UNDER the Resource Mangement Act 1991 ("RMA")

IN THE MATTER of a resource consent application to the Waikato Regional Council for the McPherson Quarry Expansion

STATEMENT OF EVIDENCE OF ANDREW FERGUSON CURTIS ON BEHALF OF MCPHERSON RESOURCES LIMITED

1. INTRODUCTION

1.1 My full name is Andrew Ferguson Curtis. I am Technical Director Air Quality at Pattle Delamore Partners. I am a Chemical Engineer with over 30 years' experience. I have specialised for over 23 years in air quality, providing advice to clients in New Zealand, Australia and overseas.

Experience

1.2 I have Bachelors Degree in Chemical and Materials Engineering from Auckland University, a Post Graduate Certificate in Sustainable Management from the Open Polytechnic and a Post Graduate Diploma in Toxicology from RMIT University. I am a Certified Air Quality Professional and an approved Hearing Commissioner.

1.3 I have extensive experience in dealing with the assessment of dust from quarrying and other activities. Some of my work experience which is relevant to this application is as follows:

(a) I have been responsible for preparing air quality assessments for GBC Winstone's Symonds Hill, Three Kings and Camerons Quarries, as well as the Brookby hard rock quarry.

(b) I was responsible for preparing air quality assessments for the GBC Winstone Portland quarry and cement manufacturing plant.

(c) I was responsible for preparing quality assessments for overburden disposal areas for the GBC Winstone's Hunua and Belmont Quarries, and Brookby Quarry.

(d) I was responsible for obtaining air discharge consents for a large number of cleanfill sites.

(e) I have also processed consent applications for a number of quarries on behalf of the Waikato and Waipa District Councils including consideration of the effects from these activities on both horses and vegetation.

Involvement in the Proposal

1.4 In respect to the proposed quarry expansion by McPherson Resources Limited (**McPhersons Quarry**) at McPherson Road, Pokeno, I was not involved in the preparation of the application or the Assessment of Environmental Effects (**AEE**). I was engaged in August 2020 to prepare this statement of evidence to address air quality related matters raised by the Submitters' submission after the application was made to the Waikato Regional Council (**WRC**).

1.5 I have not prepared a separate report, with this statement containing my assessment of air quality effects.

1.6 I have undertaken a site visit on 7 August 2020.

1.7 My evidence will focus on the air quality related effects from the proposed expansion, and specifically the potential for dust emissions.

Code of Conduct

1.8 I confirm that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2014. I have complied with the Code of Conduct in preparing this evidence and agree to comply with it while giving evidence. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

2. EXECUTIVE SUMMARY

2.1 I have undertaken an assessment of the potential for dust to result in off-site effects. It is my opinion that with the mitigation measures proposed in the Application, together with the additional measures I have

recommended, including monitoring, that there is a low potential for off-site dust effects.

2.2 I do not consider that there is any risk of effects associated with $PM_{10,}$ based on my experience at other sites, nor do I consider that the presence of the quarry activity significantly changes the quantity of silica that exists in the local area or the risk from crystalline silica.

2.3 I consider that with the changes I have proposed that the consent conditions proposed by the WRC are appropriate.

3. BACKGROUND

3.1 The background information is set out in the AEE, and therefore I will not reiterate that material here other than highlighting some aspects that are important from an air quality point of view.

Site Location

3.2 The area surrounding the quarry is primarily used for farming purposes, with some lifestyle blocks located around the site (primarily to the north but also along SH2). The site contains a mix of vegetation, with forests on the hillsides to the east and west, and pastoral land on the flat land to the south. Figure 1 presents a view of the topography of the surrounding area.

Sensitive Receptors

3.3 The AEE identified a number of dwellings within 500 metres of the quarry activities which would be considered as sensitive receptors. However, dust is different from some other pollutants, as there are physical settling processes that effectively limit the distance within which effects might potentially be experienced.

3.4 Based on my experience dust effects will typically occur within 100 m of an unmitigated source, with some potential, in very strong wind conditions (greater than 10 m/s) for dust effects to be experienced out to 300 metres.

This is consistent with guidance[1] provided by Ministry for the Environment (MfE).

3.5 Based on this guidance I consider that there are only four receptors identified (in Figure 2) as having any potential to experience dust effects from McPherson Quarry.

3.6 Three of these receptors are just beyond 300 metres from the proposed quarry activities, however Receptor 2 (40 McPherson Road) is within 200 metres of the site access road.

Dust Concentrations

3.7 In a previous project I have installed dust monitors to gather data on the existing levels of airborne particulate. For one such site a monitor was installed approximately 300 metres from the quarry, a similar distance to the nearest receptors to McPhersons Quarry. For context, that quarry was a hard rock quarry that processes material onsite, and the area between the quarry and the monitor was pastural land which sloped gently downwards.

3.8 The monitor initially measured Total Suspended Particulate (TSP) which is the size fraction large enough to be carried off-site (up to in the order of 50-100 microns) and also included all the smaller size fractions. I have presented this data in Figures 3 and 4 which cover almost a year, and therefore captures the seasonal variations and typical activities that occur as a result of quarrying operations.

3.9 As can be seen from these figures the peak short-term (1 hour) concentrations (Figure 3) are typically well less than 100 µg/m³, with the average 24 hour average concentrations (Figure 4) typically well less than 20 µg/m³.

