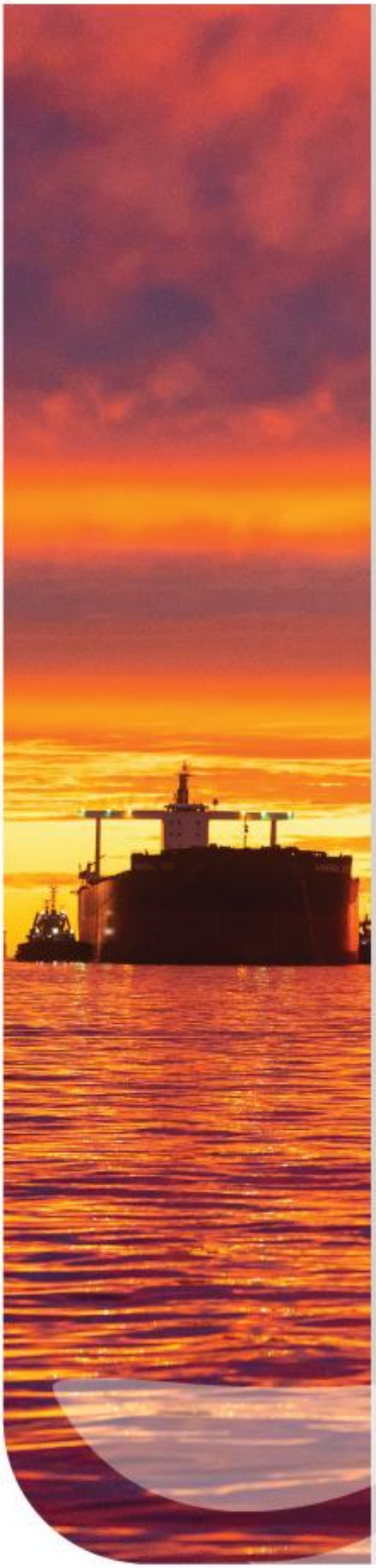


PILBARA PORTS

LUMSEN POINT MATERIALS HANDLING FACILITY

Licence Application

Supporting Document

Part V *Environmental Protection Act 1986*

Revision 1 5/03/2025

TABLE OF CONTENTS

Tables

Figures

Annexures

1. EXECUTIVE SUMMARY

This document is designed to complement and support Pilbara Ports' application for a Licence and should be read in conjunction with the completed Department of Water and Environmental Regulation (**DWER**) Application Form.

Pilbara Ports is currently progressing the construction of the Lumsden Point General Cargo Facility at the Port of Port Hedland. To facilitate trade of critical battery minerals, Pilbara Ports is seeking to obtain a licence under Part V of the *Environmental Protection Act 1986* (**EP Act**) to construct and operate a bulk handling facility at the two new wharfs, Port Hedland 5 (**PH5**) and PH6.

The project will be implemented by a staged approach and will include:

- Stage 1: Loading of vessels using cranes with rotating containers at PH5 and PH6;
- Stage 2: Construction of a common user conveyor system and shiploader at PH6;
- Stage 3: Integration of mineral concentrate storage sheds to allow outloading over the common user conveyor system.

The facility will consist of a mix of common user infrastructure constructed by Pilbara Ports, and infrastructure to be developed by Pilbara Ports' customers. These developments are likely to occur in different timeframes. As such, Pilbara Ports is requesting that the approval allows for stages to be progressively implemented and integrated into the Prescribed Premises Licence.

This licence application is for Stage 1 of the project only, being the loading of vessels using rotating containers over PH5 and PH6. Pilbara Ports has provided an overview of the whole project in this supporting document as well as in dust and noise models to support DWER in the staged assessment of the project.

2. APPLICATION ELEMENTS

Pilbara Ports has prepared a Licence Application for export of spodumene and copper concentrate products from the Lumsden Point General Cargo Facility wharf using rotating containers at PH5 and PH6. No works approval is required to construct infrastructure for this material handling methodology as all infrastructure will be constructed as part of the Lumsden General Cargo Facility project under a Part IV approval (Ministerial Statement 1231).

Pilbara Ports is also preparing to submit a subsequent Works Approval Application (**WAA**) to seek approval from the DWER to construct infrastructure to facilitate the export of spodumene and copper concentrate products at Lumsden Point via a materials handling facility (**MHF**) and shiploader at PH6 (Stage 2).

It is proposed that once the MHF is constructed, under a works approval, that the Licence would be amended to include both material handling methodologies.

Table 1: Application Elements

SECTION IN APPLICATION FORM	WHERE INFORMTION IS PRESENTED
Part 1: Application Type	Refer to Application forms.
Part 2: Applicant Details	Refer to Application forms. This document, Section 3. **- Annexure A**: Proof of Occupier Status.
Part 3: Premises details	Refer to Application forms. This document, Section 4. **- Annexure B**: Premises map(s).
Part 4: Proposed Activities	Refer to Application forms. This document, Section 5 and Section 6. **- Annexure B**: Premises map(s).
Part 5: Index of Biodiversity Surveys for Assessments (IBSA) and Index of Marine Surveys for Assessment (IMSA)	Refer to Application forms (Not Applicable).
Part 6: Other DWER Approvals	Refer to Application forms. This document, Section 7.
Part 7: Other Approvals and consultation	Refer to Application forms. This document, Section 7 and Section 8.
Part 8: Applicant History	Refer to Application forms.
Part 9: Emissions, discharges and wastes	Refer to Application forms. This document, Section 9. **- Annexure D**: Air Quality Assessment Report. **- Annexure F**: Environmental Noise Assessment Report.
Part 10: Siting and location	Refer to Application forms. **- Annexure G**: Sensitive Land Users and Receptors.
Part 11: Submission of any other relevant information	Refer to Application forms.
Part 12: Proposed fee calculation	Refer to Application forms.
Part 13: Commercially sensitive or confidential information	Refer to Application forms.
Part 14: Submission of application	Refer to Application forms.
Part 15: Declaration and signature	Refer to Application forms.

3. APPLICANT DETAILS

3.1 Applicant Overview

The applicant for this Licence is Pilbara Ports, further details of the applicant are provided in Table 2.

Pilbara Ports operates as a Western Australian Government Trading Enterprise and is governed under the Western Australia (WA) *Port Authorities Act 1999* and the *Government Trading Enterprises Act 2023*. Applicant details are presented in Table 2.

Table 2: Applicant Details

APPLICANT DETAILS	
Entity Name	Pilbara Ports Authority
Trading Name	Pilbara Ports
ABN	94 987 448 870

3.2 Authorised Representative and Contact Person

Contact details for the Authorised Representative and nominated Contact Person

[redacted]

3.3 Applicant Background

Pilbara Ports is responsible for planning, developing, authorising, co-ordinating and controlling a range of port services across its four operational ports in the

Pilbara. These services include pilotage, navigation aids, anchorages, maintaining navigable depths (dredging), vessel traffic services, port communications, ship scheduling and berthing allocations. Pilbara Ports also operates several common user berths and provides for storage and handling of cargo at these berths.

Pilbara Ports issues Licenses and manages Service Agreements for a range of other services across its operational ports, including pilotage, towage, mooring, lines boats, bunkering, pilot transfers and stevedoring at common user berths. Pilbara Ports is also responsible for security within port areas, and cooperates with Commonwealth Government agencies responsible for customs, quarantine, maritime safety and security.

Pilbara Ports manages approximately 3,200 hectares (**ha**) of port-vested lands at the Port of Port Hedland (**Port**) including land in the west end of the Port Hedland township, an area of land surrounding the inner harbour, and land in Redbank and the Wedgefield industrial estates. There are also several Dredge Material Management Areas (**DMMA**) south of the inner harbour and adjacent to South Creek and South East Creek, which are managed by proponents and Pilbara Ports. Pilbara Ports also leases port land to major proponents BHP, FMG and Roy Hill under commercial agreements.

Pilbara Ports currently owns and operates four public berths within the Port's inner harbour, with the total going up to six once construction of the Lumsden Point General Cargo Facility is completed. There are 15 additional private berths (constructed by other entities under State Agreement Acts or lease agreements with Pilbara Ports), which facilitate the export of bulk minerals such as iron ore.

Pilbara Ports' public berths facilitate the trade of bulk minerals (iron ore, manganese, salt, spodumene and copper concentrate), petroleum products, ammonium nitrate, bulk liquids, general cargo, containerised cargo and livestock. Pilbara Ports controls the marine operations of the Port, including all vessel movements, from its VTS centre within the Integrated Marine Operations Centre at the Eastern Operations site.

4. PREMISES DETAILS

4.1 Location Context

The Port is in the West Pilbara region of WA, approximately 1,630 kilometres (**km**) (by road) north of Perth. A large proportion of the land at the Port is leased to tenants.

The Lumsden Point General Cargo Facility is located at Lumsden Point, which is situated at the junction of South East Creek and South Creek within the inner harbor of the Port. It is located approximately 2.2 kilometres (**km**) south of the Port Hedland town site within the Town of Port Hedland and adjoins the existing light industrial area of Wedgefield. The FMG Anderson Point port facility, iron ore stockpiles and offloading facilities are to the west of the project and DMMA B, DMMA B-North and DMMA B-South located to the southwest.

The proposed layout of the Lumsden Point General Cargo Facility is presented in Annexure B.

4.2 Location of Prescribed Premises

The proposed initial (rotating container loading only) boundary of the Lumsden Point General Cargo Facility Prescribed Premises (**Prescribed Premises**) is shown in Annexure B. It encompasses all proposed Rotating Container concentrate export activities and includes the Wharf Laydown Area and associated berths PH5 and PH6 at the Lumsden Point General Cargo Facility.

It is proposed that the Prescribed Premises boundary is amended to include the materials handling facility and shiploader once constructed under a separate WAA.

It is proposed that the Prescribed Premises boundary is also amended to include each of the storage sheds once they are constructed under separate WAAs.

4.3 Certificate of Title

The Lumsden Point General Cargo Facility sits entirely within Lot 558 on DP 424409 with Pilbara Ports being the responsible agency with the Management Order. This reserve is also vested under the *Port Authorities Act 1999* to be part of the Port of Port Hedland. A copy of the Certificate of Title is attached as Annexure A.

5. PROPOSED ACTIVITIES

5.1 Context to Proposed Lumsden Point Operations

Pilbara Ports is leading the development of the Lumsden Point General Cargo Facility (**Project**) and is the nominated proponent under Ministerial Statement 1231 (**MS1231**). The Project includes the development of:

- **Wharf Laydown Area** – providing operational land, roads and laydown areas to support the operation of the berths.
- **New Berths** – two new berths situated alongside the Wharf Laydown Area, PH5 and PH6.
- **Access Channel** – connecting the facility to the inner harbour of the Port.
- **Causeway** – the heavy-duty access corridor connecting the Wharf Laydown Area to DMMA C (Lumsden Logistics Hub).
- **Lumsden Logistics Hub** – Onshore placement of dredged material to support land reclamation for future port development within DMMA C.

The development of new port land within DMMA C (i.e., the Lumsden Logistics Hub) is expected to occur progressively (in stages), as demand for new land is realised. The initial phase of land development within DMMA C is expected to support the Port's export capacity for battery metals such as lithium and copper concentrates, facilitate the import of renewable energy infrastructure including wind turbines and blades, and support the rapid growth of direct shipping services to the Pilbara.

However, the precise timing will be largely dependent on proponent needs, and demand for additional lands in the Port of Port Hedland. Ultimately, the entire area of DMMA C will form a land precinct that will be used to support future industrial development and/or marine service activities associated with the operation of the Port. This development approach enables Pilbara Ports to utilise existing reclaimed (disturbed) areas for its future port development needs at Lumsden, rather than seeking to disturb new (greenfield) areas.

5.2 Strategic Importance

The Lumsden Point General Cargo Facility forms part of a major initiative for Pilbara Ports and the Western Australian Government. The development of the Project and an associated Logistics Hub at Lumsden Point is a critical enabler of a number of the WA Government's policies and strategies to diversify the economy, support decarbonisation of the resource industry and facilitate a resilient and efficient supply chain, including:

- Climate Change Policy (supporting the implementation of clean energy projects);
- Renewable Hydrogen Strategy (supporting production of renewable energy and hydrogen in remote locations);
- Future Battery and Critical Minerals Industries Strategy (development of lithium and copper projects); and
- State Infrastructure Strategy (expansion of direct shipping services to the State's north).

The development of the Project and an associated Logistics Hub at Lumsden Point will provide enabling infrastructure for a number of proposed projects, including:

- Growth in the export of battery metals and minerals, including spodumene concentrate and copper concentrate;
- The import of wind turbines and solar panels to support renewable energy and hydrogen projects; and
- The expansion of direct shipping services to the Pilbara.

5.3 Bulk Export of Spodumene Concentrate

Two customers are currently proposing to export spodumene concentrate at Lumsden Point.

Spodumene is a pyroxene mineral consisting of lithium aluminium inosilicate, $LiAl(SiO_3)_2$, and is a commercially important source of lithium. It is used in a wide variety of products including ceramics, mobile phones, batteries, medicine and as a fluxing agent. Spodumene concentrate is a product which has been physically altered through processes such as crushing, screening, sorting, heavy media separation, milling, magnetic separation and flotation processes to increase the concentration of lithium.

Because of its importance in the production of batteries, lithium is considered to be a critical mineral under Western Australia's Battery and Critical Minerals Strategy 2024-2030 (JTSI 2024) which aims to enable global decarbonisation and underpin economic diversification.

Spodumene products proposed to be loaded through the facility are:

- Not classified as hazardous to human health.
- Not classified as Dangerous Good according to the Australian Dangerous Goods Code for road/rail transport and the International Maritime Dangerous Goods Code.
- Insufficiently soluble in seawater for the purposes of aquatic toxicity classification according to the Globally Harmonised System for Classification and Labelling of Chemicals and is therefore not classifiable as an environmentally hazardous substance for transport purposes.

See SDS and other product specifications in Annexure C.

5.4 Bulk Export of Copper Concentrate

Pilbara Ports would also like to be able to facilitate the export of copper concentrate at Lumsden Point. The Pilbara region containers copper deposits with established mines as well as deposits which are still being developed. Lumsden Point will provide an alternative path to market to the existing facilities at the Port of Port Hedland's (**PoPH**) Eastern Operations berths.

Copper is also considered to be a critical mineral under Western Australia's Battery and Critical Minerals Strategy 2024-2020 (JTSI 2024). It is used in a wide variety of applications including fuel cells and solar applications, as components in electronics and machinery and in construction.

Copper concentrate products are:

- Classified as hazardous to human health.
- Not classified as Dangerous Good according to the Australian Dangerous Goods Code for road/rail transport and the International Maritime Dangerous Goods Code.
- Classified as environmentally hazardous with both acute and chronic aquatic toxicity.

Pilbara Ports has extensive experience in managing potential environmental impacts of handling copper concentrate through its Port Hedland Eastern Operations (L4322) site. This is evidenced through Pilbara Ports' Marine Environmental Quality Monitoring Program (**MEQMP**) which has demonstrated that Pilbara Ports are able to consistently meet our Environmental Quality Objectives (**EQO**) for water and sediment quality at the Port of Port Hedland (link).

See SDS and other product specifications in Annexure C.

6. PROPOSED PRESCRIBED ACTIVITIES

Pilbara Ports is planning to facilitate the export of battery metals and minerals from Lumsden Point General Cargo Facility. This will ultimately include spodumene and copper concentrate products (collectively referred to as metal concentrate products). The initial stage, as being applied for in this Licence application, is for the export of metal concentrate products over PH5 and PH6 using rotating containers.

Following construction of the materials handling facility and conveyor system to a shiploader at PH6, as being applied for in a separate WAA, the licence would be amended to include both handling methodologies.

The proposed throughput for export from these berths will be up to 4.25 million tonnes per year (**Mtpa**). At capacity this could involved in the order of 60 to 80 shiploading events per year.

The first export of spodumene concentrate products would occur following the completion of construction of the Lumsden Point General Cargo Wharf and associated berths. This is currently planned for 2026.

6.1 Loading of Vessels Via Rotating Containers

6.1.1 Process Description and Key Infrastructure/Equipment

Metal concentrate will be loaded onto ships using mobile cranes to tip material from containers into the hold of vessels. The loading procedures that will be followed are:

- Metal concentrate will be transported to the Prescribed Premises inside lidded containers on trucks or road trains;
- These containers will either be:
  - delivered directly to one of the berths, either PH5 or PH6, ready for loading; or
  - delivered to the Wharf Laydown Area for temporary laydown in preparation for loading (these containers will be used to create a buffer to ensure a consistent loading rate rather than relying on timing of an extended logistics route).
- Mobile cranes will then be used to lift the container into the hold of the vessel. A specialised lifting attachment will be fitted to each crane used in the operation which is designed to lift the lid off the container, tip it upside down to discharge product into the vessel, and then replace the lid. This procedure will be undertaken within the hold of the vessel both to minimise the fall distance and prevent interaction of wind with the falling product.
- Shiploading may occur at either PH5, PH6 or both berths simultaneously, with one or more cranes used to load a vessel.
- Once empty the sealed containers will be lifted back onto the berth for transport away from the Prescribed Premise.

6.1.2 Proposed Construction Activities and Schedule

The Lumsden Point General Cargo Facility Wharf and associated Berth (PH5 and PH6) will be constructed under a Part IV approval (Ministerial Statement 1231).

The proposed export of bulk metal concentrate products via rotating containers at PH5 and PH6 does not require any additional construction activities. The only additional equipment required to facilitate this loading methodology is the crane attachment used to lift and tip containers as well as the containers used to transport cargo. These are all proprietary products that will be supplied by third party suppliers, and not constructed onsite, as such no works approval is required.

Pilbara Ports is proposing to install air quality monitoring equipment to monitor and support management of dust impacts associated with the Prescribed Premises. A dust management plan including details of the proposed air quality monitoring is attached to this Licence Application (see Annexure E).

Pilbara Ports is looking to commence the export of spodumene concentrate from the Prescribed Premises immediately following the completion of construction of the Lumsden Point General Cargo Facility Wharf Laydown Area and associated Berths, which is currently planned for 2026.

6.1.3 Proposed Commissioning Activities

Given the proposed export of bulk minerals is via rotating containers using mobile cranes, there are no commissioning activities which are planned or required. Pilbara Ports has extensive experience in managing shiploading operations using the same methodology and equipment from operations at the Port of Port Hedland Eastern Operations facility under L4432/1989/14 (**L4432**).

6.1.4 Time Limited Operations

Given the proposed export of bulk minerals is via rotating containers using mobile cranes, Pilbara Ports will move directly into operations. Pilbara Ports is not intending to apply for Time Limited Operations for rotating container loading.

7. OTHER REGULATORY APPROVALS

7.1 Part IV Approval for the Project and Part IV Approvals Held by Pilbara Ports

Pilbara Ports is the nominated proponent responsible for Ministerial Statement 1231 (**MS1231**) – *Lumsden Point General Cargo Facility* as nominated by notice issued on 12 August 2024 under the *Environmental Protection Act 1986* (WA). The Development Envelope for MS1231 wholly encompasses the Prescribed Premises.

Other Part IV approvals which Pilbara Ports either holds or has held include:

- Development of a Quary and Industrial Site – King Bay, Burrup Peninsula (MS634);
- Port Expansion and Dredging Program – Dampier Port (MS643);
- Utah Point Berth Project – Port Hedland (MS788);
- Dredging at Nelson Point, BHP Billiton RGP6 Project – Port Hedland (MS812): Pilbara Ports became the nominated proponent for this project in 2009 when DMMA C was transferred from BHP's control to Pilbara Ports. MS812 was superseded on 12 August 2024 by MS1231 when it was amalgamated with MS967;
- South West Creek Dredging and Reclamation Project (MS859);
- Dampier Marine Services Facility (MS868);
- Lumsden Point General Cargo Facility (MS967): this ministerial statement was superseded by MS1231 on 12 August 2024 as part of an amalgamation with MS812; and
- Wheatstone Development – Shipping Channel, materials offloading facility and access road, Shire of Ashburton (MS1131). Pilbara Ports became the nominated proponent for this project in 2020.

7.2 Other DWER Approvals Held By PPA

Pilbara Ports holds the following Part V Licences:

- L4432 – Port of Port Hedland Wharf PH1 and PH2 Eastern Harbour operations; and
- L8937 – Port of Port Hedland Wharf PH4 Utah Point Materials Handling Facility operations.

7.3 Aboriginal Heritage Act

Consent for the Lumsden Point General Cargo Wharf was granted under section 18 (**s18**) of the *Aboriginal Heritage Act 1972* (**AHA**) on 10 June 2016 (ministerial reference 34-66757). The s18 consent was issued for the purpose of development, operation and maintenance of a port and associated infrastructure.

8. CONSULTATION

Pilbara Ports recognises the value of building positive relationships with key stakeholders and the communities in which it is active. Stakeholder engagement is ongoing and part of the broader engagement approach at each of its Ports. The key community stakeholders that have been identified as relevant to this licence application are outlined in Table 4.

8.1 Community Stakeholders

The table below identifies all community stakeholders relevant to Lumsden Point and categorises them in relation to their impact and influence rating.

Table 4: Key Stakeholders identified as part of Pilbara Ports' stakeholder engagement approach for Lumsden Point General Cargo Facility.

COMMUNITY STAKEHOLDER	INTEREST IN PROJECT	IMPACT/INFLUENCE RATING AND MANAGEMENT STRATEGY
Kariyarra Aboriginal Corporation (KAC)	KAC serves as a pivotal voice representing the cultural heritage and interests of Aboriginal people in the Port Hedland region. With deep-rooted connections to the land and a rich cultural heritage, KAC's involvement ensures that the project respects and integrates Aboriginal perspectives.	High influence, high impact – manage closely.
Port Hedland community members	These upgrades not only facilitate smoother transportation for residents and businesses but also contribute to the economic growth and development of Port Hedland. The construction will also have a material impact on some Port Hedland community members who utilise this section of Great Northern Highway for business/leisure, so it's important the community is broadly aware of construction impacts.	Low influence, high impact – keep informed.
Wedgefield businesses and residents	Construction is most directly going to impact businesses and residents located in the Wedgefield vicinity. These stakeholders require the most frequent communication and updates regarding road works and closures etc.	Low influence, high impact – keep informed.
Pilbara Ports' Port Hedland Community Consultative Committee (CCC)	As per the Port Authorities Act 1999 (WA), Pilbara Ports is required to establish a CCC for each port under its control. The purpose is to facilitate information sharing and consultation between Pilbara Ports and the local community. The Port Hedland CCC meets three times each year.	Low influence, high impact – keep informed.
Care for Hedland Environmental Association	The Care for Hedland Environmental Association is a conduit for the communication of environmental and sustainability information into the community and provides a forum whereby business, industry, government and community can discuss barriers, opportunities and solutions to sustainable development for Hedland and the Pilbara. They have an interest in how projects and land use impact the environment and what measures are implemented to minimise impact.	Low influence, low impact – check periodically.

8.1 Engagement Approach

Pilbara Ports is leading communications and engagement for the Lumsden Point General Cargo Wharf Facility, including the intended use(s) for the facility.

The engagement approach for the Lumsden Point General Cargo Wharf Facility aims to ensure comprehensive communication with key stakeholders via a combination of Pilbara Ports' existing channels and direct communication. Engagement methods are summarised in Table 5.

Table 5: Stakeholder engagement for Lumsden Point General Cargo Facility

CHANNEL	PURPOSE	TARGET STAKEHOLDER
Pilbara Ports website	Utilising the dedicated project page on the Pilbara Ports website, stakeholders have easy access to detailed information, project updates, relevant resources, and a contact address for any queries or concerns they have (via the feedback@pilbaraports.com.au email which is promoted on the page).	All
Pilbara Ports social media (LinkedIn, Facebook and YouTube)	Through regular active engagement on Pilbara Ports' social media platforms, Pilbara Ports shares project milestones and creates awareness for Lumsden Point General Cargo Facility, including its proposed use to export concentrate products from the Port.	All
Briefings and presentations/meetings	Briefings, presentations, and meetings will help us communicate project updates, milestones, impacts and promote open discussions and an avenue to address concerns.	As required
Port Hedland CCC meetings	Pilbara Ports' Port Hedland CCC meetings are held three times annually and have been used as a forum to provide relevant project updates and facilitate direct interaction with community representatives in relation to Lumsden Point. Updates on Lumsden Point have been presented at the CCC meetings since the early planning phases of the project including the four most recent meetings on: • 12/11/2024; • 24/06/2024; • 9/04/2024; and • 9/11/2023.	Port Hedland CCC members
TACC	The Port of Port Hedland Technical Advisory Consultative Committee (TACC) meets twice a year to in relation to dredging and disposal activities within the Port of Port Hedland (Port) and its Shipping Channel.	Port Hedland TACC members

CHANNEL	PURPOSE	TARGET STAKEHOLDER
	Regular updates on the Lumsden Point project has been provided to the TACC with a focus on dredging and reclamation activities including the two most recent meetings on: • 5/12/2024; and • 21/06/2024.	

8.2 Engagement Method

Engagement strategies for each of the key stakeholder groups are described in Table 6.

Table 6: Community Stakeholder Engagement Methods

COMMUNITY STAKEHOLDER	HOW WE ENGAGE	KEY CHANNELS
KAC	Pilbara Ports' engagement with Aboriginal people in relation to the proposed development of Lumsden is driven through: • General community engagement • Port Hedland CCC • Direct engagement • Aboriginal Engagement and Reconciliation Plan	• Direct engagement (meetings, emails, phone calls, site visits etc) • Aboriginal Engagement and Reconciliation Plan (available on website). • Port Hedland Community Consultative Committee • Website • Social media • Face-to-Face Examples include: • KAC monitors were present for first ground disturbance for the Phase 2 causeway widening on 15 April 2024. • Update on Lumsden given by Pilbara Ports Heritage Advisor to KAC on 14 August 2024. • Port Hedland harbour tour including Lumsden Update provided to KAC on 6 September 2024.
Port Hedland community members	While Port Hedland community members may have low influence, their potential impact on the project is significant, necessitating proactive communication and information sharing. The engagement approach taken is utilising social media platforms and the Pilbara Ports and Main Roads' websites and a Main Roads e-newsletter to disseminate project updates, milestones, and relevant information, ensuring that	• Website • Social media • Face-to-Face • Variable Message Signs

COMMUNITY STAKEHOLDER	HOW WE ENGAGE	KEY CHANNELS
	community members are kept informed about the project's progress and potential impacts. Main Roads will also provide updates on their Travel Maps and Variable Message Signs on site. Direct face-to-face engagement will help address any community concerns or inquiries, cultivating transparency and inclusivity.	
Wedgefield residents and located businesses	Although Wedgefield local businesses and residents may have low influence, their potential impact on the project remains substantial. We are prioritising keeping them informed through dedicated project pages on the Pilbara Ports websites, social media updates and email updates. These channels are being utilised to communicate project developments, timelines, and any potential disruptions, ensuring that businesses and residents are well-informed and prepared. By maintaining open lines of communication and providing regular updates, we aim to foster a sense of community engagement and support throughout the project duration.	• Website • Social media • E-newsletter • Main Roads Travel Maps • Face-to-Face
Pilbara Ports' Port Hedland CCC	The CCC play a crucial role in providing valuable insights and feedback on the project. We keep committee members informed by participating in meetings three times per year, providing comprehensive updates on project progress, developments, and any relevant issues. This will ensure that committee members remain engaged and informed, allowing them to fulfill their role effectively as representatives of the community.	• 3 x yearly meetings • Presentations
Care for Hedland Environmental Association	While the Care for Hedland Environmental Association may have low influence and impact on the project, their expertise and perspectives on environmental matters are valuable. We check in periodically as required (emails,	• Direct engagement (emails, phone calls) as required • Social media • Website • TACC meeting updated (Care for Hedland are a member)

COMMUNITY STAKEHOLDER	HOW WE ENGAGE	KEY CHANNELS
	phone calls), ensuring that any environmental concerns or considerations are addressed. Additionally, we maintain a presence on social media platforms to keep the association informed about project updates and developments, fostering transparency and collaboration where environmental issues are concerned.	

9. EMISSIONS, DISCHARGES AND WASTES

The potential emissions and wastes produced by the Prescribed Premises are discussed below. The primary emissions being dust and noise. Proposed controls for the emissions are detailed in the following section as well as in the Risk Assessment (Section 11).

9.1 Emissions to Air – Dust

There is potential for fugitive dust to be generated during the following activities within the Prescribed Premises:

- Product hung up on external (niche areas) of the rotating containers, as a result of container loading practices at the proponent storage shed.
- the rotating containers are being discharged (tipped) into the hold of the ship.
- Accumulation of product (dust) beneath the truck situated on the wharf deck where the rotating containers are placed following discharge into ships hold.

9.1.1 Proposed Controls

Controls for dust emissions are inherent in the proposed process are described in Table 7.

Table 7: Proposed Controls

ASPECT	LOCATION(S) / INFRASTRUCTURE	CONTROLS
Spillage as a result of product hangup on rotating containers	Roadways and wharfs	• Customers required to have systems in place to clean containers to remove product hangup prior to transport to the facility. • Routine environmental inspections (at least weekly) to confirm compliance with environmental controls.

ASPECT	LOCATION(S) / INFRASTRUCTURE	CONTROLS
		• Any spillage to be cleaned and returned to the customer or disposed of at a licenced landfill.. • Post-shipment inspection and clean down of wharf and roads (for spillage and dust).
Dust emissions during tipping of containers into the hold of vessels	Wharfs	• Product will be discharged into ships hold via crane fitted with custom rotating tipping frame. The container remains lidded until it is lowered into the ships hold, and the lid is replaced before the empty container is returned to the road train and removed from the premises. • Tip height kept as low as reasonably practicable. • Customers required to provide product to site at a moisture level that is equal to or exceeding the dust extinction moisture (DEM) level. • Customers required to provide post shipment report to confirm compliance with DEM level. • Metal concentrates products undergo wet processing at the mine and therefore are typically well above DEM without needing to add moisture (as evidenced by Pilbara Ports extensive records of compliance with DEM levels at Eastern Operations L4432). • At least one high volume dust sampling event to be undertaken per shipment (including monitoring metals in dust as PM_{10}).
Accumulation of product (dust) beneath the truck situated on the wharf deck where the rotating containers are placed following discharge into ships hold.	Wharfs	• During loading crane operators to avoid touching cargo stockpiles in the hold with the container. • Cleaning and containment of product off containers if required. • Any spillage to be cleaned and returned to the customer or disposed of at a licenced landfill. Post-shipment inspection and clean down of wharf and roads (for spillage and dust). • Routine environmental inspections (at least weekly) to confirm compliance with environmental controls.

9.1.2 Air Quality Modelling

Air quality modelling was undertaken by ETA (2024) to assess the potential air quality impacts associated with the landside facilities. The Air Quality

Assessment Report is provided in Annexure D. The modelling was undertaken for the following scenarios:

Scenario 1: Export of 4.25 Mtpa via rotating containers. This scenario covers all operations proposed under this Licence Application. It is a conservative model assuming load rates of up to 1,200 tonnes/hour using two cranes simultaneously for loading of one vessel at a time on either PH5 or PH6. This is a short-term peak loading rate assuming availability of two cranes and a supply of containers ready on the berth. The average loading rate throughout the loading of a vessel will be lower, and as such the model is conservative.

The modelling relating to Scenario 1 predicts no discernible change in the 24-hour averaged PM_{10} concentration at the Taplin St, Neptune Pl and South Hedland receptors (these receptors are aligned with the location of dust monitoring stations in DWER's Port Hedland Air Quality Monitoring Network - link). Maps showing the predicated maximum 24 hour and annual contributions of the rotating container loading to dust concentrations are shown in Figure 1 and Figure 2.

Scenario 2: Export of 4.25 Mtpa via the proposed materials handling facility including shiploader and conveyor systems. Applications for works approvals and licence amendments for infrastructure associated with this scenario will be included in future submissions.

Scenario 3: Export of 4.25 Mtpa with both the materials handling systems being used. Assumptions include a 50:50 split between product loaded through the materials handling facility and using rotating containers. As discussed above this scenario considers both the current application as well as future works approval applications and licence amendments.

