Huntly Quarry Managed Fill - Air Quality Technical Assessment

Prepared for

Gleeson Managed Fill Limited

November 2019

PATTLE DELAMORE PARTNERS LTD
Level 1, 111 Customhouse Quay,
Wellington 6011
PO Box 6136, Wellington 6141, New Zealand

Tel +64 4 **471 4130** Fax +64 4 **471 4131**
Website **http://www.pdp.co.nz**
Auckland Tauranga **Wellington** Christchurch

Quality Control Sheet

TITLE	Huntly Quarry Managed Fill – Air Quality Technical Assessment
CLIENT	Gleeson Managed Fill Limited
VERSION	Final
ISSUE DATE	04 November 2019
JOB REFERENCE	
SOURCE FILE(S)	H01503600 - Final

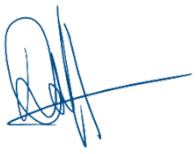
DOCUMENT CONTRIBUTORS

Prepared by

SIGNATURE 

Chris Bender

Reviewed and approved by

SIGNATURE 

Deborah Ryan Approver's name.

Limitations:

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Paua Planning Ltd and Gleeson Managed Fill 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 Paua Planning 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.

Table of Contents

SECTION		PAGE
1.0	Introduction	4
2.0	Description of Proposed Activities	4
2.1	Proposed Activity	4
2.2	Material transport and handling	5
2.3	Hours of operation	6
3.0	Nature of Air Discharges	6
3.1	Sources of Dust	6
3.2	Dust	7
3.3	Combustion Source Emissions	8
4.0	Receiving Environment	8
4.1	Sensitivity of the Receiving Environment	8
4.2	Topography and Meteorology	11
4.3	Background Ambient Air Quality	15
5.0	Regulatory Framework	17
5.1	National Environmental Standards	17
5.2	Ambient Air Guidelines	19
5.3	Regional Air Plan	21
6.0	Assessment of Environmental Effects	21
6.1	FIDOL Assessment	21
6.2	High Voltage Transmission Lines	23
7.0	Mitigation and Monitoring	24
7.1	Mitigation Methods	24
7.2	Monitoring	25
8.0	Summary and Conclusions	25
9.0	References	26
10.0	Limitations	26

Table of Figures

Figure 1 District Plan Map showing proposed Fill Areas 9

Figure 2 Nearest residences location map 9

Figure 3 Gleeson Quarry and Fill Areas with High Voltage Power Lines 11

Figure 4 Ruakura (left) and Whatawhata (right) wind roses, 2012-2017 12

Figure 5 Ruakura (left) and Whatawhata (right) wind roses (strong winds > 5 m/s), 2012-2017 13

Figure 6: Dry Surface Days per Month for Tauranga Airport (2007-2012) 14

Figure 7 30-day dust deposition rates near Huntly Power Station, 2017-2018 16

Figure 8 Proposed Fill Areas relative to Huntly airshed 18

Table of Tables

Table 1: Fill area description 5

Table 2: Site operating hours 6

Table 3: Sensitive receptors nearest to Fill Areas 10

Table 4: Huntly PM_{10} monitoring results, 2014-2018 16

Table 5: New Zealand Ambient Air Quality Standards from 1 September 2005 (as Amended 2011) 17

Table 6: New Zealand Ambient Air Quality Guidelines 19

Table 7: Suggested Trigger Levels for Total Suspended Particulate (TSP) 20

Table 8: Suggested Trigger Levels for Total Suspended Particulate (PM_{10}) 20

Appendices

Appendix A: Site Layout Map

1.0 Introduction

Pattle Delamore Partners Limited (PDP) has been engaged by Paua Planning Limited on behalf of Gleeson Managed Fill Limited (Gleeson) to prepare an air quality technical report to support an application for resource consent for air discharges for proposed overburden fill, clean fill and managed fill areas. The proposed site is north of the Gleeson Huntly Quarry, located at 300 Riverview Road, Huntly ('the Site').

The activities associated with the proposed site are likely to result in the discharge of dust into air and therefore may have adverse effects on air quality around the Site. The proposed activity has been assessed as being a discretionary activity under the Waikato Regional Plan.

This report provides an air quality technical assessment for the overburden, clean fill, and managed fill activity, with recommended mitigation and monitoring.

2.0 Description of Proposed Activities

The Huntly Quarry has been operating since 1980 and the existing overburden fill site has reached its capacity. Gleeson is investigating options for developing four new Fill Areas for depositing overburden material from the quarry as well as depositing imported clean fill and managed fill material. The site containing the Fill Areas (the Site) could accept some asbestos-containing material (ACM) along with clean fill and overburden material.

2.1 Proposed Activity

Four main gullies within the Site's boundaries have been identified as areas where filling could be undertaken: Fill Areas 2, 3, 4 and 5, as per the site plan in Appendix A.

The types of material to be placed in the Fill Areas is proposed to include:

- Overburden – topsoil and sediment removed from the adjacent quarry site to enable access to underlying aggregate material;
- Clean fill – excavated natural materials such as clay, soil and rock that are free of combustible, putrescible, degradable or leachable components;
- Controlled fill - Predominantly clean fill material that may also contain inert construction and demolition materials and soils from sites that may have contaminant concentrations in excess of local background concentrations, but with specified maximum total concentrations that will not restrict future land use; and,

- Managed fill - Predominantly clean fill material and controlled fill material that may also contain material with contaminant concentrations in excess of controlled fill limits such as ACM.

Table 1 below provides a summary of the area and projected fill volume for each of the fill areas, as well as the type of material proposed to be placed in each fill area. For the purpose of this brevity, overburden, clean fill and managed fill will be referred to as simply 'fill' or 'fill material' in the remainder of this report.

Table 1: Fill area description

Fill ID	Fill Area (hectares)	Projected fill volume (m^3)	Fill material
Fill Area 2	3.8	630,000	Managed fill with ACM
Fill Area 3	4.2	575,000	Managed fill with ACM, clean fill/overburden
Fill Area 4	5.1	800,000	Managed fill with ACM
Fill Area 5	2.5	180,000	Clean fill/overburden

Potential effects of ACM will be managed by an Asbestos Fill Management Plan (AFMP), which sets operational processes to achieve this compliance with asbestos regulations, and to minimise asbestos exposure risk to site workers and neighbouring site users. Provided the measures in the AFMP are followed, asbestos is not expected to be an air contaminant and has therefore not been considered further in this report.

2.2 Material transport and handling

Site access to the Fill Areas will be via the existing quarry entrance on Riverview Road. Trucks will arrive by the existing unsealed road that accesses the Site from the quarry. Additional internal roads will be constructed to reach the Fill Areas as needed to allow materials transport to and from the fill locations. The proposed internal access roads are proposed to be two-way, 11 m wide, and are not proposed to be sealed.

Current traffic at the quarry site consists of an estimated has 233 truck trailers (466 movements) per day. The overall number of movements at the quarry is not proposed to change as a result of the acceptance of fill material at the Site. This is because trucks transporting fill material would normally be arriving at the site empty in order to pick up aggregate. It is estimated that around 25% of trucks delivering aggregate (60 trucks out of 233) will be bringing fill back from the project sites to deposit in the Fill Areas.

Prior to entering the Site each truck will be weighed and inspected at the weighbridge to ensure that the load is sufficiently covered and moistened to prevent mobilisation of dust from the material when deposited at the fill site.

Acceptance of ACM will be undertaken in compliance with an Asbestos Fill Management Plan (AFMP) for the Site. All ACM will be wrapped with 200 µm heavy gauge polyethene (asbestos bags or truck tray/skip lining), and truck/skip cover.

