1 July 2016 – 30 Sep 2016)	N/A – refer to section 4.5.5	DWER record (A1181456)
10.	BHPBIO (2016) <i>BHP Billiton Iron Ore Pty Ltd Annual Environmental Report: July 2015 – June 2016</i> .	BHPBIO, 2016	DWER record (A1171492)
11.	BHPBIO (2015) Resourcing global growth: Annual Report 2015. BHP Billiton Limited	BHPBIO, 2015	Accessed at: http://www.bhpbilliton.com/~media/bhp/documents/investors/annual-reports/2015/bhpbillitonannualreport2015.pdf?la=en
12.	BHPBIO (2014) Value through performance: Annual Report 2014. BHP Billiton Limited	BHPBIO, 2014a	Accessed at: http://www.bhpbilliton.com/~media/bhp/documents/investors/reports/2014/bhpbillitonannualreport2014_interactive.pdf?la=en

13.	BHP (2014) Annual Environmental Report – July 20013 to June 2014.	BHPBIO, 2014b	DWER record (A832848)
14.	BHPBIO (2010) Environmental Management System: Environmental Management Plan PP-13-100.	BHPBIO, 2010	Accessed at: http://www.epa.wa.gov.au/EIA/referralofProp-schemes/Lists/Proposal/Attachments/160/Appendix%20A%207%20Construction%20EMP.pdf
15.	Bureau of Meteorology (2017) Climate statistics for Australian locations: Port Hedland Airport.	BoM, 2017	Accessed at: http://www.bom.gov.au/climate/averages/tables/cw_004032_All.shtml
16.	Department of Environment (2006) Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives.	Department of Environment, 2006	Accessed at: http://edit.epa.wa.gov.au/EPADocLib/pilbaracoastalwaterquality_Marine%20Report%201.pdf
17.	Department of Health (2016) Port Hedland Air Quality Health Risk Assessment for Particulate Matter. Environmental Health Directorate.	HRA, 2016	Accessed at: http://ww2.health.wa.gov.au/~media/Files/Corporate/general%20documents/Environmental%20health/Port%20Hedland%20Health%20Assessment.ashx
18.	Department of Health (2017) Port Hedland – FACT SHEET.	DoH, 2017	Accessed at: http://www.jtsi.wa.gov.au/docs/default-source/default-document-library/health-factsheet.pdf?sfvrsn=0
19.	Department of Planning, Lands and Heritage (2017) Fact Sheet: Port Hedland Dust Taskforce – Proposed land use planning changes, August 2017.	Department of Planning, Lands and Heritage, 2017	Accessed at: http://www.jtsi.wa.gov.au/docs/default-source/default-document-library/dplh-taskforce-fact-sheet.pdf?sfvrsn=2
20.	Department of State Development (2010) Port Hedland Air Quality and Noise Management Plan. The Port Hedland Dust Management Taskforce Report.	DSD, 2010	Accessed at: http://www.dsd.wa.gov.au/docs/default-source/default-document-library/ph_air_quality_noise_management_plan_0310?sfvrsn=8
21.	DER Licence L4513/1969/18 – Port Hedland Operations	L4513/1969/18	der.wa.gov.au
22.	DER Works Approval W5611/2011/1 – Temporary screening plant	W5611/2011/1	der.wa.gov.au
23.	DER <i>Guidance Statement on Regulatory principles</i> (July 2015)	N/A	der.wa.gov.au
24.	DER <i>Guidance Statement on Setting conditions</i> (September 2015)	N/A	
25.	DER <i>Guidance Statement on Licence duration</i> (November 2014)	N/A	
26.	DER <i>Guidance Statement on Licensing and works approvals processes</i> (September 2015)	N/A	
27.	Environmental Protection Authority (2010) Environmental Assessment	EPA, 2010	Accessed at: http://www.epa.wa.gov.au/sites/default/fi

	Guidelines: No. 5 Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts.		les/Policies and Guidance/EAG%205%20Lights%20Turtle%2011110.pdf
28.	Katestone, (2011), NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining,	Katestone, 2011	Available on request
29.	Luke, G J, Burke, K L, and O'Brien, T M. (2003) Evaporation data for Western Australia. Department of Agriculture and Food, Western Australia. Report 65.	Luke <i>et. al</i> , 2003	Accessed at: http://researchlibrary.agric.wa.gov.au/cgi/viewcontent.cgi?article=1058&context=rmt
30.	Ministerial Statement 740	MS 740	Ministerial Statement, Report and Bulletin accessed at http://www.epa.wa.gov.au/
31.	Ministerial Statement 433	MS 433	Ministerial Statement, Report and Bulletin accessed at http://www.epa.wa.gov.au/
32.	National Research Council of the National Academies (2003) Committee on Oil in the Sea: Inputs, Fates, and Effects. The National Academies Press, Washington D.C.	National Research Council of the National Academies, (2003).	Accessed at: http://www.nap.edu/read/10388/chapter/1#i
33.	Pacific Environment Limited (2016) <i>Air Quality Assessment – 290 Mtpa</i> , prepared for BHP Billiton Iron Ore, September 2016.	PEL, 2016	DWER records (A1539830)
34.	Pacific Environment Limited (2014) <i>Interim Target Review – Port Hedland Perimeter Dust Monitoring System</i> , prepared for BHP Billiton Iron Ore, December 2014.	PEL, 2014	DWER records (A1140126)
35.	PHIC (2016) Annual Report – 2015-2016: Port Hedland Ambient Air Quality Monitoring Program	PHIC, 2016	Accessed at: http://www.phic-hedland.com.au/phic/d/Resource_Library/PDFs/JNUVPB34T6N2B4V6RL16V40H1LXUD6/N8QA3S58LGUCC52.pdf/D16004-4+-+PHIC+2015-16+Annual+Monitoring+Report_v1+0_FINAL.pdf
36.	PHIC (2015) Annual Report: Ambient Air Quality Monitoring Report to the Port Hedland Dust Management Taskforce (2014-2015)	PHIC, 2015	Accessed at: http://www.phic-hedland.com.au/phic/d/Resource_Library/PDFs/RCRXW8ZDIAJK2BLV6BKVP36LUVVK1S/HG4YN8XTUD4ORJH.pdf/20372+PHIC+Annual+Report+2014-2015_Final_Rev1+%281%29.pdf?
37.	Port Hedland Port Authority (2013)	Port Hedland	Accessed at:

	Lumsden Point General Cargo Facility: Benthic Habitat Survey, Pilbara Ports.	Port Authority, 2013	https://consultation.epa.wa.gov.au/seven-day-comment-on-referrals/lumsden-point-general-cargo-facility/supporting_documents/RSD_Appendix%203_Benthic%20Habitat%20Survey_FINAL.pdf
38.	SVT Engineering Consultants (2014) Port Hedland Cumulative Environmental Noise Study. PHIC and DER.	SVT, 2014	DWER record (A1570117)
39.	Town of Port Hedland (2012) Pilbara's Port City Growth Plan: A vision for a nationally significant regional city.	Town of Port Hedland, 2012	Accessed at: https://www.planning.wa.gov.au/LocalPlanningStrategies/7039.aspx
40.	Toxikos (2015) Report – Health Risk Assessment Port Hedland, commissioned by the Department of Health.	Toxikos, 2015	Accessed at: http://ww2.health.wa.gov.au/~media/Files/Corporate/general%20documents/Environmental%20health/Port%20Hedland%20Health%20Assessment.pdf
41.	WillyWeather (2017) Port Hedland Wind Forecast.	WillyWeather, 2017	Accessed at: https://wind.willyweather.com.au/wa/pilbara/port-hedland.html
42.	Worley Parsons (2010) South West Creek Tug Harbour and Cyclone Mooring Facility Benthic Habitat Dredging Tolerances and Implications for this Project. Report for Port Hedland Port Authority.		Accessed at: https://www.pilbaraports.com.au/getmedia/86e4d923-b730-418e-99a3-8932e4d6aa8e/BHDTIP.pdf.aspx

Appendix 2: Summary of Licence Holder's Comments on Risk Assessment and Draft Conditions

The two tables below provide a list of Licence Holder comments received during the two consultation periods along with DWER's response. Comments from the Licence Holder are presented as verbatim.

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
N/A – Definitions: Iron Ore Interim Product and Iron Ore Product	The terms Interim Product and Product does not need to be distinguished in this licence. The current two definitions relate to one and same product i.e. a product produced at the mine that may be blended with other products at the Port. BHP request that DWER removes the use of these terms throughout the licence.	Agreed. The definition has been removed and Condition 16 amended to require the Licence Holder to obtain the DEM level for all incoming iron ore, including those to be blended on site, and all outgoing iron ore and iron ore blends.
N/A – Definition: Potentially Problematic Product <i>means Iron Ore Product or Iron Ore Interim Product that has a Moisture Content below the corresponding DEM Level.</i>	BHP requests that the term Potentially Problematic Product (PPP) is removed from the licence. This term refers to an existing BHP internal notification process that enables the mines to provide the Port operations with general information on a range of factors, which may impact production, including potential hazards. This process is also used to notify the Port when material being loaded onto a train appears dry, however this is only based on visual observations conducted by operators at the mine train load-out and is not measured against any standard. The PPP is a subjective process which is applied on an ad-hoc basis and therefore not considered suitable for use as a compliance requirement in a regulatory instrument. Please refer to comments on condition 20 for further information.	Noted. Conditions referring to Potentially Problematic Product have been removed. The visual assessment of dry product at the mine site is highly subjective and is therefore likely to be inaccurate. The Licence Holder has made significant commitments to improve moisture content monitoring across its whole the supply chain (detailed further through DWER's responses to Licence Holder comments on Condition 20).

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
<p>N/A – Definition: Routinely Operated <i>means to be operated at a minimum frequency of at least:</i> <i>every 3 hours during the day;</i> <i>every 6 hours during the night;</i> <i>or</i> <i>until small puddles just start to form as a result of rainfall or use of cannons or water carts.</i></p>	<p>This definition (and as applied through Table 12 – Row 12) would require the stockyard cannons to be run even in low risk periods regardless of the current condition of the ore type or potential for dust lift-off. BHP is concerned this would cause additional water to be used on-site when it is not required.</p> <p>Additionally the wording <i>until small puddles just start to form</i> is very difficult to monitor and demonstrate compliance against. Adding additional water to the surface of the stockpiles when it is not required may result in slumping of stockpiles and material handling issues within the plant, for example for Yandi fines product which often already has a high moisture content. The condition does not currently allow for the application of stockpile cannons based on the potential for dust lift-off.</p> <p>BHP suggests the following condition wording is more appropriate and will meet the intent of this requirement:</p> <p><i>Routinely Operated means to be operated at a minimum frequency of at least:</i></p> <ul style="list-style-type: none"> (a) <i>every 3 hours during the day;</i> (b) <i>every 6 hours during the night; or</i> (c) <i>until the ore moisture has been increased to be at or above DEM or until there is no visible dust lift off from the stockpile.</i> 	<p>Partially accepted. Due to the high level of uncertainty associated with ore moisture contents, and the high level of risk associated with dust from the Premises, the proposed condition has been amended to also require the routine operation of stockpile cannons where the moisture content is not yet known.</p> <p>This amendment applies a precautionary approach to the management of dust from stockpiles.</p>
<p>Condition 3 <i>The Licence Holder must only load less than a maximum total volume of 290 million tonnes of Iron Ore per Annual Period.</i></p>	<p>BHP requests this wording is revised to allow up to a maximum of 290 million tonnes of Iron Ore per annual period as per its licence amendment application. The current wording only allows less than 290 million tonnes of Iron Ore per annual period.</p> <p>BHP requests the wording is revised a follows:</p> <p>The Licence Holder must only load a maximum total volume of 290 million tonnes of Iron Ore per Annual Period.</p>	<p>Accepted. Condition amended to authorise the loading of up to 290Mtpa.</p>

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
<p>Condition 4</p> <p><i>In the event that more than 1,012,000 tonnes of Iron Ore is loaded at the Premises within any 24 hour period, the Licence Holder must investigate, undertake the actions and report in accordance with Schedule 4.</i></p>	<p>BHP's normal operations involve running at higher rates outside of planned or unplanned outages (e.g. shutdowns, breakdowns, shipping delays, cyclones) to meet a full year production target.</p> <p>BHP supports the view that there is no correlation between daily throughput and ambient PM10 concentrations. "A clear correlation between the volume of materials exported and ambient PM10 concentrations is not evident from the monitoring data" (Decision Report 4.6.3 para 2).</p> <p>BHP monitors atmospheric conditions continuously and takes preventative actions as soon as possible to manage any potential increase in dust levels.</p>	<p>Noted. DWER does not agree that data indicates no correlation, only that there is a no notable or clear correlation between the volume of materials exported and ambient PM₁₀ concentrations based on available data including over an annualised period. This is due in part to the limited level of detail in the data available to DWER, which is raises uncertainty in the assumption of a definitive "zero correlation".</p> <p>The purpose of Condition 4 is to identify short-term high dust events during days of high throughput volumes. Information gathered will be used to identify possible correlations between ambient air quality and product quality, volumes and loading methods.</p>
<p>Condition 5</p> <p><i>The Licence Holder must maintain a Direct Ship component of no less than 45% of the total volume of Iron Ore exported from the Premises over a rolling twelve month period until 31 December 2019.</i></p>	<p>Please note that 44% Direct Ship Ore (DSO) was applied in the 290 Mtpa application, not 45%. "A direct ship ore (DSO) of 44% was applied with approximately 125 million tonnes per annum of ore directly shipped" (Decision Report 4.6.1).</p> <p>BHP requests that this condition be re-worded as follows:</p> <p><i>The Licence Holder must maintain a Direct Ship component of no less than 44% of the total volume of Iron Ore exported from the Premises over a rolling twelve month period until 31 December 2019.</i></p> <p>DSO is a unique and important operating mode for BHP to achieve high volumes with low emissions. To achieve an annual volume of 290Mt, our supply chain modelling indicates that annualised DSO needs to be ~44%, but this requires a range of market, shipping, rail and mine parameters to be achieved.</p>	<p>Disagreed. DWER understands that BHP is currently shipping over 45% of its total throughput directly from car dumpers to ship loaders, reducing the number of dust generating activities such as stacking and reclaiming. Based on the high level of risk associated with dust emissions DWER has determined that a reduction in the proportion of direct shipping is not acceptable.</p> <p>In addition and noting the moisture content at in-load requirements and compliance against DEM level (detailed in DWER's responses to Licence Holder comments on Condition 20), a clause has been added that the Direct Ship Ore rate of 45% can cease either from 31 December 2020, or when the online moisture analysers have been installed, are operational and the Licence Holder is achieving an in-load moisture content compliance rate of 90% or more.</p>