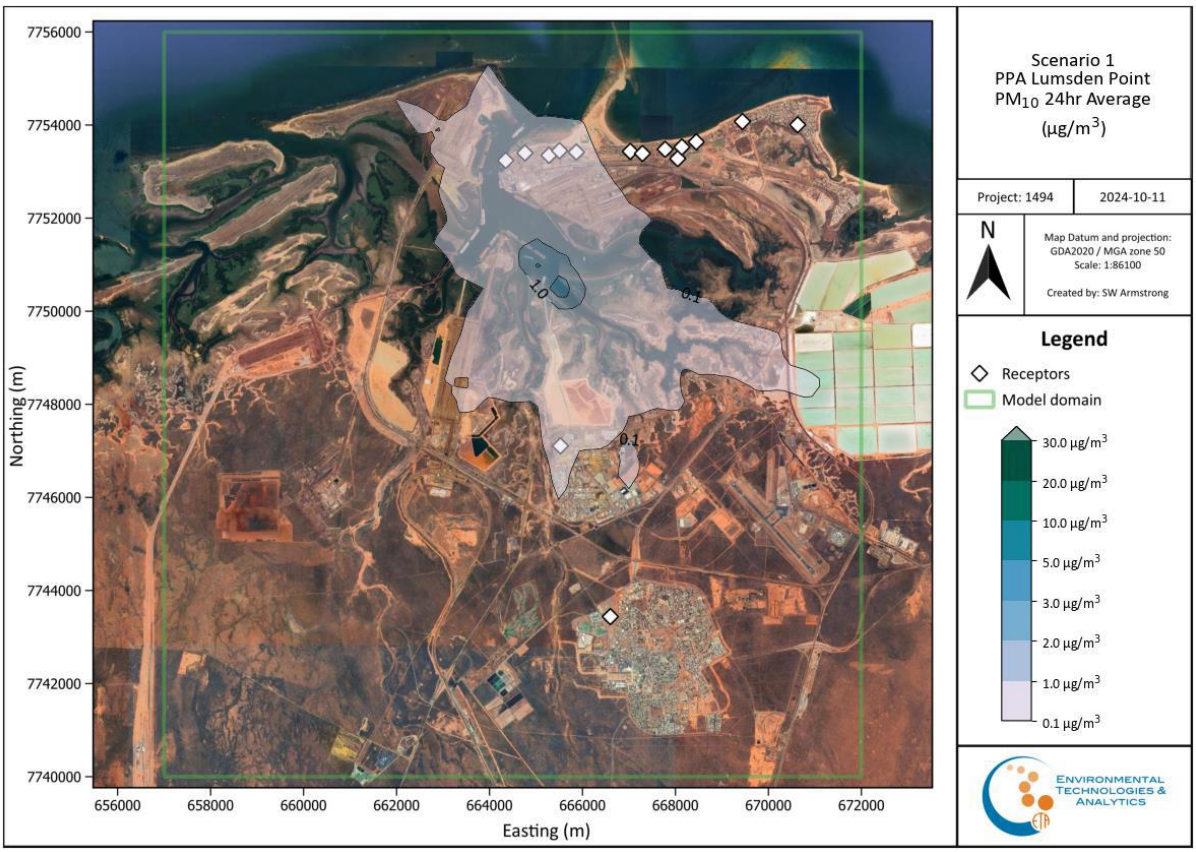


Figure 1: Scenario 1 – Maximum predicted 24hr average PM_{10} concentrations

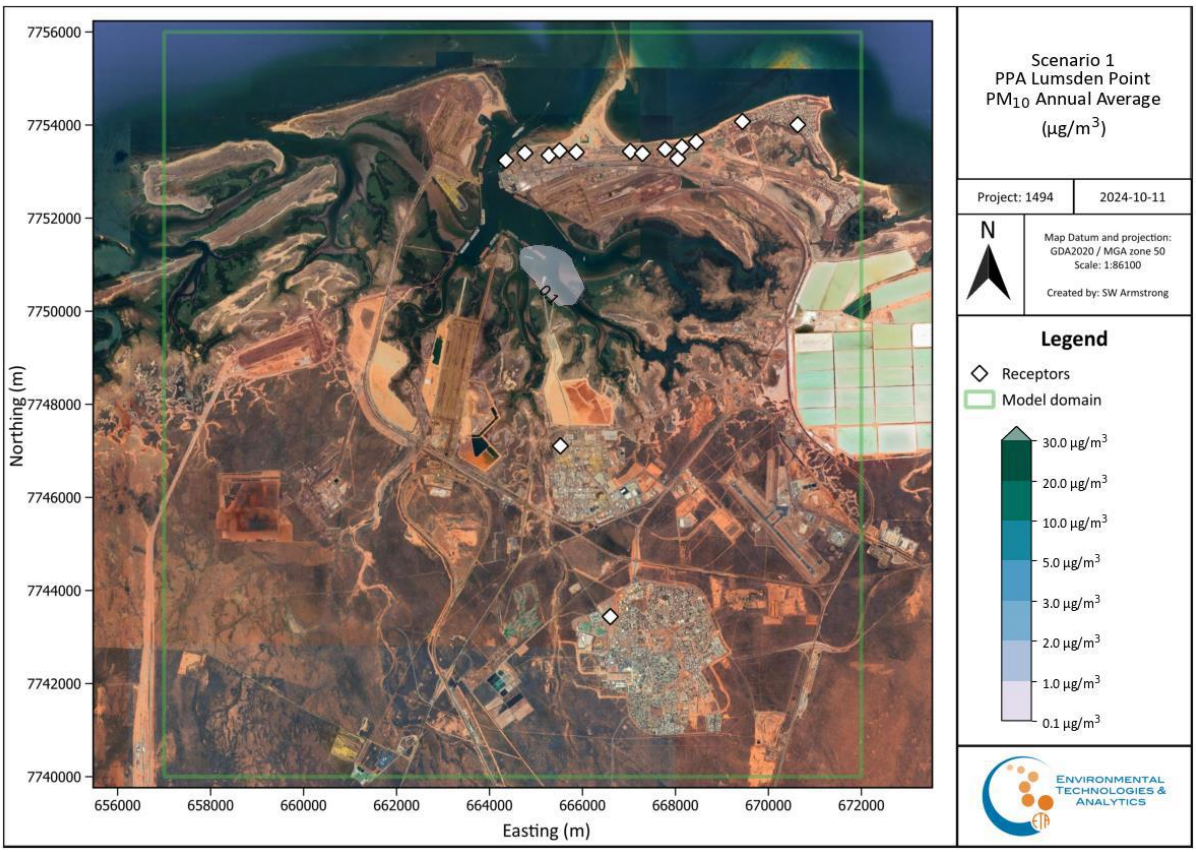


Figure 2: Predicted annual average PM_{10} concentrations

9.1.3 Air Quality Monitoring

Pilbara Ports propose to undertake air quality monitoring for dust and metals in dust as PM_{10}[1] using high volume air samplers (**HVAS**).

The monitoring will be undertaken in accordance with:

- AS 3580.1.1: Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment.
- AS 3580.9.6: Methods for sampling and analysis of ambient air – Determination of suspended particulate matter - PM_{10} high volume sampler with size-selective inlet - Gravimetric method

Further details of the proposed air quality monitoring program are presented in Annexure E.

9.2 Emissions to Air – Noise

Noise will be generated during operations as a result of:

- the operation of road trains (trucks) which deliver the rotating containers;

[1] Particulate Matter with an aerodynamic diameter of 10µm or less

- operation of the mobile harbour cranes;
- handling and tipping of the containers; and
- operation of sweeper trucks.

9.2.1 Proposed Controls

Compliance with *Environmental Protection (Noise) Regulations 1997* and regular maintenance of equipment and other sources of noise emissions. There are no further controls proposed.

9.2.2 Noise Modelling

Pilbara Ports engaged Talis Consultants (2024) to undertake noise modelling of the proposed operations at Lumsden Point. A copy of the report is provided as Annexure F. The scenarios considered for noise modelling were identical to those used in dust modelling (see Section 9.1.2).

Noise modelling results for all three scenarios predicted that operations at Lumsden Point will comply with the assigned levels for allowable noise at all key noise sensitive receivers and do not result in an increase in the existing noise levels in the Town of Port Hedland. As such no additional noise mitigation was recommended. Results from the modelling are shown in Table 8 and Figure 3.

Table 8: Noise modelling results for scenario 1 export via rotating containers at Lumsden Point

SENSITIVE RECIEVER	ASSIGNED LEVEL (dBA)	SCENARIO 1 PREDICTED (dBA)
Brearley Street	32	21.2
Hospital	32	26.4
Police Station	47	29.8
Pretty Pool	30	14.3
South Hedland	30	6.6
Wedgefield	60	<30

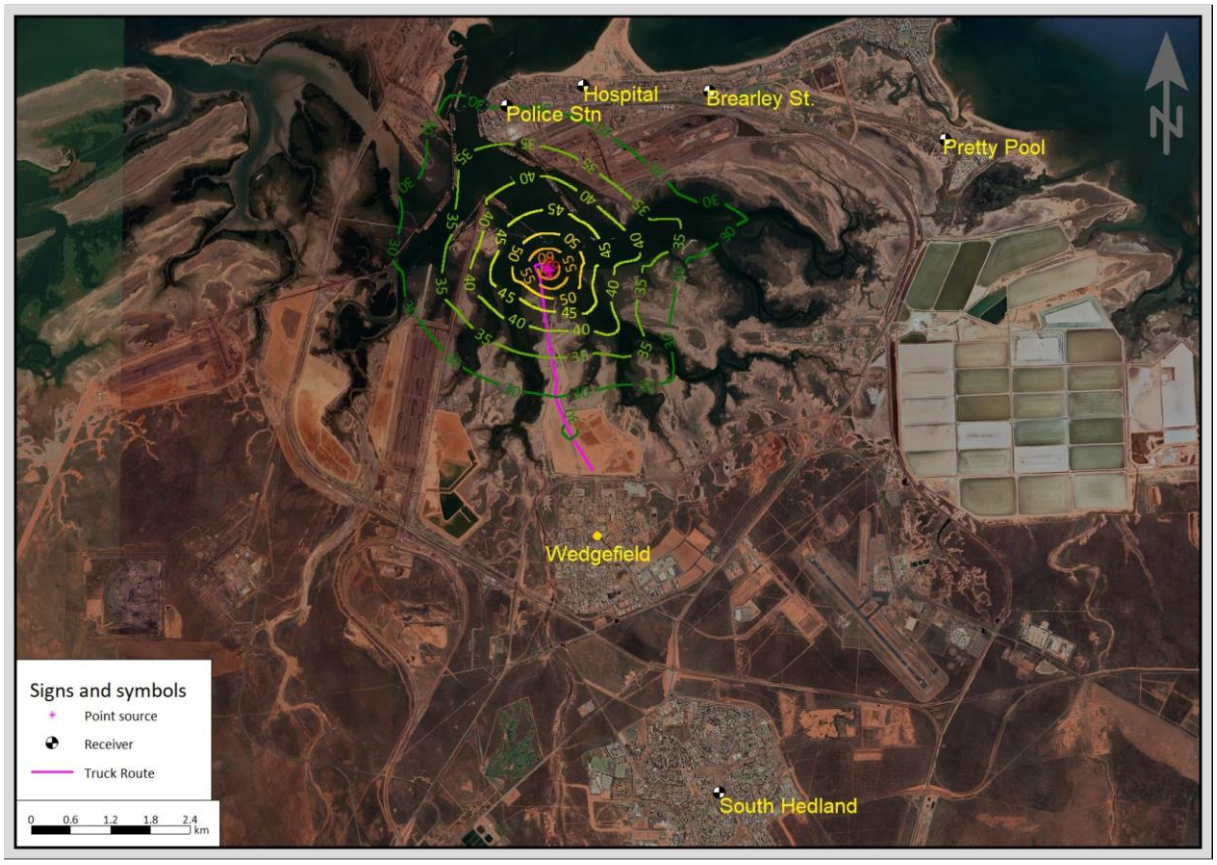


Figure 3: Scenario 1 – Worst case predicted noise contours

9.3 Emissions to Land and Water

9.3.1 Accidental Spillage or Discharge of Ore Product - Marine Environment

Lidded spodumene concentrate containers will be delivered on road trains, which will drive directly onto PH5 or PH6. A crane with a custom rotating tipping frame will be used to lift the container from the road train and discharge the product from each container into the ship's hold one by one. Loading operators will be undertaken by competent operators using lifting equipment that is regularly maintained and inspected. Pilbara Ports considers there is no plausible scenario where spodumene concentrate is tipped directly into the marine environment from the rotating containers.

It may be possible for product dust to accumulate on the surface of the wharf deck, where the rotating containers are placed following discharge into ships hold. This may enter the marine environment through the stormwater network. Although volumes of product accumulation would be considered extremely negligible, any spillage of ore product to the deck of the wharf will be monitored and cleaned up during shiploading. Pilbara Ports will undertake post shipment inspections and weekly environmental inspections to ensure clean-up practices are sufficient.

9.3.2 Accidental Spillage of Ore Product – Terrestrial Environment

Lidded metal concentrate rotating containers will only travel over a fully sealed route and discharged to the sealed deck of PH5 or PH6. There is no impact pathway to unsealed land or infiltration to groundwater.

Any wastes arising from accidental spillage of ore concentrate product to the deck of the wharf will be cleaned as soon as reasonably practicable. All personnel onsite will be made aware of the requirement to report and clean up any spillages through mandatory site inductions. Pilbara Ports will undertake post shipment inspections and weekly environmental inspections to ensure clean-up practices are sufficient.

9.4 Management of Emissions, Discharges and Wastes – Incidents and Emergencies

Pilbara Ports' processes for managing environmental hazards and incidents are documented in the *Incident Management Procedure* and *Hazard Management Procedure*. All environmental hazards and incidents are reported and communicated via Pilbara Ports' online reporting tool.

Pilbara Ports' Business Resilience program includes:

- **Emergency Response** – the initial onsite response which focuses on the preservation of life, the protection of property and environment, and the prevention of escalation; and
- **Incident Management** – the direct management of the response to an incident by an Incident Management Team.

Pilbara Ports has developed an Emergency Response Plan for each of its operational Ports in Ashburton, Varanus Island, Dampier, and Port Hedland. Pilbara Ports *Environmental Risk Register* identifies marine oil pollution as the principal environmental emergency response scenario relevant to all Port locations, which requires a targeted emergency management plan.

10. SITING AND LOCATION

10.1 Sensitive Receptors and Environmentally Sensitive Areas

The nearest sensitive receptor is the marine and terrestrial environment. Other sensitive receptors include (insert). The locations of sensitive land uses and receptors with respect to the premises are show in Annexure G.

TYPE / CLASSIFICATION	DESCRIPTION	DISTANCE FROM PREMISES	CONTEXT
Sensitive Land Uses			
Aboriginal and other cultural heritage sites	The area has been subject to heritage surveys with	No extant Aboriginal or other cultural heritage are located within the footprint	The Marapikurrinya Yintha Site is an ethnographic site which is said to be where a large culturally significant water serpent resides. This site was

TYPE / CLASSIFICATION	DESCRIPTION	DISTANCE FROM PREMISES	CONTEXT
	Traditional Owners.	of the proposed Prescribed Premises. Nearest sites are: • North – Marapikurrinya Yintha Site (DPLH Site ID 22874) waters of inner harbour. • South East – Shell midden (DPLH Site ID 15883) ~640m • South – Shell midden (DPLH Site ID 25016) ~325m	subject to Section 18 (s18) consent under the Aboriginal Heritage Act 1972 (Min. Ref. 34-66757) to disturb. Therefore, is no longer extant no longer requires management or mitigation. In addition, numerous shell middens are registered within the intertidal habitat surrounding the inner harbour, including the two adjacent to the Lumsden Point. These middens are situated on low sandy islands with closed hummock grasslands over open tussock grasslands, surrounded by supratidal saline mudflats and mangroves. Pilbara Ports has a Cultural Heritage Management Plan. All staff and contractors will made aware of the Aboriginal heritage sites and will not be permitted to access these areas. Pilbara Ports plan to implement a project to improve access to the shell middens by traditional owners in consultation with KAC.
Industrial areas	The proposed Prescribed Premises is located within the Port of Port Hedland inner harbour which is a multi-user port.	The nearest industrial areas to the Prescribed Premises Boundary are: • East – Redbank 3.5km • South – Wedgefield 3km • West – FMG Herb Elliott Port 870m	The two industrial sites closest to the Prescribed Premises Boundary are the Wedgefield Industrial Estate and Fortescue Metals Group's (FMG) Herb Elliott Port which is a bulk export facility with five berths for loading vessels with iron ore, tug pens and iron ore stockpiles.
Residential Developments	No residential developments within the Prescribed Premises. Closest is the West End of Port Hedland.	Approximately 2.5km north of the Prescribed Premises Boundary.	The West End of Port Hedland is the closest residential area to the Prescribed Premises Boundary.
Specified Ecosystems			
Environmentally Sensitive Areas	No ESAs within Prescribed Premises	The nearest ESAs are:	The distance from the ESA suggests it is unlikely to be impacted by the

TYPE / CLASSIFICATION	DESCRIPTION	DISTANCE FROM PREMISES	CONTEXT
		• ~3km north Port Hedland Spoilbank • ~31km east coastal areas of De Gray • ~13km west Weerdee Island	Prescribed activities. As such no control measures will be required.
Ecological Communities (Threatened Ecological Communities (TEC) and Priority Ecological Communities (PEC))	N/A	N/A	N/A
Important wetlands in Australia	N/A	No Important wetlands within the proposed Premises boundary or within proximity to the boundary.	N/A
Ramsar Sites in Western Australia	N/A	No Ramsar Sites within the proposed Premises boundary or within proximity to the boundary.	N/A
Department of Conservation and Biodiversity (DBCA) Legislated Lands and Waters	Not within Prescribed Premises Boundary.	North Turtle Island Nature Reserve is located approximately 59km to the northeast of the Premises Boundary (offshore). Eighty Mile Beach Marine Park is located approximately 100km to the east of the Premises Boundary.	The distance from the legislated lands and waters suggests they are unlikely to be impacted by the Prescribed activities. As such no control measures will be required.
Biological Component			
Threatened / Priority Flora	Due to the cleared and developed nature of the Prescribed Premises (berth and sealed deck), no flora is present.	N/A	Proposed Prescribed Premises is within existing industrial area.
Threatened / Priority Fauna	Due to the cleared and developed	Numerous fauna assessments have been conducted for the project	Proposed Prescribed Premises is within existing industrial area and built upon reclaimed dredge material

TYPE / CLASSIFICATION	DESCRIPTION	DISTANCE FROM PREMISES	CONTEXT
	nature of the Prescribed Premises (berth and sealed deck), no fauna or fauna habitat is present.	site and its surrounds including: • Port Hedland regional fauna assessment (ENV 2011) • Lumsden Flora and Fauna Survey (Worley Parsons 2013) • Roy Hill Port Expansion Project (Biota 2022) • Wedgefield Industrial Estate (GHD 2009, GHD 2011)	and as such is not likely to provide suitable habitat for most fauna species. The various fauna surveys identified between 28 and 75 conservation significant fauna species as potentially being present within the region with the majority of those being migratory birds. Threatened and priority fauna that could potentially occur in the vicinity of the prescribed premises include: • 4 mammals (three species of bats and Bush-tailed Mulgara) • 10 birds (nine species of migratory sea birds, and a species of falcon) • 4 reptiles (three species of turtle and a skink) None of the threatened and priority fauna species are likely to be significantly impacted by the Prescribed Premises as the surrounding mangrove habitats are regionally common.
Physical Component			
Public Drinking Water Source Areas (**PDWSA**)	No nearby PDWSA. Nearest PDWSA is the Yule River and De Grey River Water Reserves	Yule River wellfield is located ~45 km to southwest of Prescribed Premises and De Grey River wellfield is ~60km east.	Prescribed Premises is not within or immediately adjacent to a PDWSA. Due to the separation distance from the nearest PDWSA it is unlikely to be affected by the proposed activities within the Prescribed Premises.
Surface Water Management Area	Proclaimed Pilbara Surface Water Area	Within Prescribed Premises Boundary.	Prescribed Premises includes marine (berth) areas and a sealed wharf deck which is located within the controlled drainage network of Lumsden Point General Cargo Facility. Pilbara Ports has developed a Coastal Hazard Risk Management and Adaptation Plan (**CHRMAP**) (Cardno 2022) for the Port of Port Hedland which includes a risk assessment of climate change and vulnerability of infrastructure to storm surge. Design heights at Lumsden

TYPE / CLASSIFICATION	DESCRIPTION	DISTANCE FROM PREMISES	CONTEXT
			Point take into consideration the outcomes of the CHRMAP.
Groundwater	N/A	Within Prescribed Premises Boundary.	Sealed wharf deck at PH5 and PH6. Emissions to groundwater unlikely.
Surface Water Bodies	Inner Harbour of Port of Port Hedland (Estuary)	Within Prescribed Premises Boundary.	N/A
	Indian Ocean	Prescribed Premises occurs ~ 3.5km from the Indian Ocean	N/A
Contaminated Sites – Reported Sites	N/A	None identified within the proposed Prescribed Premises	N/A
Regionally Significant Area	The Proposed Prescribed Premises is located within the inner harbour of the Port of Port Hedland, and located immediately adjacent to a 'Regionally Significant' mangrove area (EPA 2001).	The Wharf Laydown Area is immediately adjacent to mangrove habitats.	The proposed Prescribed Premises does not impact any Mangrove areas, however, mangroves are located to the south of the Wharf Laydown Area.

10.2 Aboriginal heritage

10.2.1 Context

Pilbara Ports interacts across a large geographic area of the Pilbara coast with a broad range of Aboriginal people who have ties to, and traditional knowledge of, port lands. This may include but is not limited to traditional custodians and/or native title holders or applicants under the *Commonwealth Native Title Act 1993*. Aboriginal people may be represented by a Native Title Representative Body or a Prescribed Body Corporate when Native Title has been determined, or an Incorporated Aboriginal Organisation where Native Title has been extinguished.

The Port of Port Hedland is located within the traditional lands of the Kariyarra People, and the traditional name for the inner harbour is Marrapikurrinya, referring to the hand shaped formation of the tidal creeks coming off the natural harbour. The Kariyarra People Native Title claim

(National Native Tribunal File No. WCD2018/015) was determined in December 2018. It was determined that Native Title has been extinguished over the majority of port vested land, including the Prescribed Premises.

The proposed work on port lands are within the Lumsden Point development area. The works will occur within a fully cleared, previously disturbed area, which is to be developed as wharf by Pilbara Ports under Ministerial consent granted under section 18 of the *Aboriginal Heritage Act 1972* (WA). No cultural heritage sites remain extant within the proposed works area and no heritage sites will be disturbed by the works.

10.2.2 Cultural Heritage Management Plan

The proposed activity within port land at Lumsden Point is undertaken in accordance with Pilbara Ports' Cultural Heritage Management Plan (**CHMP**). The CHMP identifies the systems and processes that enable Pilbara Ports to protect, promote and manage the cultural heritage values that exist within port lands and waters. The CHMP is publicly available on Pilbara Ports' website, enabling transparent communication of its cultural heritage management systems and processes to a wide range of port stakeholders including staff, lessees and port users. The CHMP was first developed in 2015 by Pilbara Ports in consultation with cultural heritage stakeholders including Traditional Owners, port users, regulatory authorities, local government, and local history groups. The CHMP is reviewed on a biennial basis, considering feedback from cultural heritage stakeholders, including KAC.

11. RISK ASSESSMENT

Based on the Pilbara Ports' assessment of the siting (Section 10, Annexure G), sensitive receptors requiring consideration consist of:

- The surrounding marine and terrestrial environment (<1km)
- FMG's Herb Elliott Port (~ 0.9km)
- Wedgefield (~ 3km)
- The West End of Port Hedland (~ 2.5km).

The residual risk assessment ratings are consistent with the risk assessment matrix used by DWER as shown in Table 9. The Proponent applies an accepted risk level based on "As Low as Reasonably Practicable" (**ALARP**) principles.

A summary of the environmental risks relevant to the Works Approval application, and the associated environmental management measures to be implemented to reduce these risks to an acceptable level, are presented in Table 10.

Table 9: Risk Matrix and Criteria

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

Likelihood	
The following criteria has been used to determine the likelihood of the risk / opportunity occurring	
Almost Certain	The risk event is expected to occur in most circumstances
Likely	The risk event will probably occur in most circumstances
Possible	The risk event could occur at some time
Unlikely	The risk event will probably not occur in most circumstances
Rare	The risk event may only occur in exceptional circumstances

Consequence		
The following criteria has been used to determine the consequences of a risk occurring		
	Environment	**Public Health and Amenity**
Severe	• On-site impacts: catastrophic • Off-site impacts local scale: high level or above • Off-site impacts wider scale: mid-level or above • Mid to long term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • Adverse health effects: high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • Local scale impacts: permanent loss of amenity

Consequence		
Major	• On-site impacts: high level • Off-site impacts local scale: mid-level • Off-site impacts wider scale: low level • Short term impact to an area of high conservation value or special significance^ • Specific consequence criteria (for environment) are exceeded	• Adverse health effects: mid-level or frequent medical treatment • Specific consequence criteria (for public health) are exceeded • Local scale impacts: high level impact to amenity
Moderate	• On-site impacts: mid-level • Off-site impacts local scale: low level • Off-site impacts wider scale: minimal • Specific consequence criteria (for environment) are at risk of not being met	• Adverse health effects: low level or occasional medical treatment • Specific consequence criteria (for public health) are at risk of not being met • Local scale impacts: mid-level impact to amenity
Minor	• On-site impacts: low level • Off-site impacts local scale: minimal • Off-site impacts wider scale: not detectable • Specific consequence criteria (for environment) likely to be met	• Specific consequence criteria (for public health) are likely to be met • Local scale impacts: low level impact to amenity
Slight	• On-site impact: minimal • Specific consequence criteria (for environment) met	• Local scale: minimal to amenity • Specific consequence criteria (for public health) met

Table 10: Summary of Risk Assessment and Management

Activity	Emission Type & Source	Potential Receptors [2, 3]	Potential Pathway	Potential Adverse Impact	Proposed Controls & Monitoring	Residual Risk		
						Likelihood	Consequence	Ranking
Cat 58: Bulk Handling Facility	Generation of Dust (PM_{10}, $PM_{2.5}$, TSP, Dust Deposition): • Unloading rotating containers into ship's hold • Loading empty container onto truck	The West End of Port Hedland (~2.5km) South Hedland (~6.6km) Wedgefield (~3km)	Air / wind dispersion	Impacts on Human Health and Amenity Reduction in visibility	**Management Controls** **Delivery to Prescribed Premises** • Ore Concentrate is delivered to the Prescribed Premises at or above the DEM • Ore Concentrate is delivered in fully sealed rotating container. • Wharf deck and laydown areas where containers are stored within the Prescribed Premises will be sealed • Access road connecting Prescribed Premises to Great Northern Highway sealed **Unloading Rotating Containers into Ship's Hold** • Lid will be removed from the rotating container only when the container is lowed fully into the ship's hold • The rotating container will be lowered in a manner that will minimise drop height **Loading Rotating Containers onto Trucks** • Rotating containers will be inspected for product hang-up in niche areas, and cleaned (where required) prior to departing Prescribed Premises • The work area below the truck will be inspected and cleaned (where required) to manage any accumulation of product dust (although unlikely) **Proposed Monitoring** • High Volume Air Samplers • Visual observations.	Unlikely	Slight	**Low**
Cat 58: Bulk Handling Facility	Excessive or Unreasonable Noise • Operation of trucks • Dumping of ore; • Operation of mobile machinery (crane).	The West End of Port Hedland (~2.5km) South Hedland (~6.6km) Wedgefield (~3km)	Air / wind dispersion	Impacts on human health and amenity	**Management Controls** • Noise emissions will comply with the *Environmental Protection (Noise) Regulations 1997*. • Equipment and machinery will be regularly maintained in accordance with manufacturer specification to ensure optimum efficiency and minimise emissions. • Noise attenuating equipment will be used where practicable to minimise noise during operation. • Separation distance of operations from the nearest sensitive receptors. **Proposed Monitoring** • Any complaints received by the Proponent will be investigated and corrective actions will be implemented as required.	Rare	Slight	**Low**

[2] Dust Emission receptors identified in the 2024 Air Quality Assessment (ETA 2024)

[3] Noise Emission receptors identified in the 2024 Environmental Noise Assessment (Talis 2024)

12. REFERENCES

ETA (2024) Pilbara Ports – Lumsden Point Air Quality Modelling Assessment

Biota (2022) Roy Hill Port Expansion Project Flora and Vegetation Study

Cardno (2022) Coastal Hazard Risk Management and Adaptation Plan – Port of Port Hedland CHRMAP

ENV (2011) Port Hedland Regional Fauna Assessment

GHD (2009) Preliminary Environmental Impact Assessment and Biological Survey: Report for LandCorp Industrial Land LIA 3,4,5 and General Transport A

GHD (2022) Wedgefield Industrial Estate Vegetation and Fauna Management Plan

Talis (2024) Lumsden Point Port Facility Environmental Noise Assessment

Worley Parsons (2013) Lumsden Point General Cargo Facility Flora and Fauna Survey

ANNEXURE A – CERTIFICATE OF TITLE

WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
LR3177	126

RECORD OF CERTIFICATE
OF
CROWN LAND TITLE
UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

The undermentioned land is Crown land in the name of the STATE OF WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts
REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 558 ON DEPOSITED PLAN 424409

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE VESTED UNDER STATUTE

PRIMARY INTEREST HOLDER: PILBARA PORTS AUTHORITY OF LEVEL 3/16 PARLIAMENT PLACE WEST PERTH WA 6005

(XE N501272) REGISTERED 5/12/2016

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. K693808 LEASE TO BHP BILLITON MINERALS PTY LTD, IN 85/100 SHARE, ITOCHU MINERALS & ENERGY OF AUSTRALIA PTY LTD, IN 8/100 SHARE, MITSUI IRON ORE CORPORATION PTY LTD, IN 7/100 SHARE, ALL OF CARE OF STATEWIDE TENEMENT AND ADVISORY SERVICES PTY LTD, 180 CLAISEBROOK ROAD, PERTH, AS TENANTS IN COMMON EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 22/8/2008.
   L793499 CHANGE OF ADDRESS AFFECTING LEASE K693808. THE CORRECT ADDRESS OF THE LESSEES IS NOW PO BOX 7474, CLOISTERS SQUARE, PERTH. REGISTERED 28/11/2011.
2. K693809 LEASE TO BHP BILLITON MINERALS PTY LTD, IN 85/100 SHARE, ITOCHU MINERALS & ENERGY OF AUSTRALIA PTY LTD, IN 8/100 SHARE, MITSUI IRON ORE CORPORATION PTY LTD, IN 7/100 SHARE, ALL OF CARE OF STATEWIDE TENEMENT AND ADVISORY SERVICES PTY LTD, 180 CLAISEBROOK ROAD, PERTH, AS TENANTS IN COMMON EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 22/8/2008.
   L793501 CHANGE OF ADDRESS AFFECTING LEASE K693809. THE CORRECT ADDRESS OF THE LESSEES IS NOW PO BOX 7474, CLOISTERS SQUARE, PERTH. REGISTERED 28/11/2011.
3. K693814 LEASE TO BHP BILLITON DIRECT REDUCED IRON PTY LTD OF CARE OF STATEWIDE TENEMENT AND ADVISORY SERVICES PTY LTD, 180 CLAISEBROOK ROAD, PERTH EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 22/8/2008.
4. L573515 LEASE TO MOLY METALS AUSTRALIA PTY LTD OF 46-50 KINGS PARK ROAD, WEST PERTH EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 11/3/2011.

