WINSTONE AGGREGATES

Belmont Quarry Development – Part B

Substantive Application
Appendix B.7 – Air Quality Assessment and Dust Management Plan
Winstone Aggregates

16 August 2026

Belmont Quarry Development – Air Quality Assessment

Prepared for

Winstone Aggregates Ltd

July 2026

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Limitations:

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Winstone Aggregates Ltd. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of Winstone Aggregates Ltd for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk. PDP acknowledges that this report may be used and relied upon by the Expert Panel appointed under the Fast-track Approvals Act 2024.

The authors confirm that, in their capacity as authors of this report, they have read and agree to abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

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1.0 Introduction

Winstone Aggregates[1] (Winstone) is the owner and operator of the Belmont Quarry, north of Wellington City. The site currently disposes of overburden in a dedicated overburden disposal area (OBDA) known as the Cottle Block. The Cottle Block will reach capacity before Winstone is able to completely extract approximately 40 years' worth of resource that is left at the quarry. Therefore, Winstone is seeking an overburden solution to extend the life of the quarry.

Winstone seeks approvals to establish a new OBDA within an area of Belmont Regional Park adjacent to its Belmont Quarry under the Fast-track Approvals Act 2024 (FTAA), subject to a land exchange with the Department of Conservation (DOC). Winstone engaged Pattle Delamore Partners (PDP) to undertake an assessment of the potential air quality related effects associated with the establishment and operation of the new OBDA for the substantive application.

2.0 Background Information

2.1 Location

Belmont Quarry ('the Site' or 'site') is in the hills on the western side of the Hutt Valley, approximately 22 km north-east of Wellington City. The site is bordered to the north and west by Belmont Regional Park, which is managed by Greater Wellington Regional Council on behalf of DOC. The surrounding landscape is characterised by steep terrain and regenerating native vegetation. To the north of the quarry is a walking trail known as 'Buchanan's Track'.

2.2 Land Exchange

The applicant has sought a land exchange with DOC for bush-covered portions (totalling 30.2 hectare (ha)) of its site with a 23.86 ha portion of Belmont Regional Park for use as an OBDA, which is immediately adjacent to its site. Figure 1 shows the portion of the Belmont Regional Park adjacent to the site which Winstone wishes to exchange land for (also known as the "DOC-Give" site). This land exchange is being sought separately (and contemporaneously) and is not the focus of this report.

[1] An Operating Division of Fletcher Concrete and Infrastructure Limited

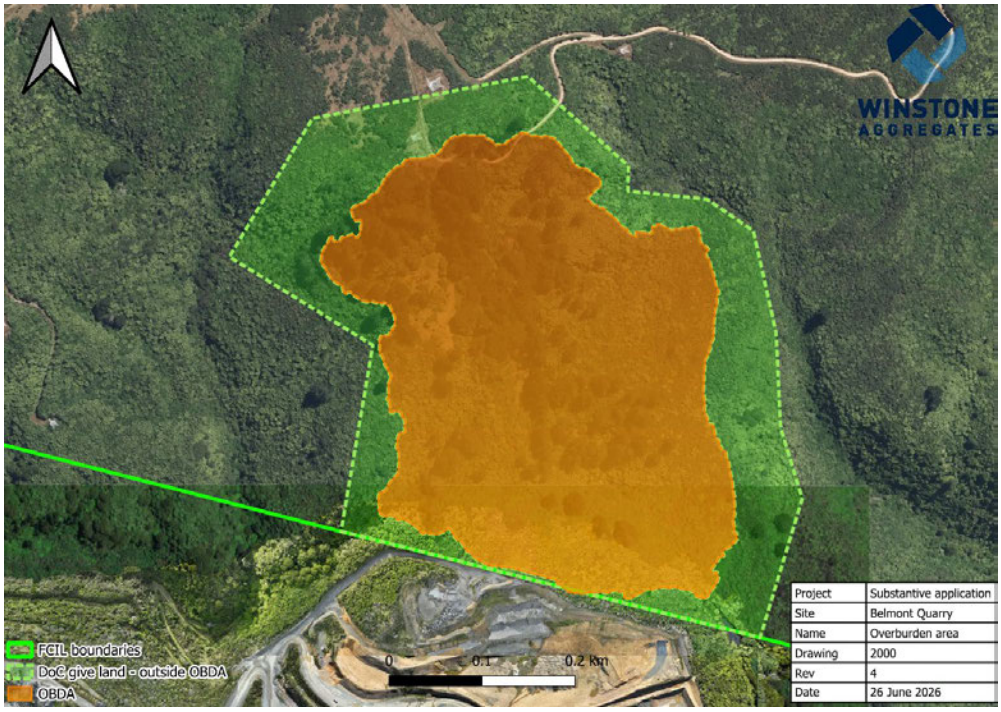

Figure 1: Proposed land exchange area adjacent to Belmont Quarry

2.3 Overburden Disposal Area

The proposed OBDA will be implemented in ten sequenced stages, with the final stage providing formal closure and rehabilitation of the area.

Figure 2 provides details of the total area that each stage will cover when finalised. While Stage 1 covers an area of 5.3 ha, each corresponding stage covers an area of less than 2 ha, with the exception of Stage 4 (4.26 ha total). Furthermore, Winstone has confirmed that Stage 1 (and following stages) will be progressively cleared, which means that at no stage will the active OBDA be greater than 5 ha, and generally it will be less than 2 ha.

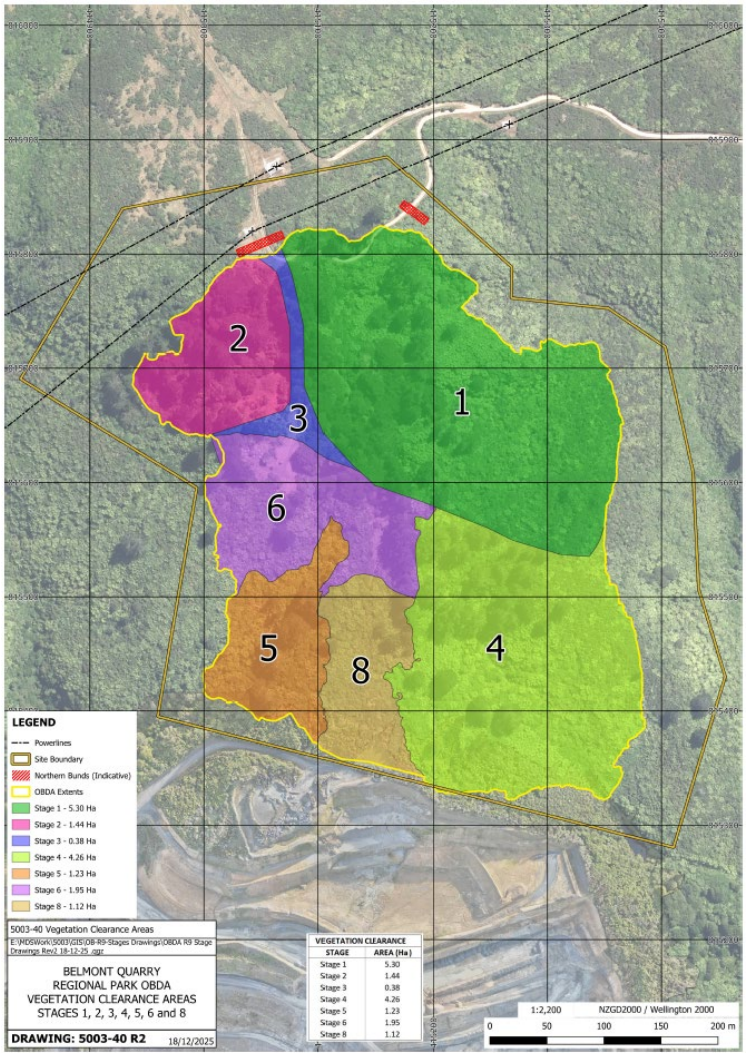

Figure 2: Staging of OBDA and Vegetation Removal

Consequently, the size of the open areas will be more comparable to the existing OBDA. An extension of the internal haul roads will connect the northern quarry area with the proposed OBDA, avoiding any interaction with public accessways or legal roads. Large amenity bunds will be built to stop hikers and walkers from wandering on the site, and to provide visual screening of the proposed OBDA (particularly during Stages 1 and 2).

2.4 Background Air Quality

The existing quarry is within the Lower Hutt airshed, which is a Gazetted Airshed in New Zealand according to the Ministry for the Environment (MfE). This airshed is not considered polluted[2] under the National Environmental Standards for Air Quality (NES-AQ).

PDP has completed background monitoring of air quality adjacent to the existing OBDA. PDP considers that the Total Suspended Particulate (TSP) monitoring completed in the proposed OBDA area is representative of the background air quality and sets a baseline for the proposed activity's potential contribution to the background dust.

Other sources of air contaminants in the wider surrounding area include vehicle emissions and domestic home heating. Industrial sources of pollutants are limited in the immediately surrounding area, these are discussed in more detail in Section 4.3.

2.5 Topography

The landscape is defined by steep ridgelines, rolling slopes, and incised gullies, forming part of the wider hill country backdrop to Lower Hutt. The proposed OBDA sits within a varied environment of regenerating bush, shrubland, pasture, and modified slopes influenced by quarrying. The quarry site location is shown in Figure 3.

Figure 3: Existing Belmont Quarry Location

[2] Based on LAWA data dated for 6th November 2025.

2.6 Meteorology

Wind speed and direction influence dust generation and transportation. PDP has reviewed the site weather station data and considers that the wind data does not accurately represent the climate of the wider Hutt Valley and recorded wind data is likely impacted by the immediate topography. The on-site Automatic Weather Station (AWS) is located near a valley which likely funnels the wind going across the Belmont Regional Park as shown by the windrose in Figure 4. In addition, the AWS is approximately 2 m above ground level, which will also enhance the influence of the immediate terrain.

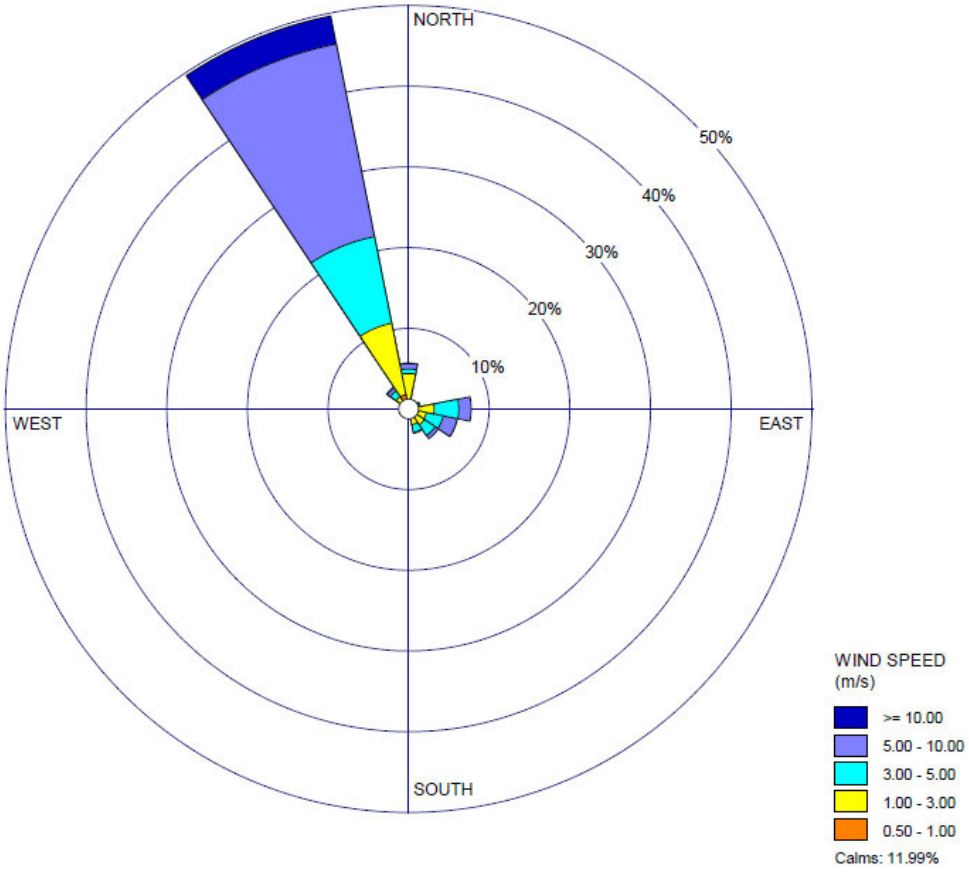

Figure 4: Windrose of On-site AWS 2024 to 2025[3]

In PDP's opinion based on the high percentage of north-northwest winds (49.5%) and large number of calms recorded (12%), it is likely that the on-site AWS is under-representing the frequency with which different wind directions occur. While the data from this monitor is useful, PDP considers that it does not provide adequate information on the winds in the wider area. For completeness, a frequency table of meteorological conditions recorded from the on-site AWS is provided in Appendix A.