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
		DWER has extended the duration of this condition from the end of 2019 to 31 December 2020 to align with the expected date of the online moisture analysers and compliance for in-load moisture content of iron ore to reach 90%.
<p>Condition 8, Table 2, Rows 2-4 (Roads and open areas)</p> <p><i>Zone 3 to 5 requirements include asphalt, coarse material treatment, windrows and kerbing as specified in Figure 4, Schedule 1.</i></p> <p><i>Must be completed by 30 June 2018</i></p>	<p>Please refer to the compliance report submitted to DWER (21/12/17) for the roads and open areas works under Works Approval W5792/2015/1. These works are now complete and therefore do not need to be included in the licence.</p> <p>Therefore BHP requests that rows 2-4 of Table 2, Condition 12, and Figure 4 are removed from the licence.</p>	Noted. Condition 12, Rows 2 to 4 of Table 2 and Figure 4 have been removed.
<p>Condition 18, Table 3, Row 2, Column 1</p> <p><i>Moisture Content analyser at Sample Stations SS21, SS205, SS510, SS611, SS612, SS563 and SS730 depicted in Figure 1; and</i></p> <p><i>SS705, SS809, SS817, SS891 and SS897 as depicted in Figures 2 and 3 of Schedule 1.</i></p> <p><i>(out-load circuit)</i></p>	<p>Sample stations SS205, SS612, and SS817 are not part of the out load circuit and do not have on-line moisture analysers. BHP requests that these are removed from Table 3.</p>	Accepted. Tables have been updated for accuracy (note now Condition 17).
<p>Condition 19</p> <p><i>The Licence Holder must obtain</i></p>	<p>It is unclear from the wording whether this means accurate records or accurate calculation/measurement. Currently accurate measurements</p>	Accepted. The term 'accurate' has been removed due to uncertainties with measurements conducted at the

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
<p><i>accurate records in relation to the Moisture Content of all Iron Ore Product and Iron Ore Interim Product accepted at the Premises within 40 hours of receipt of that material, averaged over each Rake, until 31 December 2018.</i></p>	<p>cannot be obtained from the mines as the equipment is not compliant with the recognised standards.</p> <p>BHP request removal of the word 'accurate' or substitute accurate for 'records adjusted for precision and bias estimates'. BHP also request the timeframe is updated to 48 hours as per the draft decision report Section 8.4.</p>	<p>mines (note now condition 18).In correspondence dated 2 May 2017 in response to DWER queries about processes used to verify that ore moisture content remains above DEM from mine to ship, BHP stated that:</p> <p><i>"Mechanical sample stations test ore moisture content prior to loading product at the mines for rail. The system at mines collects sub samples from the ore stream, aggregating to a representative stockpile sample from which stockpile moisture content is determined. This process is automated and is controlled by an online production control system. This process is subjected to third party validation on an annual basis. The representative samples are sealed and transported to a laboratory for analysis. Moisture is determined as part of the on-site analysis suite. This process is replicated across all BHPBIO's mining operations."</i></p> <p>From this statement, it was inferred that the Licence Holder had accurate and reliable measurements of ore moisture content available.</p>
<p>Condition 20</p> <p><i>The Licence Holder must upon becoming aware of receiving Potentially Problematic Product through Conditions 17 and 18 or 19:</i></p> <p><i>(a) Routinely Operate water cannons where Potentially Problematic Product is</i></p>	<p>This condition is considered unworkable and will cause a significant impact on BHP's production. By the definition included in the licence, a Potentially Problematic Product is one that is below its corresponding DEM level. It is normal for each iron ore type to have an ore moisture distribution which varies depending upon a number of factors including the geology, characteristics of the ore body (above/below water table) and the degree of ore conditioning that can effectively be applied through the handling process. A proportion of material will always inherently be above and/or below the nominated DEM level.</p> <p>The dust modelling presented by BHP for the 290Mtpa licence</p>	<p>Accepted.</p> <p>DWER acknowledges that due to current limitations to the Licence Holder's ability to accurately measure product moisture content as it arrives to site, this condition is not operationally achievable.</p> <p>The following requirements will remain on the amended Licence through Conditions 12-15 and 23 and include:</p> <p>(a) the regular application of water to stockpiles;</p>

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
<p><i>stockpiled;</i></p> <p><i>(b) operate BOC sprays on conveyors where Potentially Problematic Product is transported;</i></p> <p><i>(c) not re-screen or re-stack Potentially Problematic Product; and</i></p> <p><i>(d) investigate, undertake the actions and report in accordance with Schedule 4.</i></p>	<p>application reflects this ore moisture variability for ore handled through the Port. Additional dust abatement has been installed by BHP to ensure there is no increase in dust emissions as a result of increasing throughput to 290Mpa.</p> <p>Currently the measurement of ore moisture levels for iron ore being railed to the Port is only available from samples and analysis undertaken at the mines. BHP is installing on-line moisture analysers at the Port to measure in-flow ore moisture levels, as reflected in draft condition 8.</p> <p>The ability to increase the ore moisture content of ore arriving at the Port and therefore its performance against the associated DEM level however, is dependent upon the ability to accurately measure moisture levels at the mines and condition the ore before it is railed to Port.</p>	<p>and</p> <p>(b) the targeted application of BOC sprays during events where high dust levels are witnessed at boundary monitors, and operated as required thereafter.</p>
<p>Condition 20 (continued)</p>	<p>The infrastructure installed at the mines does not currently provide consistent and accurate sampling and analysis of ore moisture levels against the relevant ISO standards. The facilities in place were historically designed to determine the relevant mineralogy of the products and they will require infrastructure upgrades to provide accurate and reliable ore moisture measurements.</p> <p>Additionally, the bulk ore conditioning systems at the mines require upgrades to ensure that adequate moisture can be added at the mines to improve overall performance against the respective DEM levels.</p>	<p>Noted. As above.</p>
<p>Condition 20 (continued)</p>	<p>BHP has developed and is implementing an integrated ore moisture improvement program for its supply chain, which will improve the moisture content of ore being delivered to the Port. This program includes upgrading the sampling and analysis facilities and ore conditioning systems at the mines. These works are essential to providing accurate ore moisture measurement and appropriate conditioning of products being railed from mines to Port. To be successful, the initiatives must be delivered as an integrated program</p>	<p>Noted. The Licence Holder has made significant commitments to improve moisture content monitoring and management across its whole the supply chain.</p> <p>Based on the described program of work and to provide certainty on its implementation DWER has established a limit on moisture content for all in-loaded iron ore versus DEM level. This has been set at 90%</p>

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
	<p>across all mines to ensure an overall improvement is achieved. The works require sufficient lead time to be designed, constructed and commissioned.</p> <p>Through this continuous improvement program, BHP currently expects that an inflow ore moisture target of 90% of product received at the Port at or above DEM, is achievable by 31 December 2020.</p>	<p>for all in-loaded products to be at or above moisture content above DEM level by 31 December 2020.</p> <p>The timeframe is set based on the Delegated Officer's understanding of the time required to install and commission the online moisture analysers at the premises, mine sites and mining hubs as well as moisture conditioning equipment infrastructure and equipment required at the mine sites and mining hubs.</p>
Condition 20 (continued)	<p>There are however, a number of technical challenges that need to be overcome to achieve this target. These include testing and confirming the ability of the on-line moisture analysers to provide reliable and accurate measurement of ore moisture, particularly on high volume production conveyors, and achieving an optimum balance between moisture content and material handling characteristics of each ore type to avoid blockages of ore handling plants, train loads-outs and car dumpers. A broad range of ores types are mined across BHP's operations and it is currently uncertain whether all ore types can be conditioned to achieve DEM at all times.</p>	Noted.
Condition 20 (continued)	<p>The current data available from the mines measurements indicate that between 20-30% of ore unloaded at Port is below the corresponding DEM level. The samples currently collected at the mines are often exposed to further moisture loss through transportation between sites before analysis is completed. The data currently reported is therefore expected to show moisture values lower than the actual moisture content of ore being railed to Port.</p> <p>The proposed licence condition is considered unnecessary and unworkable as BHP would not be permitted to re-screen or re-stack up to 30% of product through the Port on the basis of compliance to DEM levels. This would have a significant impact on its ability to meet its annual production targets.</p>	Noted. As above.

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
Condition 20 (continued)	<p>When Port operations become aware that product it is receiving from the mine may be below the DEM level, either through existing notification processes (or in future once the on-line moisture analysers at the Car Dumpers are operational), these dust controls are routinely operated whilst the material is being handled, to ensure any additional dust emissions are mitigated. There are a number of other conditions in the draft licence that reflect these controls and also require additional actions that will ensure that dust emissions will continue to be effectively managed without the need to apply restrictions on ore handling activities. These include:</p> <ul style="list-style-type: none"> • Condition 5 - minimum direct to ship volume requirement that will ensure ore is not unnecessarily re-handled on-site; • Condition 14 - minimum compliance requirements for dust equipment availability; • Condition 21 - minimum ore moisture compliance rate for out-flow, and; • Schedule 3 (Table 12) – Operational requirements for dust control infrastructure. <p>These controls are utilised as part of an integrated dust management system across BHP operations, incorporating real-time air quality monitoring data together with forecast weather information to enable active adjustments to operational activities to minimise dust emissions.</p>	Noted. As above.
Condition 20 (continued)	Applying conditions that restrict ore handling activities will remove the ability of the operators to determine what is the most appropriate and effective response based on the environmental and operational conditions at any given time.	Noted. As above.
Condition 20	Additionally, the boundary monitoring and response requirements in Condition 27 include a rolling 1-hour trigger that is updated with	Noted. As above.

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
(continued)	monitoring data being collected from the network every 10 minutes. This trigger ensures that any increase in dust emissions that may occur on-site is identified early and appropriate controls applied to mitigate any increase in dust levels.	
Condition 20 (continued)	BHP recognises the importance of improving ore moisture management across its supply chain and is committed to a targeted program of continuous improvement initiatives to deliver this outcome. BHP believes that the current proposed condition 21 relating to outload ore moisture compliance, together with a continuous improvement target for in-flow ore moisture compliance, are reasonable and sufficient measures to ensure overall ore moisture performance.	Noted. As above.
Condition 20 (continued)	<p>BHP requests condition 20 is removed from the licence as it is unworkable and suggests it can be replaced with the following continuous improvement based condition:</p> <p><i>The Licence Holder must take all reasonable measures to ensure that Iron Ore Product accepted at the Premises has a Moisture Content at or above the corresponding DEM Level, averaged over each Annual Period at a target of 90% from 31 December 2020 onwards.</i></p> <p>BHP considers that applying a target is appropriate, given there is a program of work required to achieve this outcome, with some technical risks still to be resolved including:</p> <ul style="list-style-type: none"> • performance of the NIR technology; • upgrades to Bulk Ore Conditioning systems at the mines including the supporting water infrastructure to maintain the systems and reliably provide the required water quality; • integration of technology into the material tracking systems, and; 	<p>Partially accepted. DWER has determined that a monthly averaging period for the suggested condition is more appropriate to ensure that sufficient product moisture is maintained during seasons where dust risks are greater.</p> <p>DWER considers that three years to 31 December 2020 is sufficient time to install and effectively operate real-time moisture analysers and achieve the 90% compliance rate at the Premises. Further, that prior to this date, the information received from the online moisture analysers can be used to identify ores with a higher risk of dust generation. DWER expects that this information will be used by the Licence Holder to implement improved management systems across the supply chain that will ensure a higher rate of products having a moisture content that exceeds the DEM level.</p>

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
	<ul style="list-style-type: none"> uncertainty whether all ore types can achieve DEM. 	
Condition 22, Table 4 <i>Table 4: Point source dust emissions monitoring</i>	<p>BHP understands the intent of this condition is to collect monitoring information on the emission levels from the wet scrubber stacks located on the premises. The condition currently requires monitoring on quarterly basis over a 12 month period, presumably to gather samples that are representative of the different ore types handled through the equipment.</p> <p>To complete this program scaffolding will be required on a number of the scrubber towers to provide safe access, with it required to be dismantled and erected between each quarter, to allow on-going access and maintenance of the facilities. A more efficient means of collecting this data would be to undertake the monitoring on a campaign basis (over a 12 month period) that provides representative sampling of all the product types handled through each unit. BHP has proposed changes in the draft licence in accordance with this preferred approach.</p>	Agreed. Changes have been made to Table 4 to require BHP to conduct representative sampling from the wet scrubber stacks for all product types handled.
Condition 23 <i>The Licence Holder must undertake air quality boundary monitoring.</i>	<p>There are a number of monitoring stations listed in Column 1 of Table 5 (including E-samplers) which must comply with Australian Standards AS3580.9.11; or AS3580.12.1.</p> <p>There is no Australian standard for light scattering method of PM2.5 and PM10 concentration measurements which relates to the BAM real time module and E-sampler measurement techniques. As such, BHP request that the E-samplers are removed from Table 6 as they cannot comply with the applicable standards.</p> <p>The remaining 14 monitors in the network will continue to provide sufficient coverage of the premise boundary at both the Finucane Island and Nelson Point operations, with the following proposed change. With the proposed removal of the E-samplers from the table there would be only one up-wind monitor on Finucane Island compliant with the applicable standards. BHP proposes shifting the BAM monitor</p>	Agreed. The relocation of the BAM monitor by 1 May 2018 has been set as a requirement through Table 2 of condition 8. The BAM monitor at Finucane Island West must be available from 1 May 2018 onwards in accordance with condition 22 (formerly condition 25).

