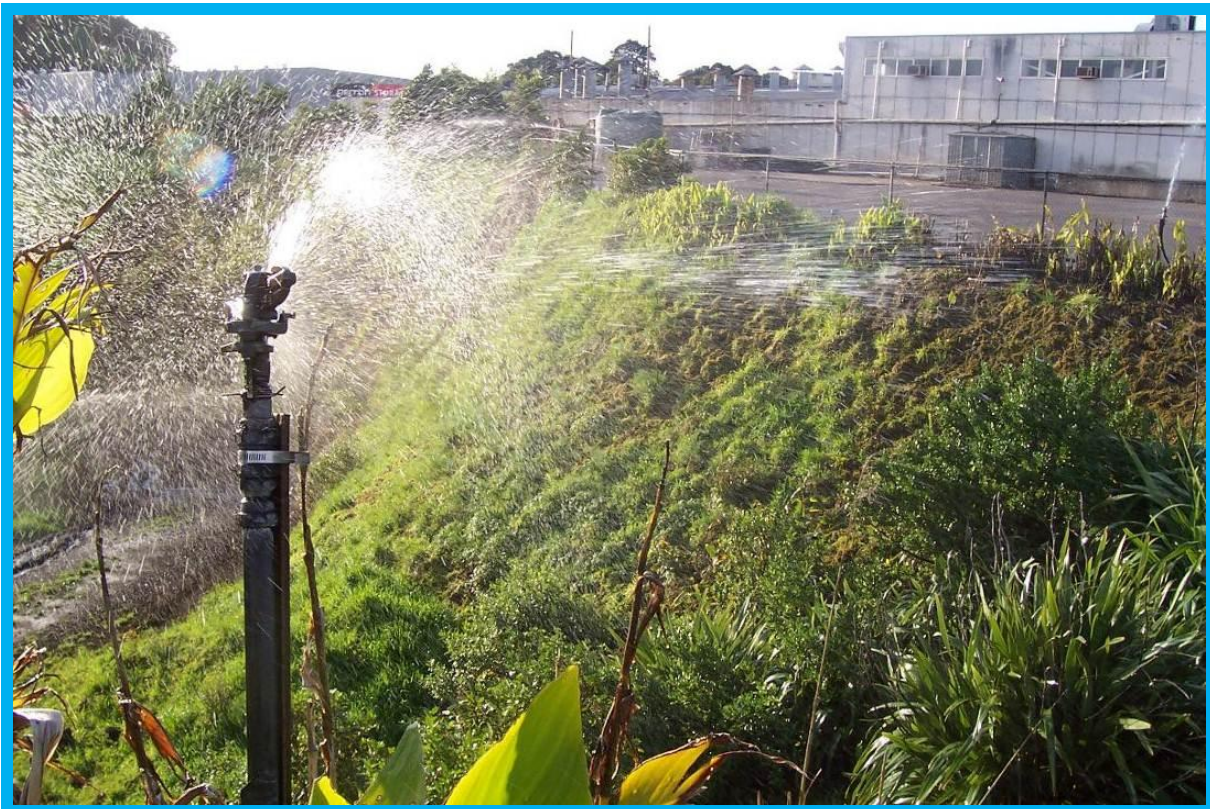


May 2015 ~~February 2012~~

Three Kings Air Quality Management Plan

An Air Quality Management Plan for the Three Kings Quarry is required by condition 2625 of the Air Discharge Permit for Three Kings Quarry (Permit No 4004121875)



Note: This plan is subject to change. The Site Manager or Consent Authority
~~Quarry Manager~~ should be contacted to ensure the latest version is being viewed.

Text Revised - May 2015
Appendices Updated - May 2015

Table of Contents:

1. Introduction

2. Purpose and Objective of the Plan

3. Resource Consent Requirements

- 3.1 Requirement to Prepare an Air Quality Management Plan
- 3.2 Limit Conditions
- 3.3 Process Conditions
- 3.4 Expiry of the Air Discharge Permit
- 3.5 Permitted Activity Standards

4. Relevant Documents

- 4.1 Locations of Documents

~~4.2 Guidelines~~

5. Roles and Responsibilities

- 5.1 Winstone Aggregates
- 5.2 Auckland Council
- 5.3 Technical Experts

6. Specific Plan Components

- 6.1 Overall Requirements
- 6.2 Consultation
- 6.3 Training

7. General Description of Quarry Operations

- 7.1 Extraction
- 7.2 Crushing and Screening
- 7.3 Stockpiling
- 7.4 Loadout and Transport
- 7.5 Incoming Fill
- 7.6 Fill Placement

8. Dust Suppression Methods

- 8.1 Reticulated Dust Suppression System
- 8.2 Excavation and Blasting
- 8.3 Crushing and Screening
- 8.4 Stockpiling
- 8.5 Loadout, Transport and Transfer Operations

9. Additional Dust Control Measures

- 9.1 Vehicle Speed Limit
- 9.2 Water Cart Management Procedure
- 9.3 Wheel Wash
- 9.4 Truck Spillage
- 9.5 Vehicle Exhausts
- 9.6 Vegetation
- 9.7 Water Supply
- 9.8 Limitation on Extraction, Processing and Stockpiling
- 9.9 Procedure for the Relocation of the Processing Plant

10. Monitoring

- 10.1 Total Suspended Particulate Monitoring
- 10.2 Video Recording of Blasting
- 10.3 Video Monitoring of General ~~Site Quarry~~ Operations
- 10.4 Weather Station
- 10.5 Daily Air Permit Log
- 10.6 Complaints
- 10.7 Summary of Monitoring Requirements

