

IN THE MATTER of the Resource Management Act 1991 ("RMA" or "the Act")

AND

IN THE MATTER of an application under section 88 of the Act to **WAIKATO REGIONAL COUNCIL** and **WAIKATO DISTRICT COUNCIL** (ref LUC0488/22) by **GLEESON MANAGED FILL LIMITED** to establish and operate a managed fill disposal activity at 310 Riverview Road, Huntly.

STATEMENT OF EVIDENCE OF DEBORAH ANNE RYAN

AIR QUALITY

Dated 23 November 2022

1. **INTRODUCTION**

- 1.1 My full name is Deborah Anne Ryan. I am a Company Director and a Technical Director in Air Quality at Pattle Delamore Partners Limited (PDP).
- 1.2 This evidence is given in respect of resource consent application LUC0488/22 by Gleeson Managed Fill Limited ("GMF") to Waikato Regional Council ("WRC") and ("Waikato District Council") ("WDC") to establish and operate a managed fill disposal activity at 300 Riverview Road, Huntly ("Site").

Qualifications and experience

- 1.3 I am qualified in biotechnology and bioprocess engineering (1991) and have a Post Graduate Diploma in Business with sustainability (2021). I am Branch Secretary of the Clean Air Society of Australia and New Zealand (CASANZ) and I am a Certified Air Quality Professional with CASANZ. I am also certified as a commissioner under the Making Good Decisions programme for Resource Management Act decision making.

- 1.4 I have over 30 years' experience in air quality effects assessments and often appear as a technical specialist at resource consent hearings, advising applicants and councils as an independent reviewer, making recommendations for mitigation, control, and monitoring.
- 1.5 I spent eight years as an Air Quality Specialist and Resource Consents Advisor with the Manawatu-Whanganui Regional Council and the Waikato Regional Council. I have been employed as an Air Quality Consultant in various roles since 2000, principally with Jacobs New Zealand Limited (formerly SKM), and currently with PDP.
- 1.6 My experience with dust discharges includes assessment of effects for consents, and/or monitoring, including for large scale construction projects such as for the Riverlink project in Hutt City, Kiwi Rail's Freight Hub proposal at Palmerston North, Roads of National Significance (RoNS) including Pūhoi to Warkworth, and Warkworth to Wellsford designation and consenting; and the Temauku Land Reclamation Feasibility study.
- 1.7 I have experience with dust-producing industries including lime extraction and processing (McDonalds Lime, King Country), hard rock quarries (Winstone Pokeno), mineral extraction processes (Waihi Gold Mine); coal mining (New Vale and Goodwin Mines, Southland, Solid Energy and Glencoal, Waikato) and landfill developments (AB Lime Ltd, Southland and Envirowaste Limited, Waikato). My experience with aggregate quarries includes the Cromwell Certified Concrete Limited quarry extension at Amisfield, quarry consent applications including Fulton Hogan's Royden and Miners Road extension proposals, Road Metals Limited's Twizel and Canterbury managed fill sites, and the Kiwi Point and Willowbank Quarries in Wellington.
- 1.8 I have provided expert witness advice to assist with Resource Management Act planning and enforcement, particularly relating to adverse effects and odour and dust.

Involvement in the project

- 1.9 PDP was engaged by GMF in August 2019 to provide an air quality technical report to support consenting for cleanfill and managed fill operations near Huntly. I reviewed and approved the PDP report *Huntly Quarry Managed Fill – Air Quality Technical Assessment* (November 2019), ("AQTA") which was attached as Appendix 11 to the resource consent application. PDP also prepared the *Dust Management Plan – Huntly Managed Fill Site Draft V2* (February 2020) ("DMP"), which was lodged as Appendix 6 to the applications.

Site visits and background material

- 1.10 PDP's initial work to prepare the AQTA and DMP were desktop studies and based on information provided by the applicant. I undertook a site visit on 26 October 2022. When on site, I noted the topography of the fill locations and the locations of potentially affected parties and sensitive receivers around the site.
- 1.11 In preparing this evidence, I have read and am familiar with the:
- (a) *Assessment of Effects Proposed Overburden & Managed Fill Activity Riverview Road Huntly*, 12 July 2022 (AEE) prepared by Paua Planning.
 - (b) *Huntly Site & Fill Management Plan*, Revision 08 July 2022 (SFMP).
 - (c) The WRC's *Technical Assessment Air Discharges Gleeson's Managed Fill*, 2 August 2022, prepared by Dr Jonathan Caldwell.
 - (d) The submissions that are relevant to my area of expertise.

Purpose and scope of evidence

- 1.12 The purpose of my evidence is to summarise the 2019 AQTA and provide information where my opinions may have changed since that assessment was undertaken.
- 1.13 My evidence is structured as follows:
- (a) Briefly describes the Site (Section 3);
 - (b) Briefly describes the proposal (Section 4);
 - (c) Sets out the assessment framework (Section 5);
 - (d) Addresses any relevant air quality issues arising (Section 6);
 - (e) Comments on issues raised by the Officer's Report relevant to my area of expertise (Section 7);
 - (f) Comments on issues raised by Submitters relevant to my area of expertise (Section 8);
 - (g) Comments on the conditions (Section 9);
 - (h) Provides a brief conclusion (Section 10).

- 1.14 A summary of my evidence is contained in Section 2.
- 1.15 The potential effects of asbestos containing material ("ACM") and erionite discharging to air are addressed in evidence by Mr Lidgard. Accordingly, my evidence on air quality should be read together with Mr Lidgard's evidence, which includes ACM acceptance, management, and related monitoring at the Site.

Expert Witness Code of Conduct

- 1.16 I have been provided with a copy of the Code of Conduct for Expert Witnesses contained in the Environment Court's 2014 Practice Note. I have read and agree to comply with that Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.
- 1.17 I understand and accept that it is my overriding duty to assist the Independent Commissioners in matters which are within my expertise as an air quality professional.