3.10 With the exception of one of the hourly measurements, the measured concentrations are typically less than the MfE recommended trigger values for a high sensitivity area. However, from further analysis of the

[1] Ministry for the Environment (MfE) Good Practice Guide for the management of dust, 2016.

one exceedance, based on the wind direction this event was the result of earthworks from a nearby residential development, therefore there were no exceedances as a result of the quarrying activities.

3.11 The same monitor was then used to measure PM_{10} and I have presented this data in Figure 5 which covers the period of approximately 5 months, during the driest period of the year, when the greatest potential for dust effects exists.

3.12 As can be seen in Figure 5 the average 24-hour average concentrations are typically well less than 10 µg/m³.

3.13 I have also done other dust monitoring around a number of other quarries, with the results of that monitoring typically showing average 24-hour PM_{10} concentrations of between 10 and 15 µg/m³.

3.14 These values are also similar to PM_{10} concentrations measured by the Auckland Council at Patumahoe, where data from the last year indicates an average daily PM_{10} concentration of 11.8 µg/m³ and an average daily $PM_{2.5}$ concentration of 4.8 µg/m³.

3.15 Given the relatively close nature of this monitoring site and similar environment I would consider these concentrations to those likely to be experienced in the be similar to those likely to be experienced in the area around McPherson Quarry.

Wind Effects

3.16 The other important consideration in assessing the potential for dust effects is local meteorological conditions.

3.17 As the site does not have its own meteorological station and the closest publicly available data is measured at Patumahoe and the Firth of Thames which are located 15 km to the west and 36 km to the east respectively, where wind patterns are likely to be different (the Firth of Thames site having stronger winds influenced by the open water of the Firth and Patumahoe having much lower wind speeds with a predominate direction from the southwest), I do not consider these sites representative of the meteorological conditions experienced in the vicinity of the McPherson Quarry.

3.18 Therefore, to provide wind data that is more representative of the site, I have extracted data for the location of the quarry using the Auckland Council Regional CALMET dataset for 2007.

3.19 I have attached a wind rose as Figure 6 and have provided a breakdown of the wind frequencies in Table 1.

Table 1: Wind Speed Frequency Distribution

Direction	Wind Speed (m/s)		Total (%)
	0-5	>5	
North	4.7	0.4	5.2
North northeast	5.2	0.8	6.0
Northeast	5.0	1.7	6.7
East northeast	8.2	1.3	9.5
East	4.5	0.9	5.4
East southeast	2.1	0.5	2.6
Southeast	1.1	0.4	1.4
South southeast	1.1	0.3	1.4
South	1.2	0.1	1.2
South southwest	2.7	0.6	3.2
Southwest	6.9	4.3	11.1
West southwest	13.3	3.7	17.0
West	7.6	2.6	10.3
West northwest	4.7	1.6	6.4
Northwest	4.4	1.0	5.4
North northwest	3.7	0.2	3.9

4. POTENTIAL DUST SOURCES

4.1 Again I do not intend to discuss the proposal in detail as that is covered in the Application and in the evidence of others, however, I will discuss the activities that have the potential to generate dust if not appropriately controlled.

4.2 The potential sources of dust I have considered in this assessment are:

(a) Removal of overburden;

(b) Placement of overburden and cleanfill;

(c) Rock extraction;

(d) Rock processing;

(e) Stockpiling; and,

(f) Vehicle movements.

4.3 These activities are discussed in the following section along with the current or proposed mitigation measures that will be used to mitigate the potential for dust effects from them.

4.4 An important part of the mitigation is the comprehensive quarry management plan. As part of the Application a draft quarry management plan was submitted which included the proposed mitigation as well as identifying the triggers for action and who is responsible for implementing the mitigation. The current measures are generally considered appropriate, however my evidence includes additional control measures, I consider should be included.

Removal of overburden

4.5 In my experience, the removal of the topsoil and clay does not generally generate dust, unless it is undertaken during extremely dry weather conditions when the soils are dry.

4.6 However even in these conditions the dust potential can be mitigated through the use of water to dampen the soils prior to the work being undertaken.

4.7 I consider that the following dust mitigation should be undertaken to limit the impacts of dust from this activity:

(a) Applying water;

(b) As far as practicable avoid overburden removal activities in hot dry conditions when wind speeds are greater than 5 m/s, and blowing towards residential receptors;

(c) As soon as practicable stabilise expose areas (grassing or mulching) to minimise dust pick up.

Overburden and cleanfill placement

4.8 Overburden and cleanfill placement is essentially an earthmoving activity, with the material being placed and then contoured. Once the area is at the final contour, the placement area can then be hydroseeded.

4.9 I consider that the following dust mitigation needs to be undertaken to limit the impacts of dust from this activity:

(a) Applying water;

(b) As far as practicable avoid placement activities in hot dry conditions when wind speeds are greater than 5 m/s and blowing towards residential receptors;

(c) Avoiding, as far as practicable, the placement of dry dusty material, and where this is necessary placing the material in such a way as to minimise dust emissions;

(d) Having procedures in place to check for dusty cleanfill loads before the material is placed to ensure that proper mitigation is available; and,

(e) As soon as practicable grass areas that have reached their final contour.

4.10 I note that while the use of water, with or without the addition of chemical stabilising agents, is generally the most effective dust control measure, during the contouring of the placed material, water needs to be used judiciously to ensure that the required levels of compaction and strength are obtained.

4.11 This means that at times there is the potential that there will be some visual dust observed from site activities, and also that there will be an increase in ambient dust in the immediate vicinity of the works, and on occasions off-site, particularly when those activities are occurring closest to the site boundary.