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
	<p>(Finucane Island B1 – Temp) from its current location to the site of ES5 to provide an additional compliant monitor up-wind of the Finucane Island operations. BHP requires a period of ~ 3 months to move the monitor to the new location.</p> <p>E-samplers will continue to be used on-site where required by operations to supplement the boundary monitoring network.</p>	
<p>Condition 24</p> <p><i>The Licence Holder must provide access to the CEO at all times to an online electronic database storing and display the monitoring data required by Table 5 of Condition 23.</i></p>	<p>BHP notes that condition 23 requires that monitoring is undertaken in accordance with Australian Standard AS3580.9.11. Australian Standard AS3580.9.11 requires that data is verified prior to its use (Section 12.4 - Data Validation). Verified data will not be available immediately. Therefore the requirement to access unverified online data would be inconsistent with Condition 23, meaning that BHP would not be able to comply with condition 23.</p> <p>BHP notes that the intent of this condition is to allow DWER to access data in response to events and/or community complaints. BHP suggest that the wording be amended as follows to enable DWER access to validated monitoring data upon request:</p> <p>"The licence holder shall provide verified monitoring data required under Table 5 of Condition 23 to the CEO upon request".</p>	<p>Agreed. The condition has been removed. The Licence Holder will be required through conditions 28 and 31 to provide monitoring data to the CEO upon request.</p>
<p>Condition 26</p> <p><i>The online electronic database referred to in Condition 24 must be capable of:</i></p> <p><i>(a) displaying real-time PM10 (1 hour averaged and 24 hour averaged) data for all the air quality monitoring stations listed in Table 5;</i></p>	<p>BHP requests this condition is removed from the licence as submission of verified data is required for reportable events and/or can be provided as requested in accordance with the proposed changes above to condition 24.</p>	<p>Agreed. As above.</p>

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
<i>(b) producing verified monitoring data, as required by Condition 23 and Table 5, for the preceding 5 years.</i>		
<p>Condition 27, Table 6</p> <p>Dust monitoring, management action and Reportable Event criteria</p> <p><i>No reclaiming, rescreening or out-loading of Iron Ore Product or Iron Ore Interim Product with an unknown Moisture Content or with a Moisture Content below the DEM Level to occur using Finucane Island/Nelson Point.</i></p>	<p>This management action included in Column 3 of Table 6 is unworkable and will have a significant impact on BHP's production for the reasons outlined in response to condition 20.</p> <p>The current data available from the mines measurements indicate that between 20-30% on average of ore unloaded at Port is below the corresponding DEM level. However, the samples currently collected at the mines are often exposed to further moisture loss through transportation between sites before analysis is completed. The data currently reported is therefore expected to show moisture values lower than the actual moisture content of ore being railed to Port.</p> <p>The proposed management action is unworkable as it would mean the operation is unable to reclaim, re-screen or outload from any stockpile when the trigger criteria in Column 2 applies. This requirement will have a significant impact on BHP's ability to meet its annual production targets.</p> <p>The proposed two tiered management criteria approach outlined in Table 6, along with the proposed management actions (application of BOC's and stockyard cannons) are effective measures to ensure the early identification and proactive management of potential dust emissions on-site. No further restrictions on ore handling within the premises is necessary, as the Reportable Event Criteria provides the necessary means to ensure all relevant measures are taken to avoid an increase in dust emissions at the boundary.</p>	<p>Accepted. DWER acknowledges that due to current limitations to the Licence Holder's ability to accurately measure product moisture content as it arrives to site, this condition is not operationally achievable.</p> <p>In regard to management action, DWER has removed the requirement to cease reclaiming, rescreening or out-loading of product during unfavourable meteorological conditions noting that the following requirements will remain on the amended Licence:</p> <ul style="list-style-type: none"> (a) the regular application of water to stockpiles with unknown moisture content; and (b) the application of BOC sprays will be targeted to events where high dust levels at boundary monitors, and operated as required thereafter. <p>In addition requirement has been added for the Licence Holder to undertake an investigation into the source of the exceedance and where they have been identified to be caused from activities at the premises implement dust abatement measures which may include changes to how products are handled.</p>
<p>Condition 27, Table 6</p> <p>Dust monitoring, management</p>	<p>This equipment is designed to be mobile and moved around site as the need arises to provide targeted dust suppression on a discrete source e.g. LRP rather than a large area such as stockpile. A mobile fog</p>	<p>Agreed. The requirement has been removed from Table 6. However, the operation of the mobile fogging cannons may be required following investigation and</p>

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Condition summary	Licence Holder comment	DWER response
<p>action and Reportable Event criteria:</p> <p><i>Mobile fog cannon operated between the northern most stockpiles and the West End.</i></p>	<p>cannon will have limited effectiveness when applied to a stockpile, particularly in higher winds as the mist created by the cannon is carried away. A network of dedicated water cannons is already in place which provides effective dust suppression for the stockpiles including those in North Yard.</p> <p>Prescribing where a fog cannon should be located will prevent the operation from applying this control in the most effective way, based on the relevant operational and environmental factors (i.e. wind speed/direction) at the time. BHP requests the wording in Table 6 is removed to provide the necessary flexibility to operate the mobile fogging cannons in the most effective manner.</p>	<p>identification of visible dust sources during Reportable Events and on an as-needs basis under Table 12.</p>
<p>Condition 27, Table 6</p> <p>Dust monitoring, management action and Reportable Event criteria</p> <p><i>BOC sprays to be operating on all conveyors that are handling ore through Finucane Island/Nelson Point infrastructure.</i></p>	<p>The current condition requires the BOC's sprays to be run regardless of whether the source of the monitoring trigger is related to ore being handled. The monitor may be triggered by a range of reasons not related to the handling of ore. This would result in additional water being wasted, as it will be applied to ore even when it is already adequately conditioned. This will also cause material handling issues resulting in delays and stoppages in the plant.</p> <p>BHP request the wording for this management action is reworded as follows:</p> <p><i>BOC sprays to be operating on all conveyors that are handling ore through Finucane Island/Nelson Point infrastructure, unless the moisture content of the ore being handled is at or above DEM.</i></p>	<p>Partially agreed. The operation of BOC sprays will be required during triggered dust events on all product handled unless the moisture content is <i>known</i> to be above DEM.</p> <p>As the risks associated with dust emissions have been assessed as 'High', DWER requires the precautionary management of material with an unknown moisture content to reduce the potential for fugitive dust generation during transport.</p>
<p>Condition 27, Table 6</p> <p>Management trigger criteria:</p> <p><i>≥100 µg/m³ PM₁₀ (rolling 1 hour average)</i></p> <p><i>and wind direction is between</i></p>	<p>A trigger criteria of 100 µg/m³ (Column 2) is considered very low, particularly when applied over a short averaging period of 1-hour and therefore has the potential to be triggered on a frequent basis. This condition would require the operation to restrict ore handling without being able to first investigate the source of the trigger and confirm it is related to operations or a false alarm, and without being able to first implement additional abatement measures if required to reduce dust</p>	<p>Accepted. There appears to be low correlation between boundary monitor dust levels and exceedances of interim criteria at Taplin Street, based on current data, but the data is not detailed enough to support the conclusion that high boundary monitoring data does not correlate with exceedances at Taplin</p>

Comments received on draft Decision Report and Licence sent 4 December 2017		
Condition summary	Licence Holder comment	DWER response
<p>wind arcs 250° and 320°</p> <p>Unless where BOM or Yule River monitoring stations have recorded $\geq 100 \mu\text{g}/\text{m}^3 \text{PM}_{10}$ (rolling 1 hour average) during the same Day.</p>	<p>levels.</p> <p>BHP understands that DWER have selected the $100 \mu\text{g}/\text{m}^3$ trigger criteria in Table 6 as it is contained within BHP's <i>Respond To High Dust Alarm Procedure</i>. This trigger applies in the procedure when the live reading for Taplin Street is above $100 \mu\text{g}/\text{m}^3$. It is used internally as an early warning to review activity on-site and apply dust controls to ensure the Taplin St target ($70 \mu\text{g}/\text{m}^3$) over a 24-hour period is not exceeded due to BHP's operations.</p> <p>The Finucane Island monitors in particular, given the location and orientation of the operation, can be significantly impacted by local activities outside the premise (such as construction works, external traffic that use the outside boundary road at the North of the site) and can also be heavily influenced by neighbouring operations adjacent to the premise. These sources will contribute to triggers of the criteria and would be outside of BHP's control to manage.</p> <p>This proposed trigger level of $100 \mu\text{g}/\text{m}^3$ is considered too low to be an effective management tool for Finucane Island. Historical data indicates that for just one of the proposed monitors on Finucane Island, this criteria was triggered up to 6846 hours per year (~14% of the year). This criteria will have the unintended consequence of diverting management efforts towards investigating and responding to false alarms or short-term insignificant dust events that are not the primary cause of a potential exceedance of the proposed Reportable Event Criteria. These types of events could include for example road sweeping or cleaning activities in the vicinity of a monitor.</p> <p>When this trigger criteria is revised to a more appropriate level of $200 \mu\text{g}/\text{m}^3$ (rolling 1 hour average), the historical data indicates the same monitor was triggered up to 757 hours per year (1.2% of the year).</p> <p>Given the trigger criteria is based on a rolling 1 hour period, this revised criteria of $200 \mu\text{g}/\text{m}^3$ still provides an appropriate early warning</p>	<p>Street in some way.</p> <p>The trigger criteria for Finucane Island downwind boundary monitors has been amended from $\geq 100 \mu\text{g}/\text{m}^3 \text{PM}_{10}$ (rolling 1 hour average) to $\geq 200 \mu\text{g}/\text{m}^3 \text{PM}_{10}$ (rolling 1 hour average), on the grounds that there is a greater separation distance between operations at Finucane Island and West End residents when compared to Nelson Point operations. However, the risk assessment identified sensitive receptors in the West End that are nearer to Premises operations. Therefore the management trigger level at the northern boundary monitors of Nelson Point has been retained at $\geq 100 \mu\text{g}/\text{m}^3$.</p> <p>Changes have been made to the use of background monitors as an exemption for management actions. Management actions are now only required where background monitors have not recorded $\geq 100 \mu\text{g}/\text{m}^3 \text{PM}_{10}$ over a rolling one-hour average for at least three hours prior to the boundary monitor trigger event. This represents a minor amendment to the original wording from 'Day' to 3 hours to provide for a higher level of specificity and correlate to the period of the trigger event.</p>

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Condition summary	Licence Holder comment	DWER response
	<p>mechanism to implement proactive dust controls at Finucane Island and avoid an exceedance of the Reportable Event Criteria (230 µg/m³ rolling 24 hour average).</p> <p>BHP requests that the management trigger criteria for the Finucane Island monitors listed in Column 2 of Table 6 be revised to 200µg/m³ (rolling 1-hour average).</p>	
Condition 27, Table 6 Management trigger criteria (continued)	<p>There are number of external sources including from neighbouring premises that will have an impact on the dust levels recorded at BHP premises and will contribute to triggers of the management criteria proposed in Table 6. BHP considers it essential that the licence requirements recognise and address the impact of these third party contributions, by also linking the upwind boundary monitors to the management triggers.</p>	<p>Noted. DWER has applied these controls based on the high level of risk associated with dust emissions. In the event of high dust levels triggering management criteria specified in Table 6, the Licence Holder should not significantly contribute to those existing levels.</p> <p>DWER seeks to apply a consistent approach to other premises where there is a similar situation.</p>
Condition 27, Table 6 Management trigger criteria (continued)	<p>The proposed management trigger levels in Table 6 have not been tested before for this premise and therefore there is inherent uncertainty as to whether they are the most effective criteria to use. BHP is concerned the proposed values may result in significant additional management effort and administration, that is not focused on mitigating dust emissions on-site. It is therefore important that the trigger criteria are considered interim measures and are subject to further review and adjustment (if required) once they are operating for a period (e.g. 12 months).</p> <p>BHP requests DWER include a mechanism in the licence that will enable the performance of these trigger criteria to be reviewed once further information on their effectiveness is available.</p>	<p>Disagreed. The Licence Holder has the ability to submit a licence amendment application in accordance with s.59(2) of the EP Act. Supporting information would be required to justify the removal of management trigger levels from the Licence.</p>

