# Appendix 21

## Air Quality Effects Assessment

Auckland Hamilton Tauranga Wellington Christchurch Invercargill

PATTLE DELAMORE PARTNERS LTD

# Air Quality Assessment – Northport Proposed Eastern Expansion

Northport Limited

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Prepared for

Northport Limited

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# 1.0 Introduction

Pattle Delamore Partners Limited (PDP) has been engaged by Northport Limited (Northport) to undertake an assessment of the potential air quality effects associated with the proposed expansion of its port facilities. This assessment is required to support a resource consent application to the Northland Regional Council (NRC) for this project.

Northport is proposing to expand the port's capacity to the east by reclaiming land and building additional berths. This project comprises land reclamation, construction of wharves and associated dredging.

This report assesses the potential air quality effects associated with the construction of the proposed expansion, including the effects of future port operations at the nearest identified sensitive receptors. This assessment is based on the project description prepared by Enviser and has been prepared in accordance with the Ministry for the Environment (MfE) Good Practice Guide for Assessing and Managing Dust (GPG AMD).

# 2.0 Proposed Activities

## 2.1 Project Overview

Northport proposes expanding its existing facilities to increase its freight storage and handling capacity to support the future freight needs of the upper North Island.

The Proposal includes:

- Reclamation within the Coastal Marine Area (CMA) and earthworks to the immediate east of the existing reclamation to expand Northport's footprint by approximately 13.7 hectares (ha). This comprises 11.7 ha of reclamation within the CMA and 2 ha of earthworks outside the CMA.
- Capital and associated maintenance dredging to enlarge and deepen the existing swing basin and to enable construction of the new wharf.
- A 520 metres long wharf (including the consented but not yet constructed 270 metres long Berth 4) constructed on the northern (seaward) face of the proposed reclamation.
- Sheet piling and rock revetment structures on the eastern edge of the proposed reclamation.
- Treatment of operational stormwater via the existing pond-based stormwater system.
- Port-related activities on the proposed expansion and wharves.

- Construction of a new tug jetty.
- Replacement of the existing floating pontoon, public access and public facilities.

The anticipated port-related activities include a container terminal, Coastguard, biosecurity, border control/customs and quarantine facilities, harbour control facilities plus supporting offices and workshops. In the future, as the number of containers handled by Northport increases, ship-to-shore gantry cranes will be added.

The construction of the reclamation, wharf and associated structures is expected to include some or all of the following activities:

- Capital dredging, using a trailer suction hopper dredger (TSHD) and/or cutter suction dredger (CSD), to remove an anticipated volume of 1.4 million $m^3$ of dredge spoil.
- Reclamation, using the dredge spoil, and discharge of decant water.
- Construction dredging, using a backhoe dredger, to create the desired underwater profile and allow for construction of the batter slope.
- Excavation, placement of material and compaction.
- Construction work to construct seawalls and abutments (work above and below Mean High Water Spring (MHWS)).
- Staging of construction equipment, including piling to create work platforms and install pile gates.
- Pile-driving, using methods including vibro and top-driven impact hammers. This will involve cranes (shore based or mounted on jack-up barges), excavators and power packs (generators and hydraulic pumps).
- Placement of formwork, tying reinforcing steel and laying of ducts and pipework.
- Pouring of concrete for the port deck and discharge of concrete curing water.
- Construction of pavement surfaces.
- Installation of wharf furniture (bollards, electrical services etc).
- Installation of services and other infrastructure on the expansion area.

The final design will be confirmed during the detailed design phase. Further detailed information can be found in Section 3 of the main resource consent application.

### 2.2 Potential Air Quality Effects of the Project

From an air quality perspective, the proposed expansion is made up of two key areas, being; the reclamation and construction of the wharf and hardstand area, and the operation of these new facilities. Once established the new port facility will be used for container operations. From an air quality perspective, the handling and moving of containers will result in relatively small quantities of discharges to air, other than a small amount of combustion gases ($PM_{10}$, $PM_{2.5}$, $NO_2$ and CO) from the vehicles used to move the containers. Whereas during the construction and reclamation of the new wharf, the greatest potential for air discharges that could have off-site effects is from the nuisance associated with dust. Given that nuisance dust has the greatest potential to result in off-site effects, the main focus of this report will be on nuisance dust as a result of the construction and reclamation activities.

## 3.0 Site Background

### 3.1 Location and Context

Northport is located on a 58 hectare site at Marsden Point, which is approximately 18 km directly southeast of the centre of Whangarei City. The port is bordered by commercial activities to the south and the Marsden Point Import Terminal to the southeast. The Whangarei Harbour surrounds the port to the west, north and east. The nearest residential dwellings to the proposed port expansion are located approximately 1,000 metres to the north at Reotahi Bay and 1,200 metres to the west in One Tree Point. There may be users of the beach to the east of the port on occasions which we consider below.

The site is bordered by the Marsden Point Import Terminal and other industrial activities. Given that those sites are considered to have a low sensitivity to any air quality effects that may be produced by the proposed port expansion, this project is not likely to cause significant adverse effects at these locations. Therefore, they are not the focus of this assessment.

To the south of Northport there are a number of commercial activities which include engineering and construction companies, a concrete batching plant, a manufacturing plant and companies that support the nearby marine industry. Given the available land, and the zoning rules, there is the potential for further commercial and industrial activities to be established in the future. There are a wide range of permitted commercial and industrial activities that could operate within this area, which will have varying degrees of sensitivity to air quality from low to moderate. While this land is zoned for industrial use, this area is not a focus of this assessment, however given the potential for commercial activities to be present, for this assessment PDP considers this location to having a moderate sensitivity to air quality effects.