4.12 This does not mean that there will be no increase in ambient dust from this activity, but it does mean that any dust that may be present is at levels which do not result in nuisance effects.

Rock Extraction

4.13 Rock is extracted using one of two methods at McPherson Quarry depending on the type of rock.

4.14 Blue rock is extracted by drilling and blasting to break up the rock. Given the amount of blue rock onsite, this activity only occurs 1-3 times per year. Once rock has been blasted it is removed from the working face using excavators and trucks, and moved to the processing plant.

4.15 The majority of rock on site is brown, and this is extracted directly from the working face using either an excavator or dozer. Some of the brown rock is sold as “run of pit” and loaded directly into road trucks and taken off-site. The reminder of the brown rock is further processed on site.

4.16 Drilling and blasting has the potential to generate dust, with the blasting process also generating some combustion emissions, but generally these are not significant.

4.17 There are two main methods used to control dust from drilling, these are wetting the ground prior to drilling and to use dust collection equipment on the drilling rig.

4.18 Control of dust emissions from blasting relies on the adoption of good blasting practice, which may result in making a trade off between maximising the blast efficiency and minimising dust emissions.

4.19 Other practices that can be used to control dust emissions from blasting include wetting the rock faces prior to blasting, and removing any loose rock or spoil from the blasting areas.

4.20 When loading the extracted material into trucks, the following mitigation measures can be used to control dust if required:

(a) Wetting the material on the ground prior to the commencement of loading;

(b) Using water sprays while loading; and,

(c) Having the excavator drivers to take care to ensure that the drop height is minimal.

Rock processing

4.21 McPherson Quarry process rock in two stages, these being primary and secondary crushing and screening.

4.22 The processing plant is located south of the quarry pit and is surrounded by the stockpiles.

4.23 Rock from the quarry is tipped into a bin hopper that feeds the material into a jaw crusher followed by a screen. Depending on the products required, material may also be processed in the secondary crusher before the final screening.

4.24 The processing plant has the potential to generate dust, particularly operations such as screening and at any point in the process where aggregate drops.

4.25 I consider that the following dust mitigation should be undertaken to limit the impacts of dust from this activity:

(a) Applying water to the material before it is processed; and,

(b) Using water misting at key parts of the process to control dust.

Stockpiling

4.26 Dust emission from the stockpiling of material depends on the size of the material being stored, the dryness of the material and the height of the stockpile.

4.27 I consider that the following dust mitigation should be undertaken to limit the impacts of dust from this activity:

(a) Storing finer or unwashed material in less exposed areas of the site;

(b) Keeping the height of the stockpile to a minimum and no more than 5 metres in height; and,

(c) If dust emissions are observed from the stockpiles, apply water to the material before it is processed.

Vehicle movements

4.28 Based on my experience one of the most significant potential sources of dust from activities of this type is vehicle movements on internal haul roads. The potential for this type of emission increases with longer haul distances, and therefore McPherson Quarry will need to be vigilant with

respect to dust potential from this source, and as well as vehicles moving on the site access road.

4.29 This is not an issue unique to McPherson Quarry, nor are the mitigation measures proposed, the majority of which are successfully employed at other sites to control the potential for these emissions. I consider that the following dust mitigation is undertaken to limit the impacts of dust from this activity:

(a) Keeping the haul roads well maintained, including regularly laying clean aggregate on the running surface;

(b) Limiting the vehicle speeds to 20 kilometres per hour;

(c) Using a water truck at regular intervals in hot dry conditions; and,

(d) Ensuring that the McPhersons Road is kept as clean as practicable.

4.30 In addition, there are fixed sprinklers located along the site access road. Based on my observations these sprinklers do not cover the entire road, and I understand that the pump supplying water to then needs to be upgraded to allow all of the sprinklers to run at the same time.

4.31 Dust suppression for the access road could also be improved by increasing the number of sprinklers or improving the coverage area, and potential triggering them based on vehicle movements, in order to minimise unnecessary water usage.

Monitoring

4.32 In addition to the activity specific mitigations already discussed, I also consider that an appropriate level of visual monitoring is an important aspect to control dust. This visual monitoring is set out in Table 2.

Table 2: Proposed Dust Monitoring	
Monitoring Activity 4.7	**Frequency** 5.2
Check weather forecasts for strong winds and rainfall to plan appropriate work schedule and dust management response.	Daily
Inspect land adjacent to the site for the presence of dust deposition.	Twice Daily
Observe weather conditions including wind and rain via observations.	Daily and as conditions change
Inspect all exposed surfaces for dampness and to ensure that the exposed un-stabilised area is minimised.	Daily and as conditions change
Inspect dust generating activities to ensure dust emissions are effectively controlled.	Daily and as new activities are commenced
Inspect watering systems (water carts) to ensure equipment is maintained and functioning to effectively dampen exposed areas	Weekly
Monitor dust generating activities and water application rate.	In winds over 5.5 m/s (11 knots or Beaufort Scale 3)

4.33 In addition to the visual monitoring I consider that there is merit in installing a weather station on site to provide site specific wind speed and direction data that can be used to inform decisions on whether to implement mitigation.

4.34 I also consider that there is merit in undertaking some short term campaigns to monitor total suspended particulate (**TSP**) to demonstrate that the mitigation is effective, particularly adjacent to the site access road.