Comments received on draft Decision Report and Licence sent 4 December 2017		
Decision Report section	Licence Holder comment	DWER response
3.1 Infrastructure	Reclaimers listed in Table 2 need to be updated to reflect list in Licence i.e. Reclaimers 5, 6, 7, 8 and 10 (no Reclaimer 9). Transfer stations listed in Table 2 need to be updated to reflect revised list provided in Licence.	Noted. Table updated.
4.1 Section 46 Inquiry	The Minister for Environment approved (18 December 2017) Ministerial Statement 1070 which deletes the conditions of Ministerial Statement 433 and 740. BHP request that this section be amended to incorporate the approved Ministerial Statement 1070.	Amended. Section title also changed to <i>Ministerial Statement 1070</i> .
4.2.1 2016 Report to Government	Amend wording to better align with the Taskforce Report: The Taskforce Report further considered changes to Town Planning Scheme No. 5 for Port Hedland's West End area. These changes include the use of a Special Control Area that would align current zonings with the Pilbara's Port City Growth Plan, taking into consideration the HRA. The Growth Plan defines the West End (Precinct 1) as the commercial and cultural core of Port Hedland with predominantly mixed land uses, including short stay accommodation areas.	The paragraph has been amended to reference the Special Control Area and describe the intent of changes to zoning. In accordance with <i>Guidance Statement: Land Use Planning</i> , DWER has given consideration to the proximity of existing sensitive receptors to the Premises when assessing risks associated with dust, noise and odour.
4.5.3 Works Approval W5792/2015/1	BHP request that the Works Approval W5792/2015/1 is retained as further works under the approval may be required.	Noted. Works Approval W5792/2015/1 expires 8 November 2020.
4.6.2 Ambient Air Quality Monitoring, Table 9	BHP requests that this data be updated (e.g. additional table) to include the BHP reported days above criteria for the corresponding FY13-FY17 period as reported in the AER's. This will provide the reader with further important context on BHP's reported performance against the broader regional air shed. The header description ideally to be consistent with the wording of the	Noted. The table has been updated to include PHIC data for FY2016/17 and the table header description has been amended to refer to the number of days above NEPM and interim guideline values for PM ₁₀ . No further changes have been made. The Annual Environmental Reports submitted by the

Comments received on draft Decision Report and Licence sent 4 December 2017		
Decision Report section	Licence Holder comment	DWER response
	<p>table i.e. "Days above criteria", with a clear and obvious caveat that compliance of 70 is determined at Taplin Street with an allowance of up to 10 days above criteria.</p> <p>Including the other monitoring stations implies that the criteria applies to these locations which is not accurate and therefore they should be removed all together or at least separated from the Taplin St data and clearly indicated as being provided for reference purposes only.</p> <p>BHP also requests that PHIC monitoring data for 2016/17 be included in Table 7 to show the improvement in the occurrences of interim guideline exceedances for Taplin Street.</p>	<p>Licence Holder provide details on the reported number of days above interim criteria at Taplin Street only. This information is captured within Table 9 of the Decision Report.</p> <p>The table intentionally does not separate Taplin Street monitoring data from data at other West End monitors. A footnote has been applied to clearly note that the interim criteria do not currently apply to those monitors other than Taplin Street.</p>
4.6.3 Ambient air quality and throughput	<p>BHP request that the wording be amended to make it clearer to the reader that monitoring data shows no clear correlation.</p> <p>Suggested Wording:</p> <p>It is evident from the monitoring data that there is no clear correlation between the volume of materials exported and ambient PM₁₀ concentrations.</p>	<p>DWER does not agree that data indicates no correlation, only that there is a no notable correlation between the volume of materials exported and ambient PM₁₀ concentrations based on available data including the averaging periods (annualised). This is due in part to the limited level of detail in the data available to DWER, which is raises uncertainty in the assumption of a definitive "zero correlation".</p>
4.7 Air Quality and Amenity (General)	<p>DWER have not made any changes to this section based on BHP's previous comments regarding the Court and Tribunal considerations which have specifically rejected that references should be made to a dictionary definition which considers the "pleasantness" of a place or that amenity is to be considered subjectively.</p>	<p>DWER acknowledges in the Decision Report that the term 'amenity' is intrinsically subjective and linked to a particular community's expectations at a particular point in time. Therefore DWER has given consideration to the large volume of anecdotal evidence of impacts to amenity in the West End including that provided in submissions.</p> <p>In addition, consideration was given to the consistently elevated concentrations of PM₁₀ recorded at ambient air quality monitoring locations, particularly within the West End.</p>

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Decision Report section	Licence Holder comment	DWER response
4.9 Key Finding 3 (Noise Monitoring)	There is no discussion of the historical town planning in section 4.9. BHP requests that further explanation is included on historical town planning in section 4.9 to justify the finding or it be deleted.	Noted. The finding has been clarified to note that the close proximity of residential receptors to industrial activity in the West End has resulted in land use conflicts for noise.
7.4.1 Key Finding 1 (Risk Assessment – Dust)	BHP notes that iron oxide may contribute to the majority of particulate matter in some situations but is not always the case. The statement implies that the export of iron ore is the major contributor to the elevated dust concentrations in Port Hedland. This ignores the facts presented in draft decision document (e.g., number of exceedances at Neptune PI relative to Taplin St monitors) and also other documents (e.g., Department of Health HRA where it is stated that "The data suggests it may currently be possible to meet the interim guideline at Kingsmill Street if dust from the spoil bank is managed.")	Noted. DWER has clarified that the HRA identified that iron oxide as the major component of dust arising from port and commercial operations in Port Hedland. It is acknowledged in the Decision Report that there are other sources of dust.
7.5.4 Criteria for assessment (Risk Assessment – Noise)	Wording should be changed to be consistent with regulation 8(3) Table 1 of the <i>Environmental Protection (Noise) Regulations 1997</i> which refers to "Industrial and utility premises other than those in the Kwinana Industrial Area".	Agreed. As the Kwinana Industrial Area does not relate to the assessment, wording has been changed to: "Industrial and utility premises eg. Pilbara Ports Authority's Eastern Operations, Wedgefield"
8.2 Bulk Granular Material Specifications	DWER has indicated in the decision report that it has applied a DTS limit of 45% even though the modelling is based on an annual average 44% DTS. BHP requests that the DTS % be consistent with the modelling included in the application which is 44%.	Disagreed. DWER understands that BHP is currently shipping over 45% of its total throughput directly from car dumpers to ship loaders, reducing the number of dust generating activities such as stacking and reclaiming. Based on the high level of risk associated with dust emissions DWER has determined that a reduction in the proportion of direct shipping is not acceptable.
	BHP requests that the wording in section 8.2.2 reflect the Condition 6	Agreed.

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Decision Report section	Licence Holder comment	DWER response
	and definition in the Draft Licence for Static stockpiles.	
8.4 Moisture Content Monitoring and Management	Changes to this section are required based on BHP's comments for Draft Licence Condition 19 and 20.	Noted and accepted. DWER has removed condition 20 as requirements are captured through other conditions of the licence. Refer to DWER response to Licence Holder comments on condition 20.
8.5 Dust Monitoring and Management	<p>BHP request that this section be updated to reflect its comments on the Draft Licence conditions 23, and 27. The Decision Document notes that exclusion for background events and fires is considered, however does not take into account 3rd party activities. Many major wind vectors that come across our site are impacted by other operations. These are presented in the investigations of an event, however they will impact on the real time management levels associated with the licence conditions proposed.</p> <p>BHP does not support a condition that restricts it meeting its annual production targets, particularly when there are other dust management options available to mitigate dust emissions. BHP considers that a trigger action should require implementation of dust control infrastructure and equipment that is already conditioned to mitigate dust.</p>	<p>Noted. DWER has applied these controls based on the high level of risk associated with dust emissions. In the event of high dust levels triggering management criteria specified in Table 6, the Licence Holder should not significantly contribute to those existing levels.</p> <p>DWER is in the process of reviewing licence conditions placed on other port operators in Port Hedland and will consider applying management trigger criteria where justified by risk.</p>

Comments received on draft Decision Report and Licence sent 22 January 2018		
Condition summary	Licence Holder comment	DWER response
Condition 5 The Licence Holder must maintain a Direct Ship	<p>Condition 5(b) currently implies a DEM level of 90% as opposed to the wording in condition 20 which requires a minimum compliance rate of 90% for Moisture Content at or above the corresponding DEM level.</p> <p>BHP requests the following wording for condition 5(b) to prevent any</p>	Noted. DWER agrees with BHP's interpretation and has amended part (b) of Condition 5 for clarity to state:

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Condition summary	Licence Holder comment	DWER response
<p>component of no less than 45% of the total volume amount of Iron Ore exported from the Premises over a rolling twelve month period until:</p> <p>(a) 31 December 2020; or (b) the requirements of Condition 8, 9, 10 and 11 are fulfilled and the Licence Holder is achieving compliance with an in-load Iron Ore Moisture Content at or above the corresponding DEM Level of 90%, averaged over each Rake and each calendar month, as specified through Condition 20.</p>	<p>inconsistency with condition 20:</p> <p>(b) <i>the requirements of Condition 8, 9, 10 and 11 are fulfilled, and the minimum compliance rate specified in condition 20 has been achieved.</i></p> <p>BHP notes that the intent of this condition is defined in the Department of Water and Environmental Regulation's (DWER's) Draft Decision Report in <i>Section 8- Regulatory Controls</i>. It is further noted that Section 8.2.1 provides the justifications for including specific conditions in the licence amendment that are appropriate for the Risk Event (i.e. Dust).</p> <p>BHP refers to DWER's 'Note' in section 8.2.1 which states: "Minimum direct shipping requirements have been set to 31 December 2020 only. Following this date it is anticipated that the Licence Holder will be in the position to accurately monitor the moisture content of iron ore as it arrives to site and achieve a 90% compliance rate for moisture to be at, or above the DEM level for each product (refer to section 8.4). DWER notes that the Licence Holder will continue to direct ship a proportion of iron ore following 2020, as required to meet production targets." For the purpose of clarification, BHP therefore interprets condition 5 to mean Direct Ship component applies only until:</p> <ul style="list-style-type: none"> • 31 December 2020; or • Any earlier date where the requirements referred to in condition 5(b) are achieved. 	<p>(b) <i>compliance with Condition 8, 9, 10 and 11 is achieved and the minimum compliance rate specified in Condition 20 has been achieved.</i></p>
<p>Condition 13</p> <p>The Licence Holder must maintain an Average Monthly Availability rate of 90% or more for all:</p>	<p>Request including "combined" to ensure consistency with definition above and as per existing licence condition.</p>	<p>Disagreed. DWER expects that each series of infrastructure of the types described in section (a) to (d) of Condition 13 be available at 90% of the time, averaged over each month. This condition has been applied based on the high risk of dust impacts as determined through section 7.4.</p>

Comments received on draft Decision Report and Licence sent 22 January 2018		
Condition summary	Licence Holder comment	DWER response
(a) water sprays on stackers, reclaimers and ship loaders; (b) dust collectors combined with wet scrubbers at transfer stations, car dumpers and lump rescreening plants; (c) belt wash stations; and (d) BOC sprays.		
Condition 19 The Licence Holder must ensure that Iron Ore out-loaded from the Premises has a Moisture Content at or above the corresponding DEM Level, averaged over each ship load with a minimum compliance rate of 95%, averaged over each calendar month.	<p>Ore samples are collected every 6 minutes at the sample station prior to ship loading, over a period of 30-60mins (depending upon flow rate) until a 10Kg sample has been collected. This process is repeated until the ship has been loaded. The 10Kg samples are then aggregated and a single moisture value is then derived for each ship load. This process is compliant with the requirements of ISO 3802 and ISO3807.</p> <p>As the volume of ore loaded into each ship can vary significantly and the composition of ore types may also vary between ships, the current averaging approach proposed in condition 19 does not provide a true representation of performance, as it considers all ship loads as equal.</p> <p>This proposed approach would treat a smaller load which may be below the compliance rate, the same as a larger load which may below the compliance rate. However in terms of potential dust emissions the larger load is likely to have greater potential to generate dust given the greater volume of ore being handled.</p> <p>Therefore BHP requests that this condition be based on a volume weighted average for the total volume of ore shipped each calendar month. This approach will more appropriately account for any differences in volumes being handled. This is also consistent with the dust modelling which considers potential dust emissions on a volume</p>	<p>Noted. DWER has amended the condition for clarity and to ensure that it is fit for purpose and enforceable to state:</p> <p><i>The Licence Holder must ensure that 95% of all Iron Ore out-loaded from the Premises, has a moisture content at or above the corresponding DEM Level, as measured in accordance with Condition 17, Table 3, and averaged over each calendar month.</i></p>

Comments received on draft Decision Report and Licence sent 22 January 2018		
Condition summary	Licence Holder comment	DWER response
	<p>basis rather than ship loads. BHP suggests the following revised wording:</p> <p><i>The Licence Holder must ensure that Iron Ore out-loaded from the Premises has a minimum volume weighted average compliance rate of 95% for Moisture Content at or above the corresponding DEM Level over each calendar month.</i></p>	
<p>Condition 20</p> <p>By no later than 31 December 2020, the Licence Holder must ensure that all Iron Ore in-loaded and accepted at the Premises has a Moisture Content at or above the corresponding DEM Level, averaged over each Rake with a minimum compliance rate of 90%, averaged over each calendar month.</p>	<p>To ensure consistency in approach with ore being out-loaded as required under condition 19 above, BHP requests that this condition also be a volume weighted average for the total volume of ore accepted at the premise for each calendar month. BHP suggests the following revised wording:</p> <p><i>By no later than 31 December 2020, the Licence Holder must ensure that all Iron Ore in-loaded and accepted at the Premises has a minimum volume weighted average compliance rate of 90% for Moisture Content at or above the corresponding DEM Level over each calendar month.</i></p>	<p>Noted. DWER has amended the condition for clarity and to ensure that it is fit for purpose and enforceable to state:</p> <p><i>By no later than 31 December 2020, the Licence Holder must ensure that 90% of all Iron Ore in-loaded and accepted at the Premises, has a moisture content at or above the corresponding DEM Level, as measured in accordance with Condition 17, Table 3, and averaged over each calendar month.</i></p>
<p>Schedule 3: Table 12, Row 13</p> <p>Mobile fogging cannon</p> <p>Operated as required and following identification of visible dust sources within the Premises; or as identified through Conditions 23 and 25.</p>	<p>Delete reference to conditions 23 and 25 as this equipment is no longer referenced in those conditions.</p>	<p>Agreed. References removed.</p>

