Decision Report

Application for Licence Amendment

Division 3, Part V *Environmental Protection Act 1986*

Licence Number:	L8194/2007/3
Applicant:	Fortescue Metals Group Ltd
ACN:	002 594 872
File Number:	DER2013/001082
Premises:	Anderson Point Materials Handling Facility Part of Lot 1497 on Plan 404497, Part of Lot 370 on Plan 35619, Part of Lot 556 on Plan 60836, Part of Lot 321 on Plan 74344 and Lot 322 on Plan 74344 within coordinates as defined in Appendix 1 WEDGEFIELD WA 6721
Date of report:	Wednesday, 2 September 2020
Status of Report	Final

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Definitions of terms and acronyms

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

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
AER	Annual Environmental Report
Amended Licence	the amended licence issued under Part V, Division 3 of the EP Act following the finalisation of this Decision Report.
Annual period	the inclusive period from 1 January until 31 December in that year
Anderson Point	Anderson Point Materials Handling Facility
Applicant	means Fortescue Metals Group Ltd (FMG)
Application	means the application submitted 2 January 2020
AP5	Anderson Point Berth 5
AS 1940-2004	Australian Standard 1940-2004: The storage and handling of flammable and combustible liquids
AS1692-2006	Australian Standard 1692-2006 (R2016): Steel tanks for flammable and combustible liquids
Assigned Level	Noise level not to be exceeded at receiving premises, defined by Part 2, Division 1 of the Noise Regulations
BOM	Bureau of Meteorology
BPPH	Benthic Primary Producer Habitat
Category	As used in Schedule 1 of the EP Regulations
CBAF	Cloudbreak Mokari Fines
CBMO	Christmas Creek Manganese Product
CBPF	Cloudbreak Fines
CBSF	Cloudbreak Special Fines
CBTF	Cloudbreak Super Special Fines
CBTL	Cloudbreak Lump
CBXF	Cloudbreak Blended Fines
CCMO	Christmas Creak Manganese Product
CCSF	Christmas Creek Special Fines

CCTF	Christmas Creek Super Special Fines
CCXF	Christmas Creek Blended Fines
CHF	Refers to the Iron Bridge Concentrate Handling Facility authorised for construction under W6394/2020/1
Decision Report	This document
DER	Department of Environment Regulation
DJTSI	Department of Jobs, Tourism, Science and Innovation
DMMA	Dredge Material Management Areas
DoH	Department of Health
DWER	Department of Water and Environmental Regulation
EIP	Environmental Improvement Plan
ELIF	Eliwana Fines
EP Act	The *Environmental Protection Act 1986*
EP Regulations	The *Environmental Protection Regulations 1987*
EPA	Environmental Protection Authority
FMG	Fortescue Metals Group Ltd
HRA	The Port Hedland Air Quality Health Risk Assessment for Particulate Matter published by the Department of Health dated January 2016)
ICMS	Incidents and Complaints Management System
kL	kilolitre
Licence Holder	Fortescue Metals Group Ltd (FMG)
Reviewed Licence	refers to the reviewed Licence L8194/2007/3, issued 7 December 2016
Management Plan	The Port Hedland Air Quality and Noise Management Plan published by the Department of State Development dated March 2010
µg/m^3	micrograms per cubic metre
mbgl	metres below ground level
mg/L	milligrams per litre
ML/d	megalitres per day
MS	Ministerial Statement
Mtpa	million tonnes per annum

NEPM	National Environment Protection (Ambient Air Quality) Measure
Noise Regulations	Refers to the *Environmental Protection (Noise) Regulations 1997*
OEPA	The Office of the EPA
OWS	Oily Water Separator
PDWSA	Public Drinking Water Source Area
PHIC	Port Hedland Industries Council
PM	Particulate Matter
$PM_{2.5}$	Particulate matter that is smaller than 2.5 microns (µm) in diameter
PM_{10}	Particulate matter that is smaller than 10 microns (µm) in diameter
PPA	Pilbara Ports Authority
Prescribed Premises	is defined in the EP Act to mean premises prescribed for the purposes of Part V
the Premises	Anderson Point Materials Handling Facility as defined on the cover page and Schedule 1 of the Licence.
Primary Activities	is defined in the DER *Guidance Statement: Risk Assessments* to include the primary activities which fall within the description of the category of prescribed premises in Schedule 1 to the EP Regulations.
Registration	An instrument issued under Part V, Division 3 of the EP Act in relation to Categories of Prescribed Premises listed in Part 2 of Schedule 1 of the EP Regulations.
RIWI Act	The *Rights in Water Irrigation Act 1914*
SODF	Solomon King Fines (CID)
SOFF	Solomon Firetail Fines
SOKF	Solomon King Fines (DID)
SOTF	Solomon Super Special Fines
the Taskforce	The Port Hedland Dust Management Taskforce
TDS	Total Dissolved Solids
TRH	Total Recoverable Hydrocarbons

1. Purpose and scope of assessment

This assessment has considered the Fortescue Metals Group Ltd (Licence Holder) activities and infrastructure at the Anderson Point Materials Handling Facility (the Premises), which fall within the definition of Prescribed Premises Categories 58 and 70 in Schedule 1 to the *Environmental Protection Regulations 1987* (EP Regulations).

The Premises also includes a desalination plant designed for a maximum inflow of approximately 12 megalitres per day (ML/d) of seawater and a maximum waste discharge of 8 ML/d of saline water. The salinity of the brine discharged from the desalination plant is approximately 60,000 milligrams per litre (mg/L) total dissolved solids (TDS). The desalination plant and other supporting infrastructure, not directly related to Primary Activities, have been excluded from the Decision Report (see section 3.2).

The Dredge Material Management Areas (DMMA) are also situated on the western and eastern sides of the Premises (referred to in Figure 1 as Settlement ponds). These are for the management of dredge material and were approved and conditioned under Ministerial Statements issued under Part IV of the *Environmental Protection Act 1986* (EP Act). These ponds are not considered to meet the definition of a Prescribed Premises and are not within the Premises boundary. Therefore the settlement ponds have not been considered further in this Decision Report.

The original Licence review undertaken in 2016 was initiated by the Department of Environment Regulation (DER), now, and hereon referred to as Department of Water and Environmental Regulation (DWER). The Reviewed Licence, issued 7 December 2016, formed part of a wider review of Category 58 premises within the Port Hedland port. The purpose of this review was to apply a risk-based assessment approach consistent with DWER's Regulatory Framework and to apply a coordinated regulatory approach following the release of the Department of Health (DoH) *Port Hedland Air Quality Health Risk Assessment for Particulate Matter*, January 2016 (HRA).

1.1 Amendment Notice 1

Amendment Notice 1, issued 7 January 2019, was initiated by the Licence Holder to modify a 200m portion of the Anderson Point Materials Handling Facility Prescribed Premises boundary on Australia Island. The Licence Holder has requested a change in Prescribed Premises boundary to prevent an overlap with a third party, Pilbara Marine, not directly related to Primary Activities.

1.2 Amendment application received December 2019

Through the initial review in 2016, dust emissions from the Premises were not assessed or conditioned on the grounds of avoiding unnecessary duplication with EP Act Part IV Ministerial Statement (MS) 690 and 771. At the time of issuing the Licence, MS 690 and 771 were the primary regulatory instrument to regulate dust from the Premises. The Licence Holder has since submitted a request to the Minister for Environment to initiate the removal of conditions listed under MS 690 and 771 under a section 46 (s.46) of the EP Act. Conditions for removal relate to dust management and to allow for the regulation of dust under the Part V Licence (L8194/2007/3).

On 18 March 2020, the Environmental Protection Authority (EPA) published Report 1669 which addressed a proposed amendment to condition 17 of Ministerial Statement 690. The EPA has recommended that it would be appropriate to include a condition that enables dust management requirements in condition 17 to cease when the Part V Licence L8194/2007/3, is amended to include dust management measures consistent with surrounding port operations.

This Decision Report assesses the risk of dust from existing Premises activities and proposed

throughput increases described below.

1.2.1 Throughput increase

On 2 January 2020, the Licence Holder submitted an application (the Application) to DWER to authorise an increase in Category 58 (bulk material loading) production to 210 million tonnes per annum (Mtpa) from 175Mtpa (the Application). Proposed production increases are anticipated to be made possible through:

- the incorporation of the export of up to 22 Mtpa of magnetite concentrate, sourced from the North Star Mine, received and concentrated at the proposed Iron Bridge Concentrate Handling Facility (CHF) from where it will be transferred to the Premises for storage and then out-loaded via wharf shiploaders;
- incremental increases in the throughput capacity of the existing Premises by up to 13Mtpa through more efficient utilisation of existing infrastructure;
- the implementation of Stage 2B of the Anderson Point AP5 Materials Handling Facility Expansion, authorised under Works Approval W5643/2014/1 as approved on 18 September 2014 (see section 5.1.1), which includes the construction of:
    - two in-load conveyors CV909 and CV918
    - one additional live row and one additional bulk-out row
    - a fourth stacker SK705
    - transfer station TS909,

  and;
- the construction of the following additional infrastructure:
    - one conveyor (CV302)
    - one conveyor CV902 linking TUL2 and TUL3 with Stacker One (SK701)
    - two surge bins BN948 and BN921 (located on CV921 and CV948) and two conveyors (CV921A, CV948A) from the surge bins to the AP1-3 wharf. Note, these two conveyors are only required if the surge bins are installed.
    - new shuttle (SH906A) within transfer station (TS906)
    - new sample stations (SS301, SS917, SS914, SS913).

Up to 22Mtpa of the proposed throughput increase will be attained following the construction of a new in-loading circuit directly adjacent to the existing Premises boundary. The adjacent Iron Bridge CHF is designed to accept iron ore via pipeline slurry that will then be dewatered and conveyed to the Premises in-loading circuit. From there ore will be stockpiled prior to out-loading using Premises shiploaders. Approval for the Iron Bridge CHF is being assessed as part of a separate application for works approval (W6394/2020/1), and is beyond the scope of this Decision Report.

1.2.2 Consolidation of approvals

Amendment Notice 1 to the Licence was issued on 7 January 2019, to amend the Premises boundary only. The current Application has requested further changes to the Premises boundary making Amendment Notice 1 redundant.

The Application also seeks to incorporate existing works approved through Works Approval W5643/2014/1. DWER has not undertaken any additional risk assessment of the already approved infrastructure for construction at the Premises. Amalgamation of construction approval through W5643/2014/1 to the Amended Licence is administrative only.

The Amended Licence (L8194/2007/3) is set out in Attachment 1.

Key determination: The Delegated Officer notes the following:

1) The removal of dust management conditions within MS 690 and 771 (refer to section 4.1.3) avoids regulatory duplication by enabling the assessment and regulation of dust emissions under the Amended Licence. This is consistent with the regulation of dust emissions from other premises licensed under Part V for Category 58 activities in Port Hedland.
2) The construction and operation of proposed additional infrastructure not previously assessed, constitutes a modification of processes carried out at the Premises that may alter the nature or volume of waste (dust) and/or noise emitted from the Premises. Therefore in accordance with s.53(1) of the EP Act, works must be constructed in accordance with a licence or works approval.
3) Proposed additional infrastructure will be assessed in this Decision Report for authorisation through the Amended Licence. Works already authorised as part of Stage 2B under Works Approval W5643/2014/1 will be incorporated into the Amended Licence and are not reassessed in this Decision Report.
4) The existing Works Approval W5643/2003/1 will act concurrently to the Amended Licence until such a time as the Works Approval is revoked or expires, whichever comes first. As conditions have been directly transferred from the Works Approval and have not changed, Licence conditions merely duplicate, and do not contradict, conditions of the approved Works Approval.
5) Construction of the Iron Bridge CHF is yet to be authorised and commenced requiring the assessment of risk to be based on a staged increase in throughputs. The applicant for a separate Works Approval (W6394/2020/1) for the construction and operation of the Iron Bridge CHF, is not the same as the Licence Holder.
6) Amendment Notice 1 to Licence L8194/2007/3 will become redundant at the grant of the Amended Licence, as administrative changes to the Premises boundary have been transferred across to the Amended Licence presented in Attachment 1.

2. Background

The Licence Holder holds the Licence L8194/2007/3 under the EP Act for the Premises. Iron ore handled and exported from the Premises is received from Solomon, Christmas Creek and Cloudbreak mines (hematite), with future input from Eliwana (hematite) and North Star mines (magnetite), all located in the east Pilbara region of Western Australia.

Previously ore from the Nullagine Iron Ore Project (a joint venture between the Licence Holder and BC Iron Nullagine Pty Ltd) was also transported to shared facilities at the Premises prior to shipping. The Nullagine Iron Ore Project was suspended in January 2016 with the final shipment occurring in early March 2016.

The Licence relates only to the activities undertaken at the port, specifically those Prescribed Premises categories listed in Table 2. Category 70 was added to the Licence to allow the Licence Holder to undertake campaign screening of ballast from the stacker rail lines in the stockyard.

Table 2: Prescribed Premises Categories

Classification of Premises	Description	Approved Premises Production or Design Capacity
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	175,000,000 tonnes per Annual Period
Category 70	Screening, etc. of material: premises on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated	45,000 tonnes per Annual Period

3. Overview of the Premises

3.1 Infrastructure

The Premises infrastructure, as it relates to Category 12 and 58 activities, including activities outside the scope of this Review but within the Premises, is detailed in Table 3 with reference to Figure 2 and those in the Amended Licence.

Table 3: Premises infrastructure

Category 70: Screening, etc. of material		
A mobile screening plant is utilised on-site to screen ballast underlying stackers in the Premises stockyard, as a result of spilt ore making the stacker rail foundation unstable. Additional screening may occur in support of future works on a campaign basis. The assessed total throughput of the screening plant is 45,000 tonnes and the rescreening program is anticipated to operate for a 10 week period (FMG UID-63691, 12 October 2016).		
No.	Infrastructure	Plan reference
1.	Mobile screening plant	N/A
Category 58: Bulk material loading or unloading		
The Premises currently receives iron ore via train from three Pilbara mine sites (Cloudbreak, Christmas Creek and Solomon). Three train unloaders (rotary car dumpers) deliver ore to the stockyard via conveyors where it is placed into stockpiles by three stackers (one additional proposed). The stockyard has a maximum capacity of 9.7 million tonnes with a total of eight rows (six live rows and two bulk-out rows). At the Premises, ore types are layered on stockpiles through horizontal stacking methods. Ore is then removed from the stockpiles by a reclaimer digging through multiple layers and thereby blending materials and transferred to the wharves via conveyor. Three ship loaders operate across the five berths (AP 1 – 5) to load the ore product onto ships for export. The Licence Holder has applied to receive and out-load additional (magnetite) ore from the Iron Bridge North Star mine, which will be transported to Port Hedland via pipeline in a slurry. It is then proposed that the slurried ore will be dewatered at a processing facility adjacent, but separate to the Premises, before being conveyed and transferred to in-loading conveyors at the Premises. Magnetite from the Iron Bridge CHF will be stockpiled in row G1-G6 and blended into existing hematite rows.		
No.	**Infrastructure**	**Figure reference on the Amended Licence (bolded references represent proposed infrastructure)**

1.	3 x Train unloaders	Figure 2: TUL601, TUL602, TUL603
2.	4 x Stackers	Figure 3: SK701/CV923, SK702/CV936, SK704/CV937, **SK705/CV939**
3.	3 x Reclaimers	Figure 3: RC701/CV920, RC702/CV928, RC703/CV938
4.	Stockpiles	Figure 3: B1-B6, C1-C6, D1-D6, E1-E6, F1-F6, **G1-G6**
5.	In-load Conveyors	Figures 2 and 3: **CV302,** CV901, **CV902**, CV903, CV905, CV906, **CV908**, **CV909,** CV911, CV912, CV916, **CV918,** CV968
6.	Out-load Conveyors	Figures 3 and 4: CV913, CV914, CV917, CV944, CV915, CV921, **CV921A**, CV922, CV927, CV932, CV945, CV948, **CV948A,** CV950, CV953
7.	Transfer Stations	Figures 2, 3, 4 and 5: **TS301**, TS901, TS902, TS903, TS904, TS905, TS906, TS908, **TS909**, TS914, TS917, TS944, TS945, TS954, TS968
8.	Shuttle conveyors	Figure 2 and 5: **SH906A,** SH913, SH914, SH917
9.	Sample stations	Figure 4: **SS301**, SS903, **SS913, SS914, SS917**, SS944, SS945
10.	Surge and blending bins	Figure 5: **BN921, BN948**, BN950
11.	3 x Ship loaders	Figure 5: SL701/CV925, SL702/CV926, SL703/CV935
12.	5 x Berths	Figure 5: AP1, AP2, AP3, AP4, AP5
13.	Stormwater discharge points and associated sedimentation ponds.	Figure 9: W1, W2, W3, W4 and W5
14.	Oily water separators (OWS)	Figure 9: OWS1 and OWS2
15.	Process water tanks for OWS 1 and 2	Figure 9: OWS1 and OWS2
16.	OWS 3 for Train Unloader 3 Silt Trap discharge	Figure 9: L2
Other infrastructure		
No.	**Infrastructure**	**Plan reference**
17.	Desalination plant	Figure 1: Desalination plant
18.	Desalination plant emission point	N/A
19.	Fuel farm (1 x 52,400 L tank)	N/A

3.2 Excluded infrastructure

3.2.1 Iron Bridge Concentrate Handling Facility

Approximately 22Mtpa of throughput increases will be derived from magnetite ore processed at the Iron Bridge CHF. Although the CHF will be physically connected to the Premises, the construction and operation of this facility will be conducted by Iron Bridge Operations Pty Ltd, a joint venture company of which FMG is a member. The CHF is proposed for construction through a separate works approval application from Iron Bridge Operations Pty Ltd and within an area of land occupied by the Licence Holder. A future amendment will be sought to the prescribed premises boundary to ensure that there is no overlap with the Iron Bridge CHF premise.

Key Finding: In accordance with s.53(1)(a) of the EP Act, an occupier of any prescribed premises who, if to do so may cause an emission, or alter the nature or volume of the waste, noise, odour or electromagnetic radiation emitted, from the prescribed premises commits an offence unless he does so in accordance with s.53(1)(f). The Delegated Officer notes the overlap in boundaries between the CHF and the Premises creates ambiguity as to who the legal occupier would be for the purposes of regulation in accordance with the EP Act, between the Licence Holder and Iron Bridge Operations Pty Ltd.

The Delegated Officer has determined that the Iron Bridge CHF will be constructed and operated through separate Part V approvals and therefore all emissions and discharges associated with the CHF will not be further considered through this Decision Report until the point where product is received on infrastructure specified in the Amended Licence (TS301).

3.2.2 Desalination plant

The Licence Holder operates a desalination plant which was constructed in 2011 under works approval W4979/2011/1. The plant provides supplementary water supply for operations at the Premises. The plant has a maximum throughput of 12 ML/d which equates to approximately 4.4 gigalitres (GL) per year, and maximum waste discharge of 8 ML/d which equates to 2.92 GL per year into the Port Hedland Inner Harbour.

The total water supply to the Premises in 2018 was 1.4 GL, consisting of 0.9 GL of groundwater and 0.5 GL of desalinated water. Water demand for the Premises following expansion is expected to increase to approximately 2.5 GL per year. The increase water usage will be supplied by a combination of groundwater abstraction and production from the desalination plant.

The discharge from the desalination plant is authorised for discharge to the DMMAs under Ministerial Statement 859 granted under Part IV of the EP Act. However, it is understood from the Licence Holder that this is not a current or future planned activity. The DMMA's contain dredge material from previous dredge campaigns.

The Licence Holder only discharges to the marine environment via the 'Desal Outflow' located alongside berth AP4.

Key Finding: The Delegated Officer has not considered the desalination plant in this Decision Report and has determined based on the relevant facts that:

- the occupier may apply under r.5B of the EP Regulations for the prescribed premises category 85B (water desalination plant) to be registered; or
- the occupier may apply under s.59B of the EP Act or to amend the Licence (L8194/2007/3) to include the prescribed premises category 85B for defences associated with the discharge of wastewater onto land or into waters (other than marine waters).

The maximum volume of discharges to the marine environment from the plant does not exceed production criteria for regulation as a Category 54A water desalination plant, as specified in Schedule 1 of the EP Regulations.

Noting the above, and given the presence of Ministerial Statements which regulate emissions from the DMMA, additional regulatory controls issued under Part V of the EP Act are not likely to be required.

Figure 1: Stormwater discharge and emissions to land locations

4. Legislative context

Approvals and underlying tenure associated with the Premises which are held by the Licence Holder, subsidiaries and related companies are outlined in Table 4.

Table 4: Approvals and tenure

Legislation	Number	Holder	Approval
Environment Protection and Biodiversity Conservation Act 1999 (Cth)	Referral number 2004/1562	Fortescue Metals Group Ltd	Construction of the port rail infrastructure determined not to be a controlled action.
	Referral number 2010/5513		Approval of additional rail infrastructure, including rail loop at the Premises.
	Referral number 2012/6314		Construction of additional rail infrastructure determined not to be a controlled action.
Part IV of the EP Act (WA)	Statement Number 690	Fortescue Metals Group Ltd	Construction of a port at Anderson Point in Port Hedland, which includes shipping facilities, reclaimed areas for iron ore handling infrastructure, stockpiles and ancillary facilities and a connecting north-south railway.
	Statement Number 771		Dredging of not more than 3,500,000 cubic metres off Anderson Point, for a third ship berth; disposal of dredge spoil on pre-existing and previously approved land at Anderson Point; and extension of the approved open-pile wharf.
Part V of the EP Act (WA)	W4283/2006/1 (expired)	Fortescue Metals Group Ltd	Construction of the Anderson Point Materials Handling Facility.
	W4392/2007/1 (expired)		Construction of a wastewater treatment plant with a maximum throughput of 33kL/day to cater for construction workforce (no longer in use).
	W4814/2010/1 (expired)		Upgrade of port infrastructure to increase throughput capacity from 45Mtpa to 120Mtpa
	W5284/2012/1 (expired)		Changes to the discharge point from the desalination plant
	W4979/2011/1 (expired)		Construction of a temporary desalination plant
	W5643/2014/1		Expansion of the existing port operations and an increase in

			throughput capacity from 120 Mtpa to 175Mtpa.
	W5749/2014/1 (expired)		Construction of the North Star Stage 1 Export Facility (not complete – refer to section 5.1.1)
	R1963/2007/1 (not issued)		Category 85 Wastewater treatment plant (no longer required – see section 5.1.2)
	L8194/2007/3		The Licence
Railway and Port (Pilbara Infrastructure) Agreement Act 2004	N/A	The Pilbara Infrastructure Pty Ltd and Fortescue Metals Group Ltd	State Agreement
Railway and Port (The Pilbara Infrastructure Pty Ltd) Agreement Amendment Bill 2018	N/A	The Pilbara Infrastructure Pty Ltd and Fortescue Metals Group Ltd	State Agreement
Rights in Water and Irrigation Act 1914	GWL1639999(6)	Fortescue Metals Group Ltd	Groundwater abstraction licence
Dangerous Goods Safety Act 2004	Dangerous Goods Licence DGS021978	Fortescue Metals Group Ltd	Approval for the storage of up to 162,400 L of diesel fuel.

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 690 and 771.

The Pilbara Iron Ore and Infrastructure Project was referred to the EPA in December 2003. The project was assessed in two stages:

- Stage A – The proposed port at Anderson Point and 345 km of railway to associated mine sites in the East Pilbara; and
- Stage B – The development of proposed mining and an additional 160km of rail.

In its assessment of the Stage A proposal, the EPA undertook a detailed evaluation of the following factors:

(a) terrestrial biodiversity;

(b) marine and sediment quality;

(c) benthic primary producer habitat (BPPH) - mangroves;

(d) surface water hydrology;

(e) dust; and

(f) noise.

Stage B of the project was assessed separately and is not discussed further in this Decision Report as the assessed activities do not form part of the Premises.

The EPA later assessed a proposal to upgrade the port facility including additional dredging, dredge spoil disposal, construction of Berth 3 and extension of the wharf alongside Berths 2 and 3. The EPA's report (EPA Bulletin 1286, 2008) informed the Minister's decision to approve the proposal subject to the conditions contained within Ministerial Statement 771.

The Licence Holder submitted a referral to the EPA in August 2010 for the expansion of the materials handling facility from 45 Mtpa to 120 Mtpa. This included the onshore components of the expansion including construction works for an additional wharf and additional ore handling facilities. The Office of the Environmental Protection Authority (OEPA) notified the Licence Holder on 20 September 2010 that the referral was not assessed and the proposal would be managed by Part V of the Act.

The Port Hedland Port Authority (now the Pilbara Port Authority/PPA) referred a proposal to the EPA for dredging of an area of South-West Creek to allow for the construction of a number of additional berths. Ministerial Statement 859 was issued in relation to this proposal.

4.1.2 Ministerial Statement No. 690

Cumulative impacts of the Licence Holder's iron ore handling was initially assessed under EPA Report Number 1173 by the EPA and managed under Part IV of the EP Act Ministerial Statement 690.

The EPA noted that the greatest potential for the port operations to generate dust emissions was from rail car dumpers; ore conveyors; stockpiles, ship loading and vehicle traffic. The EPA concluded that the operation of the Premises could contribute to an increase of approximately 6 per cent in maximum 24-hour average concentrations of particulates (PM_{10} and $PM_{2.5}$) at the Port Hedland townsite and had the potential to result in an increase in the number of dust exceedances annually. Further that maximum 24-hour average particulate concentrations at Wedgefield could increase between 2.3 and 8.8 per cent.

Condition 17-1 of Ministerial Statement 690 requires the proponent (the Licence Holder) to manage its dust emissions in accordance with a Dust Management Plan:

17-1 The proponent shall monitor and control dust associated with construction and operation of the port in accordance with a Dust Management Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Deposited dust on mangroves is also monitored as required under MS 690 to measure the early warning indicators of deteriorating mangrove health. In accordance with its 2011 Mangrove Protection Management Plan (P-PL-EN-0012) the Licence Holder has committed to the following actions in the event of dust deposition impacting mangroves:

1. Take immediate short term measures to reduce impact (e.g. washing foliage).
2. Investigate measures to ameliorate impact on affected mangroves.
3. Review and improve dust control methodologies.

Despite comments in EPA Bulletin 1173 and MS 690 that noise and dust emissions would be regulated under Part V of the EP Act, the primary instrument for the regulation of noise and dust emissions from the Premises remained as MS 690. The OEPA approved dust and noise management plans which are the primary mechanisms for the regulation of these emissions from the Premises.

4.1.3 Ministerial Statement No. 771

MS 771 was issued in August 2008 for the dredging and construction of a third ship berth, including the disposal of dredge spoil. MS 771 contains conditions:

- Limiting the total core closed-canopy mangroves directly or indirectly adversely affected within the port project area (including affects from Stage A) to less than 14.8 hectares;
- Requiring dust to be monitored and controlled in accordance with the Dust Management Plan, already required under MS 690 (refer to section 4.1.2);
- Requiring construction noise to comply with Regulation 13 of the Noise Regulations.
- Requiring the proponent to incorporate monitoring and management of the new DMMA into the Dredging and Reclamation Monitoring and Management Plan required by MS 690.

A change to MS 771 was made in November 2008 to increase the dredge volumes, area and disposal area. The application for Part IV approval did not include an increase in the throughput of the port which, at the time was authorised at 45Mtpa.

Similar to MS 690, Ministerial Statement 771 conditions the Licence Holder to implement dust management under condition 11-1:

11-1 The proponent shall monitor and control dust associated with construction and operation of the port in accordance with the Dust Management Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority as stated under Ministerial Statement 690.

4.1.4 Amendments to Ministerial Statements 690 and 771

Subsequent changes to MS 690 and 771 which have relevance to the risk assessment in this Decision Report are listed below:

- In August 2008 two additional train unloaders were approved (three in total).
- In February 2014 Berth AP5 was added to MS 690 and a previous reference to an authorised export tonnage of 45Mtpa was removed. In removing the reference to export tonnage, the amended Ministerial Statement states that relevant environmental matters, such as noise and dust, can be managed under Part V of the EP Act.

Mangrove health continues to be monitored quarterly with summary reports developed by the Licence Holder who has committed to ongoing mangrove monitoring until two years following decommissioning of the Materials Handling Facility. While mangrove monitoring is primarily for the assessment of impacts to mangrove health from dredging and reclamation activities, consideration is also given to dust deposition on mangrove foliage.

In December 2019, and following a request to the Minister for Environment in September 2019, the Minister requested that the EPA inquire into and report on the matter of changing condition 17 of MS 690 relating to dust management. On 18 March 2020, the EPA submitted Report 1669 to the Minister recommending that condition 17, relating to dust regulation, be deleted to allow the Part V Licence (L8194/2007/3) to be unconstrained. At the time of finalising the Amended Licence, the Minister had not approved the removal of Part IV dust conditions.

Conditions for the regulation of noise against an Operations Noise Management Plan will be retained on the Ministerial Statement. The current versions of these plans received approval from the OEPA on 29 July 2011.

Key Finding: The Delegated Officer has reviewed the relevant EPA reports and Ministerial Statements and finds that:

1. Water quality of discharges from the DMMAs, including any contribution from the Licence Holder's desalination plant discharges, are managed under MS 771 and MS 859.
2. Impacts associated with noise will continue to be managed under Part IV through Ministerial Statement 690.
3. A similar process to that undertaken for the removal of dust conditions from MS 690 has also commenced for MS 771 but is not complete . The Delegated Officer understands that a request from the Minister for Environment under s.46(1) of the EP Act will be made to inquire into changing implementation conditions for dust regulation.
4. The level of duplication of dust conditions between the Part V Amended Licence (L8194/2007/3) and Part IV Ministerial Statements 690 and 771 is in accordance with DWER's *Guidance Statement: Setting Conditions* (October, 2015) for the following reasons:
    (a) Existing Ministerial Statement conditions for the management of dust are complimentary to dust conditions placed on the Amended Licence.
    (b) During the process of amending Part IV controls, any duplication is temporary and not considered 'unnecessary'.
5. Requirements to monitor dust deposition impacts on mangrove communities under Part IV are complimentary to the specific dust management and control conditions applied through the Amended Licence.

As a result, the Delegated Officer has determined that controls in relation to noise and discharges from the desalination plant will not be considered further as part of this Decision Report.

4.1.5 Ministerial Statement No. 859

MS 859 relates to a proposal to dredge an area of South West Creek for new berth pockets, turning circles and shipping channels. Some of the berth pockets are used by the Licence Holder as part of the operation of the Premises however the proponent for this project was PPA.

Relevant to this review, conditions of MS 859 relate to the monitoring and management of mangrove health and requirements to limit direct or indirect impacts upon BPPH. MS 859 also requires the proponent to manage water quality of water discharged from DMMAs.

These DMMAs are located on either side of the Premises boundary and do not form part of the Premises however the Licence Holder discharges saline effluent from the desalination plant within the Premises into the DMMAs on the eastern side of the Premises (shown in MS 859 as DMMA B and DMMA B South).

4.2 Contaminated sites

The Premises is not classified as contaminated under the *Contaminated Sites Act 2003.*

4.3 Rights in Water Irrigation Act 1914

The Licence Holder holds a Groundwater Licence (GWL) under the *Rights in Water Irrigation Act 1914* (RIWI Act). GWL1639999(6) allows the abstraction of water from a bore field located adjacent to the rail line.

4.4 Planning

The Premises is located within an area designated under the Town of Port Hedland: Town Planning Scheme No. 5 as “Other purpose: Port Facilities”.

4.5 Other relevant approvals

4.5.1 Department of Jobs, Tourism, Science and Innovation

The Premises is operated under the *Railway and Port (Pilbara Infrastructure) Agreement Act 2004* which is administered by the Department of Jobs, Tourism, Science and Innovation (DJTSI).

This agreement requires the State to provide an area of the Port Hedland Port as a lease under the *Port Authorities Act 1999* for the port facilities and additional port infrastructure.

4.5.2 Department of Mines, Industry Regulation and Safety

The Department of Mines, Industry Regulation and Safety (DMIRS) regulates the Premises under the *Mines Safety & Inspection Act 1994*.

4.6 Port Hedland Dust and Noise Management Taskforce

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

4.6.1 Government response to the 2016 Taskforce Report

On 15 October 2018, the McGowan Government released its response to the 2016 Port Hedland Dust Taskforce Report endorsing recommendations made in the Taskforce Report.

