

Department of Transport
Port Hedland Spoilbank Marina
Construction Dust Management Plan

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JBS&G Australia Pty Ltd T/A Strategen-JBS&G

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Appendix A Monthly Wind Roses

Abbreviations

Term	Definition
ACM	asbestos-containing material
BOM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
DoT	Department of Transport
DMP	Dust management plan
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	Environmental Protection Act 1986
NEPM	National Environment Protection (Ambient Air Quality) Measure
PHIC	Port Hedland Industries Council
PM	Particulate matter
TBT	Tributyltin
TSP	Total suspended particulates

1. Introduction

The Department of Transport (DoT) proposes to develop a marina complex (the Proposal) on the western side of the 'Spoilbank' sand formation located in the town of Port Hedland (the site). The site is located approximately 1 km west of the Port Hedland Old Town Centre, 5 km west of Cooke Point and 11 km to the north-west of the Port Hedland International Airport (Figure 1.1).

Key components of the Proposal include:

- marina basin, mooring facilities (up to 80 pens), boat launching area and entrance channel
- capital dredging approximately 900,000 m³ (no ocean disposal)
- breakwaters, revetments and sand trap
- parking facility, amenities (public and pen holders) and public open space (gardens)
- trucking route for delivery of rock to site and removal of excess dredged spoil off-site.

This construction dust management plan (DMP) has been prepared to support the referral of the Proposal to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986* (EP Act).

1.1 Scope, objective and purpose

Air Quality is a key environmental factor for the Proposal, and the scope of the DMP is to provide a framework for the management of dust during the construction of the marina.

The EPA's objective for the factor Air Quality is to maintain air quality and to minimise emissions so that environmental values are protected. The principal objective of the DMP is to demonstrate, in accordance with the EPA's environmental factor guideline for air quality, that potential dust emissions during construction can be managed so that environmental values are protected and impacts to human health and amenity are minimised.

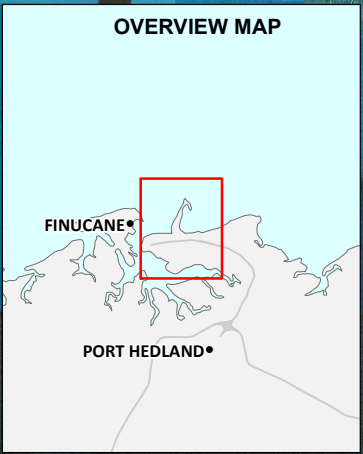
This DMP consists of the following:



- an introduction outlining the Proposal background, context and purpose of the plan
- a description of the existing environmental setting, regulatory obligations, site characteristics and significant environmental aspects to be managed
- dust risk assessment
- details of the proposed dust management measures
- proposed dust monitoring program.

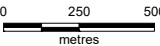
The purpose of the DMP is to:


- document, as part of the Construction Environmental Management Plan (CEMP), the management of fugitive dust emissions to be implemented during construction to mitigate dust emissions as far as practicable
- provide reference for finalisation of the Proposal's air quality monitoring program
- provide information and background suitable for project stakeholders including, but not limited to, the Town of Port Hedland and Pilbara Ports Authority.

The DMP has been prepared during the planning stages of the proposal and will be subject to review prior to commencement of construction to ascertain its relevancy for ongoing management of actual construction activities.



Legend:
 Proposal area
 Roads (MRWA)

Scale 1:25,000 at A4


Coord. Sys. GDA 1994 MGA Zone 50


Job No: 58244

Client: Department of Transport

Version: A Date: 20-Feb-2020

Drawn By: cthatcher Checked By: CI

Port Hedland Spoilbank Marina

SITE LOCATION

FIGURE 1.1



2. Environmental setting

2.1 Existing land use

The Spoilbank is a man-made coastal landform created in the late 1960s and early 1970s as a result of disposing of material associated with dredging activities within the Port Hedland Inner Harbour and Goldsworthy shipping channel. The area is currently identified as the 'Spoilbank Recreation Reserve,' but does not have formal reserve status.

The site comprises approximately 76.3 ha of the largely undeveloped reclaimed land extending from directly adjacent to Sutherland street on the southern boundary to approximately 575 m north. The western site boundary is approximately opposite where Howe Street meets the end of Sutherland Street, and the eastern site boundary is approximately 55 m to the east of where Acton Street meets the southern side of Sutherland Street (Figure 2.1).

Currently, the site is used for informal recreation purposes including fishing and off-road driving. The Proposal development envelope includes the existing yacht club facilities (building and dry dock area), a boat ramp and a small inset lagoon accessible to the ocean only at higher tides.

2.2 Topography

The site extends from the high-water mark in the west and approximately 4.0 mAHD in the north to a maximum height of 13 mAHD along Sutherland Road and approximately 8.8 mAHD metres along the eastern boundary (Figure 2.2).

2.3 Vegetation cover

The Spoilbank Reserve is an artificial landform adjacent to the coast which has a low diversity of vascular flora species and high densities of aggressive weeds. The vegetation does not meet criteria for conservation significance, and no Priority Flora species were identified during a flora and vegetation survey carried out in February 2020 (Strategen JBS&G 2020).

2.4 Surrounding land use

The land to the south of the site, across Sutherland Road, is mostly vacant and was the site of the now-demolished Old Port Hedland Hospital. There are a few residences remaining on the southeastern corner of that vacant block and on the block to the south. Beyond Wilson Street is industrial land including the BHP iron ore operations.

Residential areas are located to the south-east of the site, across Sutherland Road, and to the west right up to the waterfront. The nearest residence is within 50 m of the southeastern corner of the site. Between the residential area to the west and Wilson Street is an area used for commercial and light industrial use.

Port Hedland Old Town Centre is 1 km along the shore in a westerly direction and across the water to the west is a large iron ore port facility (storage, loading and shipping).

2.4.1 Proximity of sensitive receptors

Sensitive receptors in the community include dwellings, schools, day care centres, hospitals and elderly care homes. Recreation areas and protected wetlands are also considered sensitive receptors. In Port Hedland, the West End of the town is recognised as a sensitive receptor for industry dust management.