2. SUMMARY OF EVIDENCE

- 2.1 GMF proposes to operate three Fill Areas at its site adjacent to the existing Gleeson and Cox Ltd Huntly Quarry. GMF proposes to undertake earthworks to prepare the Fill Areas, place quarry overburden, and accept cleanfill and managed fill that will be imported into the Site. The exposed area associated with earthworks and fill activities is to be limited to three hectares. Trucks bringing fill will use the exiting Quarry site entrance, with only a small increase in truck movements associated with the fill activities compared with the exiting quarry.
- 2.2 The Site is in a rural area south of Huntly township. The prevailing winds are from the west through to the southwest and the nearest dwellings, not owned by GMF, are to the northeast of the Fill Areas at a distance of at least 400 metres.
- 2.3 Excluding asbestos containing material ("ACM"), which is addressed by Mr Lidgard, the key issue for air quality is dust. Dust may be generated from sources including earthworks, open areas if stabilised, unsealed site access roads, and handling of fill materials. Dust will mostly be inert soil material, but managed fill could also contain contaminants up to the levels set by the Site's Waste Acceptance Criteria ("WAC"). Mr Rumsby advised me that based

on the methodology¹ used to derive the WAC, the inhalation route is not a concern for any airborne dust and that the ingestion route is acceptable for human health. Dr Caldwell has also agreed that standard good practice dust management is appropriate for the managed fill (other than for ACM).

- 2.4 Therefore, I have assessed the proposal's potential effects on air quality by considering the amenity impacts of dust; and the potential for effects on health from exposure to particulate matter smaller than ten microns in diameter or PM₁₀, which is a component of dust.
- 2.5 The relevant assessment criterion for dust is provided in the Ministry for the Environment's, *Good Practice Guide for Assessing and Management Dust*, 2016 (Dust Guide) and is that "*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*". This criterion aligns with the Waikato Regional Plan (WRP) provisions.
- 2.6 For PM₁₀, the National Environmental Standards for Air Quality Regulations ("NESAQ" or "Regulations") are relevant. The NESAQ for PM₁₀ is 50 µg/m³ as a 24-hour average, which is designed to protect public health and the environment.
- 2.7 In accordance with good practice, I assessed the potential for adverse effects of an offensive or objectionable nature due to dust discharges from the site by considering the "FIDOL" factors: frequency, intensity, duration, offensiveness, and location. I considered that the overriding factor for the Site is "location", and that due to the large separation distances to dwellings the risk of effects from dust at sensitive receptors is negligible, this is given the majority of dust will fall out of air within the first 100 metres.
- 2.8 I also used relevant guidance from the Institute of Air Quality Management² ("IAQM"). The IAQM reports that beyond 400 metres of quarry sites there is no measurable increase in PM₁₀. Therefore, at locations where people could be exposed, the increase in PM₁₀ relative to the NESAQ is expected to be negligible.
- 2.9 In addition, GMF is proposing good practice dust mitigation measures including: a maximum open area of three hectares, dampening dusty loads prior to handling, stabilising exposed surfaces and completed areas, using sprinklers and/or a water truck to dampen dust, and using a wheel wash and

¹ Section 4, page 20, Ministry for the Environment, *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health*, 2011.

² IAQM (2016), *Guidance on the Assessment of Mineral Dust Impacts for Planning*.

exiting the Quarry via a concreted area. The Gleeson Site Fill and Management Plan ("SFMP") documents management and monitoring that will be undertaken in relation to dust, and an updated DMP will be provided as a condition of the consents.

- 2.10 Odour has been raised as a potential issue for the Site but will not be a factor given the proposed fill acceptance criteria and the treatment of potentially odorous Acid Sulphate Soils ("ASS") at a location more than 1 kilometre from the nearest dwelling.
- 2.11 Dust from trucks exiting the site will be addressed by vehicles using a wheel wash and exiting via a concreted area, which if maintained and kept clean will minimise tracking of dirt from the site.
- 2.12 Dr Caldwell reviewed the air quality assessment for the WRC. He concluded that the effects will be no more than minor from discharges to air associated with the Fill Areas. His conclusion was subject to a proactive adherence to the controls, monitoring and management procedures that have been proposed. Dr Caldwell made additional recommendations relating to ceasing activity at Fill Areas 3 and 4 under strong winds blowing towards the dwellings to the northeast, and on-site monitoring of wind conditions. GMF has agreed to the additional dust control measure and the monitoring. Therefore, there are no areas of disagreement in relation to effects on air quality.
- 2.13 Based on the proposed mitigation and adherence to the proposed conditions of consent, I agree with Dr Caldwell that the effects of the operation on air quality will be no more than minor.

3. **SITE DESCRIPTION AND LOCALITY**

- 3.1 The main residential area of Huntly is located around one kilometre to the north of the Site. Figure 1 shows the nearest residences to Fill Areas 2 to 4 ("Fill Areas") shown as the coloured shapes in Figure 1 below. Fill Area 5, shown in magenta has already been consented. Table 1 provides a description of the locations relative to the proposed activity.

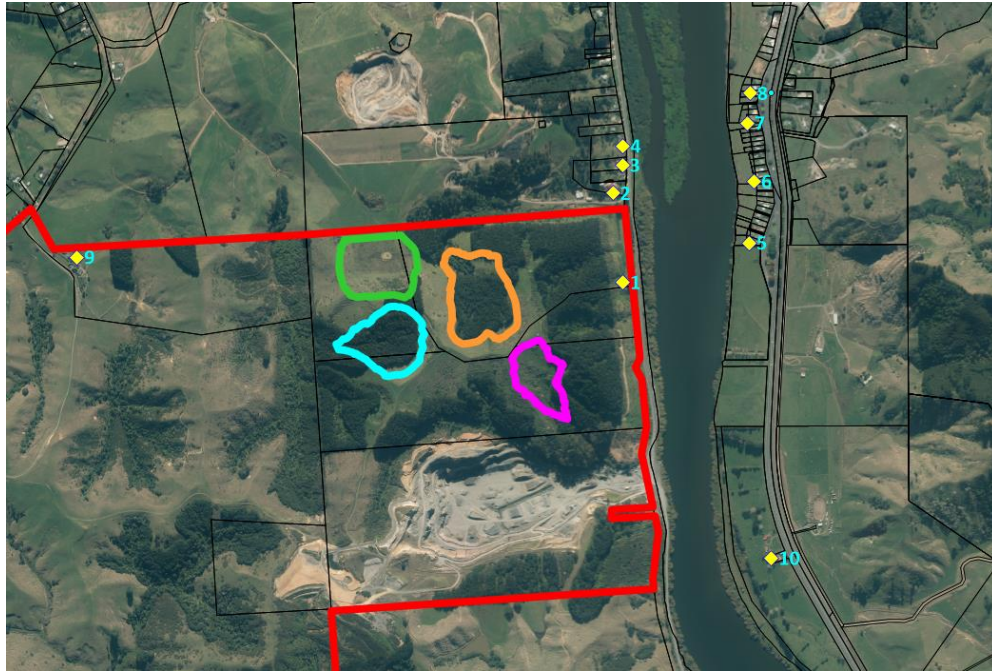


Figure 1 Nearest residences location map (AQTA, 2019)