In doing so the Government endorsed multiple strategies to both reduce ambient dust impacts and minimise receptor exposure in the West End of Port Hedland. This includes the Government’s position that an air guideline value (AGV) of 24-hour PM_{10} of 70 µg/m3 (excluding natural events) applies where people live on a permanent basis; and that measures should be introduced to cap (and if possible, reduce) the number of permanent residents in dust-affected areas.

The Port Hedland AGV was derived using established human health risk assessment techniques and assumptions as further described in section 4.6.2, and is considered to be protective of the health of a ‘general population’ within the defined area, provided that the number of permanent residents remains largely unchanged into the future.

For its part, DWER is responsible for implementing two key Government-endorsed recommendations, including:

- Developing and implementing a dust management guideline for bulk handling port premises; and
- Taking over control of the operation and maintenance of the Port Hedland ambient air quality monitoring network.

The second part of the Government’s broader position on dust management relates to proposed planning changes prohibiting new residential development and other sensitive land uses, including aged care and childcare premises, west of Taplin Street.

To give effect to this, the Western Australian Planning Commission (WAPC) is considering an

Improvement Plan and Improvement Scheme designed to achieve the land use outcomes of the Taskforce recommendations (DJTSI, 2018).

The Department of Planning, Lands and Heritage (DPLH) is in the process of consulting on the proposed Improvement Scheme No.1 (Figure 2) to provide an outline of the strategic intentions for the West End (DPLH, 2020). The consultation period ends 3 July 2020.

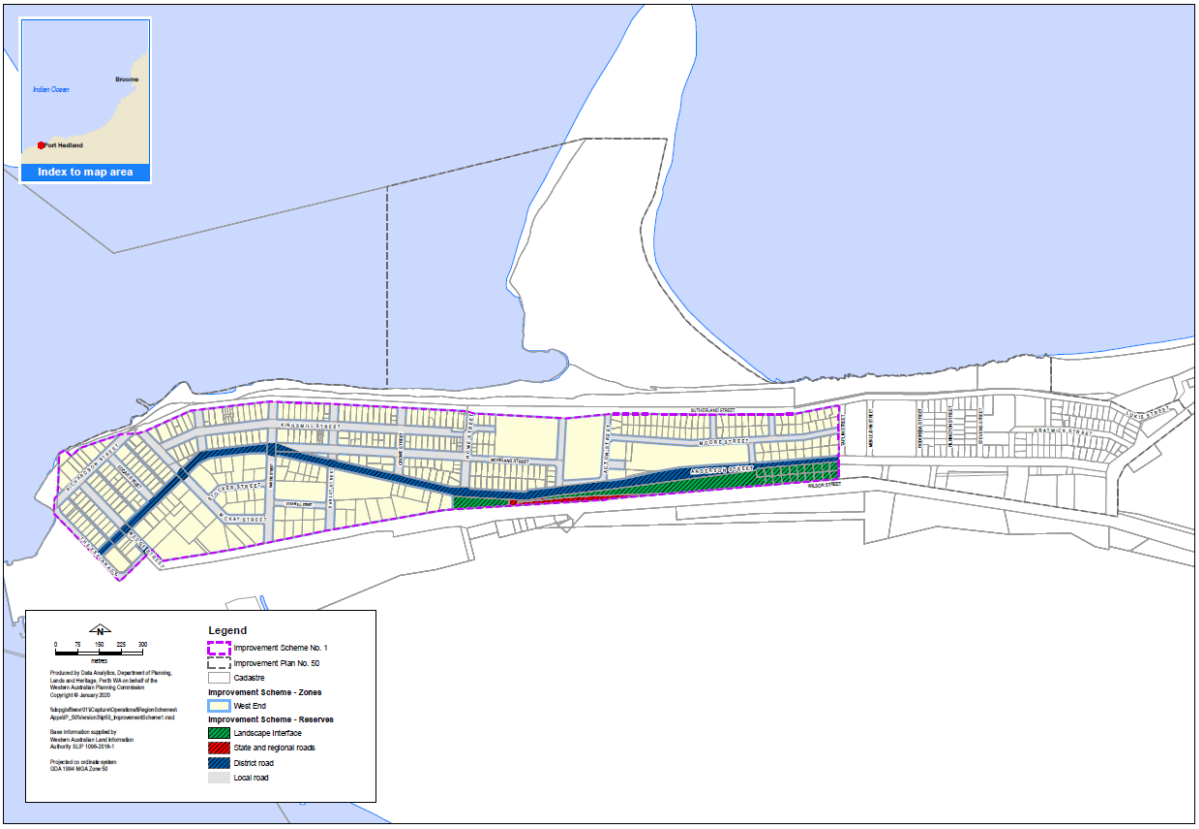


Figure 2: Proposed Port Hedland West End Improvement Scheme No. 1 (Source: DPLH 2020)

In August 2019, the Government introduced the concept of an industry-funded voluntary buyback scheme for Port Hedland. The proposed buyback scheme is separate to, but supports the endorsed Taskforce recommendations relating to restricting population growth in the West End of the Port Hedland peninsula. The intention is to provide residents in the West End the opportunity to relocate from areas subject to the improvement plan.

Key findings relevant to DWER's regulation of Category 58 premises (bulk handling) is provided below.

Key findings: The Delegated Officer also notes the Government's position that the interim guideline of 24-hour PM_{10} of 70 µg/m^3 (excluding natural events), hereon referred to as the AGV, shall continue to apply to all residential areas of Port Hedland.

DWER will implement the commitments made by the Government in its response to the Taskforce Report. Specifically it will develop a dust management guideline for bulk handling port premises and implement the guidelines through Industry self-assessments and licence reviews.

4.6.2 Health Risk Assessment

The Department of Health (DoH) released the *Port Hedland Air Quality Health Risk Assessment for Particulate Matter* (HRA) in January 2016. The outcomes of the HRA were the basis for the Government-endorsed Taskforce recommendation that the air guideline value of 24-hour PM_{10} of 70 µg/m^3 (excluding natural events) applies to residential areas of Port Hedland and that measures should be introduced to cap (and if possible, reduce) the number of permanent residents in dust-affected areas of Port Hedland.

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 DoH's *Port Hedland – Fact Sheet* and not taken to apply solely to port operations at the Premises.

The report provides the final health risk assessment for Port Hedland. DoH also published the Port Hedland – Fact Sheet, which provides the summary findings of the study as follows:

- The HRA identifies that PM_{10} 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/m^3) 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/m^3) 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, 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 PM_{10} concentrations over 70 µg/m^3. 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/m^3
    - Cardiovascular disease
        - **1** additional death **every 3 years** in areas that frequently exceed 70 µg/m^3
    - 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/m^3
        - Pneumonia and bronchitis.
            - **1** additional admission **per year** in areas that frequently exceed 70 µg/m^3
        - 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/m^3
- 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 µg/m^3 , and
    - not greater than 50 µg/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 µg/m^3
            - **1** additional admission every **3 years** in areas not exceeding 50 µg/m^3
        - Pneumonia and bronchitis
            - **1** additional admission every **4 years** in areas not exceeding 70 µg/m^3
            - **1** additional admission every **5 years** in areas not exceeding 50 µg/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 µg/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 µg/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.

5. Part V of the EP Act

5.1.1 Works Approvals

Since December 2006, seven works approvals have been issued to the Licence Holder under s.54(3)(a) of the EP Act for activities at the Premises. Summarised below are the details of the most recent issued works approvals (past three years).

W5643/2014/1

Works approval W5643/2014/1 was issued on 15 May 2014, for the expansion of the existing port operations and an increase in throughput capacity from 120Mtpa to 175Mtpa.

The increase in capacity was assessed as occurring in three stages (1, 2A and 2B). The stages are characterised as follows:

- Stage 1 – Increase to 155Mtpa throughput achieved through efficiency measures;
- Stage 2A – Increase to 175Mtpa partly achieved through extension of South West Creek Wharf to allow for a fifth berth (AP5) and upgrades to associated conveyors; and
- Stage 2B – Increase to 175Mtpa partly achieved through an additional in-load circuit (conveyors, transfer station, stacker and two additional stockpile rows).

A compliance report for Stage 1 was received on 29 May 2011 and the Stage 2A compliance report was received on 6 March 2015. The Licence Holder advised DWER in a letter dated 30 December 2014 that Stage 2A alone would be sufficient to operate at the 175Mtpa capacity.

To date, compliance certification for Stage 2B in-load infrastructure has not been received by DWER. The expiry date of W5643/2014/1 was amended through Amendment Notice 1 to 18 May 2020 and later extended through Amendment Notice 2 to 18 May 2022. These extensions have been granted to allow the continuation of Stage 2B construction activity in advance of construction conditions being authorised through the Licence. Stage 2B is expected to support throughput increases to 188Mtpa and includes the installation of:

- stacker SK705 and associated in-load conveyors CV909 and CV918 and transfer point TS909;
- dual skirting systems and wet extraction systems at conveyor transfer points and the implementation of belt scrapers to clean conveyor belts; and
- water sprayers on the stacker booms.

Works approval W5643/2014/1 will cease at the issue of the Amended Licence at the request of the Licence Holder.

W5749/2014/1

Works approval W5749/2014/1 was issued on 19 February 2015 for the construction of the North Star Stage 1 Export Facility.

This application was made to accommodate the trucking of approximately 2Mtpa of magnetite-hematite ore from the North Star deposit. This proposal involved the dumping of ore by side-tipping trucks, collection by front end loaders and stockpiling by either a mobile telestacker or front end loaders. An existing reclaimer was proposed to be used to reclaim the ore for ship loading.

On 22 February 2018 the Works Approval expired and compliance documentation had not been received by DWER. Available aerial imagery indicates that construction of the stockyard access road discussed in the Works Approval application may have commenced although this is not a prescribed activity.

Additional throughputs at the Premises associated with ore from the North Star deposit will be assessed through this Decision Report, which does not require the works approved through W5749/2014/1.

5.1.2 Registrations

One registration (R1963/2007/1) related to the Premises is recorded in DWER's system. This registration is for a category 85 sewage facility and relates to the wastewater treatment system authorised through works approval W4392/2007/1.

During a site visit on 19 July 2016, DWER officers were advised by representatives of the Licence Holder that this wastewater treatment facility is no longer in use and wastewater is

removed from site by a contractor. Registration R1963/2007/1 has not been issued.

5.1.3 Licence amendments

From the date the licence was originally issued on 23 April 2004, the licence has been amended six times. The licence has been renewed twice on 14 April 2011 and 17 April 2014.

Prior to the Reviewed Licence, the most recent amendment to the Licence L8194/2007/3 was on 7 July 2016 via an Amendment Notice. The amendment included the following:

- Addition of Category 12 (with an approved premises production or design capacity of 63,000 tonnes per Annual Period) for the use of a mobile screening plant onsite (rescreening project).
- Inclusion of an emission point to surface water for the sample laboratory silt trap which will discharge via an overflow pipe into South West Creek. This emission point was also included in the quarterly monitoring requirement for total recoverable hydrocarbons with a limit of 15mg/L.

In a letter dated 12 October 2016, the Licence Holder advised DWER that the scope of the rescreening project had changed. The letter outlined the following changes from the original amendment application:

- Ballast screened for stacker 701 only (previously 701, 702 and 704);
- Total throughput reduced from 63,000 tonnes to 45,000 tonnes;
- Program duration reduced from 15 to 10 weeks; and
- Hourly throughput may exceed the 50 tonnes per hour limit specified in the Amendment Notice.

The key emissions and risks associated with the operation of the mobile screening plant are noise and dust. Rescreening was operated as a short campaign (15 weeks) and there are no current plans for future campaigns. The Licence Holder has requested that rescreening activities continue to be authorised under the Amended Licence and therefore emissions from this activity are considered through this Decision Report.

5.1.4 Material Change notifications

Prior to this latest assessment to amend, Licence L8194/2007/3 included conditions requiring notification to the CEO of material changes which occur at the Premises. Material Changes are defined as changes to the description provided in Schedule 2 of the Licence including any:

- new commodities;
- volume increases of commodities;
- changes to the control or ownership of the infrastructure or equipment within the Premises; and
- changes to the site layout of prescribed premises infrastructure and equipment as specified on the plans in Schedule 2, Table 3 of the Reviewed Licence.

The department has since reconsidered its approach to providing licence holders, in particular Category 58 operators, the flexibility to make changes to their premises that may result in an increased risk to public health, amenity or the environment. DWER has determined that these conditions may allow for significant changes to Premises operations that could alter the nature or volume of waste (which includes dust) or noise emissions ahead of any assessment of risk from DWER. In this scenario DWER would be unable to prevent the material change from being implemented even where the risk to public health, amenity or the environment was unacceptable.

From the date of the Reviewed Licence being issued, no notifications of Material Change have

been submitted to the department.

Key determination: At the time of Reviewed Licence being issued the Delegated Officer determined that matters of dust and noise were regulated under Part IV of the EP Act and therefore were not conditioned through the Licence. For the reasons outlined in section 4.1.4, the Delegated Officer has determined that the Amended Licence is not constrained by Part IV conditions for the regulation of dust.

Noise will continue to be managed under Ministerial Statement 690.

Since the implementation of material change conditions across a range of Category 5 and 58 licences, DWER has identified that the conditions may present an unacceptable risk to public health, amenity or the environment if implemented inappropriately by licence holders. Material change conditions have therefore been removed from the Amended Licence.

5.1.5 Clearing

Clearing associated with the Premises has been assessed and approved through Part IV of the EP Act and as such does not require a clearing permit under Part V of the EP Act.

There is no further clearing proposed as part of works required to expand throughput to 210Mtpa.

5.1.6 Inspections

DWER has conducted eight compliance inspections of the Premises since the commencement of the Licence. No significant (non-administrative) non-compliances were identified during inspections with the exception of the inspection conducted 26 March 2013, which noted spilt ore on the wharf and a failure to clean out a wash bay sump.

The most recent inspection was conducted 1 November 2018. At the time of inspection low levels of dust were visually observed from the following sources the Premises:

- unsealed areas;
- wherever ore is broken through movement, such as at transfer stations, shiploaders, bucketwheel reclaimers and stackers;
- dried material from the underside of return conveyors.

Photographic evidence was also provided to DWER inspectors to demonstrate that significant levels of dust can be generated from spoil grounds in the area.

5.1.7 Enforcement and complaints

DWER's Incidents and Complaints Management System (ICMS) is the system used to record complaints received and non-compliances requiring investigation. A review of ICMS indicates that there have not been any complaints received in relation to the Premises.

The most recent enforcement action was completed 16 December 2013 when the Licence Holder was issued with a formal Letter of Warning (ICMS28679) for an alleged contravention of the conditions of Works Approval W4814/2010/1. This related to the commissioning of infrastructure prior to the submission of a compliance document. The Licence Holder later submitted a revised compliance document confirming that works had been undertaken in accordance with the works approval and the incident was closed.

5.1.8 Annual compliance reporting

A requirement of the Reviewed Licence is the submission of an Annual Audit Compliance Report (AACR) by 31 March each year. A review of the previous three AACRs did not identify

any non-compliances with conditions of the Reviewed Licence. However, since 7 December 2016, following the issue of the Reviewed Licence, the Premises was not subject to conditions relating to dust.

Non-compliances relating to monitoring data capture and equipment availability were the only matters identified for the three periods prior to the (2013-2015). These non-compliances are not expected to result in increased risk of emissions and were rectified within the respective reporting periods.

5.2 Applicable regulations, standards and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations.

DWER's Guidance Statements which inform the assessment in line with this legislation are as follows:

- Guidance Statement: *Regulatory principles* (July 2015);
- Guidance Statement: *Licensing and works approvals process* (September 2015);
- Guidance Statement: *Setting Conditions* (October 2015);
- Guidance Statement: *Land Use Planning* (October 2015); and
- Guidance Statement: *Licence duration* (November 2014).

Other key documents used in this assessment are documented in Appendix 2.

5.3 Ambient air quality monitoring

Ambient air quality monitoring is undertaken at Port Hedland through a number of monitoring stations within the Town of Port Hedland shown in Figure 3. Monitoring is coordinated through the PHIC and real-time monitoring is reported on the PHIC website.

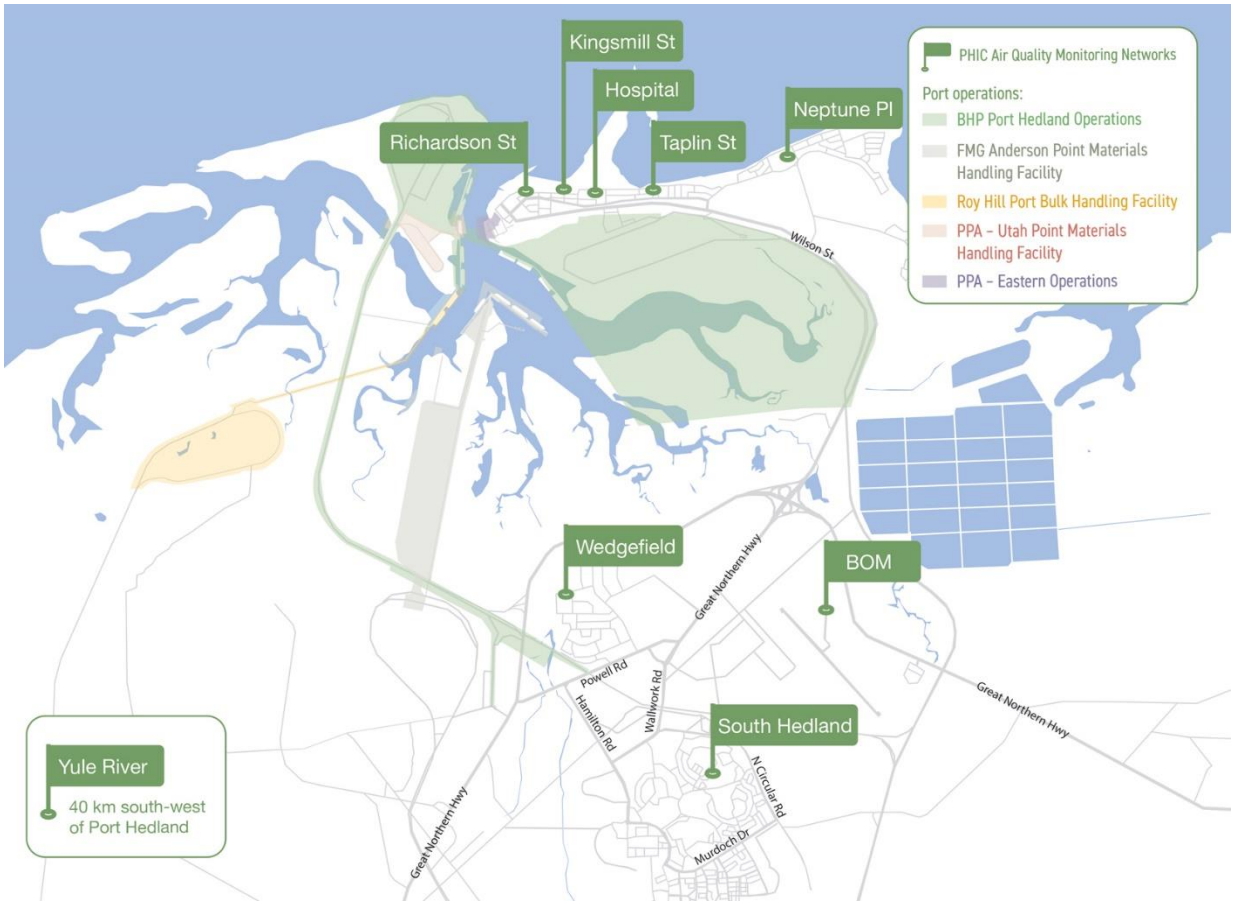


Figure 3: PHIC monitoring locations in Port Hedland

5.3.1 Limitations of the ambient monitoring network

It is important to note that the siting of some PHIC air monitoring equipment does not satisfy Australian/New Zealand Standard *AS/NZS3580.1.1: Guide to siting air monitoring equipment*. For example, the ambient air monitor at Neptune Street is located within a few metres of two dwellings 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 industrial activity and/or obstructions within close proximity to the monitor potentially limiting the reliability of data. It is understood that there are often significant constraints with regard to availability of land or other tenure issues when selecting suitable monitoring locations.

The data from non-compliant monitors can remain valuable as long as these constraints are kept in mind when analysing the data and monitors are operating effectively (refer to section 5.3.3). That is, analysis must take into consideration the potential for other nearby dust sources to contribute to the data recorded. This is particularly important in the context of Port Hedland where there may be a large number of non-port related dust sources including both natural and anthropogenic sources that can result in highly variable dust concentrations from year to year as demonstrated in section 5.3.2.

DWER has undertaken a ‘strengths and limitations’ audit of the air monitoring network and has engaged with both industry and the community on the existing air monitoring network and how the future network could best inform stakeholders. It is considered the monitoring network is generally satisfactory with regard to both the methods and equipment used although there may be opportunity for siting improvements through slight relocation of some monitors.

In keeping with Government-endorsed Taskforce recommendations, DWER is in the process

of acquiring from PHIC the full responsibility for maintenance control of the ambient air quality monitoring network. Any incurred costs are to be covered by port operators holding a Part V licence granted for Category 58 under the EP Act and in accordance with the 'polluter pays' principle (see section 4.6.1). It is anticipated that issues associated with faulty monitoring equipment (see section 5.3.3) will be identified and resolved quicker with DWER having greater oversight over the monitoring data.

Once in control of the ambient monitoring network DWER will publish real-time monitoring data on the department's website with trends and further analysis reported annually.

5.3.2 Seasonal variation

In order to demonstrate seasonal variation of average daily PM_{10} concentration at Taplin Street each month, the 2017/18 annual period is shown in Figure 4. Monthly data from the Taplin Street monitor for 2018/19 was reported as being 23.8 µg/m^3 in PHIC's annual report. This was later identified as inaccurate due to equipment fault (see section 5.3.3). Taplin Street data from the 2018/19 period is not presented in any of the figures below.

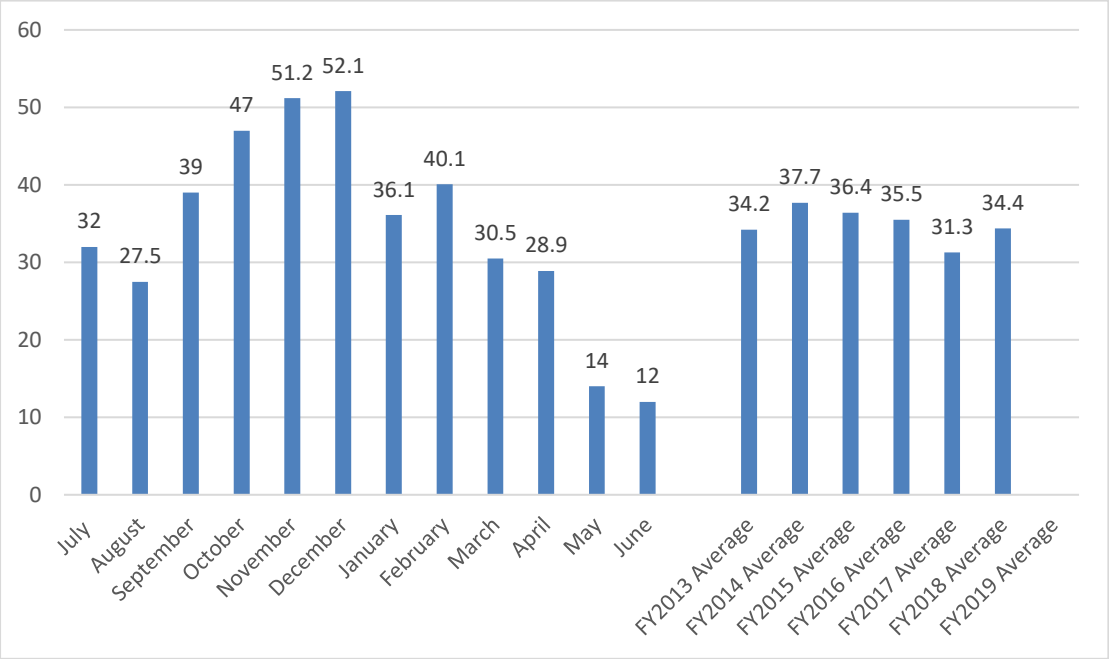


Figure 4: Average daily PM_{10} concentration at Taplin Street (BHP 2018; PHIC 2018)

As shown in Figure 4 there is a wide seasonal variation over the 2017-18 annual period for dust concentrations. The lowest daily averages for PM_{10} are typically recorded in the months May to August, and the highest recorded in summer months (November to March).

While average dust concentrations recorded at the faulty Taplin Street monitor decreased significantly, this trend was not observed at other ambient monitors in Port Hedland, including those located further away from key industrial sources. All other sites recorded an annual PM_{10} concentration increase of 31% from the previous year while a 29% decrease was recorded at Taplin Street. Based on data trends recorded from monitors further away from industrial sources, it is likely that the Taplin Street location also experienced higher PM_{10} concentrations on the previous years.

5.3.3 Exceedances of air guideline value

As introduced in section 4.6.1, the AGV (PM_{10} – 70µg/m^3 with a 24 hour averaging period), is used for Port Hedland. Historically the AGV has been applied to all areas east of Taplin Street, which is located approximately 3.3km east of the nearest shiploader. A summary of Taplin

Street exceedances for annual periods are provided below (PHIC Annual Reports).

- 2012-2013 period – 17 exceedances at Taplin Street monitoring station with two reported to be attributed to industry;
- 2013-2014 period – 6 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;
- 2016-2017 period – 3 exceedances at Taplin Street with two reported to be attributed to industrial activity; and
- 2017-2018 period – at least 9 exceedances at Taplin Street with eight exceedance days reported to be contributed to by local industry (see key findings for further discussion).
- 2018-2019 period – 0 exceedances at Taplin Street (see key findings for further discussion).

The 2018-2019 period marked the first instance of zero days above the AGV for a reporting period since the Taplin Street monitor was established. However, monitors both to the west and east of Taplin Street recorded significant increases in the number of days where PM_{10} concentrations exceeded 50µg/m^3 (refer to Table 5). DWER was later advised by PHIC that monitoring data from the Taplin Street monitor is likely to contain errors due to equipment fault.

It is noted that the use of Taplin Street alone as a benchmark for air quality impacts due to operations at the Premises is limited. This is owing to the cumulative nature of dust emissions from varying and multiple industrial and non-industrial sources. The dust contribution from the Premises to the overall dust concentration recorded at the Taplin Street monitor is therefore difficult to determine from that monitoring result alone.

The HRA found that the number of exceedances of the AGV increased with proximity to the West End and that there are also seasonal influences on exceedances.

This is supported by preliminary modelling data from 2010, which indicated Nelson Point and Finucane Island operations (which include the Premises and BHP operations) dominate the background levels of particulate matter in the West End.

Since 2013, PHIC has reported annual monitoring data from all ambient and background monitors within the network shown in Figure 3. In each report PHIC has identified the number of incidences at each monitor where PM_{10} concentrations exceeded NEPM guidelines and the Port Hedland AGV, as detailed in Table 5.

Based on the monitoring data provided in Table 5, it is evident that PM_{10} concentrations in Port Hedland area (inclusive of South Hedland and Wedgefield) are greatest at Wedgefield and the West End. In addition, PM_{10} concentrations in Port Hedland appear to increase with increasing proximity to category 58 activities (refer to section 6.1). The other Category 58 operators within the Port Hedland Inner Harbour are also likely to contribute to ambient dust at sensitive receptors. There are significantly fewer exceedances of NEPM ambient air quality criteria (50µg/m^3 averaged over a 24-hour period) in South Hedland compared to the West End and Wedgefield.

A site visit conducted by DWER officers in July 2016 identified a number of dust generating sources in the Wedgefield industrial area. 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. Most of these sites are not prescribed premises and are not regulated by DWER under Part V of the EP Act.

A proportion of exceedances of 24 hour criteria at Wedgefield may be attributed to the siting of the monitor. A review of monitoring data collected during the LiDAR campaign (refer to section 5.3.6) identified that dust from Wedgefield did not appear to move across to the West End in significant concentrations when compared to Category 58 operations in Port Hedland. However, Wedgefield may have a more significant impact on ambient air quality on South Hedland just 1.5km to the south.

Industrial activities occurring in Wedgefield are not prescribed under the EP Regulations and are therefore not licensed under Part V of the EP Act. Emissions and discharges from these premises can be regulated by other sections of the EP Act and subsidiary legislation, including the *Environmental Protection (Unauthorised Discharge) Regulations 2004*.

Table 5: Number of exceedances of NEPM and Port Hedland AGV for PM_{10} recorded by PHIC ambient monitoring network – 2013 to 2019

Monitoring Station	24hr criteria ($\mu g/m^3$)	Days above criteria						
		FY 2012/13	FY 2013/14	FY 2014/15	FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19
Richardson St	50	74	50	79	39	90	143	167
	70	23	9	11	6	Unknown*	Unknown*	Unknown*
Kingsmill St	50	89	98	156	112	83	103	155
	70	29	19	50	46	Unknown*	Unknown*	Unknown*
Taplin St	50	48	48	55	48	27	65	3
	70	**17**	**6**	**10**	**10**	**3**	**9****	**0****
Neptune Pl	50	25	25	67	43	29	15	102
	70	11	8	14	14	Unknown*	Unknown*	Unknown*
Wedgefield	50	157	148	169	150	99	88	165
	70	82	84	59	50	Unknown*	Unknown*	Unknown*
South Hedland	50	24	13	19	12	8	0	11
	70	8	3	6	5	Unknown*	Unknown*	Unknown*
BoM	50	24	10	17	12	7	4	25
	70	10	3	7	2	Unknown*	Unknown*	Unknown*
Yule	50	14	8	18	5	1	8	15
	70	8	3	6	2	Unknown*	Unknown*	Unknown*

* Information not available. PHIC ceased reporting of exceedances of AGV in its 2016/17 annual report for all monitors with the exception of Taplin Street.
** See key findings in this section for further discussion.

In 2018/19 there was a universal increase in PM_{10} concentrations exceeding NEPM guidelines at both ambient and background monitors with the single exception of Taplin Street (refer to key findings below). Historically the number of exceedances of the AGV (and the Ambient Air Quality NEPM) at Port Hedland monitors typically increases with proximity to the West End. For example, in the 2014/15 annual period there were 50 occurrences at the Kingsmill Street monitor where PM_{10} averaged greater than 70µg/m^3, and 156 occurrences greater than the NEPM guideline of 50µg/m^3 over a 24-hour period. By comparison at Taplin Street, there were 10 exceedances of the AGV (70µg/m^3) and 48 exceedances of the NEPM guideline (PHIC, 2016).

As part of the HRA it was noted that monitoring undertaken from 2011-2014 concluded that PM_{10} levels at Port Hedland's West End (Taplin, Kingsmill and Richardson street monitors) were higher than areas further to the east of Taplin Street. For the 2011-2014 period monitors recorded dust concentrations above the AGV on 16% of the sampled days at Taplin Street, compared with 3% and 2% at South Hedland and Yule River respectively shown in Figure 5.