Sensitive receptors for the Proposal include the residential areas described above (Section 2.4). Furthermore, there is a school (St Cecilia's Catholic Primary School) located within 1 km to the east of the site along Sutherland Road, and a children's playground (Marapikurrinya Park) approximately 1.5 km away.

An aquatic centre, complete with outdoor pool, is located approximately 2 km east of the site along the coastline. There are sports fields, tennis courts and the Port Hedland Racetrack located to the south of the aquatic centre.

2.5 Soil and sediment characterisation

Soil sampling conducted during acid sulphate soil and ground contamination investigations carried out in 2014 (RPS 2014a, RPS 2014b) determined soil types on the site to be pale brown, off white sands of fine to coarse grain size with lenses of sandstone/limestone (pale brown, off white) and sandy clays (dark brown) encountered through the profile.

The detailed site investigation identified asbestos-containing material (ACM) and tributyltin (TBT)¹ in some areas of the site (RPS 2014b). The ACM was identified in two areas and an isolated rubble stockpile and the TBT was identified in surficial soils within the yacht club boat maintenance and storage facility.

At both locations, the contamination was found to be surficial. Based on the advice of DoT, it has been assumed that these isolated areas have been/will be remediated prior to the commencement of construction. Therefore, the DMP is designed for the control of uncontaminated dust.

Subject to ongoing dredge studies, freshly dredged material is proposed to be disposed of onshore – either to build up areas to the required heights or to be stockpiled in an area located adjacent to the proposed marina to the north.

A sediment quality assessment was conducted including analysis of the material in the area to be dredged/excavated to form the marina basin, channel and sand trap area (O2 Marine 2019). The assessment determined that the sediment is suitable for onshore disposal.

During the sediment analysis, it was determined that the sand fraction (particle size 0.06 mm to 2 mm) dominated the sediment. Finer sediments increased out into the channel where up to 45% were below 45 µm and 28% below 11 µm (results from sample retrieved furthest from shore).

¹ biocide in antifouling, banned since 2008 due to toxicity to marine organisms



Legend: Proposal area Public open space Parking area Sand trap Marina Roads (MRWA)	Scale 1:6,000 at A4			Port Hedland Spoilbank Marina		
	Coord. Sys. GDA 1994 MGA Zone 50			DEVELOPMENT ENVELOPE		
	Job No: 58244					
	Client: Department of Transport				FIGURE 2.1	
	Version: A	Date: 20-Feb-2020				
	Drawn By: cthatcher	Checked By: CI				



Figure 2.2: Site topography (RPS 2011)

2.6 Local Climate

Port Hedland has a semi-arid climate with hot, wet summers and warm, dry winters. Summertime thunderstorms are frequent and tropical cyclones bring significant rainfall events. Mean monthly climatic data for Port Hedland International Airport is shown in Figure 2.3².

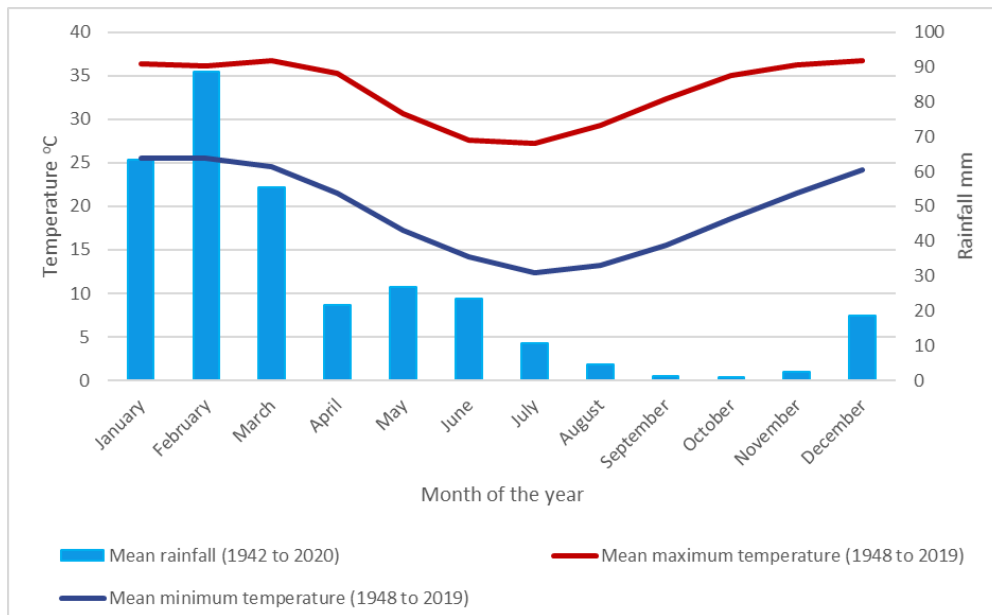


Figure 2.3: Mean monthly climatic data for Port Hedland Airport (BOM 2019)

Winds are predominantly from the east-south-east in the morning and north-north-west in the afternoon. An annual wind rose from the Bureau of Meteorology (BOM) monitoring site at Port Hedland International Airport³ is presented in Figure 2.4. Seasonal variation is seen in the change of wind direction from a prevailing north-westerly wind from September to March to a prevailing south-easterly wind from May through August (refer to monthly wind roses in Appendix A).