The site and the immediate surrounding area have a flat topography and is only a few metres above mean high tide sea level.

The location of the proposed works is shown in Figure 1 as an orange polygon, with the blue polygon indicating the location of an already consented, but not implemented, reclamation.

**Figure 1: Site Location**

## 3.2 Meteorology

The topography of the surrounding area has an influence on wind speed and direction and therefore can have a significant effect on dust generation and the transportation of air pollutants. The Northport site itself and the surrounding area is relatively flat, however it is situated near the mouth of the Whangarei Harbour and the Whangarei Heads which will have an influence on the winds experienced in this area. It is also noted that the proposed expansion will alter the terrain, however as this reclamation will be relatively flat, in PDP's opinion it is unlikely to result in any significant changes to the winds experienced in the area.

Northport has several meteorological monitoring stations, however these are located very high on port structures or near buildings, and therefore have been considered to not accurately reflect the metrological conditions for the proposed port expansion. Therefore, for the purposes of this assessment, meteorological data developed by Tonkin and Taylor using CALMET for the Marsden Point Oil Refinery (as it was then) has been used in this assessment.

The distribution of hourly average wind speeds and directions predicted at Northport for the years 2011 to 2012 is shown in Figure 2 and Table 1 presents the distribution frequency of wind speed. These windspeeds are at 10 metres above the ground. The windrose shows that the predominant winds are from the west and typically have lower wind speeds. However, as discussed further in the assessment winds greater than 5 m/s have the greatest potential to result in dust nuisance effects and based on the data presented in Table 1 these higher winds are predominantly from the northeast.

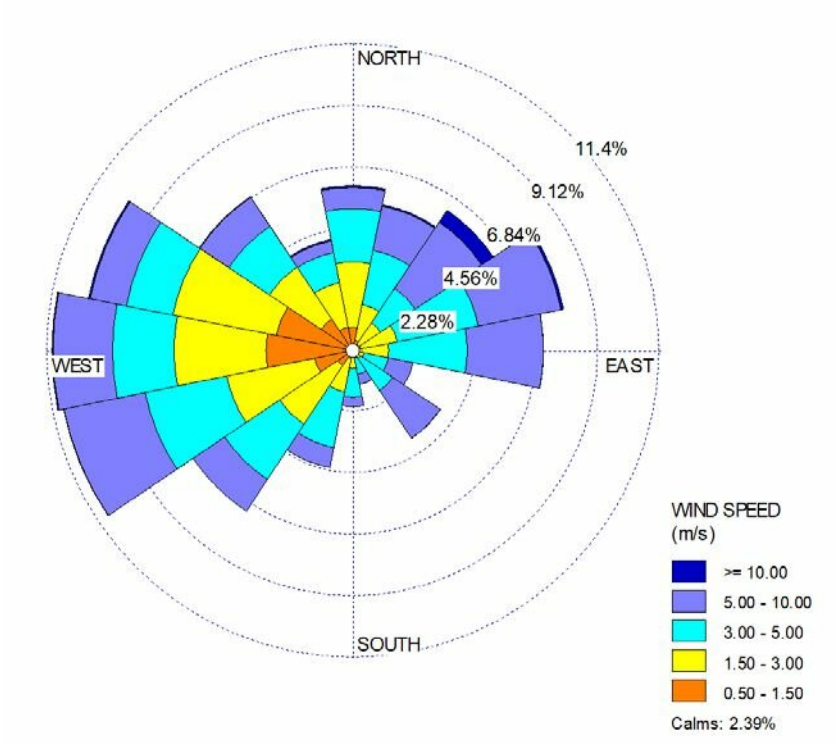


**Figure 2: Wind Speed and Wind Direction at 10 metres centred on the Site for 2011-2012 (1-hour average)**

| Table 1: Wind Speed Frequency Distribution at 10 metres for the Site | | | | |
|---|---|---|---|---|
| Direction | Wind Speed (m/s) | | | Total |
| | 0-5 | 5-10 | >10 | |
| North | 5.3 | 0.8 | 0.1 | 6.2 |
| North northeast | 3.8 | 1.7 | 0.1 | 5.6 |
| Northeast | 2.8 | 2.9 | 0.5 | 6.2 |
| East northeast | 4.8 | 3.1 | 0.1 | 8 |
| East | 4.3 | 2.8 | 0.0 | 7.1 |
| East southeast | 1.4 | 0.9 | 0.0 | 2.3 |
| Southeast | 1.8 | 2.1 | 0.0 | 3.9 |
| South southeast | 0.9 | 0.4 | 0.0 | 1.3 |
| South | 1.8 | 0.4 | 0.0 | 2.2 |
| South southwest | 3.7 | 0.8 | 0.0 | 4.5 |
| Southwest | 5.8 | 1.4 | 0.0 | 7.2 |
| West southwest | 7.9 | 3.1 | 0.0 | 11 |
| West | 8.9 | 2.2 | 0.0 | 11.1 |
| West northwest | 8.6 | 1.4 | 0.1 | 10.1 |
| Northwest | 5.6 | 1.3 | 0.0 | 6.9 |
| North northwest | 3.7 | 0.4 | 0.1 | 4.2 |

## 3.3 Sensitive Receptors

In the context of this assessment and based on the definition in the Regional Plan for Northland (operative in part), the term 'sensitive receptors' is defined as a location where people or surroundings may be particularly sensitive to the effects of air pollution. These types of receptors include:

- Residential buildings and associated garden areas, and
- School, hospital buildings and care facilities and grounds, and
- Amenity areas where people congregate, including parks and reserves, and
- Community buildings and grounds, including places of worship and marae, and
- Orchards, crops and commercial growing areas, and

- Water bodies used for the supply of drinking water and for stock drinking, and
- Apiaries, and
- Natural wetlands and significant areas of indigenous vegetation and habitats of indigenous fauna.