[3] Note that because of the dominance of the northwesterly winds it is not directly, visually comparable to other windroses.

PDP has compared this data to (Greater Wellington Regional Council) GWRC's Lower Hutt CALMET Data 2017-2019. The Lower Hutt CALMET meteorological dataset comprises hourly, gridded meteorological fields developed for dispersion modelling in the Hutt Valley and Wellington Harbour area. The dataset represents local wind and boundary-layer conditions while accounting for the influence of terrain, land use and available meteorological observations. The Lower Hutt topography can result in terrain-influenced wind channelling and spatially variable dispersion conditions.

The 3-year period provides a representative basis for assessing inter-annual and seasonal variability in wind flow, atmospheric stability, and is considered suitable for high-level assessment of dispersion conditions across a range of typical meteorological scenarios. Based on this, PDP considers that the CALMET data will be representative of the on-site conditions without having a topographic bias like the on-site AWS.

Figure 5 shows a windrose taken from the CALMET dataset at the same geographical location as the existing on-site AWS but at 10 m above ground level. We see that without the same topographic bias as the on-site AWS, there is a higher representation of winds from the north and south.

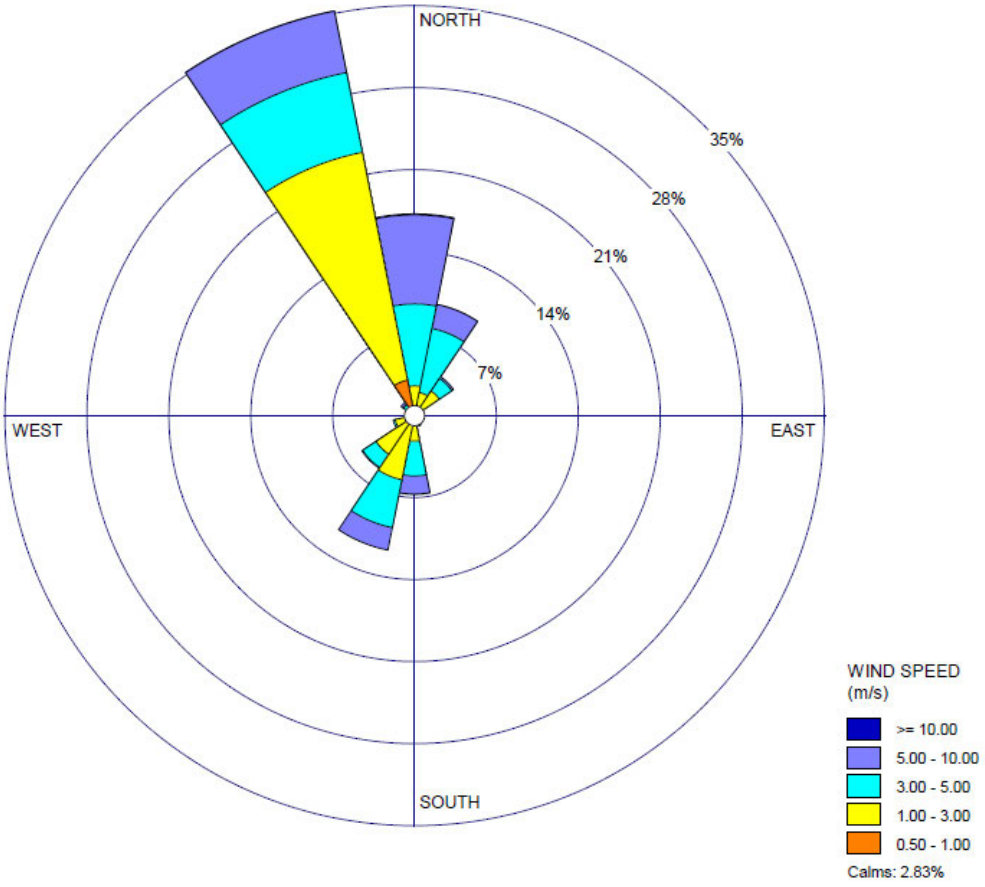

Figure 5: Lower Hutt CALMET Windrose 2017 to 2019

Based on this, PDP considers the Lower Hutt CALMET dataset to be the best for assessing the potential dust effects presented in this report, as it is representative of the conditions on-site while not underrepresenting winds from various directions. Table 1 presents the frequency that specific wind directions and speeds occur from the CALMET dataset. This data shows the predominant winds are from the north northwest, with winds in this direction occurring 35.1% of the time.

Table 1: Wind Speed Frequency Distribution from Calmet 2017 – 2019

Direction	Frequency (%)					Total (%)
	0.5 – 3.0 m/s	3 – 5 m/s	5 – 7.5 m/s	7.5 – 10.0 m/s	> 10 m/s	
North	0.5	2.1	7	7.6	0.1	17.3
North Northeast	0.1	1.9	5.6	2	< 0.1	9.7
Northeast	0.1	2.4	1.3	0.2	0	4
East Northeast	0.1	0.4	0.3	0.1	0	0.9
East	0.1	0.4	0.1	0	0	0.6
East Southeast	0.1	0.3	0.1	0	0	0.5
Southeast	0.1	0.3	0.1	0	0	0.5
South Southeast	0.3	0.5	0.2	0.1	0	1.1
South	0.4	1.7	3	0.6	< 0.1	5.8
South Southwest	0.5	5.1	4.2	1.9	0	11.7
Southwest	0.5	3.5	1.4	0.1	0	5.5
West Southwest	0.5	1.2	0.2	0	0	1.9
West	0.2	0.3	0.1	0.1	0	0.7
West Northwest	0.2	0.2	0.1	0.1	0	0.6
Northwest	0.2	0.4	0.5	0.2	0	1.3
North Northwest	3	19.8	6.9	5.3	0.1	35.1
Calms (< 0.5 m/s)						2.8
Missing or Incomplete						0.0
Total						100

2.7 Complaint History

To PDP's knowledge, there have only been two dust-related complaints related to quarrying activity at Belmont Quarry. The first occurred on 21 December 2016. Following receipt of the complaint, on-site staff reviewed the Dust Management procedures set out in the Quarry Management Plan (QMP) and provided a summary of actions undertaken to a GWRC officer. It was identified that site operations were compliant with the Belmont Quarry Dust Management procedures. However, and as a precautionary measure, several mitigation and management measures were adopted in response, including:

- Increasing the frequency of water cart usage as required;
- Collaborating with subcontractors onsite to manage dust from mobile plant;
- Cleaning the site entrance if material is tracked onto Hebden Crescent; and
- Continuing engagement with the site team to ensure awareness of neighbour concerns and proactive dust mitigation during windy conditions.

The second complaint occurred on 16 February 2024. GWRC officers advised that they observed a large volume of dust in the vicinity of the quarry while passing via SH2. Although the officers did not investigate or confirm the source of the dust, they notified Winstone Aggregates and asked them to check whether any onsite activities or incidents may have caused dust to be observed.

In response, Winstone reviewed site operation activities for the day and confirmed that no specific incidents or abnormal activities had been identified that would have generated unusual dust emissions. It was confirmed that dust control measures on site were fully operational, including wheel wash, water cart, and fixed plant dust suppression system. It was also noted that the sand conveyor system appeared to be leaking sand from an elevated position in the morning of the incident being reported, which may have been the cause of the dust observed, however this was not confirmed. The team did act immediately to add extra dust suppression to the process and stopped the leak as soon as they could. No further emission of dust was observed following the repair. While the exact source of the observed dust could not be determined, existing internal procedures around dust management were followed to minimise any potential offsite effects.

Given the very low frequency of events, and their minor consequences, PDP consider that these complaints do not indicate any consistently objectionable/offensive dust nuisance at or beyond the site boundary, especially those associated with overburden disposal. For both complaints, no OBDA activities were determined to be the source of the potential dust, all internal complaint procedures were followed, and mitigation / remedial measures deployed.

2.8 Sensitivity of the Receiving Environment

In this assessment, the term 'sensitive receptors' is defined as a location where people or surroundings may be particularly sensitive to the effects of air pollution. Sensitive receptors include:

- Residential properties;
- Hospitals;
- Schools;
- Libraries; and,
- Public outdoor locations (e.g. parks, reserves, beaches, sport fields).

PDP has undertaken a desktop study to identify receptors deemed sensitive to changes in air quality as a result of potential discharges to air from the activities. The surrounding environment primarily consists of Belmont Regional Park, which is a public destination for outdoor recreation such as walking, cycling and running. To the east and south-east of the site are a number of residential dwellings (at distances of between 680 m and >1,000 m). Selected receptors have been chosen to represent multiple dwellings in that area. R10 has been chosen due to its proximity to Buchanan's Track in the Belmont Regional Park. Figure 6 shows the location of all receptors identified, including rural-residential properties to the west and south-west, and the Dry Creek campsite (R9), while Table 2 shows the distance to each receptor from the proposed OBDA boundary.

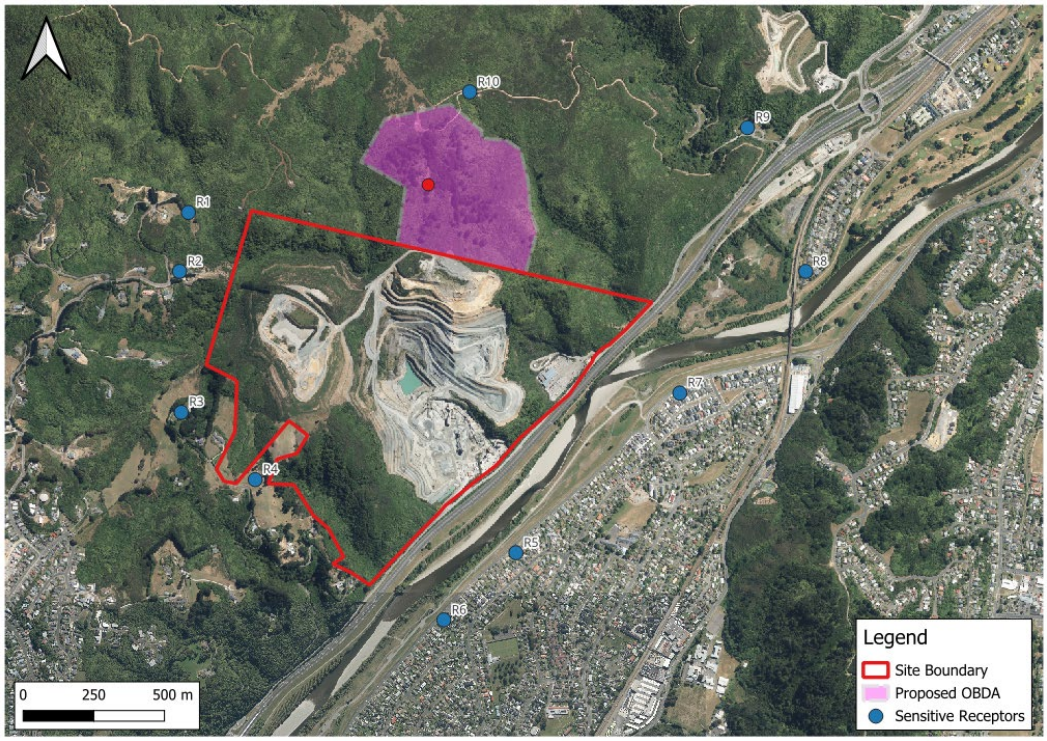

Figure 6: Sensitive Receptors in relation to the Site and OBDA.