Table 1: Sensitive receptors nearest to Fill Areas			
Receptor ID	Address	Minimum distance from Fill Areas	Direction
1	232 Riverview Road (owned by GMF)	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 (owned by GMF)	770 metres	Southeast

3.2 The surrounding topography is generally hilly, with elevations of the Fill Areas ranging from 45 to 115 metres above sea level. The Waikato River is to the east, running south to north. Gleeson Quarry is to the south of the Site, with quarrying of rock in a pit at significant depth below the Fill Areas.

3.3 The AQTA characterised the wind patterns based on the available meteorological data, from weather stations located at Ruakura and Whatawhata. The data in the AQTA indicated winds, including the strongest winds were dominated from the west and south-west. The Ruakura data also showed a component of mostly light winds from the southern and north-eastern sectors.

- 3.4 Some concerns were raised in submissions about the validity of the wind data as not being representative for the Site. In the absence of site-specific data, PDP staff under my direction, have prepared a windrose for the site, which was extracted from a meteorological model, CALMET. CALMET incorporates available observational data and prognostic data accounting for topography, to predict wind patterns, as described in Attachment A to my evidence.
- 3.5 Figure 2 is the CALMET generated windrose for the Site for the years 2017 – 2019. The windrose shows that the Site can experience winds from all directions, but winds are dominated by the westerly to the southwesterly quadrant at around 33% of the time. Winds over 5 m/s are predicted to occur 14% of the time, while winds greater than 10 m/s are not predicted to occur at the Site. The CALMET data is similar to that presented in the AQTA, with winds predominating from the west to the southwest.

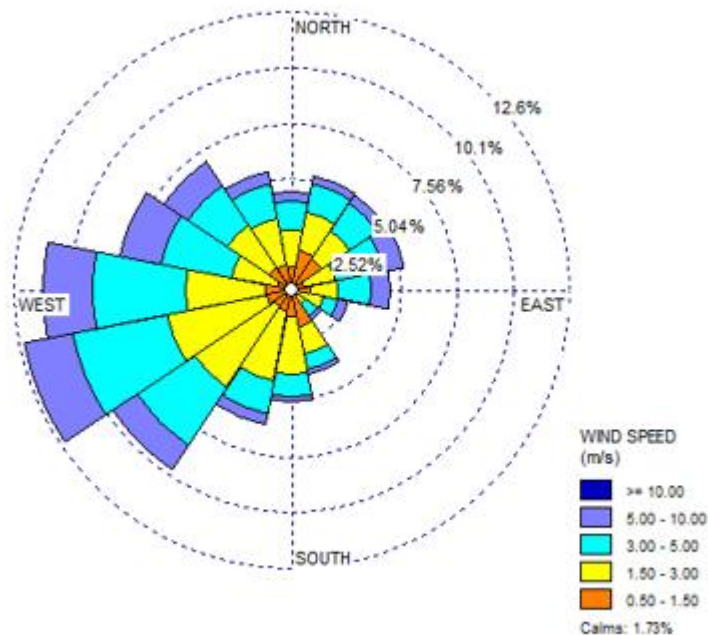


Figure 1 CALMET Generated Windrose for GMF (2017 to 2019)

- 3.6 While the focus of the AQTA was on strong winds, which have a propensity to pick up dust so that it becomes airborne, light winds can carry dust that is generated through mechanical means, so should also be considered as part of any assessment.

4. **DESCRIPTION OF PROPOSAL**

- 4.1 GMF proposes to operate Fill Areas to accept material at a rate of 300,000 m³ per year. The fill is to comprise quarry overburden from Gleasons' existing quarry operation at Huntly, and cleanfill and managed fill from offsite. The application involves three fill areas (FA2, FA3 and FA4) that are to north of the existing quarry.
- 4.2 Paua Planning advised me that the existing quarry and FA5 are operated as permitted activities for discharges to air under the relevant rules in the Waikato Regional Plan, but that a consent as a discretionary activity is being sought for discharges to air for the Fill Areas 2 to 4.
- 4.3 The site vehicle crossing and entrance way is concreted. I understand that trucks will pass through the wheel wash onto the weigh bridge and then exit the site via the concreted area. This will reduce the potential for tracking of dirt out of the site and onto the local road as long as the concrete is kept clean.
- 4.4 The AQTA described managed fill as "predominantly clean fill material and controlled fill material that may also contain material with contaminant concentrations in excess of controlled fill limits". I understand that the limits on the maximum levels of contamination proposed for materials to be accepted are as set out in the WAC agreed to by the WRC.
- 4.5 The AQTA assessed the fill activities based on no increase in overall traffic movements to and from the quarry associated with fill activities. The AEE, however, identifies that there will be up to 24 additional trucks (48 movements) per day associated with the fill activities. I do not consider that this level of increase in traffic movements is significant when considering the potential effects on air quality.
- 4.6 Internal access roads to the Fill Areas are proposed to be constructed and will be unsealed but will be stabilised with aggregate. Unsealed haul roads can be a major source of dust so that both the access roads to the Fill Areas will require good practice dust management to be applied as set out in Table 2 of my evidence.
- 4.7 Sources of dust identified in the AQTA were noted as being from:
- (a) Vehicle movements to and from the site on the main access road;
 - (b) Vehicle movements on unsealed haul roads within the site;

- (c) Stripping topsoil for establishment of Fill Areas;
- (d) Placement of clean fill, overburden, and managed fill;
- (e) Rehabilitation of Fill Areas with topsoil; and,
- (f) Fugitive emissions from exposed surfaces.