PDP undertook a site visit and identified that there are a number of residential properties located to the north and southwest of Northport, with the closest of these being approximately 1,000 metres from the proposed port expansion at Reotahi Bay. As discussed in more detail in Section 5.0, generally nuisance dust effects are not experienced more than 500 metres from the source and given this distance from the proposed expansion and that the main pollutant is nuisance dust as a result of marine sediment, PDP does not consider there are any residential receptors that would be considered affected. As already discussed, there are also a number of commercial activities to the south of the site which are considered as having a moderate sensitivity to nuisance dust, however these are on land zoned for industrial use. Given the wide range of industrial activities that could occur on this industrial land as of right which could also result in air quality effects, and that this location is generally more than 500 metres from the construction potential effects on activities occurring in this area are not the main focus of this assessment.

There is the potential for users of the beach that runs between Northport and Channel Infrastructure NZ and users of the parking area at Ralph Trimmer Road, while temporary in nature, to be within 5 -10 metres of the expansion, and consequently experience effects if they are present when construction activities are occurring.

## 3.4 Background Air Quality

The NRC operates the closest publicly available air quality monitoring site, which is located at Bream Bay College, approximately 5 km south of Northport. $PM_{10}$ is the only pollutant measured at this location and data from the latest 5 years of monitoring indicates that concentrations are typically below 30 µg/m³ and are generally considered to be low. As there is no $PM_{2.5}$ monitoring undertaken in the Marsden Point area, PDP has calculated the $PM_{2.5}$ concentration based on guidance from the Auckland Council[1], which based on its monitoring data indicates that 24-hour $PM_{2.5}$ concentrations are 37 percent (for rural locations) of 24-hour $PM_{10}$. This would indicate $PM_{2.5}$ concentrations are typically below 11 µg/m³, given the absence of any monitoring data, PDP considers this is an appropriate means of estimating $PM_{2.5}$ concentrations. The main contributors to $PM_{10}$ and $PM_{2.5}$ around Marsden Point are from transport emissions (both marine

[1] Auckland Council, Use of Background Air Quality Data in Resource Consent Applications, July 2014.

and road), sea salt and domestic home heating from the nearby residential areas. The Marsden Point Oil Refinery was also a significant contributor when it was operating.

Like $PM_{2.5,}$ there is no ambient monitoring of $NO_2$ that takes place in or around Northport. In the absence of local monitoring data for $NO_2$ it is common practice to use the Waka Kotahi NZ Transport Agency background tool[2] for estimating concentrations. Based on this assessment tool the predicted 1-hour average concentration would be 37 µg/m³ and the 24-hour average concentration would be 23 µg/m³, which also indicates low concentrations of air pollutants in the area. Background $NO_2$ concentrations are the result of combustion activities, and therefore the predominant sources will be from transportation, with the Marsden Point Oil Refinery also making significant contributions when it was operational.

PDP is not aware of any publicly available $SO_2$ monitoring undertaken near Northport, however PDP understands that Marsden Point Import Terminal has a number of $SO_2$ monitoring sites around the Whangarei Heads. Historically this area has been known to have elevated levels of $SO_2$, however the $SO_2$ concentrations have been reducing over the years as the oil refinery implemented process improvements and more recently with the introduction of the MARPOL Annex VI requirements for ships to use lower sulphur fuels. Given the recent closure of the refinery, ambient concentrations will reduce further to the point that the $PM_{10}$, $PM_{2.5}$, $NO_2$, and $SO_2$ concentrations are likely to be well below the National Environmental Standards.

Overall, this data would indicate that the air quality around Northport is relatively good and based on the proposed activities at Northport the combustion emissions ($PM_{10}$, $PM_{2.5}$, $NO_2$ and $SO_2$) are considered insignificant and they are unlikely to result in any noticeable off-site changes in ambient air quality, with the main pollutant being nuisance dust. Given that there are very few sources of nuisance dust in the area other than what is naturally generated from the marine environment or if the Marsden Point Import Terminal was to redevelop it site there would therefore be very little cumulative effect on the current background concentrations discussed.

## 3.5 Complaint History

PDP has reviewed Northport's complaint history since 2019 and there is only one air quality related complaint received. This complaint was received from Reotahi Bay and based on the complaint information, it appears that the source of the nuisance dust was from the log yard. Given the low number of complaints, this would suggest that the current site mitigation is effective at controlling dust generating activities on site.

[2] Waka Kotahi NZ Transport Agency, Background air quality guide, June 2014.

Additionally, activities on the proposed port expansion will not involve the handling of logs which was the source of this complaint. Potential activities on associated with the proposed expansion includes the handling of damp marine sediments and aggregates for the reclamation and once complete the operation of a container wharf. Therefore there is little potential for these activities to result in the same effects that led to this complaint.

## 4.0 Assessment Methodology

The potential effects of the reclamation and the general on-going port operations have been assessed qualitatively in accordance with the MfE GPG AMD.