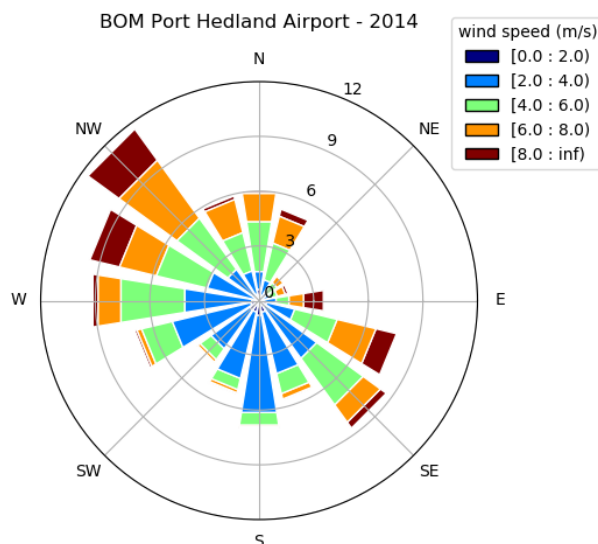


Figure 2.4 Annual wind rose BOM Port Hedland Airport

² <http://www.bom.gov.au/climate/data/>

³ The BOM Port Hedland International Airport weather data was used in preference to data recorded during baseline monitoring at the Spoilbank; the Airport station is operated to the BOM specification and is considered representative of the weather patterns that influence Port Hedland.

2.7 Existing dust impacts

Fugitive dust in Port Hedland has been the subject of many studies and reviews to date due to the close proximity of iron ore export facilities to residential areas. A dust management taskforce (the Taskforce) was established in 2009 and a permanent real-time monitoring network⁴ throughout the town of Port Hedland was established in 2010 by the Port Hedland Industries Council (PHIC). The monitoring network, previously operated for PHIC by a third-party contractor, is currently in the process of being handed over to the Department of Water and Environmental Regulation (DWER) (WA DWER 2018).

Levels of PM₁₀ above the National Environment Protection (Ambient Air Quality) Measure (NEPM) 24-hour guideline of 50 µg/m³ have historically surpassed the five allowable exceedances per year leading to the establishment of an interim guideline of 70 µg/m³ for Port Hedland. The interim guideline allows for ten exceedances per year at the Taplin Street monitoring location. The Taskforce recommended the adoption of the interim guideline in the Port Hedland Air Quality and Noise Management Plan 2010 (WA DSD 2010).

The health risk assessment completed in 2016 reported that the level of risk between the interim guideline of 70 µg/m³ and the NEPM guideline of 50 µg/m³ was not discernible for the population level at Port Hedland. The subsequent Taskforce report recommended the interim guideline should continue to be applied to residential areas of Port Hedland with a cap on the number of permanent residents in the dust affected areas. This recommendation was endorsed in the government response to that report (WA DJTSI 2017).

Concern regarding the impacts on health includes both concentration and composition of the dust. In 2016, the Port Hedland Air Quality Health Risk Assessment for Particulate Matter was published (WA DoH 2016). A key finding of the health risk assessment confirmed there is sufficient evidence of potential impacts to human health from dust (PM₁₀) to warrant dust management controls and strategic land use planning to reduce exposure of the community to dust.

Monitoring continues to show that, while export tonnage has increased from the port facilities, dust concentrations recorded for the 2017/2018 financial year were consistent with the longer-term trends. In 2018/2019 the tonnage was marginally lower and no exceedances of the interim guideline were reported at Taplin Street for the first time since the guideline was implemented.

In the 2016 health risk assessment report (WA DoH 2016), the Spoilbank was listed as a dust source and implicated in exceedances recorded at the Taplin Street and Kingsmill Street dust monitors (see Figure 2.7 for locations relative to the Spoilbank). Furthermore, for nine exceedances reported at Taplin Street in 2017/2018, two were identified to have a contribution from a non-industrial source. While not explicitly identifying the Spoilbank as the source, the analysis shows elevated concentrations of dust during winds originating from the north-west (outside the industrial arc of influence) of the monitoring location.

Sources contributing to the background airborne PM₁₀ levels in Port Hedland and at the site include:

- crustal dust from vehicle movements and windblown dust from the Spoilbank and nearby vacant blocks to the south of Sutherland Road
- sea salt
- iron-ore dust from port operations including stockpiling and materials handling
- diesel emissions from iron ore transport including rail, road and shipping.

Regional dust impacts may also occur from bushfires and dust storms.

⁴ Data for the last 7 days can be viewed online at <http://www.phicmonitoring.com.au/>

2.8 Baseline dust monitoring

A dust monitoring campaign was conducted on the Spoilbank in 2014/2015 in order to obtain a baseline dust level prior to any development. Two dust monitors equipped with wind sensors⁵ were located on the Spoilbank, one to the north of the site and one towards the south-east corner (Figure 2.7). PM₁₀ (hourly and 10-minute averages termed 'real-time') and wind speed and direction were monitored at both locations.

Data was supplied for review from January 2014 to August 2015 with accompanying validated reports. Analysis of the data determined that the two monitors, located approximately 800 m apart, were typically exposed to similar PM₁₀ levels. Data from August 2015, which may be considered a high dust risk month due to the low rainfall, is shown in Figure 2.5 as an example of the correlation.

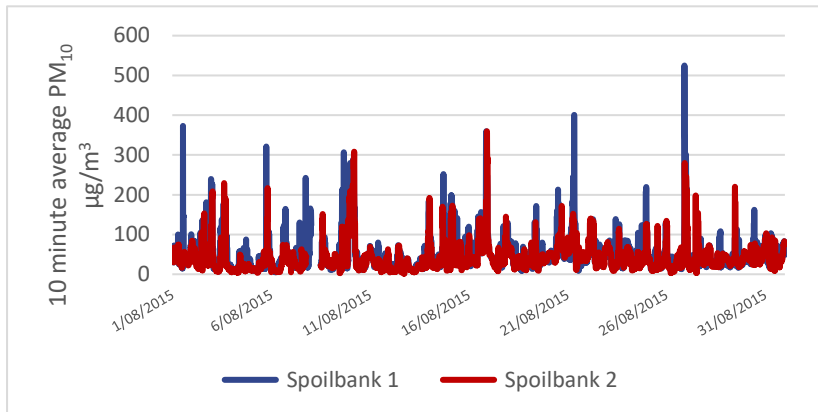


Figure 2.5: 10-minute average PM₁₀ concentrations (August 2015)

Analysis of the data for August 2015 with respect to wind direction (Figure 2.6) shows that the highest dust concentrations typically come from a southerly direction for both monitors. The Spoilbank 1 monitor located to the south of the site also had a dominant influence from a north-westerly direction. While this dust is from the direction of the iron ore port operations to the west, the westerly influence on the Spoilbank 2 monitor location is less pronounced; therefore, it is possible this impact could be from local sources on the Spoilbank.