4.8 I note from the 2022 AEE, that additional activities with the potential for dust are:

- (a) The treatment pad for acid sulphate soils (ASS), which involves storage of lime in a silo and the addition and mixing of lime with ASS. ASS stabilisation is proposed to take place within the existing quarry footprint on the old overburden area to the south;
- (b) Quarantined fill materials stored adjacent to the Fill Areas awaiting confirmation for acceptance; and
- (c) Proposed drying of fill materials prior to placement, also adjacent to the Fill Areas.

5. **ASSESSMENT FRAMEWORK**

5.1 The National Environmental Standards for Air Quality Regulations (“NESAQ” or “Regulations”) are designed to protect public health and the environment by setting concentration limits. The key contaminant relevant to the application is particulate matter, which is managed according to the NESAQ for particulate matter that is smaller than ten microns in diameter or PM₁₀. The NESAQ for PM₁₀ is 50 µg/m³ as a 24-hour average.

5.2 The urban area of Huntly, to the north of the site, is gazetted as an airshed for managing PM₁₀ under the NESAQ. The Huntly Airshed is, however, not deemed a polluted airshed under the Regulations, therefore there are no particular restrictions on granting the consent under the NESAQ.

5.3 The primary assessment criterion for discharges to air relevant to the Site relates to the amenity or nuisance effects associated with dust. The Ministry for the Environment, (MfE) *Good Practice Guide for Assessing and Management Dust*, 2016 (Dust Guide) recommends the following assessment criterion, “*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*”. I note that the Dust Guide aligns with similar provisions and guidance under the Waikato Regional Plan (WRP).

- 5.4 The Dust Guide and the WRP set out the FIDOL approach to assessing the potential effects associated with dust, which was applied in the AQTA. The FIDOL factors are defined below and considered in detail in the following sections:
- (a) Frequency – how often an individual is exposed to the dust;
 - (b) Intensity – the concentration of the dust;
 - (c) Duration – the length of exposure;
 - (d) Offensiveness/character – the type of dust; and,
 - (e) Location – the type of land use and nature of human activities in the vicinity of the dust source.
- 5.5 In paragraph 6.4, of this evidence I have updated and confirmed the assessment of dust discharges to air considering the latest information about the proposal and the receiving environment, and any changes that have occurred since the AQTA was prepared.
- 5.6 I am advised by Ms Madsen that the key policy considerations relevant to my assessment are as follows:
- (a) Operative Waikato District Plan Objectives and Policies Objective 13.2.1, Policy 13.2.2, Policy 13.2.4, Policy 13.2.5, Objective 13.2.6 & Policy 13.2.7;
 - (b) Proposed Waikato District Plan (Decisions Version) Part 2: District-wide matters / General district-wide matters / EW – Earthworks EW-P3;
 - (c) Part 3: Area-specific matters / Zones / Rural zones / GRUZ – General rural zone GRUZ-P4;
 - (d) Waikato Regional Plan (“WRP”) Objective 6.1.2 – Regional Land Local Air Management – Objectives 2 and 3; Policies 1, 4 and 5 (air discharge); and
 - (e) Waikato Regional Policy Statement (2016) Objective 3.8.
- 5.7 The objectives and policies relevant to air discharges relate to the potential for adverse effects on amenity from dust, the nature and character of the surrounding area and the effects on human health including cumulative effects. I have considered these matters in my assessment.

5.8 Section 6.3 of the WRP also contains Regional Ambient Air Quality Guidelines, which are set as the maximum acceptable levels for managing ambient air quality in the Waikato Region. The discharges to air from the Site will not significantly impact on air quality relative to the regional guidelines.

6. **AIR QUALITY ISSUES**

Dust

6.1 Dust nuisance is caused where dust has impacts on amenity, for example, dust depositing on residential properties, windows or on motor vehicles; or reducing visibility. Human health effects can occur from PM₁₀ 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 fractions are generally emitted from combustion processes such as power plants, domestic fires, and motor vehicles.

6.2 Larger particles tend to fall out relatively quickly with distance from the source, typically within 100 metres, whereas a smaller particle can be suspended for longer in the air. Dust discharged from fill activities could potentially cause a nuisance due to the soiling of surfaces and irritation to the eyes and nose. Although, coarse particles, PM₁₀ and larger, will likely dominate the discharge from fill activities (IAQM, 2016). IAQM indicates 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.

6.3 Discharges to air from the Fill Areas and associated activities will principally be uncontaminated dust from the sources as discussed in paragraph 4.7 of this evidence, with the primary effect of concern being as a nuisance or effects on amenity values and PM₁₀ being an indicator of the potential health effects.

6.4 The AQTA provided an assessment of the effects relative to the MfE (2016) assessment criterion, as referenced in paragraph 5.3 of my evidence. The assessment was based on considering the FIDOL (frequency, intensity, duration, offensiveness, and location) factors as described in Section 6.1 of the AQTA. I have considered the latest information about receptor locations, contaminants in the fill and the CALMET windrose data. I consider that the overriding factor for this proposal is "location".

- 6.5 The receiving environment is rural and rural areas are generally assessed as having low sensitivity to dust. Due to the presence of rural residences, however, the sensitivity is assessed as being moderately sensitive. The nearest receptor is the residence at 232 Riverview Road, which is owned by Gleeson Quarries Ltd, and is within the Site boundary so is not relevant for considering the environmental effects. All other residences are understood to be greater than 400 metres to the closest extent of the Fill Areas. As shown on Figure 1 above, Receptors 2, 3 and 4 are closest at between 400 to 500 metres of the Fill Areas, and are downwind in a south westerly, which is prevalent.
- 6.6 As I noted in paragraph 6.2, the IAQM (2016) indicates that impacts from even high levels of dust generation will be confined to within 400 metres of the activities.
- 6.7 When considering the offensiveness, or character, of the dust, much of the fill is expected to contain inert inorganic material, which is considered low in offensiveness. Discharges to air will principally be uncontaminated dust such as from: earthworks, cleanfill and the access roads. I understand from Mr Rumsby, that the method³ used to derive the Site's WAC for managed fill considers the potential for health effects and the inhalation exposure route is minor. I understand that the WAC derivation has considered the oral ingestion exposure route, which is set at acceptable levels for human health. I note that Dr Caldwell considered the potential for soils to have elevated levels of metals in his technical review and concluded that this factor was mitigated through good dust control.
- 6.8 Overall, considering the FIDOL factors, due to the separation distances, along with good practice dust management, I consider that there is a negligible risk of adverse effects from objectionable or offensive dust impacting on amenity values.