The operations on the eastern part of the port are associated with container loading and unloading, with the new reclamation required for the expansion of these operations. From an air quality perspective, container operations will result in relatively little air quality effects apart from vehicles emissions, and potentially from any dust that may accumulate on the surface over time.

Therefore, the focus of the assessment is on the potential dust nuisance effects arising from reclamation activities.

It is common practice in New Zealand to undertake a qualitative assessment of the potential effects associated with large earth moving projects and the bulk handling of materials. This assessment has involved reviewing the activities that are to be undertaken, and then determining the likely potential for these activities to cause nuisance dust which could affect the surrounding environment. In determining whether there is the potential for nuisance to occur, the following considerations have been made:

- The nature of the activity undertaken;
- How long the activities are likely to occur;
- The nature of the material being handled, placed, and stored;
- Whether mitigation measures can be implemented to control the potential of effects (e.g. covering or storage of materials, use of water suppression, etc.);
- How close the local community and sensitive receptors are to the activities;
- The nature of the receptors in these communities and their sensitivity to dust; and
- The prevailing meteorological conditions.

## 4.1 Comparison with Assessment Criteria

The assessment criteria used in the Operative Regional Air Plan for Northland to manage dust emissions from earthmoving and the loading, unloading and on-site movement of material is contained in Rule 9.1(4), which states:

*"The discharge shall not result in any offensive or objectionable dust deposition, or any noxious or dangerous levels of airborne particulate matter, beyond the boundary of the subject area"*

There is also a similar rule (C7.2.5 (19)) in the Appeals version[3] of the Proposed Regional Plan for Northland.

As this is a subjective standard PDP has undertaken a qualitative assessment to predict the effects from the reclamation and the new port operations using the FIDOL assessment tool (Frequency, Intensity, Duration, Offensiveness and Location).

The FIDOL factors are explained in detail below:

- Frequency; relates to how often an individual is exposed to dust. Factors determining this include the frequency that the source releases dust (including its source type, characteristics and the rate of emission of the compound or compounds); location of sensitive receptors relative to the work area; prevailing meteorological conditions; and topography.
- Intensity: is the concentration of dust at the receptor location.
- Duration: is the amount of time that a receptor is exposed to dust. Combined with frequency, this indicates the exposure to dust. The duration of dust emissions, like its frequency, is related to the source type and discharge characteristics, meteorology, and location. The longer the dust detection persists in an individual location, the greater the level of complaints that may be expected.
- Offensiveness: is a subjective rating of the unpleasantness of the effects of nuisance dust. Offensiveness is related to the sensitivity of the 'receptors' to the dust emission i.e. industrial premise may be more tolerant to dust concentrations than residential properties.
- Location: is the type of land use and the nature of human activities in the vicinity of a dust source. The same process in a different location may produce more or less dust depending on local topography and meteorological conditions. It is also important to note that in some locations certain higher dust concentrations may be more acceptable than in others.

[3] March 2022

While FIDOL assessments are typically undertaken to assess odour effects, they are also commonly used to assess dust impacts. Some regulatory authorities (Environment Canterbury) recommend FIDOL to assess for dust effects.

## 5.0 Assessment of Environmental Effects

This section provides an assessment of potential emissions resulting from the port expansion construction and reclamation, and the ongoing operations of the new port facilities.

PDP considers that dust is likely to be the key air quality concern from the project. Therefore, the assessment of environmental effects is focused on the potential effects of dust nuisance. However, the project may also give rise to other air quality effects such as those arising from vehicle emissions. These vehicle emissions are either directly under the control of Northport or not..

**Northport Controlled Sources**

These sources are directly under the control and operation of Northport and include port-owned fleet vehicles, port administration owned or leased vehicles, port-owned and shore based operated cargo handling equipment, and any other emissions sources that are owned and operated by Northport.

**Other Sources**

These sources are typically associated with tenant operations and include ships, trucks, cargo handling equipment, rail locomotives, harbour craft, and port and tenant employee commuting.

However, emissions from the additional vehicles needed for the expanded container operations would be insignificant, and given that the current background air quality is already low and is likely to further improve as a result of the closure of the oil refinery, it is expected the off-site concentrations will be below the National Environmental Standards for Air Quality.

### 5.1 Fugitive Dust Emissions

The most significant potential effect from the construction and reclamation is the nuisance associated with dust. These activities are discussed further in the AEE.

There are number of factors that are important to consider when determining whether any dust nuisance is caused by the disturbance and placement of fill materials. These include the size and density of the particles, wind speed and direction, height of release, and the distance between the discharge point and the receptors.

These factors are all interconnected, and it is how they combine that determines the potential for an effect to occur.

Typically the following applies:

- Heavier and larger particles require higher wind speeds to become airborne;
- Large particles will deposit faster than small particles of a similar density;
- More dense particles will deposit more rapidly than less dense particles of a similar size; and,
- Particles will travel further before depositing with a strong wind blowing than with a light wind blowing.

Considering this range of variables, there are a number of recognised guidance documents that states that dust nuisance effects are generally only experienced within up to 300 and 500 metres of unmitigated dust sources. While the one complaint Northport has received indicates that dust from the site can travel much further in certain conditions, the source of this dust was from logs which is much lighter than marine sediments which is the potential source of dust as a result of the port expansion, and therefore can travel much further, particularly if it occurred during ship loading and was release at an elevated height. Therefore, PDP considers a distance of 300 to 500 metres appropriate for the proposed port expansion. Given that Northport will employ various forms of mitigation, as discussed in Section 6 to control dust discharges, dust nuisance effects are not likely to be experienced at greater distances from the reclamation activity.