11. Reporting and Recording

- 11.1 Quarterly Reporting
- 11.2 Biennial ~~Bi-annual~~ Reporting
- 11.3 Blast Notification
- ~~11.43~~ Additional Reporting
- ~~11.54~~ Records

12. Contingency Plan for Air Quality Exceedances

13. Audit and Review of Air Quality Management Plan

APPENDICES

APPENDIX 1: Key Monitoring Features Layout ~~Operational Location~~ Plan

APPENDIX 2: Air Discharge Permit 4004121875

APPENDIX 3: TSP Monitoring Plan & Correspondence

Abbreviations:

AQMP: Air Quality Management Plan

AC: Auckland Council

BAM Beta Attenuation Monitor

Hi-vol: High Volume TSP Sampler

~~QOP: Quarry Operations Plan~~

~~TLVCR: Time lapse Video~~

TSP: Total Suspended Particulate

SLG: Site Liaison Group

~~USEPA: United States Environmental Protection Agency~~

1. Introduction

An Air Quality Management Plan for the Three Kings Quarry is required by condition ~~2625~~ of the Air Discharge Permit for Three Kings Quarry (Permit No ~~4004121875~~) granted ~~February 2015~~~~August 2002~~ (Appendix 1). Permit No 40041 was granted following the application made by Winstone Aggregates to renew the site's Air Discharge Permit No 21875 which expired on 1 August 2012.

Air Discharge Permit ~~4004121875~~ authorises dust emissions to air from quarry operations at the Three Kings Quarry provided that beyond the boundary of the site there shall be no odour, fume or dust which is noxious, offensive or objectionable. Discharge to air from the fill activity is classified as a permitted activity under Rule 4.5 of the Auckland Council Regional Plan: Air, Land and Water (2013) ~~Proposed Auckland Regional Plan: Air Land and Water (discharge of contaminants to air from earthworks)~~ and therefore does not require separate resource consent.

This Air Quality Management Plan records all management, monitoring and operational procedures necessary to comply with the conditions of the Three Kings Quarry Air Discharge Permit.

The Key Monitoring Features Layout ~~Operational Location~~ Plan (~~Appendix~~Figure 1) shows the general layout of Three Kings Quarry, including the operational areas and ~~air quality~~ monitoring points.

2. Purpose and Objective of the Plan

The purpose of this plan is to document all management, monitoring and operational procedures required to achieve compliance with Air Discharge Permit ~~4004121875~~ and the permitted activity standards of Rule 4.5 of the Auckland Council Regional Plan: Air, Land and Water (2013) ~~PARP: ALW~~.

The objective being to avoid, remedy or mitigate any adverse effects of particulate due to quarry/fill activities beyond the boundary of the site.

A copy of this management plan shall be kept on site at all times and will be available for use by site personnel at all times.

3. Resource Consent Requirements

3.1 Requirement to Prepare an Air Quality Management Plan

Condition ~~2625~~ of the Air Discharge Permit requires the following:

An Air Quality Management Plan (AQMP) which accurately records all management, monitoring and operation procedures necessary to comply with the conditions of this consent shall be maintained. The AQMP shall include, but not be limited to, details regarding the following:

- (a) dust suppression methods for stockpiles, crushing, screening and transfer operations including details relating to water sprays on any permanent stockpiling equipment;
- (b) operation of the reticulated dust suppression system;
- (c) any other relevant dust suppression techniques to be used on site; and

(d) all relevant monitoring procedures required by conditions 19 to 24 including procedures for dealing with elevated dust levels as required by conditions 21 and 22.

The AQMP shall be submitted to the Team Leader – Air Quality for review on the written request of the Team Leader – Air Quality. Any subsequent changes shall also be submitted for review. The Team Leader – Air Quality will advise the Consent Holder, in writing, if any aspects of the Management Plan are considered to be inconsistent with achieving the provisions of this consent.

~~The consent holder shall maintain an Air Quality Management Plan, which accurately records all management, monitoring and operation procedures necessary to comply with the conditions of this consent. The Air Plan shall include, but not be limited to, details regarding the following:~~

- ~~1) Dust suppression methods for stockpiles, crushing, screening and transfer operations including details relating to water sprays on any permanent stockpiling equipment;~~
- ~~2) Operation of the reticulated dust suppression system;~~
- ~~3) Any other relevant dust suppression techniques to be used on site; and~~
- ~~— All relevant monitoring procedures required by conditions 19 to 23 including procedures for dealing with elevated dust levels as required by conditions 20 and 21.~~

3.2 Limit Conditions

The Air Discharge Permit states limit conditions which operations at Three King's Quarry are required to meet. These conditions are 6, 7, 8 and 9-5, 6 and 7. Further requirements are detailed within condition 59 of the AC amalgamated consent conditions which authorise filling.

Air Discharge Permit

“Condition 65:

~~The consent holder shall, at~~At all times, quarrying processes on site shall be operated, maintained, supervised, monitored and controlled~~all processes on site~~ so that emissions authorised by this consent are maintained at the minimum practicable level.

“Condition 76:

~~That beyond~~Beyond the boundary of the site there shall be no odour, fume or dust caused by discharges from the site which, in the opinion of an enforcement officer, are noxious, offensive or objectionable.

“Condition 87:

~~That Quarrying activities, including~~ blasting, crushing, screening, transporting of rock ~~and other activities on site~~ with the potential to which generate dust shall be undertaken to ensure visible discharges to air are kept below levels which, in the opinion of an enforcement officer, are noxious, offensive or objectionable.

Condition 9:

The operation of the Three Kings Quarry shall not exceed:

- (a) an extraction rate of 100 tonnes per hour;
- (b) a crushing rate of 200 tonnes per hour; and
- (c) a screening rate of 200 tonnes per hour.