Human health

- 6.9 As noted above, the effects on human health due to exposure to particulate matter are principally associated with PM₁₀ and smaller fractions. Dust associated with soil particles is primarily in the range 20 microns and above, however, some PM₁₀ will be present. Proposed mitigation measures that are used to control nuisance dust will also control any finer particulate matter present. Given the proposed controls on dust at source, and the separation

³ Ministry for the Environment, *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health*, 2011

distances to the nearest dwellings, I consider that the fill operations would not be expected to significantly impact on PM₁₀ levels⁴ relative to the NESAQ, which is the relevant assessment criteria for effects on human health.

Odour

6.10 Submitters have raised odour as a potential issue that could be associated with ASS including marine sediments. I agree that these materials have the potential to be odorous. I consider, however, that adverse effects from odour associated with accepting these materials are unlikely to occur in practice due to the management and mitigation of ASS at the Site including:

- (a) Inspection of incoming loads to identify odorous loads that will not be accepted; and
- (b) An on-site treatment area for neutralising ASS, to be located to the southwestern corner of the quarry, more than 1 km from the nearest sensitive receptor.

Summary of effects

6.11 The discharge of dust from the activities associated with the proposed Fill Areas is not expected to result in a significant dust nuisance or health effects relative to the applicable amenity assessment criterion and the NESAQ for PM₁₀.

6.12 The proposed treatment of odorous soils and the location of the treatment area will also avoid potential effects of odour. Given the separation distances to sensitive receptors the effects of dust beyond the boundary will be negligible. GMF is, however, proposing mitigation and monitoring to control dust in accordance with good practice as discussed below.

7. MITIGATION AND MONITORING

7.1 Gleeson Quarry Ltd Huntly Quarry has a *Dust Mitigation Plan (2019)*, which applies to the existing quarry activity. The Huntly Quarry Plan identifies that GMF currently uses water as the principal for dust control, which is spread via a 10,000 litre water cart. I am advised by GMF that this tanker will also be used undertake dust management in the Fill Areas. The water is supplied from an existing regional water permit held by Gleeson Quarries Huntly Ltd

⁴ Institute of Air Quality Management, (*IAQM*) *Guidance on the assessment of mineral dust impacts for planning*, 2016.

(ref. 103160) to take water from the Waikato River for dust management purposes.

7.2 PDP prepared a DMP for the Huntly Managed Fill Site (February 2020), which was submitted with the applications. The DMP was a draft containing generic dust control measures and was never finalised. I agree that the DMP should be updated in accordance with the WRC's proposed consent condition 39.

7.3 I set out in Table 2 below, the key dust sources and controls relevant to this proposal. Table 2 incorporates recommendations from Dr Caldwell regarding restricting earthworks under strong winds >10 m/s blowing from the south west.

<i>Table2: Sources of Dust and Recommended Controls</i>	
Source of Dust	Control
Site establishment/earthworks	Dampen areas to be earth worked and/or open areas if they are producing visible dust emissions. Use polymer additives to form a surface crust or cover with mulch and straw if needed. Avoiding earthworks activities at Fill Areas 3 and 4 during periods of strong winds from the southwest (>10 m/s as a 10 minute average).
Topsoil stockpiles	Stockpiles will be vegetated as soon as practical and left undisturbed until needed for rehabilitation.
Material transport/ onsite roads	Maximum speed on internal roads of 20 kilometres per hour during dry and windy conditions. Keep internal roads surfaces damp using a watercart. Typical water requirements for most parts of New Zealand are up to 1 litre per square meter per hour. Consolidate the surface using aggregate.
Placement of fill	Inspect incoming loads and if dusty dampen within truck prior to placement Dampening or covering of dusty loads during placement in the Fill Areas; Avoiding activities at Fill Areas 3 and 4 during periods of strong winds from the southwest (>10 m/s as a 10 minute average).
Open areas	Maximum open area associated with the Fill Areas of 3 hectares at any time. Straw/hay mulch, fabric or similar will be applied for temporary stabilisation as required. Stabilisation of open areas and rehabilitation of completed surfaces as soon as practical.
Quarantine & drying of wet materials	Covering materials; and/or Ensuring materials are sufficiently damp prior to handling and placement.
ASS treatment area	Lime storage in an enclosed silo. ASS treatment site more than 1 kilometre from a sensitive receptor. Ensure materials are kept damp prior to handling and placement.
Vehicle track-out (vehicles using roads external to the site)	All heavy vehicles exit via the wheel wash, weigh bridge and sealed exit area. Maintaining the sealed the exit in good condition. Using a watercart to wash down or use a vacuum sweeper to keep the exit free of dirt.

7.4 Section 9.4 of the SFMP sets out monitoring for dust as follows. A daily monitoring log is to be kept recording all aspect relating to any dust or potential dust emissions these include but are not limited to the following:

- (a) Visual inspection of incoming trucks (uncovered) for moist/damp surface;
- (b) Date and details on any visible emission of dust and the source;
- (c) Frequency of watercart usage and the volume of water applied;
- (d) The volume of water used for dust suppression other than for water cart usage;
- (e) Wind direction and speed;
- (f) The date and signature of the person entering the information; and
- (g) Details and actions of dust complaints will be recorded in the Complaints register.

7.5 Daily site planning, including deploying the watercart, will take account of the daily forecast wind speed, wind direction and soil conditions before commencing an operation that has a high dust potential. GMF has also agreed to real time monitoring of wind speed and direction to assist with dust management as recommended by Dr Caldwell. Visual monitoring and record keeping procedures are documented in Section 7 of the DMP.

7.6 The SFMP contains key measures relating to dust management, and inspection of incoming loads to ensure they meet the acceptance criteria, including for odour. I understand that the SFMP is being updated to cross reference the DMP so that they will be consistent, and the updates will be provided as part of the consent conditions.

7.7 The WRC's recommended conditions include particulate monitoring at the Council's request should there be an issue with dust management during the exercise of the consents. I agree that this option can be used to assist dust management and that it is appropriate to determine the details of any such monitoring at a later stage should it be required.