Comments received on draft Decision Report and Licence sent 22 January 2018		
Decision Report section	Licence Holder comment	DWER response
7.4.8 – Likelihood of consequence (Dust)	<p>The wording in the first paragraph implies that BHP is the sole contributor to dust emissions impacting receptors at sufficient concentrations to cause health impacts. However in Section 7.4.7 it clearly states that the premises contributes to cumulative concentrations. Additionally the occasional exceedances of the 70µg/m³ guideline concentration at the Taplin Street monitor (PHIC, 2016) is a result of cumulative dust concentrations recorded at this location. Therefore for consistency BHP requests the following wording:</p> <p><i>The Delegated Officer has determined, based upon occasional exceedances of the 70µg/m³ guideline concentration at the Taplin Street monitor (PHIC, 2016) and through the dispersion modelling provided by the Licence Holder, <u>the likelihood of the Licence Holder contributing to dust emissions migrating to receptors at sufficient concentrations to cause health impacts is likely.</u></i></p> <p>Based on Table 19: Risk Criteria Table, "Likely" is defined as "The risk event will probably occur in most circumstances". BHP does not agree that its operations will be <u>solely</u> responsible for dust emissions affecting receptors in sufficient concentrations to cause health impacts in "most circumstances".</p> <p>BHP considers that a "Likely" likelihood of consequence is more appropriate in the scenario where cumulative dust emissions migrating to receptors at sufficient concentrations to cause health impacts.</p>	Agreed. Changes made to provide consistency with DWER's assessment of consequence, which refers to BHP's contribution to overall dust levels.
Appendix 2: Comments received on draft Decision Report and Licence sent 4 December 2017 DWER response to BHP commentary on former Condition 20	<p>BHP request DWER also include BHP's response used for Condition 20 to provide additional clarification for the changes:</p> <p>"The infrastructure installed at the mines does not currently provide consistent and accurate sampling and analysis of ore moisture levels against the relevant ISO standards. The facilities in place were historically designed to determine the relevant mineralogy of the products and they will require infrastructure upgrades to provide accurate and reliable ore moisture measurements."</p>	Noted. No changes made.

Comments received on draft Decision Report and Licence sent 22 January 2018		
Decision Report section	Licence Holder comment	DWER response
	<p>The samples currently collected at the mines are often exposed to further moisture loss through transportation between sites before analysis is completed. The data currently reported is therefore expected to show moisture values lower than the actual moisture content of ore being railed to Port.</p> <p>BHP has developed and is implementing an integrated ore moisture improvement program for its supply chain, which will improve the moisture content of ore being delivered to the Port. This program includes upgrading the sampling and analysis facilities and ore conditioning systems at the mines. These works are essential to providing accurate ore moisture measurement and appropriate conditioning of products being railed from mines to Port. To be successful, the initiatives must be delivered as an integrated program across all mines to ensure an overall improvement is achieved. The works require sufficient lead time to be designed, constructed and commissioned."</p>	
<p>Appendix 2: Comments received on draft Decision Report and Licence sent 4 December 2017</p> <p>DWER response to BHP commentary on former Condition 23</p>	<p>Change to 31 May 2018 to be consistent with Licence Condition 8, Table 2 Row 2, Column 4.</p>	<p>Noted. Response amended to refer to 1 May 2018, not 31 May 2018, consistent with Licence Condition 8, Table 2 Row 2, Column 4.</p>

Appendix 3: Summary of Stakeholder and Community Comments

The Table below provides a list of submissions received during the consultation periods provided for both the 290Mtpa and 275Mtpa applications along with DWER's direct response. Submissions received have been paraphrased to maintain the anonymity of each submitter, although in most cases DWER has attempted to present the submitter's views as verbatim.

Theme	Submitter (Application)	Submission	DWER Response to comment
Regulatory Process and Framework	Submitter (275 Mtpa)	The Department of Environment Regulation (DER) [now Department of Water and Environmental Regulation - DWER ³] is required to undertake its decision making for applications under Part V, Division 3 of the <i>Environmental Protection Act 1986</i> (EP Act) and in accordance with DER's Regulatory Framework. DER's Regulatory Framework consists of guidance statements, environmental standards, and guidelines.	Noted. The assessment and subsequent decision-making for this application has been undertaken in accordance with the EP Act and has been guided by DWER's Regulatory Framework. This is reflected in this Decision Report which outlines the policies that have been considered and how they have been applied.
	Submitter (275 Mtpa)	DWER should suspend its decision making for BHP Port Hedland Port Operation licence amendment application to increase throughputs to 275 Mtpa because of an ongoing inquiry under section 46 of the EP Act being undertaken by the Environmental Protection Authority (EPA) for Ministerial Statements 740 and 433. Any decisions on the 275 Mtpa application should be consistent with the DER's determination to suspend decision making for the 290 Mtpa application, as they see no material change in risk between the two applications.	Noted. DWER has issued the amendment authorising an increase in throughput at the Premises to 290 Mtpa following the completion of the EPA's inquiry under section 46 of the EP Act for Ministerial Statements 433 and 740. The inquiry has resulted in dust emissions being regulated solely through a licence issued under Part V of the EP Act. As such, the licence is unconstrained by Part IV Ministerial Statement requirements.
	Submitter (275 Mtpa)	Consistent with DWER's Regulatory Framework, DWER should suspend its decision making for BHP's application to increase throughput until it is able to impose conditions in relation to dust, as the current licence conditions relating to dust are inadequate and unenforceable. Further commentary on each of the current licence conditions outlining how they consider that each of the conditions relating to dust is not consistent with the <i>Guidance Statement: Setting Conditions</i> (eg valid and/or enforceable).	The licence amendment authorising the increase has resulted in numerous additional site specific regulatory controls being applied to the licence. Conditions have been developed to ensure they are consistent with the Department's Guidance Statement. As a result of these additional regulatory controls, the residual risk to public health, the environment and amenity is acceptable.
	Submitter (275 Mtpa)	Consistent with DWER's Regulatory Framework, DWER is required to assess cumulative impacts of BHP's increased throughputs.	Noted.

³ References to DER in submissions have been considered as references to DWER.

Theme	Submitter (Application)	Submission	DWER Response to comment
			DWER has considered the cumulative risk of dust concentrations for public health and amenity, as a result of this application and the operation of the Primary Activities on the premises, rather than the emissions in isolation. This is reflected in the risk assessment detailed in this Decision Report.
	Submitter (275 Mtpa)	Consistent with DWER's Regulatory Framework, DWER should regulate to prevent or minimise severe and extreme dust impacts (as determined in accordance with DER's <i>Guidance Statement: Risk Assessment</i>) for the West End of Port Hedland. Consistent with source-pathway-receptor model applied by DWER, consideration should be had to the closest sensitive receptor (including the Esplanade Hotel).	Noted. DWER has undertaken the risk assessment in accordance with <i>Guidance Statement: Risk Assessment</i> having regard for the receptors in the West End of Port Hedland. However, the public health criteria applied has been based on the currently endorsed <i>Port Hedland Air Quality and Noise Management Plan, 2010</i> , and the information and recommendations presented in the Department of Health, <i>Port Hedland Air Quality Health Risk Assessment for Particulate Matter, 2016</i> . The Department of Health is the lead agency for public health matters in Western Australia.
	Submitter (275 Mtpa)	Consistent with DWER's Regulatory Framework, DWER should set criteria for dust impacts for amenity in the West End using for example the standards set out in the Kwinana Environmental Protection Policy.	Noted. DWER has considered amenity criteria. There are no currently endorsed criteria for the Pilbara region of Western Australia and criteria that are applied in other jurisdictions vary widely subject to community expectations. Consideration of amenity criteria is documented through section 7.4.4 of this Decision Report. Subsequently the Department has considered other lines of evidence in informing the risk assessment of amenity impacts as detailed in section 7.4.4 of this Decision Report.
	Submitter (275 Mtpa)	Consistent with DWER's Regulatory Framework, DWER should set criteria for health impacts in the West End, consistent with the rest of Port Hedland and that this is supported by the recommendations made in the <i>Port Hedland Air Quality Health Risk Assessment for Particulate Matter, 2016</i> (HRA).	Noted. DWER refers to the Department of Health for the establishment of public health criteria and has considered the information and recommendation presented in the HRA. The HRA recommended the application of the interim

Theme	Submitter (Application)	Submission	DWER Response to comment
			guideline of 24-hour PM ₁₀ of 70µg/m ³ (+10 exceedances to accommodate natural events) continue to apply at Taplin Street followed by all areas of Port Hedland. A period of 5 years is suggested for this. How the Department has considered the HRA is outlined in sections 4.2.2 and 7.4 of this Decision Report.
	Submitter (Both)	DWER must apply the <i>Guidance Statement: Land Use Planning</i> in considering impacts. The Town of Port Hedland Town Planning Scheme No.5 (originally gazetted 2001) zones the West End Precinct as "Town Centre", which includes the ability for sensitive land uses, including multiple dwellings.	Noted. DWER has considered land use planning through application of the <i>Guidance Statement: Land Use Planning</i> . The Town of Port Hedland Town Planning Scheme No.5 (Appendix 8 and 9) includes non-permitted use and development within the Town Centre zone and mixed business zone (West End) and these include: <ul style="list-style-type: none"> • Aged or dependent persons dwelling, • Caretakers dwelling, • Multiple dwelling, • Residential building, and • Single house.
	Submitter (290 Mtpa)	DWER should not make any determination on the licence amendment application until such time as the DWER Port Hedland Dust Monitoring Campaign using LiDAR is completed. This short term monitoring campaign will be essential to understand the risks to the community.	Noted. DWER's short term dust monitoring campaign using LiDAR will be beneficial in informing future decision-making in Port Hedland as it will assist in better understanding the sources and movement of dust within the air-shed. However, it is not considered the only source of information available to the Department when considering the risk to public health and amenity from prescribed premises. A wide range of information has been considered as part of this assessment including (but not limited to) studies undertaken by the Department of Health (HRA), modelling undertaken, monitoring data, history of the premises (regulatory and complaints etc).
	Submitter(s) (275 Mtpa)	Legislation is designed to make the miners pay for pollution and proper pollution control at their operations and BHP should be required to do the same. A mechanism should be put in place to compensate owners	Noted. The type of conditions that DWER applies to licences issued

Theme	Submitter (Application)	Submission	DWER Response to comment
		<p>of commercial premises in the West End who can provide evidence of losses and damages caused by excessive dust impacts and the costs incurred in remediating such impacts during any period where Total Suspended Particles (TSP) and Dust Deposition (DD) levels in the West End do not meet the adopted criteria.</p> <p>No further increases in iron ore capacity should be approved until the agreed regulatory targets are met or landowners are paid compensation for any increased impact arising from existing operations and any expansion.</p>	<p>under Part V of the EP Act is set out through section 62A of the EP Act. The conditions that have been applied to this licence are consistent with section 62A of the EP Act.</p> <p>DWER does not enter into or require payment to third parties from licence holders as a result of emission or discharges from the premises through licences issued under Part V of the EP Act.</p>
	Submitter (275 Mtpa)	How will the Department be able to undertake a proper assessment given that BHP is responsible for monitoring and evaluating its own dust emissions. How will the Department ensure that the measures and most critically the interpretation of the measures are scientifically robust and independent and made publicly available.	<p>Noted.</p> <p>DWER generally specifies applicable standards that must be followed by Licence Holders for the collection and analyses of monitoring data and samples, allowing for a high degree of confidence in the information presented. In addition, for this assessment the Department has considered information from other parties including the Department of Health and ambient air quality network (PHIC). Further, the Department has air quality specialist that have reviewed the monitoring studies and monitoring information presented and documented in this Decision Report.</p> <p>In the event that information contained in or supporting the application is found to be false or misleading in a material respect the department can revoke or suspend the licence (refer to section 59A of the EP Act).</p>
	Submitter(s) (275 Mtpa)	While the applications appear to be relatively small in scale in comparison to current operational throughput they represent an increase by 'stealth'. The existing dust levels and impacts are unacceptable, and no measures have been undertaken to reduce dust or minimise its negative impacts. Subsequently no increases to export tonnage should be granted until it can be demonstrated that there have been bona fide improvements in reducing the impacts of dust generating operations.	<p>Noted.</p> <p>DWER has undertaken its risk assessment based on cumulative dust concentrations.</p> <p>The Port Hedland Taskforce was established to manage strategic and ongoing dust and noise issues in Port Hedland. Endorsed mechanisms from the Taskforce have been considered for decision making under Part V of the EP Act.</p>
	Office of the Environmental	The OEPA provided a number of letters for both applications providing information on requirements under Part IV of the EP Act which relate to	Noted.