Fill Permits

~~“Condition 59: of the Auckland Council amalgamated consent conditions states:~~

All necessary actions shall be taken to ensure compliance with the regional discharge air permit 21875 to prevent dust nuisance from the filling to neighbouring properties and public roads, reserves and areas outside of the subject site. These include, but shall not be limited to:

- (a) Staging of areas of works*
- (b) Retention of existing vegetation and bunds around the perimeter of the site*
- (c) The installation and maintenance of wind fences and where practicable vegetated strips as the fill level rises*
- (d) Watering down of internal haul roads which are not metalled or adequately sealed*
- (e) Watering down fill materials which are dry and/or contain dust substances*
- (f) Suspension of fill operations if necessitated by the prevailing weather conditions*
- (g) Providing dust suppression monitoring records to the Manager on a 3 monthly basis after commencement of the fill activities to ensure ongoing compliance with this condition”.*

3.3 Process Conditions

The Air Discharge Permit defines process conditions which operations at Three King’s Quarry are required to meet (conditions ~~108~~ to 18) as follows:

- *techniques used for excavating rock, blasting and drilling which minimise dust emissions*
- *crushing, screening and transfer operations which minimise dust emissions*
- *procedures to ensure that dust from the yard, quarry floor and all internal roads is kept to a practicable minimum at all times (including during non-working hours)*
- *to limit vehicle speeds within the site to a maximum of 20 km/hr unless the road or route is visibly damp and vehicles do not raise visible dust*
- *the location, construction and management of stockpiles to minimise dust emissions*
- *the installation and maintenance of a suitably designed wheel wash*
- *the operation of a automatic reticulated dust suppression system around the perimeter of the quarry working area*
- *the maintenance of water supplies for dust control measures*
- *the rehabilitation of quarry batters*
- *to limit extraction, processing and stockpiling to the existing quarry operational area*
- ~~*the procedure for the notification of the removal of the processing plant and the location of the new plant and any mitigation measures for moving the plant and operating at a new location*~~

3.4 Expiry of the Air Discharge Permit

The permit to discharge contaminants to air (Air Discharge Permit ~~40041-21875~~) will expire on 1 March 2020~~August 2012~~.

~~It is Winstone Aggregates intention to renew this permit prior to this date.~~

3.5 Permitted Activity Standards

Rule 4.5.1 of the Auckland Regional Council: Proposed Air Land and Water Plan states:

- (a) That beyond the boundary of the premises where the activity is being undertaken there shall be no noxious, dangerous, offensive or objectionable odour, dust, particulate, smoke or ash; and*
- (b) That there shall be no noxious, dangerous, offensive or objectionable visible emissions; and*
- (c) That beyond the boundary of the premises where the activity is being undertaken there shall be no discharges into air of hazardous pollutants that does, or is likely to, cause adverse effects on human health, ecosystems or property; and*
- (d) That beyond the boundary of the premises where the discharges into air of agrichemical or paint or powder coatings is being undertaken there shall be no drift or overspray from the application.*

4 Relevant Documents

Reference should be made to the Three Kings Quarry Management Plan, and the current TSP Monitoring Plan (dated April 2007) and associated correspondence (Appendix 3) and documents submitted to the Auckland Council associated with the application for a resource consent to discharge contaminants to air (application dated 31 January 2012~~24 February 2000~~). Reference should also be made to the "Assessment of Air Quality Effects from the Proposed Cleanfill at the Winstone Aggregates Three Kings Quarry – Final Report, URS New Zealand Ltd, 30th July 2008.

The TSP Monitoring Plan has been undated as of April 2007 to include the addition of a continuous TSP (total suspended particulate) monitor, the BAM (Beta Attenuation Monitor), to the monitoring programme. Approval of the April 2007 TSP Monitoring Plan is contained within correspondence from AC received 3 July 2007 (Appendix 3).

4.1 Location of Documents

A copy of the following documents will be maintained in the office at Three Kings Quarry and will be made available for use by all staff and site visitors as is reasonably required.

- Air Quality Management Plan.
- Dust monitoring records and associated reports.

In addition, the following plan will generally be available at the quarry office.

- Three Kings Quarry Management Plan.

Records are periodically archived in secure storage.

4.2 Guidelines

~~TSP sampling shall be completed and analysed in accordance with USEPA "Std Methodologies" Std high Vol. Sampler or equivalent.~~

5 Roles and Responsibilities

5.1 Winstone Aggregates

The Three Kings ~~Site Quarry~~ Manager is responsible for, and manages all site operations. Winstone Aggregates, as the consent holder, has a general responsibility to implement all consent conditions, to abide by this Management Plan, as well as all other Management Plans relevant to the operation.

5.2 Auckland Council

The ~~Manager of Team Leader~~ - Air Quality, Auckland Council is responsible for the suitability of this AQMP as well as regulating compliance to permit ~~4004121875~~. Condition ~~2625~~ of permit ~~4004121875~~ states that the Manager will advise Winstone Aggregates, as the consent holder, in writing, if any aspects of the ~~AQMP Air Quality Management Plan~~ are considered to be inconsistent with achieving the provisions of this consent.

The Auckland Council also has enforcement officer duties and assesses the operation in terms of compliance with the air discharge permit.

5.3 Technical Experts

Technical experts are, at times, required to provide advice and technical expertise on the operation. An understanding of consent conditions and this management plan is required.

6 Specific Plan Components

6.1 Overall Requirements

The overall requirement of this management plan is to comply with the conditions of Air Discharge Permit ~~4004121875~~ and the permitted activity standards of Rule 4.5 of the ~~Auckland Council Regional Plan: Air, Land and Water (2013) PARP: ALW~~. It provides a platform to efficiently monitor dust (particulate) emissions associated with the quarrying, processing, stockpiling and transport of aggregates. In addition, it provides a platform to efficiently monitor dust (particulate) emissions associated with the placement of fill.