Table 2: Location of Receptors in relation to the Quarry

Receptor Name	Address	Distance to Closest Relevant Quarry Activity (m)	Direction Relative to Closest Proposed OBDA (m)
R1	89 Kaitangata Crescent	Northwest	620
R2	87B Kaitangata Crescent	Northwest	720
R3	200 Liverton Road	West	950
R4	174 Liverton Road	West	970
R5	1197 Taita Drive	South	> 1000
R6	1215 Taita Drive	South	> 1000
R7	1378 High Street	Southeast	680
R8	31 Mary Huse Grove	East-Southeast	945
R9	Dry Creek Campsite	North	780
R10	Buchanan's Hiking Trail[1]	East	50

Notes:

1. *While not a permanent residence, Buchanan's Track is listed as people will transit through the area, meaning dust nuisance here is relevant.*

2.9 Ecological Areas

In addition to residential areas, there are areas of ecology surrounding the proposed OBDA, including those that are being swapped with DOC, that have the potential to be affected by dust from the proposed OBDA activities.

3.0 Quarry Operations

The overburden placement (except for emergency works and secondary works) activities are proposed to occur during the following hours:

- Monday to Thursday: 7:00am to 6:00pm
- Friday: 7:00am to 5:00pm
- Saturday: 7:00am to 2:30pm
- No work on Sunday or Public holidays

4.0 Nature of the Discharge

As noted below, the principal air quality effect from activities at the proposed OBDA site and associated activities is nuisance associated with dust deposition.

While this report is focused on the activities associated with the proposed OBDA, when discussing nuisance effects from dust, it is also important to consider the cumulative impact that the proposed OBDA's activities will have alongside the site's existing operations. Therefore, currently undertaken nearby dust-generating activities have also been considered for dust sources and dust impacts.

4.1 Proposed Overburden Disposal Area Activities

4.1.1 Vehicle movements

Vehicle movements along haul roads within the quarry and proposed OBDA will have potential to give rise to dust emissions if mitigation is not applied effectively. In dry conditions dust is picked up by the wheels and becomes entrained in the wake of the vehicle. Larger vehicles and those travelling at higher speeds will generate more dust. There is also potential for fugitive dust emissions to occur from uncovered loads of dry material. Vehicle movements are likely to be highest during overburden campaigns, which typically last 6 to 8 months.

4.1.2 Overburden removal and placement

Dust from the overburden removal at the quarry and placement processes on the proposed OBDA will comprise a mixture of topsoil, and highly weathered greywacke. It will be brown, grey in colour. Land clearing, excavation and handling of the overburden and its subsequent placement has the potential to generate dust emissions. Dry and windy conditions will present the greatest discharge risk. Overburden removal activities are typically short-term relative to the life of the quarry. Placement will occur on the proposed OBDA during a series of campaigns across the proposed 10 stages. Unconsolidated stockpiles of dry material may contribute fugitive dust emissions in high winds (e.g. >7.5 m/s) if they contain fine material.

4.2 Other Dust Generating Activities

As previously mentioned, dust discharged from other currently permitted or consented activities will contribute to baseline potential dust nuisance. Therefore, it is relevant to consider these activities when assessing dust impacts.

4.2.1 Aggregate extraction and handling

Dust from aggregate extraction and handling processes at the adjacent Belmont Quarry will primarily be grey in colour and originate from the greywacke being extracted. Blasting and extraction processes have the potential to generate dust emissions from the site. Mechanical handling (e.g. front-end loaders) and loading of aggregate into trucks will typically contribute to dust emissions close to site boundaries. Aggregate processing and stockpiling will continue to occur in its current location, so will maintain a minimum distance of approximately 300 m from the Firth Block and over 500 m from the Northern Gully. This activity is controlled by the existing dust management procedures in the Dust Management Plan required under the relevant zone provisions in the Operative Hutt City District Plan, as well as the requirements in Rule 27 of the Greater Wellington Natural Resources Plan (GWNRP).

4.3 Background Dust

There are other potential dust sources in the surrounding area. Given the potential for cumulative effects, it is important to consider the proposed discharge against the background of those potential dust sources. Some activities associated with the Firth Belmont Masonry, located close to Hebden Crescent, have the potential to generate dust. In addition to this, there is a Fulton Hogan Asphalt Plant and a Firth ready mix concrete plant within the southern boundary of the site which have potential to contribute to dust. These activities are also controlled by conditions of consent applying to the activities under the Operative Hutt City Council Plan and Rule 27 of the GWNRP (same as the site).

These background sources of dust have been considered in this assessment and are discussed further in more detail in Section 7.4.

5.0 Mitigation Measures

Mitigation measures discussed in this section apply to dust emissions that impact air quality and deposition at sensitive receptors and ecological areas.

5.1 Existing Measures

Currently, the site's Dust Management Plan (DMP), which is a section of the site management plan, provides mitigation measures to minimise potential dust nuisance for all activities associated with operations at the Quarry. As cumulative effects are considered as part of the assessment, some mitigation measures outside of OBDA activities are also considered.

5.1.1 Stripping and Overburden Removal

These activities are currently permitted under Rule 27(b) of the GWNRP. These activities will continue to occur contemporaneously with the proposed OBDA activities,[4] and so the mitigation measures deployed to reduce dust emissions are relevant to the air quality assessment. The following measures are used to control dust generated by these on-site activities, to comply with the requirement to avoid offensive or objectionable dust or particulate beyond the boundary of the property:

- During stripping activities in dry windy conditions, a water cart is used on site to dampen haul roads and stripped areas as required; and
- Exposed surfaces that have the potential to cause dust emissions are grassed, hydroseeded, or stabilised as soon as practicable following each stripping season as per the DMP.

5.1.2 Overburden Transportation and Disposal

Currently, removed overburden is transported via trucks to the existing OBDA. The following measures are then used to control dust emissions from overburden disposal:

- A water cart is used to dampen haul roads and overburden disposal areas in dry conditions;
- Trucks will follow site speed control rules and stay on haul roads when possible;
- Minimising duration of stripping operations; and
- Mitigation set out in the DMP plan such as overburden grassing, hydroseeding, or stabilising will be done as soon as practicable on completion of a fill area.

It is worth noting that there is unlikely to be any significant crossover between the use of the existing OBDA and the proposed OBDA, such that the use of both is unlikely to give rise to adverse cumulative effects.

[4] Noting that, as a permitted activity, the stripping of overburden does not form part of the activities requiring resource consent, and no conditions can therefore be imposed to control those activities as part of this application.

5.2 Current Monitoring and Record Keeping

Table 3 identifies monitoring activities that are currently implemented under the site's DMP.

Table 3: Current Monitoring Activities

Monitoring Activity	Frequency
Check weather forecasts for strong winds (speeds greater than 5 m/s or 18 km/h) and rainfall to plan appropriate work schedule and dust management response.	Daily
Inspect site entrance, exit, roads, and yard for the presence of dust deposition.	Twice daily
Observe weather conditions including wind and rain via observations using the Beaufort scale.	Daily and as conditions change
Inspect stockpiles to ensure enclosure, stabilisation or dampness.	Daily and as conditions change
Inspect dust generating activities to ensure dust emissions are effectively controlled.	Daily and as new activities are commenced
Inspect watering systems (sprinklers, crusher misters, dust cannons, and hoses) and tyre wash silt removal system to ensure equipment is maintained and functioning to effectively dampen exposed areas.	Weekly
Monitor dust generating activities and water application rate.	In winds over 5.0 m/s

5.3 Proposed Mitigation Measures

As each proposed OBDA stage occurs, areas of bush, shrubland, and pasture will be removed to access the land so that material can occupy its place.

All of the currently practised mitigation measures and monitoring discussed in Section 5.1 and Section 5.2 will continue to be used to minimise generated dust emissions, with progressive rehabilitation used where practicable to control the potential for windblown dust.

6.0 Assessment Methodology

This assessment has been undertaken in accordance with MfE guidance for assessing and managing the environmental effects of dust emissions[5] (MfE GPG Dust).

It is common practice in New Zealand to undertake a qualitative assessment of the potential effects associated with quarrying and mining activities. This assessment has involved a review of the current activities that are being undertaken and the proposed activities to determine 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 matters have been considered:

- The nature of the activity being undertaken;
- How long the activities are likely to occur;
- The nature of the material being handled and processed;
- Whether mitigation measures can be implemented to control the potential for effects (e.g. use of water carts);
- How close receptors are to the activities;
- The nature of the receptors and their sensitivity to dust; and
- The prevailing meteorological conditions.

While the OBDA will be completed in stages, it is important to view the cumulative effects of the OBDA activity over the entire duration of the proposal. For the purposes of this assessment, PDP has assessed dust emissions assuming that the entire proposed OBDA is to be used at one time. This means that dust emissions and impacts analysed in this report are extremely conservative (worst case scenario) compared to actual emissions and impacts that are likely to be experienced during each phase. Therefore, OBDA staging will not be discussed further.

Furthermore, currently permitted and/or consented quarrying activities will be considered alongside activities related to the proposed OBDA during dust emissions assessment. This is because dust effects created by the new activities have the potential to generate a cumulative effect with dust generated by other activities on the site. Consequently, aggregate extraction and processing that are not part of the proposed OBDA activity have been considered and discussed during analysis.

[5] MfE Good Practice Guide for Assessing and Managing the Environmental Effects of Dust emissions, November 2016

6.1 Dust Monitoring

PDP has undertaken a 4-month dust monitoring campaign where the proposed OBDA and associated activities will occur as depicted in Figure 7. This location will inform the background concentrations currently observed within the Belmont Regional Park. These background concentrations have then been compared to the concentrations taken from the site E-BAM monitor[6] during a previous OBDA campaign. This allows us to identify the impact that OBDA related activities will have on background concentrations compared to other currently permitted activities.

The monitor installed was a Thomson Dust Master Pro 7000 (DMP7000) which monitors concentrations of TSP, the location of this monitor and the location of the site EBAM is shown in Figure 7. PDP notes that the monitoring data has been used to compare the proposed activity's impact to background concentrations, and is not intended to be used for baseline compliance monitoring.