Once the fill material has been deposited, the material will be compacted and stabilised using bulldozers or excavators. Potentially dusty material will be dampened with water during placement with the use of a water cart.

2.3 Hours of operation

Hours of operation of the Site are provided in Table 2 below.

Table 2: Site operating hours

Period	Operating hours
Summer (1 October – 30 April)	Monday – Friday: 5am – 8 pm Saturday: 5 am – 3 pm
Winter (1 May – 30 September)	Monday – Friday: 5am – 6 pm Saturday: 5 am – 3 pm

3.0 Nature of Air Discharges

Emissions to air from the Site will consist of particulate matter including dust, and products of fuel combustion from the operation of vehicles and heavy equipment at the Site.

3.1 Sources of Dust

Potential dust discharge from the proposed Fill and associated activities can occur from:

- Vehicle movements to and from the site on the main access road;
- Vehicle movements on unsealed haul roads within the site;
- Stripping topsoil for establishment of Fill Areas;
- Placement of clean fill, overburden, and managed fill;
- Rehabilitation of Fill Areas with topsoil; and,

- Fugitive emissions from exposed surfaces.

3.2 Dust

The potential issues arising from dust producing activities are dust nuisance and health impacts in the surrounding community. Dust nuisance is caused where dust has impacts on amenity (such as dust depositing on residential properties, windows and on motor vehicles, and vegetation) and reducing visibility. Human health effects can generally occur from PM_{10} (fine particulate matter with diameter less than 10 microns) and smaller fractions, which are respirable and can cause short and long-term illness (WHO, 2013). The finer fractions ($PM_{2.5}$ and smaller) are those which pose the greatest risk to human health; these are generally emitted from combustion processes such as power plants, domestic fires and motor vehicles.

Larger particles fall out relatively quickly with distance from the source whereas a smaller particle can be suspended for longer in the air. How long particles remain suspended relates to the particle settling velocity, and smaller particles tend to travel further especially if there is a wind. Dust discharged from fill activities could potentially cause a nuisance due to the soiling of surfaces and irritation to the eyes and nose. Coarse particles larger than PM_{10} will likely dominate the discharge from fill activities with the finer material likely to contribute only a small portion of the total dust emissions (IAQM, 2016).

Factors that influence dust emissions from the Site and associated activities are:

- The size of particulates within the fill material;
- Disturbances of potentially dusty material such as excavations, loading and unloading of materials, traffic on unsealed roads;
- Wind speed across any exposed surfaces;
- Moisture content of the material;
- The area of exposed surfaces; and
- Frequency of rain events and the time between rain events.

Dust deposition can also have impacts on plant life and ecosystems. For example, dust can reduce the level of photosynthesis due to constricting the amount of light that reaches the leaves and can promote plant disease (MfE, 2016).

The potential impacts of dust can be reduced through adopting dust control techniques as described in Section 7 of this report.

3.3 Combustion Source Emissions

Air emissions may be generated from combustion sources associated with the Site, including emissions resulting from the use of heavy equipment used in excavation and vehicles used to transport materials to and from the Site.

The main emissions from combustion sources are sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and fine particulate matter (PM_{10}).

4.0 Receiving Environment

The Site is located to the west of the Waikato River. The western boundary of the Site adjoins forested areas featuring stream tributaries to Lake Puketirini and Lake Waahi. The proposed fill areas are all located on landholdings to the north of the existing quarry. The Site encompasses rolling hill pastureland interspersed with areas of pine forestry, some of which has recently been harvested. Patches of remnant native forest occur primarily around the boundaries of the Site, which will likely serve as a mitigating feature for offsite dust effects in the form of vegetative screening.

4.1 Sensitivity of the Receiving Environment

The Site is zoned as Rural under the Waikato District Plan (the Plan). The Site is also partially located in a designated Aggregate Extraction Area under the Plan. Figure 1 shows an extract from the Plan zoning maps, showing the Fill Areas in the context of the surroundings.

The area is primarily rural, with the main residential area of Huntly located around one kilometre to the north. There are quarries located directly to the north and to the south of the proposed Fill Areas. There are several residential properties within a one-kilometre radius where people may be exposed to dust from the Site. Figure 2 shows the nearest residences, which are also described in Table 3. PDP used aerial imagery to identify the nearest dwellings, there are no other sensitive receptors that we are aware of.

The nearest sensitive receptor is located within the Site boundary at 232 Riverview Road. This property is owned by Gleeson Quarry Ltd and is occupied by a worker at the quarry. Other residences are located 400 metres or more from the Fill Areas.