It contains operational procedures, monitoring plans, reporting and contingency plans relating to control of dust emissions.

6.2 Consultation

Winstone regularly consults with interested parties, in particular the Three Kings Quarry Site Liaison Group. The members of the Three Kings Quarry Site Liaison Group, at the Site Liaison Group meeting, will be informed of monitoring results obtained since the previous Site Liaison Group Meeting.

6.3 Training

The success of this ~~AQMP Air Quality Management Plan~~ depends on appropriate actions by site personnel in day to day operations of Three Kings Quarry. Training will be provided to staff during

site inductions and regular site operation meetings. A Health, Safety and Environmental meeting is held monthly where staff attendance is mandatory. These meetings assess the site activities and any incidents or complaints of the previous month and commit to any required actions for the next. ~~environmental meetings~~ On site practices relating to minimising dust emissions together with procedures for reporting and dealing with dust emissions are reviewed as required ~~they arise~~.

Job descriptions and annual training reviews will identify individual staff training requirements in aspects of the control. The ~~Site Quarry~~ Manager or representative Environmental Coordinator will oversee training, and ensure that it is appropriate. Staff training records will be maintained and available for inspection by AC for the duration of the relevant consents and two years thereafter. ~~and kept within the Quarry Operations Plan.~~

Procedures active at Three Kings Quarry ensure that mitigations described within this AQMP Air Quality Management Plan ~~are maintained and obligations are fulfilled~~. Specialist training will be provided as required to personnel involved in the following areas:

- Collection of TSP data ~~samples~~
- Recording and Processing of Data
- Download of Meteorological Data
- Data Storage
- Reporting

7 General Description of Site Operations

Winstone has operated a scoria quarry at Three Kings since the 1920s. Quarrying has occurred in the general location for over 150 years. The site area is 15.184 ha, with adjacent land to the immediate north, south and southwest having previously been quarried. Some of that previously quarried land has also been rehabilitated by filling, and some of it has subsequently been developed.

Until 2011 the predominant operations at Three Kings have been quarrying, involving extraction of rock resource, processing, stockpiling and load out.

In 2012, rehabilitation of the site ~~is expected to~~ commenced through backfilling of the void created by scoria extraction using imported fill material.

Fill material is typically the surplus soil resulting from development site excavations, (e.g. from sub-divisions, roads, commercial and residential structures etc.) from other parts of the Auckland region.

For a period of time resource extraction, processing, stockpiling, load out, and fill activities ran ~~will be~~ concurrent. When extraction ceaseds, stockpiling and load out ~~quarrying~~ activities ~~will~~ continue utilising aggregates imported from other quarries. As filling progresses it may enable access to additional scoria resource which may be extracted, processed and stockpiled for use or sale depending on the feasibility assessed at that time.

Quarrying

The following describes typical quarry activities which occur at Three Kings. A key aspect of the Three King's Quarry is that the rock resource is predominantly damp scoria which can generally be extracted without the need for blasting.

7.1 Extraction

Scoria is generally extracted ~~from the quarry floor~~ using an excavator or bulldozer as required. However, layers and irregular masses of harder basalt rock are often present amongst the predominant scoria material. This harder basalt may require drilling and blasting or the use of a rock hammer to extract.

7.2 Crushing and Screening

Extracted rock is crushed and screened using a mobile crushing and screening plant, located on the quarry floor. The processing plant is generally enclosed with the processed material being transported to the stockpile area using a wheeled loader as the product is processed.

7.3 Stockpiling

Product is removed from the processing plant at various points and transported by wheeled loader to the stockyard prior to sale.

Unprocessed rock and scoria or imported materials are also stockpiled within the stockpile area.

7.4 Loadout and Transport

Road trucks are loaded with aggregate within the stockpile area using a wheeled loader and are dispatched from the site via a weighbridge. Prior to exiting the site, all trucks which enter the quarry or stockpile area must pass over a wheel wash.

Fill Placement

In 2012, rehabilitation of the site ~~is expected to~~ commenced through backfilling of the void created by scoria extraction using imported fill material. Fill is transported by trucks, or trucks and trailers, and placed progressively by earth moving machinery in layers across the site. The procedures to address fill material quality and acceptance are ~~to be~~ discussed in the Fill Management Plan (FMP).

The following describes typical fill activities which will occur at Three Kings.

7.5 Incoming Fill

All vehicles transporting fill shall report to a designated reception area at the site entrance ~~off of~~ Mt Eden Road. A suitable trained person shall inspect all incoming loads and these inspections shall be documented and subject to internal quality procedures and audit which shall be reported to the Manager (AC) on an annual basis. Once all the requirements of the Fill Management Plan have been met the truck driver will be directed to the tip head.

7.6 Fill Placement

During summer months, trucks will back up over previously deposited fill and tip off at a safe distance from the tip face as directed by a spotter or machine operator. Tipped loads are pushed clear, spread in layers and will be compacted according to material type ~~—e.g. granular, cohesive, rubble etc.—~~ and according to the spatial location in the body of the fill.

In winter, if required, a tip head or tip dock which trucks reverse up to may be ~~designed and~~ constructed. This would be at the edge of the tip face with a hardened access and turning area for the trucks to traverse. Fill loads are then deposited over the tip dock, and an excavator used to lift the fill material from the trench and deposit for a bulldozer to push out.

7.7 Fill Placement/Rejection and Air Quality

A key aspect of fill placement is that the materials will generally be damp and consequently unlikely to generate any significant levels of dust during placement.