Based on the current operations at the port, once the new area becomes operational PDP considers there will be very little potential for dust emissions from this location.

As discussed, the dust from marine sediments used for the reclamation is typically dense and consequently does not travel far. Figure 3 depicts the distance potentially travelled by a range of dry material from the site based on a particle diameter of 50 to 100 µm and at wind speeds of 5 and 10 m/s. These parameters are based on PDP's experience with dust nuisance, and a wind speed of 5 m/s at ground level has been used as a suggested trigger for assessing dust effects. The release height in the figure is also typical of the height that dust is released from for a range of different construction activities.

The wind direction is an important factor in determining the potential for a receiver to be affected, especially for those downwind in a predominant wind direction.

Based on the above, marine sediments are not likely to travel more than 250 metres in the strongest winds, however 400 metres has been used in this assessment to conservatively indicate the distance within which some level of dust effects may be experienced if no form of mitigation is used. A distance of

400 metres, excludes any residential receptor and any commercial activities to the south of Northport, but includes the entire beach located to the southeast of the proposed works and therefore this location is the focus of this assessment.

As Northport will use the various forms of mitigation described in Section 6 to reduce and control the potential for dust emissions the distance in which effects could occur will reduce significantly. Based on the types of activities that will be undertaken and guidance provided in US EPA technical documents[4], with mitigation in place it is likely that effects will only occur within 50 m of sources that are located at ground level.

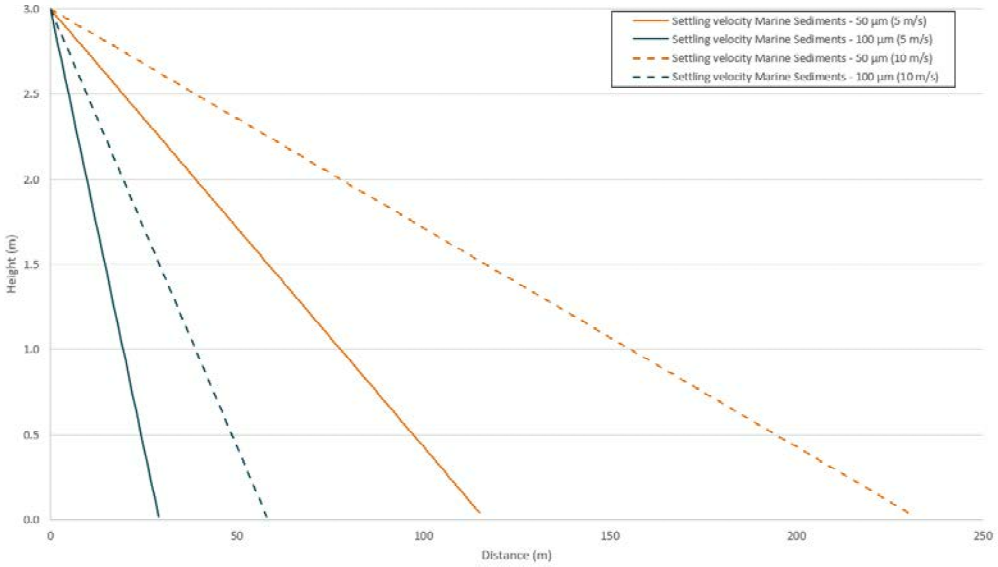


**Figure 3: Potential Nuisance Dust Travel with Wind Speed**

[4] AP 42, Fifth Edition, Volume I Chapter 13 Miscellaneous Sources, Section 2.4 - Aggregate Handling and Storage Piles.

Figure 4 the yellow polygon extends 400 metres from all dust sources and indicates the possibly affected area if no mitigation was undertaken, and the purple polygon indicates the potentially affected area with mitigation in place.

**Figure 4: Areas of Potential Nuisance Dust Effects from Mitigated and Unmitigated Dust Emissions**

## 5.2 Assessment of Effects from Nuisance Dust from the Construction and Reclamation Phase

PDP has undertaken a FIDOL assessment as described in Section 4.1.1 to assess the potential nuisance dust effects from the construction and reclamation process.

As already discussed, PDP considers that winds above 5 m/s at ground level have the potential to cause dust nuisance effects. The effects may be reduced if the mitigation measures discussed in Section 6 are implemented.

The nearest sensitive locations are the beach to the east of the Port and the Ralph Trimmer Road carpark and beach access to the south.

**Frequency**

The frequency with which effects will occur from the reclamation will depend to a large extent on the construction methodology, but in any case, will only occur when material is above the waterline. In dry windy conditions, particularly if disturbed, the marine sediments can be lifted by winds greater than 5 m/s at ground level. Based on the wind speed data in Table 1 the frequency of winds

above 5 m/s from the west to the northwest, which have the potential to carry dust from the new port area to the beach, is between 1.3 and 2.2 percent of the time. Likewise, winds from the north to the northeast have the potential to transport dust towards the carpark at Ralph Trimmer Road with the frequency of winds (greater than 5 m/s) from this direction between 0.9 and 3.4 percent of the time. As the data in Table 1 is measured at 10 metres, the actual percentage of wind speeds above 5 m/s will be lower than these values.

Based on guidance[5] prepared by the Institute of Air Quality Management, these percentage of winds are classified as infrequent. This in combination with the proposed mitigation and monitoring, means that that the frequency of any effects associated with the reclamation will be low.

Additionally, people are less likely to go to the beach during strong winds, therefore reducing the frequency in which people may be exposed to elevated dust conditions.