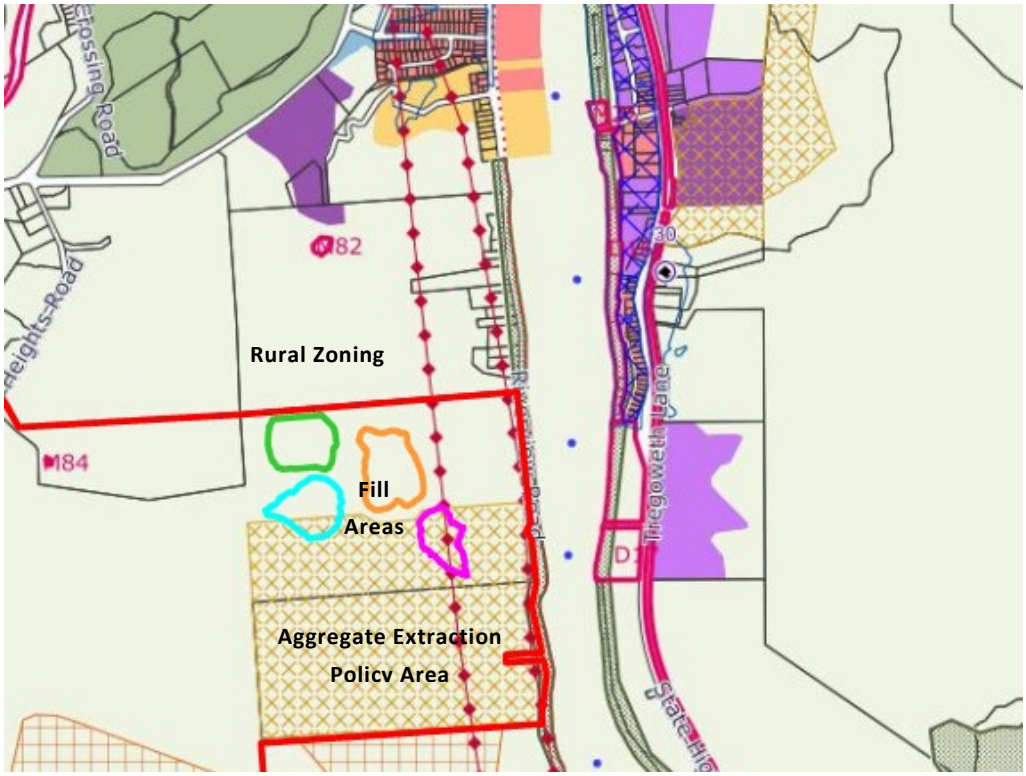


Figure 1 District Plan Map showing proposed Fill Areas

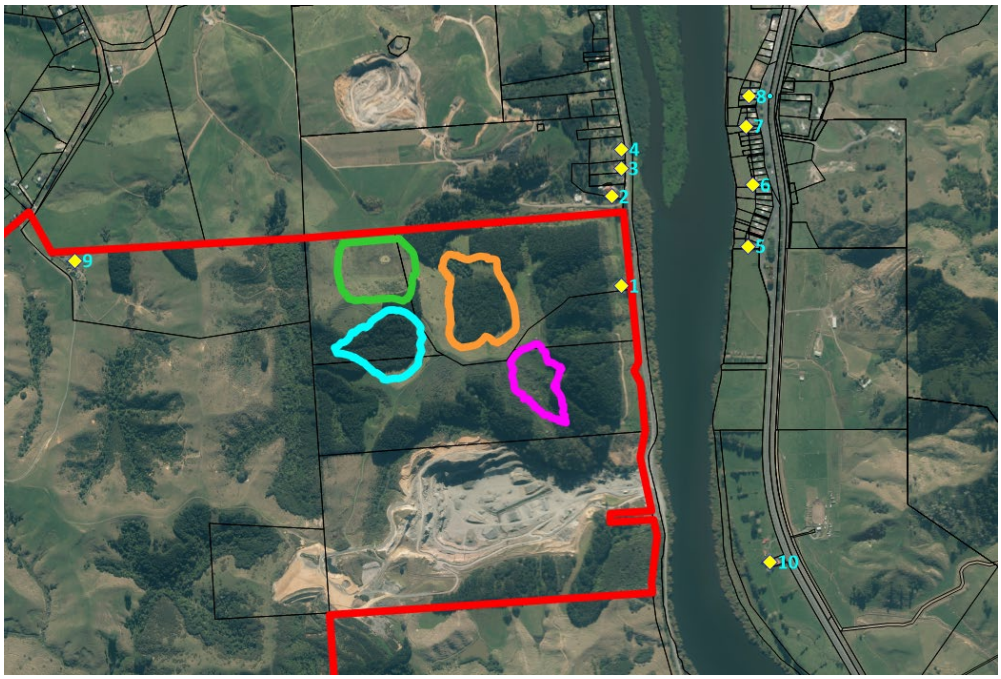


Figure 2 Nearest residences location map

Table 3: Sensitive receptors nearest to Fill Areas			
Receptor ID	**Address**	**Minimum distance from Fill Areas**	**Direction**
1	232 Riverview Road	300 metres	Within site boundary, directly east of Fill Areas
2	206 Riverview Road	400 metres	Northeast
3	204 Riverview Road	500 metres	Northeast
4	200 Riverview Road	520 metres	Northeast
5	580 Great South Road	700 metres	East
6	558 Great South Road	850 metres	East
7	540 Great South Road	900 metres	Northeast
8	526 Great South Road	930 metres	Northeast
9	95A Hillside Heights Road	820 metres	West
10	4566 State Highway 1	770 metres	Southeast

The IAQM *Guidance on the Assessment of Mineral Dust Impacts for Planning* (2016) provides guidance on the assessment of dust generating activities relevant to the proposed Site. This document suggests that impacts from even high levels of dust generation will be confined to within 400 metres of the activities, and receptors at further distances are unlikely to be affected. The only sensitive receptor within 400 metres is the residence at 232 Riverview Road, owned by Gleeson Quarries Ltd.

High voltage power transmission lines cross over the Site, as well as over the existing quarry to the south of the Fill Areas. Figure 3 shows the overhead power lines relative to the Site. High levels of dust have the potential to interfere with insulators on the transmission towers (MfE, 2010).

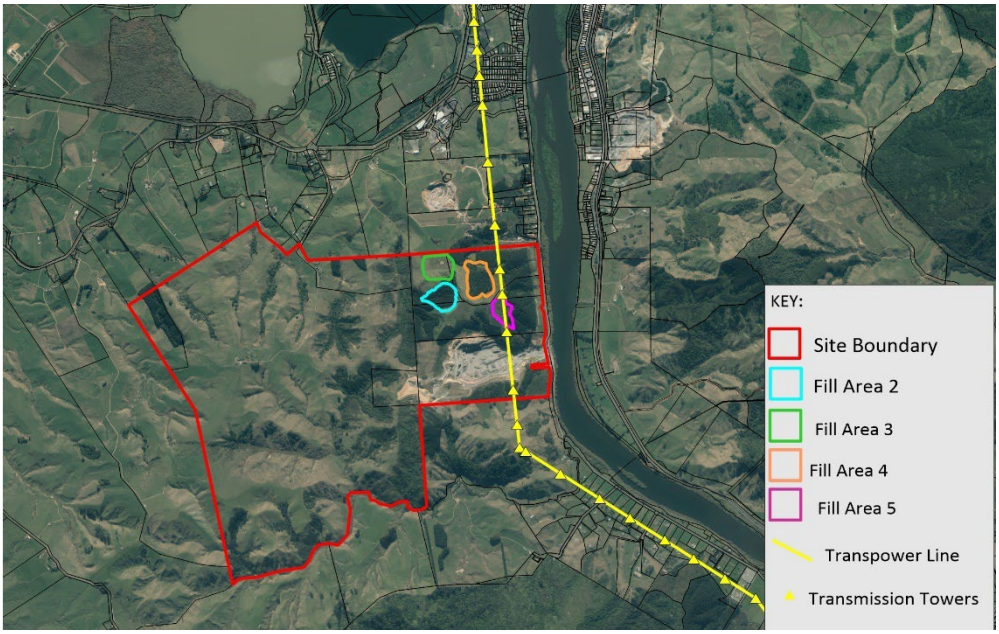


Figure 3 Gleeson Quarry and Fill Areas with High Voltage Power Lines

4.2 Topography and Meteorology

The surrounding topography is generally hilly, with elevations of the Fill Areas ranging from 45 to 115 metres above sea level. The dominant feature of the landscape is the Waikato River which bounds the Site to the east, running south to north.

The nearest meteorological stations are located at Ruakura in Hamilton (approximately 25 kilometres to the southeast) and Whatawhata (approximately 23 kilometres to the southwest). Wind roses for the six-year 2012-2017 period are provided as Figure 4. Average wind speeds for the period were 2.5 m/s at Ruakura and 2.9 m/s at Whatawhata. Calm periods (winds less than 0.5 m/s) occurred 7.6% of the time at Ruakura and 4.7% of the time at Whatawhata.

Strong wind conditions (wind speeds greater than 5 m/s) are most relevant for generation of dust from exposed surfaces and transporting the dust offsite. Strong winds occurred around 12% of the time at Ruakura and 18% of the time at Whatawhata over the 2012-2017 period. Wind roses for the six-year period showing only strong winds are provided as Figure 5 and indicate that strong winds occur almost entirely from the westerly and south-westerly directions at both meteorological stations.