Furthermore, it is important to state that material placed on the site must meet the definitions within the Three Kings Fill Management Plan. This means it will not contain contaminants that have the potential to be harmful to human health or the environment.

However, as a contingency measure Section 4.6 of the Fill Management Plan addresses the procedures in place when fill material is rejected from the site (due to any of the reasons detailed in the Fill Management Plan). As part of the fill rejection procedures air quality will be taken into account in that the material will be appropriately stored / handled to minimize any discharges to air ~~(including compliance with relevant Department of Labour Guidelines)~~.

8 Dust Suppression Methods

Winstone personnel will be made aware of all potential adverse effects of dust emissions and shall be active in identifying actual and potential dust sources.

Results of visual monitoring shall be recorded in the daily air permit log, dated and signed by the person entering the information. Although Winstone personnel are instructed to keep an eye out for dust emissions, the Site Manager or representative Quarry Manager and the Environmental Coordinator are to ensure that dust emissions from the site are within the consented limits.

The control of dust emissions at Three Kings Quarry is undertaken by a number of measures outlined below. Actual measure(s) used to control dust emissions in any given situation is dependent on factors such as location of source, current site quarry activities being undertaken, wind strength, speed and direction, and shall be determined in practice by the Site Manager or representative Quarry Manager or Environmental Coordinator.

8.1 Reticulated Dust Suppression System

An automated fixed water sprinkler system is located around the perimeter of the quarry working area in order to keep upper quarry benches and main access roads in a damp condition. The water sprinklers are spaced at 10 to 15 metre intervals in order to maximise the effectiveness of the sprinkler system as a dust suppression measure. The sprinklers use an automated timing system where individual zones operate on a continuous rotation around the perimeter of the site.

These sprinklers will generally be able to be used 24 hours a day, 7 days a week, 365 days a year provided the water supply is maintained.

Contingency measures will be put in place (such as using mains water or an alternative water supply) should the existing municipal supply ~~Metrowater~~ bore not be able to provide sufficient water to the sprinklers for any period of time (section 9.7).

Automated timing of the sprinklers is controlled from the weighbridge and is usually activated at all times. The timing and duration of the rotation of the sprinklers is able to be carried such that one part of the quarry could receive more water as required should the need arise.

The sprinkler system also maintains vegetation cover on the upper faces and benches, further reducing the potential for dust emissions arising from these areas.

8.2 Excavation and Blasting

Scoria is generally of a damp condition and dust emissions during extraction are minimal. A water cart is used to dampen haul roads throughout the site and to dampen any stockpiled material, should dust emissions occur.

Dust suppression during blasting will consist of measures such as the wetting of rock prior to blasting. Blast hole drilling rigs will be fitted with dust suppression and dust collection equipment.

8.3 Crushing and Screening

A mobile crushing and screening plant, ~~located on the quarry floor~~ is typically used to process the excavated basalt and scoria. Water sprays are not fitted on the processing plant, as the material being processed is generally damp and does not emit significant amounts of dust during processing.

Processed material is generally removed from around the processing plant as it is produced and stockpiled within the stockpile area. Haul routes from the processing plant are watered as required to reduce emissions of dust arising from vehicle movements.

8.4 Stockpiling

Stockpiles are currently located in a stockyard in the south-west section of the site. Stockpiles may be relocated as the fill operations progress. The location of the stockpile/stockyard, volume of stock and stock types will be detailed in the biennial report due by 1 November every two years starting in 2015 ~~on the floor of the quarry area.~~

Dust emissions from the stockpile area are suppressed by water from a water cart. The water cart also has a fogging facility to dampen stockpiled material as required.

8.5 Loading, Transport and Transfer Operations

The quarry haul roads are regularly dampened by the water cart especially when visual checks have identified dust to be rising with vehicle movements. The fixed sprinkler systems installed around the perimeter of the quarry also dampens main haul roads to and from the weighbridge and stockpile areas.

The site entrance is sealed from the quarry entrance to the haul road. Regular maintenance such as sweeping and repair holes are undertaken to minimise any dust nuisance created by vehicles entering or exiting the site.

All Winstone employed drivers are required to cover loads when delivering or taking aggregate~~which leave the site~~. All other drivers (including owner drivers/contractors) will be requested to cover loads which have a potential to create a dust nuisance. A sign will be displayed near the quarry exit requesting all drivers to cover loads with a potential to create a dust nuisance.

8.6 Fill Placement

~~Because of the physics of dust movements the greatest potential for effects will occur when the filling activities are within 100 m of the site boundary, as that is when the greatest potential exists for dust, if it is generated, to be carried off site. Furthermore, there will be limited potential for off site dust nuisance from the fill activities, until the filling reaches ground level. Consequently, the mitigation measures discussed below primarily relate to that time. The exception is the potential for dust from haul roads which have the potential to occur as soon as the activity starts.~~

For the fill component of the Three Kings operation the most important dust control technique is the management of the material that is brought onto the site. Winstone Aggregates will implement strict controls to determine materials meet the acceptance criteria in the Fill Management Plan. This means that potentially dusty materials will not be tipped, unless they have been dampened or otherwise stabilised. Drivers or companies that falsely declare loads that are dusty will be dealt with through the Incidents and Complaints Procedure which is detailed in the Fill Management Plan~~required to pay for any clean up required, and may be excluded from tipping if they repeatedly infringe~~.

The other mitigation measures that can be used to minimize dust emission from the placement of fill include:

Considering Meteorological Conditions

By reviewing meteorological conditions before undertaking tasks it is possible to avoid effects. For example, using alternative tipping locations within the site that are more than 100 meters from the site boundary if there is a strong wind (greater than 10 m/s) blowing towards the boundary.