**Intensity**

There is potential that if not appropriately mitigated there could be reasonably intense dust effects on the beach, beach access or at the carpark once material is placed near the perimeter of the reclamation and is above the high tide level. The potential intensity of any effects will reduce as the reclamation moves north. Using the mitigation measures discussed in Section 5, the intensity should be low.

**Duration**

PDP considers, based on the visual monitoring presented in Table 2, and the mitigation measures proposed, that if an event were to occur, at worst the duration would be limited to a period of no more than one hour at any one time.

Also given temporary nature of beach goers and carpark users, it is unlikely that these users will be in this location for any significant duration, and there may be significant periods when no one is present.

**Offensiveness**

PDP considers that dust emissions associated with the reclamation process are unlikely to be present in such quantities that they result in any off-site offensive or objectionable effects. This is based on the limited frequency of suitable meteorological conditions, the activities undertaken and mitigation measures that will be implemented.

[5] Institute of Air Quality Management, Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016.

**Location**

The reclamation is located approximately 1,000 metres from the nearest residence. This is well beyond the distance that any dust associated with the construction process would travel.

In terms of the beach and the carpark, while the construction will generally move away from these locations, however it will initially be very close.

Therefore, the location of the proposed port expansion is good in terms of permanent receptor location as there is a significant separation distance, however shot term receptors such as users of the beach or the carpark may experience some effects.

**Conclusion on potential effects of dust nuisance**

Having assessed the proposed construction and reclamation that have the potential to cause dust discharges against the FIDOL factors, PDP considers that the nearest residential receptors have very limited potential to be affected by dust, even without mitigation due to distance and therefore will have a less than minor effect.

However, given the proximity of the proposed reclamation to the beach to the east and the carpark to the south of the site, there may be some effect on these potential users. While the frequency and duration of dust events will be low, given the closeness of the works to these locations there is the potential for higher intensity effects, especially when the work is being undertaken to the east and south. At these locations there are times that the effects could be considered more than minor due to the proximity of some works, however for the majority of the time it is expected that the proposed port expansion will have a less than minor effect on air quality for users of the carpark and beach.

When the proposed mitigation presented in this assessment is considered, the likelihood of dust effects at the nearest receptors are even further reduced. Given the limited period in which members of the public will use the beach and carpark, it is unlikely that these users will experience offensive or objectionable dust effects.

## 5.3 Cumulative Effects

PDP has evaluated a range of cumulative effects scenarios, and these are set out in the following sections. Based on the proposed port expansion, air discharges from the reclamation and construction activities, and activities on the newly reclaimed area have the potential to result in cumulative effects with the existing port activities in some meteorological conditions.

The existing operations at the port give rise to the following air quality effects:

- Dust nuisance effects from the storage and handling of bulk materials such as coal, wood chip, gypsum, grain, palm kernel expeller, clinker and fertiliser.
- Combustion gas emissions ($PM_{10}$, $PM_{2.5}$, $NO_2$ and CO) from vehicles operating within the port.

### 5.3.1 Existing Port Operations Combined with Construction Activities

As already discussed, the likely distance that nuisance dust from Northport could travel if no mitigation were undertaken is 400 metres. Therefore, for a receptor to be affected by cumulative effects from the existing port operations combined with the construction activities, both these activities must be generating dust within 400 metres of a receptor at the same time when winds are blowing towards the receptor.

There are no dwellings within 400 metres of the existing port activities or the construction of the eastern reclamation, but there is the potential that beach and carpark users would be within 400 metres of these two activities and therefore could experience cumulative effects.

Figure 5 shows the potential dust effects from both the current site and the proposed expansion if no mitigation is undertaken with the green shaded area indicating the possible cumulative effects. As indicated by Figure 5 the port itself, Marsden Point Import Terminal and the Ralph Trimmer Road carpark being potentially the most affected areas for cumulative dust effects from the proposed expansion, with only a very small area of the beach that might be affected. While the Marsden Point Import Terminal will be one of the most affected areas, this is for nuisance dust and will have little to no effect on workers or visitors to the Import Terminal. There however might be an increase in the amount of soiling experienced on-site, but given the industrial nature of this site this should be indiscernible for that which already occurs.

The only area of the existing port operations that would result in a cumulative effect on the beach or the carpark is the currently consented but not reclaimed area (currently the tug berths). For this area to contribute to cumulative effects winds would need to be coming from the northwest for beach goers and the north for carpark users and be greater than 5 m/s. These winds are relatively infrequent which only occur 1.3 and 0.9 percent of the time respectively.

Given that Northport will be using mitigation and that this area of the beach is just within 400 metres of the existing port it is very unlikely that it will experience cumulative dust effects. However, even with mitigation there is the potential for the carpark to be affected given its proximity to some of the work.

However given the low frequency of winds from the north capable of moving dust, the effects at this location will be low.

**Figure 5: Area of Potential Dust Effects from Unmitigated Dust Emissions**

### 5.3.2 Current Port Activities with Port Operations on the New Reclamation

Once the newly reclaimed land becomes operational, this area will be used for container operations which will generate little dust and a small quantity of vehicle related combustion e emissions. Given that there will only be a small quantity of vehicles operating in this area and consequently a small quantity of combustion emissions and the current monitoring indicating that background air quality reasonable, the small amount of discharges from vehicles operating in this area will be insignificant and would not result in any noticeable cumulative effects and therefore would be considered to have less than minor effects.