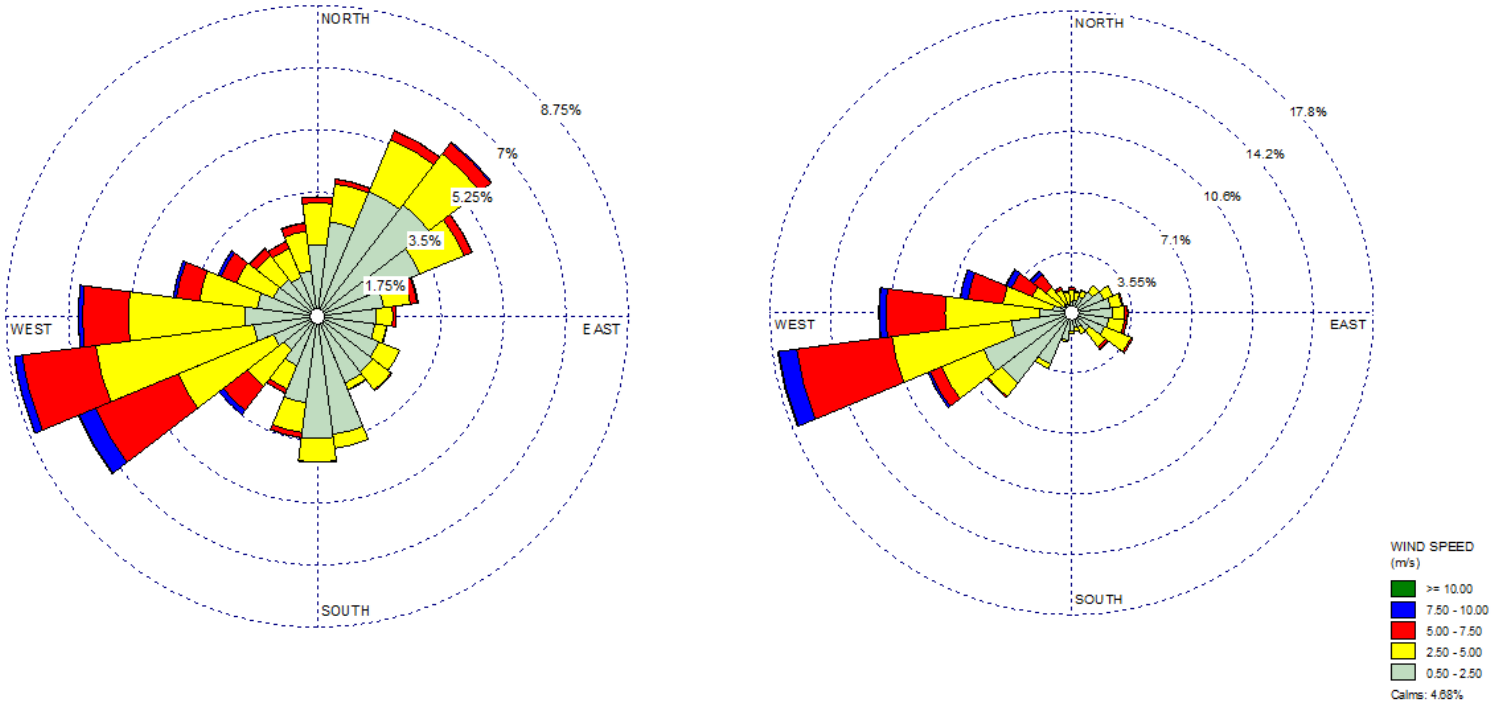


Figure 4 Ruakura (left) and Whatawhata (right) wind roses, 2012-2017

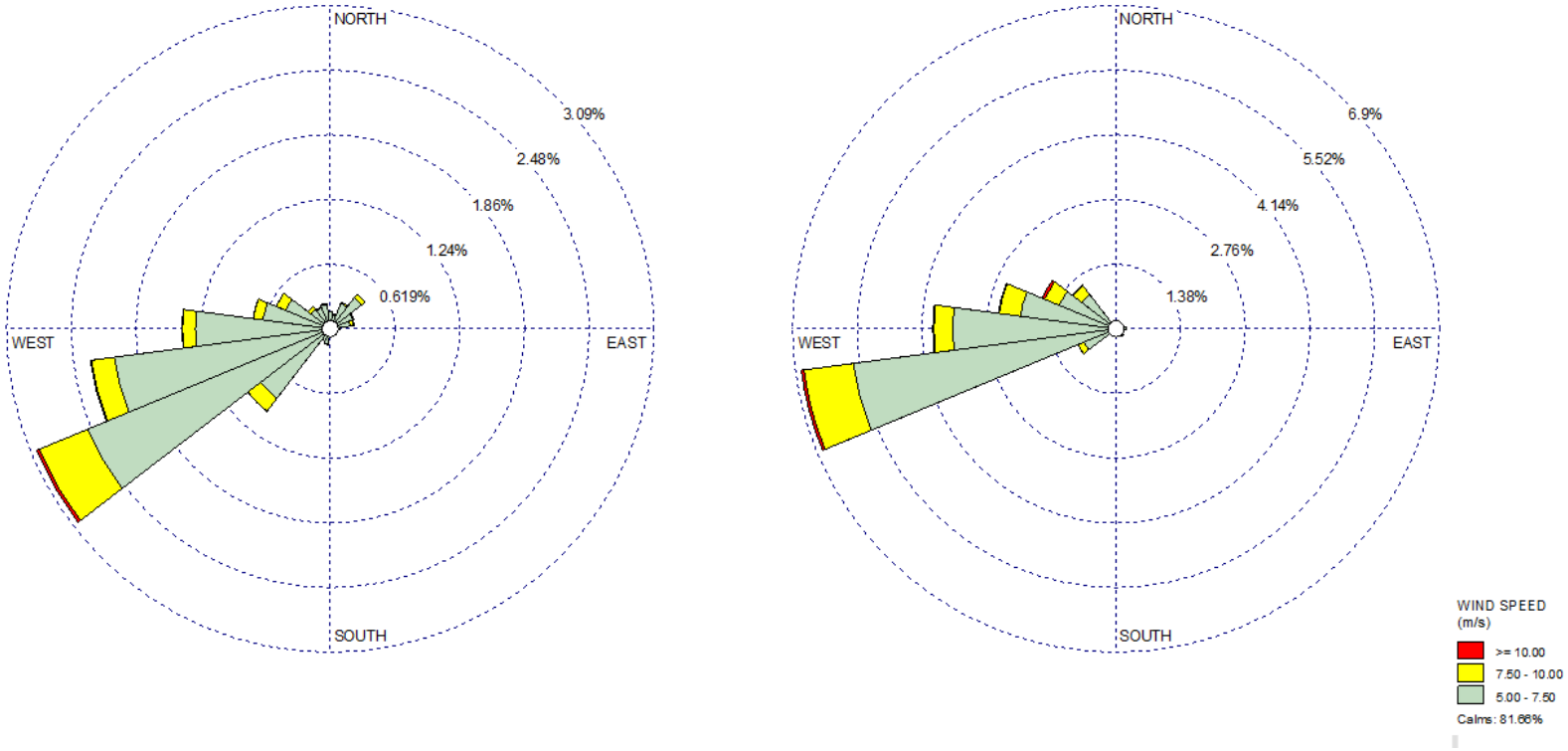


Figure 5 Ruakura (left) and Whatawhata (right) wind roses (strong winds > 5 m/s), 2012-2017

4.2.1 Calculation of Wet and Dry Surface Conditions

Rainfall has a significant influence on whether dust emissions will occur because a wet or damp ground surface will not generate dust emissions. To calculate whether a day had wet or dry ground conditions, wet ground conditions were defined as where the daily rainfall exceeded the daily evaporation (Penman ET) by more than 1 mm. This condition allows for some minimal moisture storage within the surface layer. A day with dry ground conditions, and thus a potential for dust generation, was then taken as any day when wet ground conditions had not occurred.

The percentage of dry days per month was calculated using rainfall data from the Ruakura weather station for the same period as the wind data (2012-2017 inclusive). The average monthly frequency of dry days is shown in Figure 6. This shows that dry days occur throughout the year, with the highest number of dry days in the early spring, summer and autumn months of September to April, and fewer days are expected with dry ground conditions in the May to August period.

Dry days occur during the summer period, and increased measures for dust management (e.g. water spray suppression) may be needed to mitigate potential dust discharges during this time.