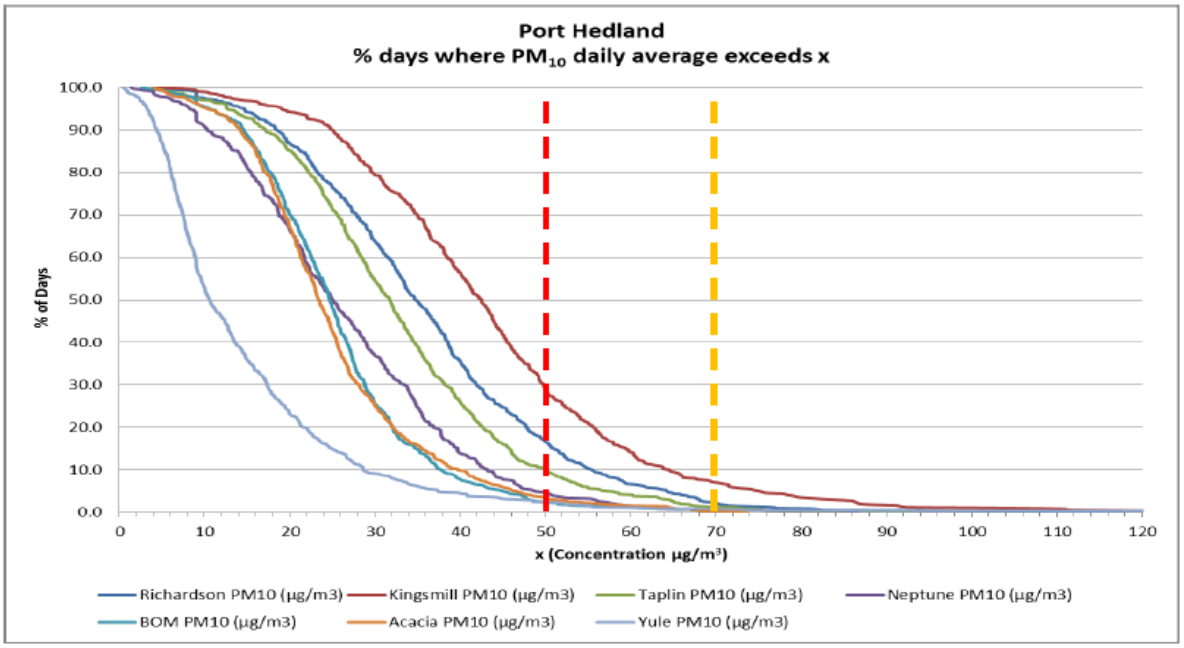


Figure 5: Percentage of days above daily the Port Hedland AGV and NEPM guideline values for PM_{10} for 2012-2013 inclusive (minus regional background and Wedgefield data) (DOH, 2016).

Key finding:

1) There has been a universal increase in PM_{10} concentrations across the Port Hedland peninsula in the 2018/19 reporting period, with the single exception of Taplin Street due to the issues noted below.
2) In November 2019, DWER formally requested from PHIC the network data used as the basis of the 2018/19 PHIC report to conduct further analysis of air quality data.
3) Data was provided 10 February 2020 and DWER was advised by PHIC that the Taplin Street monitor had been inaccurate and under-reporting actual dust levels and that it is possible that there may have been issues with the Taplin Street data from as early as April 2018. It is possible that AGV exceedance counts for both monitoring periods underestimate the actual number of exceedances.

4) PHIC has advised that new monitoring equipment has been installed at Taplin Street in January 2020 and recent monitoring results are now accurate.
5) PHIC has advised DWER that its investigations have identified no errors with monitoring data being captured at other PHIC monitoring locations.
6) PHIC has re-published its *FY2018/19 Port Hedland Ambient Air Quality Monitoring Program Annual Report* omitting the erroneous data from the Taplin St monitor.
7) Operation of the network is not currently a requirement under the provisions of the EP Act and the operation and maintenance of ambient monitors is not the direct responsibility of Licence Holders.

The department is now focused on gaining full control and oversight of the Port Hedland network as soon as possible to meet the endorsed Taskforce recommendations (see section 4.6) and provide transparent and accurate air quality information to Port Hedland residents.

5.3.4 Application of the air guideline value (AGV)

DoH has advised DWER that in principle, the National Environment Protection (Ambient Air Quality) Measure (NEPM) standard (50 µg/m^3) applies to all Australians, but it is not met everywhere that people live for various reasons. The Ambient Air Quality NEPM provides for a risk assessment, such as a health risk assessment conducted by the Department of Health, to be used to determine an appropriate alternative – such as in Port Hedland. It should be noted that the NEPM itself was originally determined by risk assessment, finding that 50µg/m^3 was an acceptable 'risk level' based on the composition of dust and the size of the population likely to be affected by dust comprising a large component of combustion particles. The Port Hedland HRA followed the same risk assessment framework.

The AGV is applied in Port Hedland in the same way that the NEPM is in other locations. That is, the NEPM guidance publications including the Explanatory Statement clearly outline the operation of the NEPM and identify that the imposition of NEPM ambient air quality standards as boundary or compliance limits is not consistent with the aims and intent of the NEPM. To apply NEPM standards to manage emissions from a single source industrial premises would not be consistent with NEPM implementation guidance.

As per the NEPM standard, the AGV applies to the 24 hour average of ambient air quality as measured from midnight to midnight. It is not to be used as a ‘real-time’ or instantaneous criterion for the management of point source or fugitive dust emissions crossing the boundary of a prescribed premises and entering the ambient environment.

Specifically, Table 1 of Schedule 2 of the Ambient Air Quality NEPM states that the pollutant PM_{10} has an averaging period of ‘1 day’. Note (3) following the table defines this as a ‘calendar day average’. In air quality measurement as in other forms of measurement and monitoring it is an accepted convention that a calendar day commences at midnight and ends the following midnight. This is also specified in the National Environment Protection (Air Toxics) Measure and in other air quality standards such as the Goldfields Environmental Protection Policy. Air quality standards differentiate between a calendar day average, being the average of each measurement within a continuous 24-hour period from midnight to midnight, and a rolling 24 hour average which may commence at any hour.

The Ambient Air Quality NEPM provides a harmonised national framework for all Australian jurisdictions to monitor and publicly report on common ambient air pollutants. The NEPM aims to guide policy formulation that allows for the adequate protection of human health and wellbeing. It does not compel or direct pollution control measures, or set penalties for non-compliance.

The Ambient Air Quality NEPM standards are based on health evidence of the impacts of air pollutants available at the time the standards are set. They are designed to provide protection to people from the pollutants’ adverse human health effects. The standards are also designed

to be realistically achievable in the different Australian jurisdictions with a focus on large urban areas, where the majority of Australia's population resides.

The NEPM provides a standard and national framework for monitoring in populated areas but specifically states that the measure is not suitable for use as a boundary or compliance limit in regard to those individual premises. Interpretation and implementation of NEPM in the context of regulation of air pollutants is a technically complex and specialised field that requires expertise such as that held within DWER.

Key finding: The department has received recent advice from the Department of Health that the previous position of 10 allowable exceedances as measured at Taplin Street, not including natural events, is acceptable. The Delegated Officer notes that, similar to the department's application of the NEPM, the AGV specific to Port Hedland is an assessment guidance level and should not be considered as an enforceable limit. One reason for this is that ambient air quality monitoring reflects the particulate concentrations in the air at the monitoring locations only. It does not attribute concentrations to specific sources, such as emissions from one or multiple port operations, local or regional dust sources.

AGV exceedances and trends in ambient air quality will be used to guide the department's regulatory decision making, including regulation through licence conditions.

5.3.5 $PM_{2.5}$ monitoring data

Particulate matter sized 2.5 microns in diameter and smaller ($PM_{2.5}$) are monitored at two ambient locations in the West End (Richardson Street and Taplin Street), and two background reference locations (BoM and Yule River).

Generally, the finer the particle in ambient air, the greater the ability that particle has to enter deeper into the lungs. In increasing concentrations, $PM_{2.5}$ can result in greater risk of respiratory and cardiovascular disease. Many of the exceedances of health guideline values for $PM_{2.5}$ can be explained by bushfire impact in the area although there has been a slow but steady increase in $PM_{2.5}$ concentrations at ambient monitors in recent times.

The annual average concentration of $PM_{2.5}$ was above AAQ NEPM for monitoring locations in the West End, Taplin and BoM. A comparison of the annual averages of $PM_{2.5}$ from some selected sites are summarised below. The latest 2018 calendar year data for Port Hedland has not been supplied, so comparisons cannot yet be made although the results are likely to be similar to 2017 results.

Table 6: Comparison of $PM_{2.5}$ concentrations in Port Hedland against larger population centres in Western Australia

Year	Richardson	Taplin	BoM – Port Hedland	Perth Metro - Caversham	Perth Metro - South Lake	Perth Regional - Bunbury
2012	6.3	5.6	8.5	7.8	8.9	8.6
2013	5.7	6.1	6.6	7.9	8.0	7.8
2014	8.6	9.3	7.9	8.1	8.1	7.8
2015	8.3	12.0	7.5	8.5	8.8	9.3
2016	5.2	11.4	5.9	7.7	8.0	8.4

2017	9.2*	11.0	6.8	8.5	8.7	8.7
2018	12.3	9.6	8.9	8.0	8.4	8.4

* Less than 75% data recovery for the calendar year.

Key finding: The Delegated Officer notes that:

1) Particles as $PM_{2.5}$, averaged annually and as measured at Taplin Street and Richardson Street monitors, have trended upward slightly since 2012.
2) In recent years $PM_{2.5}$ concentrations in Port Hedland's West End have been greater than those experienced in metropolitan areas of Western Australia and have exceeded NEPM guidelines for annual average $PM_{2.5}$ concentrations.
3) It is likely that the composition of finer particulates in Port Hedland is different when compared to urban centres, and this may result in different health outcomes (DOH, 2016).
4) Particles as PM_{10} have formed the basis of DWER's risk assessments as particulate matter sized 10 micron in diameter and smaller (PM_{10}) remains the dominant particle size in Port Hedland's ambient air that presents a risk to human health, noting that $PM_{2.5}$ size fraction of particles is part of the PM_{10} fraction.

5.3.6 Correlation of Port Hedland Port throughput and ambient dust levels

DWER has undertaken a review of annual ambient air quality at Port Hedland and cumulative throughputs of material exported from Port Hedland to determine whether there is any correlation between the two factors. The data in Figures 6 and 7 do not clearly demonstrate a direct correlation between iron ore throughputs at Port Hedland increasing over the years, and more dust in the Port Hedland airshed.

Export tonnages through Port Hedland have increased significantly over the previous decade. However, PM_{10} concentrations measured at Taplin Street, over the same period have not trended in the same way with the number of exceedances of 70 µg/m^3 (averaged over a 24-hours) remaining relatively stable. This is in part be due to the following factors:

- The department's ongoing risk-based regulation of dust has seen the introduction of more rigorous controls for dust management being mandated through Part V licence conditions.
- Increases in throughput have been largely achieved through the operation of existing infrastructure, meaning that the creation of new dust sources, such as stockyards, has been avoided.
- Many of the additional tonnages from operations near to the West End (not handled within the Premises) are directly shipped from car dumpers at the point of in-loading, avoiding the double handling of ore through stockpiling and reclaiming.
- The monitoring station at Taplin Street is only one measure of dust impacting Port Hedland and other monitoring stations must also be analysed to determine the true levels of dust throughout the township.

Therefore, a correlation between increasing throughputs and PM_{10} concentrations recorded at Port Hedland monitoring locations is not clear based on current data available to the department. Due to a range of other contributing factors, such as seasonal conditions and multiple, variable non-industrial sources, the level of dust recorded at each monitoring station will fluctuate over time. These fluctuations make clear source attribution difficult to determine.

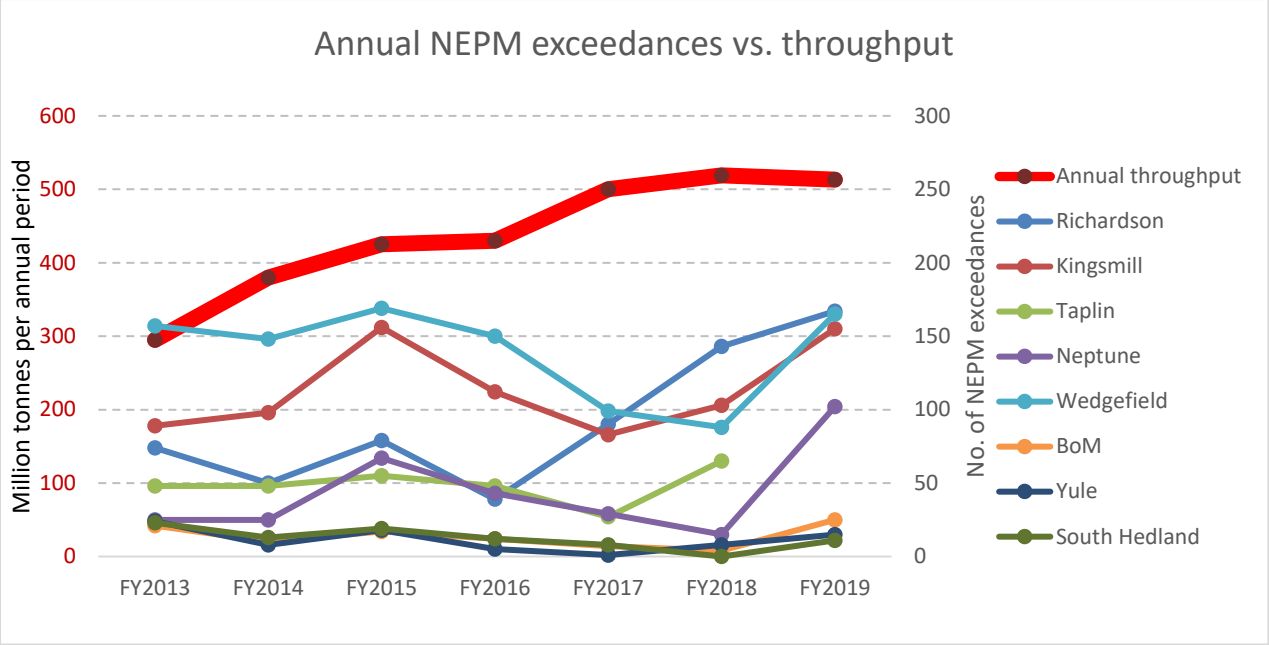


Figure 6: Annual number of days PM_{10} exceeded 50µg/m^3 against Port Hedland throughputs from FY2012/13 to FY2018/19 (PHIC Annual Reports)

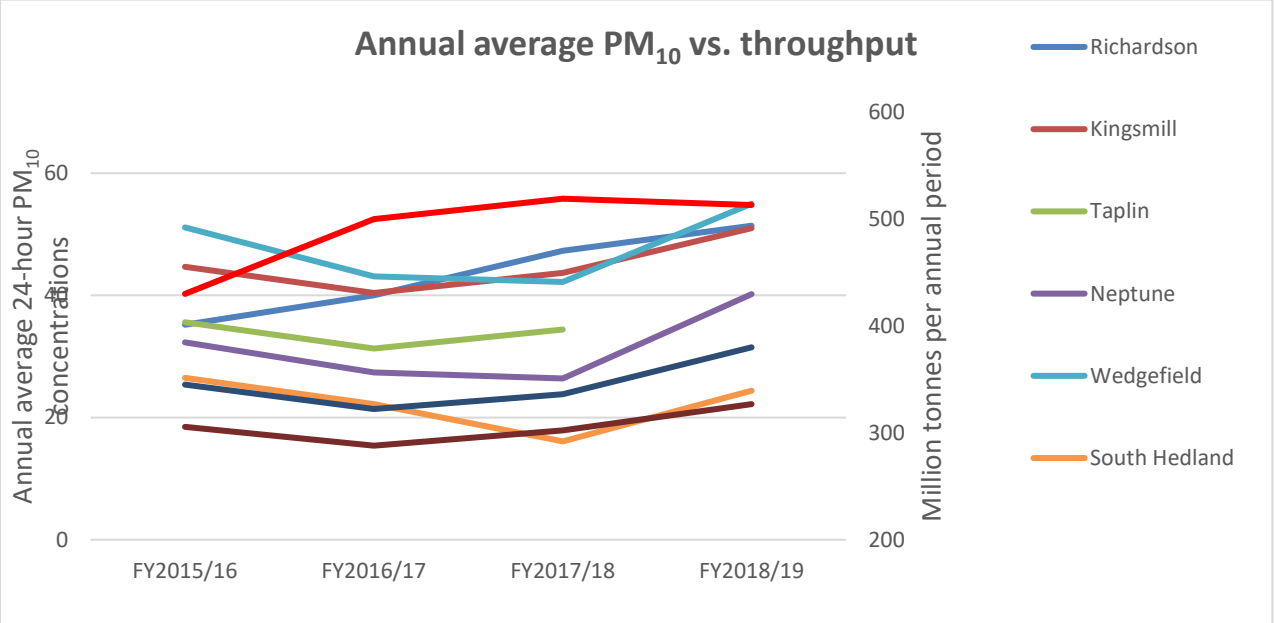


Figure 7: Annual average 24-hour PM_{10} concentrations vs throughput from FY2015/16 to FY2018/19 (PHIC Annual Reports)

Throughput growth has been the result of increases at all operations, including other operators' facilities such as BHP, Roy Hill and to a lesser extent, PPA.

Key findings: The Delegated Officer notes that improvements to dust management practices are likely to have helped offset some of the expected increases in dust from increasing throughput at Port Hedland. However, dust levels in Port Hedland's ambient air shed, in particular that of the West End, remain of concern from a public health, environmental and amenity perspective – as highlighted by the Dust Taskforce's Report described in section 4.6.

Further improvements are required as per the endorsed recommendations of the Port Hedland Dust Taskforce report to Government. Additional information on DWER's response to Taskforce recommendations can be found in the *Industry Regulation fact sheet – Managing dust in Port Hedland*, located on the Department's website.

5.3.6 Light Detection and Ranging (LiDAR) monitoring

The Department carried out a five-month dust monitoring campaign in Port Hedland from February 2017 to June 2017. The campaign was undertaken using conventional monitoring methods for particles with an equivalent aerodynamic diameter smaller than 10 micrometres (µg) (PM_{10}) as well as a Light Detection and Ranging (LiDAR) instrument, which works by emitting a light beam and measuring the backscatter from particles or dust in the air.

The objective of the campaign was to determine the origins and movement of dust contributing to impacts experienced in and around Port Hedland and to assess the suitability of applying LiDAR technology.

The LiDAR was positioned atop the Town Centre Viewing Tower to allow for a largely unimpeded view of the surrounding landscape with some hard targets such as buildings within the landscape obscuring some of the LiDAR beam.

A review of LiDAR images suggest that most of Premises' dust sources are not visible to the LiDAR as either the dust sources are too far away or are blocked by hard targets such as buildings. Figure 8 represents cumulative data over a five month period, highlighting major sources of dust (showing as red in the image) in and around the Premises within the limits of the LiDAR's line of sight.

Ship loading activities at the Premises were within the range of the LiDAR and could be detected as a source of dust. Also visible from the cumulative dust image depicted in Figure 8 were transfer station locations. This is typical of other port operations in Port Hedland where dust emissions were most concentrated at ore handling points where ore is dropped from height, for example, transfer stations, reclaimers and stackers.

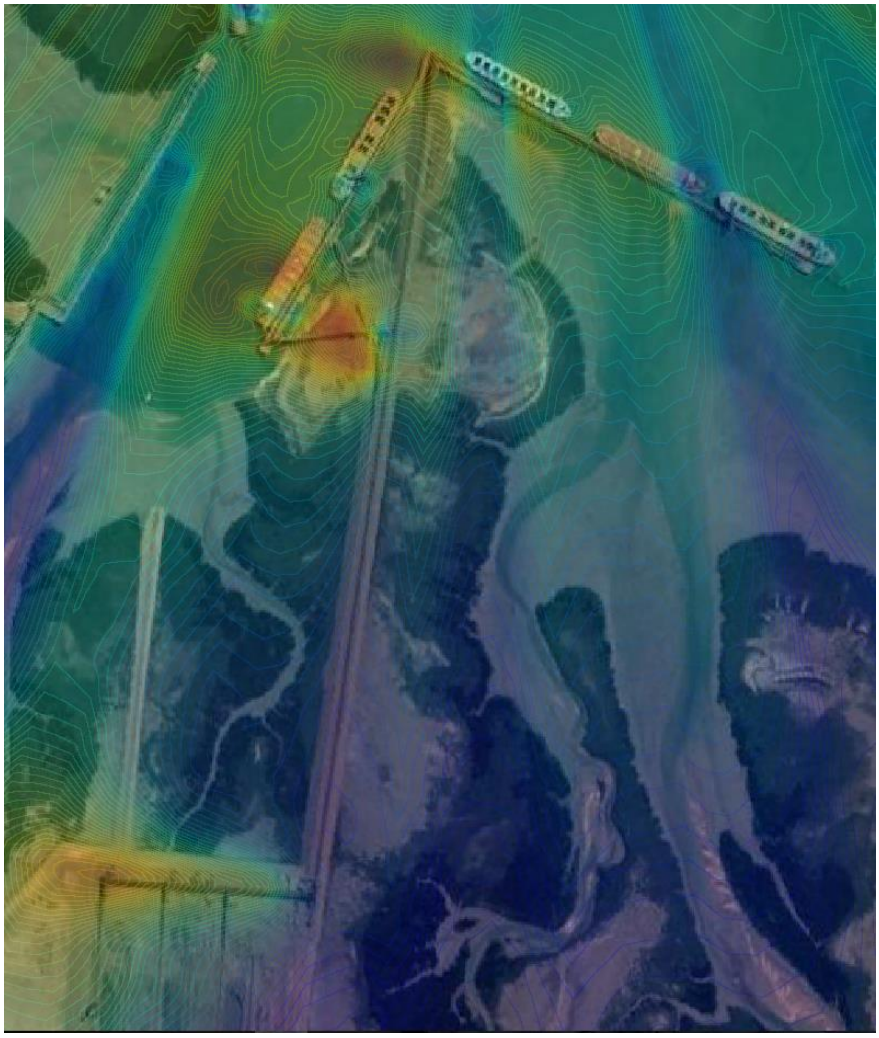


Figure 8: Cumulative LiDAR image for the Premises

The red and orange 'hot spots' in Figure 8 show higher concentrations of dust compared with the bluer shades of colour depicting lower concentrations. Given the image is based on all data from that time period, the high readings could be a result of a few significant events or multiple ongoing events of a less significant nature occurring over the five-month period.

The different colours do not represent specific dust concentrations. However, as detailed in the Department's published report, *Mapping dust plumes at Port Hedland using a LiDAR* (LiDAR Report), the LiDAR data was correlated with data collected from air quality monitoring stations. The LiDAR Report provides a summary of the issues faced in determining the correlation coefficient between the two data sets.

Key finding: Given the type of handling methods used at the Premises is similar to that used at other port operations in Port Hedland, it is reasonable to assume that the Premises will have a similar dust profile.

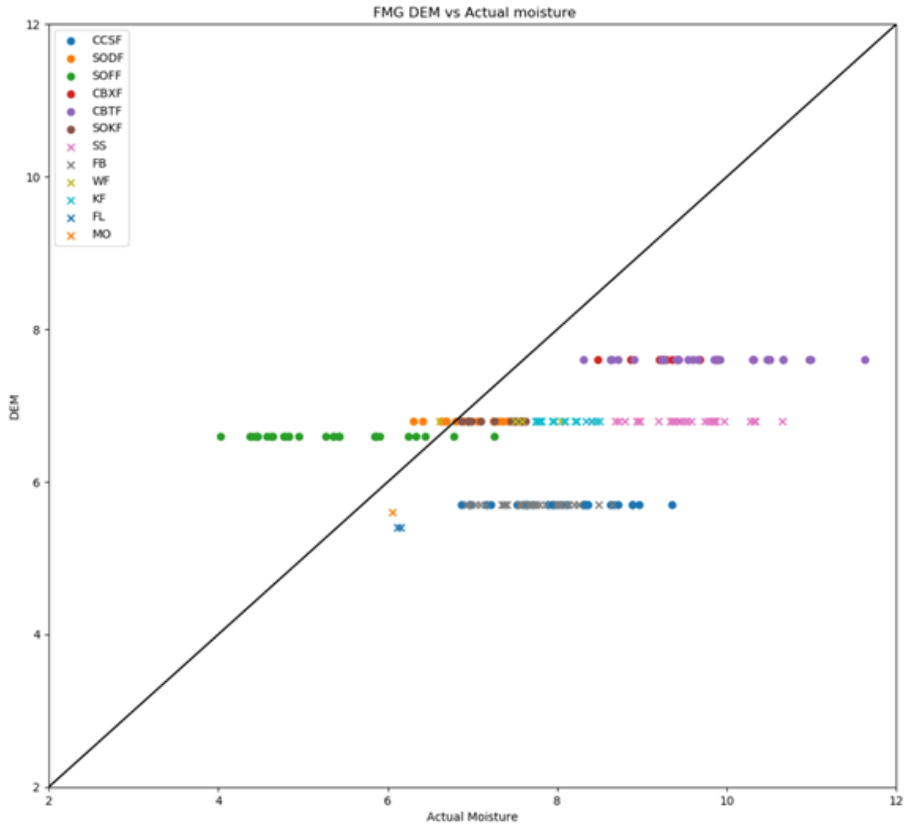
Other port operators that were nearer to the LiDAR equipment during the monitoring period, and that use similar ore handling methods, were identified as being significant contributors to dust. The LiDAR campaign identified that some dust plumes can travel large distances and therefore the Premises is likely to contribute to dust concentrations in the West End from time to time.

5.3.7 Moisture content monitoring

The moisture content of ore is measured at the point of in-load from conveyors CV901, CV905 and CV906 using real time near infra-red analysers. These are the first conveyors immediately downstream of the train unloaders and are located prior to ore entering the stockyard. The moisture content of magnetite ore from the Iron Bridge CHF will be measured at conveyor CV301. Ore moisture is again measured at the point of out-load using oven drying techniques in accordance with Australian Technical Specification *ATS5621-2013 Iron ores – rapid moisture determination*.

Figure 9 depicts the moisture content recorded for all out-loaded ores and blends against the Dust Extinction Moisture (DEM) for those products. All ore moisture readings to the left of the diagonal line representing ore with a moisture content below the DEM level. The DEM level is that at which a material is deemed to emit no dust as determined using Australian Standard *AS 4156.6 – 2000: Determination of Dust/moisture Relationship for Coal*.

From Figure 9 below it is evident that Solomon Firetail Fines present the greatest dust potential of all the ores handled at the Premises due to its typically low moisture content. This is consistent with Licence Holder comments during the inspection conducted 1 November 2018, where the Licence Holder identified Solomon Firetail Fines as being potentially problematic and requiring additional onsite control compared to other ores that are wet processed at the mine for the removal of fines. Solomon King Fines also appear to enter the Premises with low moisture content according Licence Holder data.



CCSF	Christmas Creek Special Fines
SODF	Solomon King Fines (DID)
SOFF	Solomon Firetail Fines
CBXF	Cloudbreak Blended Fines
CBTF	Cloudbreak Super Special Fines
SOKF	Solomon King Fines (CID)
SS	Super Special Fines (blend)
FB	Fortescue Blend
WF	Western Fines (blend)
KF	King Fines (CID)
FL	Fortescue Lump
MO	High Manganese Product

Figure 9: Comparison of moisture content against Dust Extinction Moisture (DEM) levels for all blended and non-blended ores at the Premises between 25 February 2016 and 15 February 2018 (FMG, 2018; DWER, 2018)

Key finding: The Delegated Officer recognises that the currently available on-line moisture analysers provide variable levels of accuracy depending on factors, such as ore type, compared to the more accurate method based on oven drying techniques. DEM compliance demonstrated by these instruments at in-load can therefore not give absolute certainty.

In addition, even if the moisture content is correctly determined to be greater than DEM at the DEM monitoring locations, there is the potential that dust can still be generated at other locations, due to reduction in moisture levels while the ore is stored and handled at the port. While, ore moisture content remains a key control for dust at the Premises, maintaining moisture content above the DEM level as an isolated control cannot guarantee the elimination of dust.

5.3.8 Dust source determination

It is possible to characterise ore types based on their composition. A key characteristic of ore types handled at Port Hedland is the differentiation of hematite, goethite and magnetite. Goethite ($FeO{\cdot}OH$), hematite (Fe_2O_3) and magnetite (Fe_3O_4) are iron oxides. Some ores contain mainly hematite or magnetite while others have varying proportions of hematite and goethite. Marra Mamba ores, for example, are characterised by ochreous hematite goethite mineralogy and occur in the Marra Mamba Iron Formation in the Pilbara. They are surface enriched with a brown colour due to the goethite content. Ores from the Christmas Creek and Cloudbreak deposits are of this type.

If ore types can be clearly distinguished and characterised, dust derived from specific ore types could be assumed to carry the ore type specific signature of composition. A dust speciation analysis would be able to reveal the dust composition and thus identify the source of the dust, specifically the ore type. In a scenario where it is known where specific ore types are handled, at which premises, theoretically dust speciation results could then help identify the source or sources of dust according to those premises.

Whether dust generated from a specific ore type is in its composition identical to the ore type material it is derived from depends on various factors, for instance, dust consists of particulates that can become airborne and travel over a distance. The source material consists of particles of different sizes and weights. Lighter particles are more likely to be lifted off and transported in dust plumes over some distances than heavier particles. For this reason the particle fraction represented in a dust sample may not be identical to the particle composition of the source material and therefore there is less certainty in source identification.

Another complicating factor to consider is the cumulative airshed over Port Hedland in which dust particles from different sources mix, so that the combined dust sample analysed no longer represents only one but multiple sources, which then adds further difficulty to the attribution of dust to specific sources. As most of the iron ore types currently handled at the port contain similar elements, dust speciation as a method of dust attribution is unlikely to be successful in most scenarios. A scenario where dust speciation could be successfully employed for source attribution is one where a distinctive material is being handled at specific premises only, so dust derived from this source can be clearly distinguished from other dust sources at the port. Currently this is the case for magnetite ore at Port Hedland, which will only be handled at Iron Bridge CHF and the Anderson Point Materials Handling Facility (the Premises).

5.4 Dust modelling

To determine the potential impacts of increasing Premises throughput amounts on the nearest

receptors in the West End, modelling was undertaken for the following scenarios:

- Scenario 1: 210 Mtpa with 100% hematite comprising approximately 50 Mtpa of ore from the new Eliwana mine.
- Scenario 2: 188 Mtpa hematite with approximately 50 Mtpa of ore from the new Eliwana mine and 22Mtpa of magnetite from the North Star Magnetite Facility currently under development (210 Mtpa total throughput).

These scenarios were compared against a "base case" model which captures the dust load from current handling amounts, ore types and handling methodologies. For each of the scenarios and base case models, results were presented as cumulative and where Premises operations are occurring in isolation (non-cumulative). Cumulative modelling assumes the operation of other existing, approved port operations and the operation of the proposed North West Infrastructure operations in South West Creek (50Mtpa)[1], located southwest of Roy Hill operations.

To support dust modelling, the Licence Holder revised its emissions estimations following a series of site specific measurement surveys of particulate emissions from identified dust sources within the Premises. Emissions estimates are expected to be more accurate to site operations compared to previous estimates, used in 2014 modelling, which were based on generic emission calculations, such as those used in the *National Pollutant Inventory (NPI) Emission Estimation Technique Manual for Mining*. Since modelling conducted in 2014, the Licence Holder has implemented a range of dust controls.

Site specific measurement surveys conducted by the Licence Holder identified the top 20 dust sources. These significant dust sources include conveyors, transfer stations and ship loaders (Figure 10).

[1] Part IV approval for the construction and operation of the North West Infrastructure facility has been achieved through MS891. However, MS1056 amends MS891, stipulating that "the proponent [North West Infrastructure] shall not commence implementation of the proposal after 2 April 2022, and any commencement, prior to this date, must be substantial." To date, DWER has not received an application for this proposal under Part V of the EP Act.