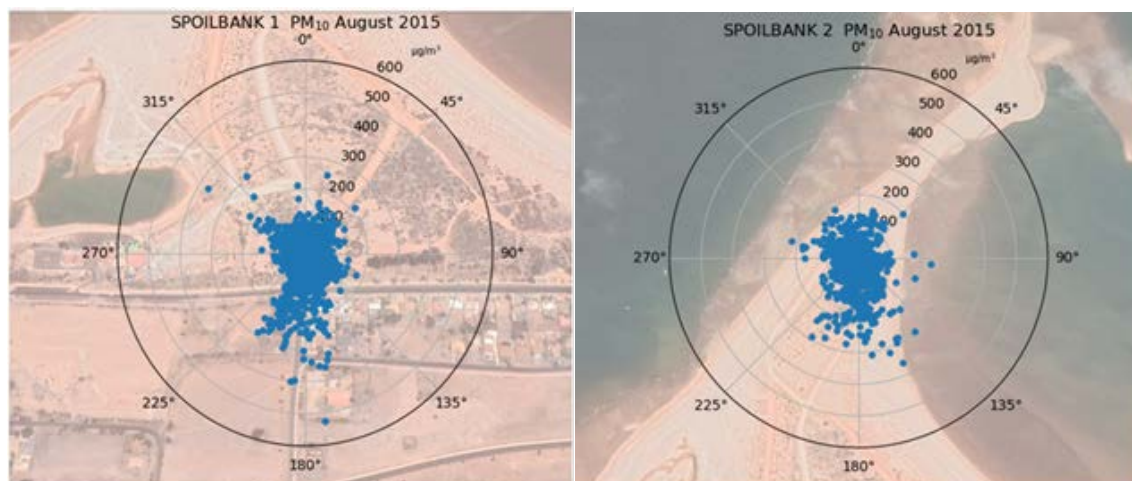


Figure 2.6 Dust impacts at Spoilbank baseline monitoring sites

⁵ PM₁₀ one hour averages were recorded with a Met One BAM 1020 (Beta ray attenuation) and 10 minute averages recorded with Met One BX-895 real time module (light scatter laser nephelometer). Indicative wind parameters were recorded at a height of 3 m and reported as not in compliance with AS3580.14.2011. A siting audit was reported to find the stations compliant with AS/NZS 3580.1.1:2007.



Legend: Proposal area Roads (MRWA) PHIC monitoring locations Spoilbank baseline monitoring locations	Scale 1:8,500 at A4				Port Hedland Spoilbank Marina	
	Coord. Sys. GDA 1994 MGA Zone 50				SPOILBANK BASELINE AND PHIC MONITORING LOCATIONS	
	Job No: 58244					
	Client: Department of Transport				FIGURE 2.7	
	Version: A	Date: 20-Feb-2020				
Drawn By: cthatcher	Checked By: CI					

3. Regulatory setting

3.1.1 Environmental Protection Act 1986 (EP Act)

The EP Act provides for "*the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing*".

Under Part IV of the EP Act, the EPA is charged with environmental impact assessment of proposals that may have significant environmental effect on the environment. The Proposal will be referred to the EPA who will decide whether or not it requires formal environmental impact assessment (EIA), and if so at what level. This version of the DMP has been prepared to support the referral of the Proposal to the EPA.

Under Part V of the EP Act, DWER is responsible for the control of pollution and regulation of prescribed premises. The Proposal is not a prescribed premises and will not be subject to regulation by DWER; however, the iron ore export facilities in the area are regulated by DWER through works approvals and licences.

In line with the Government's response to the Taskforce report (see Section 2.7), DWER is updating its regulatory approach with the aim of improving air quality to meet the interim air quality guideline in all residential areas of Port Hedland. This planned approach includes:

- developing and implementing best practice dust management guidelines for bulk handling port premises, designed to reduce emissions from port operators
- taking control of the ambient air quality monitoring network
- implementing a coordinated risk-based review and assessment of all port operator licences, to incorporate more robust regulatory controls in line with the best practice guidelines.

DWER also administers the Environmental Protection (Unauthorised Discharges) Regulations 2004. Under the regulations, a person who, in the course of or in connection with a business or a commercial activity causes or allows dust to be discharged into the environment commits an offence.

3.1.2 Town of Port Hedland Local Laws

The Town of Port Hedland's Health Local Law 2016 requires owners and occupiers of land to take all reasonable steps to stabilise dust on the land and ensure that no dust is released or escapes from the land. A DMP may be developed under the local law to ensure that the adversity to health and public nuisance caused by dust is minimised as far as is reasonably practicable.

3.1.3 Dust management guidelines

The Department of Environment and Conservation (2011) document, *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities*, is applicable to the dust management requirements of the Proposal as it involves earth works, bulk handling and stockpiling of materials. The guideline provides guidance on the following:

- identification of dust sources, impacts and associated risks
- the legislative framework surrounding dust management policy and requirements in WA
- dust management program design
- dust monitoring program design
- recommended structure for a dust management plan document.

Pilbara Ports Authority also has Dust Management leading Practice Guidelines (2015) which were compiled for management of activities and operations conducted in the region controlled by Pilbara Ports Authority. The guidelines are directly applicable to operational bulk handling activities in Port Hedland.

4. Potential Impacts

Development of the Proposal has the potential to result in airborne dust which could impact upon human health and amenity. Impacts to amenity from dust include:

- regular dust events over several weeks leading to a gradual build-up of dust on surfaces
- short-term dust events of very high concentrations which cause a rapid build-up of dust on surfaces, or soiling, if dust deposition rates are high.