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	Protection Authority (OEPA)	the premises (specifically Ministerial Statement 433 and 740). In addition the OEPA provided information in order to inform alignment between Part IV and V of the EP Act.	
Regulatory Controls	Submitter (275 Mtpa)	All current and future export activities must be underpinned by a commitment to world's best practice in the management of bulk resource commodities. Particular emphasis must be placed on dust management given the proximity to the Port Hedland's West End.	Noted. The Department has applied a range of regulatory controls considers applicable to manage the risk to public health and amenity to an acceptable level.
	Submitter(s) (Both)	BHP should comply with the following requirements detailed in the <i>Pilbara Ports Authority, Dust Management Leading Practice Guidelines</i> . <ul style="list-style-type: none"> All ore are brought into, stockpiled and loaded through the Port of Port Hedland is at, or above, the Dust Extinction Moisture (DEM) for that particular ore type. Major transfer stations or transfer stations located adjacent to ship loaders are fully enclosed with extraction (either wet or dry). All transfer stations are to have a fogging system installed. All trafficable areas are sealed and regularly cleaned and maintained (including traffic management). A meteorological forecast system to predict adverse weather conditions and allow for early action for dust management. All ship loader booms are fitted with sprays at the loading chute. Water cannons used on all stockpile areas to maintain the Dust Extinction Moisture (DEM) of the product and prevent dust emissions associated with wind erosion. All stackers should be of the luffing/slewing type to reduce drop height and be fitted with water sprays on the boom. Car dumpers should be fully enclosed and fitted with dust extraction. 	Noted. The Department has considered the management strategies set out in the <i>Pilbara Ports Authority, Dust Management Leading Practice Guidelines</i> in establishing regulatory controls in the licence.
	Submitter (275 Mtpa)	All of the existing dust suppression actions specified in the Application documentation (including Air Quality Assessment report prepared by	Noted.

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		Pacific Environment Limited) and proposed additional suppression actions should be included as conditions in the Licence.	DWER has applied proposed controls as submitted in the Application and supporting documentation as regulatory controls to ensure that the risk to public health and amenity is acceptable.
	Submitter (290 Mtpa)	All conveyers should be enclosed to reduce the dust levels in the West End.	Noted. DWER has applied a wide range of regulatory controls to the licence based on the outcome of the risk assessment considered appropriate, site specific and necessary to maintain the risk at an acceptable level.
	Submitter (290 Mtpa)	There are three highly effective methods of pollution control that have not been brought to BHP's attention for consideration. These are as follows: <ul style="list-style-type: none"> • Modernisation of the site – by covering stockpiles as is done in Esperance for example, the dust can then be contained, stabilised and disposed of safely. Similarly for the processing buildings, lumps rescreening and crushers. • Monitoring production levels – pollution levels are a result of production of iron ore through the site. By cutting back on production levels through the site, a corresponding drop in pollution levels would be achieved. • Relocation – by relocating their plant to the Boodarie Leases on the western side where FMG and the Utah facilities are in operation, BHP would not be polluting the Port, the town and the local environs and be able to design and operate the most modern plant in the world. Relocating to Boodarie would take the associated dust pollution with it and would remove all the dust pollution generated by the mining industry from the affected area, and stimulate further development in the region. 	Noted. Refer above.
	Submitter(s) (Both)	Iron ore should be stockpiled in sheds rather than in the open areas to reduce levels of dust.	Noted. Refer above.
	Submitter (290 Mtpa)	DWER should apply a condition on the licence that no dust should be allowed to cross the property boundary.	Noted. Refer above.

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	Submitter(s) (Both)	BHP should move the stockpiling of iron ore from Nelson Point and Finucane Island to Boodarie which is located much further away from Port Hedland. BHP should make the commitment now that for all exports above 270 Mtpa that the additional material will be stored on land they already own over in Boodarie and conveyed into the ships by covered conveyors.	Noted. Refer above.
	Submitter (275 Mtpa)	Recommends a firm specialising in the management of dust using nanoparticles be used by Licence Holder.	Noted. Refer above.
	Submitter (275 Mtpa)	Port Hedland will become another Wittenoom and State government should ensure that all technologies, best practices and/or physical containment barriers are in place to allow for industry to co-exist with the desired amenity for Port Hedland. State government needs to build upon the 2006 Alcoa precedent of recognising that industry must bear the cost of its own externalities.	Noted. Refer above.
	Submitter (275 Mtpa)	The use of dust management measures such as street sweeping and dust suppression by water are inadequate. Sweeping agitates and aerates the dust, and water turns the dust to mud, which dries shortly after and returns to fugitive dust. To be effective, management measures should concentrate on collecting and containing the dust at its source point, not trying to control it once it has gotten away.	Noted. Refer above.
	Submitter(s) (290 Mtpa)	BHP should proceed with the Outer Harbour project which would take shiploading operations well away from the Town, reducing exposure to the inhabitants, and opening up the town to new industries.	The progression of the BHP's outer harbour project is a matter for BHP and not for DWER.
	Submitter (275 Mtpa)	Amenity limits and monitoring for both short term events and dust deposition should be applied. This would include parameters for short-term events using PM ₁₀ , and longer term events using total suspended particles (TSP) [24 hour average] and dust deposition. This has been applied by DWER for a number of licensed premises and TSP limits are also specified in the Kwinana Environmental Protection Policy.	Noted. DWER has considered amenity criteria. There are no currently endorsed criteria for the Pilbara region of Western Australia and criteria that are applied in other jurisdictions vary widely subject to community expectations. Consideration of amenity criteria is documented through section 7.4.4 of this Decision Report.
	Submitter (290 Mtpa)	If all iron ore brought into, stockpiled and loaded through the port of Port Hedland is at, or above, 'Dust Extinction Moisture', as recommended by [a consultant] and endorsed as policy by Pilbara Ports (through the <i>Pilbara Ports Authority, Dust Management Leading Practice Guidelines</i>) there would not be a dust problem. Industry could	Noted. DWER has applied a wide range of regulatory controls to the licence based on the outcome of the risk assessment considered appropriate, site specific and necessary to

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		expand and the West End business and residential community could continue to prosper and not be covered in a film of iron ore dust every day. DWER should impose conditions on this expansion proposal and existing tonnages to ensure that both industry and the business and residential community can coexist into the future.	maintain the risk at an acceptable level. Moisture content against DEM is considered a critical control which has been applied to the licence.
	Submitter (290 Mtpa)	There is not sufficient water to manage the dust suppression for the ore that is stored in the open. Currently the company is using fresh potable water from aquifers that are non-renewable and it comes in at 4.8 gigalitres a day while the residents are on garden water restrictions. There will be no water left for other, more sustainable industry or indeed residential requirements.	Noted. The Department is aware that much of the water used at the Premises for dust suppression is recycled through water recovery system.
Health Impacts	Department of Health	The Department of Health has provided a number of letters for both applications indicating that they do not support any proposed expansions or throughput increases at the port until such time as the Environmental Protection Authority complete its inquiry of BHP's applicable Ministerial Statements and the Port Hedland Taskforce has been released. In the most recent letter the Department of Health recommended that reference to the recommendation 1 as it appears in the <i>Port Hedland dust management taskforce report to government</i> be made in this Decision Report. Noting that the final decision on recommendation 1 may be influenced by and subject to land-use planning decisions.	Noted. DWER did not make its determination of the licence amendment application until the inquiry under section 46 of the EP Act was complete. In addition the Taskforce report has been released for public review and comment. This Decision Report has been updated to better reflect the recommendations put forward in the <i>Port Hedland dust management taskforce report to government</i> .
	Submitter(s) (Both)	Concerns about the health impacts to the community of dust from industry in the West End Area of Port Hedland. Industry has not worked with the local community regarding dust levels. DWER should not make any determinations until health concerns are addressed.	Noted.
	Submitter(s) (Both)	The <i>National Environmental Protection (Ambient Air Quality) Measure</i> (NEPM) of 50 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) for PM_{10} should be applied to all areas of Port Hedland including the West End. Alternative criteria being applied from that used in rest of Australia and question why this is considered acceptable.	Noted. DWER refers to the Department of Health for the establishment of public health criteria and has considered the information and recommendation presented in the HRA. The HRA recommended the application of the interim guideline of 24-hour PM_{10} of $70\mu\text{g}/\text{m}^3$ (+10 exceedances to accommodate natural events) continue to apply at Taplin Street followed by all areas of Port Hedland. A period of 5

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			years suggested for this. How the Department has considered the HRA is outlined in sections 4.2.2 and 7.4 of this Decision Report.
	Submitter (275 Mtpa)	The Applicant should fund regular health tests of people living and working in Port Hedland so as to determine a baseline health monitoring dataset.	Noted. The type of conditions that DWER applies to licences issued under Part V of the EP Act is set out through section 62A of the EP Act. The conditions that have been applied to this licence are consistent with section 62A of the EP Act. DWER does not require human health monitoring to be undertaken by licence holders as a result of emission or discharges from the premises through licences issued under Part V of the EP Act. DWER consider that human health monitoring would be a matter for the Department of Health.
	Submitter (290 Mtpa)	A summary of monitoring results over a 24 month period between 2012 and 2013 for Port Hedland indicates the number of times monitors in the West End of Port Hedland experience levels of dust above the interim criteria (PM ₁₀ of 70µg/m ³) and the NEPM (50µg/m ³). The interim criteria were exceeded at Richardson Street by 26 days and at Kingsmill Street by 41 days which is well above the interim criteria set for Taplin Street (10 exceedances allowed to account for natural events). In addition, for that same period the NEPM was exceeded for 120 days at Richardson Street and 144 days at Kingsmill Street. While the reference/control monitor at Yule River (stated as being a dry sandy river 40 kilometres from Port Hedland) did not exceed either the interim criteria or the NEPM criteria. It is not background/regional dust coming from the region causing exceedances in the West End but industry and more needs to be done to reduce dust emissions.	Noted. A detailed review of ambient air quality monitoring data has been undertaken as part of this assessment. PM ₁₀ concentrations closer to the port are higher than those further from the port. This detailed review is documented in this Decision Report. The HRA recommended the application of the interim guideline of 24-hour PM ₁₀ of 70µg/m ³ (+10 exceedances to accommodate natural events) continue to apply at Taplin Street followed by all areas of Port Hedland. A period of 5 years suggested for this. How the Department has considered the HRA is outlined in sections 4.2.2 and 7.4 of this Decision Report.
	Submitter (290 Mtpa)	The Department of Health's <i>Port Hedland Air Quality Health Risk Assessment for Particulate Matter, 2016</i> (HRA) raises serious concerns around the health implications of dust in the West End of Port Hedland. Page 36 of the HRA recommends moving residents out of the area and restricting any future growth in the West End.	Noted. DWER has considered the information and recommendation in the HRA as part of this assessment. Page 36 of the HRA states:

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		The impacts that this has and will have on the West End of Port Hedland and also given the HRA findings the risk to workers at BHP are concerning.	<p><i>"While the risks are not urgent, ongoing expansion of the port and associated Nelson Point and Finucane Island operations is expected any additional emission sources in the future will require careful management"</i>.</p> <p>There are a number of recommendations presented in the HRA under the Guideline and Exposure Reduction section. The recommendations relevant to Part V licence include:</p> <ul style="list-style-type: none"> • air quality monitoring; • interim and target guidelines for air quality; and • the development of long-term strategies to reduce dust exposure.
	Submitter (290 Mtpa)	The TOXIKOS report (report supporting the HRA) is flawed because it fails to take into account those who were transferred to Perth because the Port Hedland Hospital was not set up to cater for the needs of the seriously ill. The health impact of the pollution is significantly higher in Port Hedland than elsewhere in Australia and there is no evidence that this proposal will improve the situation.	<p>Noted.</p> <p>DWER considers the Department of Health (DOH) to be the primary agency for public health matters in Western Australia. DWER refers to DOH advice and recommendations when determining the risk to public health.</p>
	Submitter (290 Mtpa)	There is no evidence, scientific or otherwise, to substantiate the claim that urban air, with its higher content of exhaust fumes, is more dangerous to Public Health and Safety than rural air. Therefore the NEPM Guidelines should be complied with.	<p>Noted.</p> <p>It is understood that this view is supported in the Department of Health's HRA. Refer above regarding application of NEPM versus the Port Hedland interim guideline.</p>
	Submitter (290 Mtpa)	A recent 2016 report into dust substances of interest included, particulate matter, PM ₁₀ & PM _{2.5} ; chromium, chromium III & VI; copper, manganese, iron oxide, silica and asbestos. These substances warrant dust management controls using 21st Century technology and infrastructure to make historic port of Port Hedland a world class port. [Report assumed to be the HRA]	<p>Noted.</p> <p>It is understood that these substances were considered as part of the HRA but determined to represent low or negligible risk to public health. The primary substance of concern for Port Hedland was determined to be PM₁₀.</p>
	Submitter (275 Mtpa)	The air quality in the Town of Port Hedland has been compromised by industry and development for many years, resulting in restriction of development by other industries, and strangling of development in the Town of Port Hedland resulting in a potential ghost town in future years. In 2007 the President of the United Nations declared "clean air" an international right. This was adopted internationally and nationally	<p>Noted.</p> <p>As with interim criteria, the National Environmental Protection Measure (NEPM) guideline criteria referred to in the submission is to be applied over a 24-hour averaging period.</p>

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		<p>with an accepted rate of air pollution of PM₁₀ particles at 50 parts per cubic metre. DWER has adopted the Lidar technology that has shown peaks in Port Hedland of over '1000 pmt.m³' (sic) being 20 times the accepted rate. (March 2017 DER SITE)</p> <p>Whilst industry uses the argument that the Lidar technology is not an acceptable measure, it certainly shows a trend of excessive pollution from BHPB's loading and stockpiling operations located in the centre of town. Competing companies located away from town in the industrial areas, with modern plant and equipment do not have evidence of such high level of air pollution and exceedances. BHPB has used the benefit of other companies' clean operations to offset BHPB pollution though the argument of a "shared air shed". This is no longer acceptable as it is restricting other trades, restricts development and frightens workers and residents as to their safety working with the export of minerals from the Port of Port Hedland.</p>	<p>DWER has undertaken the risk assessment in accordance with <i>Guidance Statement: Risk Assessment</i> having regard for the receptors in the West End of Port Hedland. However, the public health criteria applied, has been based on the currently endorsed <i>Port Hedland Air Quality and Noise Management Plan, 2010</i>, and the information and recommendations presented in the Department of Health, <i>Port Hedland Air Quality Health Risk Assessment for Particulate Matter, 2016</i>.</p> <p>Although the peaks described may not necessarily result in exceedances of health criteria over a 24-hour average, DWER accepts that peaks can present impacts to amenity. Consideration of amenity criteria is documented through section 4.7 of this Decision Report and DWER's risk assessment provided in section 7.4.</p> <p>While the LiDAR will be useful in understanding dust sources and movement it cannot be used accurately to derive particulate concentrations at that point in time for the image/scan. However the department will be considering LiDAR results together with ambient air quality monitoring results to better represent dust concentrations together with dust sources and movement. The LiDAR results will be used to inform future decision making.</p>
Amenity Impacts (including economic)	Submitter(s) (275 Mtpa)	As a result of dust levels cleaning costs are very high. Submitters provided a breakdown of figures in cleaning costs. One business states that they alone have an annual dust cleaning bill in the order of \$300,000. This figure does not take into account lost revenue resulting from potential customers not wanting to be in the dust zone. If this were multiplied by all the business and residents affected by the dust, then the annual cleaning cost to the community is in the order of millions each and every year.	<p>Noted.</p> <p>DWER has considered amenity impacts as part of its risk assessment for the Application to increase throughputs at the Premises to 290 Mtpa. Amenity together with public health risk has resulted in a wide range of additional regulatory controls being applied to the licence to ensure that the residual risk remains at an acceptable level.</p>
	Submitter (Both)	The damages and losses already suffered by businesses from dust levels will increase as a result of the proposed upgrade in throughputs at the port.	<p>Noted.</p> <p>Refer above.</p>
	Submitter (290 Mtpa)	There has been a focus on the protection of health while impacts on amenity caused by excessive dust deposition within the West End	Noted.