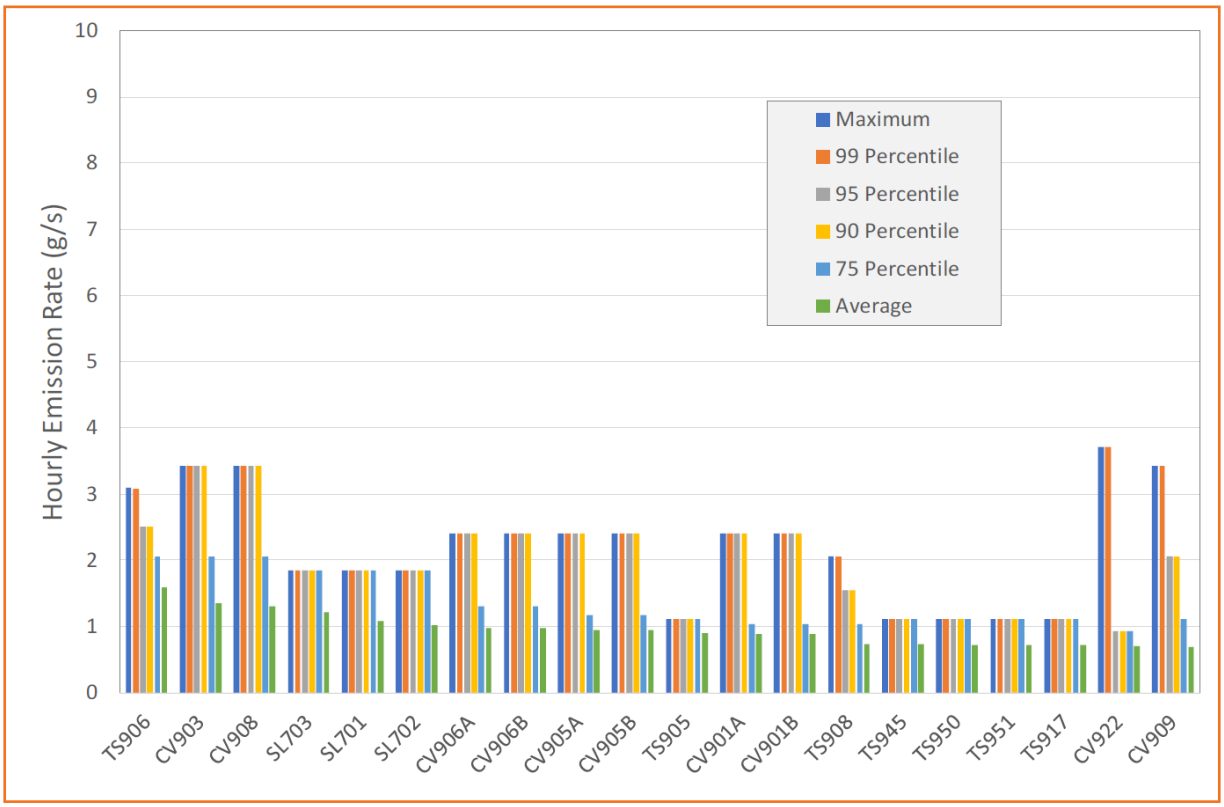


Figure 10: Top 20 dust sources from Scenario 1 hourly variable emission file (g/s) (FMG, 2020)

Scenarios 1 and 2 incorporate additional controls into the assumptions used. These include the installation of belt wash stations automation of stockpile water cannons and narrowing of access roads and increased application of chemical dust suppressant on site roads. Modelling for both scenarios determined that the maximum and annual average predicted PM_{10} ground concentration for the 210Mtpa scenarios will be greater than that predicted for the 175Mtpa base case as shown in Table 7 and Figures 11 and 12 below.

Table 7: Total estimated emissions and modelled ground level concentrations for each cumulative scenario at Taplin Street and Richardson Street monitoring locations

Statistic	**175Mtpa – base case**		**Scenario 1 – 210Mtpa (hematite)**		**Scenario 2 – 210Mtpa (hematite and magnetite)**	
Total estimated emissions (pre-control) (kg/year)	1,378,000		1,665,745		1,576,440	
Total estimated emissions (post-control) (kg/year)	1,378,000		1,333,000		1,284,000	
	Taplin Street	Richardson Street	Taplin Street	Richardson Street	Taplin Street	Richardson Street

Maximum (µg/m^3)	202	220	201	220	200	219
99th percentile (µg/m^3)	82	137	80	130	76	124
95th percentile (µg/m^3)	63	106	60	97	62	92
90th percentile (µg/m^3)	54	90	54	84	53	83
75th percentile (µg/m^3)	45	84	44	67	43	67
Average (µg/m^3)	36.9	60.8	36.2	58.0	35.9	57.3
Count > 70 µg/m^3	9	Not provided	9	Not provided	8	Not provided

Source: Summary of data extracted from data presented in Appendix 3 of the Application (FMG, 2020) and ETA (2019), as prepared for the Licence Holder.

Total estimated emissions for each scenario that take proposed dust abatement controls into consideration, suggest that the target of "no increase in emissions" will be achieved, as shown in Table 7. These controls include the installation of belt wash stations in the head chutes of the following conveyors:

- CV911
- CV912
- CV915
- CV916
- CV921
- CV944
- CV945
- CV948
- CV950

Belt wash stations are equipped with water sprays and scrapers that are designed to reduce the carry back of ore stuck to the underside of return conveyors. Field investigations commissioned by the Licence Holder identified that the dust reduction efficiency of belt wash stations, tested when operating versus not-operating, ranged between 66% and 97%. Therefore modelling based emission estimations on a 75% emission reduction from these controls.

Further controls factored into emissions estimations include:

- reducing stockpile emissions from wind erosion by 50% as a result of automated stockpile water cannons;
- narrowing access roads throughout the Premises;
- increasing the operation of water trucks and stabilising chemical to unsealed roads; and
- additional belt wash stations at CV301[2], CV302, CV927 and CV932 if needed.

[2] CV301 is considered beyond scope for this assessment as it forms part of the proposed premises associated with the Iron Bridge CHF to be regulated under a separate Part V works approval and licence.

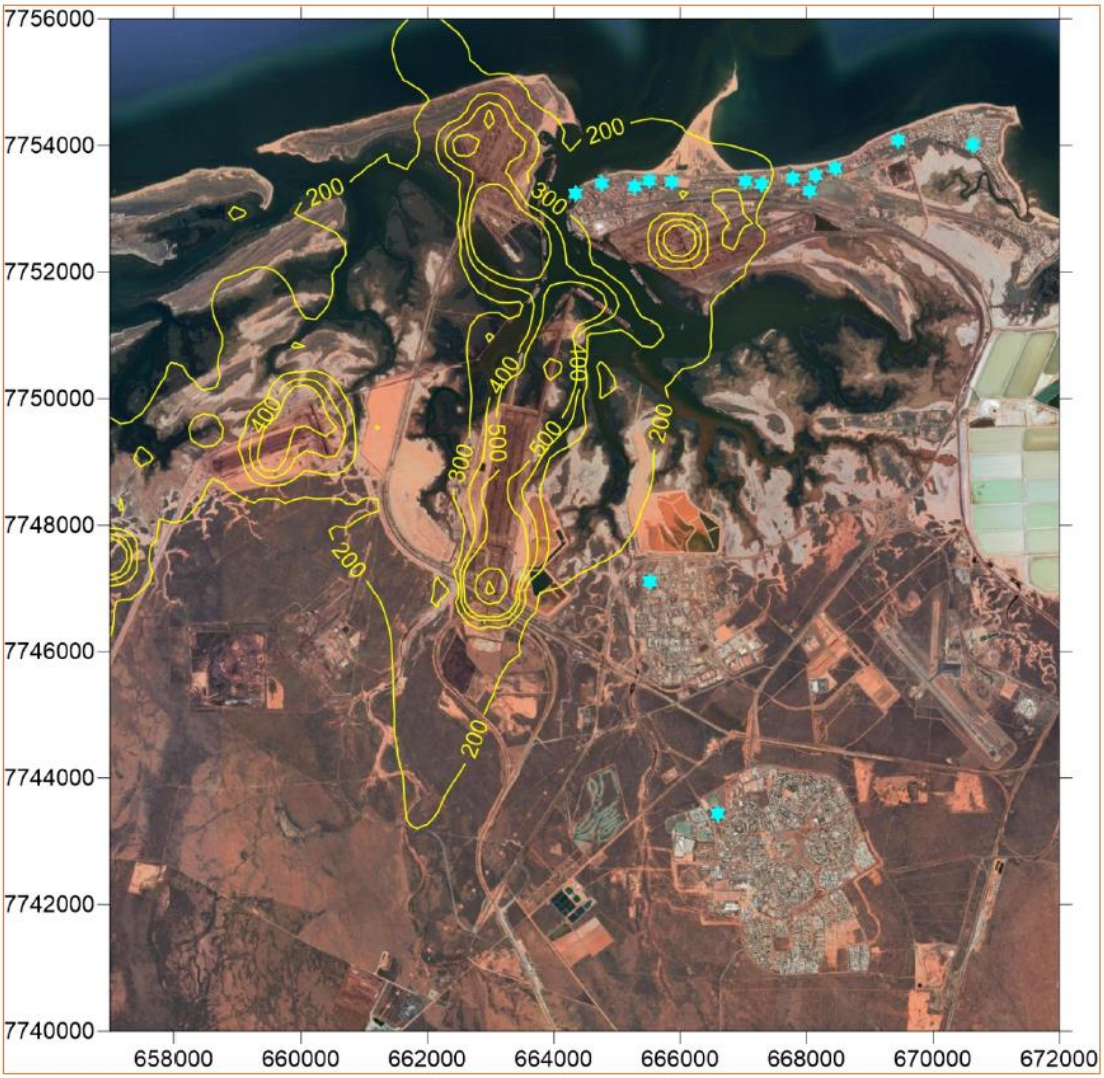


Figure 11: Maximum 24 hour PM_{10} concentration under base case – 175Mtpa cumulative ($\mu g/m^3$)

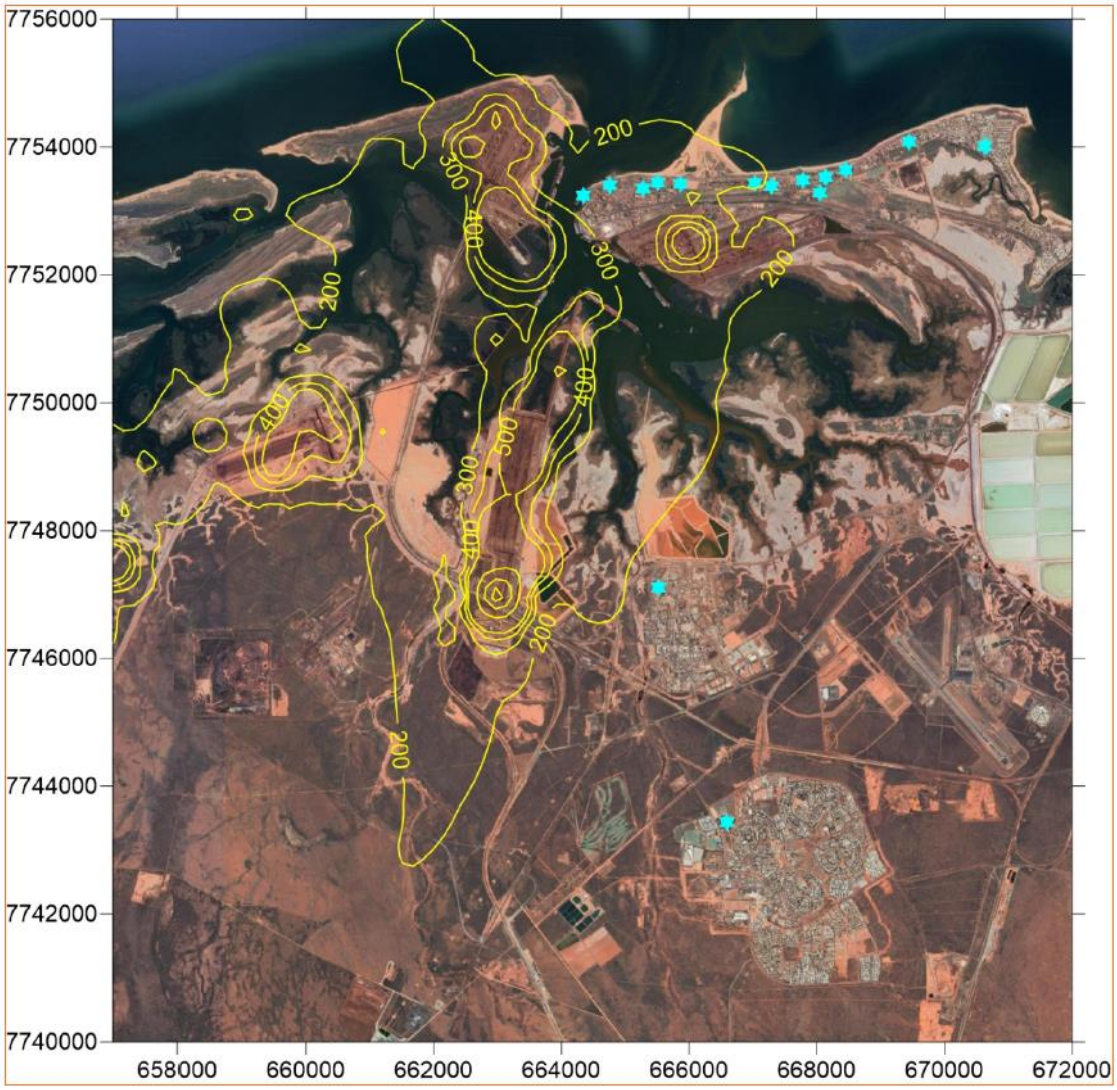


Figure 12: Maximum 24 hour PM_{10} concentration for Scenario 1 – 210Mtpa cumulative ($\mu g/m^3$)

Modelling was also run to predict the ground level concentrations of PM_{10} from the Premises under all three scenarios and in isolation of other port operators. Table 8 shows that under worst case conditions, dust generated from the Premises has the potential to significantly contribute to PM_{10} concentrations in the West End. Predicted maximum 24-hour PM_{10} concentrations at two of the monitoring locations in the West End (Harbour and Richardson Street) exceed the criteria of 70 $\mu g/m^3$.

Table 8: Predicted maximum 24-hour ground level concentrations (PM_{10} in $\mu g/m^3$) for each cumulative and non-cumulative scenario, including the Base Case (175 Mtpa)

Scenario	Harbour	Richardson Street	Kingsmill	Hospital	Taplin Street	Neptune Place	South Hedland	Wedgefield
Base Case (cumulative)	227	220	219	215	202	195	188	195
Base Case (non-cumulative)	115	118	64	53	33	16	18	83

Scenario 1 (cumulative)	227	219	219	215	200	195	189	194
Scenario 1 (non-cumulative)	117	110	66	52	30	14	26	101
Scenario 2 (cumulative)	227	219	219	215	200	195	189	194
Scenario 2 (non-cumulative)	138	114	44	46	29	11	28	80

Source: Summary of data extracted from data presented in Appendix 3 of the Application (FMG, 2020)

When the impact from the Premises is modelled as a standalone dust source on West End receptors, the Licence Holder determined that there will be a slight decrease in the maximum and average ground level concentrations following the implementation of additional controls. However, these reductions become less statistically significant with greater distance to the Premises. Under Scenario 1 modelling has identified that there could be an increase to the maximum dust contribution from the Premises to the Wedgefield Industrial Estate.

The reductions in modelled dust concentrations at West End monitors for each cumulative production scenario and base case are not statistically significant. This may be in part due to other dust sources including from other port operators, local and regional sources that also contribute to the overall dust concentrations captured at each monitor. Other limitations to the use of air quality modelling for decision making are due to the large variability and therefore uncertainty in the accuracy of emissions estimates, coupled with the small measured improvements to air quality presented in Table 8 above.

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 estimate emissions using in-field monitoring, 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 and meteorological conditions. Modelling is useful, however, for comparing scenarios and determining the relative change in emissions under those scenarios.

Modelling is limited by the quality of information provided on background concentrations that also include fugitive emissions from non-port sources, including both natural and anthropogenic sources that can be highly variable from year to year. Historical monitoring indicates that these natural and anthropogenic sources may significantly contribute to the high ambient PM_{10} concentrations experienced at Port Hedland.

Key determination: The Delegated Officer has determined that Scenario 1 represents the worst case scenario as it assumes the handling 210Mtpa of a drier hematite product from the Eliwana mine.

Magnetite handling facilities associated with Scenario 2 for the loading of ore from the North Star Magnetite Facility are yet to be constructed with approval for construction remaining

beyond the scope of this Decision Document. The Licence Holder proposes to ship magnetite ore from the Iron Bridge CHF via Licence Holder shiploaders under the Amended Licence. The first magnetite ore shipment is projected for late 2020.

Based on the limited availability of data related to how the model was produced, DWER was not able to replicate calculations and therefore could not verify, with confidence, the conclusions of the model. Specifically, this relates to the emissions reduction percentage assumed for each control. However, based on an understanding of the control mechanisms and the dust sources to which they are to be applied the Delegated Officer considers that the proposed controls do have the potential to significantly reduce dust generated from the known sources.

Therefore, taking into account the uncertainty owing to non-replicable emission reduction calculations and the generally limited accuracy of modelling predictions, for the purposes of this risk assessment, risk is conservatively assessed against Scenario 1 in accordance with the precautionary principle. Maximum and average 24 hour predicted ground level concentrations for PM_{10} under Scenario 2 are lower than both base case scenario and Scenario 1.

5.5 Noise modelling – 210Mtpa

As part of the Licence Holder's application to increase throughputs to 210Mtpa, noise modelling was provided to demonstrate the potential impacts on sensitive receptors in Port Hedland and South Hedland. Port Hedland's West End is situated in close proximity to heavy industry and at current, ambient noise does not meet the Assigned Levels specified in the Noise Regulations.

The following scenarios were modelled to compare the noise levels experienced at receptors with results presented in Table 9:

- Base Case – the current facility noise model.
- In Isolation – the new additional infrastructure operating on its own.
- Cumulative – the base case plus all new infrastructure.

New infrastructure referenced in modelling includes an additional conveyor and drive, two surge bins and infrastructure associated with the proposed Iron Bridge CHF, which is not subject to risk assessment through this Decision Report. Table 9 identifies that noise is expected to exceed Assigned Levels specified in the Noise Regulations in all scenarios in the West End.

Table 9: Predicted worst case received noise levels (L_{A10}) against Assigned Levels

Sensitive receptor	In isolation scenario – dB(A)			Cumulative scenario – dB(A)		
	Assigned Level	Model result	Exceedance in dB	Base Case	Model result	Cumulative level increase in dB
Brearley Street	32	27.6	Nil	40.7	41.0	0.3
Hospital	32	34.6	2.6	48.5	48.7	0.2
Police Station	47	41.4	Nil	54.8	55.0	0.2
Pretty Pool	30	16.9	Nil	29.7	30.0	0.3
South Hedland	30	11.5	Nil	27.0	27.2	0.2

Source: Summary of data extracted from data presented in Appendix 4 of the Application (FMG, 2020)

Key finding: Noise levels from the Premises in isolation are greater than, or within 5 dB, of Assigned Levels specified in the EP Noise Regulations at Brearley Street, Hospital and Police Station locations. Therefore the Premises is a significant contributor to cumulative noise in the West End of Port Hedland, as defined by regulation 7(2) of the Noise Regulations.

However, the additional noise generated by proposed activities is not expected to be perceptible to residents due to cumulative sources.

5.6 Stormwater and washdown water discharges

Under the Reviewed Licence, Total Recoverable Hydrocarbons (TRH) concentrations within stormwater discharges from the Premises cannot exceed current limits of 15mg/L. Conditions require the Licence Holder to monitor point source emissions to land for TRH on a quarterly basis to monitor the performance of oily water separators.

Sampling of discharge points W1 and W2 for TRH has been intermittent as sampling can only be undertaken when the discharge points are flowing, generally only after rainfall events. Both discharge points run to sediment basins that act to settle out sediment prior to discharge into the environment. During the 2018 reporting period, no water was discharged from either of the settlement ponds. In the 2015 reporting year, two minor increases of TRH are noted (3.13mg/L at L2 in Quarter 2 and 0.47mg/L at L2 in Quarter 4), however both of these are well below the limit of 15mg/L.

The Licence Holder also discharges captured process water and wash water from the train unloading sumps and oily water separator, discharging at two points, L1 and L2. Sampling of these discharge points for TRH has been undertaken monthly with all TRH concentrations measured below detectable levels (0.10mg/L) in the 2018 reporting year (AER & AACR 2018).

The Application requires the addition of a discharge point at train unloader TUL1 for the discharge of uncontaminated stormwater. As the catchment area for this water avoids all Primary Activities and areas of chemical storage, this Decision Report does not assess discharges from TUL1 stormwater discharge point.

5.7 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 noted 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;
- build-up of particulate matter on surface within buildings resulting in increased cleaning;
- soiling of laundry being dried in the open air; and
- build-up 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 10), 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 10: 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)	Emission value of PM_{10} for the protection against nuisance or significant disadvantage due to dust fall (non-dangerous dust)

Source: (pg 150, Katestone, 2011)

To measure the baseline dust deposition level, it is necessary to measure dust levels without all industry operating in the area. Due to the seasonal variation in dust concentrations from regional and other local dust sources, this would need to be carried out over an extended period of time, which is impractical. Furthermore this method would only identify an approximate contribution of deposited dust from all industrial sources that have ceased operations during sampling and is unlikely to benefit dust source determination (refer to section 5.3.8).

With regard to TSP, a general correlative ratio with PM_{10} can be determined although an appropriate trigger value for TSP (and dust deposition) that identifies the point at which amenity is likely to be impacted is unknown for Port Hedland.

Other measures commonly used to understand 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 for Port Hedland or for the coastal Pilbara region of Western Australia;
4) the community expectations in Port Hedland, the Pilbara region and the north west of Australia may be different to other parts of the world;

Based on the receipt of several stakeholder complaints and concerns (through submissions to industry expansion applications and complaints) relating to amenity impacts from dust,

the Delegated Officer has determined that the Port Hedland community is sensitive to existing ambient dust levels for amenity.

Consideration of the impacts of air quality on public health is provided in sections 4.6.2, 5.3.4, 5.3.5 and 7.4. It is considered that the application of health relevant criteria (AGV) will also be protective of amenity impacts, especially given that public health is of higher sensitivity than amenity value, noting however, the subjective nature of rating amenity values.

6. Location and siting

6.1 Siting context

The Premises is located on the south side of the Port Hedland Harbour at Anderson Point, within the Town of Port Hedland in Western Australia. The port of Port Hedland is the world's largest volume port for bulk materials export, with the main commodity passing through the port being iron ore.

The existing port operations in Port Hedland are listed in Table 11.

In addition to port operations, a number of other industrial activities are undertaken in Port Hedland including a variety of light and service industries at the Wedgefield Industrial Estate.

Table 11: Port of Port Hedland operators (Category 58 and 58A premises)

Operator	Bulk granular material	Scale of operation
BHP Billiton Iron Ore	Iron ore	Allocated capacity 290Mtpa (proposed 330 Mtpa) Four berths at Nelson Point Four berths at Finucane Island
Fortescue Metals Group	Iron ore	Proposed 210 Mtpa Five berths at Anderson Point
Roy Hill	Iron ore	Allocated capacity 60Mtpa (proposed 70 Mtpa) Two berths at South West Creek
Pilbara Ports Authority (Utah Point)	Iron ore, Manganese ore, Chromite ore and Spodumene ore	Allocated capacity 21.35 Mtpa Single berth at Utah Point
Dampier Salt	Salt	Allocated capacity 75,000 tonnes per day and averaging approximately 3.2Mtpa. Single berth (Berth 3) leased from PPA
Pilbara Ports Authority (Eastern Operations)	Copper and lithium concentrates	Throughput approximately 1,170,000 tonnes per annum Two berths in Port Hedland (Berth 1 and 2)

6.2 Sensitive land uses

The distances to residential and sensitive receptors are detailed in Table 12.

Table 12: Receptors and distance from prescribed activity

Sensitive Land Uses	**Approximate distance from prescribed activity**
The Esplanade Hotel and Pier Hotel (zoned town centre – retail/business in Town of Port Hedland Planning Scheme No. 5)	1.3km to the north of the Anderson Point berths
Port Hedland Visitors Centre (zoned town centre – retail/business in Town of Port Hedland Planning Scheme No.5)	1.45km to the north of the Anderson Point berths
Closest residential zoned premises (zoned residential in Town of Port Hedland Planning Scheme No. 5)	1.75km to the north of the Anderson Point berths (West End) 3.35km to the north of the Anderson Point stockyards
Taplin Street (zoned residential in Town of Port Hedland Planning Scheme No. 5)	3.1km to the north-east of the Anderson Point berths 5.0km to the north of the Anderson Point stockyards
South Hedland (zoned residential and community: education in Town of Port Hedland Planning Scheme No. 5)	4.5km to the south-east of the Anderson Point train loadout. 5.4km to the south-east of the Anderson Point stockyards.
Other Land Uses	**Distance from prescribed activity**
Wedgefield Industrial Estate (zoned industry – industrial zone in Town of Port Hedland Planning Scheme No. 5)	2.3km to the south-east of the Anderson Point stockyard

The Town of Port Hedland reported in the HRA a permanent population of 4,590 people in 2012/13 within Port Hedland and a larger population of fly-in-fly-out workforce. By 2016 the population had declined by approximately 8.9% to 4,180 for the Port Hedland area, which includes the residential area of, and to the east of the West End as well as a small number of residents in the Wedgefield Industrial Estate (Australian Bureau of Statistics (ABS), 2016). At the time of this Decision Report the Port Hedland population, not including Wedgefield residents, was 3,787 (ToPH, 2020).

A greater population resides in the suburb of South Hedland, which at the time of this Decision Report had a total of 9,746 residents (ToPH, 2020) and is located at slightly greater distance to stockyards at Anderson Point as those residents in Port Hedland. Therefore South Hedland residents may be exposed to dust from the Premises.

Figure 13: Aerial image of the Anderson Point berths and stockyard in relation to the West End residential area

6.3 Specified ecosystems

The distances (within a 30km radius) from the Premises to specified ecosystems are shown in Table 13.

Table 13: Specified ecosystems

Specified ecosystems	Distance from Prescribed 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.
Declared Rare flora	There are no declared rare flora species recorded within a 30km radius of the Premises.
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 3.6km from the nearest shiploader.
Migratory birds (listed under the EPBC Act)	Migratory birds have been sited near to the Premises boundary.

*Department of Environment, 2006
[#]EPA, 2001

6.4 Groundwater and water sources

The distances to groundwater and water sources is shown in Table 14.

Table 14: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental Value
Groundwater and groundwater salinity	The hydrogeology around the premises is characterised by shallow aquifers within surficial sediments. During construction of the train unloading facilities the Licence Holder observed groundwater at approximately 1-2 metres below ground level (mbgl). The nearest bore is 1.3km from the train unloading facilities (based on available GIS dataset – WIN Groundwater Sites)	Groundwater salinity (total dissolved solids) is 1,000-3,000mg/L which is considered brackish. Water used in the operation of the Premises is sourced from both groundwater and the desalination plant at the Premises
RIWI Act	The Premises is located in a RIWI Act Pilbara Groundwater Area	N/A

6.5 Soil type

The Premises is located on coastal plains mainly beyond marine flooding influence. The main soils are pedal calcareous earths with some associated highly calcareous earths (Northcote *et al.* 1960-1968).

The area surrounding Anderson Point is dominated by tidal mudflats. The marine habitat in the Port Hedland harbour has already been extensively modified and comprises of bare sandy silty sediments, which create a turbid environment from the large tidal movements in the harbour creek system.

6.6 Meteorology

6.6.1 Wind direction and strength

The following wind rose (Figure 14) provides the annual wind direction and strength averaged over the past five years. Wind vectors from the south-southwest to west-southwest place residential receptors in the West End downwind of Premises' bulk handling activities at approximately 13% of the time. Winds between the north, east and south vectors are expected to remove the pathway for noise and dust emissions to West End receptors the majority of the time.

Five year averaged wind directions from the northwest and north-northwest place residents in South Hedland downwind of Premises activities approximately 16.01% of the time although these residents are at slightly greater distance to Premises activities.

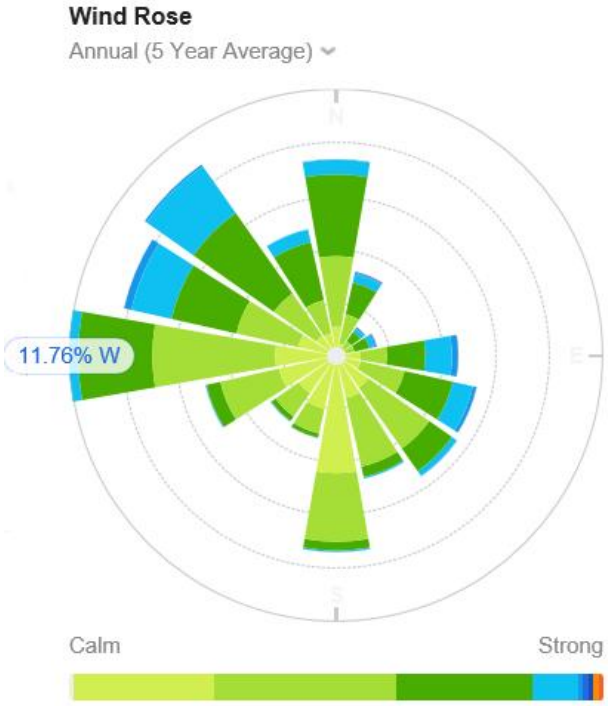


Figure 14: Annual average wind direction and strength in Port Hedland (WillyWeather, 2019)

Key note: Average wind directions offer only an indication of the likelihood of pathways to receptors. As wind direction and speed changes frequently, it is possible for dust lift-off from a strong westerly wind to be transported to receptors northeast in the West End, or southeast in South Hedland.

6.6.2 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 directions consisting of north-westerly

during the summer months and south-easterly during the winter months. Spring also shows high north-westerly dominance.

6.6.3 Rainfall and temperature

The Bureau of Meteorology provides the mean rainfall and maximum temperature for the Port Hedland (mean maximum temperature 1948-2019 and mean rainfall 1942 to 2019). Figure 15 below illustrates that the Port Hedland region is hot to warm all year round with rainfall predominantly over January to March.

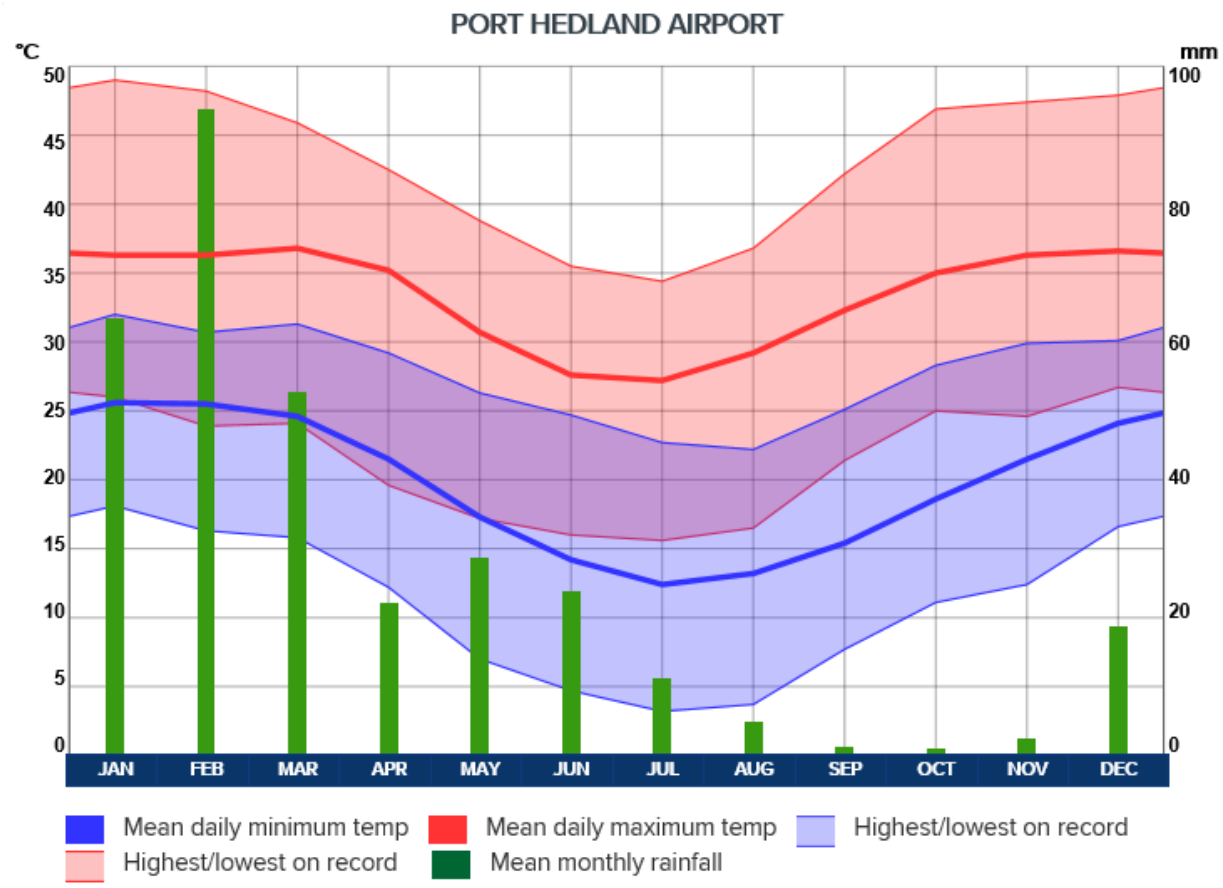


Figure 15: Mean temperature and rainfall Port Hedland (WeatherZone, 2019)

7. Risk assessment

7.1 Emissions, pathway, receptor identification

Identification of key potential emissions, pathways, receptors and impacts are set out in Table 15 below. Table 15 also identifies which potential emissions and impacts will be progressed to a full risk assessment. Some potential emissions/impacts may not receive a full risk assessment if a potential receptor or pathway cannot be identified or if assessment of the emission would result in regulatory duplication.