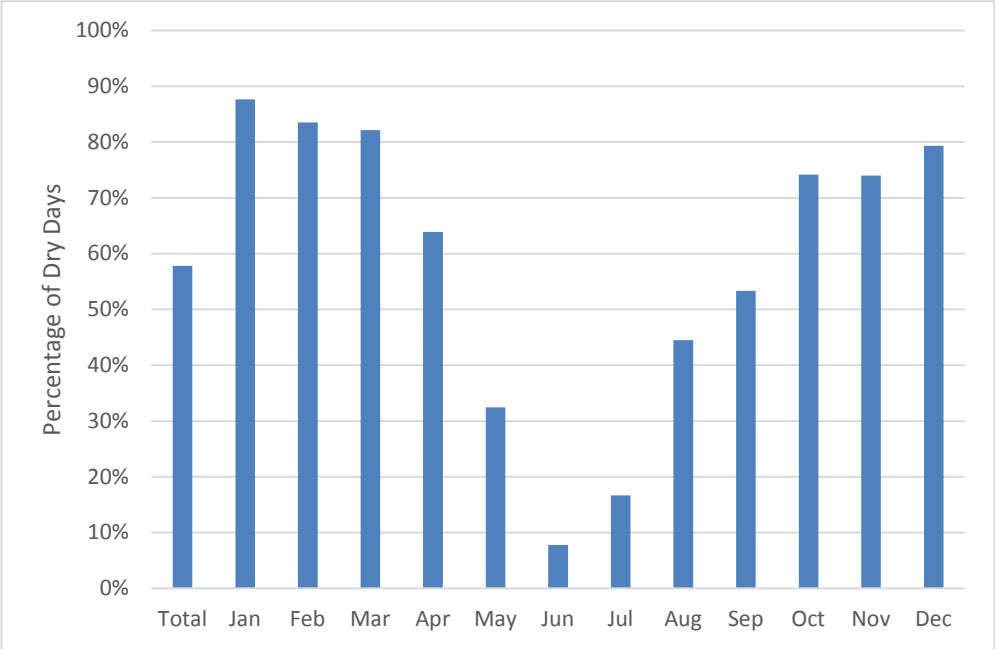


Figure 6: Dry Surface Days per Month for Tauranga Airport (2007-2012)

4.3 Background Ambient Air Quality

Background concentration of contaminants will vary depending on local activities and seasonal variations. Activities in the area surrounding the Site are a combination rural activities and aggregate extraction, with existing quarries located immediately to the north and south of the Site. There is a third quarry around 700 metres to the east of the Site. The main Huntly residential area is located around one kilometre to the north.

Genesis Energy Limited (Genesis) operates the Huntly Power Station, a coal and gas-fired power station which is located around 4 kilometres north of the Site. Genesis maintains a network of four ambient air monitoring stations within the Huntly area. The nearest ambient air monitoring station to the Site is the Croft Terrace site, around 3.3 kilometres to the northeast of the Site. The ambient monitoring stations continuously monitor PM_{10}, SO_2, NO_2, and meteorology. The locations of the four ambient monitoring sites are:

- Huntly i-Site – Directly to the east of Huntly Power Station, 4.5 km north of the Site.
- Croft Terrace – South of Lake Hakanoa, 3.3 km to the northeast of the Site.
- Pukekapia Road, approximately 6 kilometres to the northwest of the Site.
- Frost Road, approximately 8 km to the northeast of the Site.

Table 4 provides a summary of the annual average and highest 24-hour average concentrations of PM_{10} at each site over the past five years. This information has been sourced from the *Huntly Power Station 2017-2018 Annual Compliance Monitoring Report.* There have been no exceedances of the 24-hour average ambient air standard for PM_{10} of 50 µg/m^3 at any of the monitoring sites over this period. The Huntly Airshed is therefore considered to be in compliance with the NES with regard to particulate matter.

Table 4: Huntly PM_{10} monitoring results, 2014-2018						
Site	**Averaging Period**	**2014**	**2015**	**2016**	**2017**	**2018**
i-Site	24-hour (maximum)	36	35	405	31	39
	Annual	14	13	12	9.1	8.3
Croft Terrace	24-hour (maximum)	27	42	24	20	34
	Annual	12	11	7.2	7.3	8.6
Pukekapia Road	24-hour (maximum)	28	30	37	26	33
	Annual	11	10	10	10	9.7
Frost Road	24-hour (maximum)	n/a	33	34	29	20
	Annual	n/a	8.4	9.6	8.5	7.6

Dust deposition monitoring has also been undertaken at four sites in the vicinity of the Huntly Power Station. The dust deposition monitoring result for July 2017-June 2018 are provided in Figure 7 below, and show that the maximum 30-day dust deposition rate was just under 3.5 g/m^2, though generally the dust deposition rate was much lower. This is consistent with the general range of dust deposition in New Zealand of 1–4 g/m^2/30 days (MfE, 2016).

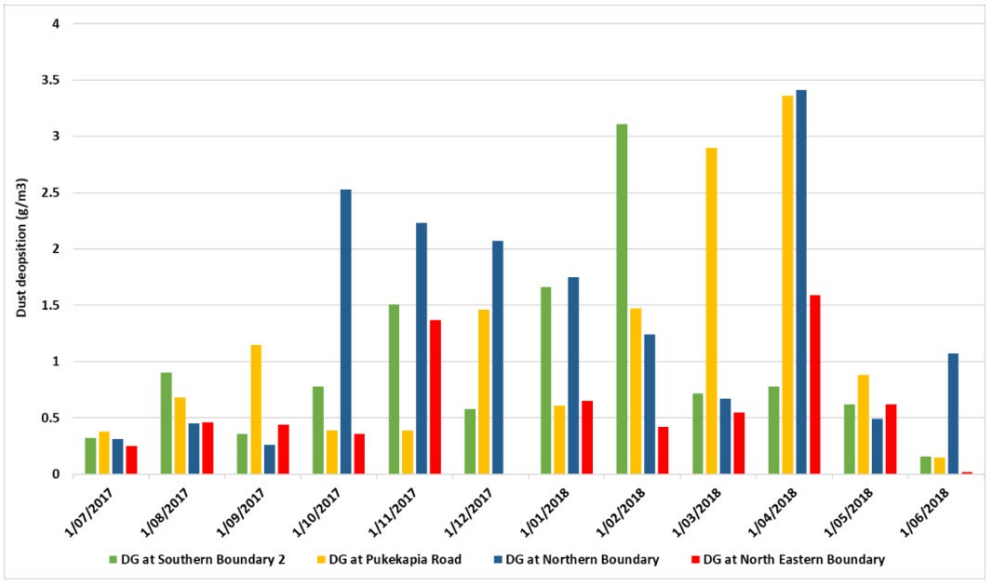


Figure 7 30-day dust deposition rates near Huntly Power Station, 2017-2018

5.0 Regulatory Framework

5.1 National Environmental Standards

The New Zealand Government gazetted National Environmental Standards for Air Quality Regulations (NESAQ or "the Regulations") in 2004 and amended in 2011. The NESAQ are designed to protect public health and the environment by setting concentration limits. The NESAQ includes concentration thresholds and permissible excursions relevant to emissions from the Company's proposed activity. These are presented in Table 5.

Table 5: New Zealand Ambient Air Quality Standards from 1 September 2005 (as Amended 2011)

Contaminant	Threshold Concentration	Averaging Time	Permissible Exceedances
Particulate matter (PM_{10})	50 µg/m^3	24-hour	One in a 12-month period
Nitrogen dioxide (NO_2)	200 µg/m^3	1-hour	9 in a 12-month period
Carbon monoxide	10 mg/m^3	8-hour	One in a 12-month period
Sulphur dioxide	570 µg/m^3	1 hour	None

The NESAQ uses the term "airshed", which defines where air quality must be monitored and for polluted airsheds determines the basis for certain decisions on resource consents. The Ministry for the Environment (MfE) has gazetted airsheds for managing air quality, which are generally in populated areas where the NESAQ for fine particulate matter (PM_{10}) is being breached or is likely to be breached.

