



Department initiated Amendment

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

Licence Number	L4503/1975/14
Licence Holder	BHP Iron Ore Pty Ltd
ACN	008 700 981
File Number	DER2013/000901-2~2
Premises	Mt Whaleback/Orebody 29/30/35 Iron Ore Mine Tenements E52/2009-I, ML244SA G52/19-G52/27, G52/276, G52/277, G52/279, K858923 and N088235 NEWMAN WA 6753
Date of Report	16 January 2023
Proposed Decision	Revised licence granted

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an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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1. Decision summary

Licence L4503/1975/14 is held by BHP Iron Ore Pty Ltd (Licence Holder, BHP) for the Mt Whaleback/Orebody 29/30/35 Iron Ore Mine (the Premises), located approximately 2km west of Newman in Western Australia's Pilbara Region.

This Amendment Report documents the assessment of potential risks to the environment and public health from dust generated during the operation of the Premises. As a result of this assessment, Amended Licence L4503/1975/14 has been granted subject to conditions commensurate to the dust risk.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Amendment Report, the Department of Water and Environmental Regulation (the Department or DWER) has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at <https://dwer.wa.gov.au/regulatory-documents>.

2.2 Risk review summary – dust

On 6 October 2020, the Department notified the Licence Holder that it will be reviewing the licences for the Premises (L4503/1975/14); and Eastern Ridge Iron Ore Mine (L6942/1997/13). This review will focus on dust emissions and impacts from the Premises, to ensure that the impacts of dust are well understood and regulated to the appropriate levels.

While the Pilbara is a naturally dusty environment and there are numerous sources of local and regional dust, BHP operates two large iron ore mines that each have the potential to significantly contribute to ambient dust at Newman, being Mt Whaleback and Eastern Ridge, located approximately 2km and 4.5km respectively from the nearest residential receptors.

Potential dust generating activities and sources at both mine sites include ore crushing, screening, blasting, truck movements on mine roads, open/unsealed areas and clearing and rehabilitation works, among other general activities. Of these activities, the Licence (L4503/1975/14) regulates ore processing activities, which includes crushing and screening of ore.

This Amendment Report review will consider prescribed premises activities only. This includes all associated dust sources, emissions, pathways and management measures, in addition to historic monitoring results and the findings of the recent dust study. Activities and dust sources that are beyond the scope of assessment within this Amendment Report are discussed in Section 2.3.

Existing and additional controls have been placed on the Amended Licence and the justification for these controls are provided in section 5.5. Following the implementation of additional controls through the Amended Licence the Department expects that the risk of dust emissions will be reduced from the Premises and that overall dust emissions are likely will be acceptable. In the event that unacceptable dust emissions are identified in the future, the Licence may be modified or further amended to require additional controls.

2.2.1 Amendment application

On 12 October 2021, the Licence Holder submitted an application to authorise an increase in authorised waste disposal tonnages from 6,000 tonnes per annual period (tpa) to 14,500 tpa. The purpose of the request to increase waste disposal rates is to allow for the disposal of approximately 8,500 tonnes of asbestos material illegally dumped by a third party and

identified by the Shire of East Pilbara at the Newman Substation located between the Premises and the townsite. In addition, the Licence Holder has applied to dispose of inert concrete waste within landfill facilities, pits or overburden storage areas located within the Premises boundary.

Further amendments associated with the application include requests to:

- authorise the ongoing operation of the OHP5 crushing circuit;
- allow for existing wastewater treatment facilities to accept waste water generated from non-sewered facilities (e.g. temporary toilets) provided the acceptance of this waste does not exceed existing authorised capacity or output requirements;
- remove the existing licensed landfarm and amend the licence to allow bioremediation facilities to be installed anywhere within the prescribed premises provided they are constructed in accordance with licence conditions; and
- remove duplicative and unnecessary conditions.

No changes to the approved Premises production, design capacity or ore processing throughputs authorised through the Existing Licence have been considered in this Amendment Report or authorised in the Amended Licence (Table 1).

Table 1: Approved design or throughput capacity under the Licence

Classification of Premises	Description	Existing Premises production or design capacity or throughput	Amended Premises production or design capacity or throughput
Category 5	Processing or beneficiation of metallic or non-metallic ore: premises on which — (a) metallic or non-metallic ore is crushed, ground, milled or otherwise processed; or (b) tailings from metallic or non-metallic ore are reprocessed; or (c) tailings or residue from metallic or non-metallic ore are discharged into a containment cell or dam.	80,000,000 tonnes per annual period	80,000,000 tonnes per annual period No change
Category 6	Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore.	8,000,000 tonnes per annual period	8,000,000 tonnes per annual period No change
Category 54	Sewage facility: premises — (a) on which sewage is treated (excluding septic tanks); or (b) from which treated sewage is discharged onto land or into waters.	183.2 cubic metres per day	183.2 cubic metres per day No change
Category 61	Liquid waste facility: premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.	9,348,600 tonnes per annual period	9,348,600 tonnes per annual period No change
Category 64	Class II or III putrescible landfill site: premises on which waste (as	6,000 tonnes per annual period	14,500 tonnes per annual period

	determined by reference to the waste type set out in the document entitled “Landfill Waste Classification and Waste Definitions 1996” published by the Chief Executive Officer and as amended from time to time) is accepted for burial.		Increase of 8,500 tonnes per annual period
Category 73	Bulk storage of chemicals etc.: premises on which acids, alkalis or chemicals that — (a) contain at least one carbon to carbon bond; and 1 000 m ³ in aggregate (b) are liquid at STP (standard temperature and pressure), are stored.	13,000 cubic metres	13,000 cubic metres No change

This review has been informed by supporting information submitted to DWER by the Licence Holder including monitoring data, the Licence amendment application submitted on 12 October 2021, various site visits conducted by DWER and other Government officers to the Premises, and the findings of the recent dust study. A full list of supporting information and reference documents is provided in the References section at the end of this Amendment Report.

2.3 Beyond scope

2.3.1 Non-dust generating activities

All activities that are not expected to generate dust including mine dewatering (Category 6), waste water treatment (Category 54), storage of liquid waste from the reverse osmosis plant¹ (Category 61) and bulk fuel storage (Category 73).

Conditions in the Existing Licence relating to the regulation of these activities have been transferred to the Amended Licence with only administrative changes made where necessary.

The risk assessment of emissions and discharges associated with these prescribed premises activities may be reviewed at a later date but are not considered within this review document.

2.3.2 Non-prescribed premises activities

The focus of this Amendment Report is on dust emissions from prescribed premises activities only, as defined by the *Environmental Protection Regulations 1987* (EP Regulations). Therefore, dust generated from clearing of vegetation and waste rock management including storage and landform rehabilitation works are not within scope of this Amendment Report (Licence review). Although carried out for the purpose of processing and beneficiation of ore, mining activities such as blasting and extraction do not satisfy the definition of Category 5 of the EP Regulations (refer to Table 1). Similarly, the dust generated from ore haulage and open areas created from mining are considered beyond the scope of this Amendment Report.

¹ Category 85B reverse osmosis plant is operated under registration R2436/2016/1 to treat up to 16.5ML/day raw water for supply of potable water to the Newman townsite and the Premises. Up to 5.7 ML/day of reject water produced from the water treatment process is directed to the XD57 tank located at Mt Whaleback, where it is blended and used onsite for dust suppression.

Key findings and determinations:

- 1) The scope of review for the licences issued under Part V of the *Environmental Protection Act 1986* (EP Act) will only:
 - a. consider the emissions of dust from the prescribed premises category descriptions as defined in Schedule 1 of the EP Regulations;
 - b. assess dust management controls in relation to prescribed premises activities; and
 - c. review the air quality monitoring network and determine a fit-for-purpose network and response framework (as licence conditions) that aims to provide beneficial data and to proactively respond to high dust events to limit the degree and duration of impacts on the town of Newman.
- 2) The Department of Jobs, Tourism, Science and Innovation (DJTSI) is responsible for facilitating the approvals process for major resource projects, including BHP's Newman Operations under the *Iron Ore (Mount Newman) Agreement Act 1964* (State Agreement – refer to section 3.3.1).
- 3) The Department of Mines, Industry Regulation and Safety (DMIRS) takes active steps to regulate occupational health at the premises, maintaining a focus on dust levels where workers are present. The scope of this assessment has a focus on ambient air quality experienced by the sensitive receptors living in Newman. DMIRS regulatory oversight of the Newman Operations does not extend to the management of dust for the protection of the community.
- 4) The Shire of East Pilbara also plays an important role in managing local dust sources in or near to residential areas of Newman through the establishment of industry zones appropriate to the prevailing land use (Shire of East Pilbara Local Planning Strategy 2020). The Shire may also require the use of dust controls as a conditions on approvals for certain activities conducted in close proximity to sensitive receptors.
- 5) There exist numerous dust sources at the Premises that are beyond the scope of this assessment including dust from waste rock dumps, blasting, excavation and haulage activities. These activities are not directly related or physically connected to ore processing or beneficiation, or landfill activities as defined under the EP regulations although controls have been implemented by the Licence Holder for the management of dust.
- 6) DWER will work with the Environmental Protection Authority (EPA) to identify opportunities for the effective regulation of dust emissions from the operations subject to existing Ministerial Statements (refer to section 3.3.7) and impacts from those sources not within the scope of this Amendment Report.
- 7) DWER will continue to engage with DJTSI, DMIRS, EPA and the Department of Health (DOH) to develop an inter-Departmental approach to managing broader dust impacts on the town of Newman.

3. Premises overview

The Premises consists of the iron ore mines of Mount Whaleback and Orebodies 29, 30 and 35 and is part of BHP's Newman Operations. The Premises also receives ore transported rail from other mine sites Orebody 24 (Eastern Ridge), located approximately 8km east of the Premises, and Orebody 18 operations situated approximately 40km to the east. Ore from the Premises is transported to Port Hedland via the BHP Newman to Port Hedland railway lines and is shipped out through Port Hedland at Nelson Point and Finucane Island.

3.1 Ore handling at the Premises

Iron ore at the Premises is mined using conventional open cut methods. The ore is drilled and blasted and then loaded onto haul trucks using an excavator. Ore is then transported to one of three ore handling plants (OHP – OHP2, OHP3 or OHP5). OHP2 and OHP3 consist of primary crushers that receive ore dumped from haul trucks via a hopper. In OHP2, crushed ore is then conveyed to secondary crushers then conveyed to the tertiary crushing infrastructure (OHP4). In OHP3, ore with lower iron level is secondary crushed and depending on the ore size, is either dry or wet screened, then processed through the Beneficiation Concentrator Plant to remove non-ferrous material prior to stockpiling. Waste is transported to the thickener for later discharge into the tailings facility (refer to Figure 1). The fines ore is sent direct to the OHP4 Fines Stockyard, unless for operational reasons it joins the lump ore which is sent to OHP4 for tertiary crushing and screening.

OHP5 processes exclusively Marra Mamba ore from the Orebodies 29, 30 and 35. Fines and lump ore are separated at the OHP5 screen and then re-stockpiled and blended in the main stockpile area. A portion of the Marra Mamba ore is stockpiled at the ROM pad, meaning that there is triple handling for that portion prior to train load out. Other ores handled at the premises are typically tipped by ore trucks directly into the feed hoppers of fixed crushing and screening infrastructure.

Table 2 demonstrates the location at which each ore type is handled at the Premises.

Table 2: Ore source and processing location (current) (BHP, 2021b)

Orebody Name/Number	Ore Type	Processed at the Premises			Stockpiled at the Premise
		OHP2	OHP3	OHP5	
Whaleback	Brockman	X	X	X	X
Bill's Hill	Brockman	X		X	X
Eastern Syncline	Marra Mamba	X	X	X	X
Silver Knight	Marra Mamba			X	X
OB29	Marra Mamba			X	X
OB30	Marra Mamba		X	X	X
OB32	Marra Mamba				X
OB33	Marra Mamba				X
OB35	Marra Mamba	X	X	X	X

OHP2 and OHP3 receive approximately 50% of their feed directly from haulage trucks (direct tipped), with the remainder being taken from ore that is stockpiled on a ROM pad from the truck and later front end loaded into the crushing circuit. At OHP5, all ore is rehandled from a stockpile to the crushing plant via front end loader.

The Premises also receives coarse ore by train from Eastern Ridge (OB24/25) and Jimblebar/Wheelarra Hill (OB18) Iron Ore Mines. Ore from OB24, OB32 and OB33 is crushed at OB24OHP and OB25OHP located at the Eastern Ridge Iron Ore Mine before being either stockpiled at that mine or loaded directly onto a train for stockpiling and blending at the Premises (BHP, 2021b). Ore is delivered via rotary car dumper and conveyed to the Coarse Ore Stockpile that is built up to choke feed conveyors running to OHP4 for further crushing and screening.

In the 2019/20 annual period approximately 66.13 million tonnes of ore was processed (crushed, screened and/or blended) of which, 18 Mt and 11.5 Mt of ore was received and reprocessed from the Eastern Ridge (L6942/1997/13) and Orebody 18 (Jimblebar – L5415/1988/9) Iron Ore Mines respectively (BHP, 2020).

Following crushing and screening ore from each handling plant is stockpiled in either fines or lump piles in the Whaleback stockyard using one of two boom stackers. In some instances the Licence Holder will blend ores at stockpiles using chevron stacking techniques to improve the quality of lower grade ores to meet customer demands. Ore is then reclaimed by bucketwheel reclaimer that delivers ore to either the fines or lump train load out (TLO) stockpiles. From these stockpiles ore is funnelled into a car dumper and railed to Port Hedland for shipping.

Approximately seven trains are loaded each day via either the fines or lump train load out.

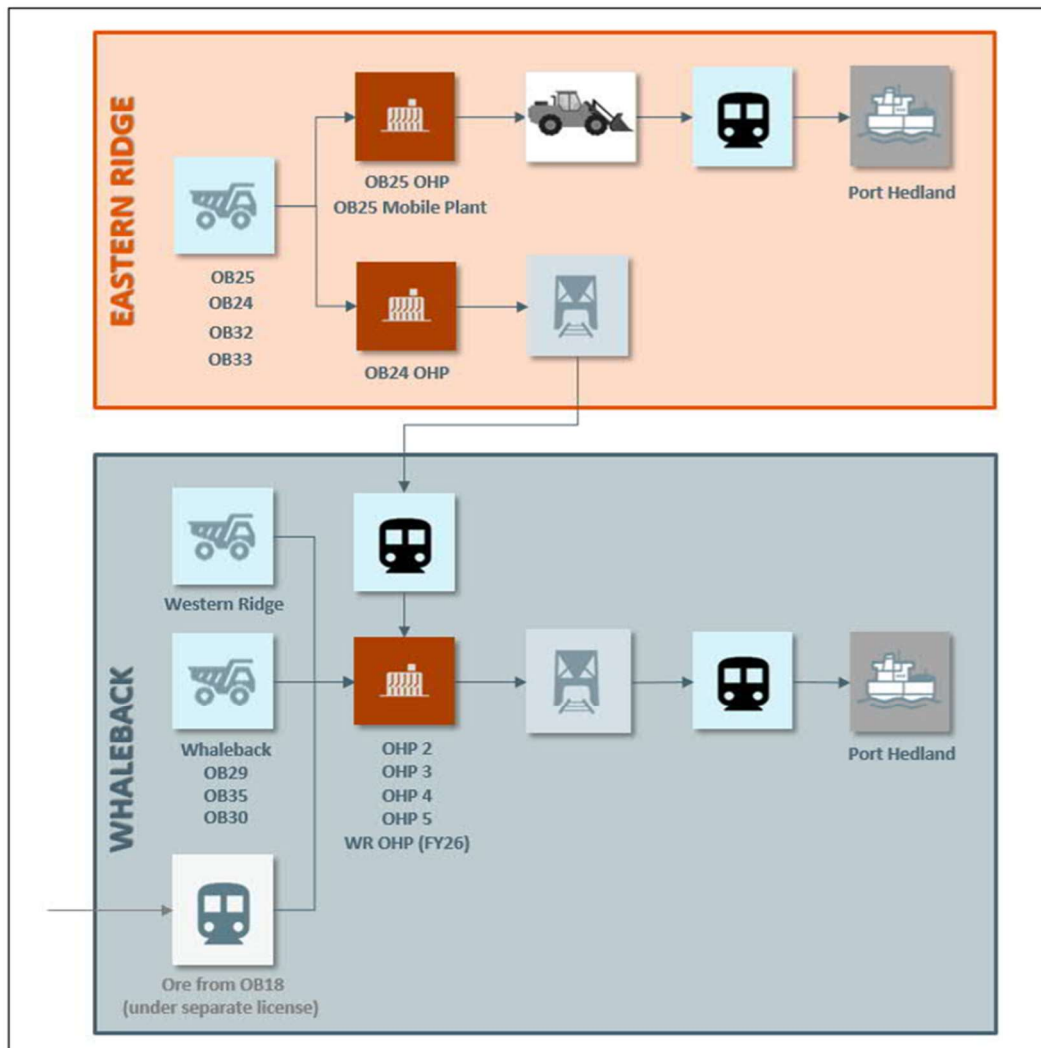


Figure 1: Process flow chart at the Premises and Eastern Ridge operations (BHP, 2021a)

To support mining activities and personnel the Licence Holder operates inert landfills, a putrescible landfill and a tyre dump at the site which accepts waste material generated onsite. There are also two asbestos disposal sites operated onsite which accept Type 1 Special Wastes (Asbestos) contained within demolition debris waste from onsite and from other premises operated by the Licence Holder and in the vicinity of Newman. Fibrous material from drill holes during exploration and production drilling is disposed of at the asbestos disposal sites².

² Note that in 2017 DWER conducted a dust monitoring campaign in Newman to determine the presence of fibrous material in ambient air. Asbestos levels were below the limit of detection for all samples collected.

3.2 Infrastructure

The Mt Whaleback/Orebody 29/30/35 Iron Ore Mine infrastructure, as it relates to Categories 5 and 64 activities, is detailed in Table 3 and with reference to the Site Plan (attached in the reviewed licence).

Table 3 lists infrastructure associated with each prescribed premises category.

Table 3: Premises infrastructure as it relates to Prescribed Activities

	Infrastructure	Site Plan Reference (on Amended Licence)
	Prescribed Activity Category 5	
1.	3 x Primary Crushers (or similar)	Figure 2: OHP2; OHP3; OHP5
2.	4 x Secondary Crushers	Figure 2: OHP2 (3); OHP3 (1);
3.	3 x Tertiary crushers	Figure 2: OHP4 (3)
4.	21 x Screens	Figure 2: OHP3 (3 x wet screens; 3 x dry screens); OHP4 (13 dry screens); OHP5 (3 x dry screens)
5.	Beneficiation Plant – ore concentrator to beneficiate lower grade ore-	Figure 2: OHP3 (Bene Concentrator Plant; Thickener; Bene Waste)
6.	Conveyor Belts	Figure 2: OHP2: M101, M103, M112, M120, M121, M122, CV301, CV302 OHP3: M13, M201, M206, M210, M214, M215, M216, M217, M218, M219, M220, M221, M222, M223, M224, M225, M227, M231, M232, M116, M233, M234, M240, M242, M250, M251, CV228, CV230, CV234, CV235, CV252, CV253, CV301, CV302 OHP4: CV401, CV402, CV404, CV405, CV406, CV451, CV452, CV453, CV454, CV501, CV502, CV503, CV504, CV601, CV602, CV603, CV604, CV701, CV702, CV751, CV752 OHP5: CV02A/B, CV03A/B, CV04A/B/C, CV05A/B/C, CV06, CV107, CV108, CV109, CV10, CV11, ST101.
7.	Stockpiles	Figure 2: Lump; Fines; Dead Lump Stockpile(s); Dead Fines Stockpile(s)
8.	3x Stackers	Figure 2: OHP3: ST253 – Waste OHP4: ST601 – Fines, ST602 – Lump

	Infrastructure	Site Plan Reference (on Amended Licence)
9.	1x Reclaimer	Figure 2: OHP4: RC701
10	Car Dumper (CD501) to receive primary crushed ore from orebodies OB24 (Eastern Ridge) and OB18	Figure 2: OHP4: Car Dumper
11	Train Loadout	Figure 2: OHP4: Train Loadout; Fines; Lump
12	Tailings Storage Facility	Figure 1: Tailings Storage Facility
13	Water cart: One water cart for light vehicle roads in the Fixed Plant West area.	N/A – mobile
Prescribed Activity Category 6		
14	Dewatering discharge points	Figure 3: W1; W2; P3 Figure 1: Tank XD57 Discharge Point
15	Dewatering pipeline	N/A
Prescribed Activity Category 54		
16	7 x WWTP	Figure 1: EPCO STP, Beneficiation Plant STP; ANFO Yard STP; Hub STP; Lab STP; Security Gate STP; Warehouse STP
17	4 x WWTP irrigation areas	Figure 1: ANFO Yard STP Irrigation Area; Lab STP Irrigation Area; Security Gate STP Irrigation Area; Warehouse STP Irrigation Area
18	2 x WWTP discharge ponds	Figure 1: EPCO Sewage Discharge Ponds; Hub Discharge Pond
Prescribed Activity Category 61		
19	Waste oil storage	Figure 1: Waste Oil Storage Area Main Fuel Farm; Waste Oil Storage Area MEW
Prescribed Activity Category 64		
20	4 x Inert Landfills	Figure 1: Inert Landfill (4)

	Infrastructure	Site Plan Reference (on Amended Licence)
21	2 x Putrescible Landfills	Figure 1: Putrescible Landfill (2)
22	5 x Asbestos Disposal Areas: These accept Type 1 special wastes (asbestos) contained within demolition debris waste from onsite and from other BHP premises in the vicinity of Newman. Fibrous material from drill holes during exploration and production drilling are also disposed of at these asbestos disposal sites	Figure 1: Asbestos Disposal Area (5)
23	1 x tyre dump Tyres are buried in piles of up to 100 units with 6 m separation distance between each pile. Tyre burial areas are located within the overburden (waste rock dumps) within the Premises boundary depicted in Schedule 1 of the Amended Licence.	N/A – not shown
Prescribed Activity Category 73		
24	Fuel storage area	Figure 1: Main Fuel Farm
Ancillary infrastructure to Primary Activities		
25	ARD management areas	Figure 3: ARD Dams A, B and C; ARD Evaporation Cells 1-5 Figure 3: P4; P5; P6; P7; P8; P9; P10; P11
26	Bioremediation facilities – hydrocarbon contaminated soils	New landfarms, constructed to the specifications outlined in row 9 of Table 15, not shown.
27	Water carts	N/A – mobile

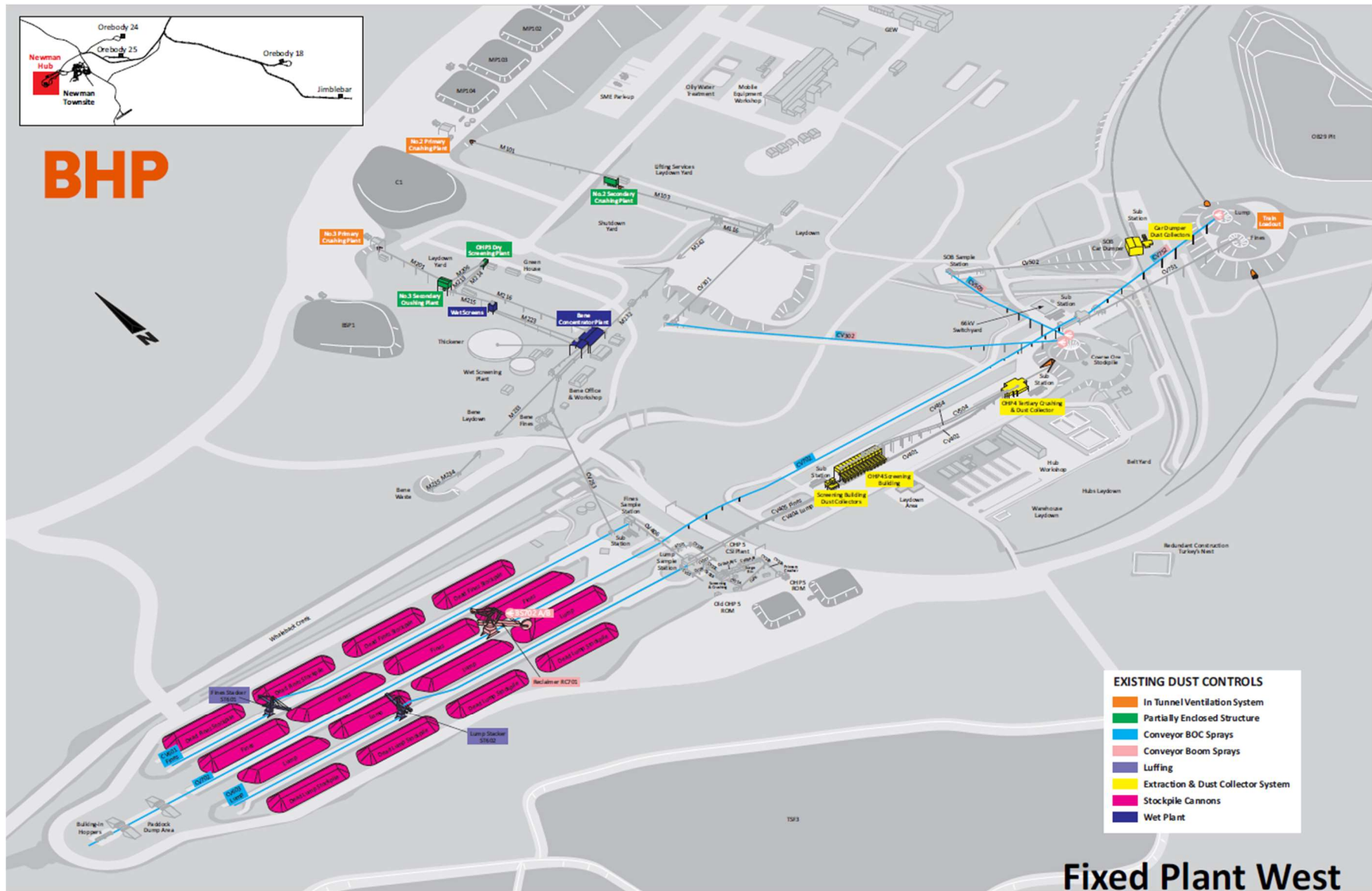


Figure 2: Ore processing infrastructure (existing)

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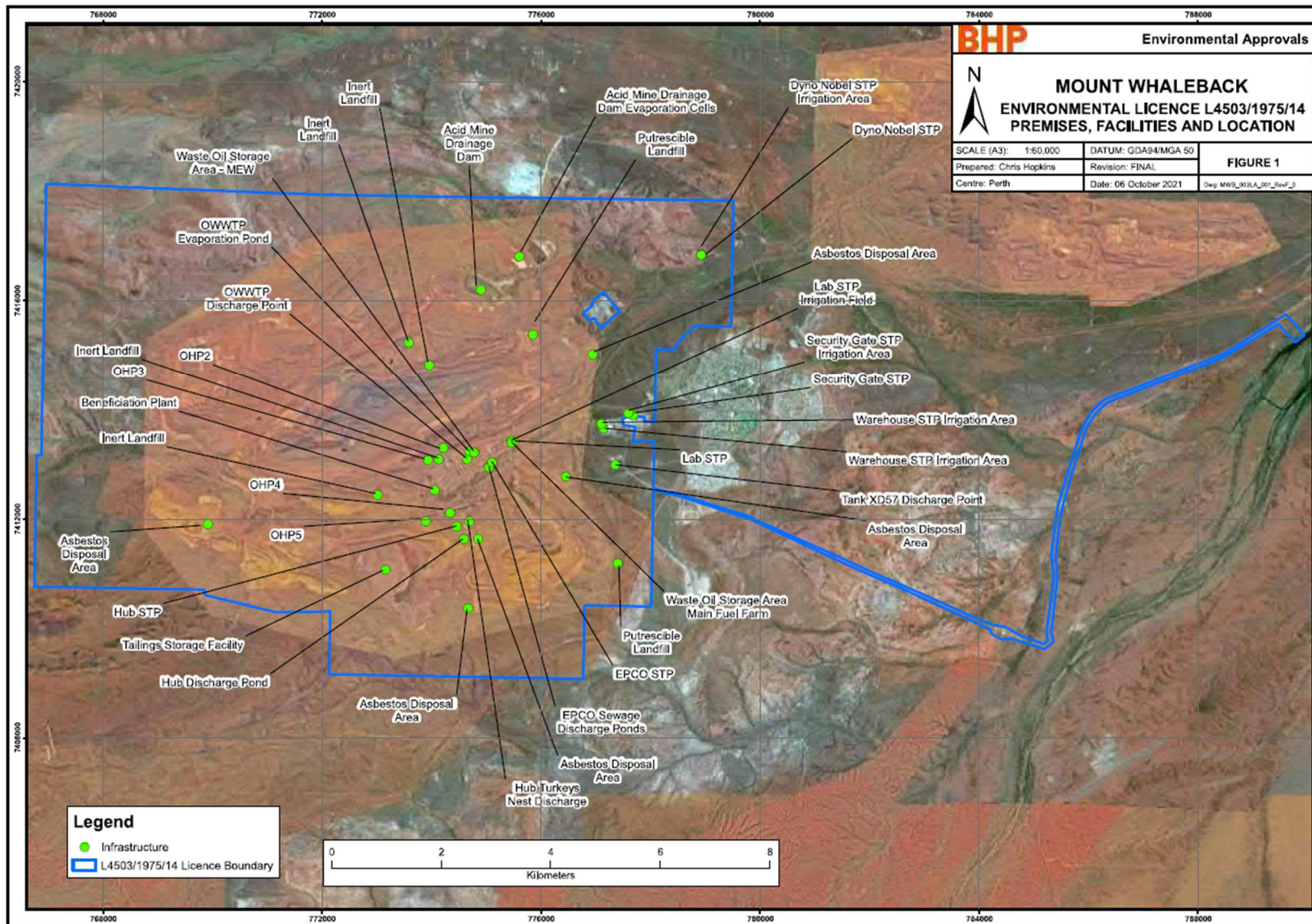


Figure 3: Premises key infrastructure map

Licence: L4503/1975/14

3.3 Legislative context

The mine is located on tenements E52/2009, ML244SA and G52/19-G52/277 and was initially approved under the *Iron Ore (Mount Newman) Agreement Act 1964*, with operations commencing in 1969. Table 4 summarises approvals relevant to the assessment.