Dust may impact upon the environment where surface deposition affects vegetation growth.

4.1 Parameters of interest

Dust arising from the construction of the Proposal will include Total Suspended Particulates (TSP) and PM₁₀.

- TSP are particles each having an equivalent aerodynamic diameter of up to nominal 50 micrometres (µm). The primary issue with TSP emissions that could arise from the Proposal relates to impacts on amenity from a visible dust perspective and deposition onto surfaces
- PM₁₀ is particulate matter of 10 µm or less in diameter, which is the fine particle fraction of TSP. PM₁₀ includes inhalable particles that are small enough to penetrate the thoracic region of the lungs, where they can have a direct physical (inflammatory) effect and/or be absorbed into the bloodstream. All people are continuously exposed to PM₁₀ from naturally occurring and anthropogenic dust emissions in urban and industrial areas. Health impacts are related to the chemical composition of PM₁₀.

PM_{2.5} (particulate matter of 2.5 µm or less in diameter) is not considered a parameter of interest for this DMP as these particles are primarily emitted because of combustion.

It is assumed that the isolated areas of surficial contamination have been/will be remediated prior to the commencement of construction and therefore impacts are assessed as uncontaminated dust with amenity being the primary potential impact.

4.2 Criteria for assessing impacts

Port Hedland has an interim air quality guideline value for PM₁₀ of 70 µg/m³, with ten allowable exceedances per year (See Section 2.7).

No formal air quality guideline value for TSP applies to Port Hedland⁶. Given that the primary health effects of suspended particles are expected from the PM₁₀ fraction, efforts for management of dust impacts in Port Hedland are focused around this smaller fraction (note: TSP is not measured as part of the PHIC monitoring network).

4.3 Emissions sources

Emissions of dust from construction of the proposed marina may result from three main processes:

- wind erosion
- materials handling
- vehicular movements.

⁶ The Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999 has a Kwinana specific TSP standard of 150 µg/m³ applied to heavy industry area (Area A) and 90 µg/m³ applies to nearby land bordering the industrial area. A limit of limit 260 µg/m³ applies to both areas.

The dust-generating sources and activities associated with the construction of the Proposal are described in Table 1.

Table 1: Potential dust sources and dust generating activities

Activity	Description	Dust generation and exposure potential
Dredging of entrance channel	Dredging of channel using floating barge (CSD/Backhoe Dredge); spoil material to be deposited on barge.	Dust generated by wind action on spoil drying out while stockpiled on barge.
Excavation of harbour basin	Excavation of sand material from marina basin using hydraulic excavator.	Dust from movement of excavator over dry areas; Dust generation potential from physical disturbance of dry material during excavation and transfer.
Construction of breakwater, sand trap and internal revetment	Excavation of sediment and rock using hydraulic excavator.	Dust generation potential from disturbance of dry material during excavation.
Vehicles traversing site	Movement of earthworks vehicles, trucks and light vehicles on unsealed areas.	Dust generation potential due to soil disturbance during movement of vehicles over the site.
Transport and materials transfer	Use of trucks to convey material to different locations within site.	Dust generation potential during loading and unloading activities from dry transported material or dry tipping surface.
Dozer activity during landscaping	Movement of materials for construction, vegetation removal, recontouring, spreading of spoil or topsoil, trimming of slopes and compaction.	Dust generated during manipulation of soil/sediments; Increased exposed areas due to vegetation removal.
Stockpiling	Interim stockpiles during construction or longer-term stockpiling of excess spoil.	Dust generated during the placement of soil on dry stockpiles; Dust generated by action of wind on stockpile surfaces.
Exposed surfaces	Presence of un-stabilised exposed surfaces during construction.	Dust generated by wind action on any surficial dry material.
Revegetation	Spreading of topsoil.	Potential for dust generation during mechanical spreading and from exposed soil surfaces from the action of the wind.

It is assumed that no spoil will be required to be transported offsite; should transport offsite be required then appropriate management controls will be implemented, e.g. covering of loads.

5. Dust risk assessment

A site risk assessment/classification was conducted in accordance with the framework provided in the DEC (2011) guidance to determine the level of dust management and monitoring required for the site. The site classification chart for uncontaminated dust was utilised.

Part A Nature of site

Item	Comment	Score
Nuisance potential of soil when disturbed	Soils are expected to be uncontaminated particles predominantly larger than 50 µm diameter; therefore, the nuisance potential is considered primarily to amenity	2
Topography and protection provided by undisturbed vegetation	There is no protection provided by the topography or undisturbed vegetation	18
Area of site disturbed by the works	More than 10 ha	9
Type of work being done	Bulk earthworks	9
Total part A score		38

Part B Proximity of site to other land uses

Item	Commentary	Score
Distance of other land uses from site	The nearest residence is within 100 m	18
Effects of prevailing wind direction (at time of construction) on other land uses	The residential areas will be affected by winds coming from the north-west	9
Total Part B score		27

The site classification score is the product of the Part A and Part B scores (38 x 27 = 1026). A site classification score over 800 is considered high risk. Therefore, the Proposal is considered high risk for potential dust impacts and the management provisions have been determined accordingly.

6. Management provisions

The following control measures will be implemented at the site as part of standard controls to mitigate dust generation and provide contingency arrangements should dust emissions arise.

6.1 Movement of vehicles

Vehicle movements across the site may disturb soils and generate dust. The following measures will be adopted during all construction activities to prevent excessive dust generation:

- unnecessary vehicle movements on the site will be avoided as far as reasonably practicable
- vehicles will adhere to speed restrictions within the site; the appropriate speed limit will be subject to the determination of the Site Manager based on the activities being undertaken, location and site conditions at the time
- vehicles will keep to designated access roads as far as reasonably practicable
- vehicles deviating from designated access routes will do so only as required for specific work activities and under appropriate permissions
- public roadways used for access will be kept clear of deposited material tracked by vehicles.