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE

REGISTER NUMBER: 558/DP424409 VOLUME/FOLIO: LR3177-126 PAGE 2

	M351426	TRANSFER. LESSEE NOW PROCESS MINERALS INTERNATIONAL PTY LTD OF 1 SLEAT ROAD, APPLECROSS REGISTERED 24/7/2013.
5.	L723600	LEASE TO CONSOLIDATED MINERALS PTY LTD OF 28-42 VENTNOR AVENUE, WEST PERTH EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 1/9/2011.
	N588202	SURRENDER OF LEASE L723600 AS TO PORTION ONLY. REGISTERED 29/3/2017.
6.	Q048039	RESERVE 29082 FOR THE PURPOSE OF HARBOUR & PORT PURPOSES & ANCILLARY THERETO REGISTERED 1/7/2024.
7.	N501272	VESTED. PURSUANT TO SECTION 25 OF THE PORT AUTHORITIES ACT 1999 REGISTERED 5/12/2016.
8.	M429240	LEASE TO THE PILBARA INFRASTRUCTURE PTY LTD OF LEVEL 2, 87 ADELAIDE TERRACE, EAST PERTH EXPIRES: SEE LEASE. AS TO PORTION ONLY - SEE DEPOSITED PLAN 67095. REGISTERED 20/12/2013.
	M503449	VARIATION OF LEASE. REGISTERED 20/12/2013.
	M542090	MORTGAGE OF LEASE M429240 TO CREDIT SUISSE AG REGISTERED 5/2/2014.
9.	M503448	LEASE TO THE PILBARA INFRASTRUCTURE PTY LTD OF LEVEL 2, 87 ADELAIDE TERRACE, EAST PERTH EXPIRES: SEE LEASE. AS TO PORTION ONLY - SEE DEPOSITED PLAN 77204. REGISTERED 20/12/2013.
10.	O237795	LEASE TO ROY HILL INFRASTRUCTURE PTY LTD OF 5 WHITHAM ROAD PERTH AIRPORT WA 6105 EXPIRES: SEE LEASE. AS TO PORTION ONLY - SEE DEPOSITED PLAN 412385 AND 412388 REGISTERED 16/9/2019.
	O324973	MORTGAGE TO ANZ FIDUCIARY SERVICES PTY LTD OF LEVEL 12 100 QUEEN STREET MELBOURNE VIC 3000 REGISTERED 16/1/2020.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

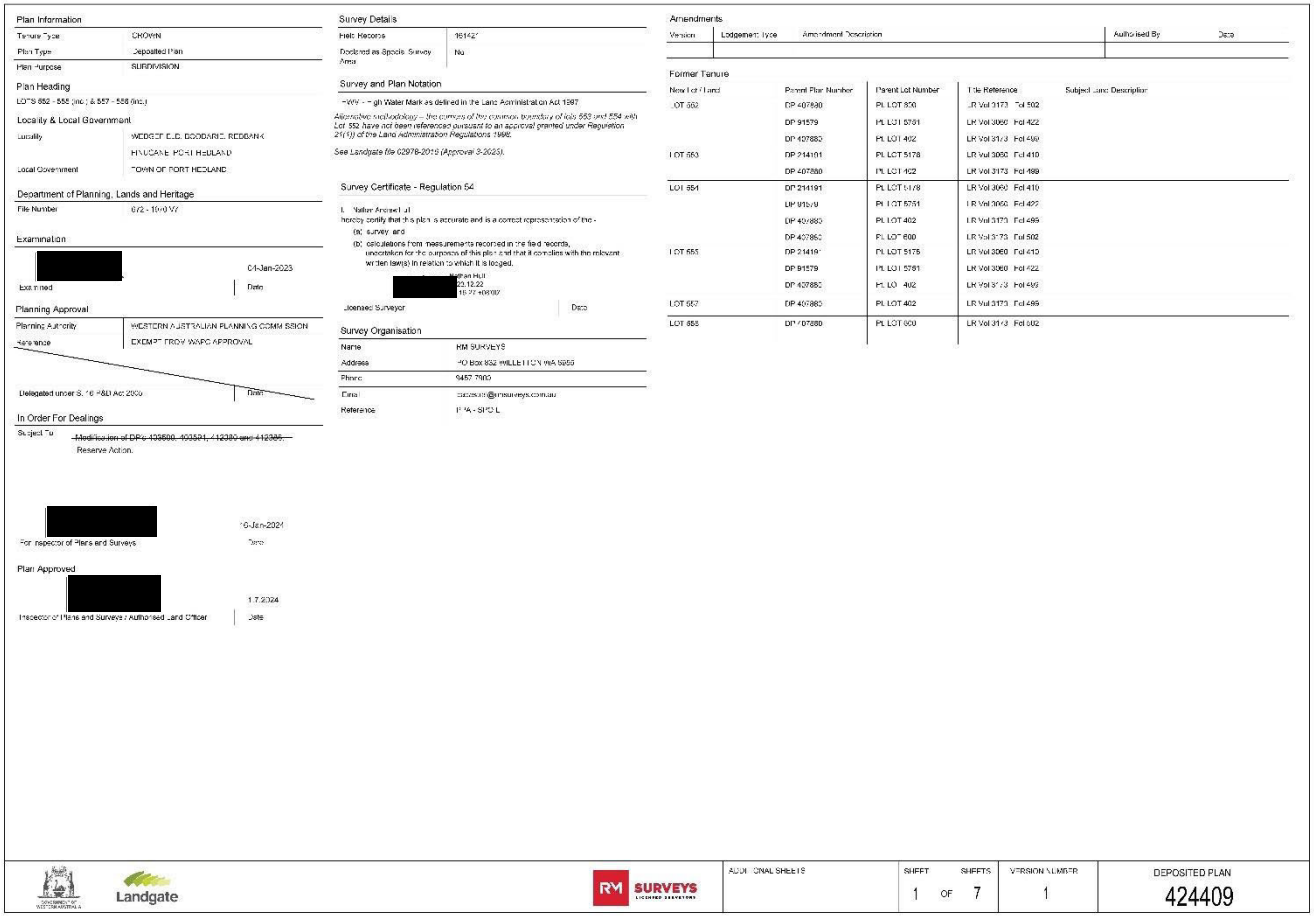
----------END OF CERTIFICATE OF CROWN LAND TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP424409
PREVIOUS TITLE:	LR3173-502
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	TOWN OF PORT HEDLAND
RESPONSIBLE AGENCY:	PILBARA PORTS AUTHORITY

NOTE 1: Q048038 CORRESPONDENCE FILE 00672-1970-01RO



Plan Information

Tenure Type	CROWN
Plan Type	Deposited Plan
Plan Purpose	SUBDIVISION

Plan Heading

LOTS 552 - 555 (inc.) & 557 - 558 (inc.)

Locality & Local Government

Locality	WEDGE ELD, GOODARIE, REDBANK
	HAUCANE, PORT HEDLAND
Local Government	TOWN OF PORT HEDLAND

Department of Planning, Lands and Heritage

File Number	672 - 10[illegible] V2

Examination

[redacted] 04-Jan-2023

Examined | Date

Planning Approval

Planning Authority	WESTERN AUSTRALIAN PLANNING COMMISSION
Reference	EXEMPT FROM WAPC APPROVAL

Delegated under S. 16 of the PD Act 2005 | Date

In Order For Dealings

Subject To: ~~Modification of DPs 403690, 403691, 412380 and 412385~~ Reserve Action.

[redacted] 16-Jan-2024

For Inspector of Plans and Surveys | Date

Plan Approved

[redacted] 1.7.2024

Inspector of Plans and Surveys / Authorised Land Officer | Date

Survey Details

Held: Records	16142
Declared as Special Survey Area	No

Survey and Plan Notation

"WW" - High Water Mark as defined in the Land Administration Act 1997.

Alternative methodology – the survey of the common boundary of lots 553 and 554 with Lot 552 have not been referenced pursuant to an approval granted under Regulation 21(1)(i) of the Land Administration Regulations 1998.

See Landgate file 02976-2019 (Approval 3-2023).

Survey Certificate - Regulation 54

I, Nathan Arnold Hill

hereby certify that this plan is accurate and is a correct representation of the -

(a) survey; and

(b) calculations from measurements recorded in the field records,

annotation for the purpose of this plan and that it complies with the relevant written law(s) in relation to which it is lodged.

[redacted] Nathan Hill 23.12.22 16 374 [illegible]

Licensed Surveyor | Date

Survey Organisation

Name	RM SURVEYS
Address	PO Box 852 WILLETTON WA 6955
Phone	9457 7900
Email	[illegible]@rmsurveys.com.au
Reference	PWA - SPD L

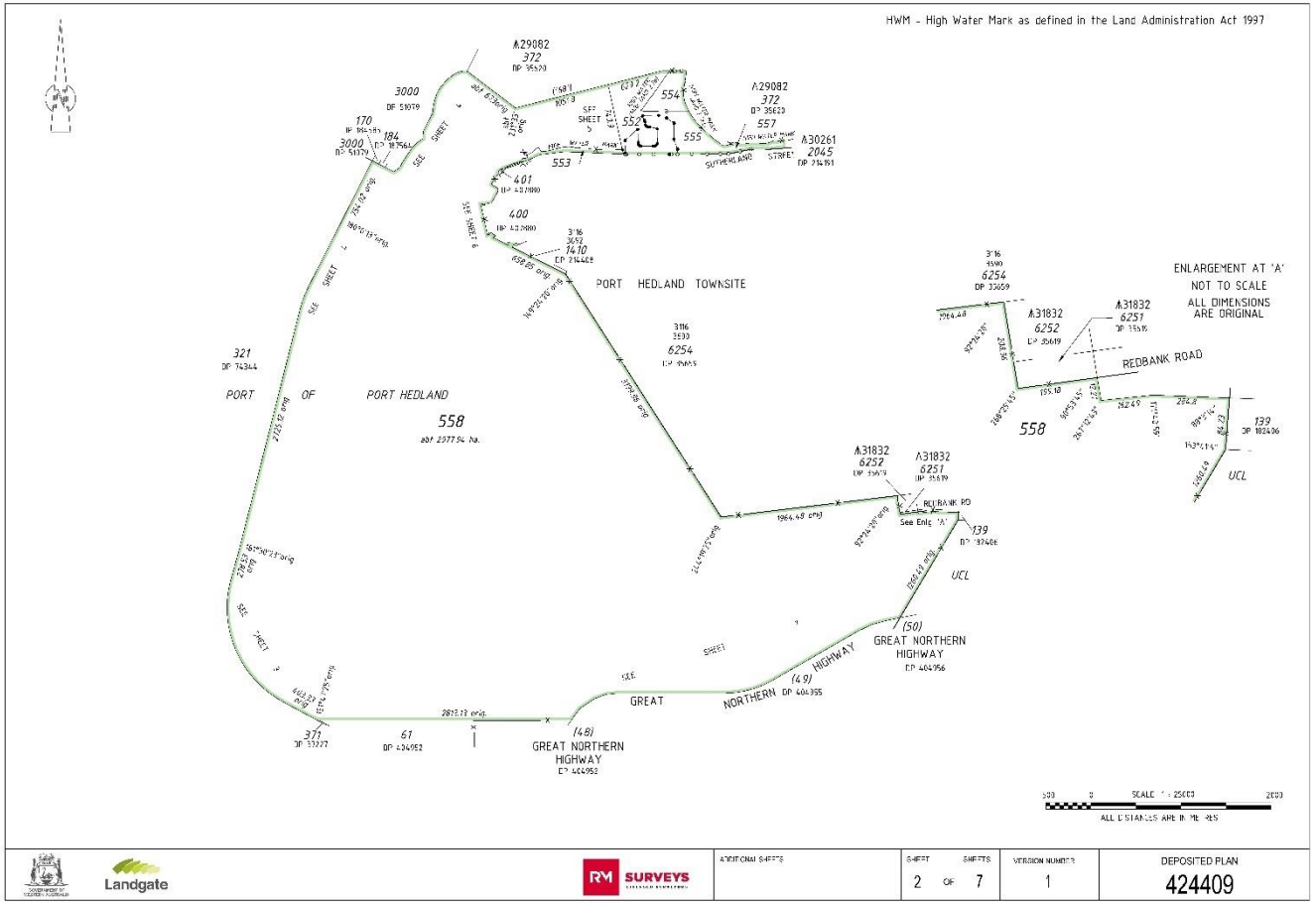
Amendments

Version	Lodgement Type	Amendment Description	Authorised By	Date

Former Tenure

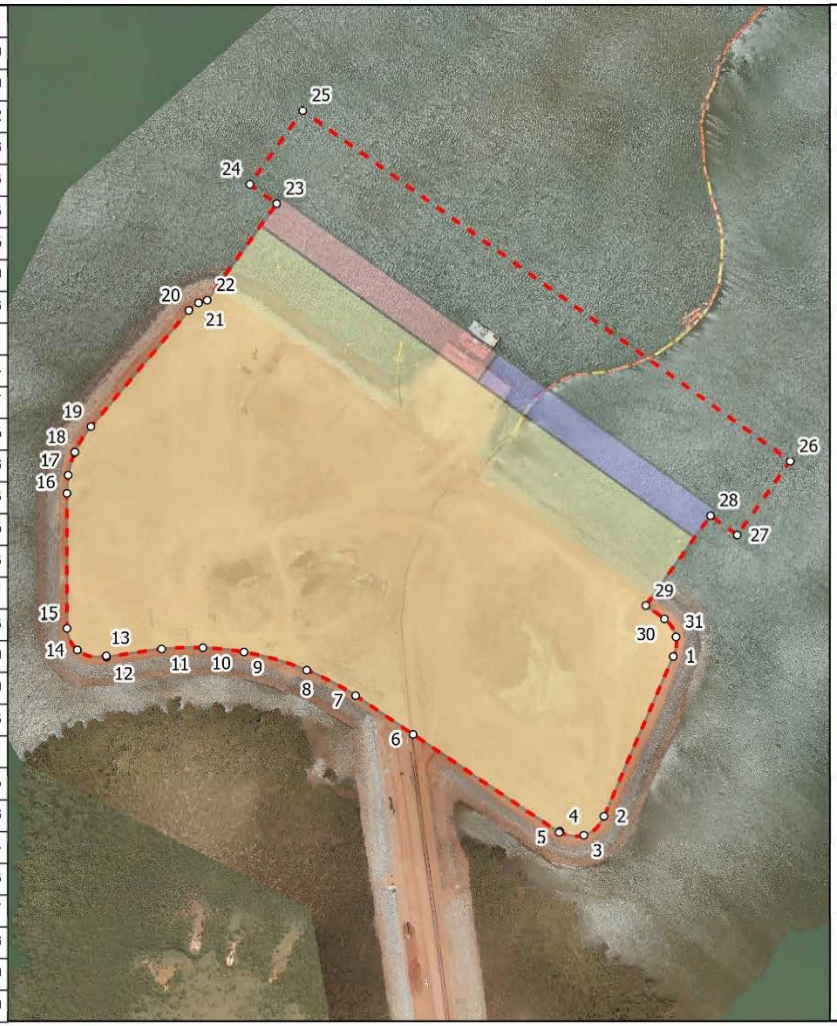
New Lot / Land	Parent Plan Number	Parent Lot Number	Title Reference	Subject Land Description
LOT 552	DP 407880	PL LOT 600	LR Vol 3173 Fol 502	
	DP 91579	PL LOT 5781	LR Vol 3060 Fol 422	
	DP 407880	PL LOT 402	LR Vol 3173 Fol 499	
LOT 553	DP 214101	PL LOT 5178	LR Vol 3060 Fol 410	
	DP 407880	PL LOT 402	LR Vol 3173 Fol 499	
LOT 554	DP 214101	PL LOT 5178	LR Vol 3060 Fol 410	
	DP 91579	PL LOT 5781	LR Vol 3060 Fol 422	
	DP 407880	PL LOT 402	LR Vol 3173 Fol 499	
	DP 407880	PL LOT 600	LR Vol 3173 Fol 502	
LOT 555	DP 214101	PL LOT 5178	LR Vol 3060 Fol 410	
	DP 91579	PL LOT 5781	LR Vol 3060 Fol 422	
	DP 407880	PL LOT 402	LR Vol 3173 Fol 499	
LOT 557	DP 407880	PL LOT 402	LR Vol 3173 Fol 499	
LOT 558	DP 407880	PL LOT 600	LR Vol 3173 Fol 502	

Landgate | RM SURVEYS | ADDITIONAL SHEETS | SHEET 1 OF 7 | VERSION NUMBER 1 | DEPOSITED PLAN 424409



ANNEXURE B – PREMESIS MAPS

Label	X	Y
1	665353.39	7750524.00
2	665301.53	7750404.79
3	665286.36	7750390.62
4	665268.40	7750393.56
5	665267.84	7750392.73
6	665158.62	7750465.73
7	665115.60	7750494.75
8	665079.05	7750513.79
9	665032.05	7750527.36
10	665001.29	7750530.61
11	664970.38	7750529.64
12	664929.13	7750523.57
13	664928.98	7750524.55
14	664907.27	7750528.96
15	664899.60	7750545.03
16	664899.52	7750646.05
17	664900.42	7750659.73
18	664905.44	7750676.97
19	664917.52	7750696.03
20	664990.84	7750782.99
21	664998.02	7750788.59
22	665004.48	7750790.58
23	665056.40	7750862.81
24	665036.31	7750877.25
25	665076.00	7750932.46
26	665440.95	7750670.14
27	665401.26	7750614.93
28	665381.18	7750629.37
29	665332.88	7750562.16
30	665346.73	7750552.20
31	665355.46	7750538.70



PILBARA PORTS

PORT OF PORT HEDLAND

Lumsden Point
Proposed Prescribed Premises Boundary

21 February 2025

Proposed Prescried Premises Boundary
Wharf Laydown Area
Wharf PH5
Wharf PH6

N

0 50 100 150 200
Metres

1:4,000 (at A4 size)
MGA2020 Zone 50

ANNEXURE C – PRODUCT INFORMATION

See attached Zip file containing:

1. **SDS**
   - **1.1 Spodumene Concentrate Blend – PML**
   - **1.2 Spodumene Concentrate Course – PML**
   - **1.3 Spodumene Concentrate – MRL**
   - **1.4 Copper Concentrate – Greatland**

2. **DUST EXTINCTION MOISTURE (DEM)**
   - **2.1 Spodumene Concentrate – PML**
   - **2.2 Spodumene Concentrate – MRL**
   - **2.3 Copper Concentrate – Greatland**

3. **RESPIRABLE CRYSTALLINE SILICA (RCS)**
   - **3.1 Spodumene Concentrate – PML**
     Note: only course and blend products will be exported from the Premises. The report provides results for samples of Fines (RCS = 0.12%) this product is used in production of the course blend (RCS = 0.032%) and will not be exported from or handled at the Premises.
   - **3.2 Spodumene Concentrate – MRL**
   - **3.3 Copper Concentrate – Greatland**

4. **ASBESTOS**
   - **4.1 Spodumene Concentrate – PML**
   - **4.2 Spodumene Concentrate – MRL**
   - **4.3 Copper Concentrate – Greatland**

5. **PARTICLE SIZE DISTRIBUTION (PSD)**
   - **5.1 Spodumene Concentrate Blend – PML**
   - **5.2 Spodumene Concentrate Coarse - PML**
   - **5.3 Spodumene Concentrate – MRL**
   - **5.4 Copper Concentrate – Greatland**

6. **RADIOACTIVITY (RAD)**
   - **6.1 Spodumene Concentrate – PML**
   - **6.2 Spodumene Concentrate – MRL**
   - **6.3 Copper Concentrate – Greatland**

ANNEXURE D – AIR QUALITY ASSESSMENT REPORT

Pilbara Ports – Lumsden Point

Air Quality Modelling Assessment

Final Report
Version 3

Prepared for: Pilbara Ports

January 2025

Project Number: 1494

Pilbara Ports – Lumsden Point

Final Report

Executive Summary

Pilbara Ports is seeking to develop a new materials handling facility at Lumsden Point in the Port of Port Hedland for the export of bulk concentrates including Spodumene and Copper. Pilbara Ports are seeking approval for a total throughput of 4.25 million tonnes per annum (Mtpa). The proposed handling methodologies include:

- Rotating containers:
  - Product loading into rotating containers offsite, then driven to the facility along sealed roads.
  - Rotating containers unloaded into ships via cranes.
- Storage sheds, conveyer system, and shiploader:
  - Truck unloading into negatively pressured storage sheds (with enclosed stacking/reclaiming) fitted with extraction systems.
  - Enclosed outgoing conveyors to a common use conveyor system with transfer stations (enclosed).
  - Conveyer-fed shiploader.

Overview of assessment

The potential impacts were determined through a dispersion modelling study, which incorporated site-specific meteorological data, emissions information, source characteristics, and the location of model receptors, using the PHIC Cumulative Air Model (PHIC CAM) (AERMOD). An inventory of particulate (dust) emissions from the current operations was developed and projected for the conceptual change in operations.

Emission rates for the conceptual facilities were determined using emission factors sourced from the NPI EETM for Mining. The study adopted a conservative approach, consistent with similar assessments in the region, using AERMOD software (version 12).

Ground-level particulates (as PM_{10} concentrations) were predicted at sensitive receptors and the surrounding environment and were compared with the relevant air quality assessment criteria. Predicted project contributions were presented in isolation of non-project related emission sources, and with the inclusion of background and existing concentrations to represent the potential changes in cumulative impacts in the Port Hedland area.

Key findings

Modelling was undertaken for the following scenarios:

- Base Case – Existing and approved PHIC Operations (as per Section 3.6) with background.
- Scenario 1: 4.25 Mtpa (received and exported):
  - Loading of rotating containers with 2 cranes @ 1,200 tonnes/hour.
- Scenario 2: 4.25 Mtpa (received and exported)
  - Both sheds are receiving ore on a continual basis.
  - Loading via shiploader (conveyors/transfer stations).
- Scenario 3: 4.25 Mtpa (received and exported)
  - Both sheds are receiving ore on a continual basis.
  - 50 % is loaded via shiploader (conveyors/transfer stations).
  - 50 % is loaded via rotating containers with 2 cranes @ 1,200 tonnes/hour.

The results of the modelling, at selected receptors, make the following predictions:

- For Scenario 1:
    - At the Taplin St, Neptune Pl, and South Hedland receptors, there is no discernible change in the predicted 24-hour averaged PM_{10} concentration from the model results
- For Scenario 2:
    - At the Taplin St, receptor the maximum predicted 24-hour averaged PM_{10} concentration is 2 µg/m^3, with the 99th, 95th, and 90th percentile being approximately 1 µg/m^3.
    - At both the Neptune Pl and South Hedland receptors the maximum predicted PM_{10} concentration is approximately 1 µg/m^3 with the lower statistics recording minimal to no predicted impact discernible from the model results.
- For Scenario 3:
    - At the Taplin St, receptor the maximum predicted 24-hour averaged PM_{10} concentration is 2 µg/m^3, with the 99th and 95th percentile being approximately 1 µg/m^3.
    - The predicted PM_{10} concentrations are nearly identical to Scenario 2, resulting in minimal impact at the nominated receptors.

Overall, at the Taplin St receptor the modelling indicates that:

- On a cumulative basis (existing and approved with background PM_{10} concentrations) the proposed operations at Lumsden Point:
    - Are not predicted to result in an increase in the number of excursions at Taplin St.
    - Are not predicted to result in an increase to the maximum predicted 24-hour averaged PM_{10} concentrations.
    - Are not predicted to result in increases to the lower percentiles (99th, 95th, 90th and 70th).
    - The model does indicate that the predicted annual average PM_{10} concentration may increase by up to 0.2 µg/m^3.
- On a standalone (isolated) basis the proposed operations at Lumsden Point;
    - Are predicted to potentially result in a 24-hour averaged increase of up to 2 µg/m^3.
    - For the lower percentiles the potential increase in the 24-hour averaged PM_{10} concentration is predicted to be no more than 1 µg/m^3.

Table of Contents

Tables

Figures

1 Introduction

1.1 Background

Pilbara Ports has requested Environmental Technologies & Analytics (ETA) to undertake emission estimation and dispersion modelling for the export of bulk concentrates including Spodumene and Copper from a new facility at Lumsden Point in the Port of Port Hedland (Port). The purpose of this project is to determine the potential change in ground level concentrations of particulates (as PM_{10}) that could occur at receptors within Port Hedland under different facility designs.

Pilbara Ports are seeking approval for a total throughput of 4.25 million tonnes per annum (Mtpa). The proposed handling methodologies include:

- Rotating containers:
  - Product loading into rotating containers offsite, then driven to the facility along sealed roads.
  - Rotating containers unloaded into ships via cranes.
- Storage sheds, conveyer system, and shiploader:
  - Truck unloading into negatively pressured storage sheds (with enclosed stacking/reclaiming) fitted with extraction systems.
  - Enclosed outgoing conveyors to a common use conveyor system with transfer stations (enclosed).
  - Conveyer-fed shiploader.

Modelling was undertaken using the atmospheric dispersion AERMOD configured in accordance with the work undertaken as part of the Port Hedland Industries Council (PHIC) Cumulative Air Model (CAM) including meteorology, receptors, background concentrations and existing and approved operations in the region.

1.2 Scope of work

The scope of work includes:

- Development of an emissions inventory for the conceptual facility for three different loading scenarios
- Atmospheric dispersion modelling for the proposed emissions of each scenario
- Modelling using the PHIC CAM (AERMOD), with relevant modelling files provided by PHIC. This includes the validated meteorological and background data as well as specified model configurations and in accordance with the Air Quality Modelling Guidance Notes (DoE, 2006)
- Comparing the modelled results to the air quality criteria as detailed in the '*Port Hedland Regulatory Strategy, 2021*'.

The scenarios considered are:

- Base Case – Existing and approved operations with background air quality (background).
- Scenario 1: 4.25 Mtpa facility loading a single vessel via rotating containers, with and without background.
- Scenario 2: 4.25 Mtpa facility loading a single vessel via shiploader and associated conveyer system, with and without background.
- Scenario 3: 4.25 Mtpa facility loading two vessels simultaneously via rotating containers (50%) and shiploader system (50%), with and without background.

This report outlines the methodology for the emission estimation and atmospheric modelling of the predicted dust impacts associated with the proposed conceptual facility, across the model domain, as shown in Figure 1-1.

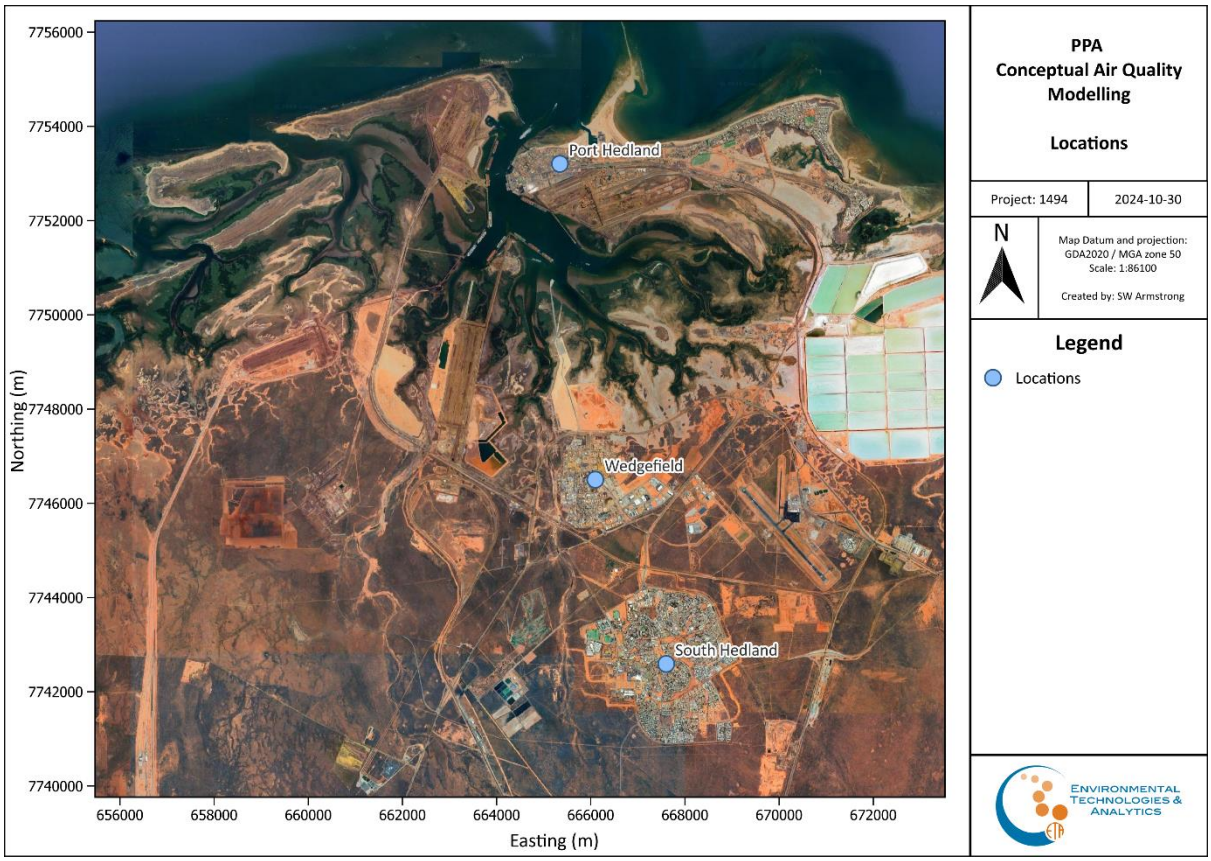


Figure 1-1: Project location and setting.

1.3 Structure of Report

This report describes the methods and findings of an air dispersion modelling assessment of the potential impacts to the air environment arising from the conceptual project scenarios. The assessment includes:

- The study approach and methodology in Section 2.
- Project emission estimation and inventory in Section 3.
- An evaluation of the predicted ground-level concentrations and interpretation of the potential impact of the Project (Section 4).
- Conclusions of the assessment presented in Section 5.

The appendices contain supporting information.

2 Assessment methodology

The following section outlines the methodology utilised in the assessment of the potential changes in the air quality resulting from the conceptual modelling of two potential export facilities in the Port Hedland airshed.

2.1 Dispersion modelling

During 2014 and 2015 the Port Hedland Industries Council (PHIC) undertook an extensive atmospheric dispersion model validation project where it was determined that both AERMOD and CALPUFF were suitable models to determine the potential impact from industrial sources in the area. In brief:

- AERMOD is the acronym or common name for the AERMIC Dispersion Model. It was designed by the AERMIC Committee (the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee) to treat elevated and surface emission sources in terrain that is simple or complex (Perry, Cimorelli et al, 2005). In 2013 AERMOD replaced AUSPLUME as the regulatory model for air quality assessments in Victoria by the Victorian Environmental Protection Authority (EPAV).
- CALPUFF is the dispersion module of the CALMET/CALPUFF suite of models. It is a multi-layer, multi species, non-steady-state puff dispersion model that can simulate the effects of time-varying and space-varying meteorological conditions on pollutant transport, transformation and removal. The model contains algorithms for near-source effects such as building downwash, partial plume penetration, sub-grid scale interactions as well as longer range effects such as pollutant removal, chemical transformation, vertical wind shear and coastal interaction effects. The model employs dispersion equations based on a Gaussian distribution of pollutants across released puffs and considers the complex arrangement of emissions from point, area, volume and line sources (Scire et al., 2008).

2.2 AERMOD modelling

For this assessment, the dispersion model AERMOD (version 12) was used. The model was configured in accordance with the work undertaken as a part of the PHIC CAM (PEL, 2015). As noted in the PHIC CAM report (PEL, 2015) there are some factors that need to be considered when using the PHIC CAM (AERMOD) including:

- The model may over-predict concentrations at Richardson St.
- At the Kingsmill St and Taplin St receptors the model results are considered to be reasonable reflections of actual monitored air quality.
- The number of excursions of the interim target at Taplin St are considered to be reasonable reflections.

To undertake the air quality assessment, emission estimation and modelling were undertaken for the following scenarios:

- Scenario 1 – A 4.25 Mtpa ship loading facility located at Lumsden point utilising rotating containers unloaded by two cranes.
- Scenario 2 – A 4.25 Mtpa processing (fully enclosed and negatively pressurised stockpile sheds with stacking/reclaiming, enclosed truck dumping) and ship loading facility located at Lumsden Point
- Scenario 3 – A 4.25 Mtpa processing (fully enclosed and negatively pressurised stockpile sheds with stacking/reclaiming, enclosed truck dumping) and ship loading facility located at Lumsden Point utilising both rotating containers and the shiploader and conveyer system, with each system responsible for 50% of the material being inloaded into the stockpile sheds.

Each of the scenarios is presented both in isolation and alongside background and existing concentrations to represent the potential changes in cumulative impacts in the Port Hedland area. Other existing and approved operations in the region include:

- BHP at 330 Mtpa
- Pilbara Ports at 28 Mtpa
- Fortescue at 210 Mtpa
- North West Infrastructure at 50 Mtpa
- Roy Hill Facility at 70Mtpa.

2.3 Meteorological file

The AERMOD modelling incorporated the meteorological file developed as part of the PHIC (CAM) project which has been accepted for consistent use across studies by the Western Australian (WA) Department of Water and Environment Regulation (DWER).

A summary of the stability and mixing heights of the PHIC CAM meteorological file is provided in Appendix A.

2.4 Grid system

The modelling undertaken as part of this assessment utilised the same receptors, and their locations, as that contained within the PHIC CAM report (PEL, 2015). These receptors, and their coordinates, are listed in Table 2-1 and presented graphically in Figure 2-1. Note that due to the number of receptors within the Town of Port Hedland, not all receptors have been named in the figure.