Table 4: Relevant approvals and tenure

Legislation	Number	Subsidiary	Approval
<i>Iron Ore (Mount Newman) Agreement Act 1964</i>	Tenements E52/2009-1, ML244SA, G52/19-G52/27, G52/276, G52/277, G52/279; and Special Leases K858923 and N088235	Pilbara Iron Limited BHP Minerals Pty Ltd Mitsui-Itochu Iron Pty Ltd CI Minerals Australia Pty Ltd	The Newman Upgrades State Agreement proposal to run Whaleback at 82Mtpa was approved on 23 April 2019
<i>Rights in Water and Irrigation Act 1914</i>	<i>GWL65148(10) Whaleback Pit</i> <i>GWL160418(8) Orebody 29, Orebody 30 and Orebody 35</i>	BHP Billiton Iron Ore Pty Ltd	<i>5C Licenses to Take Water</i>
<i>Dangerous Goods Safety Act 2004</i>	Dangerous Goods Licenses: <ul style="list-style-type: none"> • DGS015372 • DGS015398 • DGS015402 • DGS015403 • DGS015404 • DGS016933 • DGS021844 • DGS022033 	BHP Billiton Iron Ore Pty Ltd	Eight Dangerous Goods Licenses
Part IV of the EP Act (WA)	Statement Number 963	BHP Billiton Iron Ore Pty Ltd	Ministerial Statement 963 was published on 18 March 2014 to extend the mining of the existing approved above water table Orebody 29, 30, and 35 mines to below the water table and discharge any excess dewatering from these three orebodies into Ophthalmia Dam.
	Statement Number 1105	BHP Billiton Iron Ore Pty Ltd	Provides conditions on future iron ore mining and associated activities and operations under the boundary of the Pilbara Expansion Strategic Proposal (see Figure 6).
Part V of the EP Act (WA)	L4503/1975/14	BHP Iron Ore Pty Ltd	This Licence
	W6281/2019/1	BHP Billiton Iron Ore Pty Ltd	Construction of the OHP5 Relocatable Crusher (refer to section 3.3.1).
	W6363/2020/1	BHP Billiton Iron Ore Pty Ltd	Car dumper, reclaimers, stacker and OHP4 upgrades to remove bottlenecks between the coarse ore stockpile, the product stockpiles and train loadouts (refer to section 3.3.1).

3.1.1 Iron Ore (Mount Newman) Agreement Act 1964

The State Agreement details the rights, obligations, terms and conditions for the development of the project, and is administered by DJTSl on behalf of the Western Australian Government.

In the case of the Newman Operations, the State Agreement negates the requirement for regulation under the *Mining Act 1978*. However, DMIRS will continue to provide advice to DJTSl on the implementation of the State Agreement as required. As the Newman Operations licence review is not associated with an expansion of BHP's operations, DJTSl's role will be to ensure consistent communications between each agency and support a coordinated regulatory approach across Government.

No activity conducted under the State Agreement is exempt from compliance with the EP Act.

3.1.2 Environmental Protection Act 1986

There are numerous activities at the Premises that have the potential to contribute to dust impacts in Newman, some of which are not within scope of this assessment but may be regulated via alternate regulatory approvals. While it is acknowledged that the Licence Holder does apply a range of additional dust controls to these sources that are beyond scope of a Part V licence, a whole-of-Government approach to managing dust in Newman would be required to ensure more complete regulatory capture.

As the primary administrator of the EP Act, DWER is most suitably placed to regulate the dust from the Licence Holders prescribed activities to, in part address existing high dust levels in Newman through the Part V licence.

DWER regulates the environmental performance of mining operations at both Mt Whaleback and Eastern Ridge through Part IV and V of the EP Act. There remains scope within both Part IV and Part V approvals to enhance the regulation of dust from the Newman Operations and promote improved dust management practices across the whole facility.

Further detail on the role of DWER is provided in the sections below.

DWER will continue to engage with key decision-making authorities on the environmental performance of BHP's Newman Operations as it does with other projects of State significance. This includes the supply of air quality monitoring data that may be used to inform the decision making of other departments such as the DOH.

3.1.3 Works approval W6281/2019/1 – OHP5 Relocatable Crusher

Works approval W6281/2019/1 was issued 23 January 2020 for the installation of a 12 Mtpa Relocatable Crusher to replace the 7 Mtpa Relocatable Crusher (OHP5) in the same/similar location. The intent of this application was not to increase the authorised throughputs under the Existing or Amended Licences, rather it was to:

- 1) reduce dust emissions by:
 - (a) reducing haul distances (it is a significantly shorter journey to OHP5 from Orebodies 29, 30 and 35 than to OHP2). It is estimated that approximately 60 trucks every 24hr period will be diverted from OHP2 to OHP5, with the benefit of shorter haul distances;
 - (b) reducing the Marra Mamba ore drop height to the Coarse Ore Stockpile (OHP2 is located much higher in the landscape and has a larger drop height than OHP5);
 - (c) reducing the number of transfer stations the Marra Mamba ore passes through by approximately 16; and
 - (d) providing an opportunity to focus dust reduction measures on a 12 Mtpa OHP dedicated to exclusively processing Marra Mamba ore;
- 2) provide additional production capacity in response to upstream breakdowns (in comparison to the existing configuration).

Both the previous OHP5 setup and the replacement OHP5 Relocatable Crusher comprise a ROM bin, ROM stockpiles, primary and secondary crushers, vibrating screens, and associated conveyors belts. For the replacement OHP5 Relocatable Crusher, Marra Mamba ore is loaded directly by haul truck to the ROM bin, whereas the previous facility stockpiled all ore before loading the ROM bin using a front-end loader from stockpiles supplied by haul trucks. Therefore the design of the replacement OHP5 Relocatable Crusher removes a handling process for Marra Mamba ore.

The OHP5 Relocatable Crusher and connecting infrastructure has been designed to manage dust emissions at key ore handling and processing points. For example, conveyor transfer points have been designed to minimise ore drop heights. All secondary cone crushers allow optimised choke feeding (controlled ore flow) to mitigate dust generation in the crusher by reducing updrafts of air that can “puff” particulate matter into the environment. Additional design features on the replacement crushing and screening facility for the management of dust emissions include:

- Dust covers on sizing screens;
- All transfer chutes are fully covered and fitted with rubber skirts at entry and exit points;
- Crusher transfer points are enclosed and fitted with micro droplet water sprays at entry and exit points;
- Dust controls (e.g. water sprays/cannons, belt scrapers) are installed and maintained on stackers, reclaimers and long conveyors;
- Water spray curtain on ROM dump hopper and apron feeder discharge; and
- Dust sealing rubber curtain at head chute and skirt discharge to contain dust within transfer system.

Appeal and works approval amendment

Works Approval W6281/2019/1 was amended on 22 January 2021, at the direction of the Minister for Environment following determination of a third party appeal. The Minister allowed the appeal by amending the works approval as follows:

- Condition 1 was amended to:
 - properly reflect the scope of works subject of the approval by deleting reference to ‘multiple crushers’ in column 1 of Table 2; and
 - clarify that all items in the first column of Table 2 are collectively defined as ‘OHP5 Relocatable Crusher’, and that this term is used consistently throughout the approval.
- Condition 12 was amended to require BHP to report on ambient dust levels to provide guidance to DWER on the extent to which dust levels have been reduced.

The Minister otherwise dismissed the appeal.

Compliance reporting

On 28 May 2021, an Environmental Commissioning Report was submitted in accordance with Condition 8(e) of the works approval. Condition 8(e) requires that information is provided to “adequately demonstrate that the OHP5 Relocatable Crusher has resulted in a reduction of dust emissions when processing ore at full capacity, as compared to the previous crusher.”

As part of the Environmental Commissioning Report, the Licence Holder submitted a dust emissions study, which was designed to verify compliance with Condition 8(e) of the works approval. During two monitoring campaigns conducted 8 and 9 May 2021, the following was observed for the respective dates (BHP, 2021; Ramboll, 2021):

- 27% and 23% reduction in downwind average PM₁₀ concentrations.
- 10% and 24% reduction in the maximum peak measured PM₁₀ concentrations.
- 70% and 69% reduction in PM₁₀ concentrations above a selected trigger value of 100µg/m³.

During the Time Limited Operations period from the 28th of May 2021 to 24th of November 2021, approximately 3.3 million tonnes was processed through OHP5.

Based on the findings of the dust emissions monitoring study (Ramboll, 2021) it is expected that increased production rates at OHP5 will offset a reduction in production at OHP2 resulting in no increase in overall throughputs at the Premises. In addition, monitoring conducted during both the monitoring campaigns and general monitoring conducted during time limited operations indicates that there would be an overall reduction in dust from OHP5 compared to original processing infrastructure (BHP, 2022).

3.1.4 Works approval W6363/2020/1 – OHP4 upgrades

On 10 March 2021, DWER issued Works Approval W6363/2020/1 for upgrades to OHP4 in-loading and outloading circuits to reduce bottlenecks. This includes upgrades to conveyor drives at OHP4, and various works to increase throughput rates through car dumping, stacking and reclaiming equipment.

Conditions of the works approval relating to dust management during commissioning including limiting the throughput at infrastructure to 33,000 tonnes over 150 calendar days and the implementation and maintenance of existing dust control infrastructure. No new dust emission points are created through these upgrades.

Conditions of the works approval require the holder to demonstrate no net dust increase at ambient monitors following the upgrades to OHP4, Car Dumper, Reclaimer and Stacker and during time limited operations.

During the process of consultation with key stakeholders and decision-making authorities on the proposed upgrades, the DOH advised DWER of no objection on the provision that the sum of upgrades will result in a net decrease in dust emissions, or at worst will not result in a net increase.

Key determination:

- 1) DWER assessed that although modifications authorised under Works Approval W6281/2019/1 and W6363/2020/1 enabled increased ore handling and processing capacity, modifications would not result in a net increase in dust emissions at Newman.
- 2) Infrastructure upgrades at OHP4 and OHP5 are expected to increase the Premises production capacity from approximately 70 Mtpa to 80 Mtpa. Neither approval is expected result in the Licence Holder increasing its production capacity above authorised throughputs (80 Mtpa).
- 3) This Amendment Report has not reassessed the risk of dust associated with works authorised by Works Approvals W6821/2019/1 and W6363/2020/1.
- 4) Conditions of Works Approval W6363/2020/1 require the Licence Holder to confirm no overall increase in ambient concentrations as a consequence of increased production capacity at OHP4.
- 5) The Licence Holder has submitted evidence to demonstrate no increase in dust emissions from OHP5 Relocatable Crusher. Increased production at this facility is also expected to be offset by reduced production at the OHP2 Crusher located to the north of OHP5.

- 6) The ongoing operation of OHP5 will be regulated through the Amended Licence. Relevant conditions from W6281/2019/1 relating to the operation of the OHP5 will be transferred to the Amended Licence where appropriate.
- 7) The Minister, in his review of the W6281/2019/1 appeal, recommended that the risk posed by smaller fraction particles (PM_{2.5}), PM₁₀ and substances such as asbestos be the subject of consideration under this Amendment Report. To inform the review of these hazards, DWER conducted the Newman Dust Composition Monitoring Campaign (refer to section 4.4).

3.1.5 Part V compliance

Current Part V licence conditions relevant to dust at the Premises are limited to the monitoring of ambient air quality in Newman, and the investigation and reporting of 24-hour dust events that exceed an ambient target of 70 µg/m³ (PM₁₀) averaged over every 24-hour period midnight to midnight. There are currently no dust management requirements on the Existing Licence although some controls are implemented by the Licence Holder.

As discussed in section 2.3.1, all matters not related to dust emissions are beyond scope of this assessment and are therefore not raised below. There have been no dust-related non-compliances reported since the 2019/20 reporting period.

A number of PM₁₀ exceedance days at the Town Centre and Newman East air quality monitors have been identified each reporting period. Exceedances of PM₁₀ reporting targets at ambient locations (70µg/m³ averaged over 24 hours) cannot represent non-compliance with the Licence conditions as they may be influenced or directly caused by non-mining sources not within the control of the Licence Holder. Therefore, further investigation of individual exceedances is required to determine source and possible pathway. Further discussion on PM₁₀ exceedance reporting is provided in section 4.3.

Reporting period 2019/2020

In the 2019/20 AACR, one non-compliance relevant to the risk assessment for dust was recorded, against Condition 1.2.3:

Condition 1.2.3 – *The licence holder shall ensure that [asbestos] wastes accepted onto the landfills:*

- *shall only be disposed of into the designated asbestos disposal areas shown in Schedule 1.*
- *Not to be deposited within 2m of the final tipping surface of the landfills.*
- *No works shall be carried out on the landfills that could lead to a release of asbestos fibres.*

On 15 April 2020, the Licence Holder identified exposed Asbestos Containing Materials (ACM) such as pipes and legacy construction materials at OB29 Asbestos Disposal Area. The area was encapsulated within the WB03 landform with over 10 metres of topsoil.

On 18 and 19 November 2020, DWER compliance officers conducted a compliance inspection of the Premises against all conditions of the Existing Licence. As part of the compliance program for the Newman Operations, DWER officers obtained photographic evidence that ACM were covered and the matter is now closed.

As further investigation is required into the reported dust exceedances, inspecting officers did not provide an assessment of the potential impacts of dust emissions from the Premises on the town of Newman.

3.1.6 Site visits

Since advising the Licence Holder of the Part V review of the Newman Operations, DWER

officers visited the Premises in November 2020 and 2021 to inform this risk assessment. On 17 November 2020, representatives of the Departments of Mining, Industry Regulation and Safety; and Jobs, Tourism, Science and Innovation and DWER visited the Premises ahead of the review commencing. DWER licensing officers also visited the site in August 2019.

During each site visit dust was observed at ore handling and processing locations, predominantly from the Marra Mamba ore. This observation is supported by DWER's understanding of Marra Mamba ore types as having a greater dust potential than ores from Brockman Iron Formations (refer to section 5.2.1).

Existing dust controls

During the site visit undertaken in November 2021, DWER officers noted that in some cases, spray equipment was not sufficiently adaptable to control dust from the different ore types that are handled at the Premises e.g. at stackers. The Licence Holder advised that each ore behaved differently and that sprays for ore types that generate coarser particles may not suppress dust as effectively from ore types that generate finer particulates. This is consistent with DWER's understanding that for sprays to be most effective, the droplet size should be similar to the size of the dust particle. As depicted in Figure 4, droplets that are too big for the particles can result in air flows that divert particulates around the droplet.

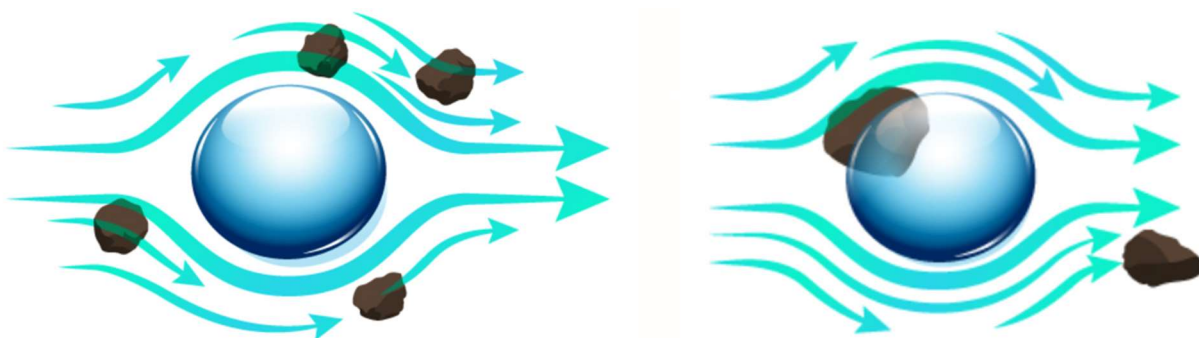


Figure 4: Dust particle behaviour and droplet size (Source: The Spray Nozzle People, 2021)

There is a significant focus on water cart operations on haul roads to reduce dust generated from wind erosion and truck movements. This may be appropriate for addressing a portion of dust generated at the Premises but is beyond the scope of this Part V assessment (refer to section 2.3.2). It was visually observed during each site visit that dust appeared to be more prevalent from handling locations where ore was being excavated (mining) or dropped from height (processing), when compared to vehicle movements. This may be a consequence of progressive improvements in dust control along haul roads.

Existing dust controls were identified as having lesser effectiveness when handling ores identified by operations staff as being sourced from Marra Mamba orebodies, for example at the train load out stacker and haul truck hoppers (bulk feeders to the crushing circuit). However, visual observations during site visits are limited to what infrastructure was handling ore and what ore was being handled at the time of the visit. On the principle that controls for one ore type may not be as effective on another, there are likely to be other opportunities for improvements at other locations around the Fixed West Plant where dual controls systems would be of similar benefit. .

Proposed dust controls

The Licence Holder identified numerous opportunities for improvements to onsite dust management which appear to be well progressed or complete, including:

- OHP5 replaced with the OHP5 Relocatable Crusher (complete – refer to section 3.3.3).
- Automation of haul trucks and water cart planning based on haulage traffic.

- Speed reduction during dusty conditions.
- Profiling and vegetating landforms in low dust risk seasons.
- Water control performance investigations and maintenance based on high priority assigned to dust control effectiveness.

DWER has sought to incorporate relevant dust control initiatives into the Amended Licence to ensure that they continue to be progressed.

Dust monitoring

When witnessing boundary monitors in the November 2021 site visit, it was noted that monitors between key dust sources and the Newman townsite may not accurately represent the dust concentrations along the likely pathway from the Fixed Plant West to sensitive receptors. Refer to section 4.2 for further discussion.

3.1.7 Part IV of the EP Act

The Environmental Protection Authority (EPA) is an independent statutory body that protects the environment by providing sound, robust and transparent advice to the Minister for Environment. DWER supports the EPA in conducting environmental impact assessments that inform conditions placed on Ministerial Statements issued by the Minister for Environment under Part IV of the EP Act.

Ministerial Statements (MS) for Mt Whaleback (MS963) and Eastern Ridge (MS478 and 1037) (Figure 5) condition the discharge of excess mine dewatering to Ophthalmia Dam and the monitoring of terrestrial and groundwater ecosystems. In parallel to this Amendment Report (Part V licence review), DWER will review the Part IV approvals to identify need and opportunity for the regulation of dust emissions and impacts from those sources not within the scope of this Amendment Report, including dust from:

- open areas beyond the footprint of ore processing and handling and tailings storage facilities;
- pits (blasting, excavation, haulage);
- haul roads; and
- waste rock dumps (overburden).

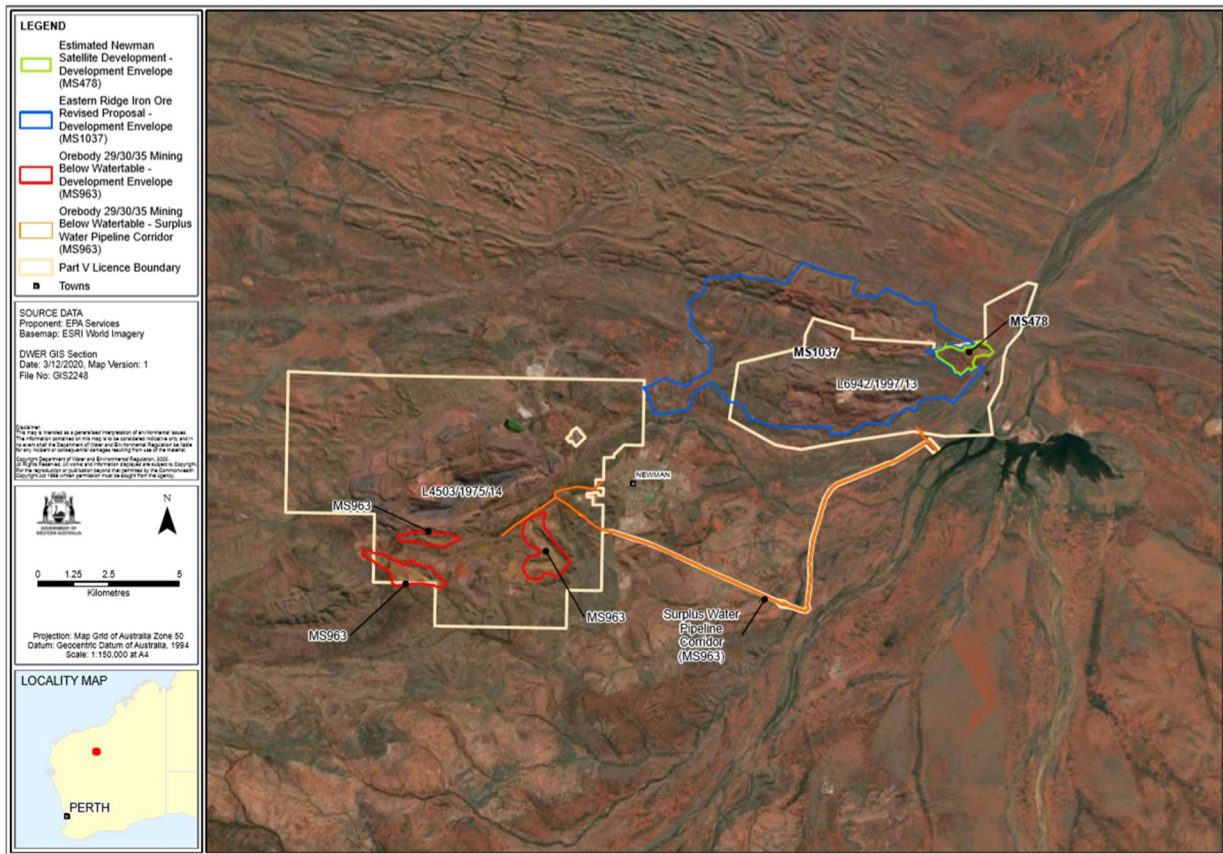


Figure 5: Overview of EP Act approval boundaries for the Newman Operations

MS 1105 was published on 11 July 2019, for the Pilbara Expansion Strategic Proposal, which is relevant to the construction and operation of all new BHP iron ore mine developments throughout the Pilbara Region. It is noted that all new applications for expansion of mining activities in the Newman Strategic Proposal project boundary depicted in Figure 6 will require BHP under MS1105 to maintain air quality and minimise emissions to meet recognised air quality standards and criteria. Criteria specified in condition 11-1 of MS1105 includes the *National Environment Protection (Ambient Air Quality) Measure (NEPM)* for particles as PM_{10} and $PM_{2.5}$.

11-1 The proponent shall manage the implementation of the proposal to meet the following environmental objective:

- (1) *maintain air quality and minimise emissions so that environmental values are protected, and in particular:*
 - (a) *meet recognised air quality standards and criteria, including:*
 - (i) *National Environment Protection (Ambient Air Quality) Measure for carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, lead, particles as PM_{10} and $PM_{2.5}$; or*
 - (ii) *other guidelines on a proposal specific basis as determined by the CEO.*

BHP is also required by Ministerial conditions 6-1 and 11-3 of MS1105 to develop an Air Quality Management Plan to address impacts on air quality, where relevant, including from, but not limited to: dust emissions due to clearing of vegetation; emissions from power plants; mining (including blasting), handling, stockpiling and transport of iron ore; and crushing and screening of materials.