5. ASSESSMENT OF EFFECTS

TSP

5.1 I have set out below my assessment of the potential for amenity related TSP dust effects from McPherson Quarry. This is based on the FIDOL assessment tool and intended to demonstrate whether the activity has, or does not have, the potential to result in offensive or objectionable dust nuisance effects beyond the site boundary, the test generally applied to assessing effects of this type.

5.2 I have primarily considered the potential for effects on those residences identified in Figure 2 and the wind conditions presented in Figure 6 and Table 1.

Frequency

5.3 In terms of dust effects, the frequency is based on a combination of two factors; when the dust generating activity is likely to occur; and when the receptors of concern are downwind of the activity in conditions that could give rise to dust.

5.4 Based on the data in Table 1, winds which might be strong enough to carry dust (greater than 5 m/s), if present, blow towards the identified receptors between 0.1 – 4.3% of the time. I note that this is simply the percentage of time that dust effects could occur as opposed to the percentage of time when some form of nuisance effects will actually occur.

5.5 When other factors (such as whether there is any activity occurring on the site which could generate dust, or is occurring but dust could not travel off-site, or whether it is raining) are taken into account, the percentage of time when some form of effect could occur on the nearby properties reduces further.

5.6 In addition, through the use of the mitigation measures outlined previously, the percentage of time when any form of effects might occur will be significantly lower than indicated in the paragraph above.

5.7 Overall using criteria[2] developed by the Institute of Air Quality Management, the frequency of off-site effects is considered infrequent.

Intensity

5.8 For dust, the intensity of effects relates to how much dust might be present. Based on the current operations and that being proposed, together with my experience with other extraction processes, the greatest

[2] IAQM, Guidance on the Assessment of Mineral Dust Impacts, https://iaqm.co.uk/text/guidance/mineralsguidance_2016.pdf

potential for intense off-site effects in this case are likely to be from vehicles operating on the site access road, in the absence of mitigation.

5.9 Given the level of mitigation proposed, together with the additional measures I have recommended, and the distance between the main haul roads and the most affected properties, I consider that the intensity of any dust from this source should will be low and not at a level which could give rise to offensive or objectionable effects.

Duration

5.10 Given the nature of the activities proposed, and the level of mitigation proposed, I consider that the duration of any dust event that might occur would be short.

Offensiveness

5.11 With dust, offensiveness generally relates to the level of soiling that occurs over and above that which occurs from normal outdoor levels of dust or pollen, and consequently the effects, for example visibility on outdoor furniture or windows. In this case, through the use of appropriate mitigation and visual monitoring the potential for dust to result in offensive or objectionable off-site effects is low and generally no different than that which might occur from any other dusty activity in the area.

Location

5.12 Location is an important factor in determining the potential for effects from dust. As indicated by nearby monitoring, there are currently low levels of dust in the existing environment, and while this may increase when activities are occurring on site, they should remain below levels which are considered acceptable for this type of environment.

Assessment Conclusion

5.13 Overall based on the above I consider there is little potential for any TSP dust to be generated by the proposed activities. There may be some increase in ambient dust concentrations; however, these increases will not be at levels that could result in offensive or objectionable off-site effects, or amenity effects.

PM_{10}

5.14 Given how low the existing levels of PM_{10} are likely to be, and the fact that there is not going to be a lot of hard (blue) rock crushing on site, it is not considered that there is any significant potential for the proposed activities to contribute significantly to PM_{10} in the area.

5.15 In any event the mitigation measures that have been discussed to control TSP, (including the monitoring discussed in paragraph 4.34) will also be effective at controlling any PM_{10} that might be generated.

6. ISSUES RAISED BY SUBMITTERS

6.1 I have reviewed the air quality related aspects of the submissions, and there are six main concerns that appear to be have been raised with respect to dust. These are:

(a) Effects of dust on roof collected drinking water and outdoor amenity.

(b) The potential for silica effects.

(c) The potential for adverse effects from PM_{10}.

(d) Controlling dusty activities during high wind speeds.

(e) Water demand for dust suppressant is based on historical data.

Effects of dust on roof collected drinking water and outdoor amenity

6.2 I understand that the properties surrounding McPherson Quarry collect and use rainwater. Therefore, it is appropriate to consider whether there is any potential for dust to affect this, as this is an amenity issue.

6.3 Based on the submissions I understand that the closest property which collects rainwater is approximately 200 m from the site access road and therefore unlikely to be affected by particulate from the works except in extremely strong wind conditions.

6.4 Even if some dust did land on the roof, it would need to remain there until it next rained, i.e. not be blown away by subsequent winds, and be present in sufficient quantities to be noticeable above the normal detritus that collects on roofs from vegetation, animals and normal ambient dust.

6.5 I am aware that the closest submitter has a modern rain water system fitted with a first flush system, which effectively divert the first tranche of rainwater, and any detritus it may contain, away from tanks, and is also fitted with inlet filters which remove bacteria or other solid material that may be in the water. Therefore, with these types of measures in place there would be no effects on drinking water.

6.6 Even if these measures are not fitted, the normal particle settling processes that occur in water tanks, mean that any particles would normally collect on the bottom of the tank along with the other normal detritus and not be drawn into the reticulation systems within the house and consequently not have any form of effect.

6.7 Based on my review of the background levels of dust and the likely changes that might occur as a result of what is proposed, it is my opinion that the concentrations of dust that might be generated in strong winds that might reach a property collecting rain water will not be at levels that could give rise to any form of effect and therefore will not affect roof collected drinking water.

6.8 In terms of dust, amenity effects can also relate to the enjoyment of the outdoor environment, and for example the annoyance that can occur if significant quantities of dust collect on surfaces.