Minimise Exposed Areas

Because of the relatively confined space within the quarry footprint and the need to move the tipping faces around the site it is not considered practical to further minimise the exposed area. However, Winstone Aggregates will develop dedicated haul routes within the site that will be used by trucks and thereby minimise surface disturbance. These haul routes are watered as required to reduce emissions of dust arising from vehicle movements.

Dampening with Water

The periodic watering of the disturbed areas of the site will be used to control dust emission of required. The amount of water and frequency of application to maintain a desired level of dust control will be a function of the season and the moisture ~~clay~~ content of the material ~~soils~~. Because of the need to control moisture content of the fill to ensure consistent compaction it is unlikely that there will be a need to water the tip areas.

Load Covering

Winstone Aggregates will insert a condition in any contract between the consent holder and any major contributor of fill requiring contractors to comply with the ~~Driver's Code of Conduct and the traffic management plan~~ (including to cover loads where necessary). For further details on the Driver's Code of Conduct refer to the Fill Management Plan. ~~Furthermore Winstone Aggregates shall use all reasonable endeavors to ensure that loads from pre-approved sites shall be covered where necessary to avoid dust nuisance.~~

9 Additional Dust Control Measures

9.1 Vehicle Speed Limit

A speed restriction of 20 km/h is generally in place within the quarry site. All vehicle speeds on unsealed roads will be limited to a maximum of 20 km/h unless the road is visibly damp, and vehicles do not raise dust. All visitors to the site quarry are requested, via a sign at the entrance, to reduce speed ~~to avoid dust emissions.~~

9.2 Water Cart Management Procedure

A water cart is operated whenever required to dampen areas throughout the site, including stockpile areas. The water cart has a fogging facility to dampen stockpiled material prior to loadout. The need for its use shall be determined in response to weather conditions and observed dust emissions on site. The water cart will be operated outside normal working hours, including weekends and public holidays as required. The water cart use, including amount of water used, is recorded in the daily water cart sheet.

9.3 Wheel Wash

To prevent the deposition of materials on public roads by vehicles leaving the site, two wheel washes have been installed. When exiting the site all vehicles that have traversed over unsealed parts of the site are required to pass through at least one of the wheel washes. At least one of the wheel washes will remain in operation at all times and for as long as the fill consents are exercised. All necessary measures, including maintenance of access roads and wheel washes, shall be used to prevent the deposition of sediment and any other materials on public roads by vehicles leaving the site. Should material be deposited on the road to an extent considered significant by the Manager (AC) it shall be removed immediately by Winstone. ~~A wheel wash is installed and maintained within the site and all trucks exiting from the quarry or stockpile area being required to pass over it. This is to ensure that grit and fine material is not trafficked from site and left on roads as a potential dust nuisance. The wheel wash uses high-pressure water sprays to remove residual particles that may be present on the undercarriage or wheels of the vehicle.~~

9.4 Truck Spillage

Dust emissions may be caused by the spillage of material from a truck either on site or once the truck has exited. Spilled material could further act as a source of dust emission if it is crushed by traffic movements.

Spillage from trucks will be minimised by not overloading or otherwise incorrectly loading trucks. Any spilled material noted or reported to the quarry within the sealed area of the site or in the general vicinity of the quarry, once the truck has left the site, will be promptly cleaned up.

9.5 Vehicle Exhausts

Winstone ensures that all its vehicles do not have downward facing exhausts as these may act to raise dust in dry conditions.

All Winstone vehicles are regularly maintained to ensure minimum emissions.

9.6 Vegetation

Vegetation is used to reduce the generation of dust emissions from upper quarry faces and benches. The vegetation planting is described in the document prepared by Boffa Miskell Limited, titled "Three Kings Quarry, Boundary Planting Proposal", dated 1996. A copy of this document is attached with to Quarry Management Plan.

This plan details boundary and screen planting in four areas during quarry and fill operations:

- Mt Eden road frontage;
- the internal access road;
- the western quarry face (adjacent to the Big King Reserve);
- all other quarry faces.

The vegetation is planted and maintained at all times and in such a manner as to create and preserve a visual screen for adjacent sites. Re-vegetation of quarry batters and faces is undertaken on an on-going basis where the resource is depleted or no longer plays an active part in the operation of the quarry. All areas to be re-vegetated will be planted, grassed or hydroseeded as soon as practical.

All re-vegetated areas will be monitored with appropriate maintenance and watering to maintain the planting or vegetation cover.

9.7 Water Supply

Water used for dust suppression within the site is sourced from the municipal supply ~~Metrowater~~ bore located adjacent to the southern boundary of the site. This bore has sufficient capacity to supply all the water requirements for the site-quarry.

Contingency measures will be put in place, such as using mains water or an alternative site quarry supply should the existing municipal supply ~~Metrowater~~ bore not be able to supply sufficient water for any period of time. In the event of a water shortage for dust suppression, water can be immediately brought onto site using a tanker truck. An alternative temporary supply to the municipal supply ~~Metrowater~~ bore can be generally established at the quarry within 5 working days.

9.8 Limitation on Extraction, Processing and Stockpiling

No extraction or processing will be undertaken within the north eastern corner of the site without a variation to existing conditions of consent. Refer to Appendix 1 for a plan which details this boundary~~This area is shown on Figure 1.~~

9.9 Procedure for Replacing the Processing Plant

The existing mobile crushing and screening plant may be replaced or additional processing plant may be installed. Notice will be given to the Manager (AC) at least one month prior to the mobile crushing and screening plant and associated equipment being replaced or additional plant being installed.

Details will be supplied to the Manager (AC) of the proposed replacement or additional processing plant, the location of the plant and associated equipment and any mitigation measures proposed for both moving and operating the new or additional plant.