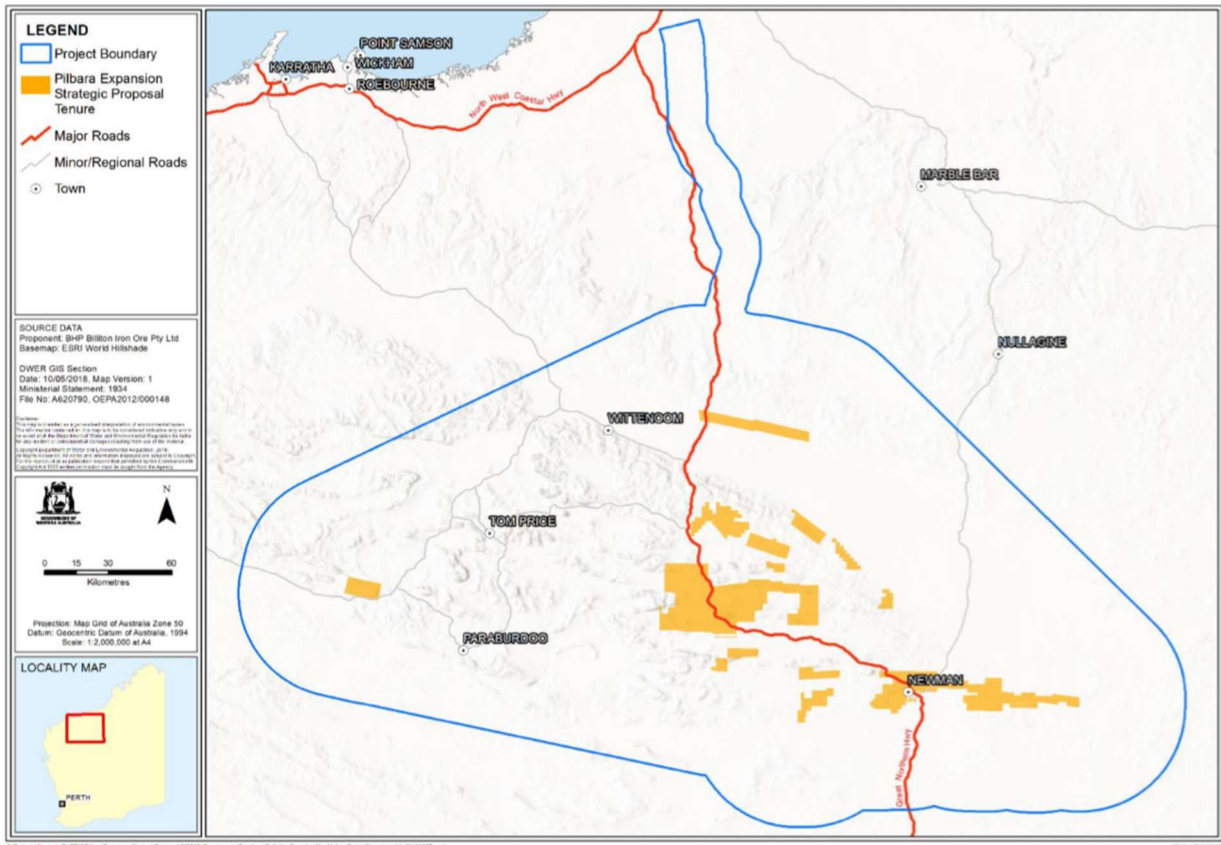


Figure 6: Strategic Proposal project boundary and BHP tenements

Key determinations:

- 1) Conditions of MS1105 are relevant only to new mining operations near to Newman townsite and in the broader Pilbara Region and do not apply to existing operations or authorised infrastructure upgrades as detailed in section 3.3.3.
- 2) The Licence Holder has notified DWER of its intent to develop the Western Ridge orebody. As it is not currently practicable for the Licence Holder to achieve NEPM criteria for particulates (PM₁₀ and PM_{2.5}) at Newman, further consideration to conditions of MS1105 would be required prior to development.
- 3) The DOH have provided advice on the relevant air guideline value to be applied in Newman (refer to section 5.1).

3.1.8 Planning

Local dust sources outside of the mine sites also contribute to dust in Newman. Dust emissions generated from activities such as land development sites, commercial activities and light industry, woodworking, grinding, roads, trotting tracks, extractive industries involving sand or gravel extraction are generally managed by local governments.

The Shire of East Pilbara plays an important role in managing dust generation and impacts in residential areas of Newman through the establishment of industry zones appropriate to the prevailing land use (Shire of East Pilbara Local Planning Strategy 2020). The Shire may also require the use of dust controls as conditions on approvals for certain activities conducted in close proximity to sensitive receptors.

4. Air quality monitoring

4.1 Ambient dust monitoring

The Existing Licence requires air quality monitoring to be undertaken at Newman Town Centre and McLennan Drive (Newman East), with the results of this monitoring publicly available online in real time on the [Newman Ambient Air Quality website](#) (Ecotech, 2021). The Licence Holder also reports on its air quality monitoring results in its Annual Environmental Report.

Each background monitor is a Beta Attenuation Monitor (BAM), maintained and operated in compliance with Australian Standard 3580.9.11 *Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM₁₀ beta attenuation monitors*. These monitors are fitted with nephelometers to measure PM₁₀ in near real time, 10-minute averages. Nephelometers, or any other 10-minute averaged particulate monitor, do not have Australian Standards associated with their operation or maintenance. However, data from these monitors remains useful for reactive management purposes to potentially reduce the degree and duration of impacts, where such impacts are associated with an activity under the control of the Licence Holder.

The Town Centre ambient monitor is also capable of measuring particulate matter sized 2.5 microns in diameter and smaller (PM_{2.5}).

Dust concentrations and movement in Newman is significantly influenced by mining activities, topography, bushfires and seasonal weather patterns. The monitors are also influenced by local sources including the use of unsealed surfaces that surround both monitors which can be accessed by light vehicle. The Town Centre monitor is located within an unsealed carpark that is accessed by the local school staff, parents and visitors.

4.2 Review of the monitoring network

A major consideration of this dust review is the appropriateness and effectiveness of the existing monitoring network.

There are differences in the monitoring equipment used across the Newman Operations. BAM1020 / Real-Time Module (RTM) monitors are used for the Newman Town Centre, Newman East and all boundary and background monitoring locations, while E-sampler monitors are used on-site. Concentrations measured by different monitors (for the same dust size fraction) are generally not directly comparable. In addition, BAM/real-time modules and E-sampler monitors record data using different averaging periods. Therefore, an accurate comparison of dust concentrations at monitors located near to dust sources (on-site, or source monitors) with data recorded at boundary and community monitors is difficult and may have a low level of confidence (reliability of comparison) as a result.

There are large variations in wind data recorded at each monitoring site. Possible causes of this are the differences in mast height, potential topographic or other aerodynamic influences.

Figure 7 depicts the existing dust monitoring network at the Newman Operations.

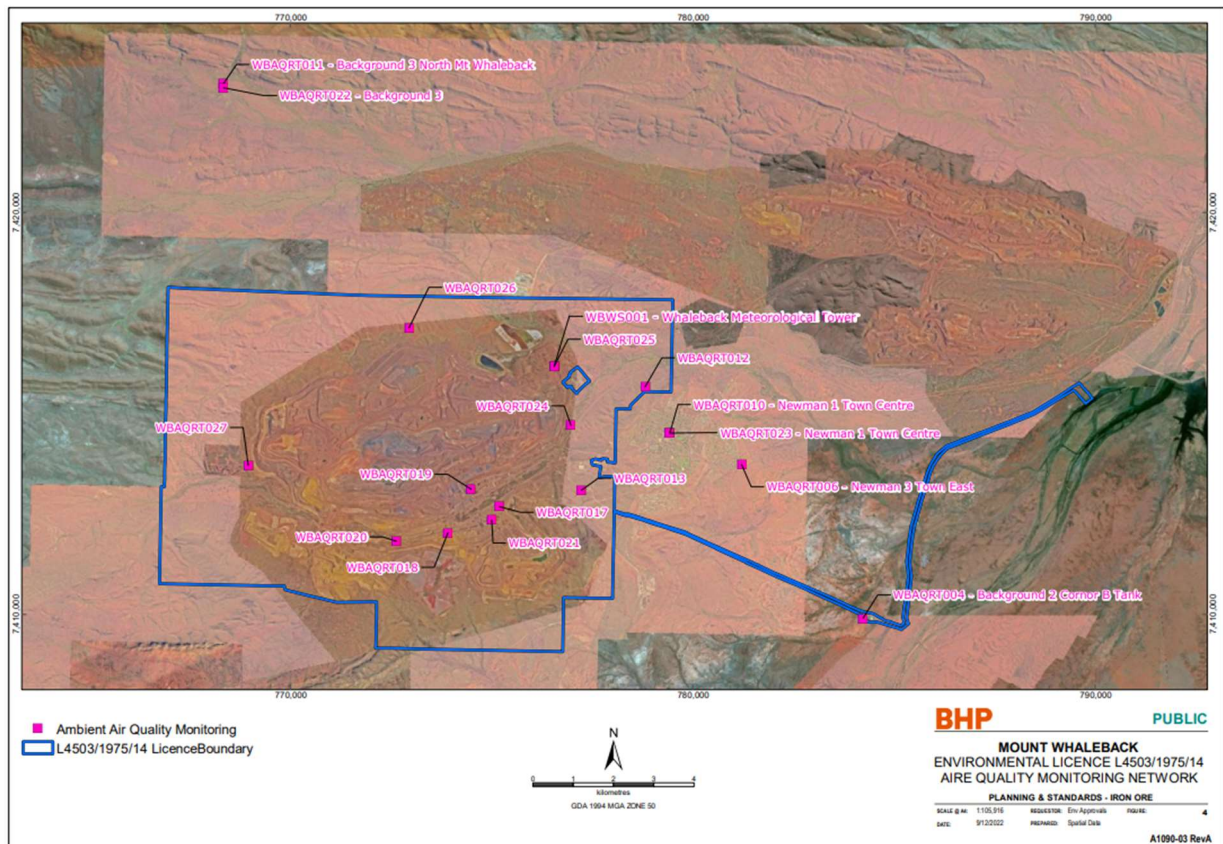


Figure 7: Newman air quality monitoring (BHP, 2022a)

4.2.1 Background monitoring

Upwind monitoring is used to quantify dust levels entering industrial premises and must accurately represent background PM_{10} concentrations. If sited appropriately background monitors can be used to indicate the general attribution of dust to industrial activities and in some cases can identify where regional dust events are the cause of high dust levels at receptors. Given the Pilbara Region is a naturally dusty environment, it is important to have accurate data on background ambient dust for both licensing and public health purposes.

Elevated PM_{10} concentrations recorded at existing background monitors (WBAQRT004 and WBAQRT011, depicted in Figure 7) appear to be affected by nearby roads in addition to other regional sources from time-to-time. DWER's assessment of all monitoring data indicates that the average concentration of dust at some boundary monitors is less than that recorded at background sites. This would suggest that these background monitors are being intermittently affected by local dust sources, which can increase daily averages.

4.2.2 Downwind monitoring

Downwind monitoring ideally represents a mixed dust plume including potential background and plume sources from industrial premises. The downwind site should not be dominated by temporary localised dust sources not directly related to ongoing operations, for example the use of unsealed road traffic, construction activity or other dust generating activities.

Monitoring data shows that major dust plumes originating from the Premises are transported through relatively narrow sectors toward the Newman townsite. Desktop review of the location of existing downwind monitors WBAQRT024, WBAQRT012 and WBAQRT013, depicted in

Figure 7, appear to be within these narrow sectors and potentially capable of identifying short term peaks in PM₁₀ concentrations from the Premises.

However, onsite observations from the WBAQRT013 monitor identified that this monitor is located at an elevation relative to the likely plume pathways during inversion conditions. In addition, small ridges are located between the monitor and the Fixed West Plant, and between the monitor and sensitive receptors in Newman. These factors may result in the redirection of wind flows away from the monitor. Therefore, improvements are required to the network to better measure PM₁₀ along the pathway between the Fixed West Plant and Newman receptors.

Monitors WBAQRT012 and WBAQRT024 are located downwind of the Mt Whaleback Pit and beyond a typical wind flow that may carry particulates from the Fixed West Plant to Newman receptors.

4.2.3 Source monitoring

On-site dust monitoring can help to identify potential individual sources at mining operations that span across a large area, such as those conducted at the Premises. DWER officers identified a number of PM₁₀ monitors near to key dust sources within the Fixed West Plant area. However, not every handling location where dust is likely to be generated had a source monitor in close proximity. This may limit the Licence Holder's ability to identify the source of high dust events recorded at boundary monitors, or for boundary monitors to accurately measure dust plumes that travel toward sensitive receptors.

Days where dust levels are recorded above air quality targets, as set in the Existing Licence, are investigated by the Licence Holder. A series of factors are reviewed including mining activities, air quality trends, wind speed/directions and dust control availability.

While the location of E-samplers are generally fixed, they can be moved around to identify dust sources and movement. To ensure data continuity that would allow comparison of particulate levels over time, it is necessary to maintain consistency in the location of monitors across the network generally.

Further investigations into dust sources include the implementation of microsensors, which have been deployed on a trial basis on haul trucks and at fixed locations around the Eastern Ridge Iron Ore Mine. The location of the sensors is reviewed and changed according to analytical needs as the Licence Holder's understanding of high-risk weather conditions evolves. The purpose of these monitors is to help understand the generation and behaviour of dust (BHP, 2021).

Microsensors have also been located adjacent to BAM monitors, including at the Newman Town Centre monitor to determine the accuracy and potential for ongoing use of microsensors across the Newman Operations. The correlation between data from the microsensors and BAMs was found to be poor during the trial period (R² value of 0.52). Despite this result, the use of microsensors as a low cost alternative to Australian Standard-monitors such as BAMs can remain worthwhile for indicative purposes.

Microsensors can be effective at measuring relative dust levels near to a source/s in the absence of BAMs or other PM₁₀ monitoring devices. Studies by the Licence Holder and third parties have demonstrated that microsensors are effective at identifying spatial variability in dust concentrations (BHP, 2021c, Tagle et. al, 2020). The correlation between microsensors was very high (R² value of 0.97) meaning that microsensors placed across a small or large area can be used to determine relative dust concentrations near to a source or along a pathway (BHP, 2021c).

Key determination: The Delegated Officer has determined that improvements to the monitoring network are required to ensure it performs its intended role. The following conclusions have been made:

- For the existing regional monitors to provide reliable data as background monitors, their siting and/or surrounding environment needs to be improved to minimise impacts from nearby roads or other dust sources. Similarly, receptor monitors in the Newman townsite may be impacted by frequent vehicle movement on the surrounding unsealed carpark.
- Boundary monitor WBAQRT013, depicted in Figure 7, is the most appropriate current boundary monitor for use in high dust events to trigger management responses at the Fixed Plant West.
- The Premises' monitoring network has a generally reasonable spatial configuration. However, there exist limitations to the monitoring network that make it difficult to identify all dust sources within the scope of this assessment.
- Although there exist limitations to the monitoring network due to the different monitors being used, relative dust trends can still be assessed so long as care is taken when analysing the data. DWER has appropriately qualified and trained air quality scientists that are capable of performing such analysis.

4.3 Monitoring data

DWER analysed data provided by the Licence Holder from all current fixed location PM₁₀ and meteorological monitors between 2016 and 2021 calendar years. The analysis included that of data from on-site/source monitors, boundary monitors and ambient monitors located in the Newman townsite.

Table 5 identifies the number of exceedances of the NEPM and Port Hedland-specific air guideline value (AGV) for 24-hour PM₁₀ concentrations (70µg/m³) at ambient monitors that are intended to represent background dust and those in the Newman townsite. A review of Table 5 shows that both criteria are likely to be exceeded each year.

Table 5: Exceedances of NEPM and criterion under the Existing Licence at monitors in Newman (PM₁₀) measured midnight-to-midnight¹

Calendar Year	Criteria µg/m ³	Town Centre	Newman East	Background 2	Background 3
2011	> 50	29	19	4	N/A
	> 70	12	2	3	N/A
2012	> 50	61	59	17	N/A
	> 70	19	18	6	N/A
2013	> 50	54	53	17	N/A
	> 70	18	20	1	N/A
2014	> 50	72	81	15	6 [^]
	> 70	26	35	4	2 [^]
2015	> 50	56	33	5	7
	> 70	31	5	2	0
2016	> 50	35	7	5	6
	> 70	11	2	1	2
2017	> 50	42	11	5	35
	> 70	8	0	0	12
2018	> 50	63	38	16	21
	> 70	32	10	5	12
2019	> 50	117	75	32	42
	> 70	50	30	14	11
2020	> 50	45	44	14	6
	> 70	23	11	5	2
2021	> 50	23	14	4	4
	> 70	5	3	1	1

Note 1: The source/s of exceedances has not been analysed within this table.

Dust (as PM₁₀) data recorded at the Town Centre monitoring site has been analysed for trends. Concentrations of PM₁₀ between 2016 to 2020 period shows the following features:

- Higher average dust concentrations and higher frequency of elevated dust concentrations during the night in comparison to daytime (7am to 7pm).
- Higher contribution of Newman Operations to overall concentrations during the night in comparison to daytime.
- Higher wind speeds do not necessarily cause the highest dust events at the Newman Town Centre.
- The contribution of higher wind speeds (greater than 3 m/s) to overall concentrations is greater in summer months, while the contribution of low wind speeds (less than 3 m/s) becomes important in winter (June to August).

The overall contribution of dust sources (as PM₁₀) at the Town Centre monitor, particularly at night-time (7pm to 7am), indicates a disproportionately higher contribution coming from the west-southwest to southwest vector (Figure 8). This direction places the Fixed Plant West and

Orebody 29 within that arc of influence. When looking at the source direction of peak emissions, high dust events appear to frequently come from the same direction. However, peak events also appear to come from the direction of the Whaleback Pit to the west and waste rock dumps to the west-northwest (Figure 9).

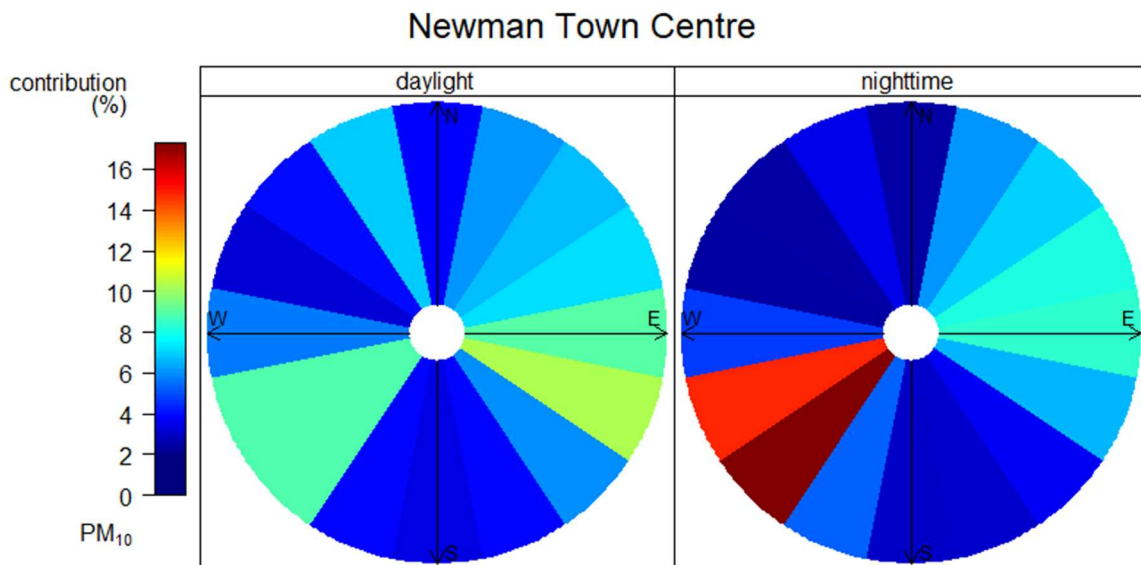


Figure 8: Overall contribution of PM₁₀ and direction of source between 2016 and 2020 as measured at the Newman Town Centre monitor

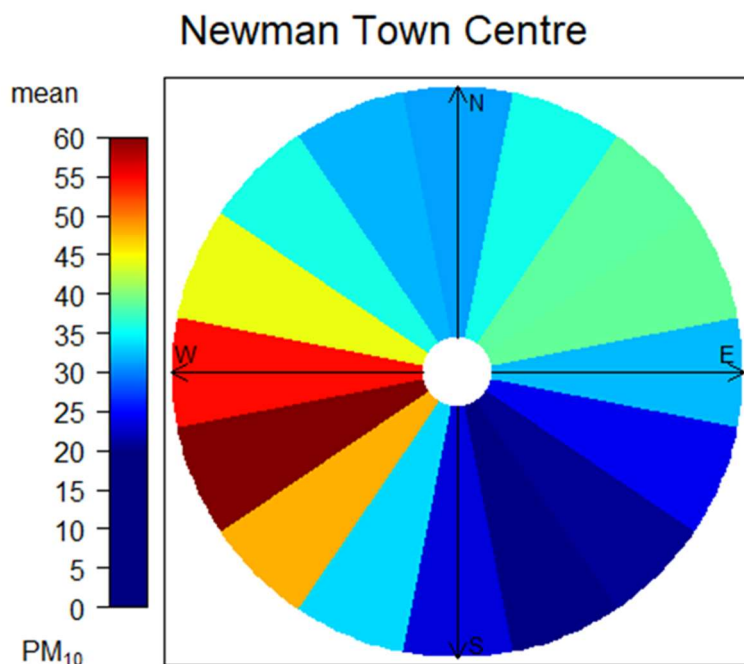


Figure 9: Direction of highest average PM₁₀ concentrations at the Newman Town Centre monitor between 2016 and 2020

The Town Centre monitor is located in the middle of an unsealed school car park. This may influence dust concentrations at the monitor during times where there is vehicle movement adjacent to the monitor inlet. The Licence Holder has identified that peaks in PM₁₀ dust concentrations at the Town Centre monitor have been consistently identified on weekday mornings and afternoons, matching up with school drop-off and pick-up times (BHP 2021). Longer term data trends indicate greater influence from the direction of the Premises.

4.3.1 Seasonal variation

A breakdown of exceedance data indicates that the majority of exceedances attributable to mining operations are recorded during the dry season, which occurs between July and October, and these are predominantly associated with the Mt Whaleback operations. For example, in the 2019/20 reporting period, 22 of the 27 (81%) of exceedances were in these drier and cooler months. DWER’s analysis of PM₁₀ and meteorological monitoring data has identified that high concentration dust impacts in the Newman townsite predominantly occur during night-time, most likely under inversion conditions.

The Licence Holder has identified that during hotter months, particularly November to January, background dust is the greatest contributor (refer to section 5.2.7). However, DWER’s analysis of PM₁₀ concentrations in 2020 identified that rainfall can play a significant role in dust reduction. For example, the month with the lowest average PM₁₀ concentrations in 2020, December, was also the month that experienced the greatest rainfall (Figure 10).

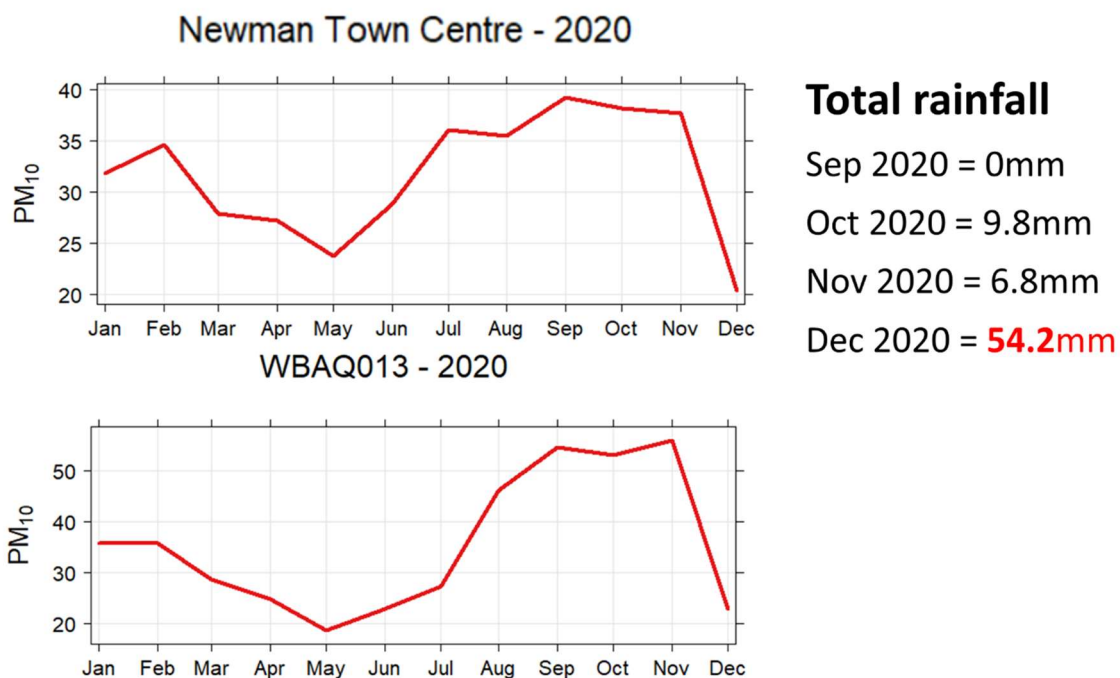


Figure 10: Rainfall and PM₁₀ concentrations in 2020

4.3.2 Exceedance reporting

The Existing Licence requires the Licence Holder to report any exceedances of the ambient target (24-hour average PM₁₀ concentration of 70µg/m³) at the ambient air quality monitors in Newman.

The ambient air target was reported to have exceeded on 43 days during the 2019/20 reporting period with 25 determined by the Licence Holder to be attributable to premises operations and two exceedances attributed to operations at the Eastern Ridge Iron Ore Mine (Figure 11). The remaining 16 events were attributed to other sources beyond Licence Holder operations (non-mining). To demonstrate variability from year-to-year, in the 2021/22 reporting period 8 exceedance days were reported with 5 determined by the Licence Holder to be attributable to Premises operations, three from non-mining sources and zero exceedances the result of mining and ore processing activities at the Eastern Ridge Iron Ore Mine.

Since the implementation of the conditions on the Existing Licence in May 2018, only four out of 106 exceedances have been reported to be attributable to Eastern Ridge mining operations (Figure 11). Exceedance data shows that the majority of exceedances of the target specified in

the Existing Licence are associated with Mt Whaleback operations (62.5%).

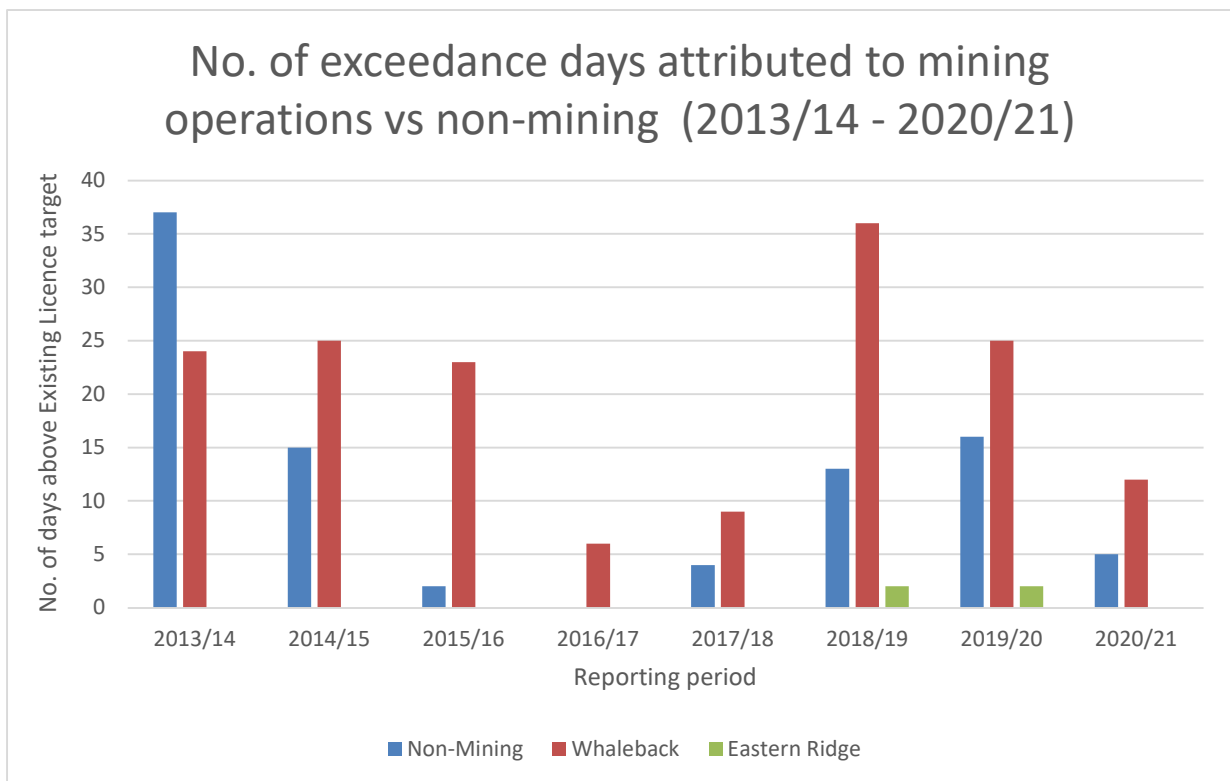


Figure 11: Number of exceedance days attributed to mining operations vs non-mining (FY2013/14 - FY2020/21)

Key findings:

- The Pilbara region is a natural dusty environment with windblown dust from non-mining related sources a significant contributor to the dust loading at Newman.
- Assessment undertaken by DWER’s air quality experts concluded that the Premises is the dominant dust source impacting the Newman town site based on recorded PM₁₀ concentrations at the Newman Town Centre site between 2016 and 2020. Occasional moderate impacts from Eastern Ridge and other non-mining, local sources were also identified, but are far less frequent and/or at lower average concentrations.
- The majority of Existing Licence target exceedances recorded in the community are associated with operations at the premises. This may be due to prevailing wind direction, the scale of mining activities and proximity to receptors.
- Dust emissions associated with the Premises operations have the greatest potential to influence the Newman townsite when the wind direction is from a north-north-west to south-south-west direction (arc of influence approximately 200 to 293° across the westerly vector). However, ore processing activities considered within the scope of this risk assessment are within the 240 and 278° wind arc as measured at boundary monitor WBAQRT013.
- As discussed in section 5.2.3, the Licence Holder is progressively implementing additional controls for the management of dust from the premises.