Table 15: Identification of key emissions

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Category 58 **Bulk material loading**	In-loading, stockpiling, reclaiming and loading of all bulk granular materials	Dust associated with storage and handling of bulk material using train unloaders, stackers, reclaimers, conveyance systems and ship loaders.	Esplanade and Pier Hotels approximately 1.32km from shiploaders. Residential receptors in the West End approximately 1.75km from shiploaders and 3.35km from stockyards. Residential receptors in the South Hedland approximately 4.5km from train unloaders and 5.3km from stockyards.	Air/wind dispersion	Impacts to public health and amenity.	Yes	Refer to section 7.4
			Dust deposition on mangroves located directly adjacent to/nearby shiploading and surrounding Port Hedland Inner Harbour.	Air/wind dispersion	Dust deposition on mangrove foliage may cause loss of condition in mangroves through effects relating to increased heat or reductions in gas exchange	No	Currently managed under Part IV of the EP Act (refer to section 4.1)
		Noise associated with additional vehicle movements, mobilisation of loading infrastructure and operation of dust control equipment.	As above.	Air/wind dispersion	Impacts to amenity	No	Currently managed under Part IV of the EP Act (refer to section 4.1)
		Waste and wastewater to marine waters – Spills of ore or hydrocarbons Discharge of wash down water or contaminated stormwater via specified stormwater discharge points.	BPPH Marine ecosystem	Spills directly to land Infiltration through soils to groundwater Overland or subsurface flow towards creek lines or marine waters	Land and groundwater contamination. Reduction in ecosystem health and water quality	Yes	Refer to sections 7.5
		Light emissions from the Premises – berth and ship loader lighting	Flat back turtles (*Natator depressus*) nest at Cemetery Beach and Pretty Pool. In addition three other turtles visit Port Hedland waters. Cemetery Beach is located approximately 4.5km from the berth at Finucane Island.	Artificial light from elevated light sources at the Premises.	Hatchlings have the potential to be impacted by artificial light as it can cause them to become disorientated and change natural behaviours (guided by light).	No	Berth and ship located at the Premises located approximately 4.5km from receptor. In addition, impacts to listed threatened and migratory species can be managed under alternative legislation such as the EPBC Act.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
	General site activities (other dust sources)	Dust associated with vehicle movements on unsealed areas and from other open areas within the Premises e.g. laydown areas.	Esplanade and Pier Hotels approximately 1.32km from shiploaders. Residential receptors in the West End approximately 1.75km from shiploaders. Residential receptors in the South Hedland approximately 4.5km from train unloaders.	Air/wind dispersion	Impacts to public health and amenity	Yes	Refer to section 7.4
Category 70 **Screening of material**	Re-screening of ballast	Dust associated with the rescreening of ballast.	As above.	Air/wind dispersion	Impact on health – potentially includes allergic reactions and respiratory problems Impact on amenity – visible dust leaving the Premises and dust fallout onto cars and homes	No	Refer to section 7.4
Category 85B/54A **Water desalination plant**	Discharge of hypersaline wastewater from the desalination plant to the Dredge Material Management Areas (DMMA)	Saline discharge to land (DMMA)	BPPH Marine ecosystem Habitat	Discharge to settlement areas with potential to subsequently discharge to South Creek	Reduction in ecosystem health and water quality	No	Discharge to DMMA is currently managed under Part IV of the EP Act (refer to section 4.1)
	Discharge of hypersaline wastewater from the desalination plant to the marine environment	Saline discharge to the marine environment via the Desal Outflow	BPPH Marine ecosystem Habitat	Discharge to settlement areas with potential to subsequently discharge to South Creek	Reduction in ecosystem health and water quality	No	Maximum discharge rates do not meet the criteria specified in the EP Regulations (refer to section 3.2.3)

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 16 below.

Table 16: 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 17 below.

Table 17: Risk criteria table

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

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

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

“onsite**”** means within the Prescribed Premises boundary.

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 18 below:

Table 18: 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 Event – dust

7.4.1 Description of Risk Event

Fugitive dust generated from open areas, vehicle movements on sealed and unsealed roads, stockpiles 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.

Dust emissions from handling and movement of all bulk granular material include points where ore is dropped from height such as at train unloaders, transfer points, ship loaders and stackers or where ore is reclaimed from stockpiles. Dust may also be generated from dried ore on the underside of return conveyors (carry back).

Dust may also be generated from point sources such as stacks at the end of bag houses used for dust control at the train unloaders and ballast rescreening plant. In addition, from the operation of the screening plant used to separate fines from ballast material.

7.4.2 Identification and general characterisation of emission

The HRA identified that the major component of dust arising from port and commercial operations is iron oxide. The HRA concluded, based on the results of monitoring data, that risks associated with other potential contaminants, including metals, silica and asbestos, are negligible. Refer to ore characteristics specific to the Licence Holder in section 7.4.3.

The amount of dust generated at the Premises is a factor of the ore throughputs, the way that ore is handled at the premises, the moisture content of the ore and the physical nature (particle size) of the ore.

7.4.3 Ore characterisation

Exploration drilling in the Licence Holder's proposed mining areas in the Chichester Ranges did not detect the presence of, or geochemistry indicative of asbestiform minerals. Ongoing dust monitoring at mine sites is undertaken to check for asbestiform materials in the ore (FMG, 2020a).

Personnel asbestos sampling/monitoring is routinely conducted at the Licence Holder's mine site operations across a range of job roles including driller, process plant operator and bulldozer operator. Each of these workers is expected to be exposed to a significantly greater concentration of asbestos in air compared to the residential receptors of Port Hedland due to their much closer proximity to the source of dust generation. All samples taken from personnel at the Eliwana mine site were below workplace exposure standard of 0.06 fibres per milliliter (f/mL) (FMG 2020b).

The risk to public health from the dust generated at the Premises is largely dependent on the particle size and its ability to enter the lungs, whereas coarser particles are more likely to present nuisance impacts. Finer particulates have greater potential to be carried by wind and may be transported large distances to receptors.

The majority (approximately 85%) of the Licence Holder's ore types are wet processed at the mine. Therefore the moisture content at in-loading is typically above the DEM level and the fines content is low, reducing the dust potential of these ore types. The Licence Holder estimates that wet processing of ore at the mines removes fine materials less than 40 microns in diameter from the final product thereby reducing the potential for PM_{10} generation during handling.

After processing, the content of crystalline silica within ores supplied to the Premises is less than 5% w/w (FMG, 2020b). Wet processing is expected to reduce the proportion of crystalline silica within each product that is of a finer/respirable fraction.

For the purpose of the dust modelling for the 210Mtpa license expansion, Eliwana ore was

assumed to have the dust potential of the Solomon Firetail Fines (SOFF), which is known to be a potentially problematic ore for dust generation. Processing of ore at the Eliwana mine site will include crushing and screening to meet product moisture between 5.5 and 7%. Water supplied from project bore fields will be added to the ore during crushing and screening to minimise production of dust at the mine.

The Licence Holder has analysed each ore for its dust potential properties including particle size distribution, DEM and historical data on average moisture content of ore upon arrival to the Premises (Table 19). The majority of ore handled at the Premises is iron ore fines with only around 7% of all ore handled in FY2020 being lump ore.

Particle size distribution figures presented in Table 19 describe the percentage of particles finer than 10 micron in each ore and the distribution of particles across the 20th, 50th and 90th percentiles. For example, 20% of Cloudbreak Mokari Fines (CBAF) particles are smaller than 0.4mm in diameter with a median size of 1.6mm indicating a low proportion of finer particles associated with that product. While this may indicate a low dust potential, when viewed next to the current DEM and average moisture content for the same product as it enters the Premises, it is evident in Table 19 that the product still has the potential to generate PM_{10} emissions during handling.

Table 19: Ore dust potential characteristics

Product	Percentage of ore finer than 10µm (%)	Lower 20th percentile (mm)	50th percentile (mm)	Upper 90th percentile (mm)	Current DEM	Average moisture content in FY2020 (%)	Tonnes handled in FY2020 (000s)
CBAF	5.4	0.4	1.6	5.2	7.6	6.16	66 (0.04%)
CBMO	NP	0.29	2.55	7.75	8.1	6.26*	N/A (0%)
CBPF	4.8	0.6	2	5.1	5.1	8.96	8,743 (4.9%)
CBSF	NP	0.24	2.64	7.29	7.8	8.55*	N/A (0%)
CBTF	3.9	0.6	2	5.2	6.8	9.81	12,118 (6.8%)
CBTL (lump)	NP	0.6	2	5.2	5.5	5.725	12,693 (7.1%)
CBXF	5.9	0.31	2.95	13.31	6.7	10.02	9,168 (5.1%)
CCFF	3.4	1.06	2.54	5.36	5.9	8.53	13,762 (7.7%)
CCMO	NP	0.7	2.4	5.5	5.5	3.06*	N/A (0%)
CCSF	3.0	1.1	2.6	5.5	6.2	8.4	35,010 (19.6%)
CCTF	4.1	0.32	2.58	6.74	5.8	8.27	7,550 (4.2%)
CCXF	4.4	1.1	2.7	5.5	6.5	8.28	2,629 (1.5%)
SODF	4.0	0.9	2.4	5.5	5.3	8.23	28,875 (16.2%)

SOFF	6.1	0.4	1.9	5.4	5.3	5.95	22,171 (12.4%)
SOKF	2.8	0.4	1.3	4.6	5.7	7.9	15210 (8.5%)
SOPF	8.7	0.14	2.16	7.57	5.4	4.59	9711 (5.4%)
SOTF	10.2	0.08	1.89	7.40	6.2	5.77	940 (0.5%)

Source: Summarised data from information supplied by Fortescue (FMG 2020a and FMG 2020b)
NP – Not provided
* Based on average moisture content as measured in FY2019. No product of this ore type was handled in FY2020. Below DEM values in red.

7.4.4 Description of potential adverse impact from the emission

DWER considers the key hazard associated with the Premises is from fugitive dust emission generated by PM becoming airborne, which may impact amenity and public health. Iron oxide is not considered toxic or carcinogenic to humans.

Amenity impacts may arise from the deposition of particulate matter on vehicles, clothing, private infrastructure and equipment resulting in discomfort and/or soiling and staining. There may also be some disturbance to visual amenity from dust plumes. As discussed in section 5.7, impacts to amenity are perceived differently across individuals and communities.

Particulate matter 10 microns or smaller (PM_{10}) has the potential to impact public health and affects both the respiratory and cardiovascular systems following both long and short term exposures. Note that there is sufficient evidence to demonstrate that concentrations of PM_{10} above 70µg/m^3 over long-term exposure are associated with morbidity and mortality and increased levels of acute and chronic respiratory and cardiovascular health effects.

The HRA summarised the findings of a comprehensive and detailed hazard assessment by Toxikos of PM_{10} health effects in Port Hedland as follows:

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

Finer particulates that are 2.5 microns in diameter or smaller ($PM_{2.5}$) can present a greater risk to human health if present in elevated concentrations due to the greater potential for finer particulates to be drawn deeper into the lungs. As discussed in section 5.3.5, particles as PM_{10} have formed the basis of DWER's risk assessments, noting that $PM_{2.5}$ size fraction of particles is part of the PM_{10} fraction.

Iron oxide is not considered toxic or carcinogenic. The HRA also found that there is no clear evidence of a causal link between iron-oxides and diseases beyond cardiovascular diseases and other health effects associated with generally high ambient PM_{10} concentrations.

7.4.5 Criteria for assessment

The Government has adopted the AGV for 24-hour PM_{10} of 70 µg/m^3, excluding natural events, applied to all residential areas in Port Hedland.

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 5.7). Alternative criteria used will include complaint (number and nature) together with stakeholder and community submissions. It is considered that the application of health relevant criteria will

also be protective of amenity impacts.

7.4.6 Licence Holder controls

This assessment has reviewed the Licence Holder's *Port Facility Dust Management Plan,* information obtained from site visits and the controls identified in the Application are set out in Table 20 and below.

Approximately 85% of the ore handled at the Premises has been through a wet process at the mine site.

This process removes fine materials thereby reducing the dust potential for those products. In FY2016 the Licence achieved 95% of out-loaded product having moisture content above the DEM level. Moisture content is confirmed from sample station results where ore is tested for moisture using an oven drying technique.

Moisture analysers at the point of in-load are located on each train unloading conveyor. The analysers use a near infra-red technology to determine the moisture content of ore immediately downstream of train unloaders prior to any moisture conditioning. Should ore be detected with a low moisture content, below the DEM level for that ore, dust suppression is activated on the in-load circuit. If the analysers are offline or the in-loaded ore is without a pre-determined DEM level, the dust suppression system is operated.

While it is likely that the proposed controls will reduce dust from each targeted source, the assumed degree of effectiveness of each control is not verifiable based on the level of information provided by the Licence Holder.

Table 20: Existing Licence Holder infrastructure controls for fugitive dust emissions (175Mtpa) and proposed controls (210Mtpa)

	Site Infrastructure	Description	Operation details	Reference to plan on Amended Licence
Existing controls for dust at the Premises				
1.	Stockyard	Unsealed roads around stockyard	Travel at 40 km/hr per hour or less Water carts operated and chemical dust suppressant applied to trafficable areas.	N/A
		Stackers	Stacker water sprays fitted. Stackers have slewing and luffing capability, which allows minimising the drop heights to the stockpiles.	Figure 3: SK701/CV923, SK702/CV936, SK704/CV937, SK705/ CV939
		Reclaimers	Sprays on bucket wheels and boom conveyor operated whenever ore is being reclaimed. Sprays mounted close to the bucket toward the digging face to provide a misting curtain.	Figure 3: RC701/CV920, RC702/CV928, RC703/CV938
		Train unloaders	Partially enclosed structure. Dry dust extraction system operating at all times during unloading (bag house). Water sprays activated as needed when dumping.	Figure 2: TU601, TU602, TU603

	Site Infrastructure	Description	Operation details	Reference to plan on Amended Licence
		Stockpile water cannons	Water cannons routinely operated to prevent visible dust lift off. Weather forecasting and boundary dust monitoring (high dust alerts) is utilised for manual cannon operation.	Figure 3: B1-B6, C1-C6, D1-D6, E1-E6, F1-F6, G1-G6
2.	Conveyors	Under belt scrapers and belt wash stations	Belt scrapers automatically operate when the conveyor is running to remove material carried back from the belt. Under belt sprays are used to further clean the belt at CV903, CV905, CV911, CV912, CV913, CV914, CV915, CV916, CV917, CV920, CV921, CV922, CV925, CV926, CV927, CV928, CV932, CV935, CV936, CV937, CV938, CV944, CV945, CV948, CV950 and CV953. Spillage under the conveyors is cleaned regularly to prevent suspension of material removed by the scrapers and belt wash stations.	Figures 2, 3, 4 and 5: CV302, CV901, CV902, CV903, CV905, CV906, CV908, CV909, CV911, CV912, CV916, CV918, CV968, CV913, CV914, CV917, CV944, CV915, CV921, CV922, CV927, CV932, CV945, CV948, CV948A, CV950, CV953, SH913, SH914, SH917, SH906A
3.	Transfer Stations	Enclosed	Transfer stations enclosed. Water sprays operated for dust and product moisture control. Water sprays and skirts (hard and rubber skirts) fitted to the exit of transfer points.	Figures 2, 3, 4 and 5: TS901, TS902, TS903, TS904, TS905, TS906, TS908, TS909, TS914, TS917, TS944, TS945, TS954, TS968
4.	Shiploader	Shiploader	Sprays operated on boom discharge and conveyor during loading. Dust curtains and spray bar fitted at the end of the boom. Shiploaders lowered into the hatch to minimise drop height.	Figure 5: SL701/CV925, SL702/CV926, SL703/CV935
5.	Screening plant	Ballast rescreening	Enclosed screens with dry dust extraction and collection (baghouse).	N/A
6.	Dust Monitors	Beta Attenuation Mass (BAM 1020) monitors	PM10 dust monitoring network operated at the Premises boundary with two additional monitors, one to the west of Wedgefield and one to the west of the stockyard. Four dust deposition gauges are located to the north and south of the Premises and are monitored monthly. Meteorological monitoring station operated to inform alarm systems, measuring wind speed,	Figure 6: Wharf End of the Road NW Corner NE Corner Finucane SW Corner SE Corner TUL SW TUL SE (E-sampler)

	Site Infrastructure	Description	Operation details	Reference to plan on Amended Licence
			direction, rainfall, barometric pressure and humidity. Alarm system with internal trigger values and response procedure in place. If a trigger value is exceeded, an email notification is sent to the Licence Holder's staff and an investigation is implemented. If investigation finds operational related exceedance, contingency action is taken.	
7.	Sealed roads	Road sweeper	Manual dry sweep area at the wharf undertaken daily. The main causeway road is sealed.	N/A – mobile
8.	Vegetation shelter belts	Vegetated area 2.2km long by 6 km wide to act as a natural wind fence.		
Proposed additional controls for dust (210Mtpa)				
9.	Additional belt wash stations	Belt wash stations applied to the following conveyors for the prevention of ore carry back (Figures 2, 3, 4 and 5 of the Amended Licence): CV911, CV912, CV915, CV916, CV921, CV922, CV944, CV945, CV948, CV950 And if required: CV302, CV918, CV927, CV932		

The Licence Holder has developed a high dust alert procedure to respond to high PM_{10} concentrations (Table 21) as recorded at the boundary monitor located adjacent to shiploader AP3, depicted in Figure 6 of the Amended Licence as the monitor titled 'Wharf' (FMG, 2020a).

Table 21: Existing Licence Holder alert trigger levels for dust management

Alert level	Monitor/Alert Trigger Levels
Alert Level 1	≥280 µg/m^3 PM_{10} (rolling 30 minute average) when wind direction is between 201 and 231°
Alert Level 2	≥200 µg/m^3 PM_{10} (rolling 1 hour average) when wind direction is between 201 and 231°
Alert Level 3	≥145 µg/m^3 PM_{10} (rolling 24 hour average) when wind direction is between 201 and 231° for 12 or more hours (cumulative)

Source: FMG, 2019

Once triggered, an alert is sent to site based personnel. Response to these alert triggers include the:

- identification of operating conveyor belts, where, for how much longer and if they are generating dust;
- visually inspect operations to identify the dust source;
- review dust suppression equipment to ensure it is running on operational routes;

- review the Air Quality Management System; and
- review wind and weather forecasts.

Additional controls are implemented as needed such as running more water carts, sprays and cannons during high dust events. Non-essential work that has the potential to emit dust may be ceased where additional controls implemented fail to suppress dust.

7.4.7 Key findings

The Delegated Officer has reviewed the information regarding fugitive dust and has found:

1. The amount of dust potentially generated during the handling and storage of iron ore at the Premises is expected to negatively correlate with the moisture content of that material. However, dust may also be generated as a result of over hydrated ore. Wet ore can stick to the underside of conveyors where it dries and later generates dust when conveyor vibrations liberate the dried material.
2. Not all ore received at the Premises is mined below the water table and/or wet processed and therefore has the potential to be received with a moisture content below DEM. For example, hematite fines from the Eliwana mine are currently located above the groundwater table and are not wet processed at the mine site and therefore have greater potential to generate dust.
3. The Licence Holder has not proposed any dust controls (e.g. belt wash stations) for conveyors listed the top 20 dust sources from the Premises, as depicted in Figure 10, with the exception of CV922 which is only proposed 'if needed'.
4. There is limited capacity at the Premises to condition the product once received. Blending of drier ore with wetter ore can improve the rate of out-loaded ore having a moisture content above DEM although there remain a number of potential emission points for the drier ore prior to stacking and blending.
5. The risks of asbestos fibres in residential locations was found to be negligible based on monitoring programs to inform the HRA. Proposed Premises operations are not expected to increase the likelihood of public exposure to asbestiform fibres.
6. The Premises is a significant contributor to cumulative dust (refer to sections 5.3 and 5.4). Based on its location, the Premises may also contribute to dust elevated concentrations in South Hedland depending on meteorological conditions.
7. It is expected that the application of health relevant criteria (AGV) will also be protective of amenity impacts (refer to section 5.7).

7.4.8 Consequence

Fugitive dust – existing

Based on historical monitoring data it is clear that Government-endorsed ambient air quality criteria in the West End (70 µg/m^3) will be exceeded based on cumulative impacts from all operators and dust from other local and regional sources. Dust modelling commissioned by the Licence Holder shows that dust emissions from the Premises significantly contributes to ground level dust concentrations of PM_{10} in the West End of Port Hedland based on existing

throughputs, ore products and handling methods (refer to sections 5.3 and 5.4). The maximum potential dust generated from the Premises during worst case conditions will exceed the AGV at Harbour and Richardson Street locations in the West End under all scenarios, including the base case scenario.

When reviewed in the cumulative scenario, modelling predicts that average ground level concentrations exceed air quality criteria at Harbour monitoring location based on current practices and reduces to narrowly to fall below the criteria at the same location for both increased throughput scenarios following the implementation of additional controls. As discussed in section 5.4, there is sufficient uncertainty surrounding the likely degree of effectiveness of proposed dust controls to question these conclusions.

Therefore the Delegated Officer has determined that cumulative concentrations of PM_{10} may result in adverse health effects to the Port Hedland community requiring occasional medical treatment and the consequence of impacts to health is assessed as ***major***.

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

In addition, specific consequence criterion for public health at South Hedland is likely to be exceeded each year. The Premises is expected to contribute to overall dust concentrations in South Hedland throughout the year along with other nearby industrial sources including Wedgefield. Therefore the Delegated Officer has determined that cumulative concentrations of PM_{10} in the South Hedland community presents a ***major*** consequence.

7.4.9 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of dust emissions migrating to receptors in the West End at sufficient concentrations to cause health impacts is ***possible***.

Due to its proximity to significant local sources of dust, the HRA notes that the risk to residents in Port Hedland may be up to twice as high than for those living in South Hedland (DoH, 2016). However, there remains a pathway for dust emitted from the Premises to South Hedland approximately 4.5km to the south-east. South Hedland may also be impacted by other dust sources including other port operations, cleared areas, natural sources and other industrial activities, namely from Wedgefield Industrial Area.

Cumulative dust may contribute to high ambient dust in South Hedland above criterion at some time. Therefore the Delegated Officer has assessed the Risk Event likelihood as ***possible*** for South Hedland.

7.4.10 Overall rating of dust

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 16) and determined that the overall rating for the risk of cumulative fugitive dust emissions is **High** when taking into consideration the total throughputs (all ores) handled at the Premises. However, the increase in overall throughput amounts does not substantially change the risk rating of High associated with existing Premises activities.

7.5 Risk Event – discharge to land, groundwater and marine waters

7.5.1 Description of Risk Event

Contaminants may enter the marine environment or impact BPPH through desalination plant discharges, contaminated stormwater and wash down water discharges, spills directly to land and surface water or by infiltration of soluble contaminants to groundwater.

Material may also enter the marine environment directly from spills during ship loading, for example through openings in the wharf (gaps and drainage holes) that allow a direct pathway for spilt ore.

7.5.2 Identification and general characterisation of emission

Discharges of stormwater or wash down water to the Port Hedland Inner Harbour may cause increased turbidity and/or contamination of the marine environment.

The Premises has four dedicated stormwater discharge points, each with associated sedimentation ponds/silt traps. These are shown in Figure 8 of the Licence as:

- L2 – Stormwater discharge point with associated silt trap capturing runoff from the train unloading area.
- W1 – Stormwater discharge point with associated sedimentation basin fed from stockyard stormwater drains.
- W2 – Stormwater discharge point with associated silt trap capturing runoff from Australia Island laydown area.
- W3 – Stormwater/ washdown water discharge point with associated sediment pond capturing runoff from the laboratory/ sample station area.
- W4 – Stormwater/Washwater discharge point with associated silt trap capturing runoff from wharf.
- W5 – Stormwater discharge point associated with removal of stormwater from TUL basement.

7.5.3 Description of potential adverse impact from the emission

Iron ore is not soluble in water meaning that discharges of iron ore will be present as suspended solids only. Discharges with high sediment loads (possibly as a result of spilt ore or soil picked up by runoff) can cause sedimentation and turbidity, potentially impacting the surrounding mangrove community and benthic ecosystems.

Discharge point L1 in Figure 1 relates to a discharge of treated water into process water tanks for oily water separators OWS1 and OWS2. According to DWER's report on the findings of the October 2014 site inspection, all contaminated waters generated from the washdown bays, train unloader and fuel farm are treated through the OWS network. The process water tanks collect treated water from each OWS and store it for use in dust suppression. Hydrocarbon wastes are collected and removed from site by a contractor.

Discharges containing hydrocarbons can impact receiving water quality and disrupt the ecology of marine waters and creeks. Monitoring data summarised in section 5.6 indicates that TRH levels in discharges from the Premises are consistently low and generally below detection levels. Hydrocarbon discharges may also result in the contamination of land.

As discussed in section 3.3.2, the discharge of desalination plant effluent is managed under Part IV of the EP Act and will not be further considered further through this Review.

7.5.4 Criteria for assessment

The ship loading infrastructure which forms part of the Premises is located within the Port Hedland harbour, which has been characterised as requiring moderate ecological protection (Department of Environment, 2006) and the mangrove community in the Port Hedland harbour

is a high value ecosystem (EPA 2001).

This assessment takes into consideration the guidance outlined in *Water Quality Protection Note 68: Mechanical equipment wash down*, which recommends that concentrations of total petroleum hydrocarbons within treated effluent quality from each OWS should not exceed 15mg/L prior to discharge.

7.5.5 Licence Holder controls

The Licence Holder's stormwater, wash-down and process water controls are identified in Table 22.

Table 22: Licence Holder's controls for stormwater, wash-down and process water

Controls for stormwater, wash-down and process water	
Infrastructure	**Description**
Stormwater discharge locations	Stormwater collected at the Premises is directed to settlement ponds to minimise sediment loads prior to discharge at the following locations: • Sedimentation basin discharging into South West Creek (W1) • Australia Island silt trap discharged via spillway into South Creek (W2) • Sample laboratory silt trap discharged via overflow pipe into South West Creek (W3) • Stormwater/Washwater discharge point with associated silt trap capturing runoff from wharf (W4) • Stormwater discharge point associated with removal of stormwater from TUL basement (W5)
Process Water Tanks for OWS 1 and 2	Water from the vehicle washdown bays, workshop, train unloader, fuel farm and refuelling bays is passed through an oily water separator and temporarily stored in tanks (L1) prior to use in dust suppression.
Train Unloader 3 Silt Trap	Excess wash-down and dust suppression water from the train unloader areas is collected in a silt trap (L2) prior to being discharged to the rail loop.
Desalination plant	Desalination plant wastewaters are discharged to the Port Hedland Inner Harbour although this is not a prescribed activity. Any future discharge of these wastewaters to the DMMAs is regulated through MS (refer to section 4.2.1).

The Licence Holder's controls for chemical and hydrocarbon storage are shown in Table 23.

Table 23: Licence Holder's controls for ore and hydrocarbon spills

Controls for chemical and hydrocarbon storage	
Controls	**Description**
Required actions	• hydrocarbons will be stored in a manner consistent with AS 1940-2004, utilising specially designed facilities, including any necessary bunding.

	Hydrocarbons and chemicals are to be stored only at designated areas; • Ensure a current Material Safety Data Sheets for chemicals stored is maintained near all storage areas, in a clearly identified file; • Class 3 chemicals and hydrocarbons shall be separated with buffers, ignition sources, (including cigarettes) protected places and accumulations of combustible materials by the distances indicated in AS 1940-2004; • Ensure that safe access to and egress from the storage vessels is maintained at all times; • Storage facilities containing greater than 10 kL of chemicals or hydrocarbons shall be located on open land; • Storage facilities should be secured from public access; • Bunding at the Main Tank Farm at Anderson Point will have a capacity of 22 ML; • Bunding at the Truck Loading Facility will have a capacity of 1 ML; • In other instances, storage shall utilise bunding capable of storing 110% of the volume of the largest vessel, or 10% of the total volume; • Any drainage valves within storage bunds should be kept closed at all times, unless being used to drain the bund into an appropriate vessel for treatment or disposal; • Bunding shall be inspected following all rainfall events and if necessary during major rainfall events where safety permits; • Spill cleanup within bunded areas shall utilise only materials that are compatible with the oil/water separators; • Any potential flow of a spill shall be prevented from draining to a protected place or watercourse via drainage management; • Water collected at the facility shall be managed according to the relevant section in this management plan. For other chemicals, or where there is the potential for contamination of water, liaise with the Environment Superintendent to determine an appropriate testing and disposal approach; • Storage tanks shall not be overfilled; • Tank vents and fittings shall be inspected at least annually, or on arrival on site for temporary storage vessels; • Tanks shall only be used to store the chemicals for which they are labelled.

The Licence Holder's controls for ore and hydrocarbon spills are shown in Table 24.

Table 24: Licence Holder's controls for ore and hydrocarbon spills

Controls for ore spillages	
Management controls	**Description**

Minimise spillage	The conveyor along the wharf to the ship loaders is over marine waters. Risk of spillage to the harbour is minimised by: Ore being maintained at a moisture content that prevents dispersion into the air Sides of the conveyor are concave to prevent spillage
Ore clean up	Street sweepers operate on a regular basis removing spilt ore from roads and hardstands around the ore handling infrastructure
Controls for chemical and hydrocarbon spills	
Controls	**Description**
Required actions	• Maintain spill trailers for spills during transport • Spill cleanup within bunded areas shall only use materials compatible with the relevant oily water separator • Prevent significant spills from reaching surface or ground water systems and the drainage network • For spills that cannot be managed with the use of spill kits, ensure that the spill response checklist is completed to ensure that the spill has been effectively managed or that the Emergency Response Procedure is implemented as required • Bulk spills of hydrocarbons and chemicals shall be managed according to the site Emergency Response Procedure • Appropriate spill equipment shall be located in close proximity to where chemicals and hydrocarbons are being used • Ensure that spill kits and trailers are regularly audited and following use, and are replenished as necessary • Any contaminated soils or sediments should be removed for treatment within an approved hydrocarbon bioremediation facility

7.5.6 Key findings

The Delegated Officer has reviewed the information regarding discharges and has found:

1. In the 2015 reporting year, two minor increases of TRH were recorded (3.13mg/L at L2 in Quarter 2 and 0.47mg/L at L2 in Quarter 4), however both of these are well below the limit of 15mg/L.
2. No water was discharged from either of the settlement ponds in the 2018 reporting period.
3. The Licence Holder also discharges captured process water and wash water from the train unloading sumps and oily water separator, discharging at two points, L1 and L2. Monthly sampling undertaken at discharge points L1 and L2 has identified that all TRH concentrations measured below detectable levels (0.10mg/L) in the 2018 reporting year (AER & AACR 2018).
4. The marine environment has already been exposed to extensive maintenance

dredging and shipping movements. Remaining existing benthic communities that live in the shallows of the Port Hedland Harbour are likely to be resilient to minor increases in turbidity and sedimentation at localised locations.

7.5.7 Consequence

Based upon the relevant factors discussed in this report, the Delegated Officer has determined that discharges of contaminated stormwater, wash down water or direct spills to land or surface waters may result in low-level impacts to sensitive ecosystems at a local scale. Therefore, the Delegated Officer considers the consequence to be ***moderate***.