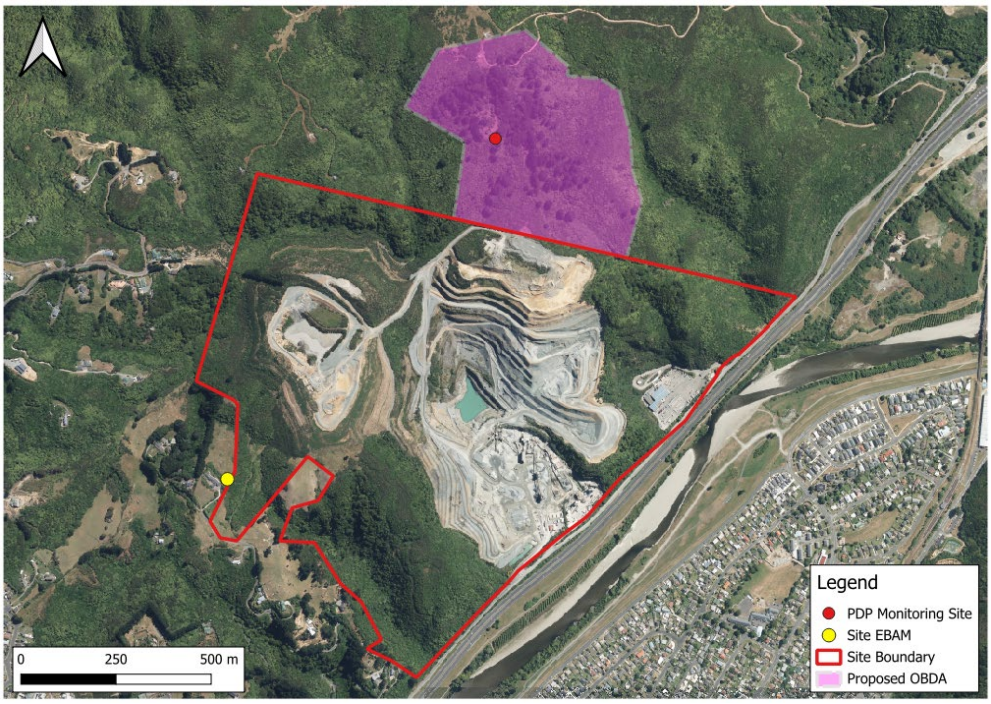

Figure 7: Monitoring Site Locations

A fraction of the dust generated by quarry activities falls into the category of particulate matter with a diameter of less than 10 microns (PM_{10}), which is regulated by the NES-AQ. In PDP's experience, quarry activities generally do not generate PM_{10} above background levels within a few hundred metres of the processing plant. As stated earlier, the Belmont Quarry is not located within a polluted airshed, and therefore the site activities and monitoring conducted do not need to be assessed against Regulation 17 and Schedule 1 of the NES-AQ.

[6] EBAM stands for 'Environmental Beta Attenuation Mass'. It is a common air quality monitor used around New Zealand.

Therefore, PDP considers that there is no need to consider PM_{10} any further in this assessment and will only focus on collected TSP data.

6.2 FIDOL Assessment

PDP has commonly adopted FIDOL methodology, which is recommended for an assessment of potential adverse effects from dust in the MfE GPG Dust. Each of the FIDOL factors are explained below:

- Frequency (F): 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); prevailing meteorological conditions; and topography.
- Intensity (I): Is the concentration of dust at the receptor location.
- Duration (D): 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 the frequency of emissions, 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 potential for adverse effects.
- Offensiveness (O): is a subjective rating of unpleasantness of the effects of nuisance dust. Offensiveness is related to the nature of the dust, for example, coal dust would be considered more offensive than soil.
- Location (L): is the type of land use and the nature of human activities in the vicinity of a dust source and the sensitivity to dust. Some locations are generally more accepting of higher dust concentrations than others, for example, rural vs urban areas.

6.3 Assessment Criteria

The qualitative assessment of dust is against Rule 27 of the Greater Wellington Region Nature and Resources Plan (GWRNRP). The relevant section of the rule states that:

> *The discharge of contaminates into the air from the handling of **bulk solid materials** including from the activities of quarrying, mining, cleanfilling, blasting, extraction, crushing, screening, processing, stockpiling, handling, conveying, sorting, and storage is a permitted activity, provided the following conditions are met:*
>
> *[…]*
>
> *(b) for all other areas, the discharge shall not cause noxious, dangerous offensive or objectionable odour, dust, particulate*, smoke, vapours, droplets or ash beyond the boundary of the **property**.

7.0 Assessment of Air Quality Effects

7.1 Dust Emissions

The most significant air quality effect from activities at the proposed OBDA site and associated activities is nuisance associated with dust deposition on sensitive receptors and nearby ecology areas. There are four main factors that are important to understand when determining whether any nuisance is caused by dust emissions from bulk handling of materials and crushing activities.

These are:

- Particle size;
- Particle density;
- Wind speed; and
- Wind direction.

These factors are all interrelated, and it is how they combine that determines the potential for an effect to occur. In general, however, it is possible to make the following statements:

- Heavier and larger particles require more wind (speed) 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.

Despite this range of variables, it is generally considered that dust nuisance effects are only experienced within 300 m of unmitigated dust sources. Winstone will employ various forms of mitigation to control dust discharges and therefore does not have unmitigated dust discharges.

In addition to the above, topography surrounding the dust source will influence the possible transport distances that dust can travel. The site is located across steep terrain which has the potential to result in an increase to suspension time and distances towards sensitive receptors. However, the proposed OBDA is located on a slight plateau relative to the area on the southern end of the site as shown in Figure 8. The elevations around the proposed OBDA do not decrease substantially within 300 m of the site, with the exception being to the southeast where there is a slight valley approximately 200 m away.

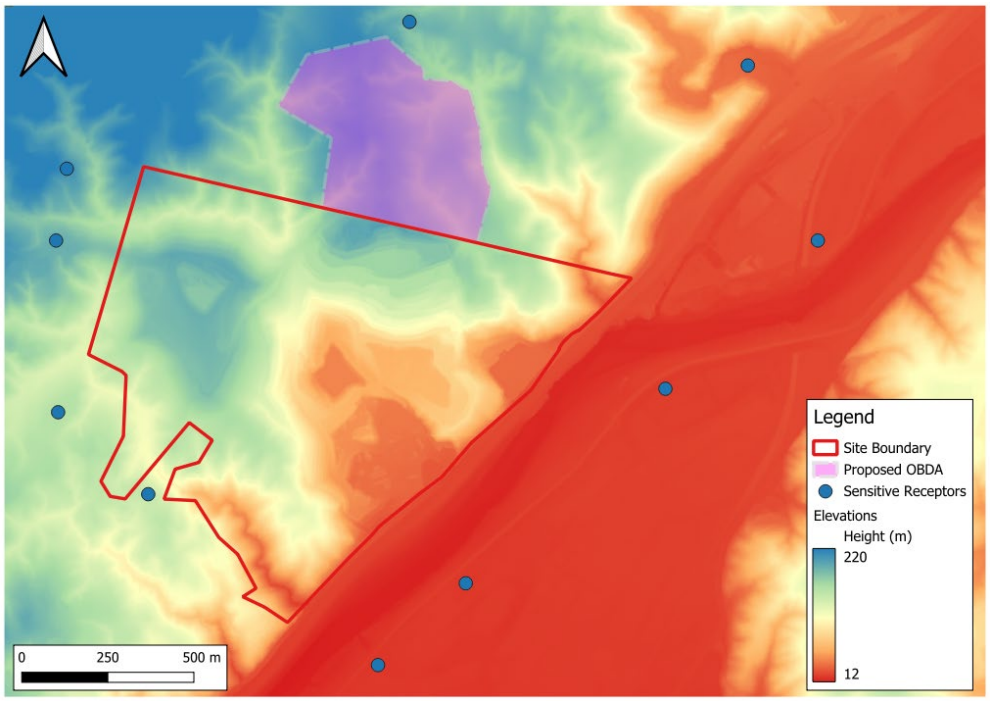

Figure 8: Elevations Map

PDP considers that the most common type of materials that have the potential to generate dust emissions from the Belmont Quarry site are soil and aggregates. Figure 9 depicts the typical distances travelled by these types of materials for a range of wind speeds. While sources located on steep terrain can result in an increase in suspension time and distances towards sensitive receptors, the receiving environment around the OBDA is a plateau relative to the area on the southern end of the site.

Due to the elevation around the proposed OBDA effectively being relative to the OBDA activities, PDP considers that using Stoke's Law as an assumption of dust travel distances is adequate for assessing dust emissions from the site.

The following assumptions have been made to calculate dust travel distances:

- The density of soil is approximately 1.6 g/cm^3;
- The density of clay is approximately 1.7 g/cm^3;
- The density of greywacke is approximately 2.6 g/cm^3;
- The particle diameter of all material is 50 µm (typically, nuisance dust has a diameter of between 20 µm and 100 µm).

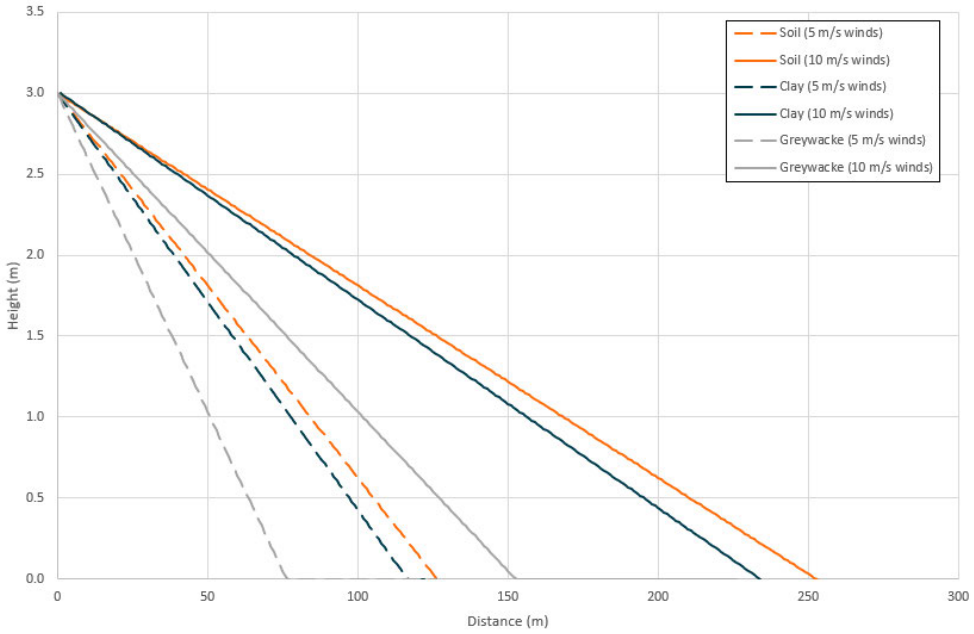

Figure 9: Particle Travel Distance with Wind-Speed

This shows that the density of the particle affects the distance it travels, with lighter particles travelling further than heavier ones. The wind direction also has an impact on the potential for a source to be affected, especially those downwind in a predominant wind direction.

Based on the above discussion, 250 m has been used in this assessment to indicate the distance within which some level of dust effects may be experienced during normal meteorological conditions (wind speeds < 5 m/s) if no form of mitigation is used. Properties located at least 250 m from the site are unlikely to be affected by dust during any wind speed condition. Winstone will use various forms of mitigation, which are described in Section 5.0 to reduce dust emissions and consequently the distance in which effects, if any, will occur. As discussed in Section 2.7 only two dust related complaints have occurred in the last 10 years. This indicates that current mitigation measures are effective at minimising dust.

Areas of ecology within 250 m will likely experience some level of dust nuisance in the absence of mitigation measures set out in Section 5.0.