4.4 Newman dust composition monitoring campaign

Between July 2018 and July 2019, DWER, in collaboration with the Shire of East Pilbara, undertook a 12-month dust composition monitoring campaign (DWER, 2020a) to assess the levels and composition of dust and to determine whether asbestos fibres were present in ambient air in Newman. The results indicate:

- asbestos levels were below the limit of detection for all samples;
- of the metals analysed, iron was detected at the highest concentrations, reflecting the mineralogy of the area. The iron levels detected are below the adopted guideline for iron oxide (as hematite);
- manganese was elevated in a small number of samples however the long-term health guideline value was not exceeded. These results are consistent with the mineralogy of the area;
- all other metals were detected at levels below the adopted guidelines; and
- daily average Total Suspended Particulates (TSP) levels exceeded a benchmark guideline adopted for the study in the majority of samples (Figure 12)³. The elevated concentrations of TSP measured during the campaign are consistent with other dust monitoring data collected by industry in the region.

The study assessed all airborne particles (as TSP) and was not intended to duplicate the ambient monitoring of PM₁₀ undertaken by the Licence Holder. For the purpose of this Amendment Report and the study, TSP is defined as all particles that are suspended in the atmosphere, including fine and respirable particles (PM₁₀ and PM_{2.5}) and larger size particles that may settle out of the air causing nuisance impacts, usually measured as those particles having a diameter of up to 50 µm.

A review of the Licence Holder's PM₁₀ monitoring data for the same period as the dust composition study revealed that the NEPM PM₁₀ reporting standard (of 50 µg/m³) was exceeded on 96 days at the Newman Town Centre monitoring site, and on 61 days at the Newman East monitoring site. The two background monitoring sites recorded exceedances of the NEPM standard on 21 and 28 days respectively.

³ For the purposes of this study, TSP concentrations were compared against the Environmental Protection (Kwinana) (Atmospheric Wastes) Regulations 1992 (EPP) Area 'C' standard of 90 µg/m³ averaged over 24 hours. This standard is for comparative reference only and is not applicable to the Newman airshed as a regulatory standard.

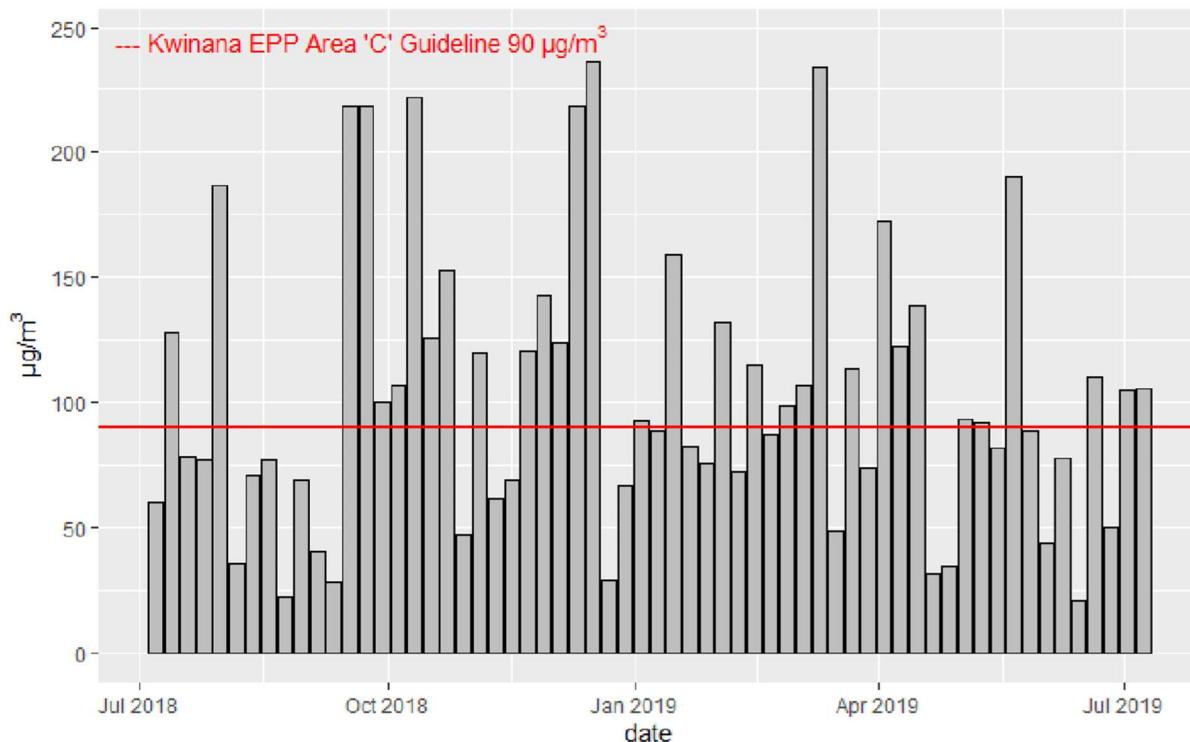


Figure 12: Daily average TSP concentrations between 7 July 2018 and 8 July 2019

The results were also compared against the 24-hour for PM₁₀ adopted by Government for residential areas of Port Hedland (70 µg/m³) and as applied through the existing Licence as a reporting trigger value. The Port Hedland AGV was exceeded on 48 days at the Newman Town Centre monitoring site, and on 21 days at the Newman East monitoring site. The two background monitoring sites recorded exceedances of the Port Hedland AGV on nine and eight days respectively (refer to section 5.1.1).

Key findings and determinations:

- 1) There exist multiple standards adopted for particulates across Western Australia. It is evident from various monitoring campaigns that ambient dust levels in Newman exceed each standard. Section 5.1 of this Amendment Report considers the appropriate for Newman against which risk will be assessed in this Amendment Report.
- 2) The Department of Health has reviewed the results of the monitoring campaign and advised that the measured concentrations of metals and asbestos do not represent a public health risk to the Newman community. Nonetheless, the elevated levels of dust in Newman have further justified this review.

4.4.1 Light Detection and Ranging (LiDAR) monitoring

The Licence Holder conducted a trial monitoring campaign in Newman commencing in August 2019 until October 2020.

The campaign was undertaken using conventional monitoring methods for particles as PM₁₀ 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 Newman.

The LiDAR was positioned atop the TV Hill in Newman to allow for a largely unimpeded view of

the surrounding landscape and emission sources. The Licence Holder reported technical issues with the campaign stating to DWER that it considered the data to be unreliable. However, the campaign was able to identify dust behaviour during high dust risk meteorological conditions such as temperature inversions. For example, when LiDAR data was analysed against PM₁₀ values at the Newman Town Centre monitor the significance of temperature inversions on dust concentrations at ground level in town became clearer.

At times where dust mixing heights/inversions lifted imagery from the LiDAR appear to demonstrate an increase in dust concentrations despite a lowering PM₁₀ concentration recorded at monitors. This observation enabled the Licence Holder to estimate mixing heights and has triggered ongoing investigations into these events and the potential implementation of 3D weather modelling for forecasting.

The Licence Holder found "...that LiDAR would not be useful as an operational tool due to complex topography at [the Premises] and distribution and nature of often moving dust sources" (BHP, 2021a).

The Delegated Officer considers LiDAR to be a significantly useful tool to identify dust sources and, in some cases, their pathway and to allow operators to respond to and manage those sources in a targeted and timely manner. At the time of completing this review, LiDAR data provided by the Licence Holder had not yet been processed by DWER. However, a review of PM₁₀ concentration data from the Licence Holder's BAM monitors has identified links along the pathway between the Newman Operations and the Newman townsite during analysis of significant dust events (10-min, 1-hour and 24-hour).

5. Risk assessment

The Department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guidance Statement: Risk Assessments* (DER 2017).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

5.1 Air quality criteria

DOH is the primary agency for public health matters in Western Australia. Therefore, DWER sought advice from the DOH during this risk assessment process as to the appropriate air quality criteria to apply to the Newman population.

The standard or target for particles for PM₁₀ as outlined in Schedule 1 of the NEPM is 50 µg/m³ averaged over 24 hours (midnight to midnight), with no exceedances. The NEPM provides a national framework for all Australian jurisdictions to monitor and publicly report on common ambient air pollutants in urban settings. The NEPM guidance level is based on exposure to emissions typical of large urban centres where pollutants other than PM₁₀ may be present in larger concentrations and contribute to overall health impacts.

NEPM monitoring protocols provide guidance to jurisdictions on monitoring population exposure to air pollution. In practice, NEPM monitoring sites are located in areas that are representative of ambient air quality for large population centres where people live (25,000 people or more).

Whilst in principle, the NEPM standard applies to all Australians, in reality it is not met everywhere that people live for various reasons. The implementation of the NEPM does not preclude jurisdictions from adopting complementary standards or targets for their own policy or regulatory purposes. In doing so, jurisdictions may use a risk-based approach in determining environmental standards appropriate for site specific circumstances or conditions, along with improvement strategies for regulated and non-regulated sources and exposure reduction strategies.

It is important to note that the interim AGV, and NEPM, are assessment guidance levels and should not be considered as enforceable limits. This is because ambient air quality monitoring reflects the particulate concentrations in the air in the areas surrounding the monitoring locations only. It does not attribute concentrations to specific sources, such as emissions from one or multiple licensed operations, local or regional dust sources.

The DOH considered the application of both air guideline values (NEPM and interim AGV) in deliberation of the appropriate health standard for PM₁₀ in Newman. The DOH consulted DWER and BHP in relation to the appropriate AGV and advised that while the 24-hour NEPM for PM₁₀ is the default health standard for particulates in the absence of further health studies specific to the Newman population, the application of the 24-hour AGV applied in Port Hedland and already stated on the existing licences for BHP's Newman Operations (70 µg/m³ for PM₁₀) is supported in the interim. This is to enable the progression of improvements to address dust sources through this review while DOH further investigates the appropriateness of implementing an alternate AGV to the NEPM ongoing. A history of the origin of the interim AGV for Newman is provided in section 5.1.1.

As discussed in section 3.3.7, conditions of MS1105 requiring the application of NEPM will apply in the event that new mining operations are conducted within the airshed of the Newman townsite.

5.1.1 Port Hedland and Newman interim air quality criteria

In Port Hedland a 24-hour of 70 µg/m³ for PM₁₀ has been applied based on the outcomes of the 2016 *Port Hedland Air Quality Health Risk Assessment for Particulate Matter* (HRA).

The HRA concluded that 70 µg/m³ for PM₁₀ provided a similar level of protection to the population of Port Hedland (at the time of assessment) as the national standard for PM₁₀ of 50 µg/m³. The DOH considered that the number of dust-affected individuals in Port Hedland is low, but also that the probability of identifying risk is also low to a large extent because the population is small (~5,000 people).

There exist similarities between the population size and composition in Port Hedland and Newman (ABS 2016a; ABS, 2016b). Similarly, both locations experience high levels of particulates, which are dominated by the presence of iron and crustal dust. The HRA concluded 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). The same conclusions could be drawn for Newman, which has comparatively fewer combustion sources near to town (no combustion emissions from diesel-fuelled ships and fewer truck movements).

A similar assessment could be undertaken for Newman to identify an appropriate public health criterion through an investigation of current health data however, this data may be limited in its representation of the Newman population. DWER understands that much of the health data available is representative of the Shire of East Pilbara population. For accurate conclusions to be derived from an HRA, health data would need to consider populations within a specific environmental context i.e. the Newman townsite. The capture of health data for populations residing in other areas in the Pilbara may reduce the reliability of the HRA's conclusions.

5.1.2 Further health studies

Community stakeholders have raised concern over the impacts of dust to the health of Newman residents. Discussions with stakeholders has identified that this concern appears largely due to the community's uncertainties relating to the composition of dust and perceived high incidence

of morbidities⁴.

As a consequence, community stakeholders have requested that further health studies be undertaken to clarify if there is a correlation between the air quality in Newman and the perceived high rates of morbidity amongst community members.

The option of a direct population study has been considered by the DOH to obtain health data that is more reflective of the Newman population than that currently available. This type of study would involve an ongoing and detailed review of the health of a population cohort as opposed to a review of existing health statistics to determine correlative risk. This type of study can take several years to complete if they are to demonstrate with statistical confidence that a specific population does not experience adverse health outcomes to higher particulate levels. However, they rely heavily on the cohort investigated remaining in Newman to maintain a 'critical mass' of participants to account for natural attrition.

Therefore, there remains the potential that such an investigation would result in similar conclusions presented in the Port Hedland HRA (2016): "[The] number of affected individuals is very low but only because the population is small."

There has been no statistical evidence or population health data either identified or provided to verify community concerns in relation to an increased incidence of morbidities at the time of assessment. There remains the real possibility that a direct population health study may fail to identify a statistically significant incidence of chronic health issues amongst Newman residents associated with exposure to dust. Health outcomes associated with PM₁₀ exposures are non-specific and have multiple causes. However, and in general, the respiration of fine particulate matter is widely known to contribute to a variety of health impacts (USEPA, 2022a).

Key findings and determinations:

- 1) DWER will look to the DOH, as the primary agency for advice on public health matters in Western Australia for conclusions on the appropriate ongoing standard for Newman.
- 2) On advice from DOH, the AGV for PM₁₀ of 70µg/m³ has been applied to this Licence Review as an interim standard (interim AGV) until advised otherwise by DOH. The interim AGV, and NEPM, are assessment guidance levels and should not be considered as enforceable limits.
- 3) Dust levels in Newman are high, exceeding both interim AGV and NEPM (refer to section 4.3). The regulatory approach focused on reducing overall dust in Newman remains unaffected by the determination of appropriate guidelines.
- 4) DOH has indicated its support for the current approach of progressing regulatory improvements to reduce overall fugitive dust impacts on Newman through this licence amendment concurrently with investigating the appropriate AGV.
- 5) DOH are responsible for considering the appropriateness of further health investigations to support the ongoing application of the interim AGV versus the NEPM standard.

5.2 Source-pathways and receptors

To understand the risk of dust to public health it is critical to understand the source and pathway of dust and the sensitivities of the receptor to that dust.

⁴ Section 4.4 of this Amendment Report summarises DWER's investigation of Newman dust composition, concluding that particulate matter presents the greatest risk to human health.

5.3.1 Ore characterisation

Certain ore types are known to have a greater dust potential than others based on their characteristics and typical moisture content as received at the Premises. For example, Marra Mamba ores are friable and can break up during handling (Lascelles, 2000). Investigations into various ore types at the Licence Holder's mines identified that Marra Mamba ores had a greater percentage of fines and higher erosion rates when compared to the typical Brockman Iron Formation ore types (BHP, 2013). Although Marra Mamba typically has a high combined water, increasing the moisture content of these ores is not expected to significantly increase the cohesiveness and the ore may continue to break during handling (Okazaki et. al, 2006).

Marra Mamba ore bodies at the Premises include Orebodies 29, 30 and 35. Each are processed at the Fixed West Plant via the OHP5 Relocatable Crusher and blended in the stockyard. As detailed section 3.1, Marra Mamba ores can be double, and sometimes triple-handled prior to leaving the Premises, which increases the opportunity for the ore to break up into finer fractions.

The greater dust potential of Marra Mamba ore types is also supported by observations of DWER officers at site visits to the Licence Holder's premises (refer to section 3.3.6).

Particle size distribution

The risk to public health from dust is largely dependent on the particle size. 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 (USEPA, 2022b). Coarser particles are more likely to present nuisance (amenity) impacts.

Finer particulates have greater potential to be carried by wind and may be transported larger distances to receptors than coarse particles. Based on the distance of key materials handling locations at the Premises and the Newman townsite (approximately 3.9km – refer to section 5.2.7) it is likely that a large proportion of the coarser particulates will drop out before reaching the nearest residential receptor.

The Licence Holder uses laser diffraction sizing to determine particle size distribution for each ore from 38 micron (µm) to 2.5 µm. Particle size distribution data provided by the Licence Holder for ores handled at the Premises indicates that up to 15.59% of the Newman West Fines ore is comprised of particles with a diameter of 10 µm or smaller. Of this fraction, approximately 50% (7.95% of the total product) is sized finer than 2.5 micron in diameter (BHP, 2021b).

Marra Mamba ores typically display a high proportion of fines due to the ore's friability (Hyunh et. al, 2018). This is evidenced by the Licence Holder's high grade fines blend, which has the highest proportion of particles sized less than 10 micron in diameter. Sizing data for individual ore bodies is not available as ores are blended prior to being handled in the OHPs. Fines material made up approximately 55% of all ore handled at the Premises in FY2020 (Table 6; BHP, 2021b).

Table 6: Particle size distribution and throughputs for Newman High Grade Lump and Fines blends (NHGL and NHGF) FY2020 (BHP, 2021b)

Sample date	In-flow Product	FY20 tonnages (Mtpa)	FY20 tonnages (%)	Particle size distribution (%)	
				≤2.51 µm	≤10.00 µm
1/08/2020	Newman West lump	23.7	30.2	3.11%	6.27%
	Newman West fines	42.4	54.0	7.95%	15.59%
7/03/2020	Newman East lump	5.4	6.9	1.34%	3.13%
	Newman East fines	7.0	8.9	4.70%	9.70%
	Totals	78.5	100.0		

Key findings:

- 1) Particle size distribution is subject to change over time due to natural variation in the source geology, which in turn will change the risk of dust emissions and level of control required at the Premises over time.
- 2) Under strong wind conditions particles with aerodynamic diameters up to 100 microns may remain suspended and travel large distances while under lighter wind conditions, particles will fall out within several minutes (SKM, 2005).
- 3) The higher density of iron ore when compared to crustal dust increases the particle's settling velocity, meaning that an iron ore particle of 4.5 microns and with a density of 5.2 g/cm³ is more likely to settle at a similar rate to a 1g/cm³ particle with an aerodynamic diameter of approximately 10 microns (SKM, 2005).

Moisture content

The dust potential of ore can be closely correlated to the ore's moisture content in comparison to the dust extinction moisture level of that ore. The DEM level for particular ore types is determined by laboratory analysis and updated on a quarterly basis to reflect changes in the ore properties as mining progresses through the ore body.

Ore moisture is measured at five locations within the handling process at the Premises. The Premises sources ore from multiple locations within the hub including Eastern Ridge and Wheelarra Hill/Jimblebar Iron Ore Mines. Ore moisture from these locations is not known before it enters the Premises.

Table 7 represents the average moisture content of each ore as it is measured at the mine of origin, noting the Premises receives some ores from Wheelarra Hill/Jimblebar and Eastern Ridge Iron Ore Mines. DEM levels presented in Table 7 have been measured using accredited analytical method Australian Standard AS4156.6-2000 *Coal preparation, Part 6: Determination of Dust/moisture Relationship for Coal*. There is no standard available specific for iron ore DEM level determination.

Table 7: Ore moisture contents as measured at the mine site, inload and outload January 2020 to July 2020 (BHP 2020d)

Product	DEM Level	Average moisture as measured at the mine of origin (%)
JMBL	2.62	2.71
MACL	2.71	3.17

NHGL	2.71	3.42
NBLL ¹	2.46	N/A
NBLLU	2.98	N/A
NHGF	4.5	6.27

Note 1: Newman Blended Lump (NBLL) includes a blend of lump ores from Mining Area C (MACL), Jimblebar (JMBL) and Newman (NHGL).

The moisture content data presented in Table 7 is measured from the point of outload (TLO) and is of a blended material. The precise moisture content of individual ores that are mined at the Premises is not known throughout the bulk of the handling process at the Fixed West Plant. In addition, the DEM level of each ore type, including blends is not known across the premises.

While ore moisture remaining above DEM level is a key control for the management of dust emissions when handling and stockpiling iron ore, there remains the potential for dust emissions from the Premises when handling wetter ores.

For day-to-day operations, operators are alerted to potential dust risks in the daily 24 hour mine plan, which details the ore types to be handled at the Premises. A key determining factor for ore “dustiness” in this report is whether or not the ore sourced from above or below water table.

Key finding: The Delegated Officer has reviewed ore moisture data and how information is used at the Premises and makes the following findings:

- 1) Ore moisture of each ore type is not accurately known at the time of handling at the Premises. Therefore, dust controls are largely triggered by operational management, which can be exposed to human error.
- 2) The ore moisture of each ore type that makes up each blend is likely to vary significantly, especially between ores that are mined from below the groundwater table and those mined above.
- 3) The handling and double handling of drier ores using FELs has the potential to significantly contribute to peak emissions from the Premises. Improvements at OHP5 have demonstrated that by reducing double handling, emissions can be reduced (refer to section 3.3.3).
- 4) Future expansion of the Orebody 35 pit has the potential to become a significant source of dust at both the ore body and at ore processing and handling locations as the ore will initially be extracted from above the water table.
- 5) The Licence Holder has notified DWER that other ore bodies are expected to be mined from below the water table. These ores are expected to be handled at a moisture content above the DEM level once this occurs. The handling of wetter ores is expected to present different dust sources that may require a revised approach to dust management.

Respirable silica

Crystalline silica is present in a large number of commodities and is abundant in the environment. All ores handled by the Licence Holder at the Premises contain silica dioxide (SiO₂) within a range of approximately 1 to 6.5% although not all is of a size fraction that is respirable (Intertek Genalysis, 2020).

Respirable crystalline silica is that measured at under 4 microns in diameter and has the potential to cause lung irritation and silicosis in humans exposed at occupational levels over many years.

The Licence Holder has commissioned analysis of each ore product that enters the Premises for respirable silica content (Table 8). Silica in this respirable fraction is only found in concentrations much less than 1% of each product (of total material) handled at the Premises,

which does not require a Specific Target Organ Systemic Toxicity (STOT) rating according to the Global Harmonisation System (IMA Europe, 2014). Concentrations above 1% are classified as STOT Category 1 (concentrations greater than 10%) or Category 2 (concentrations between 1% and 10%).

Table 8: Percentage of respirable crystalline silica within in-loaded ore products (Curtin, 2019; BHP, 2021)

Product	% of respirable crystalline silica within respirable mass fraction
NBLL	0.00039
NBLLU	0.00021
NHGF	0.00006

Asbestiform fibres

An analysis of asbestos fibres within each ore sample was conducted using a polarized light microscopy dispersion staining technique in accordance with Australian Standard *AS4964-2004 – Method for qualitative identification of asbestos in bulk samples*. This analysis failed to identify any asbestos, noting a limit of detection of 0.1g/kg (Bureau Veritas Minerals, 2020).

This is supported by results from the Newman dust monitoring campaign conducted by DWER in 2017 (refer to section 4.4).

5.3.2 Ore processing and handling emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this Amendment Report are detailed in Table 9 below. Table 9 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Supporting information to Works Approval W6363/2020/1 provided by the Licence Holder identifies the key dust (PM₁₀) emission sources at ore handling and processing facilities following upgrades (Figure 13; BHP, 2020a). Key sources included front end loading operations at OHP2, OHP5 screening, reclaiming and stacking. Although transfer stations have a comparatively lower emission rate to larger emitters depicted in Figure 13, the large number of transfer points across the ore handling and processing facilities indicates that transfer stations are likely to be a significant contributor to dust emissions.

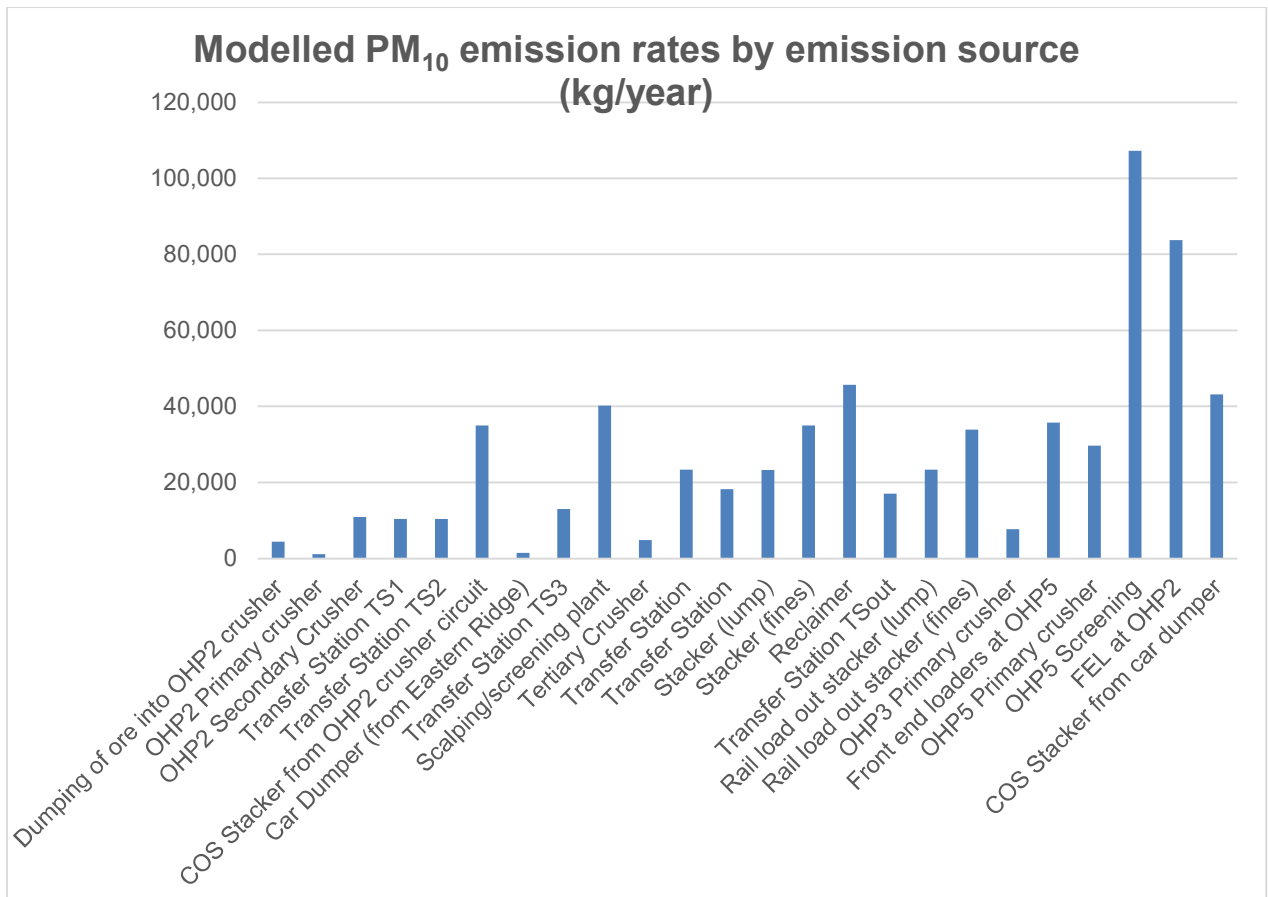


Figure 13: Modelled PM₁₀ emission rates by emission source (BHP, 2020a)⁵

The Licence Holder implements numerous controls for dust management throughout the Premises. Controls specific to ore handling and processing facilities within the scope of this assessment are provided in Table 9.