6.9 I reiterate that this does not mean that there will be no dust from McPherson Quarry beyond the site boundary, but should mean that what crosses the site boundary is at levels that do not result in any form of amenity effects.

6.10 I also note that post submissions closing, information was provided by one submitter about the levels of silica that was collected by their water filters.

6.11 I discuss the issue of crystalline silica in a subsequent section, but note that silica is one of the most common compounds and is ubiquitous in the environment, and the material collected in the sample could have come from anywhere.

6.12 To demonstrate this, I have subsequently collected samples of soil and dust from locations within the quarry and in the wider environment, and

these results are attached as Appendix A together with a figure indicating where the samples were collected.

6.13 These samples indicate that the materials collected on the water filter sample are essentially the same as those in ambient samples, and appear indicative of general dust as opposed to something originating from the quarry.

The potential for silica effects

6.14 Some of the submissions also raised a concern about the potential for there to be crystalline silica (quartz) dust generated as a result of the proposed activity.

6.15 Quartz is one of the two forms that silicon dioxide (commonly called silica), one of the most common minerals on earth. The other form (amorphous silica) is relatively inert and is not implicated in any health effects as far as I am aware.

6.16 To result in any form of health effects the quartz particles need to be small enough to be respirable, that is, enter the lungs during normal breathing. This means that the particles need to be less than 10 microns in size[3]; and in addition, the published research indicates that the particles need to have freshly fractured surfaces.

6.17 There is no New Zealand ambient air quality guideline for quartz, however the Texas Commission for Environmental Quality has a short term (1 hour) Environmental Screening Level[4] of 14 µg/m^3.

6.18 This value is essentially the same as ambient concentrations of PM_{10} in the area, and it is extremely unlikely that residents will be exposed to concentrations that would give rise to any effects, especially given the distances between the quarry activities and the residents.

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[3] About a sixth the size of a human hair.

[4] These are levels which do not indicate that there will be a health effect, but rather are a trigger for further investigation.

6.19 In addition, the mitigation measures that are proposed for the quarry activities to mitigate dust will also control any quartz that may be generated.

The potential for adverse effects from PM_{10}

6.20 PM_{10} is one of the main air pollutants in New Zealand, and because of this, there is a National Environmental Standard (NES) of 50 µg/m³ as a 24-hour average. In New Zealand, the main sources of PM_{10} are combustion discharges from vehicles and home heating.

6.21 There is potential for there to be some PM_{10} emissions associated with McPhersons Quarry, primarily from the exhausts on the machinery operating on the site. However, the number of vehicles is such that it is extremely unlikely that there will be any measurable impacts from these discharges on the concentrations of PM_{10} in the local area.

6.22 For quarries, apart from vehicle emissions, PM_{10} has the potential to be generated by size reduction activities, particularly around the crushers. I have reviewed monitoring data undertaken at another quarry where PM_{10} monitoring was undertaken in the area immediately adjacent to the crusher. While this was undertaken over a short period of time the average value measured over this period was 25 µg/m³ or half the NES.

6.23 Based on the boundary PM_{10} monitoring I discussed earlier, the typical measured values are between 10 to 15 µg/m³ which is comparable with the background levels measured at Patumahoe.

6.24 Consequently, given the low existing background levels, and based on the monitoring I have done, there no evidence that a quarry of the size and nature of McPherson Quarry will generate significant levels of PM_{10}.

6.25 Again I note that the mitigation measures proposed to control general dust will also control PM_{10} therefore, it is my opinion that there is little potential for activities from McPherson Quarry to result in any adverse health from PM_{10} emissions

Controlling dusty activities during high wind speeds.

6.26 The AEE makes the comment that the site will avoid screening and crushing in dry windy conditions, and a number of submitters have raised concerns around how this will be implemented.

6.27 I note that undertaking these type of activities during windy conditions doesn't necessarily mean that this will result in off-site dust effects, as other factors such as wind direction and distance from the source are also important factors.

6.28 In the past I have recommended that similar activities install weather stations that are capable of sending out alerts. These alerts can be trigged based on wind speed and wind direction, and I have seen these used with good results.

6.29 If a weather station was to be installed, alerts should be set up to warn the operator when wind speeds are above 5 m/s. If this alert was to happen, the operator will assess if the activity is upwind of a dwelling and is taking place within 300 metres of that dwelling. If this is the case then work should stop or appropriate mitigation undertaken.

Water demand for dust suppressant is based on historical data.

6.30 The AEE has calculated water demand for dust suppression based on water usage of the water cart and sprinklers and the number of dry days. A number of submitters has raised concerns that the rainfall data used in the AEE was historic and might not accurately reflect present conditions.

6.31 There are a number of ways to determine the amount of water required for dust suppression, and I consider that the method used in the AEE is an acceptable method to use. However, to further address the concerns of some submitters I have used a different approach which is based on evaporation rates.

6.32 The site currently has a water take consent that allows for a water extraction rate of 50 m^3 per 24 hours. However, I understand that the site has applied for a consent to take 430 m^3 of water per day.

6.33 While there could be a number of activities on site that might generate dust, not every activity will require water for dust suppression, particularly if they are a significant distance from a sensitive receptor. Therefore, to assess water demand I have considered all sources of dust within 300 metres of a dwelling.