6.2 Active dust suppression

To prevent excessive dust generation, the following wetting procedures of work area and haul roads will be undertaken:

- dry spoil to be stockpiled will be actively wet down during active extraction
- a total of three water carts (each minimum 10,000 L capacity) will be available in close proximity to the site entrance to enable pre-wetting of access roads and areas of the site where vehicle movements are anticipated will be carried out (pre-wetting and re-wetting requirements to be determined on-site by the Site Manager)
- pre-wetting will be conducted to increase the moisture content of any dry material to be moved, e.g. during recontouring
- areas to act as tipping receival surfaces will be wet down prior to commencement of tipping
- large rocks imported to the site will be washed at the source or alternative off-site staging area to reduce the amount of surface dust.

6.3 Materials handling activities

Materials handling activities will be conducted using good work practices to mitigate dust generation, including:

- the height that sand is dumped from excavator and front-end loader buckets will be minimised as much as possible
- if the sand being excavated is dry and producing dust when being worked, it will be wet down periodically to keep it damp by direct spraying of the area of active excavation.

6.4 Establishment of landscaped areas

During the establishment of landscaped areas, the following measures will be implemented:

- topsoil will be kept damp while spreading⁷ during the establishment of gardens
- exposed topsoil will be covered with mulch as soon as practicable.

6.5 General provisions

General provisions to mitigate dust impacts from the site will include:

- neighbouring land occupiers, the Town of Port Hedland and DWER will be notified prior to construction activities commencing and supplied with contact information for the Site Manager
- prior to commencement of any construction, wind fencing will be installed on the southern and eastern boundaries of the site and from the southwestern corner to the high watermark
- water carts and canons will be available at the active work areas to provide contingency in the event of excessive dust generation
- stockpiles in active use will be wet down to reduce wind erosion and displacement of dust upon the addition of more material
- where dust suppression is not achieved by water alone, chemical surfactants will be used in line with best practice
- stockpiles and cleared areas will be stabilised as required using a dust suppression crusting agent or other similar material
- stockpiled spoil to remain to the north of the marina following completion of the Proposal will be stabilised by revegetation with suitable flora species
- procedures to review and if necessary, shut down excavation and other site work during high dust events will be implemented
- Should high wind speeds be forecast for wind from the north west, site activities will be reviewed and suspended if deemed appropriate.

6.6 Visual observations

Site personnel and contractors will be required to record observations of visible dust emissions that appear to exit the boundary of the site, including date, time, location and extent of the visible plume. Those observations will be considered in relation to the measured dust concentrations and wind conditions, to inform management of site activities.

6.7 Employee education

Site personnel and contractors will be trained at induction. Training will include mechanisms of the generation of dust emissions, the importance of and responsibility of individuals to implement the above mitigation measures and reporting of visible dust emissions.

⁷ Topsoil will be spread over the recontoured surface, no mixing of topsoil and underlying spoil material is to occur.

7. Monitoring program

7.1 Purpose

In order to proactively manage any dust generated by the construction of the Proposal, a monitoring program will be established to disseminate dust impacts resulting from emissions generated at the site with background dust and emissions from other sources.

7.2 Monitoring methods

Monitoring of PM₁₀ and wind parameters is required in order to ascertain the impacts of the construction activities and to inform effective management. It is proposed that the same monitoring methods employed for the baseline Spoilbank monitoring are used (Section 2.8); specifically, BAM1020 monitors equipped with a real-time monitoring unit to yield both 1-hour and 10-minute averages as well as a wind sensor to record wind speed and direction on a 10-minute average basis. Monitoring sites will be equipped with telemetry in order to have access to real-time data via a web portal and to allow alarm notifications to be generated.

7.3 Performance criteria (trigger levels)

The following preliminary trigger levels (Table 2) will be implemented. The trigger levels will be reviewed and refined once the monitoring program is implemented to ensure effectiveness at informing site management and dust controls (see Section 7.5).

Table 2: Preliminary trigger levels

Event	Trigger level	Description	Management
Town dust event	Exceedance of 300 µg/m ³ for more than three consecutive 10-minute averages at onsite monitors upwind and downwind of the site AND Concurrent exceedance of 200 µg/m ³ 1-hour average at minimum one out of two PHIC monitoring sites (Kingsmill or Taplin Street)	Dust event not originating from site activities	Review on-site dust-generating activities to reduce contribution to dust levels in the airshed.
Local dust event - calm	Exceedance of 300 µg/m ³ for more than three consecutive 10-minute averages at any on-site monitor and winds below 0.5 m/s	Dust event possibly caused by poor dispersion during calm conditions	Review site activities for potential contribution to airborne dust; Apply additional controls to mitigate further suspension of dust during poor dispersion conditions.
Site dust event	Visible dust crossing the site boundary and/or exceedance of 300 µg/m ³ for more than three consecutive 10-minute averages at one or more on-site monitors	Possible site dust event	Review wind directions and determine if dust is a consequence of site works and apply appropriate controls.

Alarming via SMS text would be set up for the on-site monitors with notifications triggered by the above events. The alarms will be received by the Site Manager and will only be active during working hours.

Access to 10-minute average data from nearby the PHIC monitoring stations (Kingsmill and Taplin Street sites) will be sought. If available, this data will be used as part of the proactive management effort.

7.4 Number and location of monitoring sites

On-site monitoring, for the duration of the construction activities, is proposed to comprise three monitors to be installed on-site. Preliminary locations designed to record any dust arising from the development site with the potential to travel towards nearby residences are shown in Figure 7.1. Locations will be refined upon site inspection at commencement of the monitoring programme.

The Spoilbank 1 monitoring location is as close as practicable to the original location used for the baseline monitoring⁸, is close to the boundary of the site, and is in the path of dust carried on a prevailing north westerly wind from the direction of the Spoilbank towards the nearest sensitive receptors (residences along Sutherland street to the east of Acton Street).

The Spoilbank A monitoring location will capture impacts from dust coming from the northern part of the site, concerning the sand patch and potential stockpile area, on a north westerly wind towards the residences along the beach to the east of the site.