Additionally as discussed in Section 3.4 the background air quality is good and is showing an improving trend. This will be further improved with the cessation of the refining operations. Essentially the background data takes into effect both the current port operations, plus all the surround activities. Given that the concentrations are low, and any new port operations will contribute an insignificant amount to these background concentrations, there will be very little cumulative effects (or increase to background concentrations).

# 6.0 Proposed Mitigation

This section of the report presents the mitigation measures that will be used to control the effects of discharges to air as a result of this project.

## 6.1 Construction and Reclamation Activities

The reclamation process and the subsequent construction has the potential to generate dust if left unmitigated. Therefore, it is necessary to consider the mitigation measures that will be used to control emissions and base the assessment on the potential effects of the project, where these control measures have been undertaken.

The mitigation measures that are included in the following sections are in line with the MfE GPG AMD. The following measures will ultimately be used to form the Air Quality Management Plan (AQMP) for this project. A draft AQMP is attached as **Appendix A**.

### 6.1.1 Movement and Placement of Material

There will be large quantities of material disturbed and placed in the reclamation process. The following management measures are recommended to minimise dust emissions:

- On unsealed areas:
  - Limit the speed to 20 km/hr.
  - Keeping the material damp.
  - Keep roadways well maintained and covered with coarse material where possible.
- Develop guidelines to control the placement of fill material, such as sand and silts. It is expected that these guidelines would include the following:
  - Keeping the material damp.
  - Keeping drop height to a minimum.
  - Undertaking work in favourable wind conditions.
  - Having a method available to apply water to dampen material when required.
- Sealed surfaces should be regularly swept and with the frequency increasing during any spillage, dry conditions, or strong winds;
- Once the reclamation is above sea level the risk of dust emissions can increase as the material dries out and is worked by machinery. During this process the following should be implemented:

- Keeping the material damp and having a method available to apply water to dampen material as required.
- Undertaking work in favourable[6] wind conditions when working/dealing with finer material.
- Keeping drop heights to a minimum.
- Once the material has been placed in the final contour or material is not going to be worked for an extended period of time, Northport should consider sealing the material with either a permanent option (concrete or asphalt) or a temporary option (grass or coarse aggregate).

⁘ Use the monitoring set out in Section 5.4.

### 6.1.2 Stockpiled Material

For the most part, the dredged material will be discharged via pipe into the reclamation, and see very little subsequent disturbance. In some cases, the dredge material is placed within the confines of the reclamation area, this material will be reworked by earthwork machinery and may be stockpiled for a period of time before being reused as fill. From time-to-time additional bulk material used for construction and reclamation may also be brought on-site which may need to be stockpiled.

PDP recommends the following management measures are used to minimise dust emissions from stockpiles:

⁘ Develop guidelines for the removal and stockpiling of material during windy conditions. It is expected that these guidelines would include the following:
  - In the case of fill material, keeping it damp.
  - Limiting the drop height to less than three metres.
  - Only undertake these operations when wind conditions are favourable.

⁘ The size and height of the stockpiles should be below 5 metres;

⁘ Use water to control dust where practicable and appropriate;

⁘ If practicable, apply covers to the material if windy conditions are expected and the piles cannot be kept damp;

⁘ Any material that is placed in temporary stockpiles during the reclamation works where it is not disturbed for more than three months shall be vegetated or covered as soon as practicable; and,

[6] Lower wind speeds when blowing towards sensitive receptors.

- If dusty material is going to be stockpiled for long periods, install wind breaks around these stockpiles, or in temporary bunkers.

#### 6.1.3 Construction Vehicles

There will be a number of vehicles operating on the site, the combustion emissions from these vehicles are considered insignificant and they are unlikely to result in any noticeable changes in air quality. However, operators undertaking the construction and reclamation should develop guidelines to ensure emissions are minimal. It is expected that these guidelines would include the following:

- Not leaving vehicles idling while unattended.
- Maintaining vehicles regularly.

### 6.2 General Port Operations

Once the new reclamation becomes operational this area will be used for container operations. From an air quality perspective there are very little air emissions from this type of operation other than the emissions from the vehicles used to move the containers.

The following mitigation measures have been included in the draft AQMP for controlling emissions from the general port operations.

#### 6.2.1 Port Vehicles

As with the construction and reclamation phase there will be a number of vehicles operating on the site, however the combustion emissions from these vehicles are considered insignificant and they are unlikely to result in any noticeable changes in air quality. To ensure emissions from these vehicles are minimal Northport should develop guidelines which would include the following:

- Not leaving vehicles idling while unattended.
- Maintaining vehicles regularly. Electrification of port vehicles such as straddlers when replacement or upgrades are required.
- During the reclamation and construction consider using hybrid or electric vehicles i.e. there has been recent development in using hybrid power equipment such as excavators for earthworks.

### 6.3 Water Use for Dust Suppression

The use of water is one of the key mitigation measures for suppressing dust at Northport during the reclamation and construction phase. Northport has several different sources of water available to use for dust suppression on-site, and therefore there will always be sufficient water available. The primary source of water is from the dewatering/stormwater ponds onsite. In the event of dry

weather and limited water onsite, Northport is also connected to the reticulated water supply which can also be used for dust suppressant. If these two sources are not available Northport also has the option to use seawater however this is not expected to be required.

While it is still unknown exactly how the water will be applied, it is expected to be undertaken using a combination of methods such as water carts, sprinklers, etc., with water being applied at a rate as required to suppress dust.

## 6.4 Wind Conditions

There are a number of mitigation measures that require activities to be undertaken during favourable wind conditions. Based on the location of the works relative to the nearby receptors, winds from the west to the northwest, with wind speeds at above 5 m/s (at ground level) have the greatest potential to transport dust from the reclamation of the eastern expansion toward the Ralph Trimmer Road carpark and the beach.