Table 2-1: Receptors, and locations, used in assessment

Receptor Locations	Easting (m)	Northing (m)
Harbour	664,350	7,753,240
Richardson Street	664,763	7,753,402
BMX	665,281	7,753,352
Kingsmill Street	665,508	7,753,450
Historic Hospital Site	665,870	7,753,420
Taplin Street	667,030	7,753,435
St Celia's School	667,292	7,753,390
Holiday Inn	667,780	7,753,480
Shop	668,050	7,753,280
All Seasons Inn	668,140	7,753,530
Council	668,450	7,753,640
Neptune Place	669,441	7,754,077
Primary School	670,631	7,754,008
South Hedland	666,600	7,743,439
Wedgefield	665,526	7,747,107

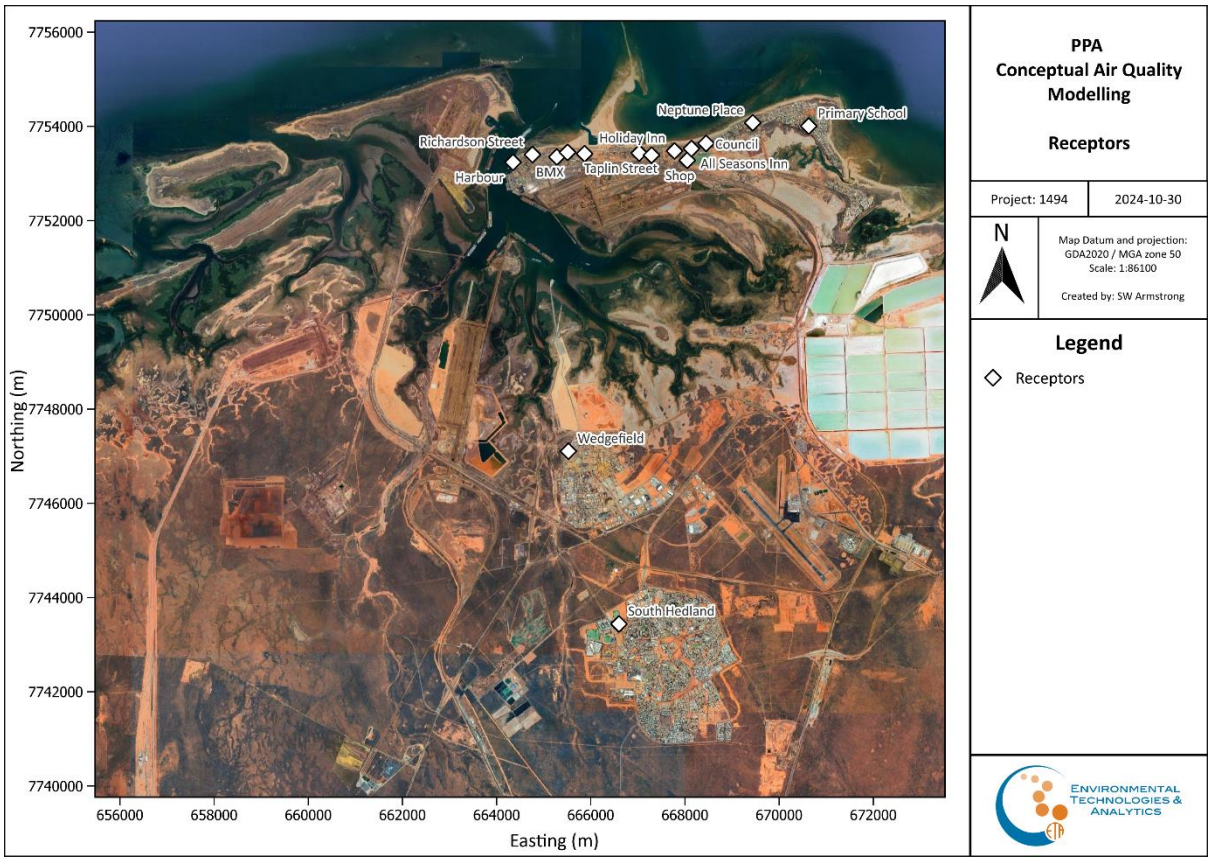


Figure 2-1: Location of receptors used in assessment.

2.5 Air quality assessment criteria

To evaluate air pollution and achieve what is regarded as acceptable air quality, environmental authorities set air quality standards or guidelines for several common air pollutants.

For Port Hedland specifically, the Port Hedland Regulatory Strategy (DWER, 2021) adopted the Dust Management Taskforce (Taskforce) guideline value of 70 µg/m^3 for PM_{10} (24-hour average) as an Air Guideline Value (AGV) and the criteria used in this assessment is presented in Table 2-2. This AGV applies to residential areas in Port Hedland, wherever people live on a permanent basis.

Table 2-2: Ambient Air Quality Standards and Goals

Pollutant	Criteria	Averaging Period	Comment
Particulate (as PM_{10})	70 µg/m^3	24-hour	At Taplin Street with 10 excursion per year

2.6 Background concentrations

It has long been recognised that the Pilbara region, due to its semi-arid climate, is a naturally dusty environment. This was highlighted in the aggregated emission study undertaken by SKM in 2000 (SKM, 2003) which calculated that the Pilbara region emitted approximately 170,000 tonnes (t) of windblown particulates for the financial

year 1999/2000. The naturally dusty environment is also apparent from the monitoring data from the PHIC Yule River monitor. This monitor is located approximately 42 kilometres (km) south-west of Port Hedland and is indicative of regional concentrations. To illustrate the potential natural dustiness of the region, the number of excursions of the 50 µg/m^3 National Environment Protection Council (NEPC, 2019) ambient air quality standard for particulates (as PM_{10}) for each financial year since 2012/2013 (FY13) are presented in Table 2-3.

From Table 2-3 it is apparent that there can be a large annual variation in the number of excursions of the criteria ranging from 24 in FY13 down to 1 in FY17 and FY22. This indicates that the quantity of particulates can vary significantly from year to year and that the background file used in the assessment should be considered as indicative only.

Table 2-3: Number of annual excursions of 50 µg/m^3 (24-hour average concentration) at Yule River

Financial Year	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Number of excursions	24	8	18	5	1	8	15	13	8	1	20

For this assessment the PHIC CAM background file was utilised and the methodology for the development of this file is outlined in PEL (2015). The PEL (2015) report also noted that due to the way the file was calculated there is a high probability that not all fugitive sources within the Port Hedland region were accounted for. This provides further indication that the file should be considered as indicative only. The 24-hour statistics for the PHIC CAM background file are presented in Table 2-4 and presented graphically in Figure 2-2. From Table 2-4 it is apparent that the maximum 24-hour concentration is higher than the criteria which will affect the analysis of the modelling results, particularly when the maximum predicted concentrations, with background, are presented.

Table 2-4: Statistics of 24-hour PM_{10} PHIC CAM background file

Statistic	Concentration (µg/m^3)
Maximum	183
99th Percentile	53
95th Percentile	36
90th Percentile	32
70th Percentile	25
Average	22
Count >50 µg/m^3	5
Count >70 µg/m^3	1

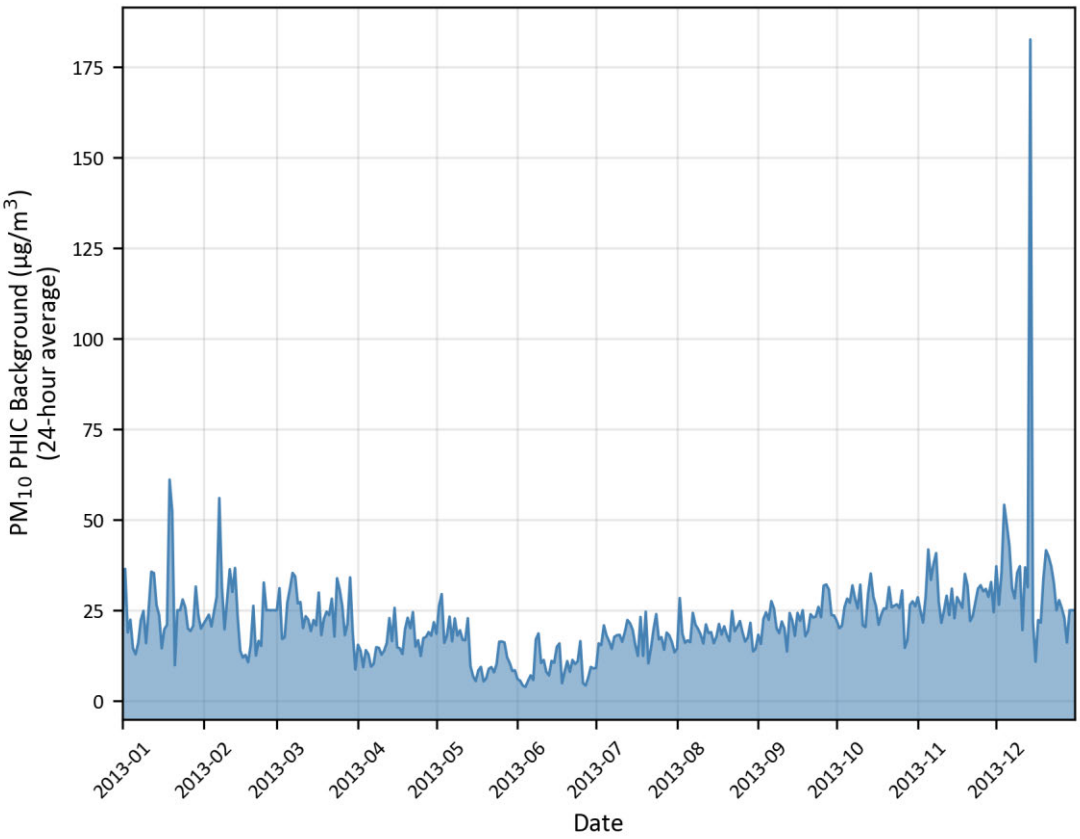


Figure 2-2: PHIC CAM background PM_{10} 24-hour concentrations (µg/m³).

2.7 Model uncertainty

Atmospheric dispersion models represent a simplification of the many complex processes involved in approximating ground-level concentrations of substances. The model uncertainties are associated with model chemistry and physics, data, and stochastic uncertainties. There are also inherent uncertainties in the behaviour of the random turbulence of the atmosphere.

Factors contributing to the general uncertainty in model results include:

- The turbulent (random) nature of dispersion in the turbulent atmosphere.
- Inaccuracies in the mathematical description of the physical and chemical processes that occur in the atmosphere (i.e. uncertainties in the numerical solutions).
- Stochastic uncertainties, as models predict 'ensemble mean' concentrations (i.e. they predict the mean concentrations that would result from a large set of observations under the specific conditions being modelled).
- Data uncertainty or variability, particularly in emission information and meteorological data inputs.

Regarding emissions information in particular, as predicted concentrations are proportional to emission rates, any errors in the emission rates will cause a proportional error in the model's predictions.

The uncertainty in modelling of extreme events, such as the maximum 1-hour ground-level concentration, is greater than the uncertainty in predicting concentrations averaged over a longer time period. Similarly, uncertainty in modelling the maximum predicted ground-level concentration at a discrete location is greater than the uncertainty in the maximum concentration predicted across the entire modelled domain. This is because the modelled concentration at a particular location is very sensitive to small changes in wind direction.

To ensure that potential air quality impacts are not underestimated, conservative assumptions have been applied as appropriate, to address key areas of uncertainty to provide over-predictions rather than under-predictions of ground-level concentrations.

3 Emissions to air estimation

When determining the potential impact of a facility, either existing or proposed, one of the critical inputs is the source emission file. The following sections outline the process whereby potential sources are identified, and quantified, based on the forecast throughput tonnage of the facility.

3.1 Emission sources

As outlined in Section 1.2, the emissions for a 4.25 Mtpa export facility were determined. This conceptual facility, for modelling purposes, is located within the new Pilbara Ports Lumsden Point facility. The material is brought into the facility in sealed rotating containers (Scenario 1), by truck for storage in stockpile sheds (Scenario 2), or both (Scenario 3). The emission sources therefore consist of:

- Fully sealed rotating containers opened within the ships' holds
- Semi enclosed truck dumping into two sheds
- Enclosed, negatively pressurised stockpile sheds with dust collectors including stacking and reclaiming.
- Enclosed transfer stations and conveyors
- Semi enclosed ship-loading with a telescope chute and a dust suppression system on a 'as required' basis.

The location of the fugitive dust emitting sources at this conceptual facility are displayed in Figure 3-1. The coordinates for each of the modelled sources, along with the model parameters, are presented in Appendix B.

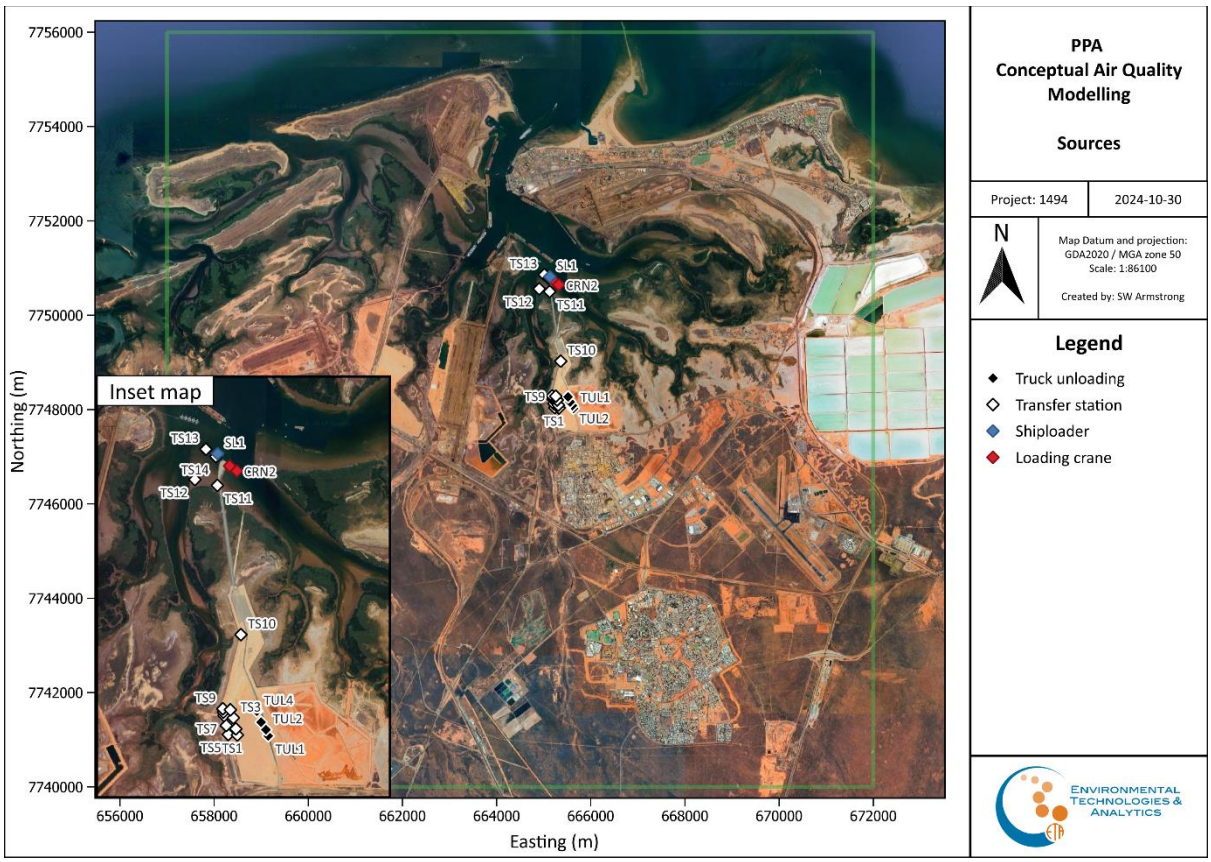


Figure 3-1: Location of dust emissions sources for the full conceptual facility.

3.2 Emission estimates

This section outlines the emission estimation process for the proposed operations. Emission estimates are sourced from this inventory for inclusion in the dispersion model. Emissions from all key sources have been identified according to accepted methods.

3.2.1 Unloading ore

The emissions for unloading ore from trucks into the sheds have been calculated using the default value for truck (dumping overburden) from Appendix A of the EETM for Mining (EA, 2012). This emission factor is as follows:

- PM_{10}: 0.0043 kg/t

The statistics of the annual emissions for loading for PM_{10} are contained in Appendix C.

3.2.2 Handling and transferring

The emissions for the handling and transferring were determined using the default emission factors for high moisture content ores from Table 3 of the EETM for Mining (EA, 2012). This emission factor is as follows:

- PM_{10}: 0.002 kg/t

The statistics of the annual emissions for PM_{10} from these sources are contained in Appendix C.

3.2.3 Unloading rotating containers

The emissions for unloading rotating containers were determined using the default emission factors for high moisture content ores from Table 3 of the EETM for Mining (EA, 2012). This emission factor is as follows:

- PM_{10}: 0.002 kg/t

The statistics of the annual emissions for unloading rotating containers for PM_{10} are contained in Appendix C.

3.2.4 Shiploading

The emissions for shiploading were determined using the default emission factors for high moisture content ores from Table 3 of the EETM for Mining (EA, 2012). The emission factor is as follows:

- PM_{10}: 0.002 kg/t

The statistics of the annual emissions for shiploading for PM_{10} are contained in Appendix C.

3.3 Emission controls

Emissions controls (for dust abatement) were included in the emissions estimation and these controls are summarised in Table 3-1, along with the percentage reduction applied to each source type.

Table 3-1: Dust abatement in place (included in model)

Conceptual facility	Equipment	Dust abatement description	Emission reduction
4.25 Mtpa Lumsden Point	Unloading from trucks	Partially enclosed with dust suppression	75%
	Stackers/reclaimer in storage shed	Fully enclosed with negative pressure	100%
	Transfer stations (inload/outload)	Fully enclosed	95%
	Shiploader	Chute with water sprays	70%
	Unloading rotating containers	Containerised, dropped inside hold	90% [1]

3.4 Stockpile shed dust collector stacks

To keep the stockpile sheds negatively pressurised, each active shed uses dust collectors and fans to transport air outside of the sheds through stacks. The parameters that describe each stack have been provided by Pilbara Ports and are described in Table 3-2 below.

Table 3-2: Stack input parameters

Input parameter	Value
Stack height (tip from ground level)	28 m
Shed height	38 m
Stack tip diameter	1.65 m
Volumetric flow	154,080 m^3/hr
Exit speed	20.0 m/s
Emission rate (per cubic meter)	15 mg/m^3
Emission rate (per second)	0.642 g/s

3.5 Emission summary

The emissions for the conceptual 4.25 Mtpa facility at Lumsden point under the three scenarios described above in Section 1.2 are presented for Scenarios 1, 2, and 3 in Table 3-3, Table 3-4, and Table 3-5, respectively.

[1] Lewis, T., North, M. (2021). Winds of Change – Reintroducing Bulk Nickel Exports at Esperance Port. IGO limited, Perth, Western Australia.

Table 3-3: Total estimated emissions for Scenario 1 – 4.25 Mtpa facility using rotating containers

Emission source	Estimated Emissions (kg/yr)	Relative contribution
Rotating container unloading	916	100%
Total Emissions	**916**	**100%**

Table 3-4: Total estimated emissions for Scenario 2 – 4.25 Mtpa facility using a shiploader and conveyers

Emission source	Estimated Emissions (kg/yr)	Relative contribution
Unloading ore from trucks	4,556	15%
Dust collector stacks	20,246	67%
Transfer stations	3,217	11%
Shiploader	2,413	6%
Total Emissions	**30,432**	**100%**

Table 3-5: Total estimated emissions for Scenario 3 – 4.25 Mtpa facility using both rotating containers and a shiploader and conveyer system

Emission source	Estimated Emissions (kg/yr)	Relative contribution
Unloading ore from trucks	2278	9%
Dust collector stacks	20,246	78%
Rotating container unloading	425	2%
Transfer stations	1,742	7%
Shiploader	1,307	5%
Total Emissions	**25,998**	**100%**

3.6 Cumulative scenario

The modelling of cumulative emissions is a requirement of DWER (DoE, 2006). The cumulative emission sources for this study include both the current and planned export operations in the Port Hedland region including:

- 330 Mtpa from the BHP operations at Nelson Point and Finucane Island.
- 28 Mtpa from the Pilbara Ports operations at Utah Point.
- 210 Mtpa from the Fortescue operations.
- 50 Mtpa from the proposed NWI operations.
- 70 Mtpa from the Roy Hill facility.

Emissions for existing and planned operations with the Port Hedland airshed were obtained from PHIC and the full emission estimation process is outlined in the PEL (2015) report.

4 Predicted air quality impact

As outlined in Section 2.1 this assessment utilised the PHIC CAM to determine the potential impact associated two conceptual operations. The modelling focus is on particulates, primarily as PM_{10}.

For this assessment the specific scenarios considered were:

- Base Case – Existing and approved PHIC Operations (as per Section 3.6) with background.
- Scenario 1: 4.25 Mtpa facility loading a single vessel via rotating containers, with and without background.
- Scenario 2: 4.25 Mtpa facility loading a single vessel via shiploader and associated conveyer system, with and without background.
- Scenario 3: 4.25 Mtpa facility loading two vessels simultaneously via rotating containers (50%) and shiploader system (50%), with and without background.

4.1 Base Case (existing and approved)

The base case represents the predicted ground level concentrations (PM_{10}) from the existing and approved operations within the Port Hedland airshed including:

- 330 Mtpa from the BHP operations at Nelson Point and Finucane Island.
- 28 Mtpa from the Pilbara Ports operations at Utah Point.
- 210 Mtpa from the Fortescue operations.
- 50 Mtpa from the proposed NWI operations.
- 70 Mtpa from the Roy Hill facility.

The predicted ground level concentrations at three receptors; Taplin St, Neptune Pl, and South Hedland for this scenario, inclusive of background concentrations (Section 2.6) are presented in Table 4-1. Of note is that:

- Currently there are 7 predicted excursions of the criteria at the Taplin St receptor.

The predicted results at all receptors in the region are contained in Appendix D.

Table 4-1: Predicted 24-hour average ground level concentrations of PM_{10} at Receptors for the base case (µg/m³)

Statistic	Taplin St.	Neptune Pl.	South Hedland
Maximum	200	193	187
99th percentile	74	61	61
95th percentile	57	44	46
90th percentile	51	40	39
75th percentile	43	34	30
Average	34.3	27.3	25.5
Count >70 µg/m³	7	1	1

The isopleths for the cumulative predicted maximum PM_{10} 24-hour concentrations for Scenario 1 are presented in Figure 4-1 with the predicted annual average PM_{10} concentrations presented in Figure 4-2.

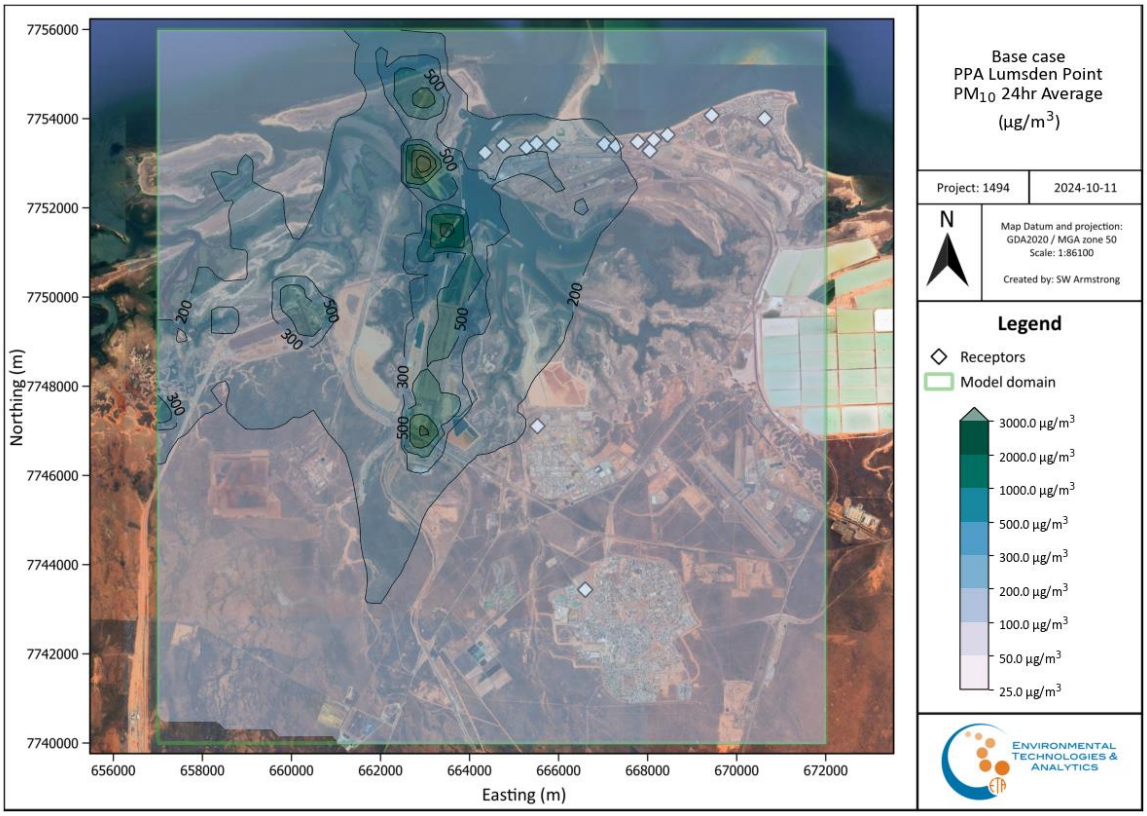


Figure 4-1: Base case – Maximum predicted 24-hour PM_{10} concentrations from existing and approved operations.

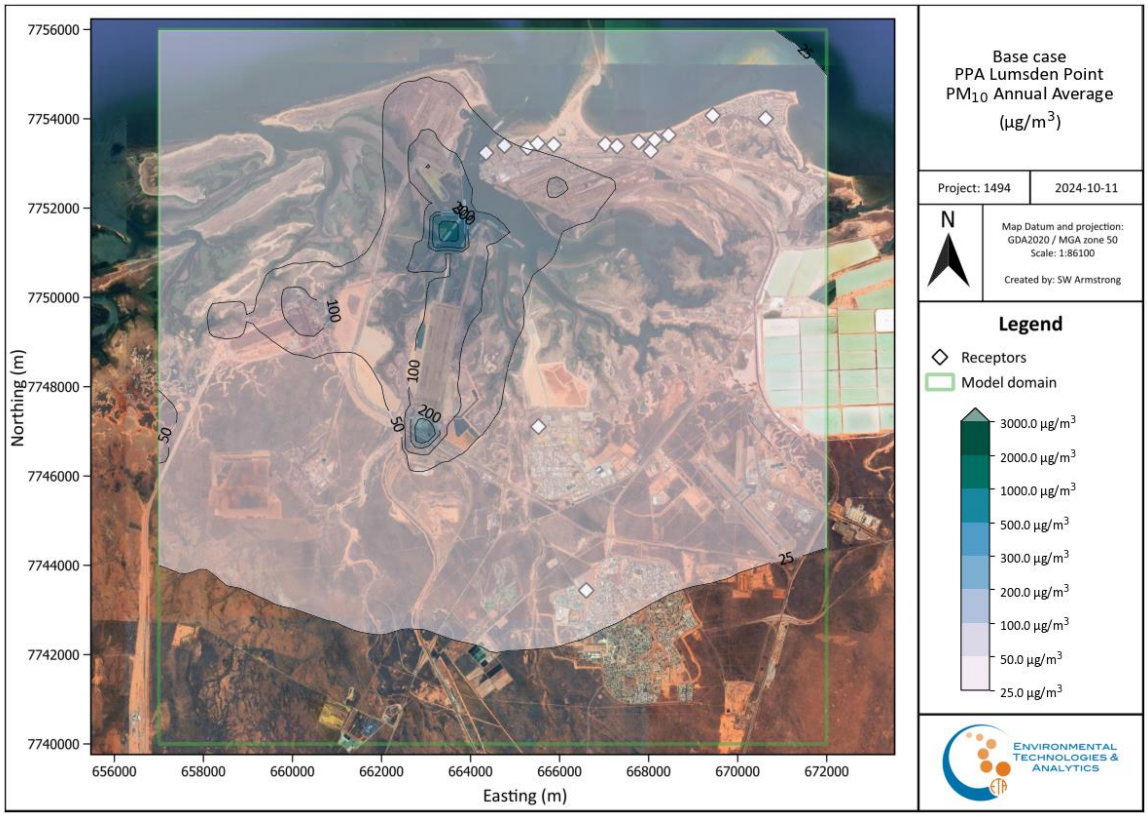


Figure 4-2: Base case – Predicted annual average PM_{10} concentrations from existing and approved operations.

4.2 Scenario 1: Rotating containers (4.25 Mtpa)

The predicted ground level concentrations at three receptors; Taplin St, Neptune Pl, and South Hedland for Scenario 1 (loading via rotating containers) are presented in Table 4-2. These results indicate that:

- At the Taplin St, Neptune Pl, and South Hedland receptors, the impact on the maximum predicted 24-hour averaged PM_{10} concentration and the annual average PM_{10} concentrations are negligible.
- There are no additional excursions of the PM_{10} criteria at Taplin St.

The predicted results at all receptors in the region are contained in Appendix D.

Table 4-2: Predicted 24-hour average ground level concentrations of PM_{10} at Receptors for Scenario 1 with and without background (µg/m³)

Statistic	Taplin St.		Neptune Pl.		South Hedland	
	Isolated	*With BG*	*Isolated*	*With BG*	*Isolated*	*With BG*
Maximum	0	200	0	193	0	187
99th percentile	0	74	0	61	0	61
95th percentile	0	57	0	44	0	46
90th percentile	0	51	0	40	0	39
75th percentile	0	43	0	34	0	30
Average	0.0	34.3	0.0	27.3	0.0	25.5
Count >70 µg/m³	0	7	0	1	0	1

The isopleths for the cumulative predicted maximum PM_{10} 24-hour concentrations for Scenario 1 are presented in Figure 4-3 with the predicted annual average PM_{10} concentrations presented in Figure 4-4.

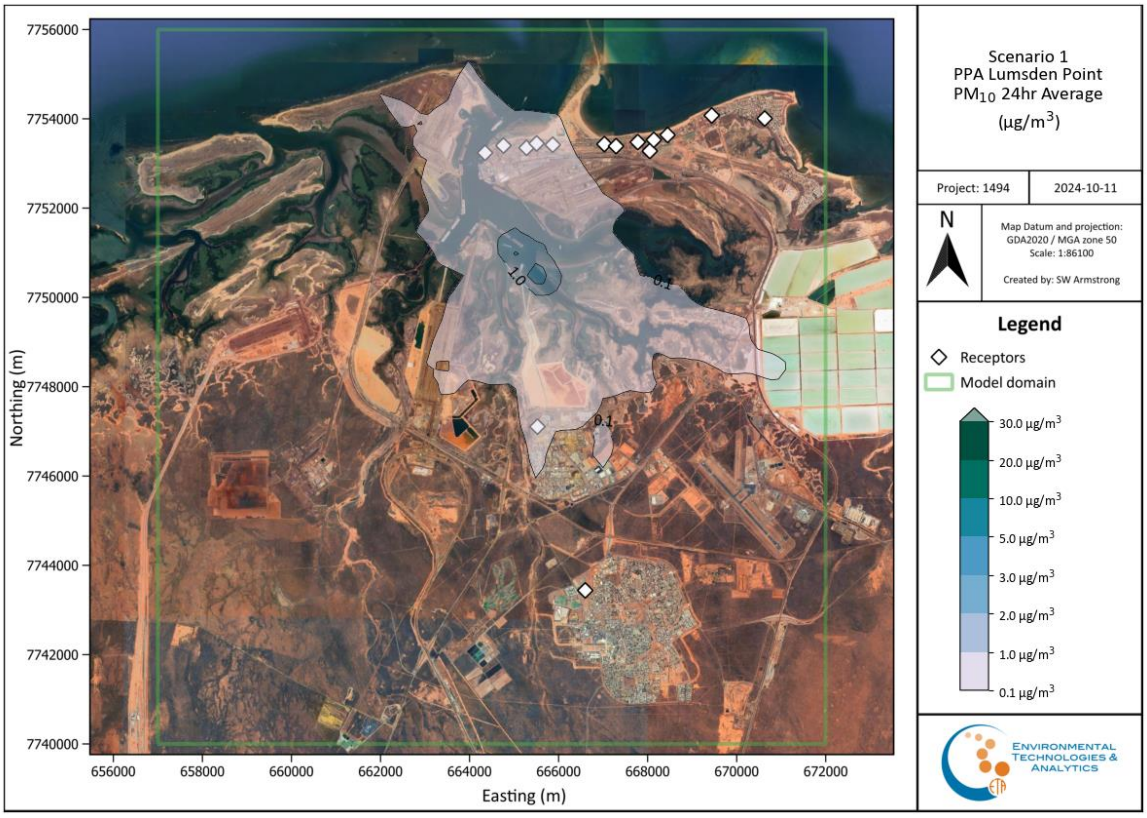


Figure 4-3: Scenario 1 – Maximum predicted 24hr average PM_{10} concentrations.