The Regulations have a particular emphasis on managing PM_{10}, with specific requirements for new discharges as follows:

- **Regulation 17(1) -** Applies to an application for resource consent to discharge PM_{10} into a polluted airshed. If the discharge is likely to increase the concentration of PM_{10} by more than 2.5 micrograms per cubic metre in any part of a polluted airshed other than the site on which the consent would be exercised, then the consenting authority must decline the application for resource consent.
- **Regulation 17(2) –** States that Regulation 17(1) does not apply if the proposed consent is for the same activity at the same site (*i.e.* is a

renewal of an existing consent), or is a new activity replacing an existing consented activity, and the amount and rate of PM_{10} discharge of the proposed consent is the same as or less than that permitted by the existing consent.

- **Regulation 17(3) –** States that the consenting authority may allow the consent if the applicant can reduce (offset) the PM_{10} discharged from another source or sources into the polluted airshed by the same or greater amount than the amount likely to be discharged by the proposed consent.

Figure 8 provides a map of the proposed Site relative to the Huntly Airshed. The proposed Site is outside the gazetted airshed for Huntly, although the Site boundary is approximately 200 metres to the airshed boundary at the nearest point. It is unlikely that the emissions from the Site will have a significant impact on the airshed at this distance. Furthermore, as discussed in Section 4, the Huntly airshed is not a polluted airshed under the Regulations, and so Regulation 17 does not apply to this proposal.

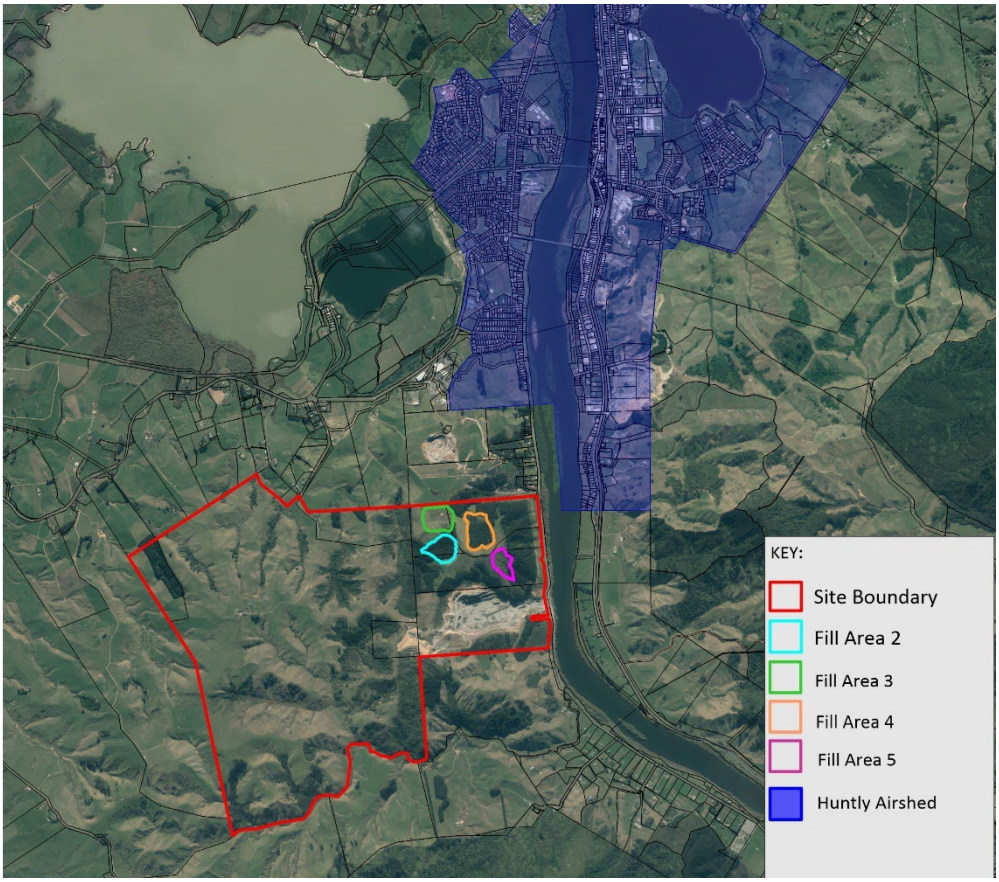


Figure 8 Proposed Fill Areas relative to Huntly airshed

5.2 Ambient Air Guidelines

The MfE[1] published ambient air guideline values for New Zealand in 2002. The primary purpose of the guidelines is to promote sustainable management of the air resource in New Zealand. The guideline values published are the minimum requirements that outdoor air quality should meet in order to protect human health and the environment. The guidelines provide values for contaminants that are commonly discharged from industrial sources.

The relevant guideline values with their respective averaging times are presented in Table 6.

Table 6: New Zealand Ambient Air Quality Guidelines

Contaminant	MfE Guideline Value	Averaging Time
Carbon monoxide	30 mg/m^3	1-hour
	10 mg/m^3	8-hour
Particulate matter (PM_{10})	50 µg/m^3	24-hour
	20 µg/m^3	annual
Nitrogen dioxide (NO_2)	200 µg/m^3	1-hour
	100 µg/m^3	24-hour
Sulphur dioxide (SO_2)	350 µg/m^3	1-hour
	120 µg/m^3	24-hour

[1] Ministry for the Environment, *Ambient Air Quality Guidelines*, May 2002.

In addition to the health based AAQGs reviewed above, the MfE has recommended a set of trigger levels for deposited and suspended particulate (MfE, 2016). The purpose of the trigger levels is to identify the potential for significant adverse effects beyond the site boundary so that mitigation measures can be applied to control dust. These trigger levels for TSP and PM_{10} are summarised in Table 7 and Table 8, respectively.

Table 7: Suggested Trigger Levels for Total Suspended Particulate (TSP)

Trigger	Averaging Period	Sensitivity of Receiving Environment		
		High	Moderate	Low
Short term	5-minute	250 µg/m^3	n/a	n/a
Short term	1-hour	200 µg/m^3	250 µg/m^3	n/a
Daily	24-hour (rolling average)	60 µg/m^3	80 µg/m^3	100 µg/m^3
Wind warning	1-minute	10 m/s (during two consecutive 10-minute periods)		
Rain warning	12-hours	There has been no rain in the previous 12 hours		
Visible dust	Instantaneous	Visible dust crossing the boundary		
Deposited dust	4 g/m^2/30 days (above background)			

Table 8: Suggested Trigger Levels for Total Suspended Particulate (PM_{10})

Trigger	Averaging Period	Sensitivity of Receiving Environment		
		High	Moderate	Low
Short term	1-hour	150 µg/m^3	n/a	n/a

A 'Rural' area such as the Project area will generally have low sensitivity but dwellings within a rural area will have a moderate to high sensitivity (MfE, 2016). We consider the sensitivity of the receiving environment to be moderate, given the distance of the activity to sensitive receptors, and that the area is already impacted by similar activities such as quarries located to the north and to the south of the Site. The MfE trigger value for TSP of 250 µg/m^3 as a 1-hour average and 80 µg/m^3 as a 24-hour rolling average would therefore apply for this assessment.

Demonstrating compliance with the above trigger levels for dust and particulate matter requires monitoring for dust and particulate matter, which can add significant cost to an operation. Therefore, proposals which are not likely to have significantly adverse effects are recommended to be assessed using FIDOL factors to assess the effects of the activities associated with the proposal. The primary assessment criterion in relation to the Site activities is therefore "There shall be no noxious, dangerous, objectionable or offensive dust to the extent that it causes an adverse effect at or beyond the boundary of the site" (MfE, 2016). A description of the FIDOL methodology and assessment of this proposal against the above criterion is provided in Section 6 of this report.