7.5.8 Likelihood of Risk Event

Based upon the relevant factors discussed within this report, the Delegated Officer has determined that the likelihood of hydrocarbon discharges to land resulting in impacts to sensitive ecosystems is ***rare***. However, the potential for a direct spill of ore to the marine environment is greater, although it will probably not result in an impact to sensitive ecosystems in most circumstances. Therefore the likelihood has been assessed as ***unlikely***.

7.5.9 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above through the Risk Matrix (Table 16) and determined that the overall rating for the risk of discharges of contaminated stormwater, wash down water or direct spills causing an impact to sensitive receptors during operation is **Medium**.

7.6 Summary of risk assessment and acceptability

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 25 below. Controls are described further in section 8.

Table 25: Risk rating of emissions

	Emission		Pathway and Receptor	Licence Holder controls	Impact	Risk Rating	Acceptability with treatment (conditions on instrument
	Type	**Source**					
1.	Dust emissions from open areas, vehicle movements, storage and handling of ore	Infrastructure and handling process	Air, moving with direction of wind.	Infrastructure and management controls, including product controls.	Public health and amenity.	Major consequence Possible likelihood **High risk**	Acceptable subject to Licence Holder controls conditioned **and additional regulatory controls**
2.	Waste and wastewater to land, groundwater	Stormwater and washwater (contaminated stormwater)	Infiltration to groundwater Overland or subsurface flow towards creek lines or marine waters	Infrastructure and management	Land and groundwater contamination Reduction in ecosystem health and water quality	Moderate consequence Rare likelihood **Medium risk**	Acceptable subject to Licence Holder controls conditioned
3.	Discharge to water from spills	Spills of ore or hydrocarbons	Direct spills and discharges points to land or marine waters	Infrastructure and management	Marine water contamination Reduction in ecosystem health and water quality	Moderate consequence Unlikely likelihood **Medium risk**	Acceptable subject to Licence Holder controls conditioned

8. Determined regulatory controls

8.1 Summary of controls

A summary of the regulatory controls determined by the risk rating of emissions in section 7.6 is summarised in Table 26.

Table 26: Regulatory controls

		Controls				
		8.2 Infrastructure and equipment controls	8.3 Moisture content management and reporting	8.4 Specified actions	8.5 Limits	8.6 Monitoring and reporting
Risk Items (see section 7)	Dust emissions from open areas, vehicle movements, storage and handling of ore	●	●	●	●	●
	Waste and wastewater discharges to land, groundwater	●			●	●
	Discharge to water from spills	●		●		●

8.2 Infrastructure and equipment controls

8.2.1 Construction conditions

Conditions have been placed on the Amended Licence to manage dust during the construction of infrastructure and additional stockyards under specified meteorological conditions that place West End and South Hedland receptors downwind of the Premises. Management actions for the control of construction dust will also be triggered when winds are greater than 14 m/s.

Note: The Licence Holder will also be required to manage dust from construction activities following the exceedance of management trigger criteria (refer to section 8.4.1).

8.2.2 New infrastructure

Infrastructure already authorised for construction under works approval W5643/2014/1 will be approved for construction through the Amended Licence.

Further conditions are required to authorise the construction of additional dust control infrastructure including the progressive installation of select belt wash stations in support of the Licence Holder's application to stage throughput increases at the Premises to 210Mtpa.

Submission of an Environmental Compliance report will be required within 30 calendar days of installing all infrastructure. In addition, written notification of the installation of each stage of

works will be required within 14 days of completion to ensure that DWER remains informed of progress and to track compliance with throughput limits.

The Licence Holder will also be required to conduct targeted dust monitoring to validate the effectiveness of dust controls associated with the Application and submit a Dust Control Validation Report within 12 months from submitting compliance certification, following installation.

Additional regulatory controls: Additional belt wash stations, surge bins and out-load conveyors described as 'if required' in the Application have also been authorised in the Amended Licence. This is to avoid additional licence amendments at a later date if it is determined by the Licence Holder and/or DWER that the objective of 'no net increase' is not achieved following additional ore handling throughputs up to 210Mtpa.

Additional controls for dust have been applied to that proposed in the Application and are specified as construction and operation requirements. For example, the installation of a belt wash station at conveyor CV922 is included in the list of conveyors that require the installation of further dust controls. A report on validation monitoring must be submitted following the installation of belt wash stations.

Key finding: The Delegated Officer has considered that additional controls are needed to demonstrate that the operations are not increasing the risk of dust emissions from the premises. Any increase in ambient dust concentrations in the West End as a result of the proposal may present an unacceptable risk to public health.

Note: DWER has not undertaken any additional risk assessment of the works associated with works approval W5643/2014/1 and amalgamation of construction approvals into the Amended Licence is administrative only. The Licence Holder has requested to surrender the works approval to allow for its revocation under s.59A(2)(3) of the EP Act and avoid holding duplicative approvals.

Conveyor CV301 has not been included in the Amended Licence as this infrastructure is considered part of the Iron Bridge CHF. The construction of CV301 and the associated dust control is authorised under works approval W6394/2020/1.

Grounds: To support the application for increased throughput the Licence Holder submitted a dust model that assumed a 75% emission reduction from the belt wash stations. Due to uncertainty in how these emissions reductions were determined and lack of reproducibility of results, validation monitoring is necessary to increase confidence that these controls are sufficient to ensure a 'no net increase' in dust concentrations in Port Hedland. In its application for throughput increases the Licence Holder has already committed to conducting validation monitoring of belt wash stations.

Additional dust controls are consistent with other similar infrastructure at the Premises that is understood to reduce dust generation.

Conveyor CV922 has been identified as a top 20 dust source at the Premises, as depicted in Figure 3. Therefore the Delegated Officer has determined that dust mitigation at this source is necessary to further justify throughput increases, in addition to other controls committed to by the Licence Holder.

A five year limit has been placed on the installation of all dust generating infrastructure to ensure that the environmental context of Port Hedland can be reinvestigated at a later date in the event that any required or potentially required infrastructure is not built. Noting that dust control equipment has no timeframe and may be installed at any time to allow for increased throughputs (refer to section 8.5.1).

8.2.3 Existing dust management controls

The new and proposed (once installed) infrastructure and equipment, specified in Table 20 to this Decision Report, must be maintained and operated onsite for dust management.

Also incorporated to the Amended Licence is the requirement to maintain the availability of dust control infrastructure at a rate at or above 90% when that equipment is required to be operational in accordance with the Licence.

Note: Requirements for the operation of water cannons, fogging systems on transfer stations and water carts have been more clearly specified in the Amended Licence to remove ambiguity and ensure consistency with DWER's *Guidance Statement: Setting Conditions*.

Based on evidence supplied by the Licence Holder that the moisture content of iron ore is not always above the DEM level for each ore, or blended product, fogging systems at transfer stations and sprays at stackers and reclaimers will be required at all times when handling ore. This does not include the maximum allowable 10% of time where dust control infrastructure may be offline. The Licence Holder is also permitted to manually override dust control equipment when it is raining or at times when handling known wet ores: Cloudbreak Super Special Fines, Cloudbreak Blended Fines and Christmas Creek Special Fines.

The Licence Holder must keep a record of dust control infrastructure maintenance inspections and identify the date and duration of any equipment not being available, until a more accurate operational tracking system becomes available by 1 July 2021.

Grounds: The existing Licence Holder controls detailed in Table 20 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.

Manual overrides to switch off dust controls are permitted to avoid the oversupply of water to the known wet ores, or when it is raining as it is unlikely that the application of water in these situations will reduce dust emissions. In these situations it is possible to increase the amount of ore that sticks to the underside of return conveyors (carryback), which could result in increased dust emissions once dried.

Table 19 demonstrates that the ores specified above are typically received with a moisture content significantly above the DEM level.

8.2.4 Treatment and discharge of potentially hydrocarbon contaminated water

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

- Hardstands and drains around areas storing or using hydrocarbons which are likely to enter washdown water or stormwater (i.e. the workshop, vehicle washdown bays, train unloader facilities, refuelling areas, fuel storage tanks etc.) must be installed and maintained so that potentially contaminated water is directed into an OWS.
- OWS and associated sump infrastructure must be maintained and operated to effectively treat potentially contaminated water so that TRH concentrations in treated water are below the limit of 15mg/L.
- Treated water within the process water tanks to be used for dust suppression purposes must have a TRH concentration of less than or equal to 15 mg/L (tested monthly via a grab sample).

Note: Infrastructure and Equipment controls are derived from those currently undertaken by the Licence Holder.

Grounds: Monitoring for TRH is required to confirm that water has been effectively treated by the OWS prior to use in dust suppression.

8.2.5 Discharge of uncontaminated stormwater

Stormwater (other than potentially contaminated stormwater captured within the areas described in section 8.2.4) must be temporarily contained within a sedimentation basin or silt trap to allow for the settling of suspended sediment prior to being discharged from the locations listed in Table 27.

Table 27: Emission points to surface water

Emission point	Description	Source including abatement
W1	Sedimentation basin discharging into South West Creek	Stormwater
W2	Australia Island silt trap discharged via spillway into South Creek	Stormwater
W3	Sample laboratory silt trap discharged via overflow pipe into South West Creek	Stormwater
W4	Stormwater/Washwater discharge point with associated silt trap capturing runoff from wharf	Stormwater
W5	Stormwater discharge point associated with removal of stormwater from TUL basement	Stormwater
L2	Silt trap discharge from train unloading area	Stormwater

Note: Infrastructure and Equipment controls are derived from those currently undertaken by the Licence Holder.

Grounds: As there is a direct discharge to the marine environment, the discharge points listed in Table 27 and the description of control (sedimentation basin or silt trap) were retained following the issue of the Reviewed Licence. Monitoring of discharges is not required as this water should not have come in to contact with hydrocarbons and should have been retained in sedimentation basins or silt traps to remove the majority of suspended sediments prior to discharge.

8.2.6 Spill control infrastructure

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

- conveyor skirts have sufficient distance from the product to belt edge to minimize spillage;
- spill kits available and utilised where needed.

8.3 Moisture content management and monitoring

A minimum of 90% of all hematite ore, as averaged per train load, accepted at the Premises shall be adequately conditioned to reduce the potential for the generation of fugitive dust during handling and stockpiling activities. Where in-loaded hematite ore is not adequately conditioned for moisture, additional dust management controls must be employed to reduce the potential for dust emissions in addition to the minimum control requirements. All magnetite

ore must be received with a moisture content above the DEM level, as averaged per 10,000 tonnes of in-loaded ore.

A minimum of 95% of all out-loaded ore must have a moisture content greater than the DEM level specific to that ore or blended ore until 30 June 2022, after which the Licence Holder will be required to adequately condition at least 99% of all ore.

The adequate conditioning refers to the moisture content of material which must be maintained at or above the DEM level from the point of receipt at the Premises to the time of out loading to a ship. The DEM level is defined as the moisture content at which the dust number is 10.

The methodology to acquire the DEM level is currently AS4156.6 – 2000.

The DEM level is expected to change as product is extracted from different locations in the ore body. Therefore the Licence Holder is required to obtain revised DEM levels at least once per annual period.

The Licence Holder is required to monitor, in real time, all in-loaded ore at the point of entry to the Premises and undertake sampling of moisture content prior to out-load to confirm that the material is adequately conditioned.

Note: The Delegated Officer understands that it is currently not possible for all ore to have a moisture content at or above the DEM level as this requires application of additional water to the ore at the mine site.

Near-infrared moisture analysers operated at the point of in-load (TU601, TU602 and TU603) must monitor ore moisture content at a minimum averaged frequency of every 10,000 tonnes. Analysers must be calibrated every six months by comparing data against the moisture content of sampled ore cuts that have had moisture analysed using Australian/ISO Standards.

There will be a short period during the commissioning of the Iron Bridge CHF when magnetite ore may not have a moisture content above the DEM level. Once commissioned, the Iron Bridge CHF is expected to deliver magnetite ore with a consistent moisture content. Significant fluctuations in ore moisture are not anticipated due to the wet processing of ore at the mine site and controlled dewatering at the Iron Bridge CHF.

Grounds: Maintaining moisture content above the DEM level has been identified as a critical control for dust mitigation. Therefore improvements are required to ensure that the Licence Holder improves ore moisture content to reduce dust emissions at all stages of handling.

Ore at the Eliwana Mine Site will be mined above the groundwater table and is dry processed therefore is likely to enter the Premises in a dry state. When the ore body intercepts groundwater it is expected that moisture content will substantially increase. Therefore conditions have been set to increase the proportion of ore required to achieve DEM to encourage the Licence Holder to continually improve moisture management from mine to port.

Shiploading infrastructure is the closest potential source of dust to residential receptors and ore conditioning is the primary control to minimise dust emissions. A key measure employed by the Licence Holder to achieve a greater rate of adequately conditioned ore at out-load versus in-load is the process of ore blending. Therefore the Licence Holder is able to achieve a higher rate of ore with a moisture content above the DEM level for out-loaded ore when compared to ore received at the train unloading facilities.

The lower required rates of ore moisture meeting DEM level for the Licence Holder when compared to other port operators in Port Hedland is justified by the required improvements to ore moisture, additional dust controls applied through the Licence Amendment and the Premises' greater distance to sensitive receptors. In addition, the Licence Holder is aware of the moisture content of inbound ore approximately 4 to 8 hours prior to receipt. This allows the Licence Holder to ensure that all necessary controls will be activated when handling drier ores.

8.4 Specified actions

8.4.1 Management trigger criteria

Conditions have been added to the Licence to trigger management actions for dust control in response to elevated short-term PM_{10} concentrations at Taplin Street where the Premises may be a contributing source, as determined by wind direction. Management trigger levels have also been applied to short-term elevated PM_{10} concentrations at boundary monitors.

Once trigger levels are exceeded investigative action is required into the cause of the exceedance. Where the cause can be identified the Licence Holder will be required to address the exceedance by acting to eliminate the source of dust. Where the cause remains unknown and background monitors (BOM and Yule) are not recording elevated PM_{10} concentrations, additional general site controls for the abatement of dust will be required. This includes additional stockpile cannon and water cart operation, and the activation of all dust suppression equipment along operational routes.

Note: Management actions will only be triggered where the wind direction places the Premises upwind of West End and South Hedland receptors. Similar conditions are applied for the management of dust during construction activities (refer to section 8.2.1).

Trigger levels applied to boundary monitors align with short term (1 hour) indicators currently applied by the Licence Holder through its *High Dust Alert Response Procedure*, as alert and alarm levels requiring immediate investigation into the cause of elevated PM_{10} concentrations. Short term trigger levels also require immediate management action to be undertaken to ensure that the Premises does not contribute to high dust levels where sensitive receptors may be impacted.

BAMs typically measure PM_{10} on an hourly averaging period, presenting data for the previous hour meaning that data received may not accurately represent the ambient air quality in real time. The BAMs located at the Premises boundary are capable of measuring PM_{10} over 10 minute intervals through real time modules. Therefore the Licence Holder is capable of reacting to high ambient dust levels at the Premises boundary in near-real time.

Grounds: Management actions that are responsive to high dust concentrations at the receptor serve to reduce the likelihood of longer-term (24-hour) exposure to elevated PM_{10} concentrations at receptor locations.

Management trigger criteria are targeted at reducing dust from Premises operations that may be contributing to dust concentrations at receptors in the West End and South Hedland. Although South Hedland is located further from the Premises compared to the West End, prevailing wind directions are more likely to place South Hedland residents downwind of prescribed activities. As existing dust levels in South Hedland are also elevated (refer to Table 5), residents in this area are sensitive receptors.

Where high dust levels are permitted to continue, the risks of both amenity impacts to sensitive receptors and the AGV being exceeded increase.

The arcs of influence are small and limit the potential for contribution from outside influences. As some monitoring locations are not downwind of Premises activities during the specified wind conditions, they have not been applied to management trigger criteria conditions. The likelihood of criteria being exceeded and wind moving in the direction of the narrow arcs is commensurate to the likelihood of Premises activities impacting sensitive residential receptors.

It is worth noting that management criteria set against wind arcs are not a perfect solution to responding to Premises impacts on receptors. For example, this method may limit the recording of, and response to dust events occurring at receptors during wind directions beyond the ‘arc of influence’. This may occur where dust from the Premises moves in an arcing fashion as wind direction swings. Wind arcs may also not capture impacts from lift-off of

settled dust from the Premises that is deposited and/or lifted during wind conditions beyond the arc of influence.

As was identified in DWER's LiDAR report 2017 it is also possible for plumes from the Premises to be narrow and miss the downwind monitor. In such instances it is possible that the Premises could be a significant contributor to ambient concentrations at West End and South Hedland receptors and no dust management measures are triggered.

It is also possible that during high dust events other operations may contribute to high dust levels under the specified wind arcs. In the absence of less limited monitoring trigger response management options, the use of these conditions in combination with the prescription of dust control infrastructure and operational dust management strategies on all port operating licences works to safeguard against impacts to receptors from high risk events. As the Licence Holder operates in a cumulative air shed where risks associated with dust are assessed as 'high', all contributions to dust concentrations in that wind arc must be addressed.

8.4.2 Static stockpile management

The specified action relates to the sealing or treatment of stockpiles that have been left unattended for six weeks or more. The Licence Holder will be required to apply a physical barrier or chemical stabiliser to stockpiles that have become 'static'.

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 six 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.

Note: 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.

An additional condition has been applied to prevent the movement of stockpiles for the purpose of avoiding the time based restriction.

The term 'static stockpile' does not apply to smaller stockpiles less than 50,000m^3 so long as it does not exceed 12 metres in height. For these stockpiles, if stored for a period greater than six weeks, the Licence Holder will be required to apply additional water through the use of stockyard cannons.

Grounds: The condition requires the shipping or sealing of drying stockpiles within sufficient time to avoid an increase in ambient PM_{10} concentrations at receptors.

The exclusion of ore that has a moisture content above DEM has been determined by the Delegated Officer to be acceptable on the grounds that the Licence Holder remains compliant with other dust management controls specified on the Licence.

Static stockpiles may lead to a drying of the stockpile surface which may lead to lift off. In addition, ore throughout the stockpile may dry out resulting in dust emissions when it is being reclaimed. In these instances dust cannot always be controlled by the available sprays.

For smaller 'static' stockpiles it is possible that the surface will be protected by other, taller stockpiles, reducing the height from which dust is emitted and thereby lowering its potential to travel over distance to the nearest receptors approximately 3.35km from stockyards.

The Delegated Officer has determined it necessary to apply these management actions on the Licence to reduce the assessed 'High' risk of dust impacts to sensitive receptors.

8.4.3 Spill control actions

Significant ore spills must be cleaned up after every ship loading event with inspections of the wharf for spills undertaken at least daily.

8.5 Limits

8.5.1 Throughput limits

The Licence Holder will be permitted to handle up to 210Mtpa under a staged approach to ensure the volume of dust generated is controlled.

Staged hematite throughput increases to 188Mtpa will be permitted upon the progressive installation of belt wash stations. The full throughput amount of 210Mtpa will only be permitted once the Iron Bridge CHF is operational and 10 belt wash stations are installed. The loading of hematite ore will be capped to 188Mtpa of the final authorised throughput amount of 210Mtpa while magnetite ore will not be limited.

The Licence Holder is only permitted to handle up to 210Mtpa of ore.

Note: Each throughput increase will only be permitted after the submission of the Environmental Compliance Report referred to in section 8.2.2. Following this the Licence Holder will then be required to validate the effectiveness of the controls (belt wash stations) over the following 12 months. To validate effectiveness the Licence Holder will need to monitor dust concentrations up and down wind of the controls equipment during on and off scenarios and when handling a variety of ore types.

In the event that validation monitoring does not confirm the effectiveness of these controls, DWER may consider initiating an amendment to the Licence to require additional dust controls, such as belt wash stations to be installed at the additional conveyor locations listed in row 9 of Table 20: CV302, CV918, CV927 and CV932.

Grounds: Modelled results presented in Table 7 of this Decision Report identify that Scenario 1 (210Mtpa of hematite ore) will result in a slight decrease in total emission rate of approximately 45kg per year, or 3.3% less than the base case/currently authorised scenario. According to modelling Scenario 2, which takes into consideration the acceptance of up to 22 Mtpa of wet processed magnetite ore, the total emissions from the Premises would reduce by approximately 6.8% (94 kg/year).

These total emissions estimates take into consideration the additional controls proposed (belt wash stations), which were measured as having between 66% and 96% emissions reduction potential. Although the Licence Holder has conservatively averaged an emissions reduction rate of 75% across all proposed belt wash stations, the margin for error appears large when compared to the margin for total emissions reduction. Therefore there is limited confidence in the dust emission model until controls are validated.

There is also uncertainty in the dust potential of additional ore sourced from the Eliwana mine site which will be used to support throughput increases.

Based on these grounds the Delegated Officer has determined that additional tonnage beyond 188Mtpa is not permitted for the Licence Holder's hematite product. This position is further supported by the fact that the Licence Holder has stated its inability to adequately condition as much as 20% of inbound hematite ore, resulting in greater dust potential for these products.

Based on the anticipated high moisture content of the Iron Bridge magnetite, an additional 22Mtpa, above the authorised 188Mtpa, will be permitted once the Iron Bridge CHF becomes operational. However, the Amended Licence does not limit the amount of magnetite ore handling.

8.5.2 New ore characteristics

Any iron ore (magnetite or hematite product) from an alternate mine site to those currently

supplying the Premises and assessed through this Decision Report may only be handled at the Premises where they meet minimum ore characteristic requirements.

The Licence Holder has requested the flexibility to introduce iron ore products that have not been assessed through this Decision Report. The determination of risk has been assessed against the characteristics of the ore handled currently and on that proposed for handling through the Application. Therefore any significant change in ore characteristics could result in a change to the risks to environment and/or public health from Premises operations. Conditions have been applied to the Amended Licence to avoid an increased risk from such a scenario by limiting the concentrations of possible key hazards associated with iron ore, including respirable dust, respirable crystalline silica and asbestiform fibres.

Note: The presence of asbestiform fibres within a new iron ore can be determined based on the presence or absence of asbestiform fibres in bulk materials in accordance with Australian Standard *AS4964-2004 Method for the qualitative identification of asbestos in bulk samples*. Product quality limits have been applied to achieve the (Department of Health) asbestos air-quality limit of 0.01 fibres per millilitre (f/ml) being met at the nearest receptor.

The Delegated Officer has elected to set limits on respirable crystalline silica limits against the Safe Work Australia occupational exposure standard of 0.1 mg/m^3 time weighted average for respirable silica in ambient air for an occupational setting. A factor of 10 has been applied to conservatively take into consideration possible concentrations in ambient air at sensitive receptor locations, located approximately 1.75km from the nearest dust generating source.

The Department considers respirable crystalline silica to be the fraction of crystalline silica dust that is 10 micron in diameter or smaller (PM_{10}).

The fines fraction trigger level is based on the product currently authorised at the Premises with the greatest proportion of fines. DWER will continue to monitor the proportion of ore being handled at the Premises with a high fines content and may reduce the trigger for fines material within new ores at a later date, with the objective of ensuring that dust emissions are not increased.

8.5.3 Discharge to land

Wastewater discharges from OWS shall not contain a greater than 15 mg/L TRH. Post treatment wastewater is directed to process water tanks for use in dust suppression.

The *Environmental Protection (Unauthorised Discharge) Regulations 2004* (UDR) outlines a number of materials including petrol, diesel or other hydrocarbons that if discharged into the environment cause an offence. Should hydrocarbons be released into the environment, it may be considered an offence. Should the hydrocarbons be considered to be from the treated wastewater (post oily water separator treatment) and requirements of the licence are met, a defence to the offence provision in the UDR is available.

8.6 Monitoring and reporting requirements

8.6.1 Boundary monitoring

The Licence Holder is required to monitor particulates as PM_{10} through its nine ‘real time’ boundary monitors located adjacent to key dust sources including the stockyard, train unloaders and shiploading infrastructure. Meteorological monitoring is required to be measured at the TUL Met Station depicted in Figure 6 of the Amended Licence. This includes the monitoring of wind speed, wind direction and rainfall. Other parameters used such as temperature and barometric pressure are also monitored and can be used to identify potential inversion events.

Based on the monitoring data obtained at boundary monitors and Taplin Street, the Licence Holder will be required to investigate and report on events where dust levels are elevated over

a 24 hour period (refer to section 8.6.4).

Note: The provision of boundary monitoring data will be required annually.

Grounds: DWER requires continued monitoring to be undertaken for air quality at the Premises boundary and within the Port Hedland airshed given the current high risk of dust events.

PM_{10} and meteorological monitoring is required to inform the management actions discussed in section 8.4.1 and to identify Reportable Events discussed in section 8.6.4. Information provided following Reportable Events at boundary monitors and at Taplin Street will assist DWER to identify the possible source, or sources of dust, which will assist compliance determinations and future risk-based decision making. Consideration of monitoring data from other ambient monitors in Port Hedland and South Hedland will assist in the determination of potential impacts to receptors.

8.6.2 Boundary monitoring data review

Boundary monitoring has several important functions. It can be used to measure dust concentrations at the premises, trend data over time, compare data from different locations at the premises in relation to operational dust source emissions, offsite dust emissions entering the premises and background dust levels. The data is also useful to compare with dust concentrations recorded at ambient monitors to explore the relationship between dust levels at the premises and at sensitive receptors. While understanding the limitations of such data analyses, they can provide important insights to inform on site dust management, evaluate the effectiveness of dust controls and to review and optimise current practices of Trigger Action Response Protocols.

Conditions have been added to the Licence to include the review of boundary dust monitoring data through a boundary monitoring data review report. The report will examine PM_{10} data from the boundary monitors specified in the Amended Licence over an extended time period which includes pre-, during and post- throughput increase.

Grounds: The boundary dust monitoring data reporting is required to demonstrate that the objectives of boundary monitoring relating to PM_{10} emissions are met. Specifically to verify the setup and location of the monitors with regards to their effectiveness in providing data capturing premises' dust source emissions, capturing the effects of dust control actions following elevated dust concentration readings and its usefulness for evaluating premises dust contributions to ambient levels. In addition the review of the monitoring data will support the evaluation of appropriate trigger levels as action criteria and reportable event criteria.

8.6.3 Dust deposition monitoring and dust speciation

As outlined in section 5.3.8, the Licence Holder will be introducing a new material, magnetite, to the port of Port Hedland and this scenario is suitable to undertake depositional dust monitoring for the purpose of speciation analysis. Specifically, this analysis will be able to identify the presence and proportions of hematite, goethite and magnetite in a depositional dust sample. This program will be set up to monitor dust at and near the Premises and at an offsite location.

Note: Monitoring results will be included in quarterly reporting. Monitoring will include establishing a baseline prior to receiving magnetite concentrate on site and then continue during operation and ongoing magnetite handling. The initial scope of the program will document the status of magnetite dust in relation to other ore derived dust at baseline conditions, when no magnetite is being processed. Data review will inform whether further monitoring locations at varying distances to the premises should be considered. This adaptive approach is consistent with DWER's risk-based framework.

Grounds: Additional monitoring controls are in accordance with DWER's *Guidance Statement: Setting Conditions* based on the assessed high risk of dust from the Premises impacting Port Hedland and South Hedland residents, when considered in the cumulative context.

The additional monitoring program is needed to provide information on premises derived dust emissions. As outlined in section 5.4 there is a level of uncertainty owing to non-replicable emission reduction calculations and the generally limited accuracy of modelling predictions, which limits confidence in the predicted degree of effectiveness of proposed controls.

The additional controls relied upon to achieve the emission reduction outcome are belt wash stations. The effectiveness of these controls depends on their ongoing effective performance. Potential issues such as breakdown due to spray nozzles clogging and reliance on a high level of maintenance are known to occur with known types of belt wash stations. As the additional monitoring will assist in informing on the level of emissions and impacts from the premises, with the ability of identifying dust from magnetite sources specifically, dust deposition monitoring and speciation analysis is required as an additional safeguard to ensure that the predicted 'no net increase to dust emissions' goal is being achieved.

The data collected will provide insights into impacts of magnetite emissions, seasonal and other meteorological influences of emission patterns and allow a degree of source attribution of dust. The new program will complement the existing particulate monitoring and enhance interpretation of dust trends based on particulate monitoring, which cannot easily attribute dust to specific sources. It may also serve to identify and record levels of background dust, dust from non-iron ore sources and the concentration of magnetite ore at distance from the Premises.

8.6.4 Quarterly reporting

The Licence Holder will be required to notify DWER of the following events on a quarterly basis:

- Where the Taplin Street community air quality monitor identifies that PM_{10} exceeds 70 $\mu g/m^3$ over a 24-hour period; and
- Reportable Events as a result of trigger criteria dust boundary monitors.

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

- meteorological data throughout the day;
- graphical representation of PM_{10} concentrations at boundary monitors throughout the day;
- air quality data from other community monitors and the Yule and BoM (background) monitors;
- the moisture content of ore handled at each shiploader in comparison to the DEM level for each product; and
- 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.

Given the absence of a clear correlation between air quality at boundary monitors and those air quality monitors at the location of sensitive land users (based on existing information and prior to DWER's investigation of boundary air quality data), DWER has determined that interim boundary targets should be used as triggers for further reporting only.

Dust deposition and speciation monitoring results are to be included in the quarterly report.

Grounds: 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. The information from the dust deposition and speciation will add additional information to interpret dust events and to give insights on magnetite emissions.

8.6.5 Discharges to land monitoring

The treated wastewater stored within the process water tanks following treatment in an OWS shall be monitored for TRH in mg/L.

Samples shall be analysed by a NATA accredited laboratory.

8.7 Administrative amendments

8.7.1 Environmental compliance

Explanatory conditions that duplicate sections of the EP Act have been removed from the Licence. For example, s.72 of the EP Act requires the Licence Holder to notify DWER as soon as practicable of any discharge of waste not in accordance with Licence conditions and likely to cause pollution or environmental harm, whether discharged as a result of an emergency, accident or malfunction.

These changes have been made in accordance with changes to the Licence template following a legal review of conditions.

8.7.2 Notification of material change

Material change conditions have been removed in the Amended Licence. DWER has determined that these conditions may allow for significant changes to Premises operations that could alter the nature or volume of waste or noise emissions ahead of any assessment of risk from DWER (refer to section 5.1.4).

Note: From the date of the Reviewed Licence being issued, no notifications of Material Change have been submitted to the department.

Grounds: Material change conditions present an unacceptable risk to the environment and public health by authorising activities that may result in greater emissions and discharges in a high risk environment.

8.7.3 Record keeping

The requirements to respond to CEO requests within 7 days has been amended to require a response from the Licence Holder within 7 days *or such other period as agreed to by the Inspector or the CEO*. This is to ensure a timely response but also allow for instances where time constraints limit the quality of information received. For example, DWER may request unvalidated monitoring data within 7 days and offer a 14 day time limit to allow for data to be validated. Due to the significant community interest in Category 58 activities in Port Hedland, it is not appropriate to provide longer timeframes for information gathering in most instances.

The Licence Holder will also be required to retain monitoring data, reports and other information required by the Amended Licence for a period of at least three years to allow for an overview of any changes over time.

8.7.4 General administrative amendments

Conditions requiring the immediate notification of the cessation of any relevant approval or tenure issued in relation to the *Railway and Port (Pilbara Infrastructure) Agreement Act 2004* have been removed. Approvals for the use of port lands that are beyond the scope of Part V regulation are not required within the Licence.

Grounds: These changes do not increase or decrease the level of risk associated with

authorised Premises activities or the regulatory requirements of the Licence Holder to comply with the Licence.

9. Setting conditions

The conditions in the Amended Licence have been determined in accordance with DWER's *Guidance Statement: Setting Conditions* (October 2015). The grounds for the applied conditions is shown in Table 28.

The Delegated Officer took into consideration *Guidance Statement: Licence Duration* (August 2016) at the time of the Amended Licence and an expiry date of 23 April 2027 has remained unchanged.