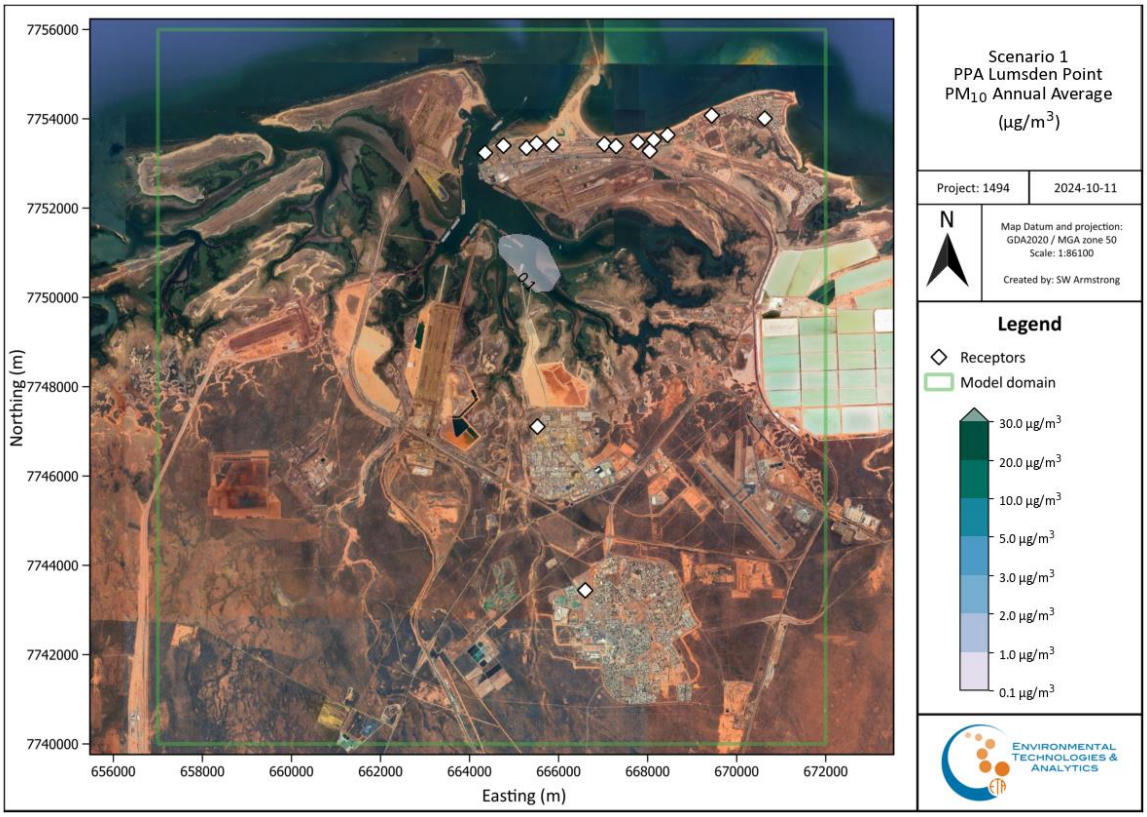


Figure 4-4: Scenario 1 – Predicted annual average PM_{10} concentrations.

4.3 Scenario 2: Shiploader (4.25 Mtpa)

The predicted ground level concentrations at three receptors; Taplin St, Neptune Pl, and South Hedland for Scenario 2 (loading via shiploader) are presented in Table 4-3. These results indicate that:

- At the Taplin St, receptor the maximum predicted 24-hour averaged PM_{10} concentration is 2 µg/m^3, with the 99th, 95th, and 90th percentile being approximately 1 µg/m^3.
- At both the Neptune Pl and South Hedland receptors the maximum predicted PM_{10} concentration is approximately 1 µg/m^3 with the lower statistics recording minimal to no predicted impact discernible from the model results.
- There are no additional excursions of the PM_{10} criteria at Taplin St.

The predicted results at all receptors in the region are contained in Appendix D.

Table 4-3: Predicted 24-hour average ground level concentrations of PM_{10} at Receptors for Scenario 2 with and without background (µg/m³)

Statistic	Taplin St.		Neptune Pl.		South Hedland	
	Isolated	*With BG*	*Isolated*	*With BG*	*Isolated*	*With BG*
Maximum	2	200	1	193	1	187
99th percentile	1	74	0	61	1	62
95th percentile	1	57	0	44	0	46
90th percentile	1	51	0	40	0	39
75th percentile	0	43	0	34	0	30
Average	0.2	34.5	0.1	27.4	0.1	25.6
Count >70 µg/m³	0	7	0	1	0	1

The isopleths for the cumulative predicted maximum PM_{10} 24-hour concentrations for Scenario 2 are presented in Figure 4-5 with the predicted annual average PM_{10} concentrations presented in Figure 4-6.

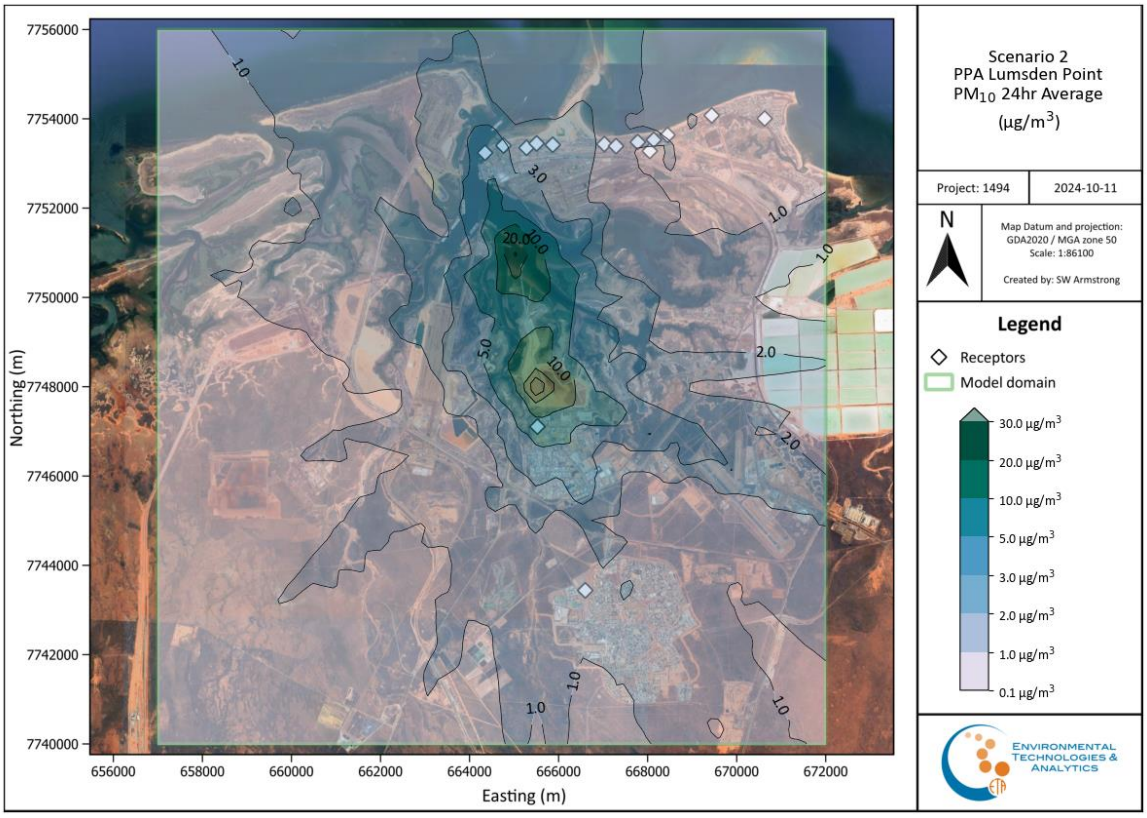


Figure 4-5: Scenario 2 – Maximum predicted 24hr average PM_{10} concentrations.

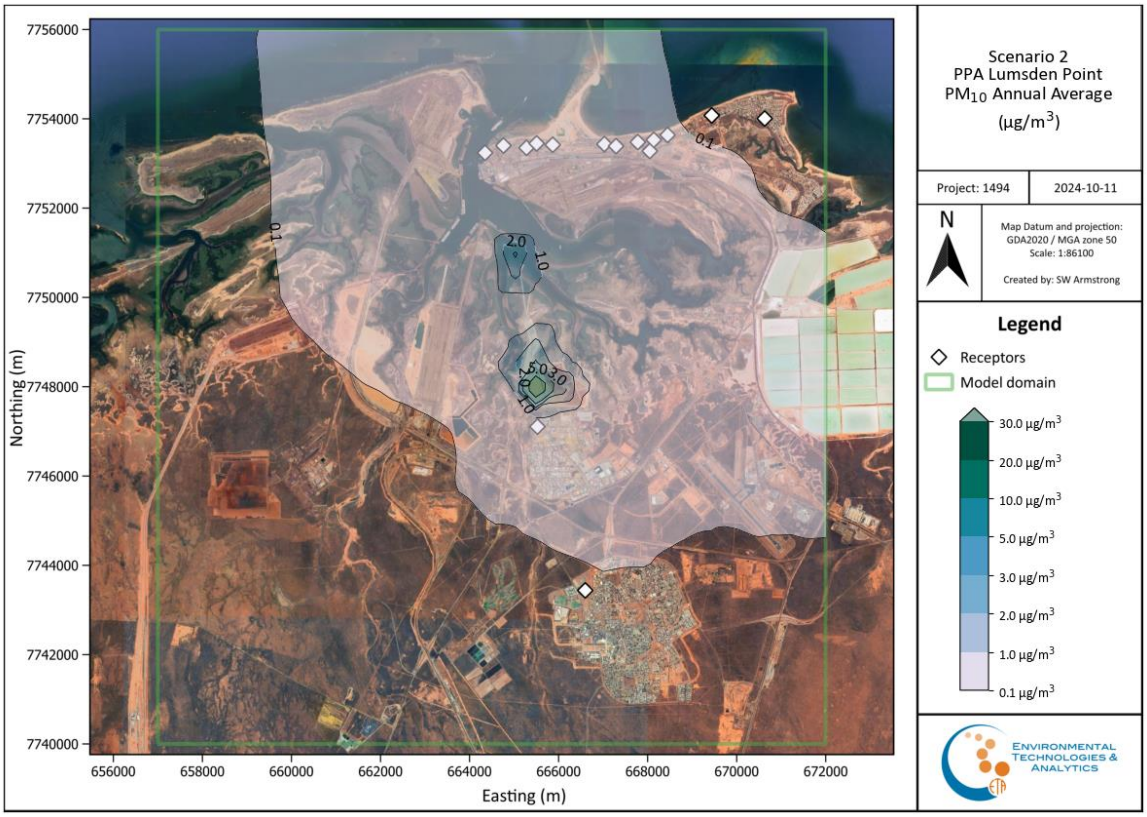


Figure 4-6: Scenario 2 – Predicted annual average PM_{10} concentrations.

4.4 Scenario 3: Rotating containers (2.125 Mtpa) and shiploader (2.125 Mtpa)

The predicted ground level concentrations at three receptors; Taplin St, Neptune Pl, and South Hedland for Scenario 3 are presented in Table 4-4. These results indicate that:

- At the Taplin St, receptor the maximum predicted 24-hour averaged PM_{10} concentration is 2 µg/m^3, with the 99th and 95th percentile being approximately 1 µg/m^3.
- At both the Neptune Pl and South Hedland receptors the maximum predicted PM_{10} concentration is approximately 1 µg/m^3 with the lower statistics recording minimal to no predicted impact discernible from the model results.
- The maximum 24-hour predicted PM_{10} concentration is nearly identical to Scenario 2.
- There are no additional excursions of the PM_{10} criteria at Taplin St.

The predicted results at all receptors in the region are contained in Appendix D.

Table 4-4: Predicted 24-hour average ground level concentrations of PM_{10} at Receptors for Scenario 3 with and without background (µg/m³)

Statistic	Taplin St.		Neptune Pl.		South Hedland	
	Isolated	*With BG*	*Isolated*	*With BG*	*Isolated*	*With BG*
Maximum	2	200	1	193	1	187
99th percentile	1	74	0	61	1	62
95th percentile	1	57	0	44	0	46
90th percentile	0	51	0	40	0	39
75th percentile	0	43	0	34	0	30
Average	0.2	34.5	0.1	27.4	0.1	25.6
Count >70 µg/m³	0	7	0	1	0	1

The isopleths for the cumulative predicted maximum PM_{10} 24-hour concentrations for Scenario 3 are presented in Figure 4-7 with the predicted annual average PM_{10} concentrations presented in Figure 4-8.

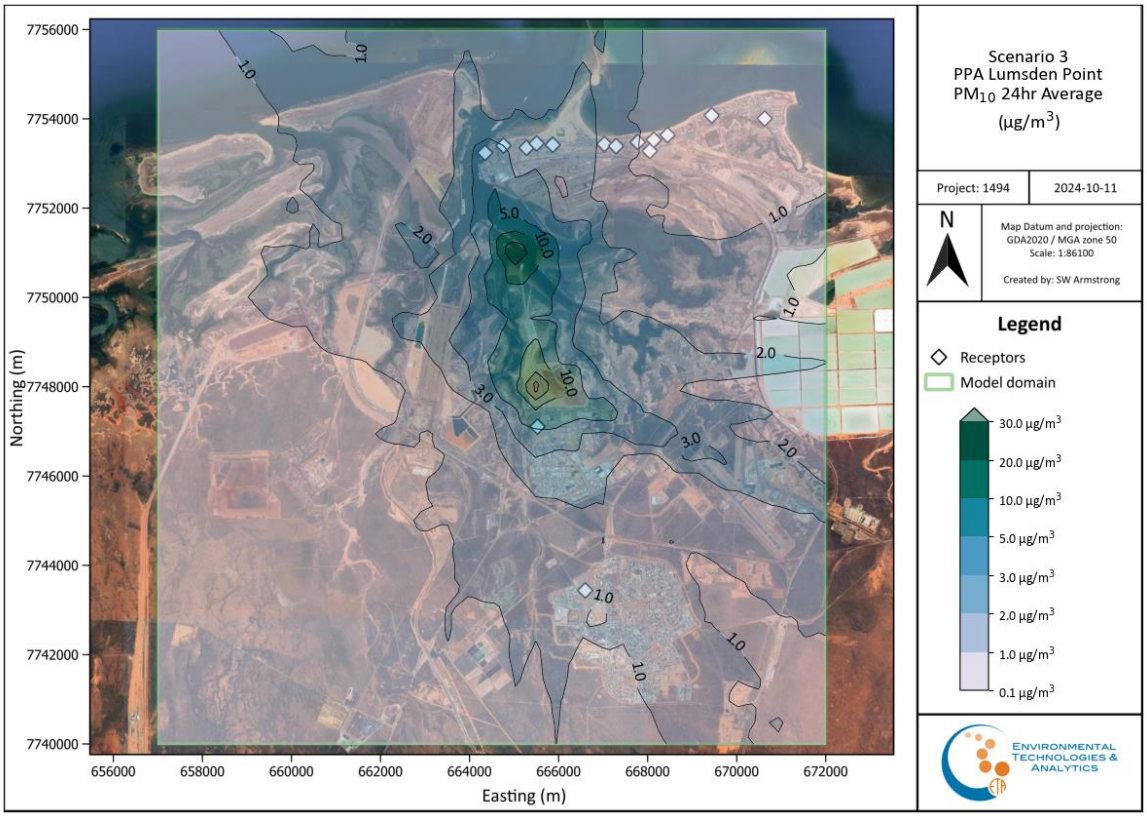


Figure 4-7: Scenario 3 – Maximum predicted 24hr average PM_{10} concentrations.

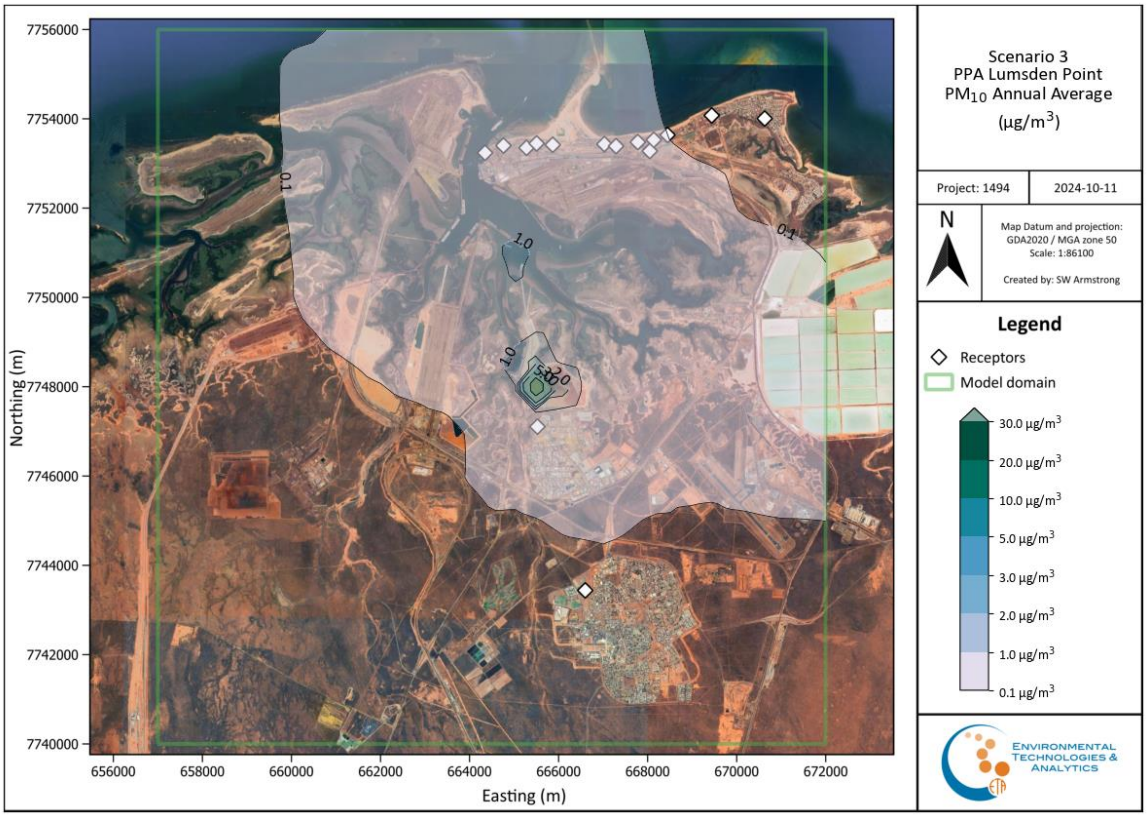


Figure 4-8: Scenario 3 – Predicted annual average PM_{10} concentrations.

4.5 Comparison at Taplin St

For comparison purposes the predicted ground level concentrations at the Taplin St receptor are presented for each scenario in Table 4-5. These results indicate that:

- On a cumulative basis (existing and approved with background PM_{10} concentrations) the proposed operations at Lumsden Point:
  - Are not predicted to result in an increase in the number of excursions at Taplin St.
  - Are not predicted to result in an increase to the maximum predicted 24-hour averaged PM_{10} concentrations.
  - Are not predicted to result in increases to the lower percentiles (99^{th}, 95^{th}, 90^{th} and 75^{th}).
  - The model does indicate that the predicted annual average PM_{10} concentration may increase by up to 0.2 µg/m^3.
- On a standalone (isolated) basis the proposed operations at Lumsden Point:
  - Are predicted to potentially result in a 24-hour averaged increase of up to 2 µg/m^3.
  - For the lower percentiles the potential increase in the 24-hour averaged PM_{10} concentration is predicted to be no more than 1 µg/m^3.

Table 4-5: Predicted 24-hour ground level concentrations of PM_{10} at Taplin St. receptor in each scenario

Statistic	Base case	Scenario 1		Scenario 2		Scenario 3	
	With BG	*Isolated*	*With BG*	*Isolated*	*With BG*	*Isolated*	*With BG*
Maximum	200	0	200	2	200	2	200
99th percentile	74	0	74	1	74	1	74
95th percentile	57	0	57	1	57	1	57
90th percentile	51	0	51	1	51	0	51
75th percentile	43	0	43	0	43	0	43
Average	34.3	0.0	34.5	0.2	34.5	0.2	34.5
Count >70 µg/m^3	7	0	7	0	7	0	7

5 Conclusions

Pilbara Ports is seeking to develop a new materials handling facility at Lumsden Point in the Port of Port Hedland for the export of bulk concentrates including Spodumene and Copper. Pilbara Ports are seeking approval for a total throughput of 4.25 million tonnes per annum (Mtpa). The proposed handling methodologies include:

- Rotating containers:
  - Product loading into rotating containers offsite, then driven to the facility along sealed roads.
  - Rotating containers unloaded into ships via cranes.

- Shiploader:
  - Truck unloading into negatively pressured storage sheds (with enclosed stacking/reclaiming) fitted with extraction systems.
  - Enclosed outgoing conveyors to a common use conveyor system with transfer stations (enclosed).
  - Conveyer-fed shiploader.

Modelling was undertaken using the atmospheric dispersion AERMOD configured in accordance with the work undertaken as part of the PHIC CAM including meteorology, receptors, background concentrations and existing and approved operations in the region.

For this modelling assessment four modelling scenarios were considered:

- Base case: Existing and approved operations including:
  - BHP at 330 Mtpa
  - FMG at 210Mtpa
  - Roy Hill at 70 Mtpa
  - Pilbara Ports at 28 Mtpa
  - NWI at 50 Mtpa
  - Includes PHIC 2013 background file

- Scenario 1: 4.25 Mtpa (received and exported):
  - Loading of rotating containers with 2 cranes @ 1,200 tonnes/hour.
- Scenario 2: 4.25 Mtpa (received and exported)
  - Both sheds are receiving ore on a continual basis.
  - Loading via shiploader (conveyors/transfer stations).
- Scenario 3: 4.25 Mtpa (received and exported)
  - Both sheds are receiving ore on a continual basis.
  - 50 % is loaded via shiploader (conveyors/transfer stations).
  - 50 % is loaded via rotating containers with 2 cranes @ 1,200 tonnes/hour.

The results of the modelling, at selected receptors, make the following predictions:

- For Scenario 1:
  - At the Taplin St, Neptune Pl, and South Hedland receptors, there is no discernible change in the predicted 24-hour averaged PM_{10} concentration from the model results
- For Scenario 2:
  - At the Taplin St, receptor the maximum predicted 24-hour averaged PM_{10} concentration is 2 $\mu g/m^3$, with the 99th, 95th, and 90th percentile being approximately 1 $\mu g/m^3$.

- At both the Neptune Pl and South Hedland receptors the maximum predicted PM_{10} concentration is approximately 1 µg/m^3 with the lower statistics recording minimal to no predicted impact discernible from the model results.

- For Scenario 3:
  - At the Taplin St, receptor the maximum predicted 24-hour averaged PM_{10} concentration is 2 µg/m^3, with the 99th and 95th percentile being approximately 1 µg/m^3.
  - The predicted PM_{10} concentrations are nearly identical to Scenario 2, resulting in minimal impact at the nominated receptors.

Overall, at the Taplin St receptor the modelling indicates that:

- On a cumulative basis (existing and approved with background PM_{10} concentrations) the proposed operations at Lumsden Point:
  - Are not predicted to result in an increase in the number of excursions at Taplin St.
  - Are not predicted to result in an increase to the maximum predicted 24-hour averaged PM_{10} concentrations.
  - Are not predicted to result in increases to the lower percentiles (99th, 95th, 90th and 70th).
  - The model does indicate that the predicted annual average PM_{10} concentration may increase by up to 0.2 µg/m^3.
- On a standalone (isolated) basis the proposed operations at Lumsden Point:
  - Are predicted to potentially result in a 24-hour averaged increase of up to 2 µg/m^3.
  - For the lower percentiles the potential increase in the 24-hour averaged PM_{10} concentration is predicted to be no more than 1 µg/m^3.

6 References

DoE (2006). Air Quality Modelling Guidance Notes. Department of Environment, Western Australia.

DSD (2010). Port Hedland Air Quality and Noise Management Plan, The Port Hedland Dust Management Taskforce Report. Department of State Development, Government of Western Australia

DSD (2017). Port Hedland Dust Management Taskforce Report to Government. Government of Western Australia, Department of State Development, Government of Western Australia.

DWER (2018). Industry Regulation fact sheet: Managing Dust in Port Hedland. Available online at: https://www.der.wa.gov.au/images/documents/our-work/community-updates/port-hedland/DWER_DOH_Fact_Sheet_-_Port_Hedland_air_quality.pdf

DWER (2021). Port Hedland Regulatory Strategy. May 2021.

DWER (2021b). L4513/1969/18 Application for licence Amendment.

Environment Australia (2012). National Pollutant Inventory Emission Estimation Technique Manual for Mining Version 3.1. Available online at: http://www.npi.gov.au/system/files/resources/7e04163a-12ba-6864-d19a-f57d960aae58/files/mining.pdf

Lewis, T., North, M. (2021). Winds of Change – Reintroducing Bulk Nickel Exports at Esperance Port. IGO limited, Perth, Western Australia.

NEPC (2016). Variation to the National Environment protection (Ambient Air Quality) Measure - Impact statement.

PEL (2015). Port Hedland Cumulative Air Model - Model Comparison. Report prepared by Pacific Environment for the Port Hedland Industries Council. Perth. Western Australia, Australia

Perry, S.G., A.J. Cimorelli, et al. (2005). AERMOD: A Dispersion Model for Industrial Source Applications. Part II: Model Performance against 17 Field Study Databases. Journal of Applied Meteorology 44(5):694-708.

SKM (2003). Aggregated Emission Inventory for the Pilbara Airshed. Report prepared for the Department of Environmental Protection, Perth, Western Australia, Australia.

SKM (2005). Improvement of NPI Fugitive Particulate Matter Emission Estimation Techniques. Available online at http://www.npi.gov.au/system/files/resources/d9d46a4c-f76e-fdc4-5d59-fd3f8181c5b8/files/pm10may05.pdf

7 Acronyms and Glossary

Acronym	Description
BWS	Belt wash station
CAM	Cumulative Air Model
CVR	Conveyor
DWER	Department of Water and Environmental Regulation
EE	Emissions estimation
EET	Emissions Estimation Technique
EF	Emission factor
ETA	Environmental Technologies& Analytics Pty Ltd
Fortescue	Fortescue Metals Group
GLC	Ground Level Concentration
g/s	grams per second
h/yr	Hours per year
kg	kilogram
kg/t	kilogram per tonne
kg/yr	kilograms per year
km	kilometre
m	metre
m/s	metres per second
mm	millimetre
Mt	Million tonnes

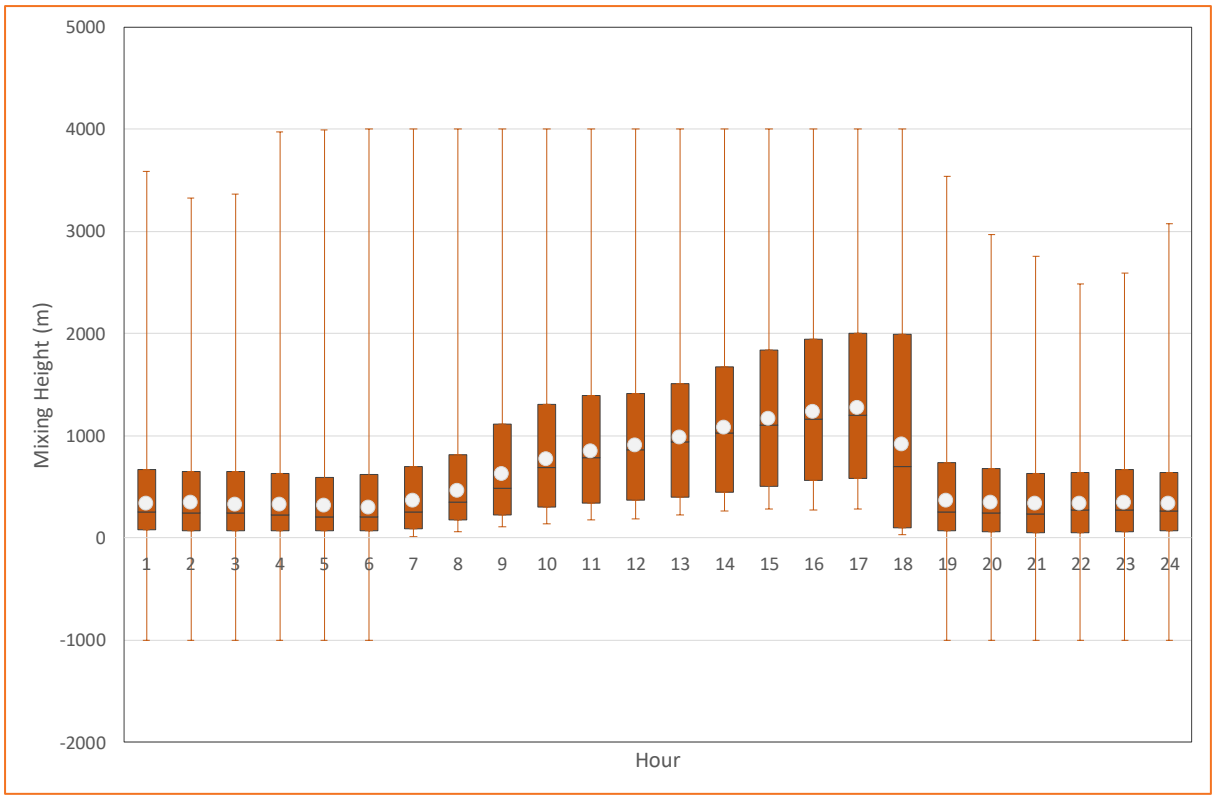
Acronym	Description
Mtpa	Million tonnes per annum
NEPM	National Environmental Protection Measure
NPI	National Pollutant Inventory
NWI	North West Infrastructure
PHIC	Port Hedland Industries Council
PM	Particulate matter, small particles and liquid droplets that can remain suspended in air.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of 10 µm or less.
PM_{10}	Particulate matter with an aerodynamic diameter of 2.5 µm or less.
t	Tonnes
t/h	Tonnes per hour
tpa	tonnes per annum
tph	tonnes per hour
TS	Transfer station
TSP	Total suspended particulates
$\mu g/m^3$	micro grams (one millionth of a gram) per cubic metre
µm	micrometre

8 Appendices

Appendix A – PHIC CAM Meteorology

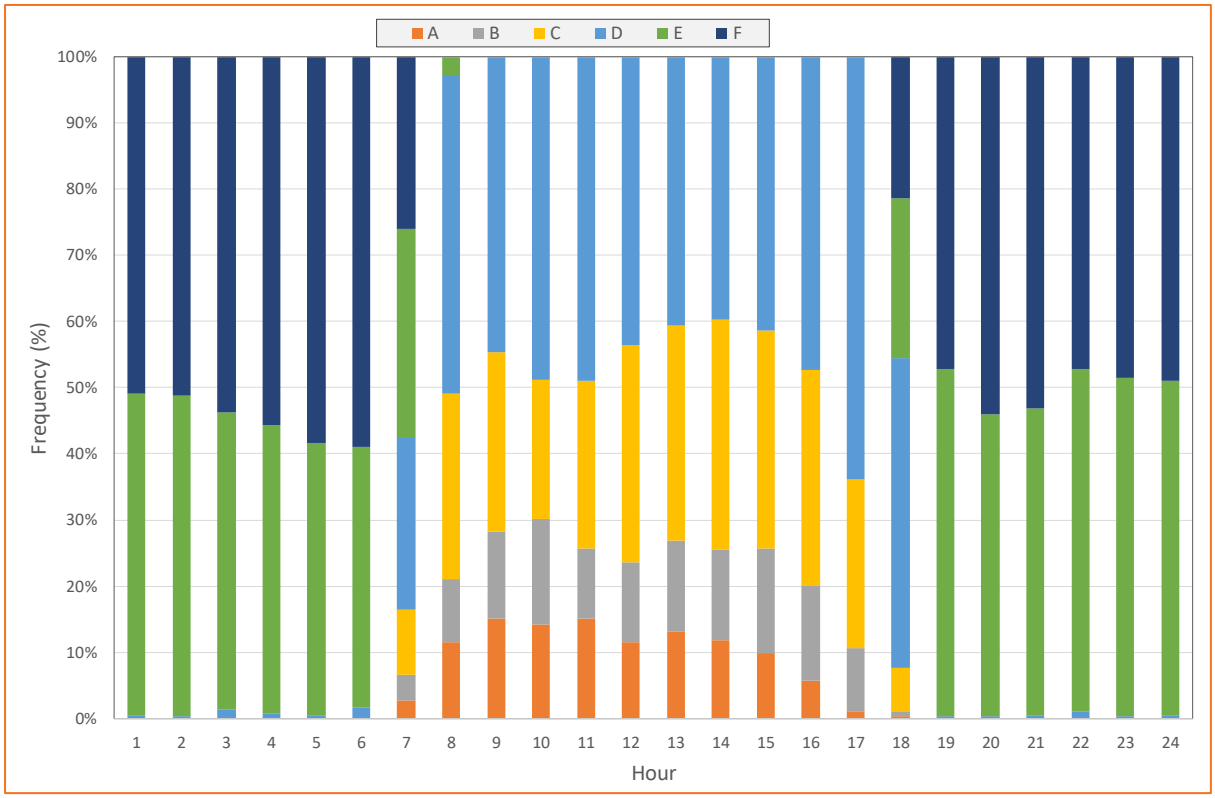
The full details on the meteorological file used in the assessment are contained in the PHIC CAM model comparison report (PEL, 2015). The following sections broadly outline the characteristics of the PHIC CAM meteorological file.

The diurnal statistics of the mixing height are presented in Appendix Figure 1. From this figure it is apparent that there is a gradual increase during the day followed by a marked decline in the average mixing height in the late afternoon. This decrease is due to the transition from convective to mechanical mixing.