7.2 Dust Monitoring Results

On 22 July 2025, PDP commenced a 4-month dust monitoring campaign, finishing on 5 December 2025 (location shown in Figure 7). The purpose of the monitoring was to record background concentrations of TSP where the proposed OBDA would be located to provide baseline concentrations typically observed off-site in the Belmont Regional Park outside of an overburden campaign. This was assessed against concentrations measured during previous overburden campaigns to compare the impact a campaign had on the receiving environment's background concentrations.

The timeframe for the dust monitoring was chosen as general cut and fill site operations were occurring at all active areas of the quarry as shown in Figure 10.

Figure 10: Location of Cut and Fill Activities at Belmont Quarry between July to December 2025

By monitoring during this timeframe, PDP were able to collect dust concentrations that would be representative of near off-site locations during normal operation activities capable of creating dust nuisance. Background concentrations during these activities are likely to be higher than when they are not occurring, giving more conservative baseline concentrations for this assessment.

The dust monitoring campaign data was compared with TSP concentrations recorded during the Season 6 and Season 7 overburden campaigns (4 December 2017 to 1 June 2018, and 6 January 2020 to 19 March 2020). Background concentrations have been assessed against MfE GPG Dust suggested trigger levels (shown in Table 4) to measure exceedances. While the trigger levels are not intended to be used for enforcement, they are still useful to provide context on the influence that OBDA campaigns have on off-site dust and the effectiveness of the mitigation measures. A summary of TSP data across all monitoring periods is presented in Table 5.

Table 4: MfE GPG Dust Suggested Trigger Levels for TSP

Averaging Period	Concentration (µg/m³)
1-hour	200
24-hour	60

Notes:

1. *Based on MfE GPG Dust concentrations of high sensitivity receiving environments.*

Table 5: Summary of TSP During Monitoring Periods

Monitoring Season	Averaging Period	Average	75%ile	Maximum	Exceedances of Trigger Levels
		µg/m³			
PDP Monitor	1-hour	13.2	17.1	74.3[1]	0
	24-hour	13.2	16.8	28.7	0
Season Six	1-hour	14.0	16.8	288.3[2]	2[4]
	24-hour	14.0	15.7	49.0	0
Season Seven	1-hour	14.1	16.7	137.8[3]	0
	24-hour	14.1	15.5	30.7	0

Notes:

1. *99th Percentile for 1-hour is 37.5 µg/m³ indicating that the maximum could be an outlier;*
2. *99th Percentile for 1-hour is 41.9 µg/m³ indicating that the maximum could be an outlier; and*
3. *99th Percentile for 1-hour is 42.7 µg/m³ indicating that the maximum could be an outlier.*
4. *These occurred in two standalone hours; no dust complaint was made during these exceedances.*

Based on the number of exceedances across the two overburden campaigns (Seasons 6 and 7), PDP considers that typical overburden activities are unlikely to cause offensive or objectionable odour. Comparatively, and from experience at the Quarry, background concentrations of overburden campaigns are not significantly higher than those recorded during the PDP monitoring programme. This indicates that the proposed OBDA activities are likely to have a negligible impact on background concentrations. This is further validated as neither dust complaint outlined in Section 2.7 occurred during the monitoring dates.

Polar plots of the Season 6 and Season 7 OBDA campaigns are shown in Figure 11 and Figure 12. The polar plots provide us with concentration values recorded based on the co-temporal meteorological conditions during these readings. This allows us to not only test background concentrations but also indicates where the origin of the dust source could be coming from depending on meteorological conditions. As the CALMET data is only for the years 2017 to 2019, meteorological conditions for the exact dates can only be extracted for Season 6. For Season 7, to keep the meteorological data consistent and comparable, the 2019 CALMET data have been used in place of real-time data, taking the same months and dates the season took part in.

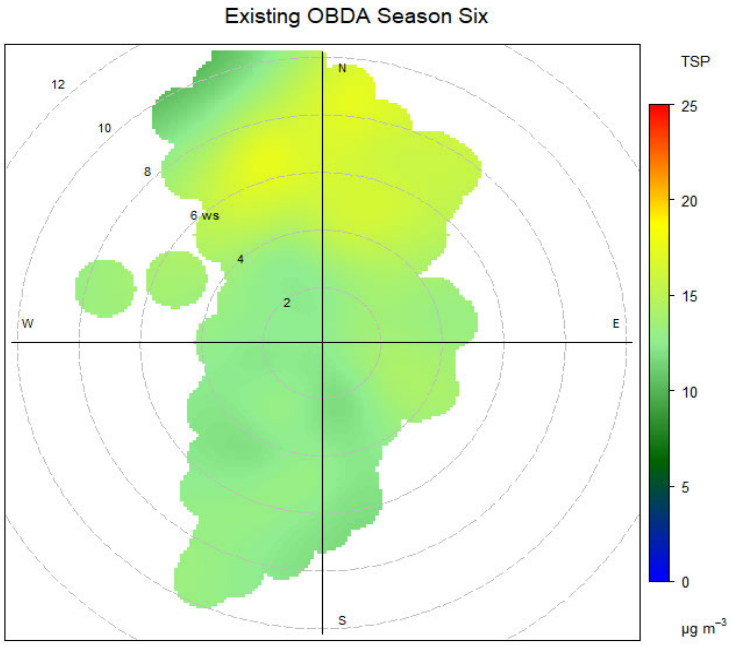

Figure 11: Polar Plot of hourly mean of TSP during Season Six

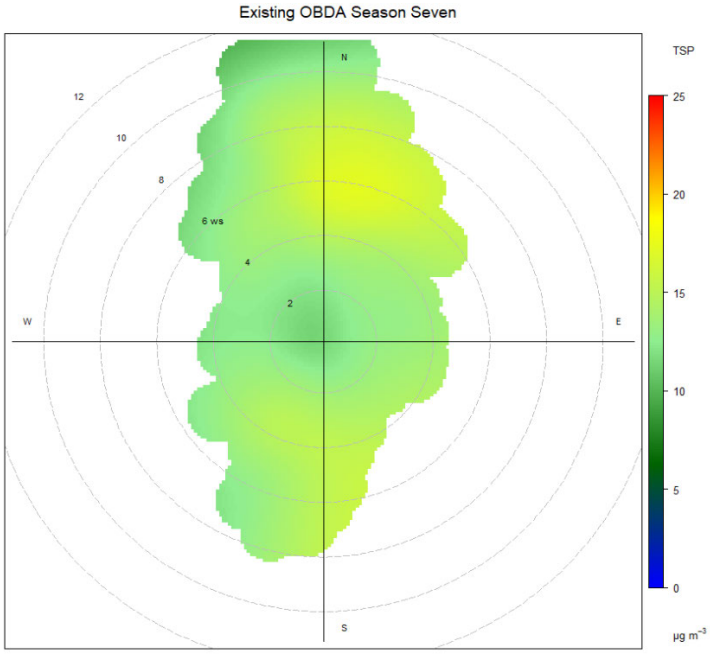

Figure 12: Polar Plot of hourly mean of TSP during Season Seven

These polar plots for the overburden campaigns can be compared with the dust monitoring data polar plot (Figure 13) to identify the difference in background concentrations during regular quarry activities and an overburden campaign. The same method for Season 7 has been used to determine the meteorological conditions used for the background monitoring polar plot.

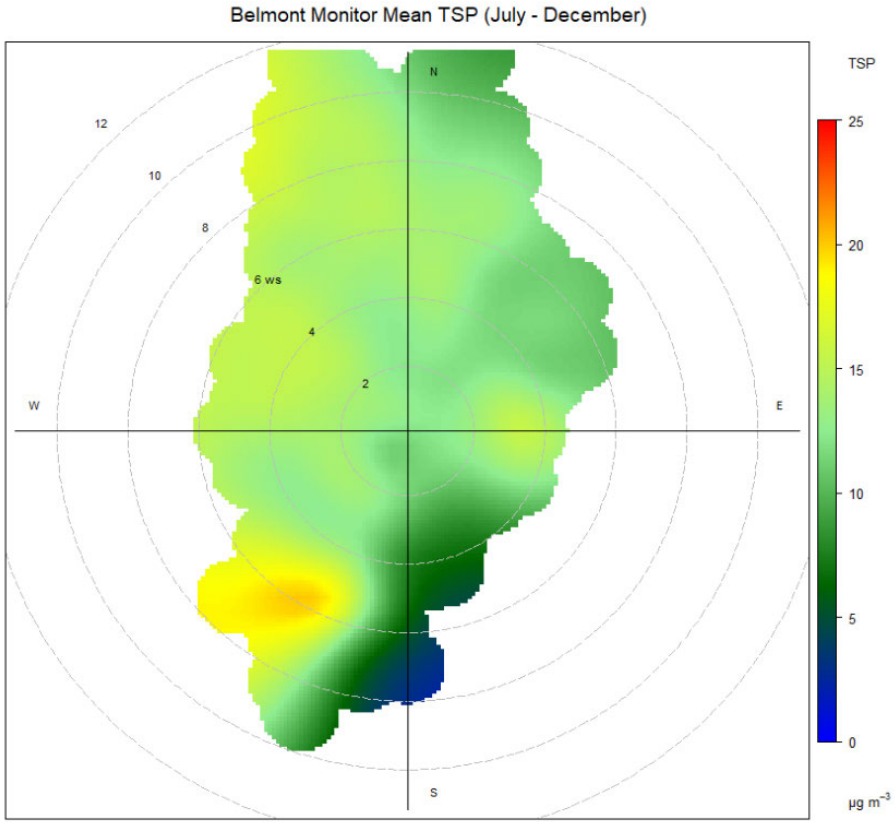

Figure 13: Polar Plot of hourly mean of TSP during Background Monitoring

Based on these figures we can see that TSP concentrations during an overburden campaign do not significantly increase above background concentrations seen during regular quarry activities. This indicates that OBDA activities have a minimal impact on background concentrations in the surrounding area and further validates the analysis in Section 7.1 that dust generated by these activities is unlikely to cause significant dust nuisance effects beyond 300 m. The results also indicate that the quarry is meeting the permitted standards outlined in Rule 27 (b) of the GWRNRP.

The higher values from the southwest in Figure 13 also indicates that there could possibly be another source of dust nuisance in the area, as higher concentrations are recorded during meteorological conditions where the quarry and existing OBDA are not downwind of the monitoring site.

However, as there is not a significant difference in concentrations, there is a low likelihood that proposed OBDA activities will result in offensive or objectionable dust nuisance beyond the site boundary.

7.3 FIDOL Assessment

PDP has undertaken a FIDOL assessment, as described in Section 6.2, to assess the potential for dust nuisance effects. This assessment considers the mitigation measures discussed in Section 5.0 of this report when considering potential impacts.

7.3.1 Frequency

To determine the frequency of potential adverse effects from dust, four parameters need to be established and understood. These are:

- The direction(s) of potentially affected receptors in relation to potential dust generating activities;
- The frequency at which the winds blow from these directions with a wind speed high enough to transport the dust source; and
- The frequency of dust discharges.

Wind speeds above 5 m/s are associated with potential to cause dust nuisance due to pick up off exposed dry surfaces. As the wind speeds increase, the potential dust to pick up and remain suspended increases.

Table 6 provides the frequency that receptors are downwind under strong wind conditions. PDP notes that where separation distances are very short (less than 100 m), light winds can also be a factor in transporting dust that may be generated from mechanical handling or vehicle movements. With this in mind, light winds have been considered for R10 due to its close proximity to the proposed OBDA. However, given the separation distances to the proposed OBDA for all other receptors exceed 600 m, light wind conditions have not been considered for any other receptors.