Table 28: Grounds for applied conditions

Condition Ref	Grounds
Emissions Condition 1	This condition is valid, risk-based and consistent with the EP Act
Infrastructure and Equipment Conditions 2 to 16	These conditions are valid, risk-based and contain appropriate controls (see section 8.2 of this Decision Report)
Throughputs Conditions 17 and 18	These conditions are valid and risk-based (see section 8.5 to this Decision Report)
Moisture content monitoring and management Conditions 19 to 26	These conditions are valid, risk-based and contain appropriate controls (see section 8.6 of this Decision Report)
Dust monitoring and management Conditions 27 to 37	These conditions are valid and risk-based (see section 8.5 to this Decision Report)
Wash water monitoring and limits Conditions 38 to 39	These conditions are valid, risk-based and contain appropriate controls (see sections 8.2.6, 8.4.3 and 8.5.3 of this Decision Report)
Record keeping Conditions 40 to 43	These conditions are valid and are necessary administration and reporting requirements to ensure compliance

DWER notes that it 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. Consultation

DWER referred the Application on 30 April 2020 to a number of interested parties including community stakeholders and government agencies. The Application was also publicly advertised in *The Northwest Telegraph* newspaper on 6 May 2020. The Application was made available for review at the Department's website.

DWER has had regard to a total of four submissions made in relation to the Application. With the exception of relevant public authorities, the name of submitters has been kept anonymous. The matters and statements raised in submissions has been summarised in Appendix 4.

11. Applicant's comments on risk assessment

The draft Amended Licence was provided to the Licence Holder on 11 June 2020. Licence Holder comments and DWER responses are provided in Appendix 3.

12. 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 May 2019.

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.

Christine Hass

Digitally signed by Christine Hass
Date: 2020.09.02 13:20:11 +08'00'

Christine Hass
Manager Licensing – Resources Industries

delegated Officer under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents and references

	Document Title	In text ref	Availability
1.	Australian Bureau of Statistics - 2016 Census QuickStats: Port Hedland. Code SSC51248	ABS 2016	Accessed at: www.quickstats.censusdata.abs.gov.au
2.	Australian Bureau of Statistics - 2016 Census QuickStats: South Hedland. Code SSC51361	ABS 2016a	Accessed at: www.quickstats.censusdata.abs.gov.au
3.	ANZECC & ARMCANZ, 2000. Australian and New Zealand guidelines for fresh and marine water quality. Volume 1, The guidelines. National Water Quality Management Strategy Paper No 4, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand.	ANZECC & ARMCANZ, 2000	Accessed at https://www.environment.gov.au/
4.	BOM, 2016. *Climate statistics for Australian locations.* Bureau of Meteorology. Accessed 25 May 2016	BOM 2016	Extracted from www.bom.gov.au
5.	DEC, 2013, Compliance Inspection Checklist & Report – 26 March 2013. Department of Environment Conservation.	DEC 2013	DER records (hardcopy)
6.	DER, 2014, *Compliance Inspection Report – 29 April 2014.* Department of Environment Regulation.	DER April 2014	DER records (hardcopy)
7.	DER, 2014, Compliance Inspection Checklist & Report – 16 October 2014 Department of Environment Regulation.	DER October 2014	DER records (A831929)
8.	DER, 2015, *Guidance Statement: Regulatory principles.* Department of Environment Regulation.	DER July 2015	https://www.der.wa.gov.au/our-work/regulatory-reform
9.	DER, 2015, Guidance Statement: Licensing and works approvals processes. Department of Environment Regulation.	DER September 2015	
10.	DER, 2015, *Guidance Statement: Setting conditions.* Department of Environment Regulation.	DER October 2015	
11.	DER, 2014, *Guidance Statement: Licence duration.* Department of	DER November 2014	

	Document Title	In text ref	Availability
	Environment Regulation.		
12.	DER, 2016, Amendment Notice - Notice of Amendment to Licence L8194/2007/3, 7 July 2016. Department of Environment Regulation.	DER 2016	www.der.wa.gov.au
13.	DoE, 2006. Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives March 2006, Department of Environment.	DoE 2006	Accessed at http://edit.epa.wa.gov.au/EPADocLib/pilbaracoastalwaterquality_Marine%20Report%201.pdf
14.	DoH, 2016, Port Hedland Air Quality Health Risk Assessment for Particulate Matter January 2016. Department of Health.	DoH 2016	Accessed at http://ww2.health.wa.gov.au/~/media/Files/Corporate/general%20documents/Environmental%20health/Port%20Hedland%20Health%20Assessment.ashx
15.	DSD, 2010, Port Hedland Air Quality and Noise Management Plan – March 2010. Department of State Development.	Management Plan	Accessed at http://www.dsd.wa.gov.au/docs/default-source/default-document-library/ph_air_quality_noise_management_plan_0310?sfvrsn=8
16.	Environmental Technologies & Analytics, 2019, Herb Elliot Port Dust Assessment (210Mtpa) Assessment Study. Prepared for Fortescue Metals Group Ltd, July 2019.	ETA 2019	DWER records (A1811008)
17.	EPA, 2001, Guidance Statement for the protection of tropical arid zone mangroves along the Pilbara coastline, No. 1. Environmental Protection Authority.	EPA 2001	Accessed at http://www.epa.wa.gov.au/epadoclib/1011_gs1.pdf
18.	EPA, 2005, Pilbara Iron Ore and Infrastructure Project: Port and North-South Railway (Stage A), Fortescue Metals Group Limited, Report of EPA Bulletin 1173. Environmental Protection Authority.	Bulletin 1173	Accessed at http://epa.wa.gov.au/EPADocLib/2685_Bulletin1286.pdf
19.	EPA, 2008, Port Facility Upgrade Anderson Point, Port Hedland Dredging and wharf construction-third berth, Report of EPA Bulletin 1286. Environmental Protection Authority.	Bulletin 1286	Accessed at http://www.epa.wa.gov.au/EIA/EPAReports/Pages/2685_PortFacilityUpgrade-AndersonPointPortHedlan.aspx
20.	FMG, 2011, *Dust Environmental Management Plan (P-PL-EN-0010),*	FMG May 2011a	Accessed at http://fmgl.com.au/community/environme

	Document Title	In text ref	Availability
	18 May 2011. Fortescue Metals Group Ltd.		nt/environment-library
21.	FMG, 2011, Mangrove Protection Management Plan (P-PL-EN-0012), 18 May 2011. Fortescue Metals Group Ltd.	FMG May 2011b	Accessed at http://fmgl.com.au/community/environment/environment-library
22.	FMG, 2011, Chemical and Hydrocarbon Management Plan, 2011. Chemical and Hydrocarbon Management Plan (45-PL-EN-0011), 16 June 2011. Fortescue Metals Group Ltd.	FMG June 2011c	Accessed at http://fmgl.com.au/community/environment/environment-library
23.	FMG, 2014, Annual Environmental Monitoring Report – 2013 45-RP-EN-1012, 31 March 2014 and Annual Audit Compliance Report L8194/2007/2. Fortescue Metals Group Ltd.	FMG 2014a	DWER records (A742168)
24.	FMG, 2014, *Surface Water Management Plan (100-PL-EN-1015), December 2014.* Fortescue Metals Group Ltd.	FMG 2014b	Accessed at http://fmgl.com.au/community/environment/environment-library
25.	FMG, 2015, Annual Environmental Monitoring Report – 2014 100-RP-EN-9613, 31 March 2015 and Annual Audit Compliance Report L8194/2007/2. Fortescue Metals Group Ltd.	FMG 2015a	DWER records (zA82326)
26.	FMG, 2015, EIP FY16. Herb Elliott Port Environmental Improvement Plan P-PL-EN-0024, Revision 2, 13 May 2015. Fortescue Metals Group Ltd.	FMG 2015b	DWER records
27.	FMG, 2016, Annual Environmental Monitoring Report – 2015 100-RP-EN-9628, 28 March 2016 –Annual Audit Compliance Report L8194/2007/3. Fortescue Metals Group Ltd.	FMG 2016a	DWER records (A1075248)
28.	FMG, 2016, EIP FY17. Anderson Point Materials Handling Facility – Environmental Improvement Plan FY17 P-PL-EN-0026 Rev0, 30 April 2016. Fortescue Metals Group Ltd.	FMG 2016b	DWER records
29.	FMG, 2016, *RE: Anderson Point Materials Handling Facility (L8194/2007/3) Amendment Notice, Category 58* - 12 October 2016.	FMG 2016c	DWER records (A1178774)

	Document Title	In text ref	Availability
	Fortescue Metals Group Ltd,		
30.	FMG, 2018, Fortescue dust data. Graphic produced by DWER.	FMG 2018	DWER records (A188556)
31.	FMG, 2019, Application submitted to DWER 30 July 2019	FM 2019	DWER records (A1811008 and A1810633)
32.	FMG, 2020, Application submitted to DWER 2 January 2020	FMG 2020; or the Application	DWER records (DWERDT239737 and DWERDT239736)
33.	FMG, 2020, Licence Amendment – Supporting Documentation. DWER request for information – Fortescue response, received 20 March 2020	FMG 2020a	DWER records (A1881440 and A1881441)
34.	FMG, 2020, Applicant Response - W6394/2020/1 Iron Bridge Concentrate Handling Facility - Application for a Works Approval - Draft Instrument and Decision Report.	FMG 2020b	DWER records (DWERDT324414)
35.	Ministerial Statement No. 690	MS 690	Accessed at: http://www.epa.wa.gov.au/peia/approvalstatements/Pages/default.aspx?a=Y&ind=7
36.	Ministerial Statement No. 771	MS 771	
37.	Ministerial Statement No. 859	MS 859	
38.	Northcote,K.H. with Beckmann, G.G., Bettenay,E., Churchward, H.M., Van Dijk, D.C., Dimmock, G.M., Hubble, G.D., Isbell, R.F., McArthur, W.M., Murtha, G.G., Nicolls K.D., Paton, T.R., Thompson, C.H., Webb, A.A. and Wright, M.J. (1960-1968). Atlas of Australian Soils, Sheets 1 to 10. With explanatory data (CSIRO Aust. and Melbourne University Press: Melbourne).	Northcote et al. 1960-1968	DWER internal systems
39.	Town of Port Hedland, 2020, Town of Port Hedland population forecast.	ToPH 2020	Accessed at: https://forecast.id.com.au/port-hedland

Appendix 3: Summary of Applicant's comments on the risk assessment and draft conditions – 2020 Licence amendment

Licence Holder comments on the draft amended licence		
Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
Average Monthly Availability	Fortescue requests additional wording in the definition to clarify that dust controls are required to be available when product is below DEM. See suggested change below. *'means the combined average percentage availability of equipment, calculated for each calendar month by dividing the time that the equipment is operating, by the time the equipment is required to be operating.* ***Equipment is considered 'available' when product average moisture content is below DEM and equipment is in compliance with Condition 2.*** *Equipment is considered 'unavailable' when it is not operating, despite being required to operate in accordance with Conditions of this Licence'.*	Noted. What is considered as 'required to be operating' is different for each group of listed infrastructure for the purpose of preventing dust emissions. The operation of belt wash stations only when the belt is carrying ore that is below DEM does not address the risk of wet ore sticking to the underside of the conveyor and subsequently dropping off and becoming suspended once dried. In addition, defining availability linked to DEM would require the Licence Holder to understand at all times the moisture content and DEM level of the product, including when stockpiled. For ores that have a moisture content slightly above DEM, the next monitoring point after in-load are at the outload sample stations, which are unable to provide real-time moisture content data. The Licence Holder has further advised that some ores are handled with a high moisture content and the addition of further water may result in ore sticking to conveyors and transfer points while not reducing the dust risk. In addition, the application of water during rainfall may also result in no tangible reduction in dust emissions. The operation requirements of each group of dust control infrastructure specified in Schedule 3 has been amended to avoid the oversupply of water where it is unlikely to reduce dust emissions. For example, water sprays on stackers, reclaimers and ship loaders are required to be operational whenever ore is handled by this equipment, irrespective of the ore moisture content in relation to its DEM level, unless when: (a) it is raining; or (b) stacking, reclaiming or loading Cloudbreak Super Special Fines, Cloudbreak Blended Fines or Christmas Creek Special Fines; (c) dust control equipment is unavailable, in accordance with average monthly availability requirements. DWER notes that the ores detailed in part (b) above are typically received with a moisture content significantly above the DEM level.

Licence Holder comments on the draft amended licence		
Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
		Specified controls are for the suppression and prevention of dust and are not intended to be applied in a way that would significantly contribute to the ore moisture.
Hematite	Fortescue requests change to spelling of Hematite throughout the Licence. Request removal of the names of specific Mine Sites. Management of any additional products will be required to be managed in accordance with this Licence and commitment to no net increase in dust emissions. *Supplementary comment submitted 19 August 2020:* Fortescue provided further information on particle size distribution and asbestos monitoring conducted at mine operations to support the introduction of an alternate condition that allows new ores to be received at the Premises. Information on the content of respirable crystalline silica was not provided, as requested by DWER.	Noted. Spelling amended in both documents. There is the potential for a change in the geological source of iron ore received to result in a change to overall emissions from the Premises as material characteristics change from ore source to ore source. The risk assessment in the Decision Report takes into account the methods of handling used for the ore handled currently, and that ore proposed to be handled through the application. Changes to ore characteristics may change the conclusions made through the risk assessment and amendments to licence conditions. Therefore limits to the hazard content of new ores have been applied to manage the risk to public health while allowing for operational flexibility (see section 8.5.2). Definitions have been amended to remove source of ore, however references to particular mine sites in Schedule 2 is necessary to identify the sources of ore that have been assessed.
Iron Ore	As above.	As above.
Magnetite	As above.	As above.
Ore Handling	Request removal of '(via conveyors)' from definition. Any handling of Iron Ore within the Premise will be required to comply with, and be managed in accordance with, Condition 23 to 28 of this Licence. This definition also precludes the use of other equipment required to transfer reclaimed ore spillage from beneath infrastructure as required by Schedule 3, Table 15, Row 5.	Removed.
Request inclusion of definition for 'Belt	Request inclusion of definition for 'Belt Wash Stations'. *'Devices or infrastructure which is capable of removing Iron Ore*	Inserted.

Licence Holder comments on the draft amended licence		
Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
Wash Stations'.	*from the return belts for the purpose of minimizing ore carryback'*	
Request inclusion of definition for 'Static Stockpile'.	'refers to any Iron Ore stockpile **greater than 50,000m³** that has been stacked and not reclaimed for a period of six weeks or more.'	Noted. It is generally accepted that a stockpile with a lower profile is less affected by wind when it is shielded by other taller obstacles (stockpiles) in close proximity. Further conditioning has been added to require management of these smaller static stockpiles using water cannons for ongoing dust suppression.
3	Fortescue requests an 'as of' date of 1 July 2021 to enable the installation of additional infrastructure required to monitor and measure availability performance of equipment. Suggested revision: *'The Licence Holder must, as of 1 July 2021, maintain an Average Monthly Availability rate of 90% or more for all…'*	Noted. As the Licence Holder does not currently have the ability to record availability rates for dust control equipment, the request for one year's lead in time has been accepted. However, the Licence Holder will still be required to operate dust control equipment in accordance with the requirements specified in Schedule 3 of the Licence. Alternative methods are required to determine high availability rates for specified controls until the operational tracking system updated in 2021. These include the requirement to keep maintenance logs of dust control equipment and report on unavailable equipment during Reportable Events. The Licence Holder will also be required to demonstrate that unavailable equipment during Reportable Events was repaired in a timely manner.
4	Reference to Tables is incorrect. Please update wording of this condition to state. *'...in Table 12 of Schedule 2 and of Table 15 of Schedule 3.'*	Amended.
7	Fortescue requests Row 6, Column 3 of Table 3 be updated to read *'CV911, CV912, CV915, CV916, CV921, CV922, CV944, CV945, CV948, CV950'* To reflect the Amendment Application Supporting Document and Section 8.2.2 of the Decisions Report.	Amended to align with revised belt wash station installation strategy presented by the Licence Holder subsequent to this comment.

Licence Holder comments on the draft amended licence		
Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
8, Table 4	Fortescue requests inclusion of CV918 in Row 1 to align with Amendment Application Supporting Document Section 6.2 and Decision Report Section 5.4.	Amended.
9	It is understood that DWER are seeking to understand the potential movement of Magnetite dust from the Anderson Point Materials Handling Facility through Condition 9. As such Fortescue proposes a number of changes to this Condition to enable the intent but provide Fortescue with certainty on the scope and timeframe of the program: • remove requirement to install a dust deposition gauge in the West End of Port Hedland, given a Dust Deposition Monitoring site is proposed in South Hedland at Fortescue's FIFO camp facility, Club Hamilton. This location is within the predominant NW wind direction and is likely to contain less impact from other activities in Port Hedland; and • Fortescue requests that the timeframe for this program be time limited to 12 prior to and 12 months post first magnetite ore received from the Iron Bridge Concentrate Handling Facility into the TPI operation. At the completion of the program, Fortescue will provide the data collected through this program to DWER. This program will enable a testing program with and without Magnetite. Updated Figure 4 to Schedule 1 provided.	Noted. Ambient monitors serve the purpose of identifying the level of impacts from the handling of magnetite on sensitive receptors. It is possible that depositional monitoring near to sensitive receptors could identify little to no impact. To account for seasonal fluctuations baseline dust depositional monitoring must be conducted for at least 12 months prior to the introduction of new materials. Therefore the timeframe for commencement of the dust deposition monitoring program is accepted. However, it is DWER's understanding that magnetite throughput rates, ore moisture content and dust control availability may change in the 12 months from the first receipt of magnetite from the Iron Bridge CHF. Upon review of monthly dust deposition and speciation data, which is required for quarterly submission, DWER may consider reduction or removal of these monitoring requirements based on the results received. DWER has mandated an initial monitoring program based on at and near premises locations and one location more distant to the premises, at the Licence Holder's FIFO camp facility. Following the review of monitoring results from these locations, DWER may consider changes to the number and location of monitors. The proposed monitoring site in South Hedland presents an opportunity to conservatively measure magnetite concentrations in deposited dust for South Hedland and is therefore acceptable. DWER has limited the initial monitoring program for dust speciation to at or near premises and one more distant location (FIFO camp) only. Data review will inform whether further monitoring locations at varying distances to the premises should be considered. This adaptive approach is consistent with DWER's risk-based framework.
	The monitoring of ambient Total Suspended Particulate (TSP) should be integrated into the ambient network and implemented by the owner of that network being PHIC or DWER when responsibility	Condition 9 requires monitoring of deposited dust, not suspended particulates. Depositional monitoring for the purpose of dust speciation will allow DWER to identify the emissions and potential impacts from

Licence Holder comments on the draft amended licence		
Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
	for the network is transferred, rather than individual proponents.	proposed ore handling processes as magnetite is not currently handled by other Port Hedland operators. The reasons for this monitoring approach are outlined in section 5.3.8.
	Fortescue raised concerns that the use of the XRD methodology required in Table 9, is not a proven methodology for fingerprinting or dust composition monitoring and does not align with the advice received from accredited laboratories. Fortescue provided alternative analytical methods for identifying iron in deposited dust.	Third party expert advice has determined that XRD analysis is the appropriate analytical method required to obtain information on source attribution for magnetite ore handling. Advice from the laboratory notes that the analytical methods proposed by the Licence Holder will not provide the same information that XRD analysis does. Suggested methods will provide only a single value for iron making it impossible to determine where the iron came from in the context of Port Hedland.
	Fortescue requests that a review date be included where the program will be reviewed 12 months post introduction of Magnetite to the Anderson Point MHF which will allow Fortescue to approach DWER and initiate close out of the condition if the outcomes of the monitoring support the removal of the program.	Monitoring for mineral phases that identify magnetite ore beyond the Premises needs to be undertaken over a minimum annual period when at full operations to allow for seasonal effects. It is not anticipated that operations will commence at or near targeted throughput amounts of 22Mtpa and therefore impacts could be under representative if monitoring is limited to 12 months from the commencement of Iron Bridge CHF operations.

Licence Holder comments on the draft amended licence		
Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
10	Fortescue requests the removal of Condition 10 for the following reasons: • Construction activities will be included in the revised Dust Management Plan which will require all activities on site (both construction and operation) to be managed in accordance with this Licence; • A review of meteorological data has shown that it is unlikely that this condition will be triggered except during Tropical Low or Cyclone events when construction activities are unlikely to occur; • Fortescue will utilize the Anderson Point MHF boundary dust monitoring network to identify any potential dust risks as per Condition 27 and implement management controls as required by Condition 10 to avoid, where possible, the triggering of Condition 29 to 32 as required by the Licence.	Noted. DWER's published *Guidance Statement: Setting Conditions* specifies that conditions must be sufficiently final and certain, enforceable and risk-based. Therefore it is not possible for a condition to refer to management plans or operating procedures under development by a licence holder. Parts (b) and (c) of construction dust management conditions differ from trigger management conditions in that they relate specifically to construction activities and do not consider dust concentrations at the boundary. The reason for difference is based on meeting the objective of 'no net increase' from premises activities. Large scale construction is not a normal activity for the premises and may present a significant source of emissions above existing levels. As such, the contribution of dust from construction activities must be minimised. DWER acknowledges that the likelihood of the event is rare. However, the risk of dust to Port Hedland residents is high and cannot be acceptably increased. Construction activities have the potential to increase dust risks if not managed appropriately. No changes made.
11	Fortescue requests wording of this Condition be amended to reflect Fortescue's comment on Condition 10. *'The Licence Holder must take proactive dust management measures where possible to prevent dust generation, this includes at a minimum the wetting down of exposed areas prior to construction and/or clearing activities that involve ground disturbance, and as needed in accordance with Condition 24 and the Anderson Point Materials Handling Facility - Dust Management Plan.'*	Noted. The condition above has been retained for the reasons outlined above.
13	Although Fortescue is incentivized to provide compliance reports due to the direct linkage with throughput amendments in Condition 16, Fortescue considers 14 days to be restrictive and difficult to comply with due to the timing of shutdowns, staged installation of, and number of infrastructure to be installed (as per Table 3 and Table 4) and requests reporting period be revised to.	Noted. Table 3 has been amended to allow for the staged installation of belt wash stations that aligns with progressive throughput increases. The compliance notification condition has been amended to require submission of written notification of final installation or construction of each row of infrastructure specified in the table, within 14 days. Notification may be by email or letter and may be in addition to the

Licence Holder comments on the draft amended licence		
Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
	'within 90 days of installation of infrastructure detailed in Table 3 and authorized by Table 4', to allow for installation of multiple infrastructure and reduce the number of submissions required to be submitted to DWER. This will also align with suggested changes to condition 16.	submission of the final Environmental Compliance Report, which must be submitted within 30 days of all infrastructure being installed under the table. An additional condition has been inserted for the same compliance reporting requirements to apply to 'authorised' infrastructure. This amendment allows DWER to be notified of major milestones in a suitable timeframe and for the Licence Holder to prepare the Environmental Compliance Report/s.
18	As detailed in the Amendment application, dust emission modelling was undertaken for three scenarios: (a) Base case – 175 Mtpa (Fortescue) in isolation and cumulative (b) Scenario 1 – 210 Mtpa Hematite (Fortescue) in isolation and cumulative (c) Scenario 2 –188 Mtpa Hematite + 22Mtpa Ore Concentrate (Fortescue) in isolation and cumulative. Each scenario projected a decrease in predicted ground level concentrations at the Taplin street receptor from the base case and no increase in excursions of the Taskforce criteria with planned controls in place. As such Fortescue requests inclusion of the modelled 210Mpta throughput of Hematite be included in Condition 16. See Suggested Condition below.	Noted. Based on the information provided with the application, DWER has not been able to verify conclusions of 'no net increase' associated with the handling of hematite ore up to 210 Mtpa. According to modelling results for Scenario 1, there will be a 3.2% reduction in total dust emitted from the premises. For DWER to be confident in the model to a margin of error of 3.2%, all assumed controls within the model must be effective at all times and all emissions estimates must be validated. Reductions are greater when the handling of magnetite is included within requested 210Mtpa production rates (Scenario 2), indicating that magnetite has a much lower dust potential than hematite, particularly hematite from the Eliwana Mine, which will be extracted from above the water table in the early phases of mining. There is greater confidence in the likelihood of Scenario 2 resulting in 'no net increase' based on the modelled 6.8% reduction in dust emissions and DWER's understanding of the dust potential of the ores to be handled.
	In its current form, this condition will restrict increase in throughput at the Port until all of the Belt Wash Stations in Table 3, Condition 6 are installed. Fortescue requests an incremental increase in throughput in direct correlation with the number of Belt Wash Stations installed as per the suggested Condition below. The suggested Condition below has prioritised installation of Belt Wash Stations on infrastructure identified as high dust emission sources. The Licence Holder is authorised to load not more than 175,000,000 tonnes of Iron Ore per Annual Period, unless in accordance with part (a) to (e) to this Condition. (a) up to 185,000,000 tonnes of Iron Ore per Annual Period upon installation of Belt Wash Stations on CV915, CV944 and CV945 and	Noted. The staged increase in throughputs coupled with the progressive installation of belt wash stations on infrastructure identified as high dust emission sources is acceptable in principle. However as stated above, the model cannot demonstrate 'no net increase' for the handling of 210Mtpa of hematite due to uncertainty. Therefore throughputs may only progressively increase to a maximum hematite throughput rate of 188Mtpa, consistent with the original application. This does not prevent the Licence Holder from submitting boundary monitoring data after operating at the throughput scenario of 188Mtpa hematite as part of their supporting evidence – to justify an increase to

Licence Holder comments on the draft amended licence		
Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
	compliance report has been submitted, and (b) up to 195,000,000 tonnes of Iron Ore per Annual Period upon completion of (a) and installation of Belt Wash Stations on CV916, CV922 and CV948 and compliance report has been submitted, and (c) Up to 210,000,000 tonnes of Hematite upon completion of (b) and installation of Belt Wash Stations on CV911, CV912, CV921 and CV950 and compliance report has been submitted, or (d) up to 210,000,000 tonnes of Hematite and Magnetite ore (combined) upon completion of (c) and construction of the Iron Bridge Concentrate Handling Facility in accordance with Works Approval. W6394/2020/1.	210Mtpa hematite in the future. Such a data review should include a comparison of historical boundary monitoring data (pre-175Mtpa) with similar data collected with increased throughputs through this licence amendment to demonstrate, with evidence, the effectiveness of implemented controls to achieve 'no net increase'.
22	Fortescue requests the wording of the Condition be updated to read: The Licence Holder must ensure that *(a)* ***by 1 July 2022****, at least* ~~***95%***~~ ***90%*** *of Hematite Iron Ore in loaded to the Premises has a Moisture Content at or above the DEM level derived from application of AS4156.6-2000 and updated on an annual basis through laboratory analysis or* ***(b) where product is below DEM, dust controls on in-load are 100% available and*** ***(c) implementation of this and reporting against control availability against below DEM products will be conducted in accordance with Schedule 5.*** Historically, the average moisture content of product at in-load is approximately 80%. Prior to trains arriving at the Port, a product specification report is sent to operations personnel which details iron ore parameters including ore moisture. This guides inload operations personnel as to how much water should be added to the ore prior to being stockpiled. In addition to this, all existing train unloaders / car dumpers are enclosed and fitted with a dust extraction system, and all major transfer stations or transfer stations located adjacent to shiploaders are fully enclosed with extraction (either wet or dry). These measures greatly reduce the risk of dust emission	Noted. DWER understands that in the 2019/20 annual period approximately 5.9% of ore handled was received with a moisture content below the DEM level as identified in Table 19. Upon amendment to the licence, it is possible that up to 188Mtpa of hematite ore could be handled, of which approximately 50 Mtpa maybe sourced from the Eliwana Mine. It is understood that this ore may enter the site in a dry state if not adequately conditioned as it is mined from above the water table. In addition it is noted that modelling assumes this ore to have similar properties to the Solomon Firetail Fines ore, which are known to have a high dust potential. Therefore the compliance rate is accepted. The Licence Holder will be required to apply dust controls in accordance with the specifications listed in Schedule 3. As a consequence of power outages, water supply and equipment failure, for example, it is not possible for the Licence Holder to ensure that dust controls will be available at all times. Therefore DWER cannot insert the proposed control. Due to the high risk to public health from dust, and there being no additional controls available, the proposed timeframe for achieving compliance is not accepted. As Transportable Moisture Limits (TML) for iron ore are typically in the range of 9 to 11% it is not accepted that the Licence Holder will be unable

Licence Holder comments on the draft amended licence		
Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
	exceedances attributed to the inloading of product. In addition to this, Fortescue's process for blending product in our stockyards improves the average moisture content of our products, resulting in approximately 95% of product being outloaded at or above DEM. Ensuring that 100% of product be at or above DEM also presents an additional potential issue with product becoming too wet and sticking to the conveyor, exacerbating carryback which is a known source of dust emissions. In addition, if all product is at or above DEM it may exceed the Transportable Moisture Limit for that shipment and pose an increased shipping risk.	to apply moisture to each ore for safety reasons. Each ore has a DEM level below the TML for that ore as it enters the Premises. Of the ores handled in the 2019/20 annual period, three had a DEM level of 7.6% moisture or higher, with a maximum of 8.1%. DWER has not seen any evidence to suggest that dust control equipment at the Premises would substantially increase the moisture content of ores. Amendments have been made to Schedule 3 to remove requirements for operating water sprays when handling specified ore types that are known to enter site with a high moisture content to reduce the potential for carryback.
23	The Iron Bridge Mine and Concentrate Handling Facility are owned and operated by the Iron Bridge Joint Venture. TPI does not have strict control over the processing and handling of the magnetite before it is transferred to TPI responsibility and therefore cannot guarantee compliance with this requirement. In addition, the requirement for 100% of ore received from the Iron Bridge Concentrate Handling Facility to be at or above DEM, allows no room for error, fluctuations in average moisture content or atypical sections of product. Again, TPI cannot guarantee compliance with this requirement. Ensuring that 100% of product be at or above DEM also presents an additional potential issue with product becoming too wet and sticking to the conveyor, exacerbating carryback which is a known source of dust emissions. Fortescue requests the wording of the Condition be updated to read *'The Licence Holder must ensure that at least 95% of ore received from the Iron Bridge Concentrate Handling Facility has a Moisture Content at or above the DEM level derived from application of AS4156.6-2000 and updated on an annual basis through laboratory analysis'*.	Noted. Magnetite ore is concentrated at a processing facility at the North Star Mine, transported to the Premises in a slurry form and dewatered at the Iron Bridge CHF. The Licence Holder, as the mine site occupier and member of the Iron Bridge Operations Pty Ltd joint venture, has direct control over the moisture content of magnetite at each of these stages and therefore has the ability to ensure a consistent moisture level above the DEM level. The condition has been amended slightly to require 100% compliance only after the completion of commissioning of the Iron Bridge CHF, to allow for adjustments to processes at the Iron Bridge CHF that ensure a consistent moisture level. The issue of ore carry back along conveyors is addressed by implementing proposed controls to remove ore from the underside of high risk conveyors, as specified through licence conditions.