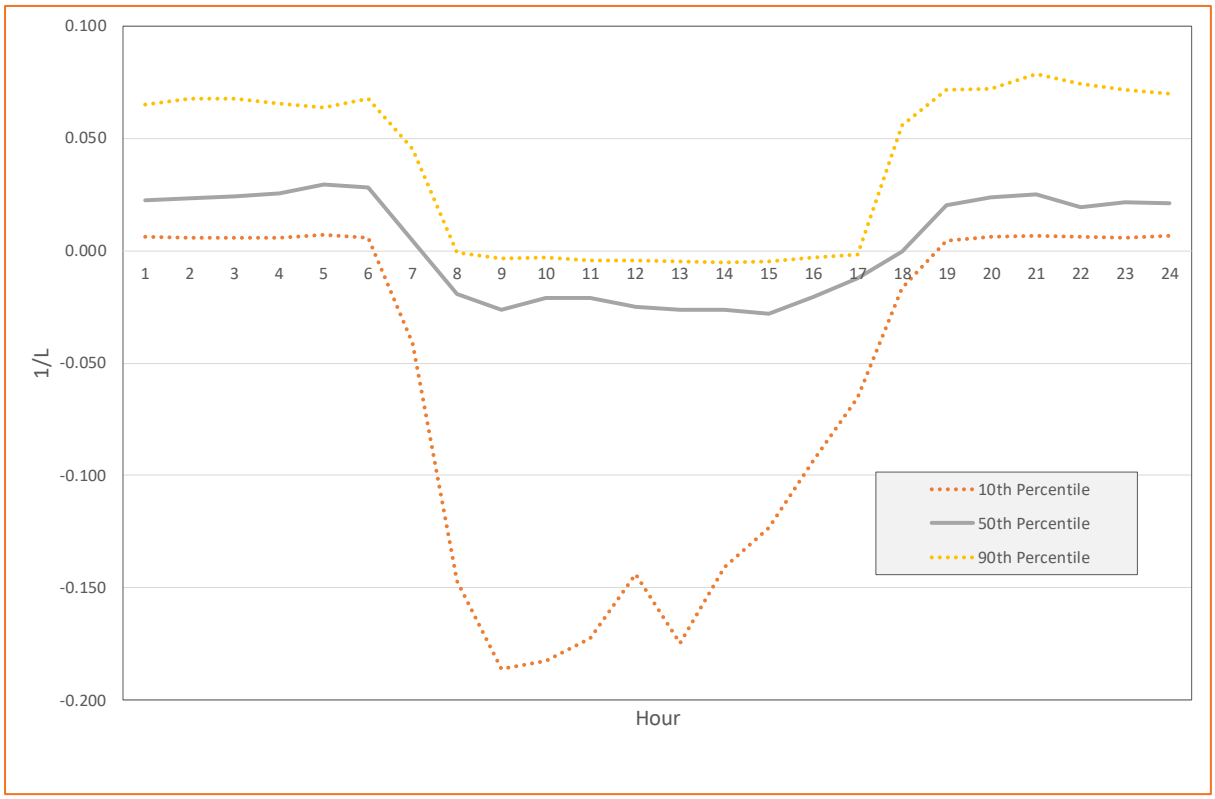


Appendix Figure 1: AERMET mixing height for the PHIC CAM

A plot of the atmospheric stability, by hour of the day, is presented in Appendix Figure 2. The profile shows that neutral (D) and unstable (A – C) atmospheric conditions occur during the daytime, with the night dominated by stable conditions (E – F). This is further confirmed in Appendix Figure 3 which shows the statistics, by hour of the day, of the Monin-Obukhov length.



Appendix Figure 2: Golder plot of stability classes by time of day



Appendix Figure 3: Hourly statistics of the Monin-Obukhov length

Appendix B – Emission Parameters

Appendix Table 1: Emission source parameters for a 4.25 Mtpa facility at Lumsden Point under different loading scenarios

ID	Used in Scenario	Easting (m)	Northing (m)	Height (m)	Sigma Y (m)	Sigma Z (m)
TUL1	2, 3	665,633	7,748,024	1	12.5	0.47
TUL2	2, 3	665,611	7,748,086	1	12.5	0.47
TUL3	N/A	665,565	7,748,157	1	12.5	0.47
TUL4	N/A	665,525	7,748,266	1	12.5	0.47
CRN1	1, 3	665,250	7,750,696	10	25	4.7
CRN2	1, 3	665,322	7,750,646	10	25	4.7
TS1	2, 3	665,327	7,748,034	25	1.75	11.63
TS2	2, 3	665,311	7,748,095	25	1.75	11.63
TS3	N/A	665,288	7,748,203	25	1.75	11.63
TS4	N/A	665,260	7,748,280	25	1.75	11.63
TS5	2, 3	665,237	7,748,039	3	1.75	1.4
TS6	2, 3	665,217	7,748,127	3	1.75	1.4
TS7	N/A	665,195	7,748,226	3	1.75	1.4
TS8	N/A	665,188	7,748,260	3	1.75	1.4
TS9	2, 3	665,183	7,748,293	3	1.75	1.4
TS10	2, 3	665,362	7,749,026	3	1.75	1.4
TS11	2, 3	665,128	7,750,503	3	1.75	1.4
TS12	2, 3	664,906	7,750,561	3	1.75	1.4
TS13	2, 3	665,016	7,750,861	3	1.75	1.4
TS14	2, 3	665,114	7,750,788	3	1.75	1.4
SL	2, 3	665,132	7,750,816	10	25	4.7

Appendix C – Emission Rates

Appendix Table 1: Emission statistics for Scenario 1, a 4.25 Mtpa facility using rotating containers (g/s)

ID	Maximum	99th Percentile	95th Percentile	90th Percentile	75th Percentile	Average
CRN1	0.03	0.03	0.03	0.03	0.03	0.01
CRN2	0.03	0.03	0.03	0.03	0.03	0.02

Appendix Table 2: Emission statistics for Scenario 2, a 4.25 Mtpa facility using a shiploader and conveyer system (g/s)

ID	Maximum	99th Percentile	95th Percentile	90th Percentile	75th Percentile	Average
TUL1	0.08	0.08	0.08	0.08	0.08	0.08
TUL2	0.07	0.07	0.07	0.07	0.07	0.07
TS1	0.10	0.10	0.10	0.00	0.00	0.00
TS2	0.10	0.10	0.10	0.00	0.00	0.00
TS5	0.10	0.10	0.10	0.00	0.00	0.00
TS6	0.10	0.10	0.10	0.00	0.00	0.00
TS9	0.10	0.10	0.10	0.10	0.00	0.00
TS10	0.10	0.10	0.10	0.10	0.00	0.00
TS11	0.10	0.10	0.10	0.10	0.00	0.00
TS12	0.10	0.10	0.10	0.10	0.00	0.00
TS13	0.10	0.10	0.10	0.10	0.00	0.00
TS14	0.10	0.10	0.10	0.10	0.00	0.00
SL	0.58	0.58	0.58	0.58	0.00	0.00

Appendix Table 3: Emission statistics for Scenario 3, a 4.25 Mtpa facility using both rotating containers and a shiploader and conveyer system (g/s)

ID	Maximum	99th Percentile	95th Percentile	90th Percentile	75th Percentile	Average
TUL1	0.04	0.04	0.04	0.04	0.04	0.04
TUL2	0.03	0.03	0.03	0.03	0.03	0.03
CRN1	0.03	0.03	0.03	0.03	0.00	0.01
CRN2	0.03	0.03	0.03	0.03	0.00	0.01
TS1	0.10	0.10	0.00	0.00	0.00	0.00
TS2	0.10	0.10	0.00	0.00	0.00	0.00
TS5	0.10	0.10	0.00	0.00	0.00	0.00
TS6	0.10	0.10	0.00	0.00	0.00	0.00
TS9	0.10	0.10	0.10	0.00	0.00	0.01
TS10	0.10	0.10	0.10	0.00	0.00	0.01
TS11	0.10	0.10	0.10	0.00	0.00	0.01
TS12	0.10	0.10	0.10	0.00	0.00	0.01
TS13	0.10	0.10	0.10	0.00	0.00	0.01
TS14	0.10	0.10	0.10	0.00	0.00	0.01
SL	0.58	0.58	0.58	0.00	0.00	0.04

Appendix D – Model Results

Appendix Table 4: Base Case - Predicted 24-hour ground level concentrations of PM_{10} for PHIC only, with background (µg/m³)

Source	Harbour	Richardson St	BMX	Kingsmill St	Hospital	Taplin St	St Cecilia's	Holiday Inn	Shop	All Seasons	Council	Neptune Pl	Primary School	South Hedland	Wedgefield
Maximum	217	212	223	222	217	200	198	195	195	194	194	193	192	187	193
99th percentile	134	138	103	96	91	74	70	66	64	65	64	61	59	61	99
95th percentile	106	89	81	79	73	57	56	52	53	51	49	44	42	46	72
90th percentile	89	79	73	68	63	51	49	46	48	45	44	40	38	39	63
75th percentile	73	62	58	56	52	43	42	40	40	39	37	34	33	30	48
Average	60.4	52.6	48.8	45.7	43.0	34.3	33.3	31.4	31.5	30.4	29.5	27.3	26.3	25.5	37.5
Count > 70	109	60	42	31	25	7	4	3	2	3	1	1	1	1	22

Appendix Table 5: Scenario 1 - Predicted 24-hour ground level concentrations of PM_{10} for a 4.25 Mtpa facility using rotating containers without background (µg/m³)

Source	Harbour	Richardson St	BMX	Kingsmill St	Hospital	Taplin St	St Cecilia's	Holiday Inn	Shop	All Seasons	Council	Neptune Pl	Primary School	South Hedland	Wedgefield
Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99th percentile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95th percentile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90th percentile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75th percentile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Count > 70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix Table 6: Scenario 1 - Predicted 24-hour ground level concentrations of PM_{10} for a 4.25 Mtpa facility using rotating containers with background (µg/m³)

Source	Harbour	Richardson St	BMX	Kingsmill St	Hospital	Taplin St	St Cecilia's	Holiday Inn	Shop	All Seasons	Council	Neptune Pl	Primary School	South Hedland	Wedgefield
Maximum	217	212	223	222	217	200	198	195	195	194	194	193	192	187	193
99th percentile	134	138	103	96	91	74	70	66	64	65	64	61	59	61	99
95th percentile	106	89	81	79	73	57	56	52	53	51	49	44	42	46	72
90th percentile	89	79	73	68	63	51	49	46	48	45	44	40	38	39	63
75th percentile	73	62	58	56	52	43	42	40	40	39	37	34	33	30	48
Average	60.5	52.6	48.8	45.7	43.0	34.3	33.3	31.4	31.5	30.4	29.5	27.3	26.3	25.5	37.5
Count > 70	109	60	42	31	25	7	4	3	2	3	1	1	1	1	22

Appendix Table 7: Scenario 2 - Predicted 24-hour ground level concentrations of PM_{10} for a 4.25 Mtpa facility using a shiploader without background (µg/m³)

Source	Harbour	Richardson St	BMX	Kingsmill St	Hospital	Taplin St	St Cecilia's	Holiday Inn	Shop	All Seasons	Council	Neptune Pl	Primary School	South Hedland	Wedgefield
Maximum	4	3	3	3	2	2	1	1	1	1	1	1	1	1	7
99th percentile	2	2	2	2	2	1	1	1	1	1	1	1	1	1	5
95th percentile	1	1	1	1	1	1	1	1	1	1	0	0	0	0	3
90th percentile	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1
75th percentile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Average	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6
Count > 70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix Table 8: Scenario 2 - Predicted 24-hour ground level concentrations of PM_{10} for a 4.25 Mtpa facility using a shiploader with background (µg/m³)

Source	Harbour	Richardson St	BMX	Kingsmill St	Hospital	Taplin St	St Cecilia's	Holiday Inn	Shop	All Seasons	Council	Neptune Pl	Primary School	South Hedland	Wedgefield
Maximum	218	212	223	222	217	200	198	195	195	194	194	193	192	187	195
99th percentile	134	138	103	97	92	74	70	66	64	65	64	61	59	62	99
95th percentile	106	89	81	79	73	57	56	52	53	51	49	44	42	46	73
90th percentile	89	80	73	68	63	51	49	47	48	45	44	40	38	39	63
75th percentile	73	62	58	56	52	43	42	40	40	39	37	34	33	30	49
Average	60.7	52.8	49.0	45.8	43.1	34.5	33.4	31.6	31.6	30.5	29.6	27.4	26.3	25.6	38.1
Count > 70	110	64	44	31	25	7	4	3	2	3	1	1	1	1	23

Appendix Table 9: Scenario 3 - Predicted 24-hour ground level concentrations of PM_{10} for a 4.25 Mtpa facility using both rotating containers and shiploader without background (µg/m³)

Source	Harbour	Richardson St	BMX	Kingsmill St	Hospital	Taplin St	St Cecilia's	Holiday Inn	Shop	All Seasons	Council	Neptune Pl	Primary School	South Hedland	Wedgefield
Maximum	4	2	3	2	3	2	2	1	1	1	1	1	1	1	5
99th percentile	2	2	1	1	1	1	1	1	1	1	1	0	1	1	4
95th percentile	1	1	1	1	1	1	1	1	0	0	0	0	0	0	2
90th percentile	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1
75th percentile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Average	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5
Count > 70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix Table 10: Scenario 3 - Predicted 24-hour ground level concentrations of PM_{10} for a 4.25 Mtpa facility using both rotating containers and shiploaders with background (µg/m³)

Source	Harbour	Richardson St	BMX	Kingsmill St	Hospital	Taplin St	St Cecilia's	Holiday Inn	Shop	All Seasons	Council	Neptune Pl	Primary School	South Hedland	Wedgefield
Maximum	218	212	223	222	217	200	198	195	195	194	194	193	192	187	194
99th percentile	134	138	103	97	92	74	71	66	64	65	64	61	59	62	99
95th percentile	106	89	81	79	73	57	56	52	53	51	49	44	42	46	73
90th percentile	89	79	73	68	63	51	49	47	48	45	44	40	38	39	63
75th percentile	73	62	58	56	52	43	42	40	40	39	37	34	33	30	49
Average	60.6	52.8	49.0	45.8	43.1	34.5	33.4	31.5	31.6	30.5	29.6	27.4	26.3	25.6	38.0
Count > 70	110	63	44	31	25	7	5	3	2	3	1	1	1	1	23

Appendix E – Model input file

```
**
**************************************
**
** AERMOD Input Produced by:
** AERMOD View Ver. 12.0.0
** Lakes Environmental Software Inc.
** Date: 30/10/2024
** File: C:\Users\sarmstrong\Projects\1494 PPA\S3_Combined_4.25Mtpa_Receptor\RHIO_all.ADI
**
**************************************
**
**
**************************************
** AERMOD Control Pathway
**************************************
**
**
CO STARTING
   TITLEONE 1494 - scenario 3 combined
   TITLETWO Run 3, Receptors, 30/10/2024
   MODELOPT CONC DRYDPLT WETDPLT ALPHA
   AVERTIME 1 24 ANNUAL
   POLLUTID PM_10
   RUNORNOT RUN
   LOW_WIND 0.2 0.2828 0.1 0.02 24 0
   ERRORFIL RHIO_all.err
CO FINISHED
**
**************************************
** AERMOD Source Pathway
**************************************
**
**
SO STARTING
** Source Location **
** Source ID - Type - X Coord. - Y Coord. **
   LOCATION TUL1          VOLUME     665632.930  7748024.384        7.000
   LOCATION TUL2          VOLUME     665610.634  7748086.237        6.540
   LOCATION TUL3          VOLUME     665562.447  7748160.316        7.000
   LOCATION TUL4          VOLUME     665519.294  7748269.636        6.320
   LOCATION CRN1          VOLUME     665249.884  7750696.482        0.000
   LOCATION CRN2          VOLUME     665322.280  7750645.506        0.000
   LOCATION TS1           VOLUME     665326.545  7748033.734        7.550
   LOCATION TS2           VOLUME     665311.442  7748094.867        6.160
   LOCATION TS3           VOLUME     665286.988  7748203.469        6.940
   LOCATION TS4           VOLUME     665257.501  7748283.301        6.640
   LOCATION TS5           VOLUME     665236.644  7748038.769        7.400
   LOCATION TS6           VOLUME     665217.345  7748127.209        4.350
   LOCATION TS7           VOLUME     665195.370  7748225.524        5.490
   LOCATION TS8           VOLUME     665188.129  7748260.089        5.440
   LOCATION TS9           VOLUME     665182.571  7748293.311        6.920
   LOCATION TS10          VOLUME     665362.255  7749026.406        6.110
   LOCATION TS11          VOLUME     665128.417  7750503.203        0.000
   LOCATION TS12          VOLUME     664906.002  7750560.620        0.000
   LOCATION TS13          VOLUME     665015.557  7750861.054        0.000
   LOCATION TS14          VOLUME     665114.330  7750787.668        0.000
   LOCATION SL            VOLUME     665132.354  7750816.429        0.000
   LOCATION STK1          POINT      665466.160  7747997.320       10.610
   LOCATION STK2          POINT      665451.300  7748130.300        5.570
** Source Parameters **
   SRCPARAM TUL1              1.0     1.000    12.500     0.465
   SRCPARAM TUL2              1.0     1.000    12.500     0.465
   SRCPARAM TUL3              1.0     1.000    12.500     0.465
   SRCPARAM TUL4              1.0     1.000    12.500     0.465
   SRCPARAM CRN1              1.0    10.000    25.000     4.651
   SRCPARAM CRN2              1.0    10.000    25.000     4.651
   SRCPARAM TS1               1.0    25.000     1.750    11.628
   SRCPARAM TS2               1.0    25.000     1.750    11.628
   SRCPARAM TS3               1.0    25.000     1.750    11.628
   SRCPARAM TS4               1.0    25.000     1.750    11.628
   SRCPARAM TS5               1.0     3.000     1.750     1.395
   SRCPARAM TS6               1.0     3.000     1.750     1.395
```

```
   SRCPARAM TS7              1.0     3.000     1.750     1.395
   SRCPARAM TS8              1.0     3.000     1.750     1.395
   SRCPARAM TS9              1.0     3.000     1.750     1.395
   SRCPARAM TS10             1.0     3.000     1.750     1.395
   SRCPARAM TS11             1.0     3.000     1.750     1.395
   SRCPARAM TS12             1.0     3.000     1.750     1.395
   SRCPARAM TS13             1.0     3.000     1.750     1.395
   SRCPARAM TS14             1.0     3.000     1.750     1.395
   SRCPARAM SL               1.0    10.000    25.000     4.651
   SRCPARAM STK1           0.642    28.000     0.000   20.0164      1.65
   SRCPARAM STK2           0.642    28.000     0.000   20.0164      1.65

** Building Downwash **
   BUILDHGT STK1           38.00    38.00    38.00    38.00    38.00    38.00
   BUILDHGT STK1           38.00    38.00    38.00    38.00    38.00    38.00
   BUILDHGT STK1           38.00    38.00    38.00    38.00    38.00    38.00
   BUILDHGT STK1           38.00    38.00    38.00    38.00    38.00    38.00
   BUILDHGT STK1           38.00    38.00    38.00    38.00    38.00    38.00
   BUILDHGT STK1           38.00    38.00    38.00    38.00    38.00    38.00

   BUILDHGT STK2           38.00    38.00    38.00    38.00    38.00    38.00
   BUILDHGT STK2           38.00    38.00    38.00    38.00    38.00    38.00
   BUILDHGT STK2           38.00    38.00    38.00    38.00    38.00    38.00
   BUILDHGT STK2           38.00    38.00    38.00    38.00    38.00    38.00
   BUILDHGT STK2           38.00    38.00    38.00    38.00    38.00    38.00
   BUILDHGT STK2           38.00    38.00    38.00    38.00    38.00    38.00

   BUILDWID STK1          285.99   283.29   271.99   252.42   225.18   191.10
   BUILDWID STK1          151.21   106.73    59.00   106.73   151.21   191.10
   BUILDWID STK1          225.18   252.42   271.99   283.29   285.99   280.00
   BUILDWID STK1          285.99   283.29   271.99   252.42   225.18   191.10
   BUILDWID STK1          151.21   106.73    59.00   106.73   151.21   191.10
   BUILDWID STK1          225.18   252.42   271.99   283.29   285.99   280.00

   BUILDWID STK2          285.99   283.29   271.99   252.42   225.18   191.10
   BUILDWID STK2          216.41   172.31   122.98   167.15   151.21   191.10
   BUILDWID STK2          225.18   252.42   271.99   283.29   285.99   280.00
   BUILDWID STK2          285.99   283.29   271.99   252.42   225.18   191.10
   BUILDWID STK2          216.41   172.31   122.98   167.15   151.21   191.10
   BUILDWID STK2          225.18   252.42   271.99   283.29   285.99   280.00

   BUILDLEN STK1          106.73   151.21   191.10   225.18   252.42   271.99
   BUILDLEN STK1          283.29   285.99   280.00   285.99   283.29   271.99
   BUILDLEN STK1          252.42   225.18   191.10   151.21   106.73    59.00
   BUILDLEN STK1          106.73   151.21   191.10   225.18   252.42   271.99
   BUILDLEN STK1          283.29   285.99   280.00   285.99   283.29   271.99
   BUILDLEN STK1          252.42   225.18   191.10   151.21   106.72    59.00

   BUILDLEN STK2          106.73   151.21   191.10   225.18   252.42   271.99
   BUILDLEN STK2          291.21   289.52   294.86   311.74   283.29   271.99
   BUILDLEN STK2          252.42   225.18   191.10   151.21   106.73    59.00
   BUILDLEN STK2          106.73   151.21   191.10   225.18   252.42   271.99
   BUILDLEN STK2          291.21   289.52   294.86   311.74   283.29   271.99
   BUILDLEN STK2          252.42   225.18   191.10   151.21   106.72    59.00

   XBADJ    STK1          -19.39   -43.18   -65.67   -86.16  -104.03  -118.74
   XBADJ    STK1         -129.85  -137.00  -140.00  -148.99  -153.45  -153.24
   XBADJ    STK1         -148.38  -139.02  -125.43  -108.02   -87.34   -64.00
   XBADJ    STK1          -87.34  -108.02  -125.43  -139.02  -148.38  -153.24
   XBADJ    STK1         -153.45  -148.99  -140.00  -137.00  -129.85  -118.74
   XBADJ    STK1         -104.03   -86.16   -65.67   -43.18   -19.39     5.00

   XBADJ    STK2         -147.77  -163.06  -173.40  -178.48  -178.13  -172.36
   XBADJ    STK2         -161.36  -148.99  -140.00  -137.00   -94.00   -73.88
   XBADJ    STK2          -51.52   -27.60    -2.83    22.02    46.20    68.98
   XBADJ    STK2           41.04    11.85   -17.69   -46.70   -74.29   -99.62
   XBADJ    STK2         -129.85  -140.53  -154.86  -174.73  -189.29  -198.10
   XBADJ    STK2         -200.89  -197.58  -188.26  -173.23  -152.93  -127.98

   YBADJ    STK1            5.99    11.80    17.25    22.18    26.43    29.88
   YBADJ    STK1           32.42    33.98    34.50    33.98    32.42    29.88
   YBADJ    STK1           26.43    22.18    17.25    11.80     5.99     0.00
   YBADJ    STK1           -5.99   -11.80   -17.25   -22.18   -26.43   -29.88
   YBADJ    STK1          -32.42   -33.98   -34.50   -33.98   -32.42   -29.88
```

```
YBADJ    STK1           -26.43   -22.18   -17.25   -11.80    -5.99     0.00

YBADJ    STK2           -31.74   -47.65   -62.11   -74.69   -84.99   -92.72
YBADJ    STK2           -65.02   -66.77   -66.49   -64.19   -87.46   -77.86
YBADJ    STK2           -65.89   -51.92   -36.37   -19.72    -2.47    14.86
YBADJ    STK2            31.74    47.65    62.11    74.69    84.99    92.72
YBADJ    STK2            65.02    66.77    66.49    64.19    87.46    77.86
YBADJ    STK2            65.89    51.92    36.37    19.72     2.47   -14.86

PARTDIAM CRN1 1 4 7 9
PARTDIAM CRN2 1 4 7 9
PARTDIAM TUL1 1 4 7 9
PARTDIAM TUL2 1 4 7 9
PARTDIAM TUL3 1 4 7 9
PARTDIAM TUL4 1 4 7 9
PARTDIAM TS1 1 4 7 9
PARTDIAM TS2 1 4 7 9
PARTDIAM TS3 1 4 7 9
PARTDIAM TS4 1 4 7 9
PARTDIAM TS5 1 4 7 9
PARTDIAM TS6 1 4 7 9
PARTDIAM TS7 1 4 7 9
PARTDIAM TS8 1 4 7 9
PARTDIAM TS9 1 4 7 9
PARTDIAM TS10 1 4 7 9
PARTDIAM TS11 1 4 7 9
PARTDIAM TS12 1 4 7 9
PARTDIAM TS13 1 4 7 9
PARTDIAM TS14 1 4 7 9
PARTDIAM SL 1 4 7 9
PARTDIAM STK1 1 4 7 9
PARTDIAM STK2 1 4 7 9
MASSFRAX CRN1 0.31 0.26 0.23 0.2
MASSFRAX CRN2 0.31 0.26 0.23 0.2
MASSFRAX TUL1 0.31 0.26 0.23 0.2
MASSFRAX TUL2 0.31 0.26 0.23 0.2
MASSFRAX TUL3 0.31 0.26 0.23 0.2
MASSFRAX TUL4 0.31 0.26 0.23 0.2
MASSFRAX TS1 0.31 0.26 0.23 0.2
MASSFRAX TS2 0.31 0.26 0.23 0.2
MASSFRAX TS3 0.31 0.26 0.23 0.2
MASSFRAX TS4 0.31 0.26 0.23 0.2
MASSFRAX TS5 0.31 0.26 0.23 0.2
MASSFRAX TS6 0.31 0.26 0.23 0.2
MASSFRAX TS7 0.31 0.26 0.23 0.2
MASSFRAX TS8 0.31 0.26 0.23 0.2
MASSFRAX TS9 0.31 0.26 0.23 0.2
MASSFRAX TS10 0.31 0.26 0.23 0.2
MASSFRAX TS11 0.31 0.26 0.23 0.2
MASSFRAX TS12 0.31 0.26 0.23 0.2
MASSFRAX TS13 0.31 0.26 0.23 0.2
MASSFRAX TS14 0.31 0.26 0.23 0.2
MASSFRAX SL 0.31 0.26 0.23 0.2
MASSFRAX STK1 0.31 0.26 0.23 0.2
MASSFRAX STK2 0.31 0.26 0.23 0.2
PARTDENS CRN1 1 1 1 1
PARTDENS CRN2 1 1 1 1
PARTDENS TUL1 1 1 1 1
PARTDENS TUL2 1 1 1 1
PARTDENS TUL3 1 1 1 1
PARTDENS TUL4 1 1 1 1
PARTDENS TS1 1 1 1 1
PARTDENS TS2 1 1 1 1
PARTDENS TS3 1 1 1 1
PARTDENS TS4 1 1 1 1
PARTDENS TS5 1 1 1 1
PARTDENS TS6 1 1 1 1
PARTDENS TS7 1 1 1 1
PARTDENS TS8 1 1 1 1
PARTDENS TS9 1 1 1 1
PARTDENS TS10 1 1 1 1
PARTDENS TS11 1 1 1 1
PARTDENS TS12 1 1 1 1
PARTDENS TS13 1 1 1 1
```

```
   PARTDENS TS14 1 1 1 1
   PARTDENS SL 1 1 1 1
   PARTDENS STK1 1 1 1 1
   PARTDENS STK2 1 1 1 1
   HOUREMIS 1494_SCENARIO3_VER2_EMISSIONS.TXT TUL1 TUL2 TUL3
   HOUREMIS 1494_SCENARIO3_VER2_EMISSIONS.TXT TUL4 CRN1 CRN2
   HOUREMIS 1494_SCENARIO3_VER2_EMISSIONS.TXT TS1 TS2 TS3
   HOUREMIS 1494_SCENARIO3_VER2_EMISSIONS.TXT TS4 TS5 TS6
   HOUREMIS 1494_SCENARIO3_VER2_EMISSIONS.TXT TS7 TS8 TS9
   HOUREMIS 1494_SCENARIO3_VER2_EMISSIONS.TXT TS10 TS11 TS12
   HOUREMIS 1494_SCENARIO3_VER2_EMISSIONS.TXT TS13 TS14 SL
   SRCGROUP ALL
SO FINISHED
**
**************************************
** AERMOD Receptor Pathway
**************************************
**
**
RE STARTING
   INCLUDED RHIO_all.rou
RE FINISHED
**
**************************************
** AERMOD Meteorology Pathway
**************************************
**
**
ME STARTING
   SURFFILE 6866_Run6a_6Feb2015.SFC
   PROFFILE 6866_Run6a_6Feb2015.PFL
   SURFDATA 0 2013
   UAIRDATA 54321 2013
   SITEDATA 1 2013
   PROFBASE 9.0 METERS
ME FINISHED
**
**************************************
** AERMOD Output Pathway
**************************************
**
**
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 1ST
   RECTABLE 24 1ST
   POSTFILE 1 ALL PLOT RHIO_ALL.AD\01_GALL.POS 31
   POSTFILE 24 ALL PLOT RHIO_ALL.AD\24_GALL.POS 32
   POSTFILE ANNUAL ALL PLOT RHIO_ALL.AD\AN_GALL.POS 33
** Auto-Generated Plotfiles
   PLOTFILE 1 ALL 1ST RHIO_ALL.AD\01H1GALL.PLT 34
   PLOTFILE 24 ALL 1ST RHIO_ALL.AD\24H1GALL.PLT 35
   PLOTFILE ANNUAL ALL RHIO_ALL.AD\AN00GALL.PLT 36
   SUMMFILE RHIO_all.sum
OU FINISHED
**
**************************************
** Project Parameters
**************************************
** PROJCTN  CoordinateSystemUTM
** DESCPTN  UTM: Universal Transverse Mercator
** DATUM    World Geodetic System 1984
** DTMRGN   Global Definition
** UNITS    m
** ZONE     -50
** ZONEINX  0
**
```

ANNEXURE E – PROPOSED AIR QUALTIY MONITORING

Intended For
Pilbara Ports

Document type
Draft Report

Date
20th of February 2025

Dust Management Plan – Lumsden Point Operations – Port of Port Hedland

Pilbara Ports

Project Name	**Dust Management Plan – Lumsden Point Operations – Port of Port Hedland**
Project No.	**01-0030**
Document Type	**Draft Report**
Version	**C**
Date	**20/2/2025**
[redacted]	[redacted]

[redacted]

MRP Technical Consulting Pty Ltd (MRP) prepared this report in accordance with the scope of work as outlined in our proposal to Pilbara Ports dated 18th of November 2024 and in accordance with our understanding and interpretation of current regulatory standards.

The conclusions presented in this report represent MRP's professional judgement based on information made available during the course of this assignment and are true and correct to the best of MRP's knowledge as at the date of the assessment.

MRP did not independently verify all of the written or oral information provided during the course of this investigation. While MRP has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided to MRP was itself complete and accurate.

This report does not purport to give legal advice. This advice can only be given by qualified legal advisors.

This report has been prepared for Pilbara Ports and may not be relied upon by any other person or entity without MRP's express written permission.

MRP Technical Consulting Pty Ltd
ACN: 679 732 453
ABN: 15679732453

Table of Contents

Tables

Figures

1 Introduction

Pilbara Ports is the developer of the Lumsden Point General Cargo Facility and Logistics Hub (the Project) at Lumsden Point (the Site) at the Port of Port Hedland (the Port).

1.1 Context

The Lumsden Point General Cargo Facility is located at Lumsden Point, which is situated at the junction of South East Creek and South Creek within the inner harbor of the Port. It is located approximately 2.2 kilometres (km) south of the Port Hedland town site within the Town of Port Hedland and adjoins the existing light industrial area of Wedgefield. The FMG Anderson Point port facility, iron ore stockpiles and offloading facilities are to the west of the project and DMMA B, DMMA B-North and DMMA B-South located to the southwest.

The development of Lumsden Point involves the provision of an additional deep water general cargo facility and will provide enabling infrastructure to diversify trade in the region.

One of the drivers for the Project is to facilitate the export of battery metals such as lithium and copper concentrates (metal concentrates). Export of metal concentrates from Lumsden Point will be implemented through a phased approach with the initial stage being the loading of vessels by tipping containerised cargo into the hold of vessels using a rotating crane attachment.

This dust management plan (DMP) has been developed to support Pilbara Ports application for a licence under Part V of the *Environmental Protection Act 1986* (EP Act) for loading of metal concentrates by rotating containers at Lumsden Point. The proposed Prescribed Premises boundary and regional context of the Project is shown in Figure 1. It is contained within the Part IV approval for the Project which was granted under Ministerial Statement 1231 (MS 1231).