8. **ISSUES RAISED BY COUNCIL OFFICER'S REPORT**

8.1 I have read the '*Technical Assessment of Air Discharges, Gleeson's Managed Fill*', dated 9 August 2022, updated on 4 November 2022, Appendix 5 prepared by Dr Caldwell for the WRC. Dr Caldwell agreed with the conclusion

in PDP's AQTA, that the discharges of dust from the activities associated with the Site is not expected to result in a significant dust nuisance or health effect relative to applicable air quality criteria. Dr Caldwell concludes that the effects will be no more than minor from discharges associated with the Site, but this is subject to a proactive adherence to the controls, monitoring and management procedures that have been proposed.

8.2 Dr Caldwell considers that a proactive rather than a reactive approach should be taken to dust control to ensure a no more than minor level of effect beyond the boundary. Dr Caldwell recommended additional conditions on ceasing earthworks during strong winds and onsite wind monitoring. GMF has agreed to these additional measures.

8.3 Dr Caldwell states that he does not have a concern about odour discharges based on the proposed activity. He has, however, proposed a condition of consent to address the potential for odour effects as follows:

(a) *"The discharge shall not result in odour that is objectionable to the extent that it causes an adverse effect at or beyond the boundary of the subject property."*

8.4 I agree with Dr Caldwell's conclusions and his proposed additional conditions of consent. Based on the proposed mitigation and adherence to the proposed conditions of consent, I agree with Dr Caldwell that the effects of the operation on air quality will be no more than minor.

9. **ISSUES RAISED BY SUBMITTERS**

9.1 A total of 42 submissions have been received. The topics raised in submissions relevant to effects on air quality are:

- (a) Dust and health effects, particularly from managed fill;⁵
- (b) Odour that may result from the managed fill;⁶
- (c) Dust from the trucks;⁷

5 Submissions of: Anthony Ernest Perkins (#2), Maree Frances Rutherford (#4), Kate Thomas (#6), Norm Hill (#7), Appollonia Johnston (#10), Kevin Wickens (#13), Daisy Thomas (#14), Garry & Audrey Cox (#15), Nola Morland (#18), Kathie Shepard (#21), Nicola Vitasovich (#22), Colleen Earby (#24), Emily Joy Thomas (#25), Huntly Community Board (#26), and Freeway Design Ltd (#42).

6 Submissions of: Maree Frances Rutherford (#4), Denise P Lamb (#5), Kate Thomas (#6), and Nola Morland (#18), Emily Joy Thomas (#25), and Huntly Community Board (#26)

7 Submissions of: Denise P Lamb (#5), Jennifer Lee Malloy (#7), Appollonia Johnston (#10), Kevin Wickens (#13), Garry & Audrey Cox (#15), Bryce and Carla Mounsey (#20), Kathie Shepard (#21), Nicola Vitasovich (#22), Huntly Community Board (#26), Shirley McDonald (#35), and Lorrel Cherie Mowles & Alex John Mowles (#36)

- (d) Limitations in assessment approach⁸;
- (e) Vehicle emissions⁹; and
- (f) Erionite¹⁰.

Dust and health effects

- 9.2 Submitters raised concerns about dust and contaminants, particularly in the managed fill. I have addressed the potential contaminants in managed fill in paragraph 6.7 of my evidence. I note that contaminant levels are to be managed in accordance with the WAC. I understand the methodology¹¹ states that the ingestion pathway is a relatively minor pathway of exposure to contaminants. On that basis, Mr Rumsby advised that the WAC should be protective of human health.
- 9.3 Dust management is set out in Section 7 of my evidence and these measures will minimise the potential for fill materials containing contaminants to become airborne. I have assessed the effects of dust from the Site as being negligible principally due to the separation distances to the nearest dwelling.
- 9.4 Submitters also raise concerns about the potential health effects associated with dust or particulate matter more generally. Some submitters indicate that health impacts are already observed in the community due to exposure to dust from the quarry.
- 9.5 As an air quality specialist, my assessment of health effects is made using the relevant air quality criteria recommended for population exposures, which for PM₁₀ are set based on epidemiological evidence. In paragraph 6.9 of my evidence, I have addressed the potential for health effects associated with particulate matter as PM₁₀ relative to the NESAQ. I note that the Huntly Airshed is compliant with the NESAQ for PM₁₀. In my opinion, the dust controls, along with the separation distances, will ensure the impact on PM₁₀ levels from the Site will be negligible at sensitive receptor locations downwind, and will not cause a breach of the NESAQ.

8 Submissions of: Kate Thomas (#6), Jennifer Lee Malloy (#7), and Huntly Community Board (#26)

9 Submission of: Colleen Earby (#24)

10 Submission of: Huntly Community Board (#26)

¹¹ Section 4, page 20, Ministry for the Environment, *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health*, 2011.

Odour from the managed fill

- 9.6 The submitters raised concerns about the potential for fill materials to be odorous. I have addressed the potential for odorous materials to be accepted at the Site in paragraph 6.10 of my evidence. On-site treatment using lime will suppress odour from ASS if it is present. Any odorous loads, other than ASS, will be rejected. In my opinion, given the proposed mitigation, the potential for odour discharge from the site will be avoided due to the waste acceptance procedures, treatment of ASS where applicable and the separation distance of the treatment area to sensitive receptors.

Dust from the trucks

- 9.7 Many of the submissions relate to dust from the trucks when travelling on roads to and from the site, and submitters also seek that all loads be covered. I consider that this is reasonable for vehicles carting potential dusty material to either be dampened or use covers. Ms Madsen advises that effects on air quality from material transport to and from the site are not within the scope of the consents being sought. Operational aspects of the trucks are covered in evidence by Mr Phillip Brown and Mr Andrew Hunter of TEAM Traffic.
- 9.8 Submitters also identified tracking of dust and dirt out on to the public road as a concern. My experience is that tracking dust and dirt onto public roads is not good practice and has been linked to dust nuisance impacts elsewhere. I understand that dust tracking from the site is principally an impact of the Quarry, and I am advised the issue is addressed via the Huntly Quarry *Dust Mitigation Plan* (2019) and relevant quarry consents currently being renewed. As I noted in paragraph 4.3 of my evidence, the vehicles exiting the site are now required to exit via the wheel wash, weigh bridge and concreted entranceway, which will significantly reduce the potential for tracking dirt off-site.
- 9.9 I note that there will be the potential for additional impacts associated with the fill operations due to 24 additional truck movements, compared to a baseline of 504 movements for the Quarry. Controls on the Quarry operation are, therefore, the primary means of addressing the potential for dust from tracking but can also be addressed via the DMP for the Fill Areas.
- 9.10 The Quarry *Dust Mitigation Plan* (2019) identifies that:
- (a) Applying water is the main control measure for dust.