⁵ DWER has not verified emission rates supplied by the Licence Holder.

Table 9: Licence Holder controls

Site infrastructure	Equipment	Dust Controls
Primary Crushers	OHP2 Primary Crusher OHP3 Primary Crusher	Crushing takes place within a tunnel where negative pressure is maintained using ventilation fans.
Primary Crusher	OHP5 Primary Crusher	<p>Water spray curtain operating at all times on ROM dump hopper and apron feeder discharge when transporting ore.</p> <p>Dust covers on sizing screens in place at all times when screening ore to minimise dust escape.</p> <p>Micro droplet water spray system at transfer chute entry and outlet to contain dust within transfer chutes.</p> <p>Crusher transfer points are enclosed and fitted with water sprays.</p> <p>Dust sealing rubber curtain at head chute and skirt discharge to contain dust within transfer system.</p> <p>Water sprays and belt scrapers must operate on the following conveyors, to reduce carry back on the underside of the conveyor belt when transporting ore: CV01, CV02A, CV02B, CV03A CV03B, CV04A, CV04B, CV04C, CV05A, CV05B, CV05C, CV06, CV07, CV08, CV09</p> <p>Ore flow through transfer chutes is controlled to mitigate dust generation within transfer chutes.</p> <p>Multiple small secondary cone crushers allow optimised choke feeding to mitigate dust generation in crusher.</p>
Secondary Crushers	OHP2 Secondary Crusher OHP3 Secondary Crusher	<p>Partially enclosed with the discharge transfer located within a tunnel that has negative pressure ventilation operating when crushing ore.</p> <p>Extracted air released via dust scrubber (wet scrubber).</p>
Tertiary Crushers	OHP4 Tertiary Crusher and screens (Hub)	<p>Crushing infrastructure and screen house is partially enclosed with negative pressure maintained using ventilation fans.</p> <p>Dust laden air within the tunnel is extracted with air released via the following wet scrubbers that operate to remove particulates.</p> <p>DC455, DC415, DC416</p>
Car Dumpers	Car Dumper CD501	<p>Car dumpers receive ore within a tunnel where negative pressure is maintained using ventilation fans.</p> <p>Dust laden air within the tunnel is extracted with air released via the following wet scrubbers that operate to remove particulates:</p> <p>DC507, DC508</p>
All conveyors equipped with BOC sprays	CV503 CV302	<p>The following BOC sprays on conveyors must be operated:</p> <p>BOC503A, BOC603 and BOC752A – whenever</p>

	CV603 CV702 CV752	transporting ore BOC302A – operational except when fines ore from the Beneficiation Concentrator Plant is running along this route. BOC702D and BOC702E – operational whenever transporting lump ores.
Coarse Ore Stockpile Boom Conveyors	CV302 CV503	The following boom sprays located on the boom tip of stackers must be operated: BS302B and BS302C – operational except when fines ore from the Beneficiation Concentrator Plant is running along this route. BS503B and BS503C – whenever transporting ore
Stackers (Yard)	ST601 ST602	Stackers are lowered to as low as reasonably practicable to minimise the drop height of ore to the stockpile.
Stockpiles	Dead Fines Stockpile; Fines; Lump; Dead Lump Stockpile Stockpile cannons: SV601A 01-14 SV601B 01-15 SV601C 01-15 SV601D 01-20 SV601E 01-20 SV601F 01-15 SV601G 01-15 SV601H 01-14	128 stockpile cannons are routinely operated over the stockpile area except when the Stacker or Reclaimer has custody of the pile.
Reclaimers	RC701	Boom sprays must operate on BS702A and BS702B, except when transporting fines ore.
Boom Conveyors (TLO Stockpiles)	CV751 CV752	The following boom sprays on boom tip and underneath the belt must operate when handling ore: BS752B BS752C BS752D
Train Loaders	TLO	Train loading takes place within a tunnel where negative pressure is maintained using ventilation fans.
Roads and open areas	Water trucks Site vehicles Haul trucks	Water carts remain available to operate on light vehicle roads and operated in accordance with trigger management conditions. Dust Suppressant additive applied as required to unsealed light vehicles roads. 20km/h speed limit on all corners for all vehicles and total site speed reduction during high dust risk periods.
Landfill operations	Inert landfill (4) Putrescible landfill (2) Asbestos Disposal Area (5)	Asbestos waste covered by 1 m of Type 1 inert waste, clean fill or soil within the close of the business day in which the asbestos waste was deposited.

The Licence Holder maintains a Dust Equipment Dashboard, which analyses real time diagnostic of controls and produces a 3-hourly report on equipment performance. In the 2019/20 annual period utilisation of dust control equipment achieved 90% availability. This is up from

30% in the annual period before. Low availability and dust control utilisation in the 2018/19 period was noted by the Licence Holder as being the result of high ore moisture content and spray head blockages. For the purpose of measurement the Licence Holder defined 'availability' as the time that the equipment was functional and capable of supporting dust suppression activity when required (BHP, 2021a).

The dust control system is not informed by ore moisture data and may be manually switched off by operators to avoid bogging in the plant. Dust controls (sprays) are typically deselected by operators where it has been raining or ore is known to be too wet. Previous trials of implementing moisture analysers has resulted in poor accuracy for readings of the large size fractions of primary/secondary crushed ore. Therefore the Licence Holder considers that automation of dust controls against ore moisture as determined by real-time analysers is not possible throughout the processing circuit.

In the 2020 annual period the Licence Holder trialled the following dust control initiatives (BHP, 2020b):

- a trial of veneer product on dormant stockpile;
- the installation of four additional dust monitors;
- completion of the dust equipment restoration in H1 (First Half) FY2020 (the works spanned across four shutdowns in FY2019-FY2020);
- restoration of existing Dust Collectors installed in the screenhouse;
- Study and initiation completed for Phase 2: Optimisation of dust equipment. This initiative subsequently will lead to ensuring the improvement to open areas and additional dust suppression based on where BHP sees improvement opportunities;
- daily irrigation plans to ensure coverage of high traffic areas and dust suppressant added to unsealed light vehicle roads that are classed as low water cart priority; and
- hot-seating implemented to increase water cart hours and utilization.

In the 2021 annual period the Licence Holder incorporated the following dust initiatives:

- a trial of on-board dust sensor technology to track dust levels on haul-roads was implemented on a sample of haul trucks to determine the effectiveness of measuring dust levels on haul-roads to optimise the use of water carts and reduce dust;
- a trial of a water extender added to water carts for dust suppression on heavy vehicle roads;
- implemented a 36-hr Risk Forecasting tool updated every 12 hours;
- the use of live dashboards to view dust readings from the monitoring network;
- replacement of the OHP5 Plant (refer to section 3.3.3).

5.3.3 Proposed dust control improvements

In addition to the controls listed in Table 9, the Licence Holder proposes a series of works over the coming 5 years to reduce the potential for ore handling and processing sources to contribute to ambient PM₁₀ concentrations in Newman, including the procurement of one additional water cart and optimising standpipe locations and identifying roads to seal around handling and processing facilities.

The Licence Holder has proposed a staged approach to improving the control of dust at the Fixed Plant West as shown in Table 10 below.

Table 10: Proposed dust control improvements

Site infrastructure	Equipment	Improvement works		Site Plan reference
		FY22-24	FY25-27	
Truck Unloading (at crusher)	OHP2 Hopper OHP3 Hopper	Install tipping hopper sprays		OHP2 Primary Crushing Plant
Secondary Crushers	OHP2 Secondary Crusher		Partially enclose M101 Shuttle transfer	OPH2 Secondary Crushing Plant
Screening	OHP4 Screens	Improve dust cover design		OHP4 Screening Building – Screen Top Covers
Train Loaders	TLO	Finalise installation of TLO sprays		Inside the TLO Tunnel

Sprays at the hoppers will be designed to capture airborne particles generated during the transfer of ore from the tipped haul truck tray to the gyratory crusher hopper. The Licence Holder determined that enclosing the OHP2 and 3 hoppers (with dust extraction) was not feasible due to the required enclosure size to encapsulate a haul truck.

Partial enclosure of the shuttle conveyor at the OHP2 Secondary Crusher will act to mitigate the release of fugitive dust emissions generated as a result of material transfer, where ore is dropped from height.

Improvements to the screen top covers of OHP4 will be made to increase maintainability and effectiveness as the current design fails prematurely when impacted by rainfall, causing the cover to sag and have less coverage.

Water sprays at the TLO will be fitted to add additional moisture to the railed product where required to meet dust extinction moisture (DEM) requirements at the Port premises, which operates under Licence L4513/1969/18. The TLO is located within a partially enclosed tunnel, which provides mitigation of dust emissions during the loading of train cars.

The Licence Holder also intends to complete a study for road sealing around high usage Fixed Plant areas. Other initiatives that are beyond the scope of this Part V review have not been listed above. For example, initiatives to reduce emissions from blasting, hauling and waste rock dumps.

Key findings: The Delegated Officer has reviewed the proposed dust controls and notes that:

- 1) Sprays as an engineering control provide varying levels of effectiveness depending on the particulate size and droplet size. Where the spray droplet size is dissimilar to the size of the dust particle, the droplet and particle will move around each other and dust particles will escape the spray area. Therefore, design of sprayers should allow for optimization of droplet size to suit the two primary ore types being handled.
- 2) Ongoing maintenance and inspection is required to determine if sprays are appropriately sized and spray nozzles do not get blocked.
- 3) In a hierarchy of dust controls and spray equipment is categorised as less effective than dust source elimination, for example by reducing double handling, and covers

or enclosures equipped with dust extraction.

- 4) There remain numerous opportunities for further improvements to dust management and control infrastructure beyond that proposed by the Licence Holder through this review. Further investigation into dust sources and control opportunities is required.

5.3.4 Landfill emissions and controls

Dust emissions may arise from landfilling activities during disposal (tipping), waste covering activities and general vehicle movements. Dust control on unsealed roads around landfilling activities will be managed via the use of water carts as required.

Disposal of some concrete wastes will be within the pit area and managed in accordance with the general movement and tipping of waste rock at the mine. Therefore the in-pit disposal of inert waste concrete is not expected to generate dust beyond that of existing mining operations.

Authorisation for increased asbestos disposal is required to remove approximately 8,500 tonnes of waste illegally dumped by a third party at the Newman Substation on behalf of the Shire of East Pilbara. Asbestos waste will continue to be managed in accordance with the following:

- *Environmental Protection (Controlled Waste) Regulations 2004*
- Code of Practice for the Management and Control of Asbestos in Workplaces;
- Code of Practice for the Safe Removal of Asbestos
- Australian Standard 2601 – The Demolition of Structure.

These codes, standards and regulations step out the safe handling and burial requirements for asbestos wastes, including transport requirements (to be wrapped in plastic), having a designated disposal site and minimum cover requirements.

There exist no controls for the covering of waste with clean fill.

5.3.5 Tailings emissions and controls

Ore with a lower grade is further processed through the Bene Concentrator Plant (Figure 2) to remove non-ferrous material. Waste is sent to a thickener to remove water content before being discharged to the Tailings Storage Facility (TSF). Waste is typically fine, clayey material that has the potential to generate dust if allowed to dry, is disturbed and/or is exposed to high winds.

DWER officers sighted the TSF during the inspection conducted November 2020 and noted that where tailings had dried, a crust had formed adding a protective layer that minimises the potential for dust liftoff (Figure 14). The Licence Holder manages the TSF by depositing tails at various locations around the TSF, controlling the location of the pond. This is primarily for the purpose of managing seepage and preventing overflow but also acts to keep the surface layer around the TSF damp and promotes consolidation/crusting of tails at the surface.



Figure 14: Tailings storage (DWER, 2020)

5.3.6 NPI emissions

The Licence Holder reports emissions estimations for the Premises to the National Pollutant Inventory (NPI) on an annual basis. In May 2022, the Australian Conservation Foundation (ACF) updated its report on what the most polluted postcodes in Australia were, identifying the Newman postcode as being the second most polluted in Australia for air, unchanged from its 2018 evaluation (ACF, 2018; ACF, 2022). The Delegated Officer has determined that the findings of this report do not accurately reflect the situation in Newman townsite.

Pollution was measured based on the reporting of NPI data that is reported to Government by industry annually. The Newman postcode covers an area of 36,687 km², which includes a large number of mining activities that span across the locality, not just the Premises or Eastern Ridge Iron Ore Mine. The report refers only to emissions as reported by individual industry through the national NPI program and may not necessarily represent the levels of air quality experienced at different locations in the same postcode. For example, the highest emitters in the Newman postcode in 2020/21 were Christmas Creek and Roy Hill Mine, which were responsible for 22.5% and 14.7% of total industry emissions (ACF, 2022).

NPI data is based on emissions estimates that are based on generic calculations that may not accurately reflect the true emission rate of each individual infrastructure or equipment. The likelihood that these emissions will impact nearby receptors is determined by the nature of the pollutant, the location from which it is emitted, meteorology and topography of the land. For comparison, the Premises contributed to around a third of NPI-reported PM₁₀ emissions from either Christmas Creek or Roy Hill Mines. However, these sites are each located approximately 120 km from the Newman townsite and unlikely to have a significant impact on ambient dust.

5.3.7 Pathway to receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), the Delegated Officer has excluded employees, visitors and contractors of the Licence Holder's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 11 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guidance Statement: Environmental Siting* (DER 2016)). In the 2016 Census the residential population of Newman was 4,567 (Australian Bureau of Statistics).

Table 11: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Prescribed premises activity/infrastructure (refer to Figures 2 and 3)	Approximate distance
Closest residential receptor	TLO stockpiles (nearest Category 5 infrastructure)	3.9km
	OHP4 Tertiary Crusher	4.5 km
	OHP4 Screening Building	4.7 km
	OHP5 Relocatable Crusher location	5.2 km
	No.2 Primary Crushing Plant	4.7 km
	No. 3 Primary Crushing Plant	5.0 km
	Stockyard	5.4 km
	Eastern edge of the Premises boundary	2 km
	Asbestos Disposal Area (nearest)	2.3 km
	Putrescible Landfill (nearest)	3.0 km
	Inert Landfill (nearest)	5.1 km
	Tailings Storage Facility	5.1 km

Ambient monitors located in Newman, Town Centre and Newman East (refer to Figure 7), are located approximately 4.7 km and 6.1 km to the east of the nearest prescribed premises infrastructure (TLO stockpile) respectively. Other major dust influences on these monitors include the nearest Premises stockpile (2.7 km and 4.6 km) and Eastern Ridge, which is approximately 5.5 km northeast of the Town Centre monitor and 4.3km northeast of the Newman East monitor.

Meteorology and topography

The topography of the region, weather and mining activities all influence the pathway and dispersion of dust.

The Newman Dust monitoring campaign (DWER, 2020a) did not identify a significant difference

in TSP concentrations over the period of the campaign. However, it was noted that wind conditions were stronger on average during the wet season (November to April; Figure 15).

Peak dust events can occur between July and October where there are generally cooler ground conditions and low wind speeds resulting in cooler, denser air settling in low inversion layers that trap particulates closer to the ground. Inversions limit the ability of particulates to disperse and mix with less dusty air. A lower inversion layer height reduces the mixing height and therefore results in greater dust concentrations than would otherwise be present with a higher/no inversion layer.

The Newman townsite is located down topographical gradient of ore processing activities which can result in air flowing from the premises toward town in periods where regional wind speeds are low and inversions are created. The undulating terrain of the region can cause these denser pockets of air to flow downward toward topographical low points, creating katabatic winds. This can often result in very different wind conditions between locations in close proximity to one another.

High background dust levels in the Pilbara with exceedances at background monitors are greatest between November and January when stronger wind conditions are observed.

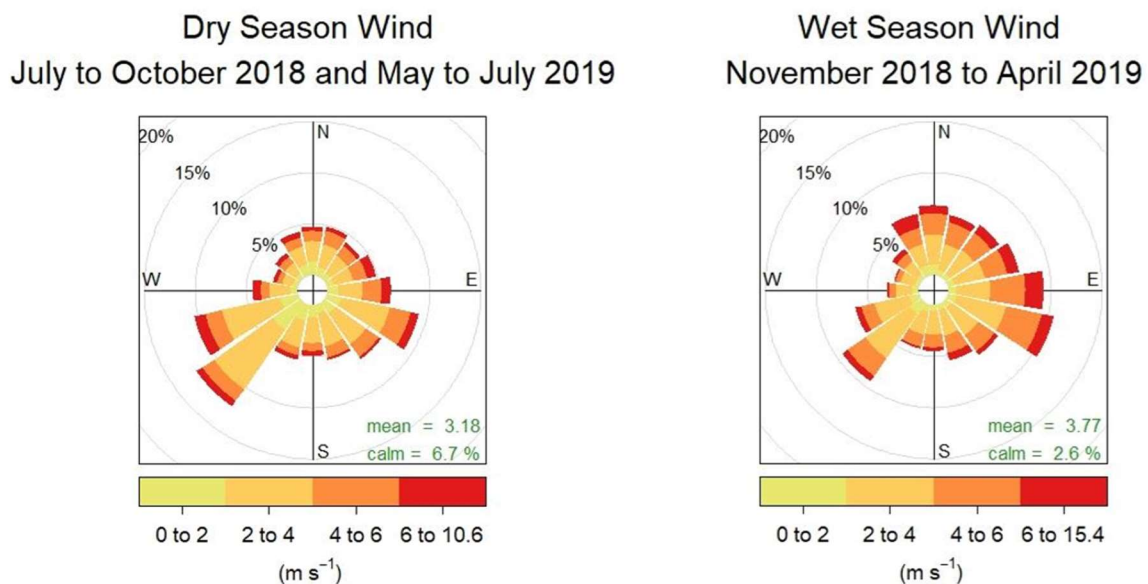


Figure 15: Seasonal wind conditions in Newman (DWER, 2020)

According to the BOM 2018, Newman receives an average annual rainfall of 332.6mm, which is mainly derived from tropical storms and cyclones during summer. During October to March the mean maximum temperature is 35.2°C to 39.0°C and during April to September the mean maximum temperature is 22.9°C to 31.8°C. Evaporation greatly exceeds rainfall in the region and mean daily evaporation at Wittenoom is 8.6mm/day, which equates to 3.1m/annum according to the BOM 2018 data.

5.3.8 Amenity impacts

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) reported that commonly identified amenity impacts include:

- short-term reduction in visibility. For example a visible plume may adversely affect the

aesthetics of the environment such as scenic view;

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

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

There are no site specific criteria for TSP or dust deposition criteria that have been established or adopted for the Newman area and no monitoring of these parameters for amenity is currently conducted by the Licence Holder in Newman.

When viewing the amenity criteria of other environmental regulators around the world (Table 12) 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 12: Dust deposition criteria used in other jurisdictions

Jurisdiction	Standard/objective	Comment
Quebec, Canada	7.5 tonnes/km ² /month (7.5g/m ² /month)	None
Alberta, Canada	53 mg/100cm ² /month (5.3 g/m ² /month)	In residential and recreation areas
	158 mg/100 cm ² /month (15.8 g/m ² /month)	In commercial and industrial areas
New South Wales, Australia	2g/m ² month	Incremental. 2 g/m ² /month corresponds to 67 mg/m ² /day
	4 g/m ² /month	Total. 4 g/m ² /month corresponds to 133 mg/m ² day
Germany	0.35 g/m ² /day (10.5 g/m ² /month)	Deposition value of PM ₁₀ for the protection against nuisance or significant disadvantage due to dust fall (non-dangerous dust)

Source: (p. 150, Katestone, 2011)

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

Community surveys and complaints

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

In 2021, the Western Mineworkers Alliance (WMWA, 2021) undertook a public survey of community sentiments about dust emissions in Newman. Respondents were identified as

current or former Newman residents, or FIFO workers who spend a significant amount of time in the community.

Of the 84 respondents, 74% said they had experienced damage to property from dust. In addition, 40% said that they had experienced lifestyle impacts (not being able to do what they would otherwise like to do, due to dust).

A search of DWER's Incidents and Complaints Management System has identified one complaint lodged to DWER in relation to amenity impacts from dust in Newman.

As at 30 June 2022, no community complaints had been received by the Licence Holder in relation to dust impacts.

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

- 1) there are no site-specific amenity criteria established or adopted for Newman or for the Pilbara region of Western Australia;
- 2) amenity is intrinsically subjective and linked to a particular community's expectations at a particular point in time. In addition, there is significant variation between criteria used across other jurisdictions;
- 3) based on community surveys and social media comments it appears that some members of the Newman community are concerned about impacts to amenity.

5.3 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 5.2.7. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the Licence Holder has proposed mitigation measures/controls (as detailed in sections 5.2.2 and 5.2.3), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Licence Holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the Licence as regulatory controls.

Additional regulatory controls may be imposed where the Licence Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 13.

The Amended Licence L4503/1975/14 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. Primary Activities listed in Table 1.

The conditions in the Amended Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 13. Risk assessment of potential emissions and discharges from the Premises during operation

Risk Events						Risk rating ² C = consequence L = likelihood	Licence Holder's controls and existing conditions sufficient?	Conditions of licence	Justification for additional regulatory controls				
Sources/Activities	Potential emission	Potential pathways and impact	Receptors	Potential adverse impacts	Licence Holder/ existing Licence controls ¹								
Crushing, screening, stockpiling and transport of ore. Vehicle movements within the processing and handling footprint. Open areas within the processing and handling footprint.	Dust	Air/windborne pathway causing impacts to health and amenity	Residences in the town of Newman, approximately 3.9 km from TLO stockpiles (nearest Category 5 infrastructure).	Health impacts associated with the inhalation of finer particulates (PM ₁₀). Amenity impacts from TSP and deposited dust.	Ore conditioning sprays on conveyors. Dust suppression sprays at reclaimers and stackers. Luffing on stackers to reduce ore drop height. Dust extraction on car dumper, crushers and screeners. Stockpile water cannons. Vehicle speed limits and application of dust suppressant/water to unsealed roads. Maintenance of dust control availability.	C = Major L = Likely High Risk	No	Existing Licence Holder controls with the following additional regulatory controls: Addition of management trigger criteria for dust recorded at Premises PM ₁₀ monitors. Restrictions to the operation of front end loaders on dead ore stockpiles during high risk meteorological conditions for dust. Minimum requirements on the operation of dust controls available at the Fixed West Plant. General housekeeping conditions for the clean-up of material deposited around site.	See section 5.5.				
Earthmoving activities within the landfill footprints. Open areas within the landfill footprints. Burial of additional asbestos wastes (refer to section 2.2.1)			Residences in the town of Newman, approximately 2.3 km from the nearest Category 64 activity (Asbestos Disposal Area).	Health impacts associated with the inhalation of finer particulates (PM ₁₀) and asbestiform fibres. Amenity impacts from TSP and deposited dust.	Waste disposal limits. Covering of waste following deposition. No asbestos deposited within 2 m of the final tipping surface of the landfill and waste to be covered before the end of the day on which it was deposited. Rehabilitation of landfill cells within 6 months after completing disposal to that cell.					C = Major L = Unlikely Medium Risk	Yes	Covering requirements for each waste type. Operation of water carts on trafficable areas. Special management requirements consistent with <i>Environmental Protection (Controlled Waste) Regulations 2004</i> .	Existing Licence Holder controls have been amended to ensure covering requirements for tyres are consistent with r.14(2) of the EP Regulations.
Open areas within the tailings storage footprint.			Residences in the town of Newman, approximately 5.1 km from the eastern boundary of the tailings storage dam.	Health impacts associated with the inhalation of finer particulates (PM ₁₀). Amenity impacts from TSP and deposited dust.	N/A – the surface of the tailings is crusted or damp as a result of even distribution of tailings material.								

Note 1: Existing Licence Holder controls not conditioned on the Existing Licence.

Note 2: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guidance Statement: Risk Assessments* (DER 2017).

5.4 Detailed risk assessment for dust emissions

As discussed in section 5.1, the specific consequence criteria (for public health) applied to the risk assessment for the premises is consistent with the NEPM. That is, a 24 hour averaged PM₁₀ concentration of 50µg/m³, as measured from midnight to midnight.

A review of proposed consequence criteria for PM₁₀ (70µg/m³) is also considered in the sections below. The purpose of this is to determine if there would be a need to revisit the risk assessment for dust emissions in the event that a Newman-specific health risk assessment, as endorsed by the Department of Health, identifies that an alternative criterion provides an equivalent level of protection to public health.

5.4.1 Consequence

On the recommendation of the DOH the AGV applied in this risk assessment for PM₁₀ concentrations is 70µg/m³ averaged over 24 hours, midnight to midnight. However, current particulate concentrations in Newman are high and are exceeding the interim AGV each year. The Premises has been identified as a dominant source of dust in Newman and potential contributor to these high dust events. Therefore the potential consequence of continued high dust levels to public health has been determined to be 'Major', in accordance with DWER's *Guidance Statement: Risk Assessments*.

It has been expressed by members of the community, and long-term visitors, that there are at least mid-level impacts to amenity in Newman occurring. In a recent survey conducted by the Western Mineworkers' Association, community members expressed concern that their lifestyle and day-to-day activities were being impacted by dust. Therefore the potential consequence of continued high dust levels to amenity in the Newman community has been determined to be 'Moderate'.

The overall consequence rating is therefore based on the assessment of impacts to public health and is determined by the Delegated Officer to be '**Major**'.

5.4.2 Likelihood

The Licence Holder's Newman Operations, including the premises under review through this assessment, is a known significant contributor to ambient dust levels in the Newman townsite (refer to section 4). While there are a range of other contributors to dust recorded at town monitors, the Premises is a frequent contributor to overall dust across each annual period and during peak dust events.

Over the period of 2011 to 2021, the NEPM standard for PM₁₀ (50µg/m³) was exceeded 597 times at the Town Centre monitor, or approximately 17.5% of days. Over the same period, the 24-hour interim AGV selected for this risk assessment (70µg/m³) was exceeded 235 times or 6.3% of days (refer to Table 5). While the frequency of exceedances is lower using the interim AGV, an average exceedance occurrence of one in every 16 days satisfies the definition of '**Likely**' when considering the likelihood of an exceedance during each annual period. An exceedance is expected to occur across each annual period as a result of operations at the premises.