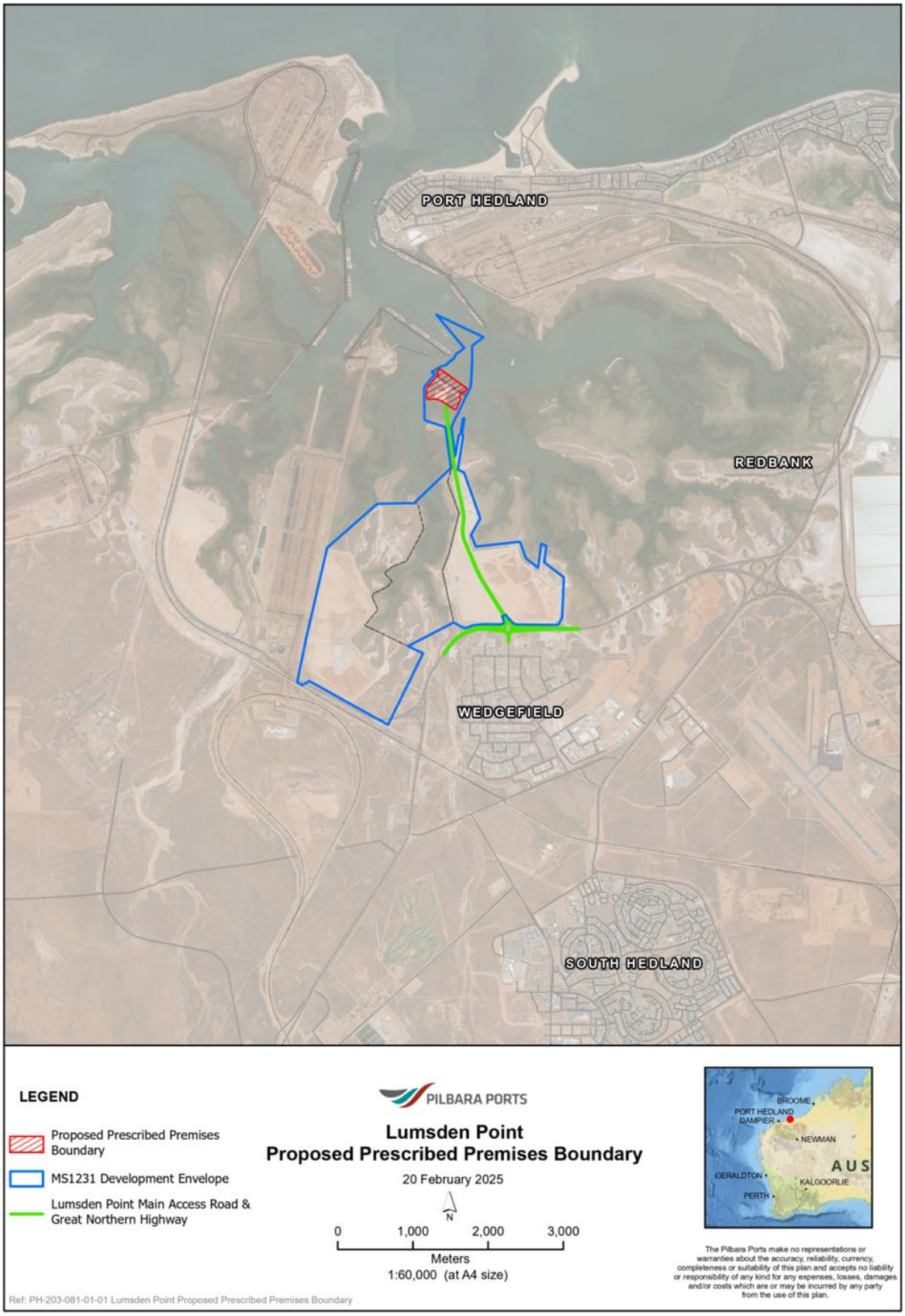


Figure 1: Lumsden Point General Cargo Facility and Logistics Hub Proposed Prescribed Premises Boundary, Part IV Approval (MS1231) and Regional Context

Dust is a significant environmental issue for Port Hedland due to both the naturally high background concentrations of particulates and the close proximity of regional operations with open stockpiles and ore handling to sensitive receptors. Industry must manage dust emissions from individual operations to keep the cumulative impacts to an acceptable level.

1.2 Scope

The purpose of this Port of Port Hedland - Dust Management Plan – Lumsden Point (DMP) is to outline the way in which the Pilbara Ports will manage operation of the proposed Prescribed Premises such that the impact to surrounding air quality is minimised. This Plan outlines management objectives and targets on which to assess performance for managing air quality and supports compliance with relevant legislation. The DMP has been developed in accordance with the Department of Water and Environmental Regulation (DWER) Guideline: Dust Emissions (2021).

This DMP seeks to:

- Protect and improve air, land, water and habitat quality within the Pilbara Ports' boundary of control, and where practical and feasible, influence beyond those boundaries;
- Comply with all applicable environmental legislation and regulations;
- Establish, monitor, report and audit performance against environmental objectives and targets to ensure Pilbara Ports environmental commitments are met; and
- Develop and implement programs and initiatives to advance environmental stewardship, mitigate impacts and drive continuous improvement.

The scope of this DMP applies to all activities that will occur within the proposed Prescribed Premises boundary associated with the prescribe activity including:

- Storage, handling and unloading (from road trains) of lidded containers containing metal concentrates; and
- Loading of potentially dust generating metal concentrate products to vessels via rotating containers loading systems.

2 Regulatory Context

Loading of vessels with bulk materials at Lumsden Point will be subject to an environmental licence (the Licence), administered by the Department of Water and Environmental Regulation (DWER). Conditions within the Licence are likely to relate to the prevention, reduction and control of emissions and discharges to the environment, and to the monitoring and reporting of specified emissions using onsite dust monitors.

More broadly, Pilbara Ports, along with all major bulk export operators in Port Hedland, are required to implement the Port Hedland Air Quality and Noise Management Plan (Department of State Development 2010). This is done through the Port Hedland Industries Council (PHIC), of

which Pilbara Ports is a member, who provide funding for the operation of the Port Hedland Air Quantity Network under a Memorandum of Understanding to DWER who operate the network. Specifically, dust is required to be monitored at Taplin Street, and results assessed against an air guideline value (AGV) of 70µg/m^3 for dust as PM_{10} as a 24-hour average.

Regulatory limits for air quality which are applicable at sensitive receptor locations are outlined in Table 1. Any exceedances identified through monitoring will be recorded by Pilbara Ports as an incident and reported to DWER if required by Environmental Licence conditions. Further detail is provided in Section 7 (Dust Monitoring) and Section 8 (Reporting and Communication).

Table 1: DWER Regulatory Criteria for Air Emissions of Dust and Metals

Parameter	Averaging Period	Concentration (µg/m^3)
TSP	24-hour	90
PM_{10}	24-hour	70
	Annual	25
$PM_{2.5}$	24-hour	25
	Annual	8
Copper	1-hour	18
	24-hour	0.92

3 Sensitive Receptors

Lumsden Point is surrounded by land zoned for industrial and commercial purposes. Sensitive receptors that may be impacted by dust emissions generated from port activities include Port Hedland to the north, Wedgefield to the south, South Hedland to the south and Redbank to the east.

In accordance with the DWER Draft Guideline for Dust Emissions, Pilbara Ports understands that the closer an emission source is to a sensitive receptor, the more stringent controls and management systems need to be to ensure the potential impacts of the emission are acceptable (DWER, 2021). Locations of sensitive receptors at the Port are outlined in Table 2 and Figure 2.

Table 2: Sensitive Receptor Locations within Port Hedland Regional Airshed

Receptor Locations	Easting (m)	Northing (m)
Harbour	664,350	7,753,240
Richardson Street	664,763	7,753,402
Kingsmill Street	665,508	7,753,450
Historic Hospital Site	665,870	7,753,420
Taplin Street	667,030	7,753,435
Neptune Place	669,441	7,754,077
South Hedland	666,600	7,743,439
Wedgefield	665,526	7,747,107
Redbank	669,688	7,749,539

Figure 2: Sensitive Receptor Locations

4 Roles and Responsibilities

The roles and responsibilities related to dust management at Lumsden Point are outlined in Table 3.

Table 3: Roles and responsibilities

Role	Responsibility
Pilbara Ports Landside Operations Team	Pilbara Ports Landside Operations will be responsible for management of operations to minimise dust emissions. This will include: • Monitoring operations and implementing controls to manage any identified dust emissions; • Post vessel wharf inspections to ensure residual material has been cleaned up; and • Reporting of any spills and/or environmental incidents via Pilbara Ports hazard and incident management system (CGR).
Licensed Stevedores	The Licenced Stevedores will be responsible for: • Ensuring the dust control equipment is utilised as required during material handling. • Monitoring out-loading operations and cleaning up spills when necessary; • Undertaking post out-loading clean-up of the plant; • Ensuring compliance with approved shiploading procedures. This includes making sure rotating containers remain closed at all times when outside the vessel's hold, until they are below the level of the deck as part of shiploading operations. Tipping of containers in the vessel hold is to occur no more than 2m above the floor or product level to prevent dust plumes caused by dropping product from height; • Implementing post shipping berth handover procedures to ensure appropriate sweeping and prompt removal of spilt product from berth areas; and • Maintaining any stevedore owned or managed equipment used in rotating container operations.
Customers	Customers will be responsible for: • Ensuring product moisture content is at or above the dust extinction moisture (DEM) upon arrival to site to minimise dust generation; • Taking necessary steps to increase product moisture prior to product arriving at Lumsden Point when directed by Landside Operations; and • Ensuring the outside of rotating containers and trucks are free from product and hangup on arrival to the Prescribed Premises.
Pilbara Ports Environment Team	Pilbara Ports Environment team is responsible for providing support to other parties to assist them to minimise dust emissions. This includes: • Maintaining and updating this management plan; • Maintaining and upgrading the dust monitoring network (including wind sensors) through its dust monitoring contractor; • Providing advice to Landside Operations and the Licensed Stevedores; and • Reporting.

5 Dust Sources

Potential dust sources associated with the Lumsden Point facility include the handling of metals concentrate products and dust lift off from wind erosion or vehicle movements.

When loading vessels using rotating containers, the following will occur:

- Metal concentrate will be loaded onto ships using mobile cranes to tip material from containers into the hold of vessels. The loading procedures that will be followed are:
  - Metal concentrate will be transported to the Prescribed Premises inside lidded containers on trucks or road trains;
  - Mobile cranes will then be used to lift the container into the hold of the vessel. A specialised lifting attachment will be fitted to each crane used in the operation which is designed to lift the lid off the container, tip it upside down to discharge product into the vessel, and then replace the lid. This procedure will be undertaken within the hold of the vessel both to minimise the fall distance and prevent interaction of wind with the falling product.
  - Shiploading may occur at either PH5, PH6 or both berths simultaneously, with one or more cranes used to load a vessel.
  - Once empty the sealed containers will be lifted back onto the berth for transport offsite.

Background dust from local offsite sources (other export operators and minor commercial/ industrial companies) and regional events may also contribute to the dust load measured at the Site. Climatic influence can significantly impact upon dust generation and control (i.e. high wind speeds can potentially increase dust lift-off from wind erosion and hot dry conditions can exacerbate emissions). The potential for dust generation is heavily influenced by climatic conditions. The risk of dust emissions increases with:

- High temperature;
- Low rainfall;
- High wind speed; and
- Atmospheric conditions (inversions).

Port Hedland is generally hot with high evaporation rates. Rainfall is low on average and falls greater than 1 mm generally only occur on around 20 days per year. Wind speeds are often high, with daily gusts in excess of 20km/hr for most months. Wind speeds are generally stronger in the morning from May to August and stronger in the afternoon from September to April.
Port Hedland is also subject to periodically high background concentrations of particulates due to regional fires which have been shown to previously be the cause of exceedances of relevant ambient air quality guidelines in the region. Suspended aerosol components of sea spray from coastal environments can also contribute to background concentrations.

6 Dust Management Strategy

The dust management strategies that will be applied during operations at Lumsden Point are categorised in accordance with the hierarchy of controls:

- Elimination – this will include controlling the moisture content of products to minimise dust generation during handling. Moisture control is one of the most effective means of reducing dust emissions from materials handling. It is achieved by optimising product moisture content;
- Engineering controls – tipping procedure on rotating containers to reduce dust emissions where applicable and the use of cleaning equipment; and
- Process controls – onsite traffic management procedures, use of water trucks, use of cleaning procedures, regular inspections of all key infrastructure and dust monitoring.

7 Dust Monitoring

Pilbara Ports will implement a comprehensive air quality monitoring program for operations at Lumsden Point to enable assessment of ambient air quality in compliance with relevant ambient air quality guidelines.

Pilbara Ports will operate three High Volume Air Samplers (Hi-Vols), one located to the north of Wedgefield, one at Redbank and the other at the Eastern Operations. During each sampling event all three Hi-Vols will be run for 24-hours using a size selective inlet to collect a sample of dust as PM_{10} on a pre-weighed filter paper for analysis of dust and metal concentrations.

Sampling events will be undertaken:

- Concentrate Samples – At least one 24-hour sampling event will be conducted during each 'Shiploading Events', which is described as any shiploading of 'Metal Concentrates'.
- Background Samples - will be collected every six days. Where a scheduled background sample falls on a day where concentrate sampling is required the concentrate sample will be collected and background sampling will resume with the next scheduled 1 in 6-day sampling event.

The proposed locations of the air quality monitoring stations are shown on Figure 3. A description of the monitors, their locations and the rationale for their locations are also provided in Table 4. Monitoring locations have been chosen using a source-pathway-receptor model with monitoring stations situated close to the sensitive receptors (residential areas and industrial areas which contain caretakers' residences). This approach is designed to better understand the impacts of metals at the sensitive receptors. Monitoring will be focused on dust as PM_{10} and metals in dust as PM_{10} being the most likely potential emission associated with the prescribed activity which has the potential to impact on community health.

Table 4: Proposed Hi-Vol Sampling Locations for Monitoring of Metals in Dust as PM_{10}

Monitor	Easting (m)	Northing (m)	Description of location	Rationale for location
Wedgefield HVAS	666,141	7,747,565	Located on southern boundary of Lumsden Point facility in close proximity to the northern edge of Wedgefield.	Determine potential impacts of metals at Wedgefield Provide background concentrations for winds from the south
Eastern Operations HVAS	664,529	7,752,831	Existing HVAS located at Pilbara Ports Eastern Operations.	Determine potential impacts of metals at west end of Port Hedland.
Redbank HVAS	668,731	7,749,606	Located on western edge of Redbank.	Determine potential impacts of metals at Redbank

Figure 3: Proposed Hi-Vol Sampling Locations for Monitoring of Metals in Dust as PM_{10}

7.1 Triggers and Corrective Actions

A detailed description of port activities and actions taken in response to any exceedance shall be recorded. This is to enable assessment on whether the exceedance is influenced by port operations and more importantly, whether management actions are remaining effective. Corrective actions and associated triggers are summarised in Table 5.

Table 5: Triggers and Corrective Actions

Trigger	Corrective actions	Responsibility
Metals Limits are Exceeded	Assess source of metals; Investigate adequacy of control measures; Implement interim dust control measures as necessary until further controls can be put in place.	Landside Operations & Environment Team
Product moisture levels below DEM threshold established for effective dust control.	Assess impact of shipping material below threshold DEM; Cease handling/shipment of material until moisture can be rectified and/or additional control measures put in place to manage dust generation.	Landside Operations & Environment Team

7.2 Quality Assurance

All air quality monitoring equipment will be maintained and calibrated in accordance with the equipment AS/NZS standards and manufacturers specifications. Calibration and maintenance will be undertaken by an appropriately qualified technician and a certificate of calibration provided to Pilbara Ports.

The following criteria will apply for acceptable data quality.

- A minimum daily data capture rate of 95% (number of valid data points obtained / total number of data points for the period minus calibration / maintenance data points);
- 75% valid daily data for averaging (number of valid data points obtained / total number of data points in the averaging period);
- Measurements are accurate, precise and repeatable; and
- Data is comparable.

Data from the units will be visually examined for any unusual or unexpected results which then need to be further investigated.

The laboratory that is used for metals analysis will be NATA-accredited. The NATA-accredited laboratory will supply pre-weighed and numbered filters.

To ensure the integrity of data and the field techniques, records to be kept will include:

- Chain of Custody (COC);
- Laboratory Sample Receipts;
- Laboratory Analysis Reports;
- Field Sheets – hard copy and electronic; and
- Equipment Calibration Certificates.

Table 6: Air Quality Monitoring QA/QC

Objective	Parameter	Frequency	QA/QC	Rationale for monitoring
Hi-Volume Air Sampling	Metals and Dust as PM_{10}	One 24-hour sample during each shiploading event of loading metal concentrates	Monitoring in accordance with AS/NZS 3580.9.6 NATA accredited laboratory analysis	Assess impact on public health via inhalation of fugitive dust generated from shipping of metal concentrates; assess compliance with regulatory limits.

8 Reporting and Communication

Dust management and performance will be reviewed and reported in line with Table 7. Recent dust reports will be discussed at daily site meetings and weekly cargo meetings. Pilbara Ports' Environment Team will be responsible for reporting on dust management and performance. A list of reports is presented in Table 7. Recent dust reports will be discussed at daily site meetings and weekly cargo meetings. A summary of monitoring results during metals concentrate out-loading will be provided to the licensed stevedore, landside operations and proponents.

Table 7: Dust reporting requirements

Dust report	Distribution	Target audience	Responsibility
Weekly dust data	Weekly cargo meeting, Weekly toolbox meeting	Landside Operations, Licensed Stevedores, Customers, Maintenance	Environment Team
DWER Licence Reporting	As required by Part V Licence	DWER, Pilbara Ports Operations, Licensed stevedore, Proponents	Environment Team
Pilbara Ports Executive and Board update (as required)	Executive / Board papers	Pilbara Ports Executive Committee and Board	Environment Team
Annual report	Intranet and email to stakeholders	All stakeholders	Environment Team

9 Review

Pilbara Ports is committed to continual improvement. A review of Pilbara Ports documents for relevance to current conditions and operations is conducted upon any of the following in line with time frames stated in the Document Control Procedure as well as:

- On addition of new products handled through the facility;
- In response to significant changes to infrastructure, operations and/or dust control equipment;
- In response to issues raised by regulatory agencies or the community; and
- In response to additional studies, significant incidents or monitoring information (such as dust/wind modelling).

ANNEXURE F – ENVIRONMENTAL NOISE ASSESSMENT REPORT

Lumsden Point Port Facility

Environmental Noise Assessment

Prepared for Pilbara Ports Authority

18 November 2024

Project Number: TN24038-1

DOCUMENT CONTROL					
Version	**Description**	**Date**	**Author**	**Reviewer**	**Approver**
0	Draft – issued for internal review	13/11/2024	SH	LA	
1	First Issue – Client Review	15/11/2024	SH	ML	GB
2	Updated with client comments	18/11/2024	LA		GB

Executive Summary

Pilbara Ports is proposing to build a new multi-user bulk materials export facility at Lumsden Point, within the Port of Port Hedland. The new facility, which will be described as the Lumsden Point Port Facility (LPPF) in this report, will enable Pilbara Ports to facilitate third party concentrate exports from two new Berths PH5 and PH6.

This report provides a summary of an environmental noise assessment undertaken for the LPPF.

Aim

The aim of this noise assessment is to quantify the environmental noise impacts of the LPPF on noise sensitive receivers in the town of Port Hedland and South Hedland.

Modelling Method

The study has adopted a methodology based on the PHIC CENS 'during growth' recommendations. Following this methodology, the LPPF noise emissions in-isolation (i.e. excluding any other noise emissions in Port Hedland) were quantified and compared to the assigned levels at each noise sensitive receiver.

Three expected operational scenarios, described in section 4.3, were assessed.

Conclusions

Noise modelling and analysis has found that predicted noise levels associated with the LPPF operations comply with the assigned levels at all key noise sensitive receivers and do not result in an increase in the existing noise levels in the Town of Port Hedland.

As such, no noise mitigation has been recommended for the LPPF.

Table of Contents

Tables

Figures

1 Introduction

Pilbara Ports is proposing to build a new multi-user bulk materials export facility at Lumsden Point, within the Port of Port Hedland. The Lumsden Point Port Facility (LPPF) will enable Pilbara Ports to facilitate third party concentrate exports from two new Berths PH5 and PH6.

This report provides a summary of an environmental noise assessment undertaken for the LPPF.

1.1 Aim

The aim of this noise assessment is to quantify the environmental noise impact of the LPPF on noise sensitive receivers in the town of Port Hedland and South Hedland.

1.2 Applicable Documents

[1] Environmental Protection Act 1986.

[2] Environmental Protection (Noise) Regulations 1997.

[3] DWER Draft Guideline “Assessment of environmental noise emissions”, May 2021.

[4] Port Hedland Industries Council Report “TN22052-4 PHIC Cumulative Model Updates 2023 Report_5.0“, Talis Consultants, Feb 2024.

[5] Port Hedland Industries Council and Department of Environmental Regulation Rpt-1253921-9-100 Rev3-7 “Port Hedland Cumulative Environmental Noise Study”, SVT, Feb 2014.

[6] UK Noise Association “Speed and Road Traffic Noise”, 2009.

2 Facility Overview

The LPPF facility is located on the Southern edge of the Port of Port Hedland, between Port Hedland and South Hedland, and immediately North of the Wedgefield Industrial Area as shown in Figure 2-1.

The facility layout, as shown in Figure 2-2, will allow for third party product exports via containers trucked directly to berths PH5 and PH6 which will be handled by two cranes. Two sheds will also be developed where products will be stacked, stockpiled, reclaimed and transported via a series of conveyors and transfer stations to a Shiploader on berth PH6 for export.

The operations will occur 24 hours a day, 7 days per week.

2.1 Road Train Operations

Quad road trains will be used to transport bulk material and containers to the LPPF berth/sheds via an entry gate at the intersection of Great Northern Highway and Pinga Street. The quantity of road trains which will enter the facility will be 6-12 per hour. Therefore, the maximum expected quantity of 12 per hour has been used in this assessment.

2.2 Noise sensitive receivers

This assessment will consider noise sensitive receivers in the surrounding communities of Port Hedland and South Hedland. In addition, the Wedgefield industrial area has been considered and assessed against the Industrial premise/caretaker assigned levels.

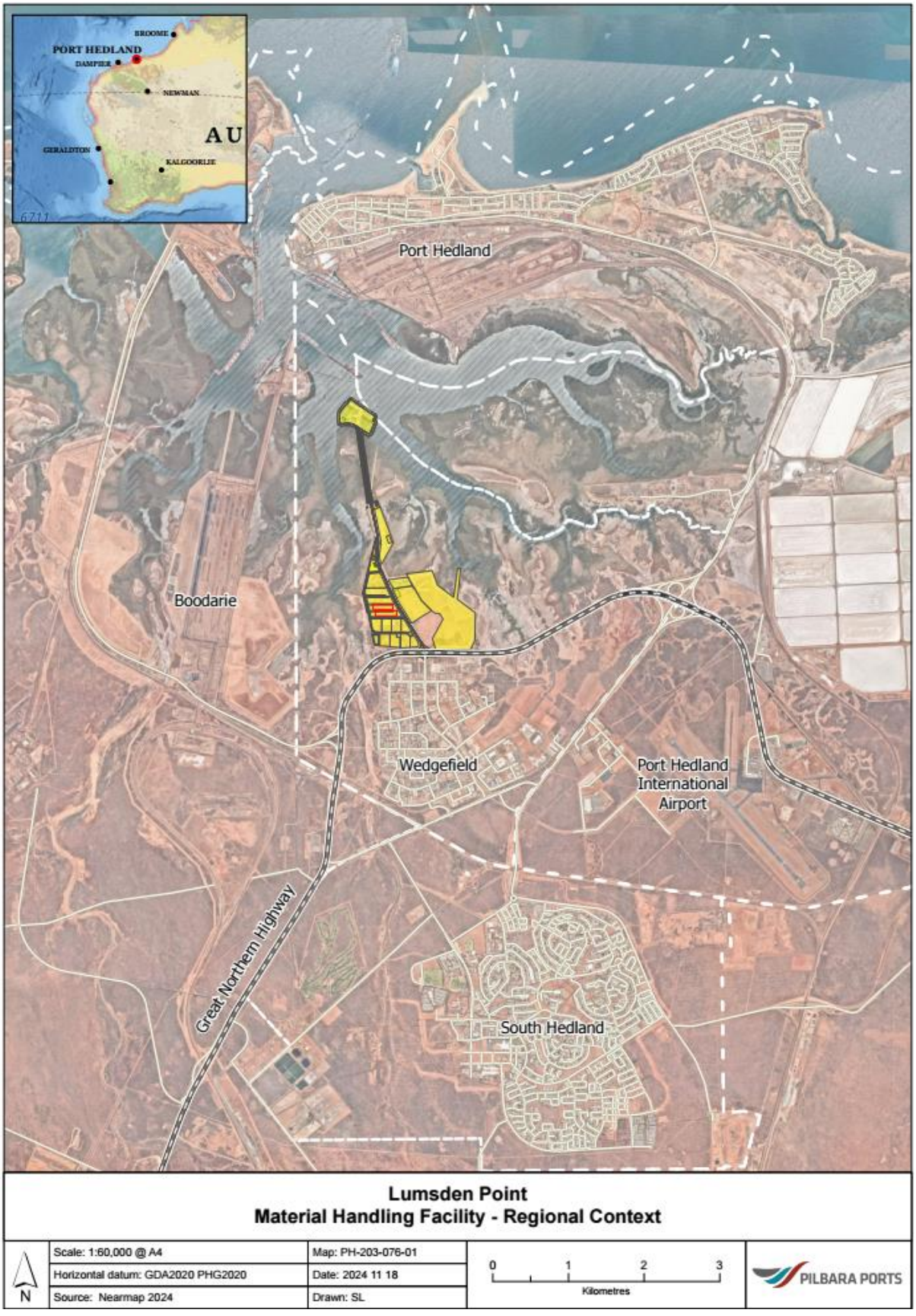


Figure 2-1 Regional Context – LPPF Area

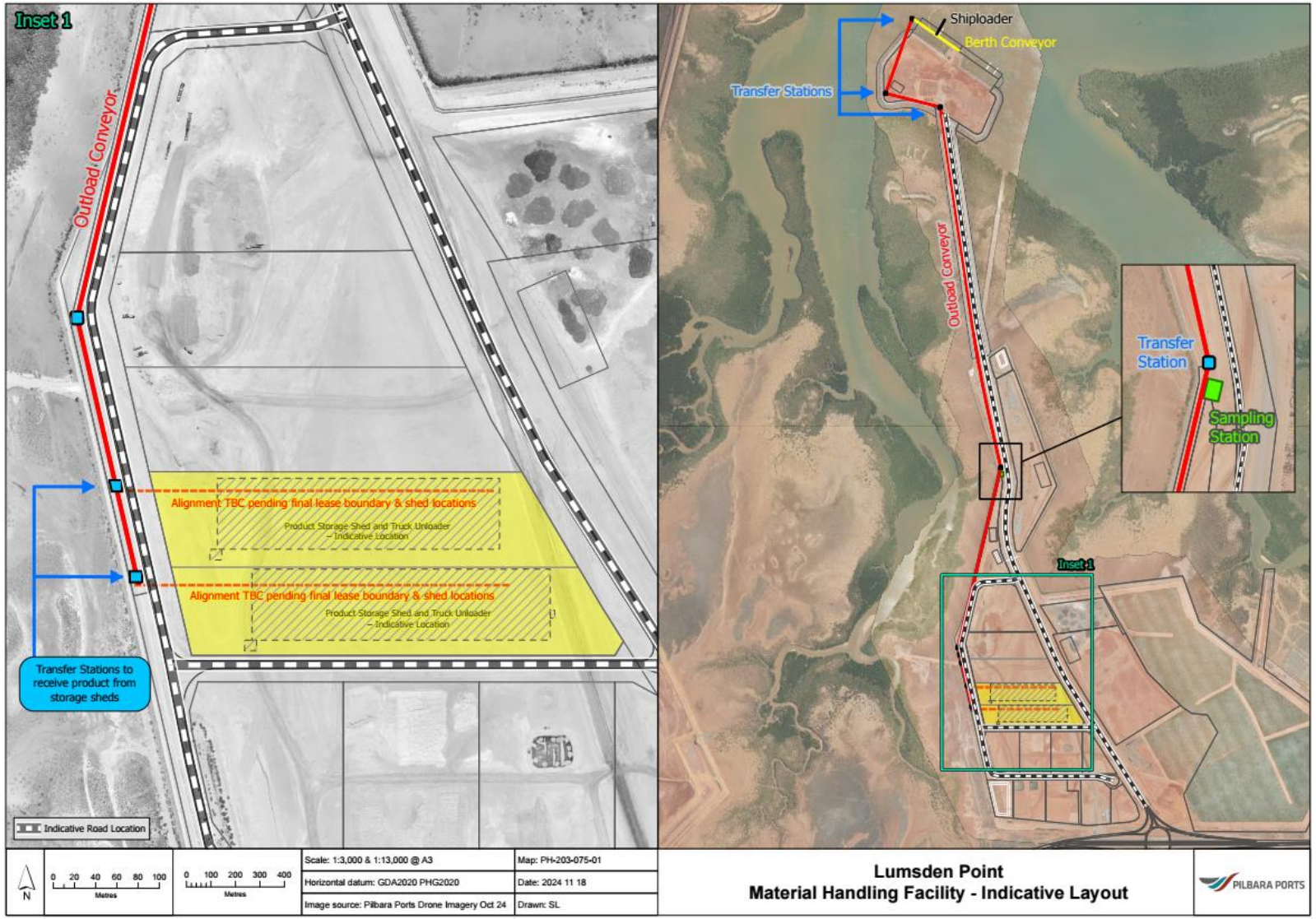


Figure 2-2 LPPF Indicative Site Layout

3 Assessment Criteria

3.1 Environmental Protection (Noise) Regulations

Noise management in Western Australia is implemented through the *Environmental Protection (Noise) Regulations 1997* [2], which operate under the Environmental Protection Act 1986.

The Regulations define maximum allowable noise levels which apply to noise received at noise sensitive premises, such as residential areas. These are determined by a combination of a base noise level plus an Influencing Factor (IF). The result is termed the "assigned level".

The assigned noise levels include L_{A1}, L_{A10} and L_{AMAX} noise parameters, defined as:

- L_{ASMAX} means an assigned level which is not to be exceeded at any time;
- L_{AS1} means an assigned level which is not to be exceeded for more than 1% of time;
- L_{AS10} means an assigned level which is not to be exceeded for more than 10% of time.

The L_{A10} noise limit is most representative of continuous noise emissions from the LPPF.

For noise sensitive premises, the time of day also affects the assigned levels. As the LPPF operates 24 hours a day, 7 days a week, the noise emissions have been assessed against the most stringent night-time assigned levels (10pm-7am).

Based on the above, the night-time L_{A10} assigned level will be used to assess the LPPF. A discussion of the Environmental Protection (Noise) Regulations is presented in Appendix A.

3.2 Port Hedland Industries Council (PHIC) Cumulative Environmental Noise Study (CENS) Methodology

The Port Hedland Industries Council (PHIC) cumulative environmental noise study (CENS) [5] identified that cumulative noise emissions from industry in Port Hedland exceed the Regulatory noise levels. To date, a Regulation 17 exemption process has not been initiated for Port Hedland. Until such an exemption has been approved, the CENS made recommendations on strategic noise goals to be utilised to give guidance to operators regarding noise management and noise assessments in Port Hedland.

This study has adopted a methodology based on the PHIC CENS 'during growth' recommendations as follows:

- As Low As Reasonably Practicable (ALARP) noise levels should be achieved and demonstrated.
- When assessed in isolation, i.e. excluding existing plant and infrastructure, any new plant equipment and infrastructure should comply with the Environmental Protection (Noise) Regulations 1997.
- The overall noise emissions, i.e. those of new plant and existing plant, should remain the same or improve.

Following this methodology, the LPPF noise emissions were quantified and for the LPPF operations in-isolation (i.e. excluding any other noise emissions in Port Hedland) and compared to the assigned levels at each sensitive receiver.

This is undertaken for three expected operational scenarios (described in section 4.3).

3.3 Noise Assessment Criteria

Five key noise sensitive receivers have been used to quantify the noise impacts of the LPPF, which are consistent with those used in the PHIC CENS cumulative environmental noise study in Port Hedland and all previous projects in the area.

The CENS existing noise levels and in-isolation noise assessment criteria are given in Table 3-1. As the LPPF is a new Greenfields development, it is assessed in-isolation only.

The operations will occur 24 hours a day, 7 days per week. Therefore, the LPPF noise emissions have been assessed against the most stringent night-time assigned noise levels.

Table 3-1 Receiver Locations (as per PHIC CENS) and Applicable Noise Levels

Sensitive Receiver Name	Coordinates (UTM)		Assessment Criteria Night-time LA10 Assigned Level	
	Easting	Northing	In isolation (i.e. assigned) [1]	Existing Noise Levels [4]
Brearley Street	667699	7753338	32	50.8
Hospital	665799	7753424	32	57.8
Police Station	664652	7753117	47	62.2
Pretty Pool	671261	7752609	30	39.6
South Hedland	667852	7742771	30	37.4
Wedgefield Industrial Area			65	N/A

NOTE: Wedgefield Industrial Area is not part of the PHIC CENS receiver locations.

[1] Includes the application of -5dB to the assigned level to account for non-significant contributor (see Appendix A for details).