Licence Holder comments on the draft amended licence		
Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
23	*Supplementary comment submitted 19 August 2020:* Fortescue requests that this condition be revised to read 98%. As per Fortescue's previous response, dated 3 July 2020, the requirement for 100% of ore received from the Iron Bridge Concentrate Handling Facility to be at or above DEM, allows no room for error, fluctuations in average moisture content or atypical sections of product. Again, Fortescue cannot guarantee compliance with this requirement. A failure scenario should also be considered in the requirement for 100% of product received from the IB CHF to be at or above DEM. Should there be an issue with the facility, for example, there is an issue with the dewatering facility and the process is halted while faults are identified and repaired, ore being in loaded into the Anderson Point MHF, for example on CV301 may not be 100% at or above DEM when it reaches SS301. The ore cannot be returned to the IB CHF and therefore this scenario would result in a non-compliance with this condition.	Noted. Magnetite ore is delivered to the Iron Bridge CHF in a wet slurry that is then dewatered and therefore it is DWER's understanding that maintaining a moisture content above DEM for 100% of ore is achievable. DWER notes that Iron Bridge CHF is in control of the moisture content achieved in the dewatered material and that a condition in the works approval for Iron Bridge CHF specifies an acceptable moisture level rate. To avoid the continued delivery of magnetite ore to the Premises that is improperly conditioned, DWER has not amended minimum compliance rates for moisture content requirements. Note that moisture content is averaged over 10,000 tonnes of magnetite delivered to the Premises and that NIR moisture analysers are capable of providing more frequent moisture content data. Although 2% of non-compliant ore may not appear a significant amount, this equates to 440,000 tonnes per annum in addition to the existing potential for up to 10% of total hematite ore (1.75Mtpa) in-loaded with a moisture content below the DEM level. The risk of dust from Premises activities has been assessed as High in the context of Port Hedland. The Licence Holder must take steps to reduce the likelihood of dust emissions from the Premises to minimise this risk. Achieving a high rate of moisture content above DEM is a key control to minimise dust risks and is applied to other premises' licences in Port Hedland. No changes made.
25	Fortescue requests the wording of the Condition be updated to read *'The Licence Holder must ensure that 95% of Iron Ore outloaded from the Premises, as averaged per cargo hold, has a Moisture Content at or above the DEM level derived from application of AS4156.6-2000 and updated on an annual basis through laboratory analysis'.* The requirement for 100% of Iron Ore outloaded from the Premise to be at or above DEM allows no room for error, fluctuations in average moisture content or atypical sections of product. Again, TPI cannot guarantee compliance with this requirement. Ensuring that 100% of product be at or above DEM also presents an	Noted. The proposed condition has been accepted in part. The Licence Holder is permitted to achieve the reduced compliance rate of 95% up until the end of June 2022, by which point all ore out-loaded must have a moisture content above the DEM level. It is understood that significant improvements in moisture content can be made through blending dry ore with ores that have a higher moisture content also below the TML. Dry ores can also be conditioned along the transport route to marginally increase moisture content. Blending is not expected to result in safety concerns if managed appropriately and in accordance with licence conditions. Hematite ore moisture is averaged over each cargo hold and each train

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	additional potential issue with product becoming too wet and sticking to the conveyor, exacerbating carryback which is a known source of dust emissions. In addition, if all product is at or above DEM it may exceed the Transportable Moisture Limit for that shipment and pose an increased shipping risk.	meaning that atypical sections of product are likely to be averaged out across the large amounts of ore measured.
25	*Supplementary comment submitted 19 August 2020:* Fortescue requests that this condition be revised to read 98% As per Fortescue's previous response, dated 3 July 2020, the requirement for 100% of Iron Ore outloaded from the Premise to be at or above DEM allows no room for error, fluctuations in average moisture content or atypical sections of product. Again, Fortescue cannot guarantee compliance with this requirement. Ensuring that 100% of product be at or above DEM also presents an additional potential issue with product becoming too wet and sticking to the conveyor, exacerbating carryback which is a known source of dust emissions. As per the above, a failure scenario should also be considered in the requirement for 100% of product to be at or above DEM on outload. The current condition does not allow for operational issues which may result in conveyors, such as CV922 or CV932, or other pieces of infrastructure failing and requiring repair while ore is being transported on the conveyor. This can result in ore being held on the conveyor for periods of time, resulting in drying or uneven wetting (from manual dust control) of the product. That product cannot be taken back into a stockpile and must proceed to the shiploader. At 100% there is no allowance for fluctuations and therefore would result in a non-compliance with this condition.	Noted. Two percent of out-loaded ore from the Premises could equate to 4.2Mtpa of ore being out-loaded in a sub-optimal moisture condition under the Amended Licence. The shiploader and out-load conveyors are the closest dust sources to residential receptors and there are limited dust controls associated with this infrastructure. Ore moisture conditioning is therefore a critical control for the prevention of dust emissions. Note that moisture content at outload is averaged over every ship hold, which may amount to up to approximately 45,000 wet tonnes of ore on a Capesize vessel. It is anticipated that atypical sections of product will be averaged out over such large ore tonnages. Acknowledging that this requirement represents an improvement to current Premises operations, DWER accepts an achievement rate of 99%.
26	As per correspondence with DWER and in alignment with the Iron Bridge Concentrate Handling Facility Works Approval (W6394), Fortescue requests removal of Row 1, Table 5 and SS301 from Row 3 of Table 5 as this infrastructure is being managed under W6394 and under the future Iron Bridge CHF Part V Licence.	Noted. As a part owner of the Iron Bridge CHF's legal occupier, Iron Bridge Operations Pty Ltd, the Licence Holder has the ability to obtain these data. A note has been inserted to the table acknowledging that the data will need to be obtained from a third party.
	Fortescue requests that the averaging period noted in Row 1,	Noted. Alerts are calculated based on a rolling one-hour average

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27	Column 3 of Table 6 be changed to 1-hour average. This will ensure there is no confusion in relation to the data channel required to be used for calculations and alerts. Currently, this condition could result in the use of the 10-minute data produced via the Real Time Module which runs concurrently with the BAM.	meaning that to comply with triggered dust management conditions of the Amended Licence, calculations must be made at each 10 minute interval. No changes made.
	The TUL SE monitoring station listed in Column 1 of Table 6 is an E-Sampler, which does not comply with AS3580.9.11. There is no applicable Australian Standard for light scattering method of sampling PM10, as such Fortescue requests this monitor be removed from this Licence. An updated Figure 3 has been provided to reflect this change. Fortescue has 2 E-Sampler stations on the premises which will continue to be used where required to supplement the Boundary Monitoring Network of BAM stations.	Noted. Although E-Samplers cannot comply with Australian Standards for beta attenuation monitors, they can still provide valuable information/data. Changes have been made to acknowledge that TUL SE monitoring station must only comply with Australian Standards for monitoring equipment siting.
	Fortescue requests the removal of Row 2, Table 6, Condition 23, as construction operations will be managed in accordance with the existing AQMS and Conditions within this Licence to maintain no net increase in dust emissions.	Noted. As the location of proposed construction monitors do not appear to target construction dust sources, which can be measured by existing boundary monitors, this row has been removed from the Amended Licence.
	Fortescue requests the removal of Condition 23, Table 6, Row 3 as Fortescue does not have tenure over this location, and it would present a health and safety risk during maintenance. Additionally, the boundary monitoring network currently in place is designed in a manner to adequately provide monitoring information during construction activities. Fortescue has 2 E-Sampler stations on the premises which will continue to be used where required to supplement the Boundary Monitoring Network of BAM stations.	As above.
	Fortescue requests an additional Condition to allow for the relocation of the Wharf (AP3) monitor approximately 100m to the west onto the main Wharf, as the current location presents significant health and safety issues to access for maintenance due to proximity to AP3 mooring lines. See Schedule 1, Figure 3 for proposed location. Please see suggested Condition wording below.	Noted. DWER understands that the revised location of the Wharf monitor will allow continued and unobstructed monitoring of PM_{10} from landside activities during wind conditions that place the MHF upwind of sensitive receptors. Further that the relocation is not significant and will allow for a continuation of monitoring data. On these grounds an additional condition has been added to the Licence to authorise the relocation on this monitor

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Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
	Relocation of the Wharf monitor has been reviewed by Air Quality Consultant to confirm that the relocation will not impact on current modelling, information provided in the Amendment Application Supporting Document or operation of the Air Quality Monitoring System. *The Licence Holder must,* *(a) within 6 months of the granting of the Licence, relocate the Wharf BAM monitor from its current location to the end of the AP3 Wharf and reinstate operation, and* *(b) within 14 days of completion of (a), prepare and submit to the CEO an Environmental Compliance Report/s on that compliance with (a).*	with notification to be provided within 7 calendar days of its relocation.
29 to 32	Fortescue suggests Condition 25, 26 and 27 be captured in Condition 23, Table 7 as per the attached Table 7 with changes highlighted. This allows for easier comprehension of requirements and connection of steps to be undertaken between triggers, requirement management measures, timing and ultimate reportable event.	Noted. There is considerable detail in the three conditions referenced. To reduce the content of the table and for clarity, the conditions have been separated. DWER's *Guidance Statement: Setting Conditions* requires conditions to be valid and enforceable. This limits the ability to replace conditions with the proposed table, which although outcome-based, are not specific enough to meet other criteria specified in DWER's guidance documents. No changes made.
34	Fortescue requests update to Column 1 of Table 9, Condition 29 to note 'Gauge 1 to 7' as per Fortescue comments on Condition 8 and updated Figure 4 of Schedule 1. Fortescue requests that 'Carbon' be replaced with 'Combustible material/ash' to avoid any misinterpretation for analysis. Fortescue also requests that AS3580.10.2, ICP-MS and ICPAES be added to Column 5, Row 2 of Table 9 based on advice from NADA accredited laboratory that these are appropriate analytical methodologies for the parameters in Column 1.	Noted. Table amended to refer to 'Gauge 1 to 7' following discussions with the Licence Holder. The term 'Carbon' has been replaced with 'Combustible material/ash'. DWER notes that Inductively Coupled Plasma (ICP) techniques however will be a poorer tool than X-ray diffraction (XRD) for determining the identity and quantity of minerals in the dust. A report for metals by ICP will provide only a single value for iron rather than identifying the differing amounts of various iron ores present. Such an analysis will not allow DWER to understand the mineral phase of the iron ore and limit the ability for source determination. XRD analysis will identify each mineral and its concentration in a sample.
36	Fortescue requests the timing in this condition be amended to read.	Amended noting that dust deposition monitoring must commence at least

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Definition/ Condition	**Summary of Licence Holder comments**	**DWER response**
	The Licence Holder must submit to the CEO a Dust Monitoring Report that incorporates the information specified in Schedule 6 within 15 months ***from the completion of the installation of the infrastructure specified in Table 3****.* As the Condition requires a single Dust Monitoring Report to be submitted within '15 months from the amendment' stipulated in this Condition does not align with Schedule 6 – Dust Monitoring Report, Contents of the Report, which states *The Licence Holder must provide:* *a review and analysis of PM10 data from the monitoring stations:* *Wharf, End of Road, NW Corner, NE Corner, Finucane, SW Corner, SE Corner, TUL SW and TUL SE, as depicted in Figure 3 of Schedule 1, for a period of at least 12 months prior to, and 12 months after installation of the infrastructure specified in Table 3* *The Condition requires the submission of the Dust Monitoring Report within 15 months of the amendment and contain at least at least 12 months prior to, and 12 months after installation of the infrastructure specified in Table 3.* As such, for example, if the amended Licence is received in August 2020, the Dust Monitoring Report required by Condition 31, would be required to be submitted in November 2021. This would imply that the infrastructure in Table 3 would be required to be installed and commissioned within 3 months of the amendment to comply with both the 12 months after installation and within 15 months of the amendment requirements of this condition. The implication being that Fortescue will be non-compliant with Condition 31 in not being able to provide 12 months of data post installation of the infrastructure in Table 3 as required by Schedule 6.	12 months prior to the handling of the first Magnetite ore concentrate at the Premises.
35	Fortescue requests removal of this Condition as this would be captured by Condition 37 which requires The Licence Holder to 'maintain accurate and auditable Books including' (b) monitoring undertaken in accordance with Conditions 22, 23, 29	Noted. Condition removed.

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	and 33 of this Licence; Which must (d) be available to be produced to an Inspector or the CEO.	
36	Fortescue requests removal of this Condition as this would be captured by Condition 37 which requires The Licence Holder to 'maintain accurate and auditable Books including' (b) monitoring undertaken in accordance with Conditions 22, 23, 29 and 33 of this Licence; Which must (d) be available to be produced to an Inspector or the CEO.	As above.
43	Fortescue request wording of the Condition be revised to read *'must respond to a Department request, within 7 days…'* to allow Fortescue to gather the requested information or to provide the Department with a response acknowledging the request and an expected response date if the request cannot be fulfilled within 7 days.	Noted. The condition also allows for an alternate timeframe as agreed by the Inspector or CEO. No change required.
Schedule 2, Table 12	This Table requires update based on Fortescue's comments on Condition 6	Noted. Amended.
Schedule 2, Table 13	This Table requires update based on Fortescue's comments on Condition 16. Fortescue requests removal of specific mine names as per Fortescue comments on Definition of 'Hematite', 'Magnetite' and 'Iron Ore'.	Noted. Schedule 2 describes what activities and operations were considered in the determination of risk at the time of assessment. Therefore the text within the section 'Bulk materials loaded and unloaded' remains accurate and does not require amendment. Refer to DWER response to comments on definitions.
Schedule 3, Table 15	This Table requires update based on Fortescue's comments on Condition 6, Condition 23 and updated Figure 3.	Noted. Some references to infrastructure have been added or removed accordingly.
Schedule 4, Dust control equipment	Fortescue request that references to raw data be replaced with Validated data. As the Condition refers to the use of BAM data compliant to AS3580.9.11, of which the standard requires that data	Noted. It is DWER's expectation that data be presented in the format specified in Schedule 7. That is, it must be provided in a computer readable/editable medium for further analysis to allow DWER to more

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monitoring	is verified prior to its use. Schedule 4 also refers states *'the format specified in Schedule 7'* Which also requires that the data be validated.	efficiently validate any conclusions made by FMG. The term 'raw' has been replaced with 'computer readable and editable'. Note that raw data may also be provided in the absence of validated data.
Schedule 5, Contents of the Report	Fortescue request that references to raw data be replaced with Validated data. As the Condition refers to the use of BAM data compliant to AS3580.9.11, of which the standard requires that data is verified prior to its use. Schedule 4 also refers states 'the format specified in Schedule 7' Which also requires that the data be validated.	As above.
Schedule 5, Reporting Frequency	This Section required update based on Fortescue's comments on Condition 32	No comments were provided on this condition.
Schedule 6, Dust Monitoring Report	This Schedule requires updating to reflect Fortescue's comments on Condition 23 and Figure 3 and 4.	Noted. Reference to former construction monitors has been removed noting that a review and analysis of construction activities based on existing boundary monitors is still required.
	Request the removal of Richardson and Kingsmill from a) exceedances of the Air Guideline Value at Richardson, Kingsmill and Taplin Street monitors; as the inclusion of Richardson and Kingsmill does not align with Reportable Event Criteria in Table 7, Condition 24. The location of the Anderson Point Materials Handling Facility at such a distance from the West End minimises the risk of dust impacts from Fortescue operation. There are also other operations, which are known to contribute significant dust emissions to the West End, which are located between Fortescue's operations and the West End. In FY19, Richardson Street recorded 167 days above the AAQ NEPM standard of 50 µg/m³. Recognising the interim measure of 70 µg/m³ is used as an interim standard for air quality under the PHDMT management plan, this is likely to result in significant reporting requirements against locations not specified under	Noted. The purpose of the Dust Monitoring Report is to review the dust management performance of the premises over a 12 month period prior to, and 12 months after the final installation of new infrastructure using the available dust monitoring and met data collected at the premises and at ambient locations. The inclusion of existing PHIC locations of Kingsmill and Richardson St in this review is imperative to interpret and understand the connection and influences of emissions from the Premises and at sensitive receptors. Because of the complex cumulative scenario in Port Hedland, multiple monitoring locations and different monitoring techniques are necessary to draw any meaningful conclusions. Given the above rationale that data from Kingsmill and Richardson St are used to better understand the potential emissions and impacts from the premises, DWER has not conditioned any reporting requirements for these locations. The data inclusion in the Monitoring Report is therefore not inconsistent with Table 7, which specifies Reportable Event Criteria.

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	Condition 24, Table 7. The siting of the Richardson and Kingsmill Street monitoring stations are not fully compliant with AS3580.1.1. Fortescue is also uncertain as to access and availability of this data as it is currently 'owned' by PHIC and although Fortescue are a member, we do not have unfettered access to the information. Further to this, it is understood that the current PHIC monitoring site is set to be taken over by the DWER and access arrangements to data in the future are currently unknown.	There are no reportable events based on Kingsmill and Richardson St monitoring locations. DWER notes that PHIC has previously recorded the number of exceedances of the Port Hedland-specific AGV at these locations in its annual reporting. DWER will take into consideration its understanding of the Port Hedland context, the presence of other port operators and the level of compliance that ambient monitors achieve with siting standards when analysing monitoring data. DWER does not accept that the Licence Holder is unable to obtain the requested information from PHIC, of which the Licence Holder is a member and notes that the ambient network will be taken over by DWER in the near future, which will eliminate any concerns about access to monitoring data.
	Fortescue request that references to raw data be replaced with Validated data. As the Condition refers to the use of BAM data compliant to AS3580.9.11, of which the standard requires that data is verified prior to its use. Schedule 4 also refers states *'the format specified in Schedule 7'* Which also requires that the data be validated.	Noted. The term 'raw' has been replaced with 'validated, computer readable and editable'.

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3.2.2	Request removal of reference throughout document to discharge from the Desalination Plant being directed to Dredge Material Management Areas (DMMAs) as this is not a current or future planned activity.	Noted. As this continues to be authorised through Ministerial Statement 859 reference has not been removed although it is noted that this is not a likely future activity.
4.1.4 – Key findings	Process has commenced. S46 to MS771 was submitted on 21 May 2020.	Noted.

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Section	**Licence Holder comments**	**DWER response**
5.4	Request removal of CV918 as this is an optional location as per Amendment Application Supporting Document Section 6.2 and as amended in Table 4 of Condition 7.	Removed.
5.4	Request removal of 15 when referring to number of Belt Wash Stations to align with the 10 listed in Row 6 of Table 3 and four listed in condition 7, Table 4.	Removed.
5.4	Request removal of *'equipped with water sprays and scrapers that are'* To align with definition suggested in the Licence, and to allow for upgrades to better configurations/alternatives as noted in Condition 5 of the Licence.	Noted. DWER understands the Licence Holder's concerns to be in relation to a perceived risk that DWER is prescribing the engineered design of belt wash stations. As these controls have been designed specifically for the Licence Holder's operations and infrastructure, DWER's definition of a belt wash station is intentionally non-specific and outcome-based. In verbal discussions the Licence Holder advised that the FMG belt wash stations include sprays and scrapers. No changes required.
5.4 – Key findings	Request removal of reference to specific shiploaders and berths for the export of magnetite as this was not presented in the Amendment Application Supporting Document and is not part of the proposal. Fortescue's world leading material handling facility has been configured and constructed to allow ultimate flexibility in both the inload and outload of iron ore through the Port. Fortescue is also considering the option to blend Hematite and Magnetite at some point in the future and outload is possible via any of Fortescue's five current berth's As detailed in the Amendment Application Supporting Document, dust emission modelling was undertaken for three scenario including Scenario 1 – 210 Mtpa Hematite (Fortescue) as a worst case scenario. Each scenario projected a decrease in predicted ground level concentrations at the Taplin street receptor from the base case and no increase in excursions of the Taskforce criteria with planned controls in place. As such, the blending of Hematite and Magnetite, and outload via any Fortescue berth, would create no additional risk	Noted. To clarify, the application submitted 31 July 2019 specified the loading of magnetite via dedicated ship loaders AP4 and AP5. As the application has since been withdrawn and resubmitted on 2 January 2020 with this information also withdrawn, reference to AP4 and AP5 has been removed from the Decision Report.

Licence Holder comments on the draft Decision Report		
Section	**Licence Holder comments**	**DWER response**
7.4.6	Row 9 is not consistent with Condition 6, Table 3, Condition 7, Table 4 or Section 6.2 of the Amendment Application Supporting Document. Row 9 needs to be updated to include CV911, CV912, CV915, CV916, CV921, CV922, CV944, CV945, CV948, CV950. And if required CV302, CV918, CV927, CV932.	Amended.
8.2.3	CV945 was included in the Amendment Application Supporting Document, Decision Report Table 20 and Schedule 3, Table 15 of the Licence but is not included in the Condition 6, Table 3 or Condition 7, Table 4 of the Licence. Request that CV945 be added to Row 6 of Condition 6, Table 3.	Added.
8.3	First paragraph states dust controls 'will be required at all times when handling ore'. Request wording be amended to ''will be available" as defined in the definition for 'availability'.	Noted. DWER has not agreed to the changed definition for 'availability' and expects foggers at transfer chutes and stacker and reclaimer sprays to operate at all times when handling ore, unless when: (a) it is raining; or (b) stacking ores with a known high moisture content that is significantly above the DEM level (Cloudbreak Super Special Fines, Cloudbreak Blended Fines or Christmas Creek Special Fines); (c) during the 10% allowable time where equipment may not be available, for example when undergoing maintenance, power outage or water supply issues.
8.3	Changes to this section are required to reflect Fortescue changes to Condition 19 – 21.	Some changes made.
8.4.1	Near-infrared moisture analysers operate at the point of in-load (TL601, 602, 603).	Amended.
8.5.1	Fortescue requests removal of reference to Taplin Street and South Hedland monitor location as management actions are not linked to specific monitor locations rather the residential area surrounding these locations (West End and South Hedland).	Amended.
8.5.1	Changes to this Section are required to reflect Fortescue changes to Condition 16. Condition 16 also states that the Compliance Report	Noted. Changes have been made to reflect updated conditions and

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Section	**Licence Holder comments**	**DWER response**
	must be submitted prior to increase in throughput, not the Validation Report, which must be submitted within 12 months as required by Condition 14	acknowledge the order of reporting.
8.5.1	*'In the event that validation monitoring does not confirm the effectiveness of these controls, DWER may consider initiating an amendment to the Licence to require additional dust controls, such as belt wash stations to be installed at the following additional conveyor locations: CV302, CV918, CV922, CV927 and CV932.'* Request CV918 also be added to Condition 7, Table 4, Row 1 to allow Fortescue to install at this location if requested by the DWER following outcomes of the Validation Monitoring Report.	Amended.
8.6.1	Changes are required to this section based on Fortescue's comments on Condition 3 and Schedule 6.	Some changes made.
8.5.1	Changes required to this section based on Fortescue's comments on Condition 8 and Schedule 1, Figure 4.	Some changes made.

Appendix 4: Summary of stakeholder submissions on the Application – 2020 Licence amendment

Submitter	Summary of stakeholder comments	DWER response
1	Eliwana presents environmental air quality risks that are unique from FMG's existing operations that have not been addressed in the application. The product, in comparison to Cloudbreak and Christmas Creek which occur predominately below the natural water table on the fringes of the Fortescue Marsh, will occur predominately above the natural water table for Eliwana. Fortescue made a statement that "The majority of ore handled at port (approximately 85%) has been through a wet process of the mines". This statement relates to FMG's existing operations which are located on the fringes of the largest ephemeral wetland in the Pilbara. I would like to know what the percentage of ore that would be handled through wet processes once the 30 Mtpa from Eliwana.	As discussed in section 7.4 of this Decision Report, for the purpose of the dust modelling Eliwana ore was assumed to have the same characteristics of the Solomon Firetail Fines (SOFF) which presents the highest dust risk at the Premises. Processing of ore at the Eliwana mine site will include crushing and screening to meet product moisture between 5.5 and 7%. Water supplied from project bore fields will be added to the ore during crushing and screening at the mine site. Due to the uncertainty in the product's dust potential, and the inability for the Licence Holder to adequately condition a large proportion of hematite ore, the department has taken a precautionary approach to authorising additional tonnages. Further discussion is provided in section 8.5.1.
1	As you would be aware, the Port Hedland Dust Management Taskforce recommended a maximum guideline of 70 µg/m^3 for PM10 (24 hour average) with 10 exceedances per year to be applied to the Taplin Street Monitor. I would envisage that if both Fortescue increased exports from 175 to 210 Mtpa and BHP increased exports from 290 to 330 Mtpa (As planned), that the modelling would show a cumulative number of exceedances at Taplin St, in excess of the current limit of 10.	Noted. Similar to the department's application of the NEPM, the AGV specific to Port Hedland is an assessment guidance level and should not be considered as an enforceable limit. DWER has had regard for the cumulative context of the Port Hedland airshed.
2	As a landowner in the West End of Port Hedland, we have already been advised through the Dust Report, that the levels of dust in the area exceed the amount that is considered safe for the residents. At the current time BHP and FMG have both applied to increase their output. This consequently will also result in increased dust level for the residents in what is already considered unsafe. No action has been taken by any mining company to mitigate the risk to resident. As such, I am not sure how the EPA can continue to increase the output from the Port until the issues of dust in the West End has been resolved. Although plans are in place regarding a buyback, this has come to a halt in the current environment. I ask that you please not grant any further license to increase port output until the needs of the residents is finalised and addressed. We need to see action taken before we continue to increase the dust in the area which is putting residents at risk.	Noted. The Amended Licence authorising the increased throughputs has resulted in numerous additional site specific regulatory controls and additional monitoring requirements being applied. Conditions have been developed to ensure they are consistent with DWER Guidance Statements. As a result of these additional regulatory controls, the residual risk to public health, the environment and amenity has been determined to be acceptable. While the assessment of the BHP application remains separate to, and beyond the scope of this Decision Report, DWER has regard to the cumulative impacts of all port operators and other dust sources in Port Hedland. Licence holders in Port Hedland have been required to demonstrate no net increase to dust emissions from their premises from port related activities. Where this is not demonstrated, DWER will consider further controls that may in part serve to offset any

Submitter	Summary of stakeholder comments	DWER response
		increase in dust emissions.
3	Please note this as an objection to this application to increase Bulk loading due to excessive dust production for this process.	Noted.
4	The community previously provided support for expansive growth from industry on the basis that amenity and environmental conditions were to improve as a result of the ports best practice, DWER's regulations, and the formation of the Port Hedland Industry Council designed to raise the standards of all exporters through the sharing of best practices, and enhancing operations. Sadly, the exports have increased from 100 million tonnes to over 600 million tonnes in 2020, while the community has been experiencing dramatic reductions to population through a health warning on land titles supported by the departments of health, planning, and environment and as a result of environment regulations being continually exceeded and causing environmental and health concerns.	Noted. DWER is committed to its responsibilities under the Government-endorsed recommendations of the Port Hedland Dust Management Taskforce (refer to section 4.6.1). To address the recommendations for which DWER is responsible, the Department has established the Port Hedland Dust Program. DWER's objective is to ensure that dust emissions from premises licensed under the EP Act are not increased in the short term, and that following the introduction of dust management controls from the dust management guidelines, impacts are reduced to the lowest practicable levels.
4	The following is sought: 1. Reassurance and continual proof that FMG's operations will not increase the cumulative air shed over the town of Port Hedland and environmental standards will be met at all times.	Noted. DWER has placed conditions on the Amended Licence to review boundary monitoring data and conduct dust control equipment monitoring. The intent of these conditions is to verify the effectiveness of dust controls after they are implemented and support conclusions made within the Application of a 'no net increase' in dust resulting from the proposal.
4	2. Installation of LiDAR in conjunction with deposition monitoring on all boundaries to ensure no FMG emissions are escaping the boundary of FMG Licence area, or reaching any of the town monitors at Taplin Street, Richardson Street, and Kingsmill Street, where community members are living and working.	Noted. The application of conditions for no dust beyond the boundary is not practicable given the scale of operations in Port Hedland and the existing methods or material handling. The risk assessment in this Decision Report has identified the need for deposition monitoring and speciation analysis for the purposes of identifying any contribution to dust emissions from magnetite concentrate handling. As discussed in sections 5.3.8 and 8.6.3. the identification of hematite ore products from individual premises is challenging as most of the iron ore types currently handled at the port contain similar elements. DWER has commissioned an independent third party for the development of dust management guidelines for bulk handling port premises. The development of the guidelines will focus on identifying leading practice dust controls and mitigation measures according to hierarchical principles that must include (but not be limited to) a measure of effectiveness, cost/benefit and practicability of

Submitter	Summary of stakeholder comments	DWER response
		implementation. Along with other controls, the implementation of LiDAR for dust identification and management will be considered during the development of these guidelines.
4	3. Ensuring that all operations are conducted with world's best practice and meet current environmental standards, and the town growth is not restricted by FMG growth.	As detailed above, best practice guidelines are currently under development by an independent third party. Port Hedland operators will be required to review existing infrastructure and management techniques against the dust management guidelines using a self-assessment tool. Following self-assessment, DWER will review Port Hedland operating licences to introduce further controls, where applicable, to reduce impacts to the lowest practicable level.
4	4. The submitter supports the growth of FMG in conjunction with the growth of the town, by ensuring all operations are conducted with world's best practice and meet current environmental standards, and the town growth is not restricted ion return for FMG growth.	Noted. As above.
4	The application shows how the cumulative air (dust and noise) emissions will increase the measures at Taplin Street, therefore probably Richardson Street and Kingsmill Street, which will further erode the community environment.	Table 7 of this Decision Report identifies that based on modelling, ground level concentrations will not increase for each cumulative scenario at Taplin Street and Richardson Street monitoring locations. However, DWER has identified uncertainty in the conclusions of modelling. Therefore modelling has not been used as a standalone quantitative analysis or forecast tool for actual emissions from the Premises. DWER has placed conditions on the Amended Licence to review boundary monitoring data, undertake additional depositional monitoring and conduct dust control equipment monitoring for the purpose of verifying modelling conclusions. Additional dust controls have also been applied based on an understanding of the control mechanisms and the known dust sources to which they are to be applied.
4	FMG demonstrates that despite their expansion not adding any further environmental or health concerns individually to the health of the environment or to the residents, the cumulative effect will increase the total emissions Particulate Matter at 10 microns per cubic meter to the Taplin Street Monitor. The Taplin Street	Noted. PHIC has advised that new monitoring equipment has been installed at Taplin Street in January 2020 and recent monitoring results are now accurate. The department is now focused on gaining full control and oversight of

Submitter	Summary of stakeholder comments	DWER response
	monitor has been reported as underreporting by the reporting body the Port Hedland Industry Council over several months. This has not yet been addressed.	the Port Hedland monitoring network as soon as possible to meet the endorsed Taskforce recommendations (see section 4.6.1) and provide transparent and accurate air quality information to Port Hedland residents.
4	There is no mention of 2.5 microns per cubic measurements at Taplin, or how the application will affect the monitors in Richardson Street, and Kingsmill Street, where people still live, and plan to live despite the proposed non-conforming use changes to their homes.	Noted. DWER has identified that particles as $PM_{2.5}$, averaged annually and as measured at Taplin Street and Richardson Street monitors, have trended upward slightly since 2012. Particles as PM_{10} have formed the basis of DWER's risk assessment as particulate matter sized 10 micron in diameter and smaller (PM_{10}) remains the dominant particle size in Port Hedland's ambient air that presents a risk to human health, noting that $PM_{2.5}$ size fraction of particles is part of the PM_{10} fraction. Additional controls applied to the Amended Licence are expected to address dust risks, including $PM_{2.5}$, PM_{10} and TSP.
4	As the applicant is located within a cumulative airshed, it is unacceptable that the Environmental Protection Authority, and Environmental regulator can expect the community must accept this and now even higher measures as a permanent measure for the exception of industry to allow emissions to escape from their licenced premises. At the same time as a planning authority restricts the residents from living in town, based on a health directive, from industry emissions.	Noted. DWER has assessed the application on the basis that there is no net increase to dust emissions in Port Hedland from proposed throughput increases at the Premises. Based on the information provided in the Application and an understanding of the effectiveness of control mechanisms applied in the Amended Licence, the Delegated Officer considers that these controls do have the potential to significantly reduce dust generated from the known sources. Additional controls have been applied to those proposed by the Applicant. In addition, the review of boundary monitoring data and dust control equipment monitoring will be used to substantiate conclusions made in the Application.
4	In 2010, the PPA commissioned SKM to conduct modelling to determine the effectiveness of dust control techniques in minimising air quality impacts in the Port Hedland region due to potential new iron ore export facilities. The guidelines set out findings based on a review of national and international best practice and describe what is broadly considered to constitute leading practice for dust management in bulk materials handling processes. These dust best practice guidelines are an integral reference for all new developments at the Port and include leading practice examples for the main activities leading to the generation of dust: Unloading, Stacking, Stockpiles, Reclaiming, Conveyors and Transfers, and Ship Loading.	Noted. The guidelines referred to were considered as part of this assessment. FMG's current ore handling activities meet leading practice as defined by the PPA guidelines. DWER notes that these guidelines were commissioned by PPA, a port operator in Port Hedland and contributor to the cumulative airshed. DWER did not have oversight over the scope of dust management controls investigated through the development of these guidelines. In addition, it is possible that in the time since the development of these guidelines leading practice in bulk material handling and dust management has evolved.

Submitter	Summary of stakeholder comments	DWER response
	Current Port dust management measures are compared against PPA Leading Practice.	DWER has commissioned Third Party Specialist Consultant to develop alternative dust management guidelines for port operators according to a government-endorsed dust taskforce recommendation.
DPLH	The Department of Planning, Lands and Heritage raise no objections to the proposal subject to FMG complying with all environmental approvals in Port Hedland granted under the Environmental Protection Act 1986, in particular, the company's ongoing responsibilities to manage emissions.	Noted.
ToPH	The Commissioner, on behalf of Council, supports the application.	Noted

Attachment 1: Amended Licence L8194/2007/3