Spoilbank B will capture dust carried by a north easterly wind component during the drier months towards residences to the west of the site. Furthermore, this site will not be influenced by the main body of the construction site during the prevailing north west winds.

Final monitoring locations will be subject to a detailed site survey and any constraints identified.

7.5 Monitoring review

Trigger levels will be reviewed within one month of the commencement of monitoring to ensure that they are appropriate at informing the management and control of dust. A further review will be carried out after two months followed by periodic review, nominally quarterly, to capture seasonal changes in meteorology and ensure alarming continues to effectively inform dust management. The need for implementation of a directional component to the alarming will also be considered during the review process.

7.6 Quality Assurance/Quality Control (QA/QC)

Real-time data will be available to site personnel via a web portal. This data will not be subject to any quality assurance checks other than an indication of the alarm status of the instrument. It is expected that the monitoring contractor will conduct a daily examination of the data to ensure instruments are online and wind data is in order. Alarming will be established to inform the Site Manager of instrument issues (as well as exceedances of trigger levels as described in Section 7.3).

Validated data, which has been subject to QA/QC checks, will be delivered on a monthly basis (or earlier if a dust event requires investigation). A valid data capture rate of greater than 90% is expected. It is anticipated that the instruments will be subject to monthly maintenance in accordance with Australian Standards and manufacturers guidelines.

7.7 Stakeholder consultation

Extensive community consultation has been carried out regarding the design and implementation of the Proposal. Consultation with the local community will continue through the approvals, assessment and construction phases and will include detail of the site monitoring program and its objectives.

⁸ Locating a monitor at the former Spoilbank 2 background site is not considered necessary as it will not assist in directly informing impact of construction on nearby sensitive receptors.

Consultation with the current monitoring contractor responsible for the Port Hedland monitoring network will be carried out to ensure monitoring is carried out in a consistent manner and, if possible, to gain access to the monitoring data, which can be used as part of the proactive management effort.

Pilbara Ports Authority was consulted on the draft DMP to ensure consistency and alignment with its dust management and control activities.

7.8 Roles and Responsibilities

Roles and responsibilities with respect to the management of fugitive dust emissions are outlined in Table 3 below:

Table 3: Site roles and responsibilities

Role	Responsibilities
All personnel	Monitor and report instances of fugitive dust by raising an incident report as required.
Site Supervisor	Develop and allocate resources to provide for a level of risk of fugitive dust that is as low as reasonably practicable and conduct and review fugitive dust inspections.
Site Manager	Monitor wind speed, direction and dust alarms. Incorporate appropriate controls into planning and modulation of construction activities, including guidance and coaching of personnel and provision of resources.

7.9 Complaints management

A complaints management system will be implemented at the site. The system will, at a minimum, record:

- the number and details of complaints received concerning the dust impacts from the activities undertaken at the site
- any action taken in response to the complaints to reduce or eliminate the risk of future events.

A notice will be erected at the site entrance providing contact details of the person to be contacted regarding the works (e.g. Site Manager).

7.10 Reporting

Monitoring results and calibration data will be provided in a monthly summary report which includes all working spreadsheets showing the raw data and review of the results. Monitoring data will be recorded and made available to relevant authorities upon request.



Legend: Proposal area Roads (MRWA) Proposed monitoring locations	Scale 1:6,000 at A4	Port Hedland Spoilbank Marina
	Coord. Sys. GDA 1994 MGA Zone 50	PROPOSED CONSTRUCTION AIR QUALITY MONITORING LOCATIONS
	Job No: 58244	
	Client: Department of Transport	FIGURE 7.1
	Version: A	Date: 20-Feb-2020
Drawn By: cthatcher	Checked By: CI	

8. Review

This DMP will be subject to at a minimum, six-monthly review to ascertain its relevancy for ongoing site management and allow for ongoing improvement. Reviews may also be implemented:

- at the direction of a relevant authority (e.g. EPA, Town of Port Hedland)
- prior to commencement of site works
- after assessment of monthly validated monitoring data
- as a corrective action resulting from an investigation into dust impacts.