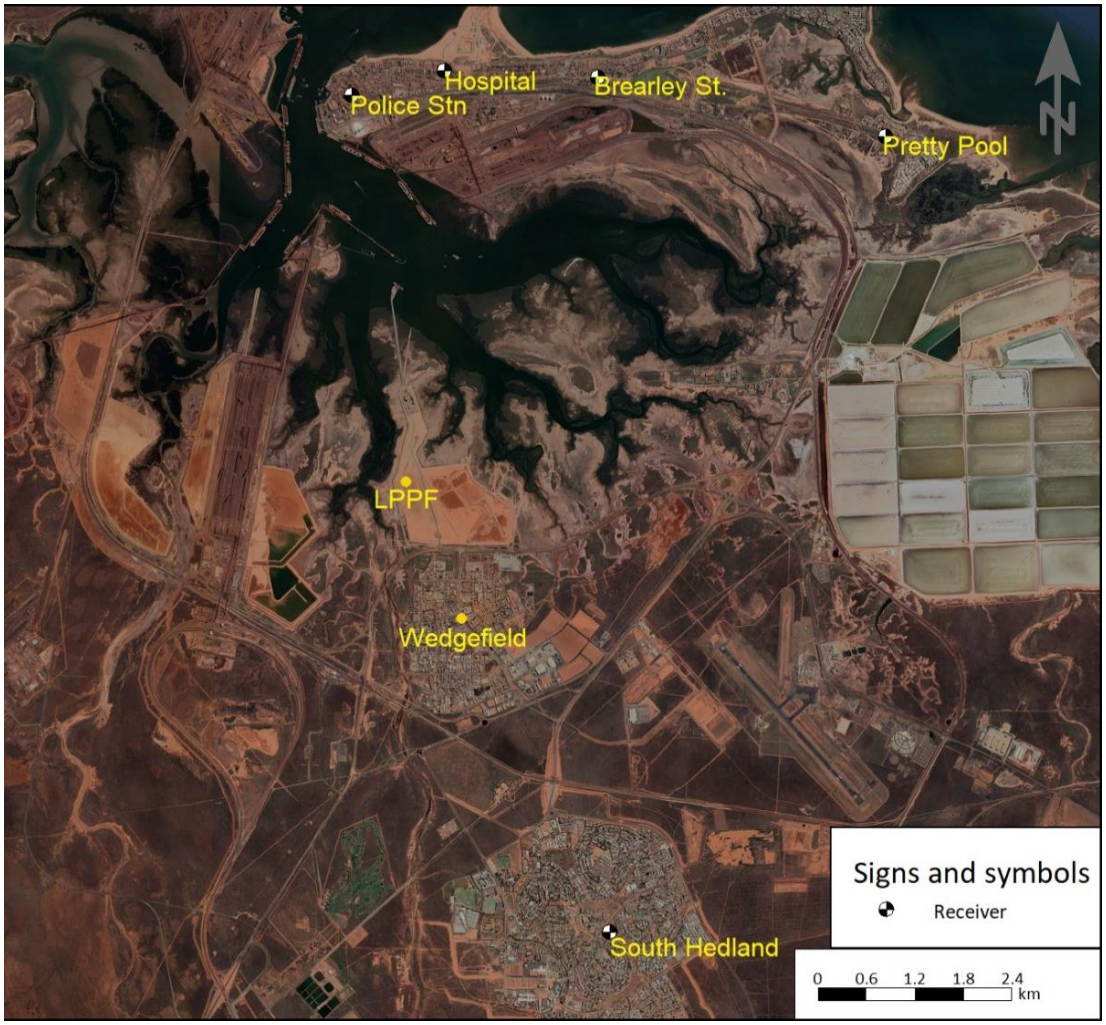


Figure 3-1 Noise Sensitive Receivers

4 Noise Modelling Overview

4.1 Noise Model Software

A desktop environmental noise model was created to simulate the LPPF using the SoundPlan v9 software program. This software package calculates sound pressure levels at nominated receiver locations and produces noise contours over a defined area of interest. SoundPlan can be used to model different types of noise, such as industrial noise, traffic noise and aircraft noise.

The inputs required by the SoundPlan modelling software are noise sources, ground topographical and absorption data, meteorological data and sensitive receiver locations. SoundPlan utilises ISO9613 for calculating the attenuation of sound during outdoor propagation in combination with CONCAWE[2,3].

4.2 Noise Model Inputs

4.2.1 Noise Sensitive Receivers

Five key noise sensitive receivers listed in Table 3-1 have been used for this noise assessment, and the Wedgefield area considered as an Industrial receiver area.

4.2.2 Topography and Ground Absorption

The topographical data, digital ground map and ground absorption factors entered in the noise model were consistent with the PHIC cumulative noise model. The ground absorption for the sea surface was set to zero (perfectly reflecting) representing a realistic worst-case condition, and 0.6 ground factor was applied to land areas.

4.2.3 Meteorological Conditions

SoundPlan calculates noise levels for defined meteorological conditions. Temperature, relative humidity, wind speed and direction data are required as input to the model. Table 4-1 presents the worst-case meteorological conditions applied to the model, which are defined in the DWER "*Draft Guideline on Environmental Noise for Prescribed Premises*" [3].

Table 4-1 Worst-Case Meteorological Conditions for Noise Propagation

Time of day	Temperature	Relative Humidity	Wind Speed	Wind Direction	Pasquil Stability Category (PSC)
Night (19:00 - 07:00)	15° Celsius	50%	3 m/s	worst case	F

[2] CONCAWE (Conservation of Clean Air and Water in Europe) was established in 1963 by a group of oil companies to carry out research on environmental issues relevant to the oil industry.

[3] The propagation of noise from petroleum and petrochemical complexes to neighbouring communities, CONCAWE Report 4/81, 1981.

4.2.4 Noise Model Layout

Figure 4-1 shows the LPPF noise model layout for the worst-case operations (scenario 3), as well as highlights which parts of the LPPF are utilised in scenario 1 and 2. The LPPF includes the following major areas/operations:

- Road train routes to the berth, storage sheds and ring-road.
- Sheds containing stacking, reclaiming, mobile equipment and dust extraction equipment.
- Fixed outload infrastructure – conveyors, transfer chutes, drive motors and shiploader.
- Cranes operating on the berth.
- Mobile equipment.

4.2.5 Noise Sources

Noise Sound Power Levels (SWL's) associated with each equipment item at the LPPF were determined using a combination of equipment lists, specifications and vendor information provided by Pilbara Ports, as well as representative equipment SWL's measured at other Port Hedland port facilities or other mining and industrial facilities in WA.

A summary of the equipment SWL's used in the model are given in Table 4-2. A detailed list of SWL's and spectral data for all noise sources modelled is presented in Appendix A.

Table 4-2 Equipment SWLs

Equipment	Component	Quantity	SWL (dBA), per metre	SWL (dBA), per item
Fixed Plant	Shiploader Conveyor	1	80.2/m	98
	Shiploader Drive	1	N/A	104
	Conveyors			
	CV100	1	80.2/m	105
	CV101	1	80.2/m	109
	CV200	1	80.2/m	112
	CV201	1	80.2/m	104
	CV202	1	80.2/m	105
	CV300	1	80.2/m	104
	Transfer Stations	9	N/A	99
	CV Drives	6	N/A	104
	Crane	2	N/A	106

Equipment	Component	Quantity	SWL (dBA), per metre	SWL (dBA), per item
Sheds	Reclaimer, travelling tripper, front end loader (shed made of 0.6mm Colourbond Steel)	2	N/A	108
Dust Extraction System	1 system per shed	2	N/A	101
Haulage	Quad Road Train (12/hour at 20km/hr)	6 per hour	72.4	116
Front end loader	CAT 992C	1	N/A	111

4.3 Model Scenarios

The following noise modelling scenarios were undertaken for this assessment:

- **Scenario 1 Initial Operations Loading of One Vessel Via Rotating.** This scenario involves the initial operations before the sheds and outload infrastructure will be operational. It includes road trains direct to berth, and cranes loading containers from road train to ship.
- **Scenario 2 (likely case) – Loading of One Vessel Via Shiploader**. This scenario will involve inloading material to both sheds via roads trains, and the outload of product via the outload conveyor circuit infrastructure to the shiploader at wharf PH6. Cranes on the berth will not be utilised in this scenario.
- **Scenario 3 (worst case) Loading Two Vessels, One Via Shiploader and One Via Containers.** This scenario will involve a combination of scenario 1 and scenario 2 operations loading two vessels simultaneously.

Table 4-3 lists the equipment contained in each scenario, which is graphically annotated in Figure 4-1

Table 4-3 Equipment present in each scenario

Equipment	Component	Included in model scenario		
		Scenario 1	Scenario 2	Scenario 3
Fixed Plant	Shiploader Conveyor		✓	✓
	Shiploader Drive		✓	✓
	CV100		✓	✓
	CV101		✓	✓
	CV200		✓	✓

Equipment	Component	Included in model scenario		
		Scenario 1	Scenario 2	Scenario 3
	CV201		✓	✓
	CV202		✓	✓
	CV300		✓	✓
	Transfer Stations		✓	✓
	CV Drives		✓	✓
	Extraction duct		✓	✓
	Crane	✓		✓
Sheds	Shed 1 (Reclaimer, tripper)		✓	✓
	Shed 2 (Reclaimer, tripper)		✓	✓
Haulage	Quad Road Trains	✓	✓	✓
Front end loader	CAT 992C	✓		✓

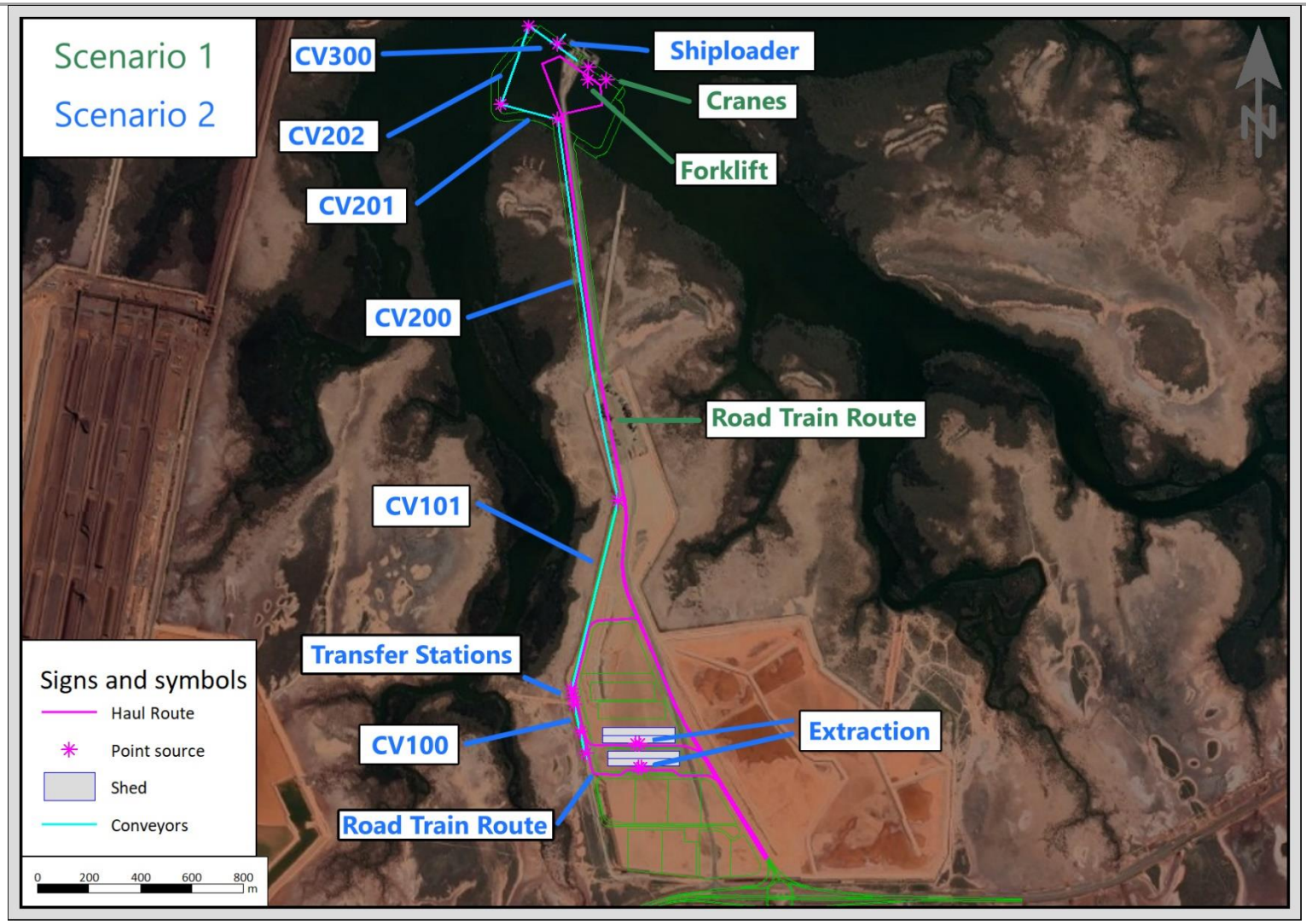


Figure 4-1 Noise Model Layout Scenario 3 (Scenario 1 labelled green and scenario 2 labelled blue)

5 Model Results

Table 5-1 gives the noise model results for each scenario, and a comparison against the assigned levels. As can be seen from the results, the LPPF complies with the assigned noise levels at all receivers.

The LPPF scenario 3 (worst case operations) have been compared against the existing noise levels in Port Hedland, which found that the LPPF does not increase the existing noise levels in the community.

Table 5-1 Model results for LPPF

Sensitive Receiver	Assigned Level	Model Predicted Level dBA		
		Scenario 1	Scenario 2	Scenario 3
Brearley Street	32	21.2	25.2	26.7
Hospital	32	26.4	29.9	31.5
Police Station	47	29.8	33.4	35.0
Pretty Pool	30	14.3	18.9	20.2
South Hedland	30	6.6	18.6	18.8
Wedgefield	60	< 30	< 40	< 45

5.1 Noise Contour Maps

Figure 5-1 to Figure 5-3shows the modelling noise contour maps for each modelled scenario, and Figure 5-4 presents a zoomed in contour map for scenario 3.

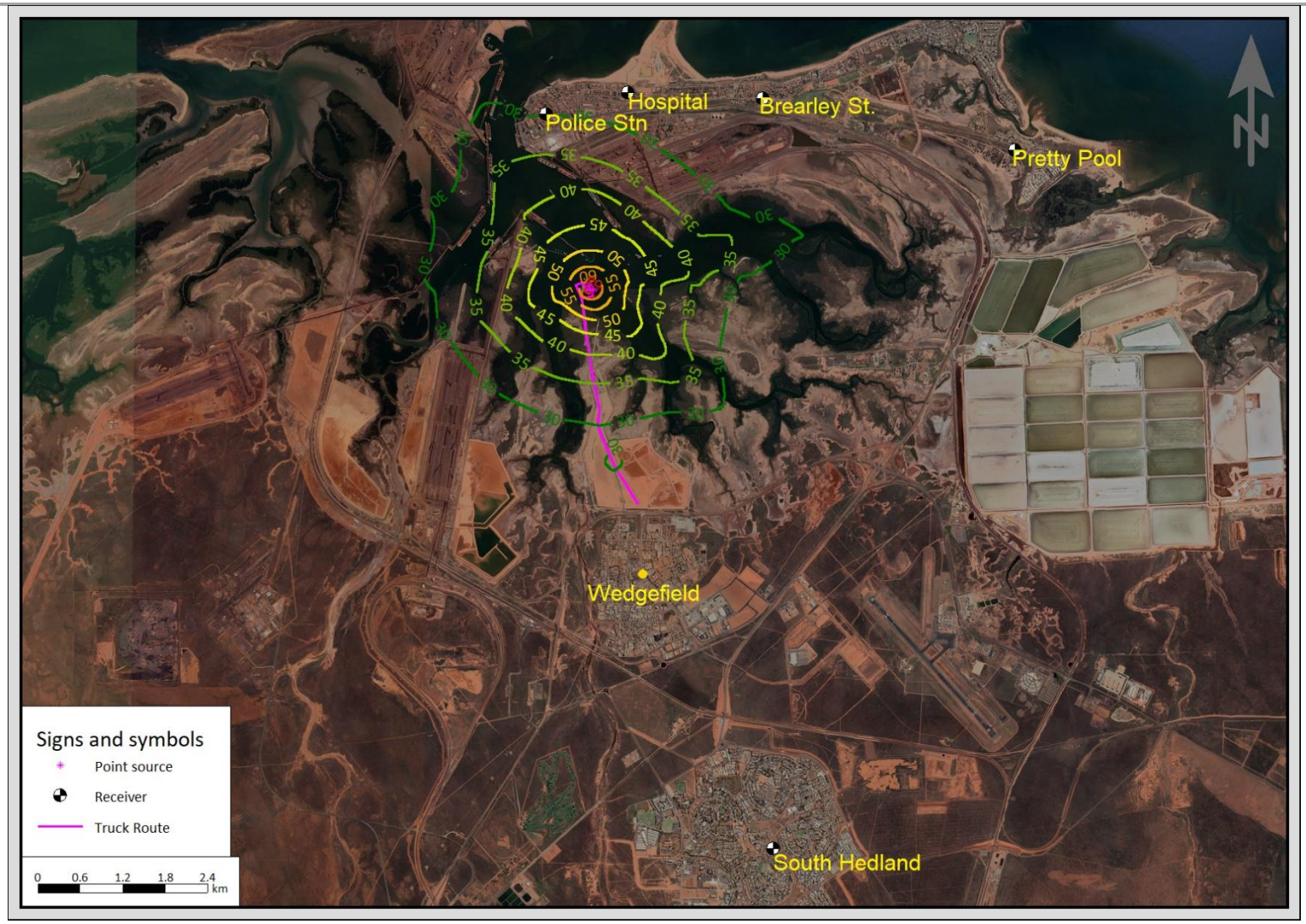


Figure 5-1 Scenario 1 Noise Contour Map

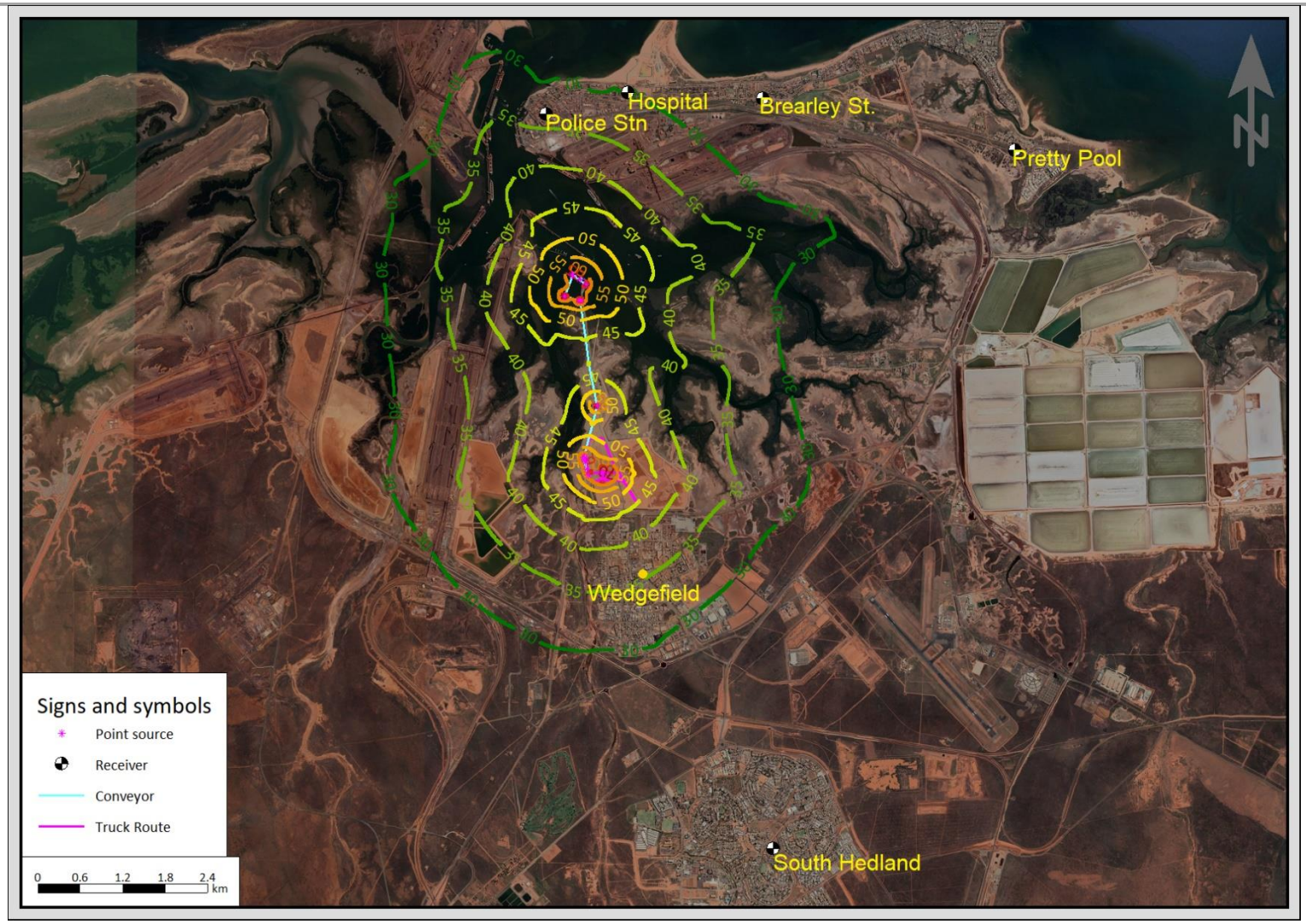


Figure 5-2 Scenario 2 Noise Contour Map

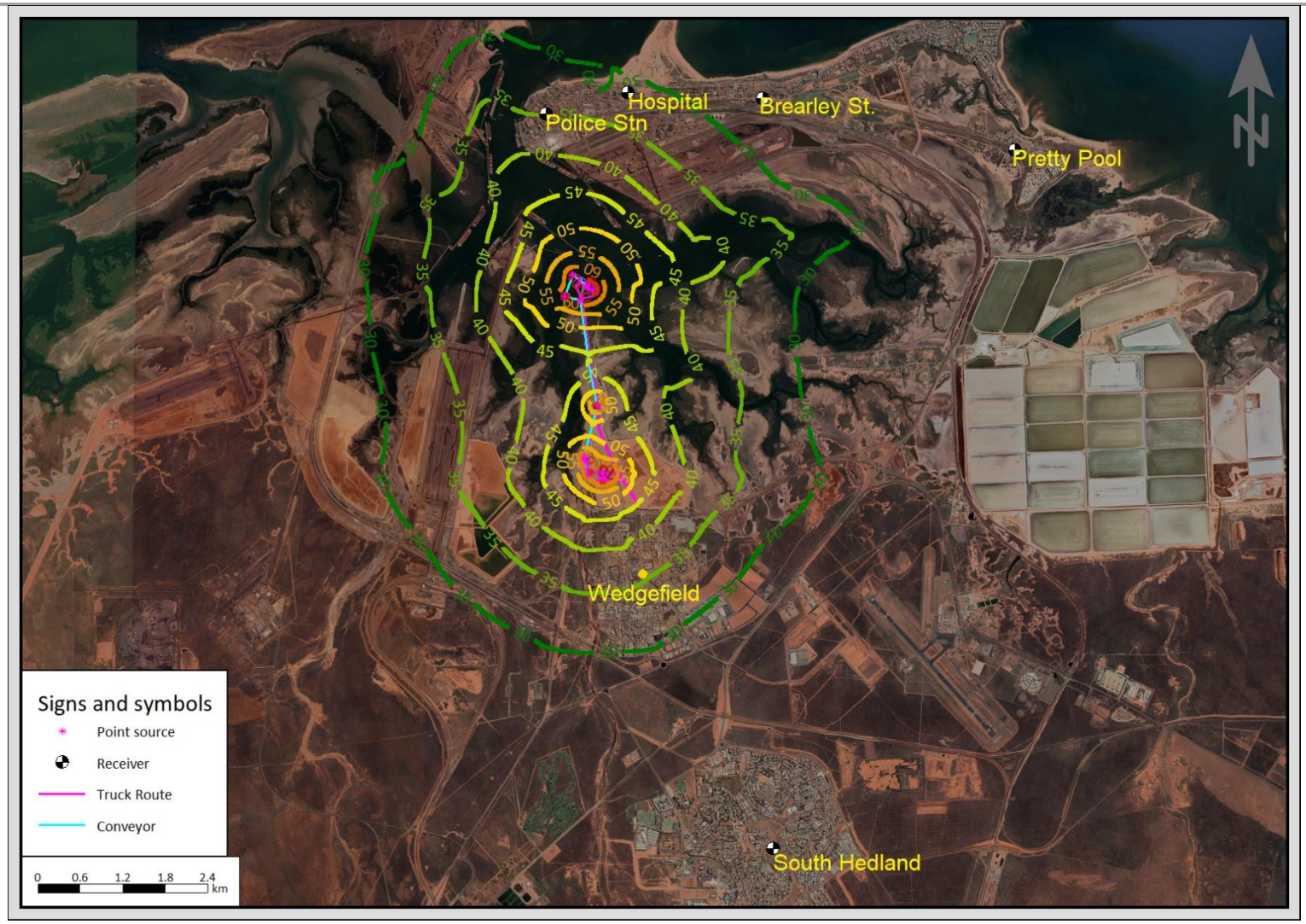


Figure 5-3 Scenario 3 Noise Contour Map

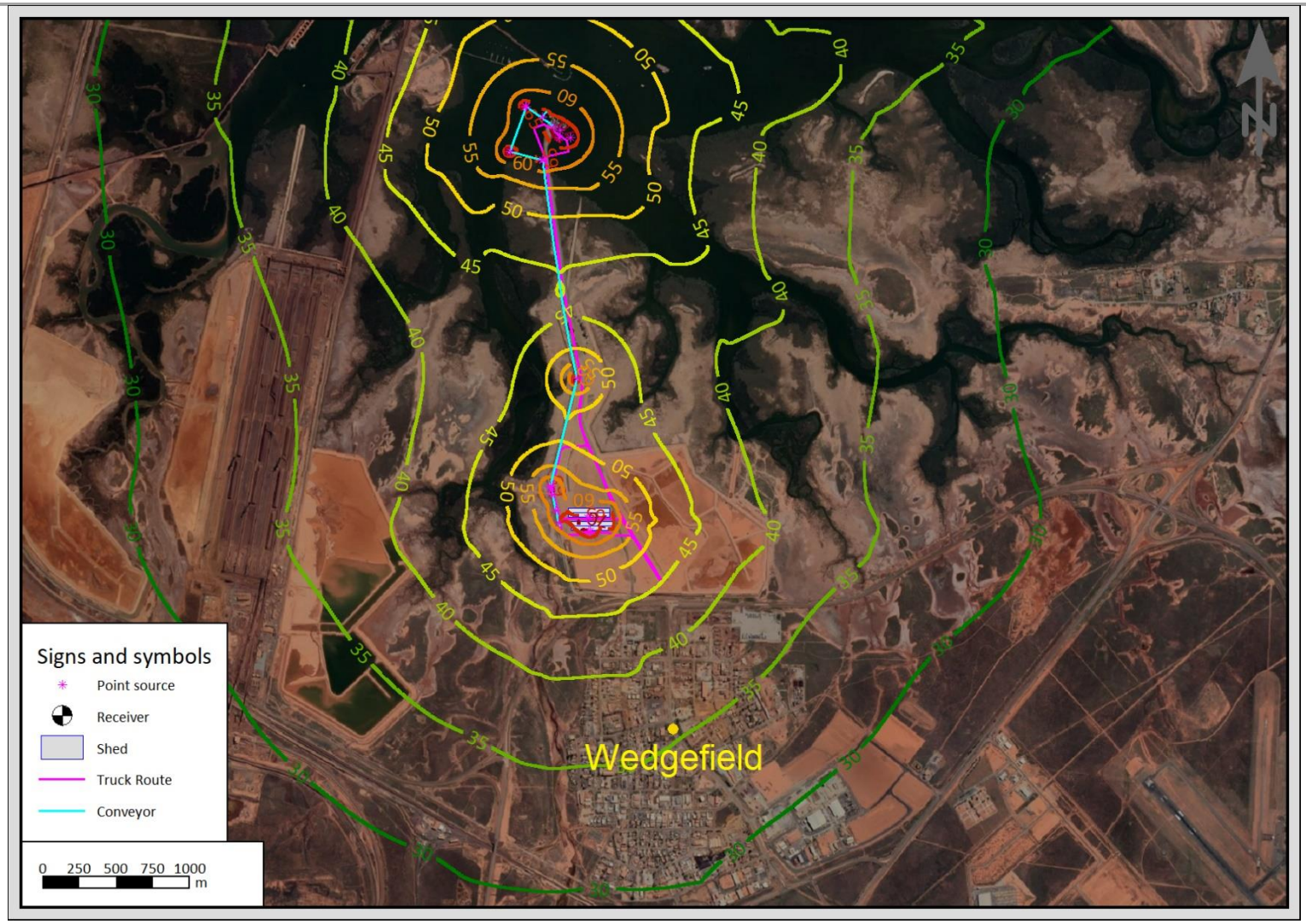


Figure 5-4 Scenario 3 Noise Contour Map – Zoomed In

6 Conclusions

Noise modelling and analysis has found that predicted noise levels associated with the LPPF operations comply with the assigned levels at all key noise sensitive receivers and do not result in an increase in the existing noise levels in the Town of Port Hedland.

As such, no noise mitigation has been recommended for the LPPF.

APPENDIX A
Environmental Protection (Noise) Regulations Overview

Noise management in Western Australia is implemented through the Environmental Protection (Noise) Regulations 1997 (the Regulations), which operate under the Environmental Protection Act 1986. The Regulations specify maximum noise levels (assigned noise levels) which are the highest noise levels that can be received at noise-sensitive (residential), commercial and industrial premises.

Assigned noise levels are defined differently for noise sensitive premises, commercial premises, and industrial premises. For noise sensitive premises, an Influencing Factor (IF) is included in the assigned noise levels. The IF depends on the presence of major/minor roads and commercial/industrial land use zonings within circles of 100 metres and 450 metres radius from the noise receiver.

For noise sensitive residences, the time of day also affects the assigned levels. The regulations define three types of assigned noise level:

- L_{ASMAX} means an assigned level that is not to be exceeded at any time;
- L_{AS1} means an assigned level that is not to be exceeded for more than 1% of time;
- L_{AS10} means an assigned level that is not to be exceeded for more than 10% of time.

Table A 1 Assigned Noise Levels for Noise Sensitive Receivers

Type of premises receiving noise	Time of day			
Noise sensitive premises: highly sensitive area	0700 to 1900 hours Monday to Saturday	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + influencing factor	45 + influencing factor	55 + influencing factor

Type of premises receiving noise	Time of day			
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90
Industrial and utility premises in the Kwinana Industrial Area	All hours	75	85	90

Environmental Protection (Noise) Regulations 1997

Appendix A1 Non- Significant Contributor

The Regulations require that *"noise emitted from any premises when received at other premises must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind".*

A noise emission is taken to significantly contribute to a level of noise if the noise emission exceeds a value which is **5 dB below the assigned level** at the point of reception.

This means that received noise from the LPPF must not exceed a received noise level which is 5dB below the assigned noise level. This is because there are many other industrial premises located in Port Hedland which cumulatively contribute to the received noise levels, and as such, the proposed infrastructure must not significantly contribute to an exceedance of the assigned level.

The results and compliance assessment have assumed that this -5dB adjustment is applicable to every receiver in Port Hedland.

APPENDIX B
Noise Source Levels

Noise source	Octave Band Levels, dBA									O/A (per item)
	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 KHz	2 KHz	4 KHz	8 KHz	
Quad Haul Truck (Road train)	76	84	100	105	110	111	109	104	94	116
Shiploader CV	58	74	84	89	94	91	88	83	77	98
Shiploader CV drive	64	78	88	97	97	98	97	92	85	104
Crane	67	83	95	98	97	101	100	95	87	106
CV100	65	81	91	96	101	98	95	90	84	105
CV101	70	86	96	101	105	103	99	94	89	109
CV200	73	89	98	103	108	106	102	97	92	112
CV201	65	81	90	95	100	98	94	89	84	104
CV202	66	82	92	97	102	99	95	90	85	105
CV300	58	74	84	89	94	91	88	83	77	98
Transfer Station	79	88	93	89	94	91	88	82	75	99
Tripper (Conveyor, inside shed)	41	57	67	72	77	74	70	65	77	82
Reclaimer	66	81	97	102	107	109	108	101	89	114
Dust Extraction	53	73	88	91	97	96	92	86	76	101
Forklift	57	71	88	92	97	99	99	91	80	104

Assets | Engineering | Environment | Noise | Spatial | Waste

Talis Consultants

Head Office
Level 1, 604 Newcastle Street,
Leederville
Western Australia 6007

PO Box 454,
Leederville
Western Australia 6903

NSW Office
5/62 North Street, Nowra
New South Wales, 2541

PO Box 1189, Nowra
New South Wales, 2541

P: 1300 251 070
E: info@talisconsultants.com.au

ANNEXURE G – SENSITIVE LAND USES AND RECEPTORS