Using the NEPM standard for PM₁₀ (50µg/m³) the determination of likelihood would remain as 'Likely'.

5.4.3 Overall risk rating

The Delegated Officer has concluded that the premises is currently resulting in a '**High**' risk of dust impacts to sensitive receptors in Newman, and therefore further dust controls are required.

6. Conclusion

Based on the assessment in this Amendment Report, the Delegated Officer has determined that a revised Licence will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

The Delegated Officer has concluded that the risk of dust in Newman is 'High'. The specific consequence criterion (interim AGV) used in this assessment (24 hour PM₁₀ of 70µg/m³) is 'regularly exceeded from all sources'.

Based on existing health records, the correlation of ongoing exceedances of health criteria with impacts to the Newman population is not easily identifiable. However, the risks from prolonged exposure to high dust levels on public health is well researched and documented. Further, the Premises and mining activities in general have been identified as a dominant source of the dust recorded at town monitors. Therefore, additional regulatory controls across the Newman Operations are required to better manage the risks to public health associated with dust exposure.

Assessment undertaken by DWER's air quality experts confirmed that the Premises is the dominant dust source impacting the Newman town site based on recorded PM₁₀ concentrations at the Newman Town Centre site between 2016 and 2021 (refer to Figures 8, 9 and 11). Occasional moderate impacts from Eastern Ridge Iron Ore Mine were also identified, but far less frequently and at lower average concentrations. Therefore, conditions of both amended licences have been designed to prioritise improvements at the Premises.

The exact cause of individual high dust events is poorly known. Further research and investigation is required into emission rates from key dust sources and the likely meteorological conditions in which dust will travel to the Newman townsite. Additional conditions of the Amended Licence have been applied to improve Government's understanding of the key sources of dust. Further conditions have been applied to better monitor and address known sources within the scope of a Part V licence, including during high dust events. Monitoring will also assist in the determination of dust sources from Premises activities not connected with ore processing, for example blasting, overburden storage and ore haulage.

Conditions placed on the Amended Licence form part of DWER's iterative approach to improving dust controls at the premises, and broader Newman Operations. Conditions are targeted toward reducing dust emissions and are expected to manage all particulate emissions (e.g. TSP, PM₁₀ and PM_{2.5}) from the Premises. The Licence Holder will be required to submit a program of works that identifies what improvements can be made for the purposes of reducing dust emissions at key sources within the Premises and to address the 'High' risk of dust emission determined through this assessment.

Activities within the premises boundary that have the greatest potential to contribute to dust emissions include ore processing, blasting, truck movements on mine roads, clearing and rehabilitation works. Of these activities, the Part V licences only regulate ore processing activities, which includes the operation of crushing and screening infrastructure, all connecting infrastructure (e.g. train load-out), and the front end loader and adjacent vehicle movements associated with feeding the crushing and screening infrastructure or train loading. As a result, the scope of the Part V licence is limited in its ability to regulate all major dust sources from the Premises.

A whole-of-Government approach to the regulation of dust in Newman is required.

Dust controls added to the Amended Licence reflect existing controls already applied, proposed additional controls and those that will be identified through further investigation. Through this iterative process of improved regulation of dust at the Premises, the Department expects overall dust emission from the Premises to be reduced and for dust risks to be managed to acceptable levels.

6.1 Summary of amendments

The focus of this assessment is on the risk of dust and the assessment of minor changes requested through the application received 12 October 2021 (refer to section 2.2.1). Other conditions relating to water discharges, surface water and groundwater monitoring have been transferred across to the Amended Licence in the revised licence format. The intent and application of these conditions remains unchanged. Added conditions relating to dust risks and Licence Holder-proposed changes are detailed and justified in the below sections.

6.1.1 Throughput limits

Limits have been applied to the Amended Licence that restrict the amount of ore processed at the Premises.

Note: Limits do not increase from previously assessed tonnages at the Premises.

Grounds: It is possible that an increase in throughput could result in additional dust outputs from the Premises, depending on the ore type responsible for throughput increases and the infrastructure used for handling the additional ore. This is particularly true for ores that require double and triple handling prior to train outload.

Although the replacement of the OHP5 Relocatable Crusher does improve handling efficiencies at the Premises, the cumulative Premises throughputs are not expected to increase beyond authorised amounts.

6.1.2 Infrastructure and equipment

The Licence Holder must be able to accurately measure and achieve an Average Monthly Availability and Performance rate of 90% or more for all key dust controls.

Note: Average monthly availability and performance is determined based on a calculation of 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.

Determination of when equipment is required to be operating is dependent on a number of factors taken into consideration where exclusions to dust control equipment may apply:

1. Moisture content of the ore being handled or periods of rain – there is a lower risk of dust generation when handling ore that is wet.
2. Slumping risk on the coarse ore stockpile – this presents a safety risk to operators and is likely to occur when the surface of the stockpile is wet/has a low dust potential already.
3. Machines operating on the coarse ore stockpile – this presents a safety risk to operators.
4. When chutes are being hosed – the hosing of chutes results in a significant amount of water being added to the product as it moves upstream, resulting in a lower dust potential.
5. Wind inhibiting factors – wind can significantly limit the effectiveness of water application, in some cases blowing the water away from the dust source and control.
6. When handling fines along conveyors – applying water to high-fines content products can introduce new dust sources through carry-back of “sticky” ore on the underside of conveyor belts.
7. When low volumes of ore are being handled – smaller tonnages handled, for example less than 500 tonnes per hour, are expected to result in reduced rates of dust generated.

Refer to Appendix 1 for further detail on the decision-making process for turning each control on and off. Exclusions to the activation of dust controls when handling dry fines has been applied to Licence conditions, although with the exception of boom sprays.

Dust control availability requirements will apply to all existing dust control equipment within 12 months, with the exception of OHP5 dust controls which must have similar availability rates within 12 months of the Amended Licence issue date. All new dust control equipment must be 90% available (monthly average) once installed and operational.

Grounds: A measured approach is required to ensure that dust is controlled in an effective and safe manner. The requirement to upgrade systems that allow the calculation of dust control availability is expected to both improve the identification of dust control faults, and ensure that there are steps in place to turn the controls on when they are needed to reduce the dust potential.

Fines have been identified in section 5.2.1 as making up approximately 55% of all ore types handled at the Premises in 2020. These products have also been identified as presenting a greater dust risk than lump ores. Therefore the application of water via stacker boom sprays has not been excluded from dust control activation requirements due to wind conditions. This approach acknowledges that adding water to high fines-high clay content ores can create additional, unintended dust sources through conveyor carry-back, while ensuring that dust sprays at the tip of conveyors stacking ores to stockpiles continue to operate. Boom sprays are not directed at the conveyors and have the potential to effectively suppress dust even during higher winds.

The Delegated Officer notes that it is not possible to statistically verify that all ore has a moisture content above the DEM Level through each stage of handling. Therefore ore that is mined below the water table or is resulting in, for example the bogging of transfers, is defined as “wet ore”.

6.1.3 Improvement requirements

A review of existing dust controls and the submission of an improvement plan for dust controls at the Fixed West Plant form a requirement of the Amended Licence. The Licence Holder is required to review all infrastructure that handles ore at the Premises to determine the most suitable locations for additional dust control, including but not limited to focus on:

- stackers;
- reclaimers;
- crusher feed bins/hoppers where ore is delivered by haul truck;
- interlocks on dust collection systems; and
- carry back of ore on the underside of conveyor belts.

Note: The Licence Holder has committed to installing additional dust control equipment and/or redesigning existing controls to improve the capture of dust from the Premises. The review of dust control equipment and submission of an improvement plan are in addition to the Licence Holder’s proposed improvement works. A proposal for additional works must be submitted to DWER within 18 months of the Amended Licence being issued based on a review of air quality and operational data. This timeframe is aligned with the same requirement for the amended Eastern Ridge licence under this review as the two operations are to be considered together.

Consideration must be given to the ore type/s handled at each location investigated. It is possible that a dual/side-by-side spray systems would be required, or the replacement of nozzles with misting spray capability, to ensure the appropriate management of dust from handling all different ore types at the Premises.

In addition, consideration must be given to future ore characteristics when determining the requirements for additional dust controls.

Grounds: The risk of dust has been assessed as ‘High’ in Newman with the Premises being a dominant contributor (refer to sections 4 and 5.4.3). DWER officers have visited the Premises and identified significant visible dust being generated at multiple sources where low or unknown levels of control were being applied to manage dust.

The Delegated Officer acknowledges that the Licence Holder, as the operator of the Premises, is best placed to identify what improvements can be made to optimise reductions in dust generated at the Fixed West Plant.

Based on observations made during site visits and the continued high dust levels experienced in Newman, a review of dust control effectiveness is required of the Licence Holder. For example, stackers at train load out were witnessed to generate significant visible dust when handling Marra Mamba ore types. As discussed in section 3.3.6 and 5.2.1, different ore types react differently to water sprays.

The Licence Holder has advised that ores that have previously been mined from above the groundwater level and are dry, with dust managed by applying additional water, will soon be mined below the water table. Wetter ores have the benefit of being less dusty when dropped from height, reclaimed, crushed or screened but can present issues to handling rates from the clogging of chutes and transfers. The handling of wetter ores may also result in the generation of new dust sources from ore carry back along conveyor routes. Therefore the review of dust controls needs to take into consideration dust sources that are expected to present themselves in future.

6.1.4 Boundary air quality monitoring

Additional source, boundary and ambient monitoring requirements have been added to the Amended Licence. Improvements to the monitoring network are required in the Amended Licence to enhance the data produced by the monitoring network and inform short- and long-term decision making around dust control implementation.

The siting of existing boundary monitor “Boundary 2” (WBAQRT013) is not optimal for identifying high dust risk events to trigger additional dust controls on site. Therefore, the Amended Licence requires the Licence Holder to install within 12 months an additional (equivalent) monitor that is suitable for use, and acts as a trigger monitor for on site management of dust emissions identified as migrating toward the Newman town site.

Note: The Licence Holder operates an extensive air quality monitoring network that is not prescribed on the Existing Licence but have been included on the Amended Licence. This includes monitors located between receptors and areas of dust generation, including the Fixed Plant West ore processing area, as depicted in Figure 2.

All monitors specified on the Amended Licence will be required to measure particulates as PM₁₀ using existing monitors (BAMs) on a 1-hour averaging period against Australian Standards and current E-samplers on a 10-minute averaging period. In addition, PM₁₀ must be measured on a 10-minute averaging period at the same locations using real-time modules (nephelometers) for application in trigger action response procedures specified in the Amended Licence (refer to section 6.1.5). Wind speed and direction monitoring will be required to continue at each monitor. This does not represent a change to existing monitoring undertaken.

Improvements to the monitoring network are required to address limitations of WBAQRT013 as a monitor to be used to identify high dust levels travelling toward sensitive receptors in Newman. Further consideration should be given to the appropriate location of, and adjacent influences on all monitors that measure dust at background monitoring locations, near to potential sources, along likely dust pathways and at receptors.

Grounds: To clearly understand the source of high dust emissions for the purpose of resolving uncertainty, monitoring data of dust concentrations near to the source, along the pathway, at the receptor and at background location/s are required. There is insufficient information that can

be obtained from the existing monitoring network, as specified on the Amended Licence, to determine all dust sources and the events that result in dust impacting sensitive receptors. DWER understands that the Licence Holder is conducting ongoing monitoring investigations using a variety of techniques to better understand the source and pathway of dust from the Premises.

These monitoring requirements do not limit the Licence Holder from implementing alternative dust source monitoring equipment around the Premises. However, microsensors for example, have not been considered for regulatory purposes as they are frequently remobilised and recalibrated, meaning that consistent data trends cannot be established. These monitors may be useful for internal dust management practices by the Licence Holder or source identification investigations that assist with investment planning for additional dust controls. Identifying the source of dust using alternative monitoring equipment may also enable more timely and focused reactions to peak PM₁₀ concentrations at the boundary before impacts are experienced at a receptor locations.

In addition, improving the quality of source monitoring onsite will minimise the incidence of site-wide dust control application, as required by conditions of the Amended Licence where the source cannot be identified. Source monitoring also serves to identify trends in the operational activities and locations that most significantly contribute to high dust events.

6.1.5 Management triggers

Amendments have been made to incorporate trigger management actions for dust control in response to elevated short-term PM₁₀ concentrations at select boundary monitors and/or Newman townsite monitors where the Premises may be a contributing source.

Management trigger criteria – Particulate concentrations and consideration of background data

As discussed in section 4.3, high dust levels recorded at town monitors can be influenced by numerous industrial and non-industrial sources including regional dust events, local sources, mining activities and ore processing activities. The focus of management triggers is intended to address dust generated within the Fixed West Plant area depicted in Figure 2. Therefore exclusions to management trigger requirements have been included for boundary and town monitors to give consideration to dust that is likely to be sourced from beyond the Fixed West Plant area.

For example, where high dust concentrations are recorded in town but are also recorded at ambient monitors (located outside of the specified wind arcs) over the previous hour, management actions are not required through the Licence. However, there is no restriction to the Licence Holder if it is identified that premises activities are contributing to the dust in Newman.

Limitations with the existing boundary monitor, WBAQRT013, have been identified (refer to section 4.2.2), which make its use suboptimal for the purpose of response actions to high dust events that may impact receptors. Therefore trigger management criteria against this monitor have been set as an interim measure until a new monitor is installed in a more appropriate location.

Management trigger criteria – Wind arcs

Management actions will only be triggered where the averaged wind direction places the Fixed West Plant upwind of the Newman townsite. Due to the significant variability in recorded wind directions and speed across monitors investigated, as described in section 5.2.7, wind arcs must be measured from each monitor specified in dust management trigger conditions.

Management requirements

The Licence Holder will be required to address each exceedance by actively seeking to identify

the source of dust, where identified, until PM₁₀ concentrations reduce to below trigger levels. Where the cause remains unknown and background monitors are not recording elevated PM₁₀ concentrations, additional general site controls for the abatement of dust are required and are stipulated on the Licence. This includes ceasing or reduction in the operation of front end loaders around outload of dead ore stockpiles, operation of available BOC sprays on routes that are currently handling ore, operation of targeted stockpile cannons on increased watering cycle interval and additional water cart operation.

Exclusions have been applied to periods where inversion conditions are present and the visible source of dust cannot be identified and the application of controls presents a risk to safety.

Timeline

To allow the Licence Holder to update their automated alert systems to achieve compliance with the clarified management trigger criteria, a 12-month lead-in period has been applied.

Note: Trigger events are to be measured against a 1-hour rolling average that relies on the use of 10-minute data collected by e-samplers and/or nephelometers located at each specified monitoring location. The use of 10-minute data to inform trigger alerts allows the Licence Holder to react to high ambient dust levels at the Premises boundary in near-real time.

To avoid requiring the Licence Holder to conduct multiple trigger investigations for the same dust event and at the same monitor location and within a three-hour period, the Licence Holder may interpret the exceedance to be a single event. In such cases, it is allowable for the Licence Holder to conduct (a minimum of) one trigger investigation where a single dust event has occurred.

Where dust levels continue to be high over an extended period and the Premises is upwind of the recording monitor, the Licence Holder will be required to investigate the high dust levels and submit analysis and conclusions as a Reportable Event within quarterly reporting (refer to section 6.1.7).

DWER notes that the Licence Holder receives notification of high dust risk meteorological conditions such as inversions/low mixing heights, high winds and wind directions that may place the Newman townsite downwind of operations. Dust risk forecasting tools continue to be adapted and improved to inform go/no-go decisions for potential dust generating activities at the Premises ahead of being alerted to high dust trigger events.

Where the exact source of the trigger exceedance cannot be determined, for example during an inversion event, but dust is visibly generated from operations, the Licence Holder is required to address the source of dust through additional control. Exclusions to this requirement are in place if the application of additional control will result in risks to safety. In addition where it can be visibly identified on the ground, and certified by operators through records, that dust is not being generated from the location where specified controls are conditioned to be turned on.

Grounds: While the operation and meteorological conditions that typically result in high dust events are not well known, the overall risk of AGV exceedances remains 'High', resulting in an elevated risk to community health. Therefore increased particulate monitoring and improved management responses are required with regulatory oversight. The high level of risk associated with dust emissions from the Premises justifies the application of interim management responses to high dust events and in the absence of detailed understanding of high dust risk conditions.

It is worth noting that management criteria set against averaged 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. Additional conditions for the ongoing management and avoidance of dust are required.

It is possible that over time management responses will be amended to ensure that they more appropriately address the risk of high dust events being experienced in the community. The intent of this condition is to ensure that high dust levels at the boundary or in the community are addressed to either reduce or prevent ongoing impacts where this is within the control of the Licence Holder.

Dust management by avoidance, using tools such as predictive dust risk forecasting, is acknowledged as a more effective control than reactive management via dust triggers. However, in a high dust risk setting multiple approaches are required to prevent and minimise impacts to nearby sensitive receptors.

6.1.6 Ambient monitoring

Community monitors will continue to be required to measure particulates as PM₁₀ on 1-hour and 10-minute averages. In addition, amendments have been made to require the monitoring particulates as PM_{2.5} at the Town Centre community monitor, as depicted in Figure 3 of the Amended Licence.

Note: The measurement of PM_{2.5} is not currently required at monitors near to dust sources, background monitors or at boundary monitors although the Town Centre Monitor location has been set up with the ability to monitor particulates as PM_{2.5}.

The Delegated Officer notes that particulate monitoring data from the Newman 1 Town Centre monitor can be impacted by adjacent vehicle movements over the surrounding unsealed road surface.

Grounds: PM_{2.5} and PM₁₀ monitoring at receptor locations is expected to provide improved understanding of particulate composition and better inform risks to human health. Enhanced community air quality data will also support any further analysis into public health data.

6.1.7 Reporting

To support DWER in its analysis of the Premises contribution to overall PM₁₀ concentrations in Newman, quarterly reporting conditions of the Licence have been amended to require the provision of all boundary monitoring data to DWER. This will also assist the department to analyse possible sources and contributing factors to high dust events periodically.

Dust scatter plots, otherwise known as dust roses, must be provided for Reportable Events to assist in the identification of the directional source of the high dust emissions. For each Reportable Event the Licence Holder is also required to provide a comparison of boundary monitoring data with that recorded at ambient monitors in the Newman community to determine possible impacts.

Average Monthly Availability and Performance rates of dust control infrastructure must be reported within the annual report with 24-hour availability rates to be provided as supporting information to Reportable Events. Similarly, there is a reporting requirement to compare moisture content against DEM at outload. This informs the investigation of ore moisture content as it runs from stockyard to train load out during high dust events.

Note: All annual reporting for monitoring data on waste inputs, discharges, surface water and groundwater have been directly transferred into the revised licence template.

Grounds: Under certain meteorological conditions there is clear correlative relationship between PM₁₀ concentrations at boundary monitors when dust is high in town. Therefore all monitoring data from the network (town and boundaries) must be provided to DWER at regular intervals to allow reviews of dust impacts and the effectiveness of dust management to inform future regulatory controls.

6.1.8 OHP5 Relocatable Crusher

The ongoing operation of the OHP5 Relocatable Crusher is approved. This infrastructure replaces a previous plant at the same location and its operation is anticipated to reduce overall dust emissions (refer to section 3.3.3).

6.2 Additional amendments

6.3.1 Amendments to waste handling and disposal conditions

Existing conditions relating to landfill acceptance criteria have been directly transferred into the new format and clarified where appropriate. Amendments have been made to:

- increase in authorised tonnages to allow for the disposal of illegally dumped asbestos;
- remove handling specifications for clean fill, which is primarily used as cover material;
- authorise inert concrete waste disposal within pit backfilling areas, overburden storage or landfilling facilities;
- amend disposal and cover requirements for tyres; and
- incorporation of hydrocarbon waste storage specifications for new facilities.

Note: The majority of these amendments have been requested by the Licence Holder in their application received 12 October 2021.

Amendments to tyre covering requirements have been amended to reduce the risk of fire and for consistency with regulation 14(2) of the EP Regulations.

Grounds: The operation of landfills can be a source of dust or fire if not managed appropriately.

6.3.2 Administrative amendments

Conditions of the Amended Licence have been transferred into the new licence template adopted by DWER. Existing conditions relating to wastewater discharges and ambient water monitoring have been directly transferred into the new format and clarified where appropriate. Some wording changes have been made to conditions to improve the validity of conditions in accordance with DWER's *Guidance Statement: Setting Conditions*. However, the intent and implementation of these conditions has not changed.

Annual reporting requirements have been amended for consistency with other licences held by BHP Iron Ore Pty Ltd.

In addition, a standard condition of the revised licence template that requires the Licence Holder to comply with a DWER request has been applied to the Amended Licence. This applies, for example, where DWER seeks additional information to inform an inquiry into compliance or to investigate a complaint or suspected non-compliance.

7. Consultation

The Licence Holder was provided with preliminary drafts of the Amendment Report and Amended Licence on 15 November 2021 and 12 August 2022. A formal draft of these documents was provided 23 November 2022. The Licence Holder commented on each draft and these comments are summarised, along with DWER's response, in Appendix 2 and 3. In direct response to proposed conditions requiring dust control equipment availability to remain above 90%, the Licence Holder has sought further definition of the periods when this equipment is required to be available. Decision-making flow charts for the determination of when dust controls are required are provided in Appendix 1 and further explained in Appendix 2.

Public comment on BHP's Newman Operations was invited on 14 June 2021 when DWER advertised its intent to review both Part V licences. On 21 and 22 June 2021, direct letters were

sent to the Shire of East Pilbara, relevant State Government agencies and direct interest stakeholders offering an opportunity to comment on the Part V licence reviews and air quality in Newman. Following public request, the comment period was extended to 24 August 2021 and the identified direct interest stakeholders notified. Comments received have been summarised and responded to in Appendix 4.

Definitions of terms and acronyms

In this Amendment Report, the terms in Table 14 have the meanings defined.

Table 14: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
Acceptance Criteria	has the meaning defined in Landfill Definitions
ACN	Australian Company Number
AER	Annual Environment Report
Annual Period	means a 12 month period commencing from 1 July until 30 June in the following year
AS 3580.1.1	means the Australian Standard AS 3580.1.1 <i>Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment</i>
AS 3580.9.11	means the Australian Standard AS 3580.9.11 <i>Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM₁₀ beta attenuation monitors</i>
asbestos	means the asbestiform variety of mineral silicates belonging to the serpentine or amphibole groups of rock-forming minerals and includes actinolite, amosite, anthophyllite, chrysolite, crocidolite, tremolite and any mixture containing 2 or more of those.
asbestos fibres	has the meaning defined in the Guidelines for Assessment, Remediation and Management of Asbestos Contaminated Sites, Western Australia, (DOH, 2009)
averaging period	means the time over which a limit or target is measured or a monitoring result is obtained
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
Amended Licence	The Licence (L4503/1975/14) granted under the EP Act as a result of this assessment.
Amendment Report	refers to this document, which can be defined as a Licence review.
Delegated Officer	an officer under section 20 of the EP Act.
DEM	Dust Extinction Moisture
Department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DoH	Department of Health
DWER	Department of Water and Environmental Regulation
EP Act	<i>Environmental Protection Act 1986</i> (WA)
EP Regulations	<i>Environmental Protection Regulations 1987</i> (WA)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of, and during this Review
Landfill Definitions	means the document titled “Landfill Waste Classification and Waste Definitions 1996” published by the Chief Executive Officer of the Department of Environment as amended from time to time

Licence	means this licence numbered L4503/1975/14 and issued under the EP Act
Licence Holder	BHP Iron Ore Pty Ltd
m ³	cubic metres
MACL	Mining Area C Lump
Minister	the Minister responsible for the EP Act and associated regulations
MS	Ministerial Statement
mtpa	million tonnes per annum
NEPM	National Environment Protection (Ambient Air Quality) Measure
NBLL	Newman Blended Lump
NBLLU	Newman Blended Lump Unscreened
NHGF	Newman High Grade Fines
NHGL	Newman High Grade Lump
Noise Regulations	<i>Environmental Protection (Noise) Regulations 1997 (WA)</i>
OHP	Ore Handling Plant
PM	Particulate Matter
PM ₁₀	used to describe particulate matter with a diameter of 10 microns (µm) or less
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Amendment Report applies, as specified at the front of this Amendment Report
Primary Activities	A defined in DWER's <i>Guidance Statement: Risk Assessments</i> to include the primary activities which fall within the description of the category of prescribed premises in Schedule 1 to the EP Regulations.
Putrescible	has the meaning defined in Landfill Definitions
quarterly	means the 4 inclusive periods from, 1 July to 30 September, 1 October to 31 December and in the following year, 1 January to 31 March, 1 April to 30 June
Risk Event	As described in <i>Guidance Statement: Risk Assessment</i>
ROM	Run of Mine
Special Waste Type 1	has the meaning defined in Landfill Definitions
TLO	Train Load Out
µg/m ³	micrograms per cubic metre
µg/L	micrograms per litre

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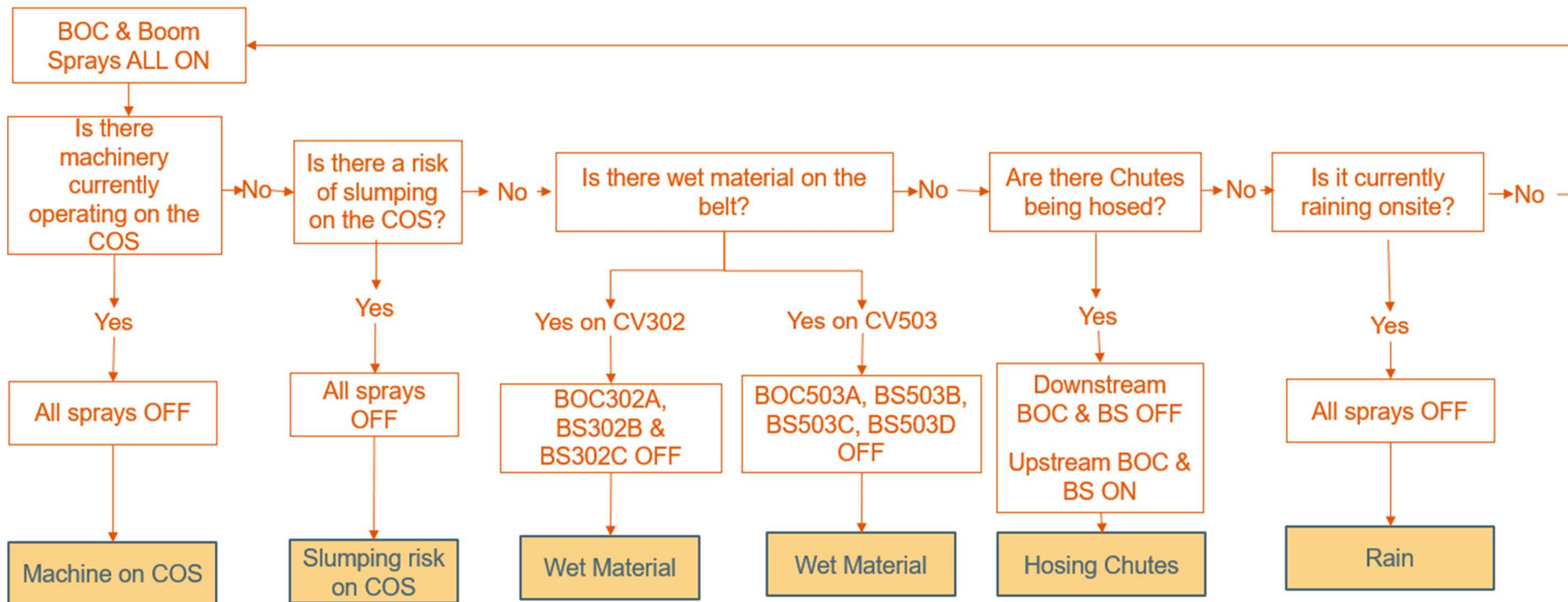
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Appendix 1: Decision making flow charts for the required operation of water controls (BHP, 2022a)

OHP4 Pre-Screens Sprays

Reason for control OFF as not required / not safe

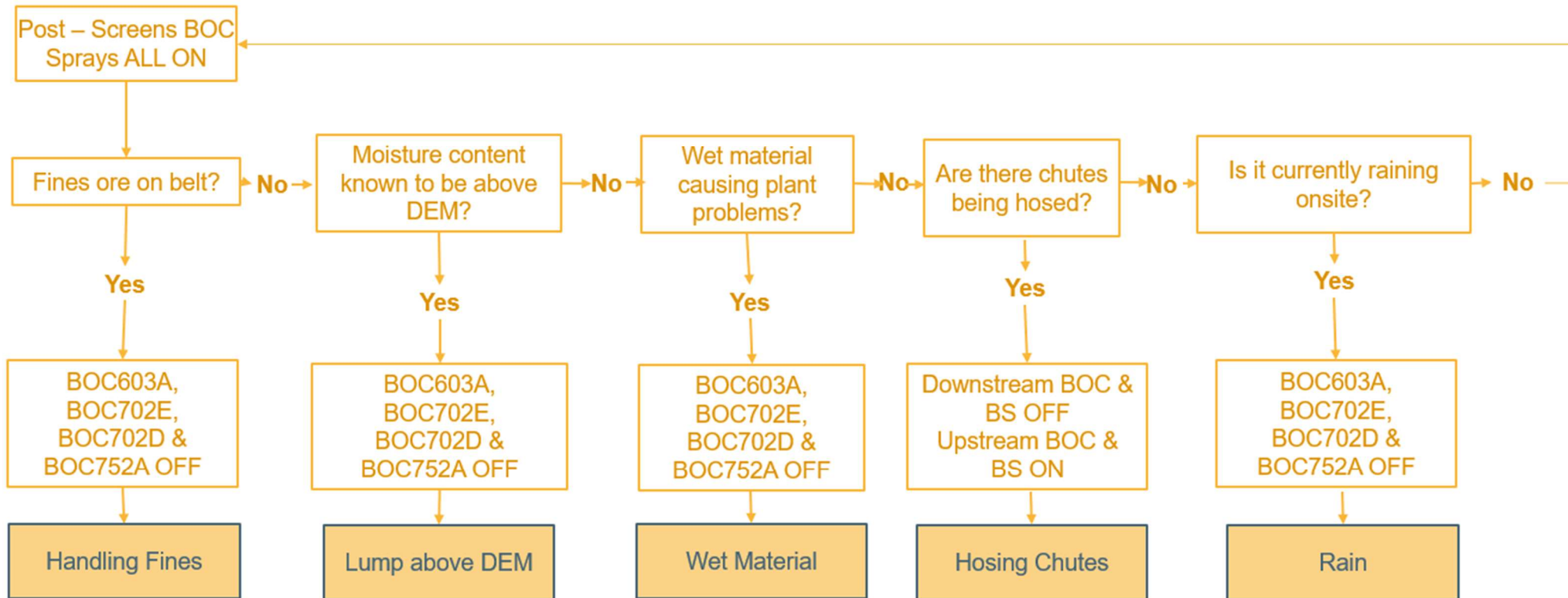
Availability – 90% of the time all sprays are ON excluding time they are not required/unsafe to operate.