Table 6: Summary of Receptor Downwind Frequencies and Distances to Nearest Relevant Site Activity (Based on CALMET 2017 – 2019 Data)

Receptor	Wind Direction(s) when Receptor is Downwind of OBDA	% of time Downwind of Site (winds 0.5 – 5.0 m/s)[1]	% of time Downwind of Site (winds > 5 m/s)	% of time Downwind of Site (winds > 7.5 m/s)	Distance to the Proposed OBDA (m)
R1	E	-	0.1	0	620
R2	ENE	-	0.3	0.1	720
R3	NE	-	1.3	0.2	950
R4	NE	-	1.3	0.2	970
R5	N	-	7.0	7.6	> 1000
R6	N	-	7.0	7.6	> 1000
R7	NW	-	0.5	0.2	680
R8	WNW	-	0.1	0.1	945
R9	W	-	0.1	0.1	780
R10	S	2.1	3.0	> 0.6	50

Notes:

1. *Due to distance from the OBDA, light winds have not been considered in dust assessment of R1-R9.*

Based on guidance prepared by the Institute of Air Quality Management[7] (IAQM), R1-4 and R7-R9 are infrequently downwind. R10 can be downwind moderately frequently when lighter winds are considered, while R5 and R6 are frequently downwind.

Ecological areas around these are likely to downwind at similar frequencies as the sensitive receptors presented in Table 6. For conservatism, it is assumed that these areas are as frequently downwind as R10, which is moderately frequent.

7.3.2 Intensity

Intensity relates to the concentration of dust that is likely to be experienced at any potential receptor. Given the distance of the receptors identified in Section 2.8 (with the exception of R10) from the proposed OBDA, PDP considers that any dust that might be experienced will have an extremely low intensity that is unlikely to be detectable above background. Even with the proposed OBDA, a significant distance is maintained between sensitive receivers from any quarry activities, so intensity of any dust experiences is expected to remain low.

[7] Institute of Air Quality Management, May 2016. *Guidance on the Assessment of Mineral Dust Impacts for planning. V1.1*

Given the proximity of R10, there is the potential that it could, in the absence of appropriate mitigation, experience an increase in dust intensity above background concentrations on occasions when winds are coming from the south or similar, which is moderately frequent.

As with R10, there is potential for ecological areas to experience an increase in dust above background concentrations in the absence of appropriate mitigation measures.

7.3.3 Duration

Duration relates to the length of time that dust effects are likely to occur. Generally, the duration of any dust discharges correlates to the duration of the wind event and/or activity that has the potential to generate dust.

Given the separation distances and the frequency of strong winds, for R1-4 and R7-R9, long duration dust events with the potential for offsite effects are considered unlikely at these locations.

For R5 and R6, the frequency of strong winds suggests that they could be prone to long duration dust events, however given the separation distances (more than 1,000 m) offsite dust nuisance effects are unlikely to occur.

For R10, while there is a small distance between the OBDA and the receptor (50 m), this location is downwind of the OBDA moderately frequently when weaker winds are considered. Therefore, there is potential for shorter duration events causing off-site effects to occur, however this is less likely to happen for extended periods of time.

The same conclusions of R10 apply to the ecological areas, however duration of these events could be longer depending on if the mitigation measures outlined in Section 5.0 are not applied effectively.

7.3.4 Offensiveness

The offensiveness of dust for the identified sensitive receptors is correlated with the type of material that makes up the dust with different materials having different levels of offensiveness. For example, coal dust could result in black deposits which could be noticeable on surfaces and be more offensive than soil.

Dust from on-site activities is most likely to be from the greywacke rock being excavated and processed or from overburden removal and placement. Greywacke from the site is generally a brown, grey colour and is unlikely to result in dark deposits. Additionally, topsoil deposits in the OBDA is generally a brown colour. Consequently, PDP considers any dust discharged from the site to be of a low offensiveness.

For ecological areas the offensiveness is more closely correlated with dust deposit rather than the make up of material. A 1993 review[8] of the effects of dust on vegetation noted that vegetation can be affected through multiple pathways, including physical smothering and chemical toxicity. It also noted that trees and shrubs close to roadways are very efficient at filtering out dust, indicating that vegetation close to the site will be most affected, although some vegetation will be more sensitive to these effects than others.

PDP has not found research that specifically investigates the effects of dust on the species found in the transfer areas. However, for conservatism PDP has assumed that vegetation is sensitive to dust and therefore has a moderate sensitivity.

7.3.5 Location

Location refers to the area of the site and its physical surroundings (i.e. rural, industrial, or urban).

The proposed OBDA extends into the Belmont Regional Park, which does not contain any permanent dwellings or residences. This will move OBDA activities closer to the Dry Creek campsite, although there still remains a reasonable separation distance (780 m). Moving activities from the current OBDA means that receptors from the east and south side of the Quarry will now be further away from OBDA activities, potentially resulting in a decrease in sensitivities to these dwellings. PDP considers that the separation distances to residential dwellings mean that the immediate residential area has low sensitivity to dust.

However, due to R10 being in close proximity to the proposed OBDA, there is potential for this receptor to be sensitive to dust when OBDA activities are occurring. This is especially true when activities occur in the northern section of the proposed OBDA during stage 1 and 2 of the staging process.

As ecological areas surrounding the proposed OBDA are in close proximity, like R10 there is potential for these areas to be sensitive to dust.

7.3.6 FIDOL Summary

Having assessed the FIDOL factors, PDP considers that there is a low likelihood of dust being offensive or objectionable to the extent that there is an adverse effect at almost all the receptors mentioned in Table 2. The majority of receptors are a significant distance away from the proposed OBDA and its potential impacts, meaning that they are less prone to dust nuisance events from the proposed OBDA activities.

However, the proximity of R10 means that even weaker southerly winds could potentially cause increased dust concentrations and will require continued effective implementation of the mitigation measures mentioned in Section 5.3.

[8] Farmer, A. M., 1993. *The Effects of Dust on Vegetation – A Review*. Environmental Pollution 79: pg 63-75.

These measures such as water carts to dampen the haul roads and fill areas, and grassing and hydroseeding presently done on the established OBDA will need to continue to be used for the proposed OBDA activities to minimise dust effects. Quantitative dust monitoring at R10 during future overburden campaigns would also help to identify when dust events occur and minimise their impact. This would also provide an additional mitigation measure to minimise potential dust at ecological areas surrounding the OBDA as the monitoring will identify trigger levels of excessive dust during the OBDA activities.

If these mitigation measures are implemented effectively this should significantly decrease the likelihood of dust nuisance occurring.

7.4 Cumulative Effects

Section 4.3 discusses the background dust sources and identifies some activities which may cause a cumulative dust effect to identified sensitive receptors.

Given the location of the Firth Belmont Masonry relative to the most potentially affected sensitive receptor (R10), it is extremely unlikely that this activity would make any cumulative contribution to adverse dust effects on that receptor. However, there is potential that it contributes to dust that might be detected near R7. However, the Firth plant, is more than 300 m from R7, and the proposed OBDA is more than 700 m away from that receptor, so any contribution to dust at R7 is going to be minimal (if anything).

In addition to this, the Fulton Hogan Asphalt Plant and a Firth ready-mix concrete supplier (within the southern boundary of the site) have the potential to contribute to generated dust. Like the Firth Belmont Masonry, these activities are extremely unlikely to make any cumulative contribution to the most potentially affected receptor (R10), due to the vertical and horizontal separation distances involved. There is the potential for these activities to contribute to dust near R5 and R6, however they are unlikely to cause a cumulative effect with the proposed OBDA activities given the separation of these receptors and associated activities.

8.0 Conclusion

PDP has assessed the effects of air discharges from the proposed OBDA on the surrounding environment, using the FIDOL factors and background dust monitoring to consider the potential for adverse effects from dust.

PDP considers that there is a low risk of dust resulting in adverse effects at most sensitive receptors, primarily due to separation distances preventing suspended particulate from reaching receptors. The site topography and location of the proposed OBDA further reduce the risk.

Monitoring conducted by PDP indicates that that background TSP concentrations are unlikely to be significantly altered by the proposed OBDA activities, based on historic monitoring of previous overburden disposal campaigns. This means that the activity would likely comply with Rule 27 of the GWRNRP as long as good mitigation measures are followed.

Considering all of the above, PDP considers that it is unlikely that any dust related environmental and health effects will be experienced off-site from the proposed ODPA.

In the case of R10, it is recommended that the mitigation identified in Section 5 or similar is used to ensure that this receptor is not affected by dust nuisance during activities occurring in the northern section of the proposed OBDA. While there is a low likelihood of significant dust nuisance occurring, due to its proximity, there is potential for people in that location to be impacted by dust nuisance events if mitigation measures are not implemented correctly. The same is true of the surrounding ecological areas.

In order to help reduce the likelihood of dust nuisance occurring at R10 and ecological areas, PDP would recommend the use of quantitative monitoring in order to maximise the protection of the receptor and ecology.

Appendix A: On-site Meteorological Data Analysis

Table 7: Wind Speed Frequency Distribution from Belmont Quarry AWS Data 2024 - 2025

Direction	Frequency (%)					Total (%)
	0.5 – 1.5 m/s	1.5 – 3 m/s	3 – 5 m/s	5 – 7.5 m/s	> 7.5 m/s	
North	2.4	2	0.6	0.7	0.1	5.8
North Northeast	0.5	0.2	0.3	0.1	0	1.1
Northeast	0.3	0.5	0.4	0.1	0	1.3
East Northeast	0.5	0.6	0.4	0.1	0	1.6
East	1.1	2	3.1	1.5	0	7.7
East Southeast	0.6	1.6	2.1	1.8	0.1	6.2
Southeast	0.8	1.6	1.6	0.5	0	4.5
South Southeast	0.8	1.2	1	0.1	0	3.1
South	0.4	0.2	0.1	0	0	0.7
South Southwest	0.2	0.1	0.1	0.1	0	0.5
Southwest	0.1	0.1	0.1	0.1	0	0.4
West Southwest	0.1	0.1	0.1	0.1	0	0.4
West	0.1	0.1	0.1	0.1	0	0.4
West Northwest	0.2	0.2	0.1	0.1	0	0.6
Northwest	0.8	1	0.9	0.5	0.1	3.3
North Northwest	4.3	6.5	10.9	24.2	3.5	49.4
Calms (< 0.5 m/s)						12
Missing or Incomplete						1.0
Total						100

Belmont Quarry Overburden Disposal Area – Dust Management Plan

Prepared for

Winstone Aggregates Ltd

August 2026

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Quality Control Sheet

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1	10/08/2026	Final	Trevor Everett	Andrew Curtis	Andrew Curtis

DOCUMENT CONTRIBUTORS

Prepared by

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Trevor Everett

Reviewed and approved by

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Andrew Curtis

Limitations:

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Winstone Aggregates Ltd. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of Winstone Aggregates Ltd for the limited purposes described in the report. PDP acknowledges that this report may be used and relied upon by the expert panel appointed under the Fast-track Approvals Act 2024. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk. This report has been prepared in accordance with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court's Practise Note 2023. The authors of this report agree to comply with the Code of Conduct, and confirm that unless otherwise stated, the issues addressed in this report are within the area of expertise of the authors. No material facts have omitted that might alter or detracted from the opinions expressed in this report.

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Appendices

1.0 Introduction

The Dust Management Plan (DMP) has been prepared by Pattle Delamore Partners Limited (PDP) on behalf of Winstone Aggregates (Winstone) for its proposed new Overburden Disposal Area (OBDA) within an area of land adjacent to its Belmont Quarry. This DMP has been prepared in accordance with the proposed OBDA activities and will focus on the OBDA and associated works.