10 Monitoring

The following monitoring will be undertaken:

- Total suspended particulate (TSP)
- Video recording all blasting and associated dust emissions
- Video monitoring of site quarry operations ~~over the summer period~~
- Wind speed, wind direction and rainfall

~~To comply with Condition 19 of the Air Discharge Permit, a "Recommended TSP Monitoring Plan" (report entitled "A Review of the TSP Monitoring Plan for Three Kings Quarry" dated April 2007) was prepared by Kevin Rolfe an independent air quality management specialist jointly selected by Winstone Aggregates, the Auckland Council, Three Kings United Group Incorporated and South Epsom Planning Group Incorporated (attached to this plan as Appendix 3). The "Approved TSP Monitoring Plan" (as contained within a letter from the Auckland Council dated 3 July 2007) is also contained within Appendix 3.~~

~~The Quarry Operations Plan (QOP) contains all relevant details and procedures relating to the carrying out of dust monitoring. The relevant chapters of the QOP are available for inspection at the quarry site, following prior arrangement with the Quarry Manager.~~

10.1 Total Suspended Particulate Monitoring

~~In accordance with Condition 19 of the Air Discharge Permit and the recommendations of the report 'A Review of the TSP Monitoring Plan for Three Kings Quarry', dated April 2007 and the subsequent information submitted as part of the application for the current Air Discharge Permit The Approved TSP Monitoring Plan requires the use of high volume (Hi vol) total suspended particulate (TSP) monitoring will be undertaken by two samplers, as well as the use of a Real Time Beta Attenuation Monitor (BAM)~~

Real Time BAM FH62

A single BAM is ~~Beta Attenuation Monitor will be~~ located at the existing site quarry ~~office site,~~ and will sample the ambient air 24hrs a day, seven days a week. ~~Alarm limits will be set to alert personnel of any exceedances that occur throughout the day, and appropriate investigations and/or actions will be taken to correct these exceedances.~~

A second BAM is ~~Beta Attenuation Monitor will be~~ located in the South western corner of the site. This monitor was installed in early 2012 prior to the placement of fill as required by the consents which authorise filling. ~~This second monitor will be up and running prior to the placement of any fill.~~

Both BAMs are programmed to send out text messages to the Site Manager and representatives at levels which provide an early warning of the potential dust issues if action is not taken. When such alarms are received appropriate investigation and/or action by the Site Manager or representative will be undertaken to address the alarm.~~Alarms are currently set to alert personnel of any exceedances greater than 80mg/m³ in any 5min interval. The Alarms levels will continue to be reviewed as data is received and analysed and the levels adjusted as required.~~

The data from the BAMs are recorded with an automatic data logger. The data is downloaded monthly for analysis, reporting and archiving~~Beta Attenuation Monitors is downloaded on a weekly basis, checked and then Archived.~~

Hi-vol TSP Samplers

~~Two Hi-vol TSP samplers will temporarily monitor ambient air quality within the Three Kings Quarry site in order to decide on an appropriate regime for subsequent monitoring. This period began April 2008, and will continue for at least 12 months, with their continued operation subject to review after 12 months of operation in line with the review and comparison of results of the BAM and the Hi-vol Samplers recommended in the Approved TSP Monitoring Plan.~~

~~Hi-vol TSP monitors will be located at:~~

- ~~• The existing quarry office site~~
- ~~• On the northern boundary adjacent to the Haul Road leading to the quarry working area.~~

~~Each monitor will collect samples over a 24 hour period with a frequency of 1 in 3 day sampling for the period 1 November to 30 April. The Hi-vol situated on the office and run in conjunction with the BAM will continue the 1 in 3 day monitoring to allow for the most accurate correlation of data possible. The Hi-vol located on the Northern boundary will collect samples over a 24-hour period with a frequency 1 in 6 day sampling for the period 1 May to 31 October.~~

~~Hi-vol TSP monitoring at each of the monitoring locations will be undertaken over the same 24-hour period.~~

10.2 Video Recording of Blasting and Associated Dust Emissions

A video recording will be made of all blasting~~ing and associated quarry activities.~~

10.3 Video Monitoring of General Site Quarry Operations

Motion activated video monitoring is undertaken at Three Kings Quarry. The locations of the cameras are detailed in Appendix 1. These cameras, depending on the location, provide video footage which can be used in dust monitoring and incident and complaint investigations as well as for processing trucks, security measures and a record of the general daily operations.

Approximately three months of data is held in archive of all video recordings. This data is available to be viewed onsite during operating hours by prior arrangement with the Site Manager or representative.

In addition, for any period requested in writing by the Manager (AC) the recordings of specific cameras will be kept for an extended period of six months from the date of each entry.

All recordings are date and time stamped.

~~Video monitoring of the site has been undertaken by the Institute of Environmental Science and Research Ltd. since November 1998.~~

~~The Air Quality Department of Watercare Laboratory Services has been commissioned until further notice by Winstone Aggregates to conduct time lapse video (TLVCR) dust monitoring at the Three Kings Quarry for the summer period (1 November to 30 of April).~~

~~The continued operation of this video monitor may cease if not requested in writing by the Manager (AC).~~

~~Subject to the ongoing agreement with the owner of the Foodtown Supermarket to the south of the quarry, the TLVCR monitor will be located on the roof of this supermarket to look into the quarry operational area (Figure 1).~~

~~Copies of all TLVCR monitoring will be available at the quarry site during operating hours.~~

10.4 Weather Station

A weather station will be maintained onsite to continuously record wind speed, wind direction and rainfall. This weather data is recorded with an automatic data logger. The data is downloaded monthly for analysis, reporting and archiving~~which is periodically downloaded, checked and Archived.~~

10.5 Daily Air Permit Log

A daily air permit log will be kept recording the following information:

- Any dust control equipment malfunctions and any remedial action taken;
- Any visible emissions of dust and the source;
- All relevant details relating to the total suspended particulate monitoring ~~or other monitoring~~ required by the TSP Monitoring Plan to enable compliance with conditions 19 to 24 of the Air Discharge Permit;
- Water cart use, the frequency of use and the volume of water used;
- ~~• A note of any complaints received, and~~
- The date and time of the entry and the signature of the person entering the information.