5.3 Regional Air Plan

The Operative Waikato Regional Plan was reprinted as at April 2012 (the WRP). Module 6 of the WRP sets out the issues, objectives, policies and methods including rules relating to air. Modules 3 and 5 relating to discharges to water and discharges to land are cross referenced in Module 6; and these modules also contain rules to permit some air discharges where the discharge to water and land is permitted (subject to conditions). Matters relating to the WRP are described in detail in the main AEE for the proposed activity.

6.0 Assessment of Environmental Effects

6.1 FIDOL Assessment

6.1.1 Overview of FIDOL

Nuisance effects of dust emissions are assessed by using FIDOL factors to take into account the nature of the source in the context of receiving environment.

The FIDOL factors are defined below and considered in detail in the following sections:

- Frequency – How often an individual is exposed to the dust;
- Intensity – The concentration of the dust;
- Duration – The length of exposure;
- Offensiveness/character – The type of dust; and,
- Location – The type of land use and nature of human activities in the vicinity of the dust source.

6.1.2 Frequency

The frequency of potential dust discharges is impacted by weather conditions (e.g. the frequency of strong winds) and the frequency of dust-generating activities.

Figure 4 shows wind roses for the area, which indicate that the principal wind directions are from the west. Figure 5 shows wind roses of only strong winds greater than 5 m/s, which occurred 12-18% of the time. Strong winds occurred almost exclusively from the west and west-southwest over the six-year period 2012-2017 and indicate that properties to the east of the Site are most at risk of being exposed to wind-blown dust. Strong winds blow very infrequently from other directions.

The nearest residence is Receptor 1 as identified in Table 3 and Figure 2 and is located to the east of the site at a distance of 300 metres from the nearest Fill Area. At this distance it is unlikely that dust effects will be significant, although as previously stated this property is within the site boundary for the quarry. The next nearest residences downwind of the prevailing wind directions are Receptor 2, 3, and 4, and are located to the northeast at distances of greater than 400 metres from the Fill Areas.

Given these factors, we consider there is limited potential for off-site dust nuisance effects to occur with any significant frequency.

6.1.3 Intensity

Intensity relates to the concentration of dust that is likely to be experienced at any potential receptor outside the Site boundary. Section 4.1 provides a description of the nearest sensitive receptors, with the nearest residence being at a distance of 300 metres from the nearest Fill Area. This residence is located within the property boundary and is owned by Gleeson. The next nearest receptors are located at a distance of 400 metres or greater. The concentrations of any dust emitted from the Site activities is expected to be low, and there is limited potential for adverse effects from the Site.

6.1.4 Duration

The overall duration of the Project will be dependent on the demand for clean fill and managed fill. The total estimated fill volume for the four proposed Fill Areas is 2,185,000 m^3. Assuming an annual acceptance of 300,000 m^3, the Fill Areas will be in operation for at least seven years.

The duration of dust discharges would be limited to periods of strong winds during dry periods, or periods of unmitigated dust-generating activities at the Site, and any effects will be limited to near the Site activities. Monitoring and mitigation measures to minimise dust are described in Section 7 of this report.

6.1.5 Offensiveness

The clean fill, overburden, and managed fill material to be deposited at the Fill Areas will consist principally of inert inorganic material. Managed fill containing

asbestos will be enclosed in impermeable packaging material to prevent emissions of the ACM to air.

The dust from fill materials will likely be light in colour and inert in nature, and therefore in itself is of low offensiveness. The dust would only potentially cause a nuisance effect if it settles on surfaces and this adverse effect will limited by distance from the proposed activity to the Site boundary as well as by mitigation measures proposed in the DMP.

6.1.6 Location

The receiving environment has been discussed previously in Section 4. Using the MfE (2016) classifications, the Site is located in a 'moderately sensitive' receiving environment. As has previously been stated, the distance of the dust generating activities to the nearest sensitive receptors is sufficient that dust nuisance effects are unlikely to be significant even without mitigation.

6.1.7 Summary of FIDOL Factors

Considering the FIDOL factors above, it is concluded that it is unlikely that there will be any exceedance of air quality assessment criteria at a location beyond the site boundary, or that there will be noxious, dangerous, objectionable or offensive dust to the extent that it causes an adverse effect at or beyond the boundary of the site. This is principally based on the nature of the receiving environment, the nature of the proposed Fill activities, and the distance of the activities to sensitive receptors.

The risk of dust effects can be minimised by the mitigation and monitoring methods as set out in the Section 7 of this report.

6.2 High Voltage Transmission Lines

High voltage transmission lines may be affected by dust build-up on the insulators, which can lead to arcing or flashover and subsequent disruption to power supply. High voltage transmission lines cross the eastern portion of the Site, passing directly over Fill Area 5, as well as over the existing quarry.

Given the dust-generating activities of the existing Huntly Quarry will be similar in nature and scale to those at the Site, and the proximity of the quarry activities is the same relative to the power lines as will be the case for the Site, there will be negligible additional risks to the power lines than are already present. Typical power transmission pylons are at a height of 15 to 55 metres above ground level, and the power lines themselves are at a minimum height of 20 – 30 metres above ground level. It is unlikely that sufficient dust would be generated to have detrimental effects to the power lines and insulators at this height.

Nevertheless, given the potential sensitivity of the power lines, and their proximity to the proposed Fill activities, we would consider Transpower to be a

potentially affected party and recommend they be consulted in relation to the proposal.

7.0 Mitigation and Monitoring

7.1 Mitigation Methods

To ensure that the actual impacts of discharged dust are minimised, the effective control of these activities using appropriate dust mitigation measures is recommended. The recommended mitigation measures have been developed in accordance with good practice for dust management based on our experience, the MfE (2016) Good Practice Guide, and the IAQM (2016) guidance.

We recommend a Dust Management Plan (DMP) be prepared for the site which incorporates the recommended mitigation measures. The DMP should assign responsibility for dust management to an individual staff member, with a plan to train other staff covering matters such as the importance of effective dust control, and communications with the local community.

7.1.1 Site Establishment

There is the potential for dust to be generated by earthworks activities associated with the establishment of the fills and associated haul roads, in particular the removal of topsoil and operation of vehicles over unsealed surfaces. While the location of the Site is such that dust is unlikely to result in off-site effects, the following mitigation measures will be used:

- Restricting vehicle speeds at the Site to 20 kph or less; and,
- Avoiding earthworks activities during periods of strong winds (>10 m/s as a 10-minute average).

7.1.2 Site Operation

The operation of the Site also has the potential to generate dust. As with site establishment, the operational activities are unlikely to have offsite effects due to the distance to sensitive receptors. Mitigation measures will, however, be used to ensure that the potential for adverse effects offsite are minimised. Measures could include the following:

- Inspection of loads to ensure they are not dusty;
- Covering and/or dampening of dusty loads;
- Dampening or covering of dusty loads during placement in the Fill Areas;
- Restricting vehicle activities to speeds of less than 20 kph;
- Rehabilitation of completed sections of the Fill Areas as soon as practical to minimise the potential for dust; and

- Use of wheel wash stations at the site exit to minimise trackout of dust.

7.2 Monitoring

Given the relatively low level of effects expected from the fill operations, we consider visual monitoring of dust to be an effective means of ensuring that appropriate dust control measures are applied to minimise the potential for offsite effects from dust. Visual monitoring measure may include daily site inspections to visually assess dust, recording inspection results, and making the log available to WRC when asked.

Real-time monitoring of wind speed and direction is recommended to assist with decision making for applying the appropriate level of controls and to assist with any dust complaint investigation. Wind speeds greater than 5 m/s can be used as a trigger for increasing the level of dust control, and wind speeds above 10 m/s may be a signal for work to cease, particularly if there has been an extended period without rainfall. Wind speed may be obtained from local weather forecasts for the purpose of scheduling the activities.