6.34 Based on this distance there is approximately 0.3 hectares of open area that has the potential to generate dust.

6.35 Using the highest evaporation rate measured at Patumahoe (October 2017 – September 2020) of 6.6 mm/day (Penman ET) and the open area of 0.3 hectares, the site would need a maximum of 20 m^3 of water to suppress dust in these high risk areas. This would allow 30 m^3 (based on the current consent) to use in other areas such as the processing plants or cleanfill area.

6.36 Therefore, I consider that the site currently has sufficient water to control dust on site, and that with the proposed additional take, there is more than sufficient water for dust control purposes.

7. COMMENTS ON SECTION 42A REPORT AND CONDITIONS

7.1 I have reviewed the sections of the WRC S42A report that relate to air quality.

7.2 I note that in preparing this report the Officer had not had the benefit of reading my evidence, which addresses a number of the issues that he raises.

7.3 Therefore, while I for the most part agree with the Officer there is one issue where we have reached different positions.

7.4 Consequently, I have concentrated on the area where our views are different in the following section of my evidence.

7.5 On page 29 of the Officer's report there is a discussion on the quantity of water required to control dust on site. I have discussed this in paragraphs 6.28 to 6.34, and in short I understand that the quantity of water that is available will be greater than the 50 m^3 quoted by the Officer and in any event is sufficient to control dust, due to the distance between the potential sources and the receptors. I also note that apart from when overburden is being removed or placed, the operation of a quarry is different to a large earthworks site, which the Officer has based his assessment on.

7.6 I note that we have also proposed that there are more stringent controls put in place when works are closer to the site boundary, such as wind speed controls, and for locations such as the access road, which mean that dust effects should be able to be controlled to an appropriate level

which meets the tests set out in the proposed resource consent conditions.

Conditions

7.7 Conditions in relation to dust discharges are set out in the Schedule One General Conditions. For the most part these conditions are standard ones that are applied to quarries, and I consider them appropriate.

7.8 However I have comments on some of the conditions which are set out below with my additions in **bold** and deletions in ~~strikethrough~~.

7.9 Condition 13 appears to have been copied from another consent so I have set out below a revised version which is more appropriate for the McPherson Quarry.

7.10 The most significant change is to clause "g", where the requirement to install a wheel wash has been removed. I do not consider that this is necessary in this instance, primarily because the access road is on a slope and the use of the sprinklers as trucks enter and exit the site will have a similar effect. In addition, McPherson is proposing to seal the first 40 metres from McPherson Road.

The consent holder shall operate mining and associated processes and other operations in such a manner that the emission of dust, smoke and odours are reduced to a practicable minimum, in accordance with at least the following measures.

a) The use of water carts or sprays to suppress dust from ~~coal~~ extraction and handling, topsoil and overburden removal, handling and storage, and from site access roads, haul roads and other frequently trafficked areas, on an as required basis;
b) The revegetation of disturbed land which is currently not being worked;
c) The regrassing of topsoil stockpiles;
d) Surface remediation of the **cleanfill**~~OPA~~ and any bunds to promote vegetation cover as soon as possible after working areas are completed
e) Where practical, locating topsoil stockpiles where they provide wind protection for exposed/excavated areas;
f) Restricting vehicle speeds on dry days and during periods of strong wind;
g) ~~The installation of a truck wash near the site exit, and~~ **C**~~c~~onstruction and maintenance of a sealed section of road between **the site access road** ~~it~~ and the public road; and

h) Covering or dampening of loads on vehicles leaving the quarry which could create a dust nuisance.
i) Use of fixed sprinkler systems for dust control **on the site access** ~~**road**and around the site offices and coal stockpiles~~

7.11 Given the nature of the site, I do not consider that the wording in Condition 27 is correct, nor is the 400 metre zone consistent with good practice as discussed in paragraph 3.4. My proposed amended wording is set out below.

The consent holder shall cease excavation ~~and~~ **of** overburden ~~placement activities~~ within **300**~~400~~ metres of dwelling locations immediately north of the mine **in dry weather conditions** when the wind is blowing from the south and the wind speeds exceed 10 metres per second, as verified by the sites weather monitoring station

7.12 Similarly there are changes required to condition 28 for the same reasons, and to ensure consistency with the Application.

The consent holder must ensure that overburden **and cleanfill** placement, **and** rehabilitation activities ~~and the spreading of topsoil is avoided~~, within **300**~~400~~ metres of dwelling locations **west and southwesteast and northeast** of the **cleanfill area** ~~OPA~~ **during dry conditions** when the wind is blowing from the direction of the **cleanfill**~~OPA~~ towards those properties and wind speeds exceed 10 metres per second, as verified by the sites weather monitoring station.

8. CONCLUSION

8.1 I have undertaken an assessment of the potential for dust to result in off-site effects. It is my opinion that with the mitigation measures proposed in the Application, together with the additional measures I have recommended, including monitoring, that there is a low potential for off-site dust effects.

8.2 I do not consider that there is any risk of effects associated with $PM_{10,}$ based on my experience at other sites, nor do I consider that the presence of the quarry activity significantly changes the quantity of silica that exists in the local area or the risk from crystalline silica.