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		have largely been ignored. There does not appear to be any significant effort at controlling dust levels in the West End or assessing or reducing amenity impacts in the West End. It is unacceptable that BHP has not addressed the issue of amenity in the West End when the levels are already demonstrably unacceptable and there is a high probability that the increase from 270 million tonnes per annum of ore shipped to 290 million tonnes per annum will increase them. Amenity for visitors and guests has been radically reduced.	Refer above.
	Submitter (275 Mtpa)	As a result of high levels of iron oxide in dust (caused by industry) corrosion of infrastructure and equipment occurs at much greater rates for properties in the West End of Port Hedland.	Noted. Refer above.
	Submitter (290 Mtpa)	The historical context of the town should be better considered as the West End of Port Hedland is a historical town, established 120 years ago. The stockpiling of iron ore within close proximity to the town has an impact on tourism and day to day amenity.	Noted. Refer above.
Ambient Monitoring and Dust Modelling	Submitter (275 Mtpa)	Industry should not undertake dust monitoring in the community and an independent party should be responsible, for example the Town of Port Hedland. This represents a significant conflict of interest.	Noted. Ambient air quality monitoring is currently undertaken by the Port Hedland Industries Council (PHIC) with real time data displayed on their website and a report providing the results published annually. This requirement was following recommendations set out in the <i>Port Hedland Air Quality and Noise Management Plan, 2010</i> . A recommendation in the <i>Port Hedland Dust Management Taskforce 2016 - Report to Government</i> sets out that DWER will undertake oversight of the ambient air quality monitoring network. Should the recommendations in the Taskforce be endorsed by Government, the Department will implement the required actions and works.
	Submitter (Both)	The Port Hedland Industries Council (PHIC) <i>Annual Report 2015/2016 Port Hedland Ambient Air Quality Monitoring Program</i> demonstrates PHIC member's collective achievements in reducing dust despite a significant increase in Port throughput. The annual report states "PM ₁₀ trend analysis suggests that, compared to the last financial year	Noted.

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		(2014/15), Taplin recorded the same number of 24-hour average concentrations of PM ₁₀ above the interim guideline (as shown in the table below). However, the number of days elevated PM ₁₀ concentrations can be attributed to Port Hedland industry operations decreased from 7 days in 2014/15 to 5 days in 2015/16 (this report)."	
	Submitter (290 Mtpa)	The AERMOD dispersion model used to estimate air quality concentrations and submitted as part of the Application is flawed. This is because it is the wrong model to use to make the predictions, and its results are likely to be just as the earlier AUSPLUME model. The EPA Victoria do not support the use of this type of model for fugitive source (or non-point source).	Noted. The dispersion model submitted as part of this application was reviewed by the Department's air quality specialist. It was considered sufficient and consistent with the Port Hedland Industries Council Cumulative Assessment model.
Land Use Planning	Department of Planning	Department of Planning stated no objections to either application provided BHP Billiton achieves the requirements of the environmental management actions under Ministerial Statement 740 (issued pursuant to Part IV of the <i>Environmental Protection Act 1986</i>).	Noted. EPA's inquiry under section 46 of the EP Act for Ministerial Statements 433 and 740 has resulted in dust emissions being regulated solely through a licence issued under Part V of the EP Act. As such, the licence is unconstrained by Part IV Ministerial Statement requirements.
	Submitters (Both)	Concerns with the levels of dust and the impact to land-use planning through restriction proposed and currently applied by planning authorities. This is reported to include restrictions to repairing existing dwellings and further developing 'prime coastal land'. Current planning restrictions include uses such as 'Aged or Dependent Persons Dwellings', 'Single House', 'Child Care Service', and 'Nursing Home' can no longer be approved, as they are considered to be sensitive to potential dust impacts.	Noted. <i>The Port Hedland Dust Management Taskforce 2016 - Report to Government</i> included a number of recommendations to restrict further population growth in the West End and for ports to continue to reduce dust emissions. Should the recommendations be endorsed by Government, responsible Departments will implement applicable recommendations. Any changes or restriction to land use planning are outside of DWER's regulatory remit under Part V of the EP Act.
	Submitters (Both)	Findings and recommendations of the HRA that no long term accommodation in the west end of Port Hedland occurs due to potential health risk represents a huge impact on the residents who own property or those who live in the area. It is not fair that restrictions are placed on them and not industry (who should be paying for the cost of pollution).	Noted. Refer above.

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	Submitter (290 Mtpa)	Land values in dust-affected areas of the West-End have plummeted well below that of other falls in the Pilbara. This is due to the combination of the issues above, being health fears, the buffer zone and related regulatory uncertainty, along with the destruction of amenity. Mining companies have accelerated this through purchasing properties in the West End and demolishing the buildings, leading to more background dust and a virtual ghost town. In 2008, all expansion for iron ore and bulk minerals were to be in the industrial zoned areas of Boodarie and Utah, not the town centre of Port Hedland (Nelson Point). Yet in 2017, BHP applied for an expansion including uncovered stock piles in the town centre area (Nelson Point), which will continue to pollute the town.	Noted. Refer above.
	Submitter (290 Mtpa)	Amenity is such an important consideration that the <i>Planning and Development Act 2005</i> ('the Act') requires the Western Australian Planning Commission to have due regard to amenity when preparing a State Planning Policy (ref. Cl 27 (e) – "amenity, design and environment"). Importantly in this case, the Act places the same emphasis on amenity for 'Public Works'. 'Public Works' are only exempt from the requirement to obtain development approval under Section 6 of the Act, where due regard is had for: <i>a) the purpose and intent of any planning scheme that has effect in the locality where, and at the time when, the right is exercised; and</i> <i>b) the orderly and proper planning, and the preservation of the amenity, of that locality at that time.</i> As the DWER is required to consider amenity impacts in their consideration of licence amendments it is imperative for the DWER to place a high regard on the amenity impacts of the expansion on Port Hedland in its consideration of the request.	Noted. DWER undertakes its regulatory functions under Part V of the EP Act for prescribed premises (applicable for this Application). The Department has considered risk to amenity to the West End of Port Hedland which is documented in this Decision Report and consistent with DWER's Regulatory Framework. Any changes or restriction to land use planning are outside of DWER's regulatory remit under Part V of the EP Act.
	Submitter(s) (290 Mtpa)	The objectives of the Town of Port Hedland Local Planning Scheme No. 5 (the Scheme) prepared and gazetted by the Minister for Planning pursuant to the Act is to: <i>"..encourage an appropriate balance between economic and social development, conservation of the natural environment, and improvements in lifestyle and amenity."</i> The preservation of amenity of the locality is also a key 'matter for Consideration' in the Scheme for the determination of any development in the Town. Regard must be had to these Local Government	Noted. Refer above.

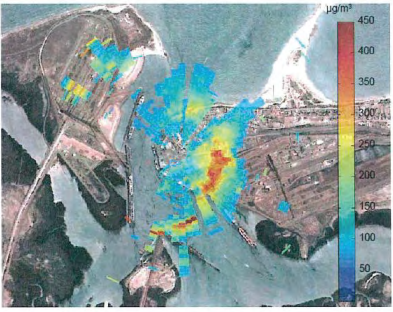
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		objectives as they are a key consideration in the orderly and proper planning for a locality. The gazetted Town of Port Hedland Town Planning Scheme No.5 zones the West End Precinct Town Centre, which includes the ability for sensitive land uses, including multiple dwellings. DWER therefore must have regard for the amenity of the Town in determining the request.	
	Submitter (290 Mtpa)	Under the <i>Port Authorities Act 1999</i> , port associated works are exempt from the need to obtain Planning Approval under the Planning and Development Act, as they are deemed to be Public Works and as such it is incumbent on all regulatory agencies to be mindful that this exemption. The existing impacts of dust over Port Hedland, and any increase in dust resulting from port expansions are, in no doubt, contrary to both the desired amenity of the West End of Port Hedland and the lone and fundamental objectives of the Planning and Development Act.	Noted. Refer above.
	Submitter (290 Mtpa)	Development controls in the Scheme limit openings (windows, doors, etc.) to certain elevations only, and requires certain seals, filtration devices and/or positively pressurised buildings to limit the amount of dust entering the building. These higher specifications result in additional up-front construction costs as well as ongoing running costs for buildings, and also have the effect of placing limitations on the design of buildings (which may act to inhibit the value of the final building project).	Noted. Refer above.
Impacts to marine fauna	Submitter (290 Mtpa)	Turtles may be impacted by light emissions and consideration must be given not only to the berth and wharf/port facilities but also to all ships at anchorage and the significant 'light bank' that is created from these vessels. Further studies and investigation should be undertaken into this offshore light sources associated with the port and its impact on turtle hatchlings.	Noted. The Department has considered risks from emissions to turtles as documented in this Decision Report. Emissions are only considered from the prescribed premises (to the extent reflected in the premises boundary) and do not extend to offshore vessels and activities. <i>The Environment Protection and Biodiversity Conservation Act 1999</i> provides for the protection of listed threatened and migratory species, including marine turtles, from anthropogenic activities. The EPBC Act is administered by the Commonwealth Department of Environment and Energy.

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	Submitter (290 Mtpa)	Iron ore has been deposited into the marine environment, due to spills from BHP's ship loading infrastructure and mounding of iron ore was now visible above the surface of the water. Impacts on the marine ecosystem, and high mercury levels have been found in locally caught fish.	Noted. DWER has considered spills of iron ore material in its risk assessment as documented in this Decision Report. Iron ore is unlikely to be a significant source of mercury in the Port Hedland Inner Harbour. The Pilbara Ports Authority's 2015 <i>Report for the Port of Port Hedland Long-term Dredge Material Management Plan</i> did not identify any anthropogenic sources of mercury.
Other	Department of State Development	The Department of State Development supports both applications as they represent important contributions to the State economy and employment in the region.	Noted.
	Town of Port Hedland	The Town of Port Hedland submitted a number of letters requesting addition time to comment on the application. In the final letter they raised concerns that BHP had not adequately demonstrated to the Town or community how they were going to mitigate increased dust emissions from the application.	Noted. Submissions from stakeholders past the original timeframes were accepted by the Department. As part of DWER's assessment of the licence amendment application consideration has been given to current and potential future emissions as a result of the increase in throughput and the proposed controls to be implemented to mitigate dust emissions. These factors and considerations have been clearly documented within this Decision Report.
	Submitters(s) (Both)	Support the applications and state that growth and development of the port is an important economic driver for the community and state.	Noted.
	Submitter(s) (Both)	Accept that industry must continually strive to improve its operation impacts on the town, whilst continuing to operate and grow in a sustainable and reasonable regulatory environment. On the premise that individual port user environmental licence conditions continue to be met, supports the principle of allowing all Port users to continue to grow their businesses.	Noted.
	Submitter (290 Mtpa)	BHP has announced new mines to support the next 100 years of exports and more port throughput cannot be justified until the damage from the dust is fixed and the processes of Port users are substantially re-engineered to mitigate their pollution to enable safe expansion. It is necessary for a long term view of Port Operations and for all industries and the effect on the whole of the town and port development to	Noted. The Port Hedland Taskforce was established to provide and implement strategies to deal with ongoing dust and noise issues in Port Hedland. The Department will apply any endorsed recommendations

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		ensure the economy grows and is not restricted from future trade.	from the Taskforce in the administration of its regulatory functions.
	Submitter (290 Mtpa)	BHP should invest in regeneration of the West End of Port Hedland and financially compensate any impacted parties.	Noted. The type of conditions that DWER applies to licences issued under Part V of the EP Act is set out through section 62A of the EP Act. The conditions that have been applied to this licence are consistent with section 62A of the EP Act. DWER does not enter into or require payment to third parties from licence holders as a result of emissions or discharges from the premises through licences issued under Part V of the EP Act.
	Submitter (275 Mtpa)	The application form has incorrectly struck out Part 6 Public health and environmental risks to be completed and that much has changed in environmental regulations since BHP (Mt Newman Mining Co.) received their licence in 1969. Therefore any amendments to an old licence should also require parts 4.2 environmental and 4.5 planning approvals of the application form to be completed to ensure that business operations and infrastructure are brought up to 21 st Century standards.	Noted. Part 6 of the application form was completed and further information on dust management has been provided in detail through additional attachments and through previous correspondence. Section 4.2 of the application form enquires into whether or not the proposal has been referred to the EPA for assessment. DWER's EPA Services branch is aware of this application and referral is not required. With regards to section 4.5 of the application form, additional planning approval from the Town of Port Hedland is not required as the proposal does not constitute a change to current land use. DWER has issued a revised (new) licence which applies a wide range of regulatory controls based on the outcome of the risk assessment considered appropriate, site specific and necessary to maintain the risk at an acceptable level.
	Submitter (290 Mtpa)	DWER's membership of the Taskforce raises an apparent conflict of interest between the Taskforce's policy review and your responsibility to enforce standards.	It is considered that the Department's membership to the Taskforce is outside of this assessment.