This DMP has been prepared in accordance with the City of Lower Hutt District Plan's Extraction Activity Area provisions and the requirements of the Greater Wellington Regional Council (GWRC) Natural Resource Plan.

It records all management, monitoring and operational procedures necessary to comply with the District and Regional Plan rules.

A current electronic and hard copy of this DMP shall be kept on site and will be available for use by site personnel at all times as per Condition 8.

2.0 Planning Requirements

Hutt City District Plan – Extraction Activity Area

6D 2.1.1

Permitted Activity Conditions

b. *Dust:*
All outside areas shall be sealed, surfaced, or managed appropriately so that there is no dust nuisance at or beyond the site boundary. All use, handling and storage of goods, raw materials and waste materials shall be undertaken so as to prevent adverse effects from dust.

GWRC Natural Resource Plan (NRP)

Dust Management: Complies with Rule R27 "Handling of bulk solid materials" as standard dust suppression measures are in place and as such is a permitted activity.

> ***Rule R27:*** *Handling of bulk solid materials – permitted activity*
>
> *The discharge of contaminants into air from the handling of bulk solid materials including from the activities of quarrying, mining, cleanfilling, blasting, extraction, crushing, screening, processing, stockpiling, handling, conveying, sorting, and storage is a permitted activity, provided the following conditions are met:*
>
> *(b) for all other areas, the discharge shall not cause noxious, dangerous, offensive or objectionable odour, dust, particulate, smoke, vapours, droplets or ash beyond the boundary of the property.*

3.0 Purpose

The Purpose of this DMP is to provide a framework to manage the potential impacts of dust discharged from activities associated with the OBDA in compliance with consent [insert reference] Condition 46, which requires that the DMP shall include but not be limited to:

- Help staff identify their responsibility for minimising dust discharge;
- Help the OBDA operate within the permitted planning requirements;
- Prevent adverse dust nuisance effects at nearby sensitive receptors and ecological areas;
- A description of dust mitigation measures as required by Condition 46 of the consent; and
- Appropriate actions to undertake during and after a dust related incident or public complaint.

4.0 Site Location and Sensitive Receptors

The proposed OBDA will be located in the hills on the western side of the Hutt Valley, on land which is immediately adjacent to the quarry. The surrounding landscape is characterised by steep terrain and regenerating native vegetation. To the north of the OBDA is a walking trail known as 'Buchanan's Track'.

In this DMP, the term 'sensitive receptors' is defined as a location where people or surroundings may be particularly sensitive to the effects of air pollution. Sensitive receptors may include:

- Residential properties;
- Hospitals;
- Schools;
- Libraries; and
- Public outdoor locations (e.g. parks, reserves, beaches, sport fields).

The area surrounding the proposed OBDA primarily consists of Belmont Regional Park, which is a public destination for outdoor recreation such as walking, cycling, and running. To the east and southeast of the site are a number of residential dwellings. Selected receptors have been chosen to be representative of multiple dwellings or equivalent in the area. Figure 1 shows the location of all receptors identified. In addition to residential areas, there are areas of ecology surrounding the proposed OBDA, including those that are being swapped with DOC, that have the potential to be affected by dust from the proposed OBDA activities.

Figure 1: Sensitive Receptors in relation to the Site and OBDA

5.0 General Responsibilities

Winstone Aggregates

The Belmont Quarry Manager is responsible for and manages all operations undertaken in the OBDA.

Winstone Aggregates has a responsibility to implement and to abide by this Management Plan.

This responsibility includes ensuring that all contractors operating on or near the OBDA are familiar with the requirements of these documents and are undertaking their activities in accordance with the requirements.

Winstone Aggregates Staff

Every Winstone Aggregates employee has a duty to avoid, remedy or mitigate any adverse environmental effect arising from an OBDA activity carried out by them or on their behalf unless that effect is authorised by consent or permitted by the plan.

Every Winstone Aggregates employee has a duty to adopt the best practicable option to ensure that dust emissions remain within permitted levels.

Contractors

Every contractor has a duty to adopt the best practicable option to ensure that dust emissions remain within permitted levels. Unless that effect is authorised by consent or permitted by the plan.

Every contractor must obey Winstone's environmental rules and requirements while on-site and complete relevant training given to them before completing works.

6.0 Training

The success of this Dust Management Plan depends on appropriate actions by site personnel in day-to-day operations at the OBDA. Training will be provided to staff and contractors during site inductions and regular environmental meetings will provide a forum to discuss:

- On-site practices for minimising dust emissions.
- Procedures for reporting and dealing with dust emissions.

Winstone personnel and all contractors operating on site will be made aware of all potential adverse effects of dust emissions and shall be proactive in identifying actual and potential dust sources.

Job descriptions and annual training reviews will identify individual staff training requirements in aspects of the dust control. The Quarry Manager will oversee training, and ensure that it is appropriate. A record of staff training will be maintained on site.

The Quarry Manager will ensure that any training provided by any earthmoving contractors to their staff also meets the requirements with respect to dust control.

7.0 Dust Mitigation Measures

Dust from disturbed or unpaved surfaces such as haul roads and the OBDA can be thrown into the air by wind or vehicle movements. Dust pick-up by wind is usually only significant at wind speeds above 5 m/s (18 kph), but vehicle re-entrainment can occur under any conditions.

In order to minimise dust emissions at the OBDA the following mitigation measures will be used:

Water Cart:

Spraying the surface of the ground with water, that is readily available, is a highly effective method of suppressing dust.

Water carts on site will provide onsite control of fugitive dust on haul roads and disturbed surfaces on an as-required basis. The frequency of watering depends on several factors; including weather, soil type, and construction traffic. Water

should be applied at a rate so that the soil surface is wet, but not saturated or muddy.

Where practicable, the water cart will start prior to OBDA works commencing to ensure that the water gets a chance to soak into the road. The water cart will then continue to operate periodically throughout the day.

Truck Spillage

Dust emissions may be caused by the spillage of material from a truck traveling along the OBDA haul roads. Spilled material could further act as a source of dust emission if it is crushed by traffic movements.

Spillage from trucks will be minimised by not overloading or otherwise incorrectly loading trucks. Any spill material will be promptly cleaned up.

Vehicle Exhausts

All vehicles will be regularly maintained to ensure minimum emissions. Earthmoving equipment will not have downward facing exhausts as these may act to raise dust in dry conditions.

Speed Limit

Vehicles traveling over paved or unpaved surfaces tend to pulverize any surface particles and other debris. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents due to turbulent shear between the wheels and the surface. Dust particles are also sucked into the turbulent wake created behind moving vehicles.

Dust emissions due to moving vehicles will be minimised by restricting speed so that dust does not rise above the wheel height of trucks and machinery accessing and using the OBDA and/or visible dust travelling for more than 25 metres within the OBDA.

- **The site speed limit is 25 kph on the haul roads**

Following Distances

All drivers will be advised to maintain a good following distance between vehicles when using the haul roads to minimise the potential for cumulative dust emissions arising from closely travelling vehicles.

Haul Road Maintenance

Haul roads will be regularly graded to maintain an even surface with potholes and bumps smoothed over as soon as is reasonably practical. Daily inspections of the haul roads will be undertaken to identify any surface deterioration that may result in increased dust generation. Site personnel will be encouraged to immediately report any deterioration of the haul road surface.

Minimising Active OBDA:

Placement of material will occur in the proposed OBDA during a series of campaigns (known as 'overburden campaigns') across the multiple proposed stages. Large areas of stockpile can lead to excessive dust nuisance if left for extended periods of time.

During overburden campaigns, or when equivalent works are undertaken, the size of the active OBDA will be keep to as small of an area as practicable. Once these areas have been filled to completion, they will be covered with grassing and hydroseeding as soon as possible in order to minimise the dry, exposed areas. This will be done in a series of indicative stages as shown in Figure 2.

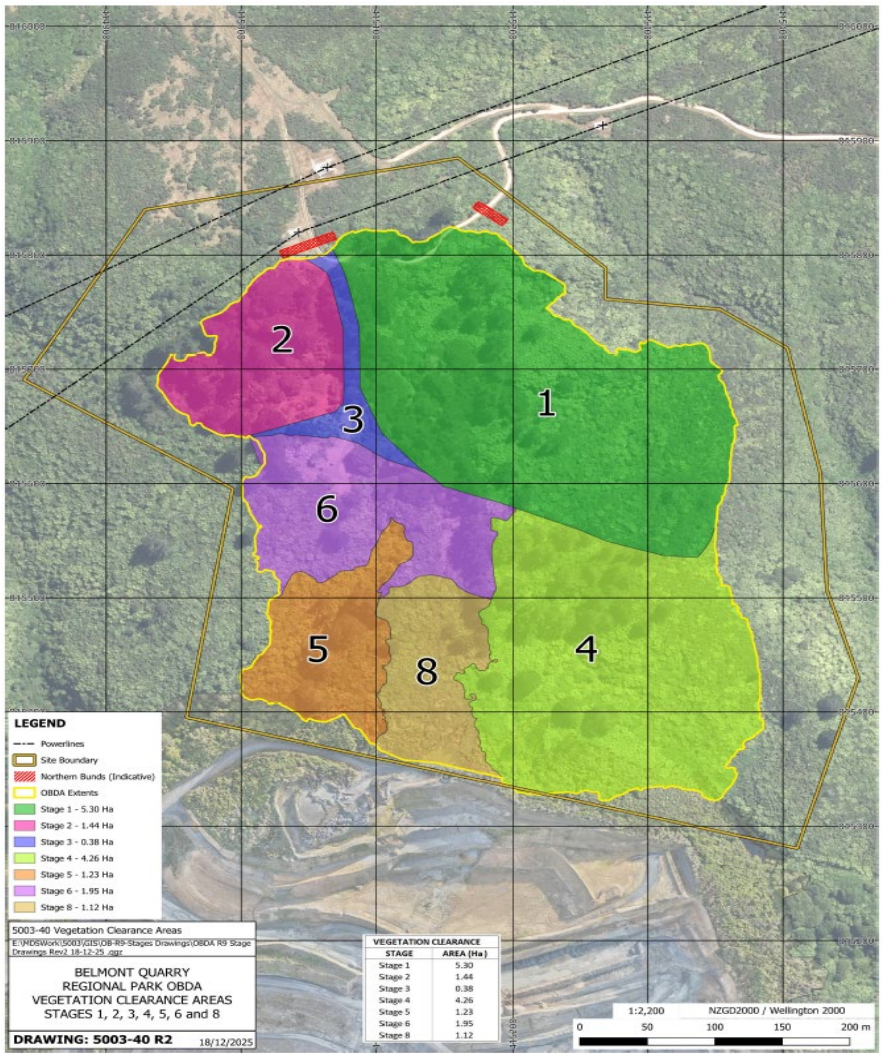


Figure 2: Indicative Staging of OBDA and Vegetation Removal

Dust Monitoring and Maintenance

During overburden campaigns a quantitative, real-time dust monitor will be operational and placed along the northern boundary of the OBDA as to measure the dust nuisance occurring at the nearby Buchanan's Hiking Trail.

An indicative location of the monitor is provided in Figure 3. If the monitor needs to be moved, it should be relocated to a nearby location that is still representative of dust conditions to the north of the OBDA.

Figure 3: Proposed Dust Monitor Location

If there is an excessive amount of dust, the monitor will alert the Quarry Manager and/or other relevant site staff who will take action to improve the dust emissions.

The monitor will measure Total Suspended Particulate (TSP) and provide alerts when trigger level thresholds are met. The Good Practice Guide for Assessing and Managing Dust provides suggested trigger levels for TSP, for conservatism the short term trigger has been halved and a lower trigger for introducing additional mitigation has been added.