OHP4 Post Screens BOC Sprays

Reason for control OFF as not required / not safe

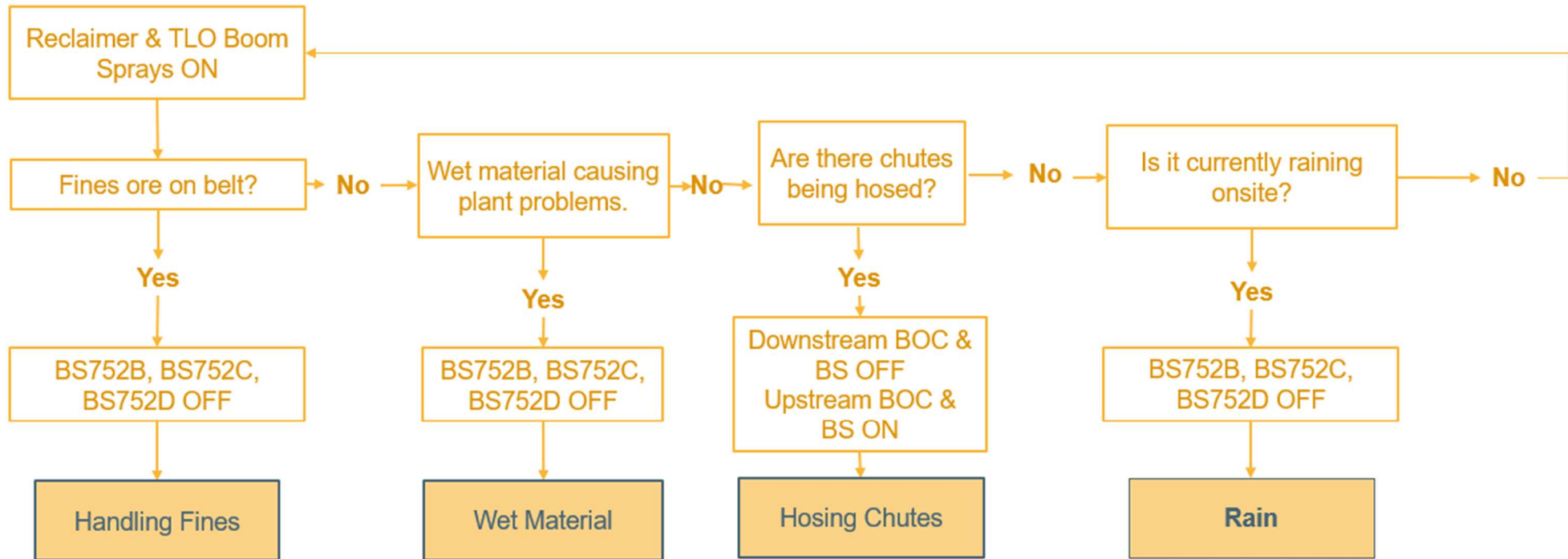
Availability BOC & BOOM Sprays – 90% of the time sprays are ON excluding time they are not required/unsafe to operate



OHP4 Post Screens Boom Sprays

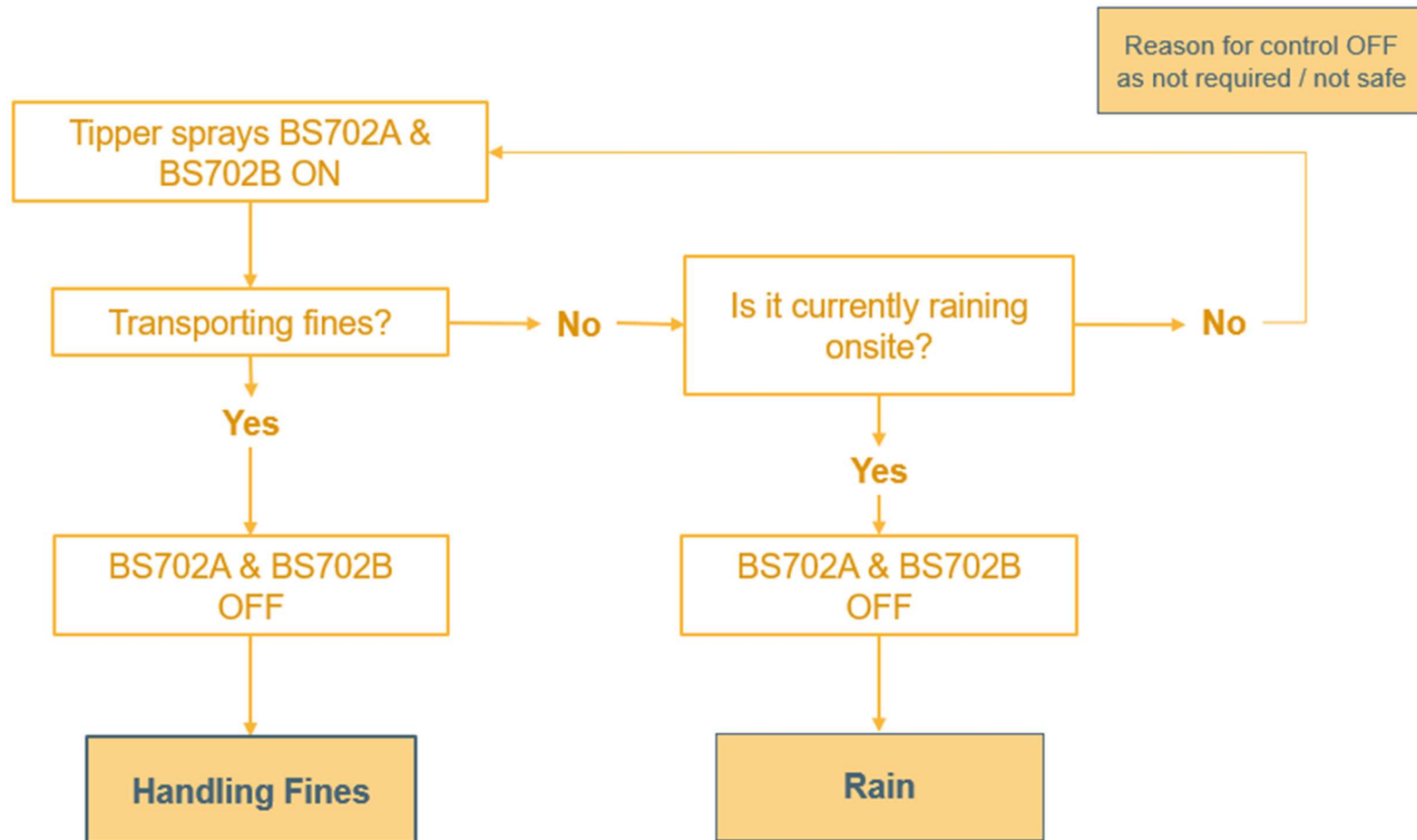
Reason for control OFF as not required / not safe

Availability **BOOM Sprays** – 90% of the time the sprays are ON excluding time they are not required/unsafe to operate



OHP4 Post Screens Boom Sprays

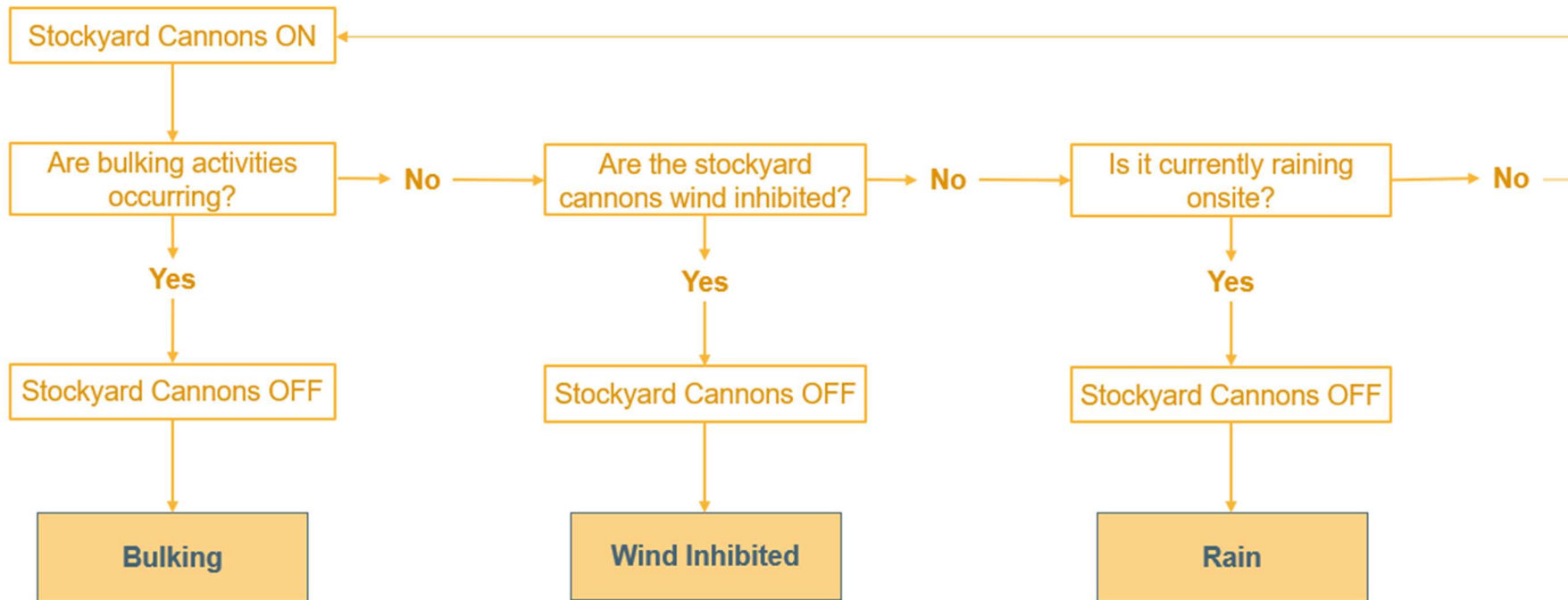
Availability **BOOM Sprays** – 90% of the time the sprays are ON unless there is an OFF selection.



OHP4 Stockyard Cannons

Reason for control OFF as not required / not safe

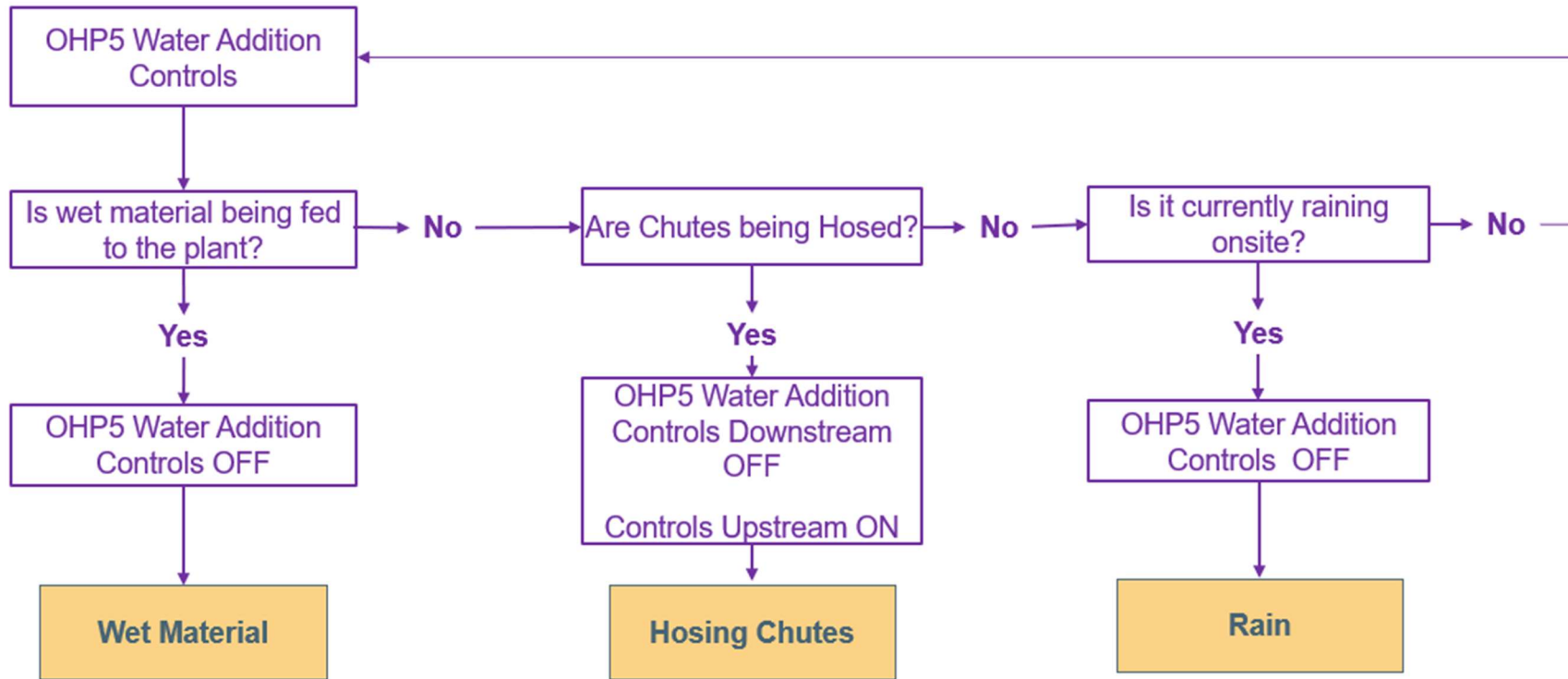
Availability Stockyard cannons – 90% of the time the sprays are ON excluding time they are not required/unsafe to operate



OHP5 Water Addition Controls

Reason for control OFF as not required / not safe

Availability OHP5– 90% of the time the sprays are ON excluding time they are not required/unsafe to operate



Appendix 2: Summary of Licence Holder’s comments on risk assessment and draft conditions – October/December 2022

Condition	Summary of Licence Holder’s comment	Department’s response
Infrastructure and equipment: Requirement for 90% rate of average monthly availability for specified dust controls.	Requesting clarification of interpretation of 90% monthly availability rates – that this refers to availability for each grouped item and overall 90% dust control availability.	Confirmed. The condition intent and wording requires the Licence Holder to achieve a 90% availability rate for each group of dust controls. That is, water sprays on stackers and reclaimer must be available for operation for a combined average of 90% of the time that the equipment is required to be operating, as averaged over each month.
	Proposed rewording to add in the parameter Average Monthly Performance for stockyard cannons. This is a more appropriate measure for this infrastructure. The provided definition for “Average Monthly Performance”: <i>means the average percentage in automatic mode of equipment, calculated for each calendar month by dividing the time that the equipment is operating in automatic mode, by the time the equipment is required to be operating, taking into account Exclusion Periods if applicable.</i>	Accepted. DWER notes that the Licence Holder is requesting a differentiation between the meaning of “Average Monthly Availability” for general dust controls and stockyard water cannons. It is understood that this is due to stockyard cannons operating on a standard scheduled time ongoing (regular intervals), as opposed to automatically based on operating conditions. As the change does not appear to alter the intent or final calculation of required availability, changes are accepted. In the event of management triggers occurring, stockyard water cannons will be required to operate on an increased timer interval.
	Request that points c) transfer station sprays, and d) BOC sprays, are combined as transfer station sprays are only on OHP5.	Accepted.
	Request the ability to remove dust control equipment from the Dust Control Equipment Inventory only on approval by the CEO in writing.	Accepted, noting that justification for the removal of dust controls without alternative replacement will require sufficient justification in the context of dust risks being assessed as ‘High’. Approval will be at the discretion of the Delegated Officer.
	Request the addition of “Exclusion Periods” for sprays using the definition provided.	Noted. Discussion provided in the “Definitions” section of this table.

Condition	Summary of Licence Holder's comment	Department's response
Further works	<p>With reference to the requirement to install and review BHP understands that the inclusion of 'install' means the review and any subsequent additions/changes to the network need to be installed within 18 months of date of issue. The Licence Holder recommends the structure of the condition to read similar to:</p> <p>"The licence holder to conduct a review of the Newman dust monitoring network and implement recommended improvements within 18 months of the date of the issue of this licence"</p> <p>Six months is not practicable as the supplier has advised that it will take at least 4-5 month lead time to install a new monitoring station, with additional time required for calibration and review (not allowing for contingency). Additional time may also be required if any further approval is required for siting of monitor within the site (e.g. any internal BHP or external Shire approvals).</p>	<p>Noted. The condition has been amended to reflect the intent of conducting a review of the monitoring network data to determine where dust improvement controls can be implemented. The requirement to install an additional trigger management PM₁₀ monitor is separate to the plan for further works but may inform future improvements.</p> <p>The timeframe to install and operate the additional trigger management monitor has been extended to within 12 months of the issue of the licence. This is to allow for appropriate land access agreements to be established and to enable contractors to visit Newman to deliver and install equipment.</p>
	<p>There is no timing associated with the submission of the report on the review of installed and existing dust monitors. Request this is aligned with the 18 month timeframe set in Condition 7.</p>	<p>As above.</p>
	<p>Requesting extension to install new dust trigger management monitor.</p> <p>Seeking confirmation that the new monitor location is in addition to the existing monitor WBAQRT013.</p>	<p>Accepted, as above. It is confirmed that the new monitor to be used for the purpose of identifying and responding to high dust events from the Fixed West Plant is in addition to the existing monitor WBAQRT013. Timing of the monitor's install has been aligned with the timing of the air quality monitoring network review.</p>
	<p>The Licence Holder requests that the acronym "OMM" (ore moisture management) be removed from the requirement to install OMM sprays at the train load out. The reason Licence Holder notes the difference between OMM sprays and BOC sprays is that BOC sprays do not generally have adjustable flow rates.</p>	<p>Noted. Wording has been amended to required "ore conditioning sprays" to reflect the intent of this control being to apply water for the conditioning of ore.</p>
Dust monitoring and management	<p>Current monitors would not comply with wind speed and direction requirements of AS 3580.14 as this is for Meteorological masts (10m high), while the installed monitors are 2.5m which would not comply with the Standard.</p>	<p>Noted. The Delegated Officer acknowledges that full compliance with Australian Standards for siting is not always possible or necessary. Suggested changes have been accepted to acknowledge the height of meteorological monitoring on existing BAMs does not fully comply with Australian Standards.</p>
	<p>Requesting an extension from 6 months to 12 months for management triggers to commence as the 12 month timeframe aligns with others</p>	<p>Noted. Wind arcs have been accepted and figures for dust management triggers have been attached to the licence figures.</p>

Condition	Summary of Licence Holder's comment	Department's response
	<p>timeframes in the document.</p> <p>Dust management trigger and reportable dust event criteria table updated with revised wind arcs for Whaleback. The basis of the proposed wind arcs for both Whaleback and Eastern Ridge is provided in the attached PDF "Newman Ops Proposed Wind Arcs_221114" (DWER record: A2138492).</p> <p>Licence Holder requests to amend the requirement to cease front end loading operations at dead ore stockpiles where a management trigger event occurs. Proposed amendment to wording to "<i>Review and if necessary modify cease all the operation of front end loading...</i>"</p> <p>The Licence Holder has requested the inclusion of the term "untreated" to unsealed trafficable areas. Some unsealed roads have been treated with chemical suppression (e.g. dust mag) and spraying with water will impact the effectiveness of the chemical suppressant.</p> <p>The Licence Holder raised that the application of additional dust controls is not required and can cause operational issues in the event that the infrastructure/location can be identified as not being the source.</p> <p>If an activity can be confirmed as not the cause of the exceedance, even if the cause of the exceedance is unknown then the management requirement should necessarily need to be applied.</p>	<p>Noted. Proposed wording does not provide sufficient certainty and cannot be applied. However, the condition has been amended to allow for a reduction of front end loading activities to address dust emissions from dead ore reclamation during high dust events. This may include the operation of fewer front end loaders or by reducing the rate of loading (e.g. reducing the speed of front end loaders).</p> <p>Noted. The term untreated has been added noting that chemical dust suppressants must be applied to, <i>and maintained</i> on unsealed light vehicle roads not regularly serviced by water carts and on unsealed and un-trafficked non-operational areas.</p> <p>Noted. An additional condition has been inserted to allow controls to not be implemented where the safety of operations would be adversely affected (existing amended condition) and where it can be identified on the ground (i.e. not via video footage) that no visible dust is being generated at that location.</p> <p>Note that the dust management condition seeks to address all minor or major contributors to elevated dust emissions. Therefore any visible dust from the specified locations must be addressed with additional dust control.</p>
<p>Required management actions once trigger criteria is exceeded.</p>	<p>Reword management trigger requirement to remove the word "cease" when referring to identifying the operational source of dust, for example front end loading operations. Proposed wording:</p> <p>"Modifying iron ore handling activities for the purpose of eliminating that dust source, such as changing feed source or adjusting rate and routes"; and</p> <p>"ceasing modify iron ore handling activities for the purpose of eliminating that dust source, for example changing the feed source or adjusting handling rates and/or routes."</p> <p>This allows for suitable flexibility in management to target the objective of</p>	<p>Noted. The term "cease" remains an option, along with modifying handling activities including reducing throughput rates and changing feed source. Therefore the addition of "or modifying" is accepted without removing the option to cease.</p>

Condition	Summary of Licence Holder's comment	Department's response
	<p>eliminating the source.</p> <p>Insert wording for the operation of additional controls in accordance with Table 14, which specifies when and how dust control infrastructure must be operated, when trigger criteria is reached.</p> <p>The Licence Holder requests the following additions (in bold) and deletion (in strikethrough) to management trigger action conditions:</p> <p>In the event that source dust cannot be identified within 60 minutes of the management trigger criteria specified in rows 1 and 2 of Table 4 being exceeded, following investigation undertaken in accordance with condition 15, the Licence Holder must undertake the following management actions, unless the activity is confirmed not to be a dust source:</p> <p>a) modify cease the operation of front-end loading associated with dead ore stockpiles where OHP4 continues to operate during the same period.</p> <p>c) apply water to all unsealed, untreated trafficable areas within the Fixed Plant West area where visible dust is generated from vehicle movement, depicted in Figure 2 of Schedule 1 where visible dust is generated from vehicle movement;</p> <p>d) operate stockpile cannons by increasing watering cycle interval based on time of day and season timer frequency</p>	<p>The exceedance of trigger criteria requires the operation of additional dust control infrastructure for the duration of that exceedance. The intent of this condition is to ensure that where high dust events occur, the Premises does not contribute to the dust levels moving in the direction of sensitive receptors. Specifications in Schedule 4 (Table 14) are provided for standard operating practices with those controls to be available for at least 90% of the time in which they are required (monthly average).</p> <p>An additional condition has been provided to eliminate potential safety issues associated with applying additional dust controls, and where additional dust controls are likely to not be necessary for the purposes of reducing premises' dust contributions.</p> <p>Noted. The purpose of management conditions is for broader controls to be applied where there is high dust and the source/s of dust cannot be visually identified. A condition has been applied to allow for management actions to not be applied where it can be visually identified on the ground (i.e. not by camera). In such a circumstance the Licence Holder will be required maintain a record of acknowledgement by the operators/inspector that the activity is not generating visible dust.</p> <p>Detailed comment and response to part a) provided in row below.</p> <p>Amendments to part c) accepted. The application of water is not required on unsealed roads with dust suppression treatment that is in good condition.</p> <p>The Delegated Officer notes that where there is visible dust from stockpiles, the time of day or season is not relevant to the intent of the condition, which is to apply additional dust controls to minimise the emission of dust. Should greater volumes of additional water and frequency of cannon operation be required to suppress dust, this can be determined at an operational level. Amendments to part d) are not required.</p>