PDP recommends that Northport utilise the current on-site meteorological monitoring stations, and in particular the site located near the tug berths and have this equipment set up to send out alerts either via text and/or email. PDP recommends that the wind triggers are set up in the following staged approach:

- Trigger 1: Winds from the west to the northwest and greater than 4 m/s at ground level require Northport staff to review the on-site activities and mitigation measures in place.
- Trigger 2: Winds from the west to the northwest and greater than 5 m/s at ground level in dry conditions require all dust generating activities within 400 metres of a sensitive receptor to cease until winds drop below 5 m/s based on a 10-minute average, if dust is observed to be travelling off-site.

## 6.5 Dust Monitoring

While the distance between the work area and the beach and Ralph Trimmer Drive carpark is relatively short, PDP considers that the use of instrumental dust monitoring is not required because:

- the local meteorological conditions indicate relatively infrequent winds in the direction of the carpark;
- the proposed mitigation measures will further reduce dust nuisance; and
- there has been only one dust related complaint in the last few years.

However, it is suggested that the following general monitoring is undertaken.

### 6.5.1 General Monitoring

There are several straightforward monitoring actions that can be used regularly to ensure that dust is being controlled appropriately. These monitoring measures are used at most large construction sites and are typically incorporated into site management plans. While some of these activities might not be suitable once the proposed expansion becomes operational, it is recommended that these measures are adopted for the construction phase of the project and modified once container operations are undertaken.

**Table 2: Visual Dust Monitoring**

| Monitoring Activity | Frequency | Action/Response |
|---|---|---|
| Check weather forecasts for strong winds and rainfall to plan appropriate activities and dust management response. | Daily | If winds (>5 m/s) from the west to the northwest are predicted and there is no rain predicted, apply water to expose areas and consider additional mitigation. |
| Inspect the site, access roads and adjoining roads for the presence of dust deposition. | Twice daily | If dust is present either sweep roads or apply water. Consider speed restrictions until this is undertaken. |
| Observe weather conditions including wind and rain via observations and data inputs from the site weather stations. | Daily and as conditions change | Pay particular attention to dry weather and winds greater than 5 m/s from the west to the northwest, and consider what mitigation may be required based on planned activities. |
| Inspect all exposed surfaces for dampness and to ensure that the exposed un-stabilised area is minimised. | Daily and as conditions change | If exposed areas are dry apply water. |
| Observe vehicle movements to ensure dust generated is kept to a minimum. | Daily and as conditions change | If dust is observed to be disturbed by vehicles and becomes entrained in the wind, reduce vehicle speed and either sweep or dampen the roads. |

| Table 2: Visual Dust Monitoring | | |
|---|---|---|
| **Monitoring Activity** | **Frequency** | **Action/Response** |
| Inspect any stockpiles to ensure that they are not subject to wind erosions. Ensure stockpile height is less than 3 m where possible or appropriate and no more than 5 m. | Daily and as conditions change | If stockpiles are too high or there is wind erosions recontour the stockpile. |
| Monitor dust generating activities to ensure dust emissions are effectively controlled. | Daily and as new activities are commenced | If dust is observed undertaken mitigation for the activity as described in the AQMP. |
| Inspect watering systems (water carts and any other spray system) to ensure equipment is maintained and functioning to effectively dampen exposed areas. | Weekly | If an issue is identified this will need to be fixed immediately. If a fix is not possible within 24 hours consider hiring equipment. |
| Monitor dust generating activities and water application rate. | In winds over 5 m/s | Increase water application rate as wind speed increases. |
| Monitor meteorological conditions to avoid undertaking operations in unfavourable wind conditions. | When wind is blowing towards sensitive receptors during high wind speeds. | If winds (>5 m/s) are from the west to the northwest and dry conditions, avoid dust generating works along the boundaries effected by winds. |

# 7.0 Conclusions

## 7.1 Reclamation and Construction Effects

PDP's assessment concludes that there is limited potential for air discharges from the reclamation and construction of the port expansion to result in air quality effects at the nearest residential dwellings due to the significant distance between these locations and the source of dust. PDP considers the air quality effect on the nearest residential dwellings to be less than minor.

There is however potential for users of the beach to the east and the carpark to the south of the site and the Marsden Point Import Terminal to experience dust effects if no mitigation were implemented. Northport will utilise a number of mitigation measures that, if appropriately implemented, PDP considers will minimise dust emissions to within 50 metres of the source, and therefore greatly

reduce the potential for beach and carpark users as well as the Marsden Point Import Terminal to experience nuisance dust. Given the industrial nature of the Marsden Point Import Terminal it has a higher tolerance to dust effects, PDP considers that the air quality effects at this location to be less than minor. For the beach and carpark users there are times that the effects could be considered more than minor due to the proximity of some works, however for the majority of the time it is expected that the proposed port expansion will have a less than minor effect on air quality.

When considering the reclamation and construction in relation to the existing port activities, the potential for cumulative dust nuisance effects is likely to be minor as the eastern extent of the port is used for shipping containers, which does not ordinarily result in dust being generated.

## 7.2 General Port Operations

Once the newly reclaimed land becomes operational, this area will be used for container operations which should result in very little air emissions. The main air emissions will be combustion gases from vehicles operating in this area. Given that there will be relatively few vehicles operating in this area the emissions off-site will be minimal and will be considered to have a less than minor effect.