8.0 Summary and Conclusions

Gleeson is proposing to establish a site to deposit clean fill, overburden, and managed fill material at locations to the north of the existing Huntly Quarry.

The potential adverse effects of dust discharges into air from the proposed Site have been assessed using consideration of the FIDOL factors. The assessment methodology considers the sensitivity and location together with the likelihood of the activities to generate dust and the frequency of winds with increased potential to result in offsite dust.

The sensitivity of the receiving environment is considered to be moderate, given the receivers at risk are rurally zoned properties and 400 metres or more distant from the Site activities.

The properties immediately to the east and northeast of the site are most at risk due to the higher frequency of strong winds occurring from the west and south-southwest, whereas properties in other directions from the site will be at a significantly lower risk of experiencing windblown dust.

Given the proximity to other dust-generating activities in the area (i.e. three active quarries), it is likely that the contribution of dust from the proposed Site will be low compared to these other sources. Nevertheless, to ensure that the actual impacts of discharged dust are minimised, dust mitigation measures have been recommended that are consistent with current good industry practice.

The sources of dust, mitigation measures, dust and meteorological monitoring programmes and reporting procedures are proposed to be documented in a DMP to be submitted to WRC for review and approval.

The high voltage power lines and associated pylons on the site are unlikely to be affected by dust generated from the Site activities. However, given the proximity and sensitivity of the power lines, we consider Transpower to be a potentially affected party and recommend they be consulted in relation to the proposal.

While asbestos-containing material is proposed to be accepted as part of the managed fill, we have excluded assessment of asbestos for the air quality assessment report because asbestos is dealt with separately via an asbestos management plan, and emissions to air would not be expected.

In conclusion, the discharges of dust from the activities associated with the proposed Site is not expected to result in a significant dust nuisance or health effect relative to applicable air quality guidelines and standards provided the proposed mitigation and monitoring methods are implemented to control dust to an acceptable level.

9.0 References

Genesis, *Huntly Power Station 2017-2018 Annual Compliance Monitoring Report,* 2018.

Institute of Air Quality Management, *IAQM Guidance on the assessment of mineral dust impacts for planning*, 2016.

Ministry for the Environment, *Ambient Air Quality Guidelines*, May 2002.

Ministry for the Environment, *MfE Good Practice Guide for Assessing and Management Dust*, 2016.

Ministry for the Environment, *National Policy Statement on Electricity Transmission: Further guidance on risks of development near high-voltage transmission lines*, January 2010.

PDP, *Huntly Quarry – Asbestos Fill Management Plan*, 2019.

Resource Management (National Environmental Standards for Air Quality) Regulations 2004.

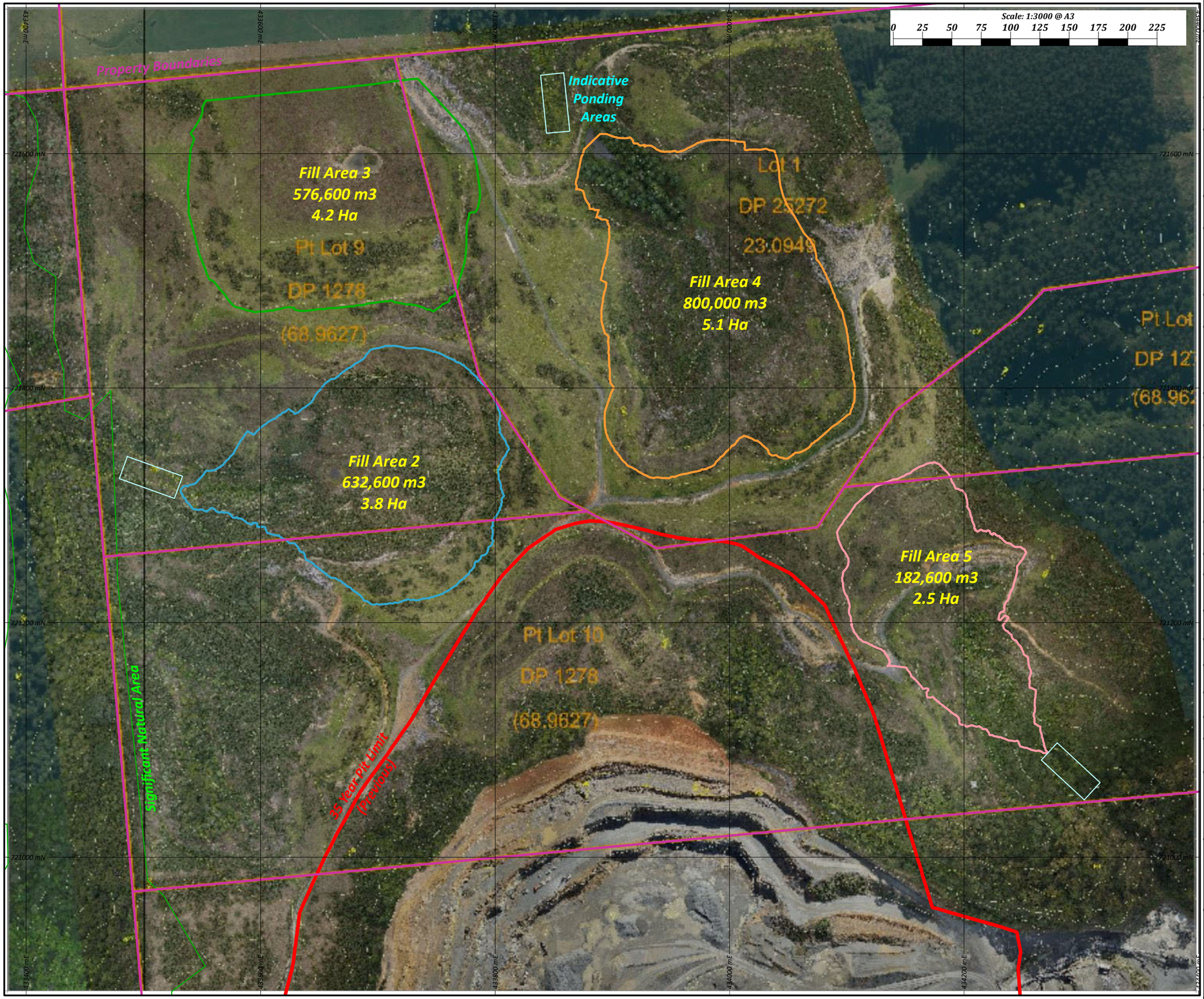
World Health Organization, *Review of Evidence on Health Aspects of Air Pollution - REVIHAAP Project: Technical Report*, 2013.

10.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Paua Planning Limited (PP) and Gleeson Managed Fill Limited. 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 Paua Planning 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.

Appendix A: Site Layout Map



Project:	
Huntly Quarry	
Title:	
Fill Site Assessments FIll Areas on Aerial (Excl. Design)	
Projection:	
Plan View	
Location:	
Huntly Quarry, Huntly, Waikato	
DRAWING REFERENCE	
Issue Date:	June 2019
Drawing No:	GCH-001
Revision No:	01
Requested By:	MJH
Drawn By:	GWF
SURVEY/TOPOGRAPHIC INFORMATION	
Survey/Photogrammetry:	Pilbrow Survey
Survey Date:	April 2019
Survey Reference:	190410
Coord Circuit:	Mt Eden Circuit
Datum:	Geodetic 2000
GENERAL	
Date: 05 June 2019	

Gleeson & Cox

Terra Mining Consultants Ltd
28 Monte Cassino Place, Birkenhead,
Auckland, New Zealand
Tel/Fax: +64-9-482-4242
Mobile: +64-21-380-624
Email: graeme.fulton@xtra.co.nz