Condition	Summary of Licence Holder's comment	Department's response
	<p>Remove the requirement to cease operations on the dead ore stockpiles. BHP has concerns about the proportionality of requiring it to cease all operations with dead ore (Bulking from Dead to Live to feed the reclaimer). In particular if OHP4 is not operational, that is a potential dust source which will not be a contributor to the target exceedance and there is no other ore source to feed the supply chain, which significantly impact business continuity for our supply chain to load trains.</p> <p>Amendment requested to the continuation of specified actions for the duration of the management trigger criteria being exceeded:</p> <p>The licence holder must continue actions specified as required trigger management responses for the duration of the management trigger criteria being exceeded, unless an on-site source is determined not to be the cause of the dust, when wind speed <2m/s and forecasted mixing height <200m.</p>	<p>Noted. Condition amended to allow the reclamation of dead ore stockpiles with front end loaders in the event that OHP4 is not operational during the exceedance event. The operation of front end loaders to reclaim and transfer ore to outloading conveyors is a known significant dust source. However, this may be offset by the elimination of other key dust sources including the OHP4 screens.</p> <p>Changes to the requirements for modifying front end loading operations under part a) to the condition were made only to cease, modify and/or allow a reduction in front end loader operations. A reduction may include fewer trucks or a marked and recordable reduction in ore feed rates from FEL movements.</p> <p>Accepted with some amendment. The consideration of dust sources within the Fixed West Plant area must be continuous during the period where management trigger criteria is being exceeded. All three variables that authorise exclusion to this condition must be satisfied ongoing throughout the duration of the exceedance event.</p>
Waste management	Request this is removed as it is not a waste material, but a capping material. This change has been undertaken in the Mining Area C licence L7851 where clean fill is now only referenced in the waste cover requirements.	Noted. For consistency and to not include capping material within the calculated authorised throughput tonnages, reference to clean fill in this table has been removed.
Definitions	<p>Insert a definition for Exclusion periods to the operation of dust controls: refers to periods during which the dust controls referred to in Condition 3 are not required to be operated, being the following:</p> <p>(a) when iron ore is presenting on the belt at below the minimum throughput threshold of 300 500 tonnes per hours; or</p> <p>(b) conditions in which operation of the dust control equipment would adversely impact safe operations.</p> <p>Without limiting the generality of (b), the following are deemed to be Exclusion Periods:</p> <ul style="list-style-type: none"> when the iron ore being handled is Wet Ore or fines; 	<p>Noted. The insertion of a definition to exclude periods where adding water may impact the safety or operation of equipment, or where the addition of water is unlikely to result in dust mitigation, has been accepted. Amendments to suggested text have been made to improve the clarity and certainty of the definition.</p> <p>Further justification for exclusion factors provided in section 6.1.2. The final point in the proposed definition is not accepted. Water at the base of stockpiles is not considered an "Exclusion period" for the purpose of control availability unless other exclusions are available. Instead, this may instigate a review of the stockyard cannon function to ensure its coverage applies more effectively to the stockpiles only.</p>

Condition	Summary of Licence Holder's comment	Department's response
	<ul style="list-style-type: none"> • during 1-hour periods where rain is recorded at BHP Stockyard weather station AT796 on tail end of CV702 or meteorological station WBWS001; • when there is a risk of slumping of, or a machine is operating on, the Coarse Ore Stockpile or Stockyard Stockpiles; • during hosing of chutes. • Wind Inhibited – When wind speed and wind direction: <ul style="list-style-type: none"> - when wind speed is greater than 8 m/s and against the direction of the stockyard cannon sprays (for stockyard cannons only); and/or - compromise operation of safety interlocks; and/or <p>cause overwater of areas surrounding the stockpile</p>	<p>Refer to Appendix 1 of this Amendment Report for decision making flow charts for when dust control infrastructure must be classified as “required”.</p> <p>Definition of “Wind inhibited” added to the Licence with amendments as applied to stockyard water cannons and discussed in the row below. All other sprays are located closer to potential dust sources and are not expected to be significantly affected by wind conditions.</p>
	<p>Refer to ore known to be “Wet Ore” as opposed to ore known to have a Moisture Content above the DEM Level.</p> <p>Add definition of Wet Ore:</p> <p>“means iron ore which :</p> <ul style="list-style-type: none"> (a) has been mined following dewatering of the orebody; (b) is known to be at or above DEM Level; or (c) is otherwise such that the addition of moisture could lead to the iron ore becoming bogged, bridged, blinded or buried.” 	<p>Accepted. It is understood that the exact moisture content of ore prior to outload is not known by the Licence Holder and that there are limitations to determining this at many handling points onsite. In addition, it is clear that the addition of moisture to ore that is known to be wet, may impact operations i.e. impede ore flows. While there exist limitations, understanding ore moisture throughout the Premises is a key area for improvement for the Licence Holder.</p>
	<p>Addendum to comment to further define “wind inhibited”</p> <p>Wind inhibited – When wind speed and wind direction:</p> <ul style="list-style-type: none"> • when wind speed is greater than 8 m/s and against the direction of the stockyard cannon sprays (for stockyard cannons only); and/or • compromise operation of safety interlocks; and/or • cause overwater of areas surrounding the stockpile <p>Within 12 months from the date of the issue of this licence, the Licence Holder must operate stockyard weather station by mode of control</p>	<p>Water sprayed from stockyard cannons may be blown away from the dust source under some wind conditions, reducing the effectiveness of the spray. Meteorological conditions that render stockyard water cannons as “wind inhibited” (refer to Appendix 1), have been specified in the Amended Licence. The insertion of wind conditions as a variable relating to exclusion periods has only been applied to stockyard water cannons.</p> <p>It is noted that the Licence Holder has requested that similar exclusions apply to boom sprays following the OHP4</p>

Condition	Summary of Licence Holder's comment	Department's response
	systems to interlock stockyard cannons for rain and when wind is greater than 8m/s."	<p>screens. The Delegated Officer considers that sprays will generally follow the direction of dust having some effectiveness and therefore remain a requirement of the Amended Licence. Spray drift can be controlled through adjustments of spray equipment and therefore "wind inhibited" has been removed from the decision flow chart displayed in Appendix 1, with the exception of stockyard cannons.</p> <p>No additional mention of safety has been applied to the definition as this is covered within the definition for "Exclusion periods".</p> <p>The operation of interlocks on stockyard water cannons for higher wind conditions can be implemented outside of licensing requirements.</p>
Schedule 4: Infrastructure and equipment	Amendments to crushing facilities to remove reference to negative pressure as these facilities are equipped with fans for OHS ventilation purposes only.	Noted. Ventilation specifications have been removed from the Amended Licence.
	<p>Request the removal of the below requirement on the OHP5 Relocatable Crusher as it is not for the control of dust:</p> <p>"Multiple small secondary cone crushers operated to choke feed ore to the crusher and minimise dust."</p>	Noted. The Delegated Officer understands that the choke feed of ore to the crushing circuit can encourage a consistent rate of feed and reduce dust from ore being dropped from height, and therefore control dust. No change made.
Schedule 5: Quarterly reporting	<p>BHP understands the requirement to report the source of ore would be as per the data provided in the current ET1 forms i.e. pit sources (e.g. Eastern Syncline 2, WB ACS4, OB29 etc.) that source refers to this for in-loaded premises.</p> <p>In addition that reporting of crushed and screened ore tonnages would be as per current ET1 form requirements.</p>	The information provided through ET1 reporting on pit sources is expected to continue. Changes made to the reporting requirements attempts to provide greater clarity and specificity on what must be reported, compared to that presented in the ET1 section of the Existing Licence.
	The Licence Holder is seeking clarification on what reporting should be undertaken for dust events until Quarterly Reports are required (6 months after the issue of the licence). Is it via the current ET1 process of reporting?	<p>Previous ET1 reporting requirements have been replaced by Schedule 5 Quarterly Reporting conditions.</p> <p>Additional condition not required. All monitoring data for the period will need to be submitted in accordance with Schedule 5 and can be investigated upon receipt of data. Further investigation may be provided by the Licence Holder</p>

Condition	Summary of Licence Holder's comment	Department's response
		to support DWER's review of the data, or DWER may request further information in accordance with reporting conditions associated with Department requests.
	Request to remove requirement to investigate the tonnes of ore crushed and screened at each ore handling plant as this would be the same ore handled at each crushing/screening plant.	Noted. The intent of this is to spatially identify where the ores are being handled during the period, in addition to the tonnes of ore from each ore body are crushed and screened. No change made.

Appendix 3: Summary of Licence Holder's comments on risk assessment and draft conditions – January 2022

Condition	Summary of Licence Holder's comment	Department's response
<p>Conduct a review of the Newman dust monitoring network to identify improvements and timeframes for implementation within 6 months of the date of the issue of this licence.</p>	<p>To ensure that the review is appropriate it needs to include any network improvements and the trigger levels (Condition 14) over a 12 month period.</p> <p>The results will then need to be analysed to determine what changes are required.</p> <p>BHP is therefore seeking to extend the review period to 18 months to enable the system to run for 12 months with the new trigger levels to determine how the system performs and what improvements may need to be made.</p> <p>Based on discussions from the site visit around the suitability of the location of the Boundary 2 monitor, this location will be reviewed within 6 months.</p>	<p>Noted. The Department's priority for the monitoring network is to improve the location of the monitor located downwind to the Fixed West Plant and upwind of the Newman townsite. The purpose of this is to improve the effectiveness of trigger management conditions applied to ensure timely and effective response to high dust events that may impact residential receptors.</p> <p>The operation of other monitors within the Fixed West Plant area can be used by the Licence Holder to quickly inform investigations into high dust events, to identify potential sources of dust recorded at the trigger monitor whether they be coming from offsite or onsite sources.</p> <p>While the importance of the overall monitoring review remains, the completion date of the broader monitor review has been extended to 18 months.</p> <p>Timeframes for the installation of "Boundary 2" monitor, the downwind monitor to be operated as a dust management trigger monitor, have not been extended.</p>
<p>Investigation timeframes and requirements following notification of trigger exceedance</p>	<p>Extend the investigation time to 60 minutes to allow sufficient time for exceedance identification and response, time to traverse the mining operation.</p>	<p>Noted. A 60 minute investigation timeframe is not accepted in situations where the source can be quickly identified as being the Fixed West Plant area. However, it is noted that the Premises covers a large area with multiple potential dust sources.</p> <p>The condition has therefore been amended to require the more immediate investigation of the Fixed West Plant area (within 20 minutes), followed by investigation of other sources within the Premises.</p>

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Condition	Summary of Licence Holder's comment	Department's response
		<p>Where one or more dust sources can be identified, that dust source must be immediately addressed.</p> <p>If, by the time that the broader premises investigation period (60 minutes) is complete and has not identified the likely contributing source/s of the dust exceedance at the trigger monitor, additional mitigative measures must be undertaken to avoid contribution from prescribed activities to the exceedance.</p> <p>Although beyond scope of the Part V licence, it is expected that the Licence Holder will have the ability to identify any blasting activities as being contributory to an exceedance of trigger criteria, depending on wind directions, and take action accordingly to avoid ongoing impacts to sensitive receptors.</p>
Landfill waste acceptance	Clean Fill is not a waste, but a capping material.	Noted. Clean fill is understood to be primarily a capping material. However under the Landfill waste classification and waste definitions (December 2019), clean fill is defined as a waste type. The authorisation of clean fill for disposal is retained to remove any ambiguity. No specifications have been applied to the disposal methods of this waste, commensurate to the insignificant risk posed from disposing of clean fill.
Schedule 3: Primary activities	<p>Clarification of, and corrections to infrastructure references.</p> <p>Request to remove references to ROM stockpiles as these may move location and change shape and size and are not directly related to the processing infrastructure.</p>	Accepted.
Schedule 4: Infrastructure and equipment	Remove reference to choke feeding secondary crusher as this is not a dust control.	Noted. Choke feeding typically allows smooth flow of ore, reducing surging and associated dust generation. No changes made.
	Remove Truck unloading sprays as these are currently not yet installed, BHP will need to develop and trial an operating philosophy for them.	Noted. The installation of unloading sprays is a commitment and is required under requirements for further works.

Condition	Summary of Licence Holder's comment	Department's response
	Reduce the requirement of water truck availability from "all times" to requiring availability during day shift only.	Noted. Changes made to only require water truck availability during periods where evaporation rates and typical wind speeds are greatest.
	Remove "Major traffic thoroughfares to be sealed and kerbing or bunding installed to discourage off road passage." Kerbing is not practical. Bunding prevents drainage and access for shutdowns.	Noted and removed. The Licence Holder will be required to consider the potential opportunities for reducing dust from heavily trafficked areas under a plan of improvement works to be submitted within 12 months of the date of issue of this licence. It is generally not accepted that kerbing is impractical and has been applied across other sites for the management of vehicle dust.
Schedule 5: Quarterly reporting	BHP notes that the first quarterly report will be deferred as a result of the deferral of the commencement of Condition 14.	Noted.

Appendix 4: Summary of public authority and stakeholder comment

Theme	Submitter	Summary of comment	Department response
Health	Department of Health	<p>DOH considers that the NEPM 24-hour, PM₁₀ standard of 50µg/m³ is the appropriate default air guideline value to apply in sensitive use areas of the townsite.</p> <p>A public health assessment, specific to the Newman population would be required to justify any variation to the default guideline.</p> <p><i>Updated comment 17 May 2022:</i></p> <p>However, the DOH appreciates that historically the guidance value has been 70 µg/m³, consistent with an agreed guidance value in Port Hedland. The DOH will continue to support the guidance value of 70 µg/m³ while the licence review is ongoing.</p> <p>The DOH has expressed reservations about conducting a health study in Newman due to the small population and the subsequent difficulties in meaningful interpretation of the findings. However, DOH is prepared to discuss further the risks and benefits of a study for providing the necessary evidence for the current, and future, licence reviews.</p>	<p>Noted. When assessing the risks associated with dust emissions DWER has applied the AGV of 70 µg/m³ and consistent with this advice, as an interim standard.</p>
	Shire of East Pilbara	<p>The Shire advocates for a regulatory approach that intrinsically incorporates public health and nuisance considerations and mechanisms to adequately address air quality.</p>	<p>Noted. DWER has taken into consideration risks to human health from dust in its review of the licence. The Delegated Officer has concluded that there is a 'High' risk to public health from dust generated at the premises. This conclusion has been based on the regular exceedance of air quality criteria (refer to section 5.1).</p> <p>In addition, operations at the premises are a known and significant contributor to ambient dust</p>

Theme	Submitter	Summary of comment	Department response
		<p>Community concerns are primarily related to the composition of the dust and the potential health impact of breathing in the dust over longer exposure periods.</p> <p>Concern also relates to potential human exposure to finer dust particles such as those measured within PM₁₀ and PM_{2.5} size ranges and the known acute and chronic health effects associated with inhaling finer particles found in dust.</p>	<p>concentrations in the Newman townsite. However, the contribution of individual sources from the premises is not well defined.</p> <p>DWER proposes an iterative and whole-of-Government approach to ensure that the impacts of dust are well understood and regulated to the appropriate levels. The Amended Licence is the first step in achieving this.</p> <p>Noted. DWER has reviewed monitoring data obtained at existing monitors for particulates as PM₁₀. Summary data and conclusions are provided in section 4.3.1.</p>
	The Western Mineworkers Alliance (WMWA)	<p>It is clear that dust emissions are at levels which seriously impact the health, wellbeing and lifestyles of community members. The WMWA undertook a public survey of community sentiments about dust emissions in Newman. Of the 84 respondents, 82% said that they had experienced health impacts.</p> <p>Of these responses, the health impacts highlighted are the most concerning. Community members identified a range of illnesses linked to dust emissions:</p> <ul style="list-style-type: none"> • Hay fever and allergies • Blood noses • Asthma • Sinus infections • Bronchitis and difficulty breathing 	<p>Noted. DWER considers the DOH to be the primary agency for public health matters in Western Australia. DWER will look to guidance from DOH on the appropriate AGV for Newman and detail on statistically relevant data on health impacts.</p> <p>This review has identified the need for further improvement works to be undertaken for the management of dust. The overall objective of the review is to reduce dust from each of BHP's premises for the purpose of improving Newman air quality.</p>

Theme	Submitter	Summary of comment	Department response
		<ul style="list-style-type: none"> Coughing up phlegm <p>Respondents noticed that these conditions almost immediately disappeared when they left town.</p>	
	The Western Mineworkers Alliance (WMWA)	The Indigenous residents of Newman, already facing a higher level of health risk, are among those most impacted.	Noted. As above.
	Community stakeholders	<p>Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory lung disease that causes obstructed airflow from the lungs and a major illness in our area.</p> <p>An allied response is required between BHP, the WA health department and the East Pilbara Shire Town planning.</p>	As above.
		<p>The Newman postcode has been identified as among the most polluted postcodes in Australia.</p> <p>I am concerned that the smallest particulate matter PM_{2.5} isn't easy to know the readings on. My understanding is that is the most dangerous of particulate matter as it is able to cross every barrier within the body, including the blood brain barrier.</p>	As above.
		<p>BHP are regularly exceeding appropriate quality air levels. What exactly does it mean for public health, that BHP daily average Total Suspended Particulates (TSP) levels exceeded a benchmark guideline adopted for the study in the majority of samples?</p>	As above.
		<p>The DWER 2020 report: <i>Newman dust composition monitoring campaign</i> failed to answer the question:</p> <p>What are we breathing and are the levels of particulates acceptable for Newman residents?</p>	<p>Noted. The monitoring campaign concluded that the measured concentrations of metals and asbestos do not represent a public health risk to the Newman community.</p> <p>Since this publication, DWER has obtained additional data on particulates both in town and</p>

Theme	Submitter	Summary of comment	Department response
			within the premises boundary. Discussion is provided in section 4.
Health – monitoring	Shire of East Pilbara	The Shire requests consideration be given to more robust monitoring, analysis and transparent reporting of dust in Newman and potential health impacts. This includes monitoring for PM ₁₀ and PM _{2.5} .	Noted. The Amended Licence includes requirements to monitor for both PM _{2.5} and PM ₁₀ at ambient (community) monitors. This level of monitoring is expected to provide a sufficient understanding of particulate composition to inform risks to human health.
	Community stakeholders	My expectation is that levels of PM _{2.5} , or preferably PM ₁ , would be measured as they are the particulate matter that is a threat to public health. I feel this is something that should have already been done and should be immediately addressed, by a new completely independent and time bound dust report.	Noted. As above.
		For me as a resident, I would like to know that medical data is being kept and researched and studied. I would like reassurance that our rates of cancers, heart attacks and strokes, mental health are not higher here as a result of PM _{2.5} . To my knowledge medical data is not being actively recorded and analysed.	Noted. DWER considers the DOH to be the primary agency for public health matters in Western Australia. DWER will look to guidance from DOH on the appropriate AGV for Newman and detail on statistically relevant data on health impacts.
		We need to explain, why there is a reported 30% increase of respiratory illnesses, presented in the Pilbara and surrounds. Port Pirie, Mt Isa and Broken Hill, have been testing people as part of their monitoring since 2012, but only as a result of community pressure and political intervention. Testing of human subjects is required, not just (ambient dust) laboratory testing. In addition, a health register should be initiated, with the aim of tracking the health concerns of Newman residents	As above.
		It doesn't seem we are doing monitoring of health specific to	As above.

Theme	Submitter	Summary of comment	Department response
		the Pilbara that could be linked to harmful exposure.	
		Testing should also include indoor monitoring of residential dwellings, schools and other venues.	As above.
		What process must our dust monitoring systems and devices pass for suitability and approval, before it can be installed? What guidelines exist to monitor the suitability of the systems and devices once they are in use? Are our present systems reliable?	<p>Conditions of the Amended Licence require particulate monitoring to be conducted in accordance with Australian Standards.</p> <p>DWER will continue to maintain regulatory oversight of particulate data in Newman. The Amended Licence requires the submission of air quality monitoring data every quarter. As part of this submission the Licence Holder will also be required to provide supporting information to high dust event investigations, as specified in the Amended Licence.</p>
		What are the problems with our present systems? Is data missing, data capture rate down?	<p>The Licence Holder has submitted sufficient information for most monitoring sites to understand potential limitations of dust monitoring data. DWER's analysis of this information did not uncover major flaws.</p> <p>In addition, the spatial configuration of the monitoring network at the Premises is generally sufficient to identify trends and trigger management in the event that high levels of dust are being emitted from prescribed activities (refer to section 4.2).</p>
Amenity	Shire of East Pilbara	<p>The Shire is aware of community concern relating to dust deposition on front and back yards, outdoor furniture items, swimming pools, roof areas, vehicles and the outdoor washing line. Ambient dust is also known to affect the servicing and maintenance of air-conditioning units and is resulting in additional cleaning considerations.</p> <p>One community comment was that the composition of the dust may have a detrimental impact to the paint work of</p>	<p>Noted. The focus of this assessment is on emissions and discharges that may present a risk to public health, amenity or the environment.</p> <p>DWER acknowledges that there exist impacts to amenity as a result of high dust levels in Newman. Controls applied to the Amended Licence for the protection of health are also expected to be protective of amenity.</p>

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Theme	Submitter	Summary of comment	Department response
		vehicles.	
	The Western Mineworkers Alliance (WMWA)	The WMWA undertook a public survey of community sentiments about dust emissions in Newman. Of the 84 respondents, 74% said they had experienced damage to property from dust. In addition, 40% said that they had experienced lifestyle impacts (not being able to do what they would otherwise like to do, due to dust).	As above.
		Day-to-day activities that would be taken for granted by most Australians – like washing clothes and cars, turning on the AC, or even taking a walk – are a struggle for those living in Newman, due to dust from BHP's operations.	As above.
Industry regulation	Shire of East Pilbara	The Shire asks DWER to continue to consult with the Department of Health to ensure that appropriate air quality targets, limits and monitoring requirements are applied to the BHP Part V licences and where levels are exceeded DWER take action to protect the public interest.	Noted. As there are a number of dust sources not regulated under the Part V licences, a whole-of-Government approach to managing dust in Newman is required. DWER will engage DJTSl, DMIRS, EPA and DoH to continue an inter-Departmental approach to managing broader dust impacts on the town of Newman. Conditions applied to the Amended Licence are focused on improving the Department's understanding of significant dust sources to inform ongoing whole-of-Government regulation.
	The Western Mineworkers Alliance (WMWA)	Environmental conditions applied by Department of Water and Environmental Regulation must be tightened and enforced.	Noted. DWER proposes an iterative and whole-of-Government approach to ensure that the impacts of dust are well understood and regulated to the appropriate levels.
		Several survey respondents who were long-term residents noted that the dust had been noticeably worse since Mount Whaleback became the hub of BHP's iron ore operations in the Pilbara. BHP's dust emissions under its Newman operations are	Noted. The AGV used in this assessment (24-hour PM ₁₀ of 70µg/m ³), is an interim standard until final determination is provided from DOH on the appropriate standard to be used. The interim AGV is intended to be applied as an assessment

Theme	Submitter	Summary of comment	Department response
		already significantly exceeding limits set out in its licences. In 2018-19, BHP exceeded its licence limits on dust emissions no less than 45 times.	guidance level and should not be considered as an enforceable limit. This approach is consistent with the broader application of the NEPM standard throughout Australia.
	The Western Mineworkers Alliance (WMWA)	The Department of Water and Environmental Regulation should be properly resourced to investigate and enforce compliance breaches. Given that BHP is already exceeding its dust limits, any tighter limits will need to be vigorously enforced.	As above.
		Conditions should include local vegetation that mitigate airborne dust. In Port Hedland, Curtin University and Greening Australia, in partnership with BHP, have begun studying the most effective local plants for easing dust pollution, with rigid branches and needle-like leaves being the most important features in reducing effective dust impacts.	Noted. The effectiveness of this control for the reduction of ambient dust concentrations has not been investigated by DWER, although the department is aware of these studies. In accordance with DWER's regulatory framework, this risk assessment has applied a source-pathway-receptor model to assess dust controls. In the hierarchy of controls, residential amelioration or abatement is classed as the lowest level of control. DWER will continue to investigate monitoring data from within the Licence Holder's premises to ensure that controls can be targeted toward the source of dust and focus on elimination, or engineering controls to reduce emissions.
Consultation and information	Community stakeholders	The community consultation process was poorly managed. The notification of the submission period for public comment could not be found on the website, nor was it easily found in the public domain.	Noted. Being a DWER-initiated licence review that did not require the submission of an application from the licence holder, there was no document made publicly available in the consultation process.

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			<p>DWER encourages all interested parties to track progress of how Newman air quality is being managed via the State Government website: www.dwer.wa.gov.au/newman</p> <p>Here, interested parties can access real-time air quality monitoring data, the DWER dust composition study and request to be notified of updates to the webpage via email.</p>
		<p>Why was the Newman dust composition report delayed and why was there repression of freedom of information, in trying to access the report and in the release of the 2 year delayed East Pilbara Shire initiated dust report? Further still, is BHP completely non-complicit in the reports delay, because they have an application pending.</p>	<p>The report required detailed analysis of data, thorough review and interagency communication and engagement with the Shire to ensure that conclusions were robust and unambiguous. DWER did not intentionally delay the release of the report.</p> <p>The report was informed by monitoring data from Shire/DWER-operated monitors, and the analysis of this data and report conclusions were made independent of the Licence Holder.</p>
		<p>Request for complete disclosure in releasing information of public interest. Information that should be transparent and time bound, that's easily accessible.</p> <p>For example, Requesting the 'Annual environmental report / BHP Billiton Iron Ore Pty Ltd.', from the state library is a cumbersome process.</p>	<p>Noted.</p> <p>Real-time air quality data, including that within Newman, is publicly accessible via the website: http://airodis.ecotech.com.au/newman/index.html Graphical data on each monitor is also available for 7 days.</p> <p>Note that care must be taken when analysing air quality data. A deep understanding of the siting and limitations of monitoring equipment is required to arrive at accurate conclusions. The Amended Licence requires the submission of validated monitoring data to DWER to be used to inform future regulatory decision making.</p>

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			The Annual Environmental Report is publicly available information that can be requested from the Licence Holder directly, or via the State Library. The report does not provide significant detail on air quality data.
		I don't feel air quality readings are readily available.	As above.
	The Western Mineworkers Alliance (WMWA)	BHP's reports on their own environmental compliance are not made public, requiring whistle-blowers to publish this alarming figure. The WMWA recommends that environmental assessments, studies and reports conducted under BHP's licences should be available for the public to review. If BHP is complying with its expectations under its licences, it has nothing to worry about; if it is not complying, the community deserves to know.	As above.
General comment	Department of Health	It is the opinion of the DOH that the main focus of the licence review should be to reduce ambient concentrations [sic] through the implementation of effective management measures at the Newman Operations sources and that these measures are subject to a scheduled audit process.	Noted and agreed in principle. Activities with the potential to contribute to dust emissions at the mine sites include ore processing, blasting, truck movements on mine roads, and clearing and rehabilitation works. Of these activities, the Part V licences regulate ore processing and associated activities, which limits the scope of regulation to crushing and screening of ore, and connecting infrastructure. Therefore a whole-of-Government approach is required for the regulation of dust at the Newman Operations, including for those activities that remain beyond the scope of the Part V licence. To ensure that the focus of improvements is on controlling the key sources of dust, further investigation and analysis of monitoring data and operational activities is required.
	Environmental	New applications for expansion of mining activities in the	Noted.

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	Protection Authority Services	Newman area may be regulated under MS 1105 (Pilbara Expansion Strategic Proposal), which requires BHP to maintain air quality and minimise emissions.	
	Department of Jobs, Tourism, Science and Innovation (DJTSI)	DJTSI's role will be to provide advice on State Agreement matters and support the Department of Water and Environment Regulation in ensuring that there is a coordinated approach across Government.	Noted.