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		All affected stakeholders are concerned that the Taskforce is focused on framing ways of forcing us to live with uncontrolled emissions rather than on holding the Port Authority and exporters to account for their failure to control emissions.	
	Submitter (290 Mtpa)	Concerns about the Department's reliance and role in implementing the recommendations of the <i>Port Hedland Air Quality Risk Assessment for Particulate Matter, 2016</i> (HRA). Questions what the Department's response will be to the Port Hedland Taskforce recommendations.	Noted. The Departments has been transparent in its consideration of the information and recommendation in from HRA in its decision-making for this Application as documented in this Decision Report. Government is yet to endorse the recommendations of the <i>Port Hedland Dust Management Taskforce 2016 - Report to Government</i> and as such the Department has not implemented required actions. However, should recommendations be endorsed the Department will clearly and transparently communicate and undertake required action and work.
	Submitter (290 Mtpa)	Question the validity and robustness, and use of limited air quality monitoring data to derive findings in the <i>Port Hedland Air Quality Risk Assessment for Particulate Matter, 2016</i> (HRA).	Noted. DWER considers the Department of Health (DOH) to be the primary agency for public health matters in Western Australia. DWER will refer to DOH advice and recommendations when determination risk to public health.
	Submitters (Both)	The Port Hedland Dust Taskforce and supporting management plan (<i>Port Hedland Air Quality and Noise Management Plan, 2010</i>) has been totally inadequate in dealing with dust. More needs to be done by the Taskforce.	Noted. This Management plan would be superseded by the <i>Port Hedland Dust Management Taskforce 2016 - Report to Government</i> should it be endorsed by Government. The Report recommendations have been established to adequately manage the risks over the long term.
Submitted Reports			
	<i>Aurora Environmental (2017) Suspended Particulate Monitoring – Esplanade Hotel</i>	The report states that there has been a long standing issue in Port Hedland with dust emissions from the iron operations in and around the port impacting on the township, particularly the West End district. Despite ongoing improvements in dust control, the situation has not	Noted. DWER has considered this report.

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		<p>improved because of the massive increase in the throughput of the Port.</p> <p>Owners of the Esplanade Hotel have incurred hundreds of thousands of dollars of costs each year for additional cleaning and maintenance work that results directly from the excessive dust emissions from the Port operations.</p> <p>With the move to measurement of fine particulate matter and the setting of assessment criteria for protection of health, little effort is now made to assess impacts on amenity. Amenity is impacted when visible dust deposits on surfaces and this results from larger particulate matter that remains suspended for shorter periods of time. Amenity impacts a generally assessed by measuring Dust Deposition (DD) or Total Suspended Particulates (TSP). Currently no effort is made to measure the impact of dust on amenity in Port Hedland. Additionally there are few if any statutory guidelines set for TSP or DD.</p> <p>A High Volume Air Sampler was set up at the Esplanade Hotel to monitor TSP during the period 13 January 2017 to 21 February 2017. The table below describes the relevant standards (desirable level not to be exceeded) and limits associated with amenity. The relevant TSP criteria for amenity in the West End area would be those set for residential or industrial commercial.</p> <table border="1" data-bbox="448 1125 976 1247"> <thead> <tr> <th>Land Use Type</th> <th>Standard [$\mu\text{g}/\text{m}^3 - 24 \text{ hours}$]</th> <th>Limit [$\mu\text{g}/\text{m}^3 - 24 \text{ hours}$]</th> </tr> </thead> <tbody> <tr> <td>Heavy Industrial</td> <td>150</td> <td>260</td> </tr> <tr> <td>Industrial/commercial</td> <td>90</td> <td>150</td> </tr> <tr> <td>Residential/Rural</td> <td>90</td> <td>150</td> </tr> </tbody> </table> <p>Monitoring identified that nearly one in three days (32.26%) were measured with dust levels in excess of standard levels set for benchmarked industrial areas. In addition, the suggested limit was exceeded on one day where the highest measurement was recorded at $184\mu\text{g}/\text{m}^3$.</p> <p>Sampled results are considered conservative based on:</p> <ul style="list-style-type: none"> the monitoring location being partially screened from dust sources and partially sheltered by trees; prevailing winds during the monitoring period were from the 	Land Use Type	Standard [$\mu\text{g}/\text{m}^3 - 24 \text{ hours}$]	Limit [$\mu\text{g}/\text{m}^3 - 24 \text{ hours}$]	Heavy Industrial	150	260	Industrial/commercial	90	150	Residential/Rural	90	150	<p>There are no currently endorsed criteria for the Pilbara region of Western Australia and criteria that is applied in other jurisdictions varies widely subject to community expectations. In addition the Department does not consider the application of the Kwinana Environmental Protection Policy appropriate in the context of Port Hedland. Consideration of amenity criteria is documented through section 4.7 of this Decision Report. Subsequently the Department has considered other lines of evidence in informing the risk assessment of amenity impacts as detailed in section 7.4 of this Decision Report.</p> <p>It is considered that due to the application of a wide range of regulatory controls to the licence following the outcome of the risk assessment which are considered appropriate, site specific and necessary to maintain the risk of dust to amenity to an acceptable level.</p>
Land Use Type	Standard [$\mu\text{g}/\text{m}^3 - 24 \text{ hours}$]	Limit [$\mu\text{g}/\text{m}^3 - 24 \text{ hours}$]													
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		<p>north and north-west;</p> <ul style="list-style-type: none"> • Port Hedland received quite extensive rainfall during the monitoring period; and • the tonnage of iron ore shipped through the port was slightly lower than normal. <p>The limited data set is strongly suggestive that the West End is impacted by unacceptable levels of TSP. Examination of the LiDAR dust monitoring programs clearly identifies both the source of the dust and the impact areas. The below figure, which represents a typical graphic provided in the LiDAR campaign, shows plumes of dust streaming off the various iron ore facilities and impacting on the Town of Port Hedland.</p>  <p>The following conclusions are made based on the study:</p> <ul style="list-style-type: none"> • A limited monitoring study provides strong evidence that TSP levels in the West End area of Port Hedland exceed accepted standards. • Weather conditions during the monitoring period favoured lower than typical dust levels. • Additional monitoring is required to identify the key sources of dust contributing to the measured TSP. 	

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		<p>Based on the results of this study, the following recommendations are made:</p> <ol style="list-style-type: none"> 1. The results should be discussed with regulators to draw their attention to potential for excessive TSP impacts. 2. Additional monitoring programs should be conducted to better characterise: <ol style="list-style-type: none"> a. TSP levels in the West End area; and b. key sources contributing to dust impacts. 3. The LiDAR technology being used to measure PM10 should form part of any monitoring program as this technology is better suited to identify the key dust sources. It is important that DWER calibrate the data being generated to correlate the colour coded data with accurate quantitative data. <p>In conclusion the Report recommends that regulators should work with the companies contributing to the dust impacts to develop a structured program that mitigates the dust impacts and in the short-term compensates land owners for any financial losses they are experiencing.</p>	
	<p><i>TPG + Place Match (2017) Estimates of Adverse Dust-Associated Economic and Social Consequences on the West End of Port Hedland in Western Australia</i></p>	<p>The report provides quantitative estimates of social and economic consequences in response to requests by BHP Billiton and another premises for amendments to their licenses. The report finds economic consequences of high levels of dust including: reduced tourism, reduced property values, increased maintenance and living costs, accelerated depreciation of plant and infrastructure, reduced growth from property development and increased infrastructure costs from displaced developments.</p> <p>The West End has been depopulated and has deteriorated to a shadow of its former self, with the dust from port activities being a substantial contributor to this deterioration. It is at high risk of being sacrificed due to inadequate dust control standards by port users, which do not comply with national and international standards, dust measurements which are simply irrelevant to human lifestyle in the West End, and town planning regulations which discourage certain</p>	<p>Noted.</p> <p>DWER has considered this report.</p> <p>Amenity considerations including economic and social impacts are detailed above and documented in this Decision Report.</p>

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		<p>types of development.</p> <p><u><i>Amenity impacts and general lack of activity in the West End</i></u> The presence of dust is resulting in substantial negative amenity impacts, which are contributing to the depopulation and adversely impacting the social fabric of the West End of Port Hedland. Further, decreased activity is resulting in decreased expenditure which is having flow-on effects down the supply chain.</p> <p><u><i>Impact on tourism and associated businesses</i></u> The presence of dust in the West End and its impact on amenity discourages visitors, tourists and locals alike from spending time in the area, which is having an adverse impact on businesses. Increasing the number of nights that visitors stay in Port Hedland and the West End would have substantial direct and flow-on economic benefits.</p> <p><u><i>Decreased development yield</i></u> Over the last few years, development projects in the West End have been substantially scaled down. While the reduced demand for housing in Port Hedland since 2012 will have contributed to this scaling down, the viability of this kind of development is further adversely affected by the high levels of dust including reduced amenity and higher maintenance costs caused by the level of dust and other dust related concerns.</p> <p><u><i>Increased costs associated with developing outside of West End</i></u> A lack of development in and around the Spoilbank Marina and the West End will eventually place additional development pressure on other growth areas. These new development areas do not have the existing infrastructure already available in the West End such as roads, telecommunication, power and water supply, and often require substantial additional fill, which drives up the cost of development.</p> <p><u><i>Loss of property value</i></u> Advice received from Landgate (via email on the 2 February 2017) indicates a price reduction of 80% in vacant land value between 2012 and 2016 in areas such as Pretty Pool, and 85% in the West End.</p>	

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		<p>Comments from the Port Hedland Esplanade Hotel suggests that the dust problem was much smaller in 2012 than in 2016 so part of the fall in property price in the West End can be attributed to the fall in iron ore price and part can be attributed to the increasing dust problem and associated social effects.</p> <p><u>Cleaning and maintenance costs</u> Significant cleaning and maintenance costs as well as accelerated capital expenditures are being borne by businesses and residents across the West End as a result of the shortened asset lives of plant and equipment associated with the adverse aesthetic and damaging effects of the high dust levels. Several cost areas for residents caused by the high dust levels include:</p> <ul style="list-style-type: none"> • additional time spent cleaning structures, vehicles and clothes • accelerated vehicle servicing (fuel system) • accelerated air conditioner, hot water and swimming pool filter replacement schedules • increased energy use due to using air-conditioning instead of open windows for ventilation. <p><u>Dust associated town planning restrictions</u> Amendment 22 to the Town of Port Hedland Local Planning Scheme No. 5 (adopted in 2012) inserted new planning provisions into the Scheme which required higher building specifications for development in the West End as an attempt to manage dust and limit certain kinds of development in the West End Residential zone. The Scheme was amended due to dust associated health concerns, and also places physical development and design controls that result in additional up-front construction costs, ongoing running costs and may inhibit the value of the final building project.</p> <p><u>Summary of estimated dust associated financial costs</u></p> <table border="1" data-bbox="440 1325 948 1421"> <thead> <tr> <th data-bbox="440 1325 570 1344">Impact</th> <th data-bbox="570 1325 948 1344">Cost</th> </tr> </thead> <tbody> <tr> <td data-bbox="440 1344 570 1421">1. Reduced Tourism Spend</td> <td data-bbox="570 1344 948 1421">\$23 million reduction to direct annual gross regional product across Port Hedland; up to \$35 million per annum when flow-on effects are accounted for Total employment impacts in</td> </tr> </tbody> </table>	Impact	Cost	1. Reduced Tourism Spend	\$23 million reduction to direct annual gross regional product across Port Hedland; up to \$35 million per annum when flow-on effects are accounted for Total employment impacts in	
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			the range 280-380 FTE jobs	
		2. Decreased development Yield in West End	\$30 to \$50 million reduced one-off development profit. The proportion attribute to the dust level is not estimated.	
		3. Increased Costs Associated with Development outside West End	Up to \$1625 million one-off additional construction cost. A market assessment is required to establish how much.	
		4. Loss of property value	\$24 million lost value (based on 2012 values) attributable to high dust level.	
		5. Cleaning/infrastructure replacement costs	Businesses – around \$1 million per year Residential – around \$1.3 million per year Town of Port Hedland – To be quantified	
		6. Town Planning Restrictions	Negative effect on growth and likely capitalised into reduced property prices already.	
		7. Lack of Activity in the West End	More than \$30 million lost since 2014 in potential property yields. This is coupled with reduced annual gross regional product and employment (direct and flow-on effects) over and above tourism impacts.	

Attachment 1: Revised Licence L4513/1969/18