- (b) Vehicle speed restrictions are applied.
- (c) Wheel washes are used.
- (d) A tractor mounted road broom is available.

9.11 In my experience, to minimise tracking, good practice is to ensure good dust control within the site including over the haul roads, having a sealed length of road internal to site that can be kept clean. Provided that the concreted entrance way is kept clean, and trucks exit via the wheel wash onto the concrete, then this will minimise the potential for dirt tracking out of the site.

Limitations in the assessment

- 9.12 The Thomas submission noted that their residence was not identified in the assessment. Other submissions also identify new residential areas and/or approved subdivisions since the AQAT was prepared.
- 9.13 Pua Planning has confirmed that the Thomas residence is located at 95A Hillside Heights Road, and this dwelling was appropriately included in the Table 3 of the AQTA, Sensitive Receptors, which was shown as 820 metres to the west of the Fill Areas.
- 9.14 In paragraph 6.4 of my evidence, I have updated and confirmed the effects assessment using the FIDOL approach based on the sensitive receiver locations. I understand the residential land use development at Waugh Lane is around 1 kilometre north of the site, so it is beyond the distance where there is a potential for effects from the discharges to air.
- 9.15 The Huntly Community Board is concerned that the windroses used for the AQTA do not represent the fill sites, which are elevated and potentially influenced by local topography. As I discuss in paragraph 6.4, I have updated my assessment using a windrose generated by the CALMET meteorological model that is specific to the highest point in the fill site area.
- 9.16 The CALMET windrose is not significantly different to the windroses used in the AQTA, with the predominant winds from the west to southwest. In any case, in my opinion, the main factor in the assessment is the "location" of the activity relative to the receptors. Therefore, the wind direction and strength, that would affect the potential frequency and duration of dust events are not critical factors in my assessment.

- 9.17 I note that GMF has agreed to establish a meteorological monitoring station to inform dust management, so can respond to conditions when there is a higher risk of dust.

Vehicle Emissions

- 9.18 Submitters raise concerns about the air pollution from heavy vehicle emissions. Emissions from trucks operating on public roads are outside of the scope of the consents for the fill site. Typical good practice is for vehicle emissions to be minimised through regular vehicle tuning and maintenance.

Erionite

- 9.19 The Huntly Community Board raises concerns about erionite. Mr Lidgard has addressed erionite in his evidence.

10. COMMENT ON CONDITIONS

- 10.1 I have reviewed the draft conditions as GMF has proffered with the application. Condition 35 of the general conditions relates to the requirement for a DMP to be approved by the WRC. Condition 37 (a) to (g) includes the minimum requirements for dust management.
- 10.2 I note that GMF has agreed to inspect all fill loads before being deposited on site for strong odour. The SFMP includes visual inspection of incoming trucks for a moist/damp surface, and I understand that if incoming loads are dusty, they will be dampened prior to placement.
- 10.3 I have reviewed the conditions as recommended in the S42A report by the WRC, Schedule One – General Conditions. Conditions specific to air quality start at Condition 39.
- 10.4 As discussed in paragraph 7.5 of my evidence, GMF has agreed with WRC's recommendation that an on-site weather station to measure wind direction and strength be installed. Conditions 47 to 51 of the recommended WRC conditions addresses real-time monitoring of wind. I support on-site wind monitoring to inform dust management.
- 10.5 Condition 43 relates to PM₁₀ monitoring if required in writing by the WRC. I consider that it is appropriate to require air quality monitoring for dust management only if the WRC considers it necessary having identified that there have been adverse effects of an offensive or objectionable nature, due to particulate matter discharges from the Site.

11. **CONCLUSIONS**

- 11.1 The key air quality issues related to the proposed Fill Areas are amenity dust and the potential for effects on human health from respirable particulate matter. The location and nature of the proposed activity means that the effects at the nearest dwellings, being more than 400 metres from the Fill Areas are expected to be negligible.
- 11.2 The proposed management and monitoring will further reduce the potential for impacts on air quality at or beyond the boundary of the Site. Based on the proposed mitigation and adherence to the proposed conditions of consent, I agree with Dr Caldwell that the effects of the operation on air quality will be no more than minor.

Deborah Anne Ryan
Pattle Delamore Partners Limited
23 November 2022

Attachment A CALMET Managed Fill Site wind data

Scope

CALMET Version 7 was used to generate an on-site windrose for a 3-year dataset (1 January 2017 to 31 December 2019), CALMET was used with data from the prognostic meteorological model TAPM (version 4,0.4) from CSIRO, Australia^[1] and local meteorological data.

TAPM Set up

TAPM predicts all meteorological parameters for the region based on large-scale synoptic information provided by the Australian Bureau of Meteorology. TAPM was configured with:

- Four nested meteorological grids with a grid spacing of 30, 10, 3, 1 km;
- Default vegetation, topography and soil types as supplied in the TAPM databases for New Zealand;
- Grid Centre at UTM 365,824 m E, 5,804,164 m S UTM Zone 60H;
- Deep soil moisture used was 0.15;
- Grid dimensions (nx, ny, nz) = 40, 40, 25;
- Prognostic turbulence scheme and hydrostatic approximation;
- No observational data was added to this dataset as those were included in the CALMET Model; and,
- Meteorological dataset was extracted from the model which was converted to a .dat file from the M3D file that TAPM produces. This file was used to input to CALMET.

CALMET Set up

Observational weather station data was added into the CALMET model from the four nearest meteorological datasets. The default terrain file (SRMT3), and the default land use file (GLCC Australia Pacific ~1km) were used to generate the CALMET model.