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10. Limitations

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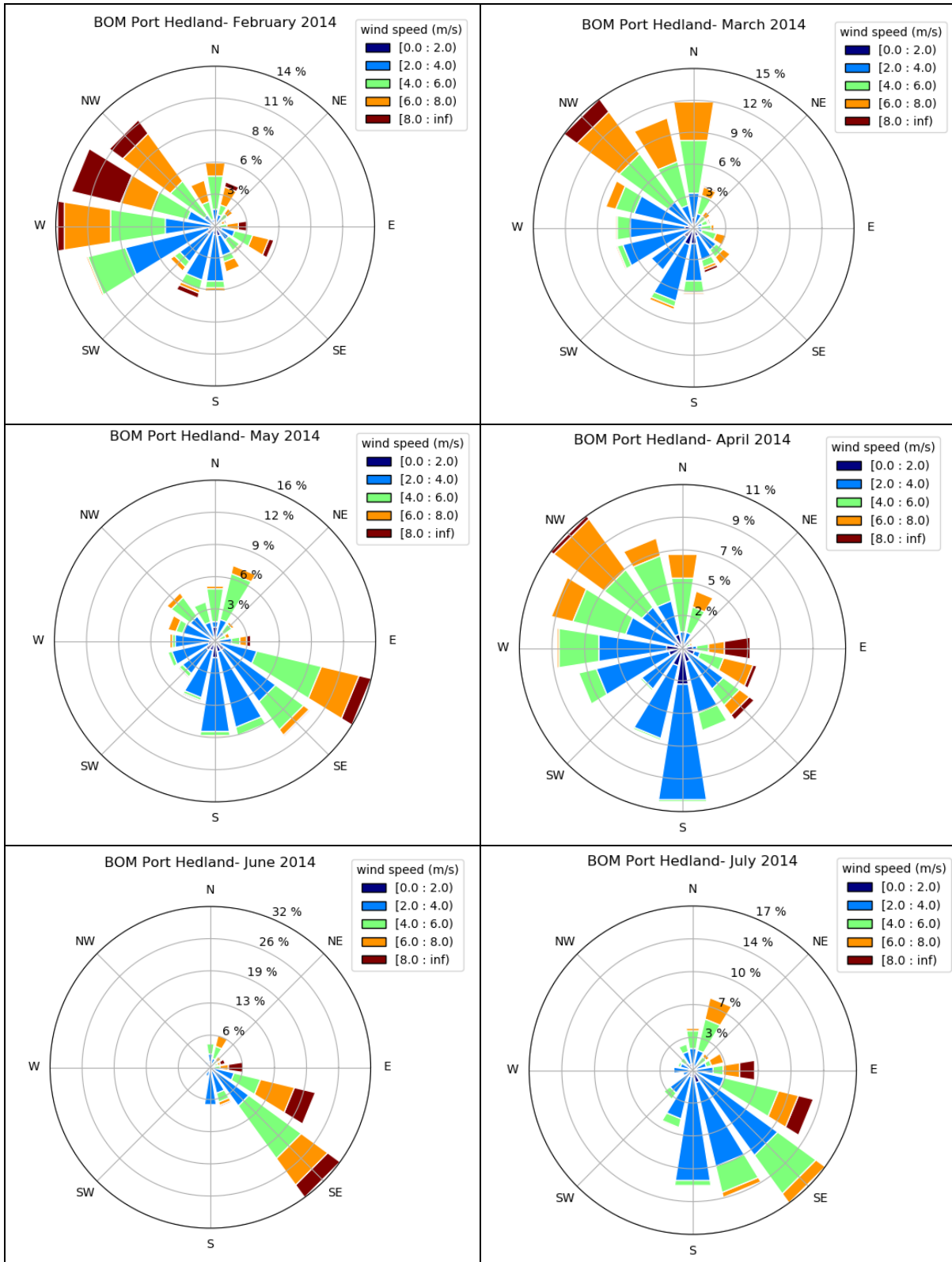
Environmental conclusions

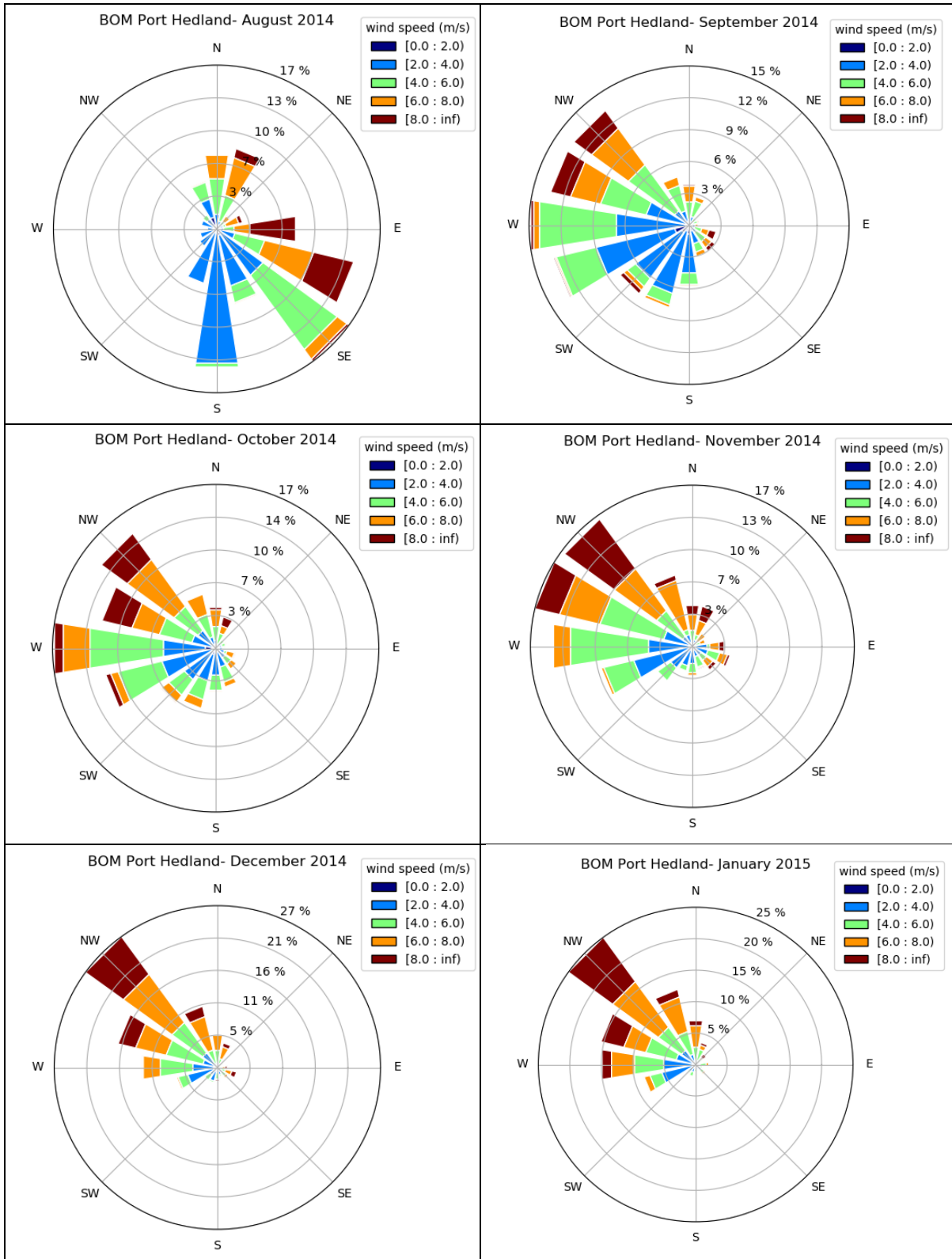
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Appendix A Monthly Wind Roses






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