8.3 I consider that with the changes I have proposed that the consent conditions proposed by the WRC are appropriate.

Andrew Ferguson Curtis

13 November 2020

Figure 1 Contours of the surrounding environment

Figure 2 Potential Sensitive Receptors

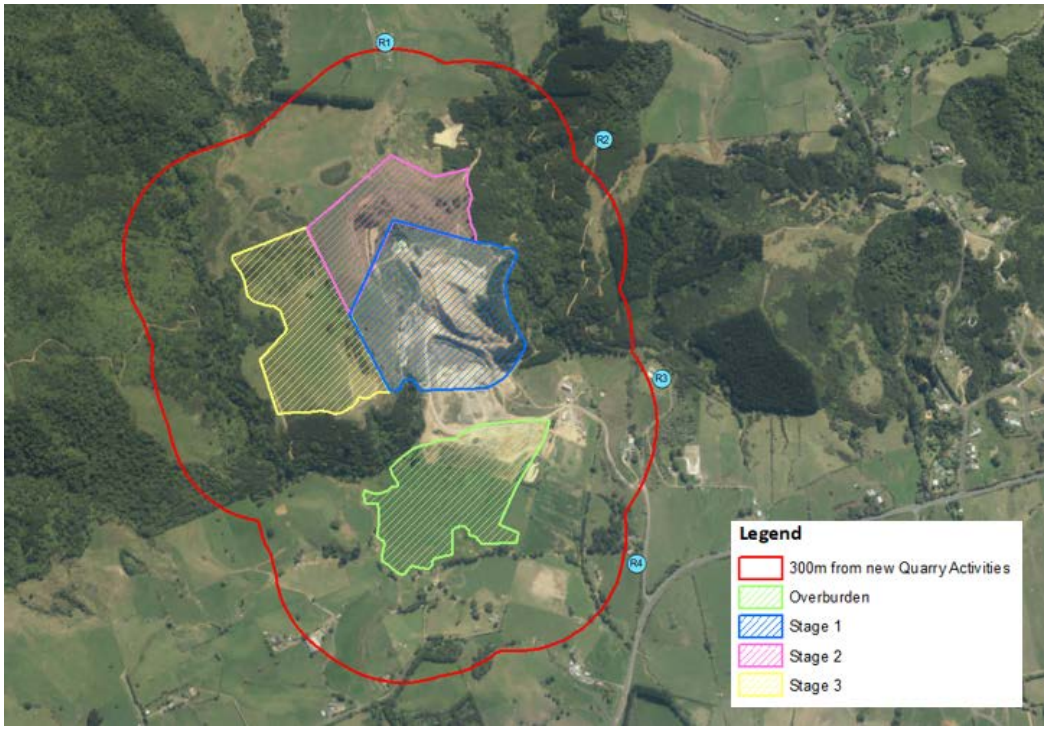

Figure 3 One hour Average TSP Concentrations

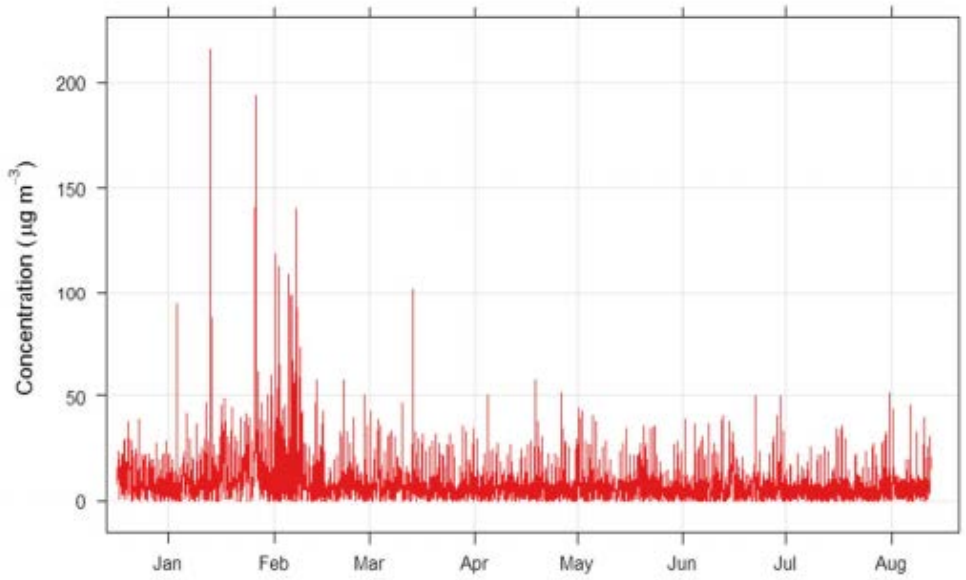

Figure 4 24-hour Average TSP Concentrations