Table A1 Observed data sources used in CALMET

Climate stations used in CALMET Dataset			
Model ID	Station Name	Operating Authority	Parameters Measured
11111	Hamilton Airport	NIWA	T, rain, P, RH, WD, WS, Ccover, Cheight
12345	Waipuna Station		WS, WD
276617	Ruakura Station	MetService	T, rain, P, RH, WD, WS
25162	Whatawhata Station	MetService	T, rain, WD, WS
Notes:			
1. WS = Wind Speed, WD = Wind Direction, T = Temperature, RH = Relative Humidity, P = Pressure, Ccover = Cloud Cover, Cheight = Cloud Height			

^[1] Peter Hurley, *TAPM V4 User Manual*. CSIR Marine and Atmospheric Research Internal Report No. 5. October 2008.

Figure A2 shows the local terrain heights as seen by CALMET with the data extracted from the highest elevation in the model for that area.

The modelling domain used was 10 km-by-10 km with a grid spacing of 250 metres.

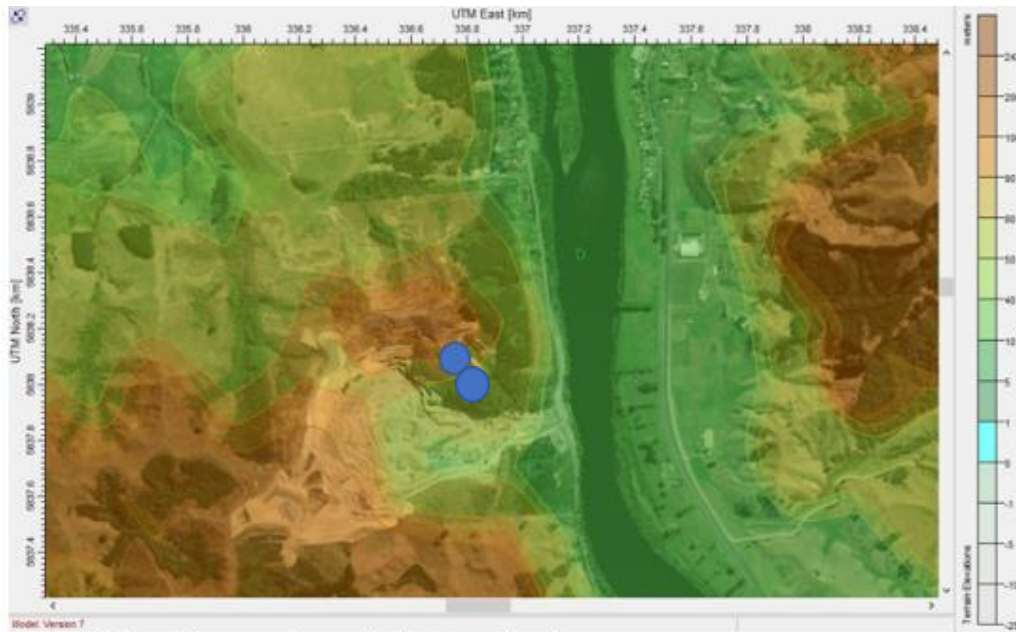


Figure A2 Local topography and wind rose location

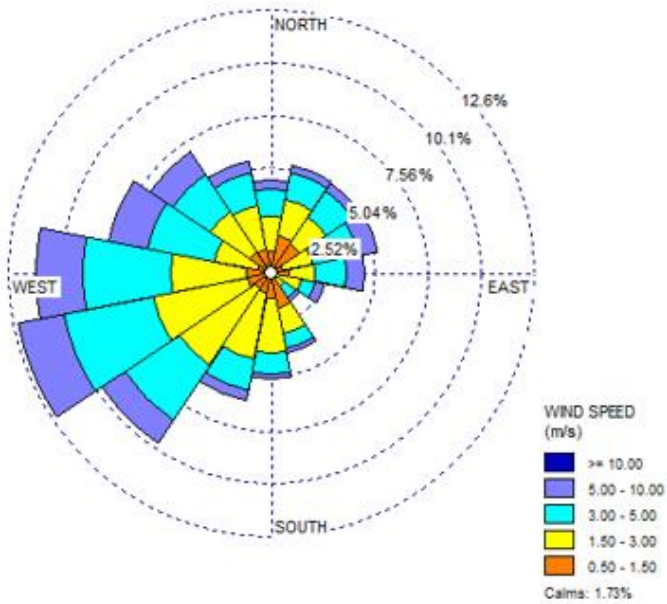


Figure A3 CALMET Generated Windrose for GMF (2017 to 2019)

Table A2 presents the wind frequency data by direction for the site.

Table A2 Wind Frequency data Gleasons Huntly

Directions	Wind Speed Category m/s					Total (%)
	0.50 - 1.50	1.50 - 3.00	3.00 - 5.00	5.00 - 10.00	>= 10.00	
348.75 - 11.25	1.0	1.7	1.3	0.4	0.0	4.5
11.25 - 33.75	1.9	1.7	1.3	0.4	0.0	5.3
33.75 - 56.25	1.7	1.5	1.6	0.4	0.0	5.2
56.25 - 78.75	0.6	1.4	2.3	1.0	0.0	5.3
78.75 - 101.25	0.9	1.2	1.6	0.9	0.0	4.6
101.25 - 123.75	0.3	1.3	0.7	0.4	0.0	2.6
123.75 - 146.25	0.2	0.6	0.6	0.2	0.0	1.7
146.25 - 168.75	1.8	1.2	0.8	0.2	0.0	3.9
168.75 - 191.25	1.3	2.6	1.0	0.2	0.0	5.1
191.25 - 213.75	1.0	3.2	1.4	0.5	0.0	6.2
213.75 - 236.25	1.0	4.4	3.1	1.3	0.0	9.7
236.25 - 258.75	1.2	4.5	4.4	2.2	0.0	12.4
258.75 - 281.25	1.2	3.7	4.2	2.3	0.0	11.3
281.25 - 303.75	0.7	2.1	3.2	1.9	0.0	7.9
303.75 - 326.25	1.2	2.3	2.2	1.3	0.0	7.0
326.25 - 348.75	1.2	2.1	1.6	0.6	0.0	5.5
Sub-Total	17.3	35.5	31.3	14.2	0.0	98.3
Calms						1.7