The trigger levels for these alerts are outlined below:

- The trigger level for dust nuisance where additional mitigation measures are applied in addition to those undertaken during normal operation in the OBDA is **75 µg/m^3** as a **1-hour rolling average; and**

- The trigger level for dust nuisance where operations in the OBDA will temporarily cease is **100 µg/m³** as a **1-hour rolling average.**

Note that these trigger levels are interim thresholds and will be subject to change/review once operations have been undertaken for a period of time.

The monitor used must be regularly calibrated and maintained by an appropriately qualified person in order to operate continuously for the duration of an overburden campaign.

8.0 Key Dust Mitigation Responsibilities

Key responsibilities for Dust Mitigation are as follows:

- inspection of works for visible dust emissions
- inspection of haul roads
- use of water cart
- limits on exposed areas
- limits on vegetation clearance
- cessation of work
- temporary cover requirements.

The Quarry Manager will be responsible for implementing these key dust mitigation responsibilities and making day-to-day decisions. The Quarry Manager may delegate some or all of these responsibilities to his deputy or site foreman, or to the earthworks contractor. Any such delegation will be documented and recorded. Records will be available at the Belmont Quarry site office.

9.0 Incidents

A permanent record of any incidents that results, or could result, in an adverse effect on the environment beyond the boundary of the Belmont Quarry will be maintained. This incident register will be made available to the Wellington Regional Council and/or Hutt City Council, on request.

The Wellington Regional Council and Hutt City Council will be notified of any such incident within 24 hours of the incident being brought to the attention of Winstone Aggregates (or the next working day should this occur on a weekend or public holiday).

An incident report will be forwarded to the Wellington Regional Council and Hutt City Council within seven working days of the incident occurring (unless otherwise agreed with the Wellington Regional Council and Hutt City Council). The report will describe reasons for the incident, measures taken to mitigate the incident, and measures to prevent recurrence.

10.0 Public Complaints

Following Complaints

Once a complaint is received it will be promptly investigated (as per Condition 49) and if found to be valid, appropriate mitigation measures will be put in place with the objective of avoiding a reoccurrence of the complaint.

A template to investigate dust complaints is attached to this plan as Appendix A – Dust Complaint Template.

A permanent record of any complaints received alleging adverse effects from or related to the exercise of this permit will be maintained. This record will include the following, where practicable:

- The name and address of the complainant, if supplied;
- Date, time, and details of the alleged event;
- Weather conditions at the time of the alleged event (as far as practicable);
- Investigations undertaken by the permit holder in regard to the complaint and any measures adopted to remedy the effects of the incident/complaint; and
- Measures put in place to prevent occurrence of a similar incident.
- Any other activities occurring in the area at the time of the complaint

The Wellington Regional Council and Hutt City Council will be notified of any complaints received, which relate to the exercise of this permit, within 24 hours of being received.

The complaints record will be made available to the officers of the Wellington Regional Council and Hutt City Council on request.

Appendix A: Dust Complaint Template

Dust Complaint Investigation Form

These are modified from complaint forms courtesy of Greater Wellington Regional Council and Environment Canterbury.

DUST COMPLAINT & ASSESSMENT FORM

PART A: Complaint Details

Date: Time:

Complaint Received By:

Name:

Address:

Contact phone numbers:

Possible source:

Anonymous: Y/N

Is dust occurring now?

Complaint details (include impacts/effects experienced by complainant:

PART B: Complainant Location Assessment

Date: Time:

Assessors Name:

Person spoken to at complaint location:

Reason for investigation: COMPLAINT/PROACTIVE

Complaint details (include impacts/effects experienced by complainant:

INITIAL IMPRESSIONS:

Type of dust

Time of the intial impression:

Any visible dust deposits: Y/N

Plume width (if known):

VISIBLE DUST DEPOSITS

Describe approximate quantites and extent

When was surface last cleaned?

Frequency of cleaning:

Describe the appearance of the deposits:

Colour

Any odour

Shape

Water soluble

Size

Other

Crystalline or powdery

Hard, soft

Weather Data (see over)

Wind direction:
Wind velocity:
Cloud cover:
Temperature:
Rainfall in past 24 hrs:

Photos Taken: Y/N

Samples taken Y/N

Diagram/description of where photos were taken.

Diagram/description of where samples were taken:

Sample collection: Use a small paintbrush (clean) to sweep samples of the dust onto a sheet of paper and then into a clean plastic bag. At least half a teaspoonful will be required for analysis. Lesser amounts may be colected on strips of clear cellotape, which should then be stuck onto sheets of clear plastic to preserve the samples. Label all samples and record date, time, location, etc on a separate sheet of paper if required.

Based on your assessment on this occasion, which of the following applies:

- ☐ I did not find any dust
- ☐ I did find dust and consider it would not be objectionable at any location for any duration or frequency
- ☐ I did find dust and consider it would be objectionable if it became continuous
- ☐ I did find dust and consider it would be objectionable if it occurred on a regular or frequent basis
- ☐ I did detect dust and consider it to be objectionable even in periods of short duration.

FINAL CHECKLIST

- ☐ Upwind assessment completed. Record details below. If not, detail reason: _____
- ☐ Aerial photo/sketch showing location of assessment and upwind assessment attached
- ☐ Are there potential witness statements to obtain YES/NO

REMARKS

PART C: Off-site dust and 360° assessment

Assess the dust upwind of the suspected source and if possible conduct a 360° sweep around the source assessing the odour at different points

OTHER POTENTIAL SOURCES **Time:** _____

Check for road works, ploughing, construction activities, burn-offs, unsealed roads, unsealed sites

Site 1:

Wind direction: Wind strength: Wind stability: GPS Loc:
Visible dust: Desciption of dust
Comment:

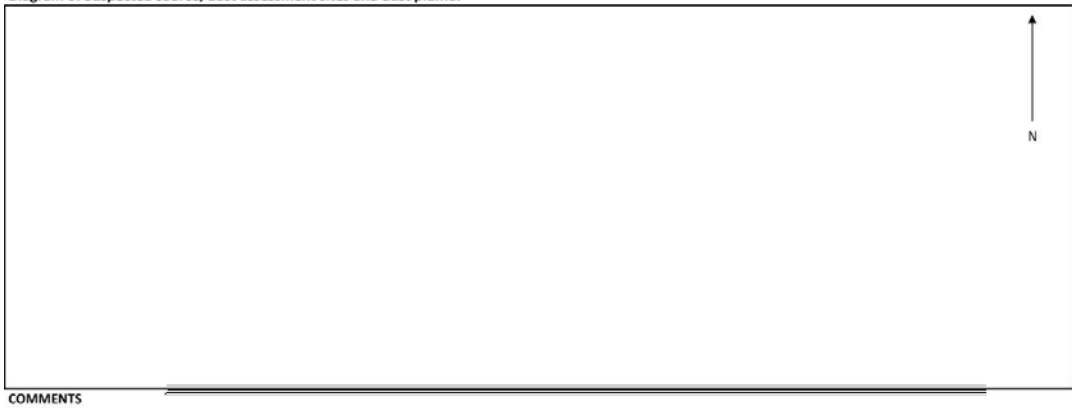
Site 2:

Wind direction: Wind strength: Wind stability: GPS Loc:
Visible dust: Desciption of dust:
Comment:

Site 3:

Wind direction: Wind strength: Wind stability: GPS Loc:
Visible dust: Description of dust:
Comment:

Diagram of Suspected source, dust assessment sites and dust plume:



COMMENTS

PART D: Source On-site Investigation

If source of dust identified, visit site, identify yourself and show warrant. Explain the findings of your investigation to staff.

Date: Time: Source Identified:

Staff spoken to:: Position:

Staff contact phone number:

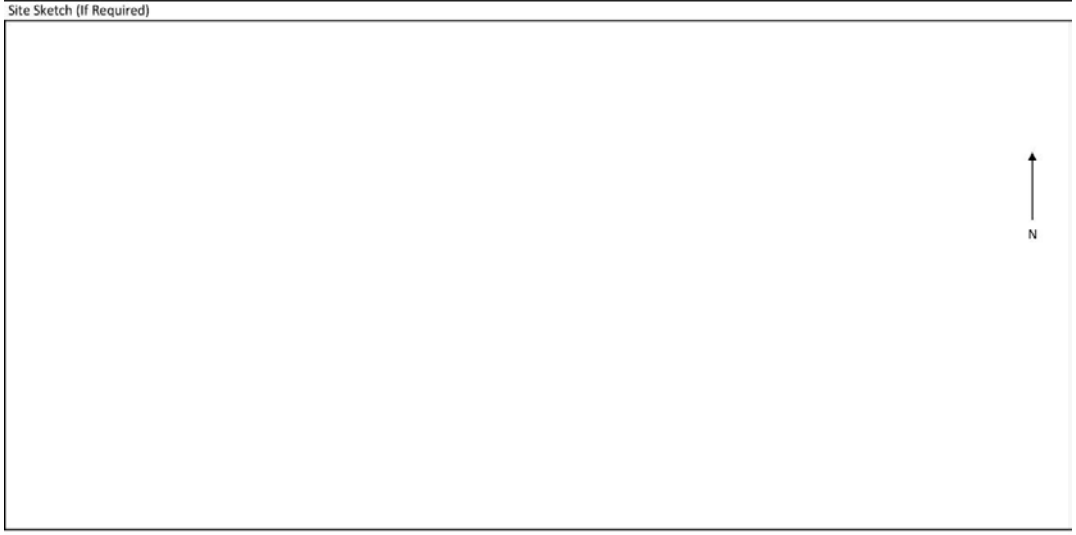
Current site operations:

Reason/explanation given for dust

Other Comments

Monitoring results/samples/other records

Site Sketch (If Required)



SIGNED BY ASSESSOR _____ DATE: _____

PART E: Dust Reference Sheet

Definitions

Objectionable The term objectionable is the term used in consent conditions and is an ingredient of any subsequent enforcement action. It is a subjective term and is open to interpretation. There is guidance from case law which defines objectionable as: unpleasant or offensive or repugnant; open to objection or undesirable or disapproved of; noxious or dangerous. A test will be applied by the court that the term objectionable will be as it applies to "the minds of a significant cross section of reasonable people in the community". The assessor must bear this test in mind when completing their assessment.

Frequency How often an individual is exposed to dust nuisance events

Intensity As indicated by dust quantity/concentration and the degree of nuisance

Duration The length of the particular dust event

Character How objectionable the dust is, having regard to the nature of the dust

Land Beaufort Wind Scale

B. No.	Description	How to Recognise
0	Calm	Smoke rises straight up
1	Light Air	Smoke drifts
2	Light Breeze	Wind felt on face; leaves rustle
3	Gentle Breeze	Flags flap; twigs move all the time
4	Moderate Breeze	Papers blow; small branches move
5	Fresh Breeze	Small trees sway
6	Strong Breeze	Large branches move, wind whistles
7	Near Gale	Whole trees sway

Measuring Temperature

Use descriptions below or obtain local meterological data, especially temperature from websites such as www.metservice.govt.nz

Cold
Cool
Mild
Warm
Hot

Measuring Cloud Cover

Okta No.	Description
0	Clear Sky
1	Sunny
2	Mostly sunny
3	
4	Half the sky is covered in cloud
5	
6	Mostly cloudy
7	Considerable cloudiness
8	Overcast
F	Fog / Mist

During the day the sun is always shining, so the amount of sunshine reaching the ground depends on the amount and duration of any cloud cover. The amount of cloud cover is usually given in units called oktas. Each okta represents one eighth of the sky covered by cloud.