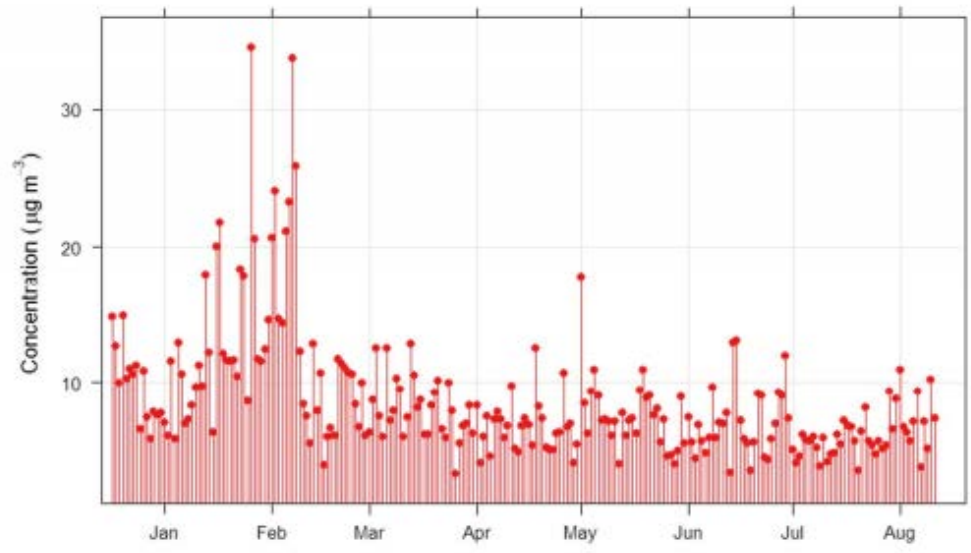

Figure 5 24-hour Average PM_{10} Concentrations

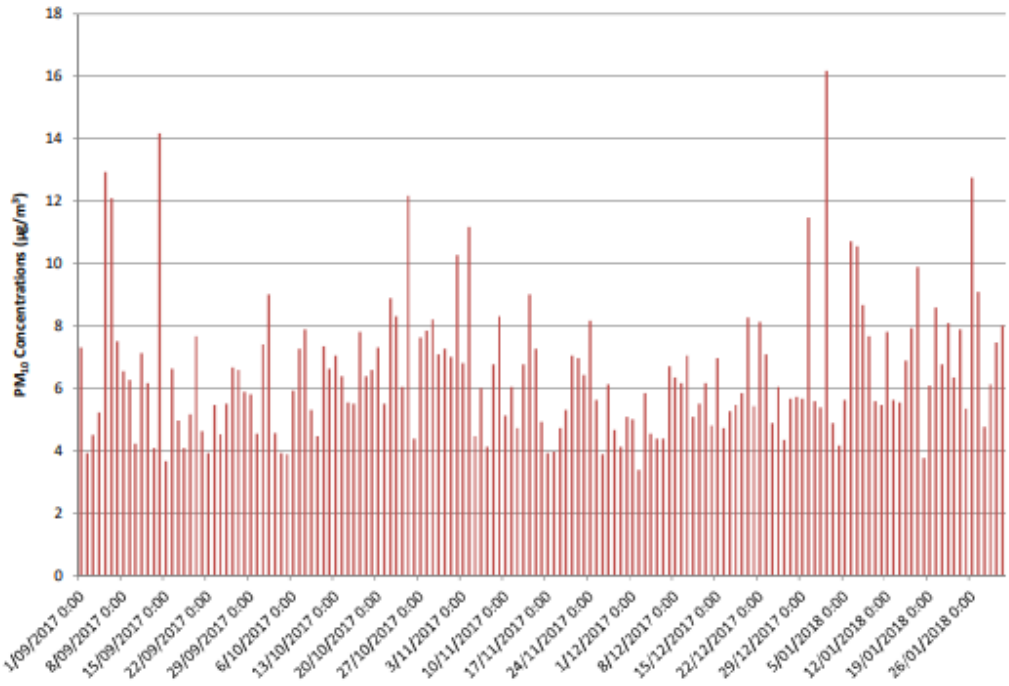

Figure 6 Auckland Council 2007 CALMET dataset centred on the site

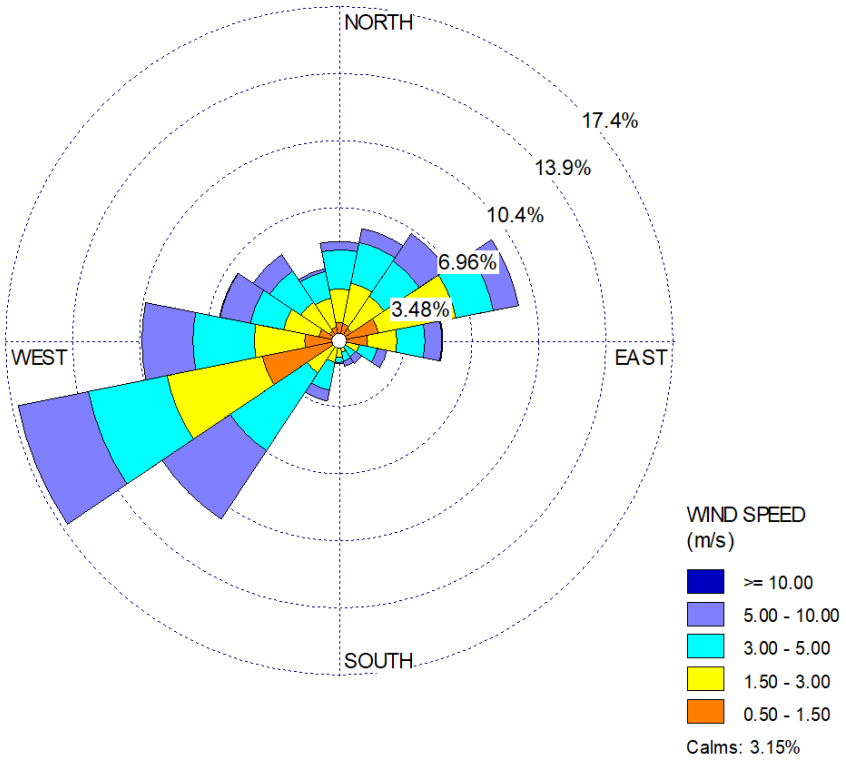

Figure 7 Silica sampling locations

Quartz Results	
Location	**Quartz Content (%)**
Irish Road	37
Cone Crusher	30
Pit Run	42
Access Road	33
State Highway 2	27