10.6 Complaints

If an air quality complaint is received it will be recorded as per the Incidents and Complaints Procedure (as detailed in the Fill Management Plan) with the following information noted in the daily air permit log and a report will be completed noting:

- The date, time, position and nature of the complaint;
- The name, phone number and address of the complaint, unless the complaint refuses to supply these details; and
- Any remedial actions taken.

A copy of all complaint records will be available on request for inspection at the quarry office during operating hours. These records will be kept for the duration of Air Discharge Permit.

A summary of all complaints received and any remedial actions will be submitted to the Manager (AC) at the end of each quarter.

10.7 Summary of Monitoring Requirements

A summary of all monitoring related to Air Discharge Permit ~~4004121875~~ is provided in Table 1

Table 1: Air Discharge Permit Monitoring Requirements

Parameter	Location	Frequency of sampling	Sampling Period
TSP—Hi vol	At two locations within the quarry site	One day in three	1 November to 30 April
TSP—Hi vol	At one location (Northern Boundary) within the quarry site	One day in six	1 May to 31 October
TSP—Hi vol	At one location (Office Roof) within the quarry site	One day in three	1 May to 31 October
Real Time BAM	On the office roof within the quarry site	24hrs a day, 7 days a year.	Continuous
Real Time BAM	South West Corner	24hrs a day, 7 days a year.	Continuous
Wind speed, Wind Direction and Rainfall	On the top of the main office at the site	Continuous	Continuous
Motion activated Time lapse video monitoring	Quarry working area	Continuous during summer daylight hours	As requested by the Manager (AC)
Video monitoring of blasting	Quarry working area	Whenever a blast is undertaken	Whenever a blast is undertaken
Visual emission of dust and water cart usage	Within the boundary of the quarry	Daily during working hours	Whenever the quarry is operating
Air Permit Daily Log	Within the Quarry Site	Daily	Whenever the quarry is operating
Water Use	Within the Quarry Site	Daily	Daily and Weekly
Complaints	Reported to the Quarry	When a complaint is received	When a complaint is received

~~All TSP monitoring is to be undertaken over the same 24 hour period.~~

~~The Hi-vol sampling will continue to operate for a minimum period of 12 months following the commissioning of the Beta Attenuation Monitor. Continued operation of the Hi-vol samplers will be subject to a review of the BAM and Hi-vol samplers monitoring results undertaken after 12 months operation of the Beta Attenuation Monitor.~~

~~The Time Lapse video of the quarry operational area will continue to operate after 30 April 2003 as requested in writing by the Manager (AC).~~

11 Recording and Reporting

11.1 Quarterly Reporting

A quarterly report will be submitted to the Auckland Council and will include a summary of ~~Hi-vel sampler, BAM and video monitoring results~~, wind and rainfall data, the daily air permit log and any complaints received for the preceding 3 months.

Quarterly reports will be submitted to the Auckland Council 10 working days following the end of~~28~~ February, ~~31~~ May, ~~31~~ August and ~~30~~ November.

11.2 Biennial ~~Bi-annual~~ Reporting

A biennial ~~bi-annual~~ air permit report will be provided to the Auckland Council by ~~in~~ 1 November 2019~~15~~ and every second year thereafter which includes:

- (a) The volume and type of the rock and areas where extraction has occurred over the previous two years;
- (b) Areas where rehabilitation has occurred over the previous two years, including the areas fully quarried out and replanted and those areas with temporary planting, and the periods when and areas where hydro seeding or grassing was undertaken;
- (c) Location of stockpiles, including volumes and aggregate types;
- (d) A summary of the weekly water usage, including water cart usage;
- (e) Projections for the upcoming two years for items (a) to (d); and
- (f) Any dust trials or additional dust control measures undertaken for the past two years or proposed for the next two years.

11.3 Blast Notification

At least 24 hours prior to any blasting being undertaken on site written notification shall be provided to the Manager (AC). This notification shall provide the following details:

- (a) The proposed date and time of the blast(s);
- (b) The proposed location and size of the blast(s) including what rock type is to be excavated;
- (c) The proposed dust suppression methods to be undertaken;
- (d) Any other relevant details; and

If any of the information changes following notification the Manager (AC) shall be advised as soon as practicable.

Furthermore, signs or notices that describe what the siren blasts mean and the timing of the subsequent blast will be placed in prominent places around the Three Kings Community. Refer to the Quarry Management Plan for further details.

11.~~43~~ Additional Reporting

In accordance with condition 27 of the Air Discharge Permit should ~~Notification of the Auckland Council by a facsimile will be undertaken as soon as practicable if any~~ TSP monitoring results from either BAM exceeds ~~6080~~ micrograms per cubic metre as a 24 hour average, ~~The Manager (AC) will be advised~~ as soon as practicable. An investigation shall be undertaken immediately by the

Site Manager or representative as to the probable causes of the exceedance. If the cause of the elevated levels of TSP is identified as being an activity related to site activities, then as far as practicable, action shall be taken by the Site Manager or representative to reduce those discharges to the satisfaction of the Manager (AC). ~~of any action that will or has been undertaken to reduce any discharges attributed to the quarry operation following such exceedances.~~

~~The Auckland Council Manager will be notified in writing 24 hours prior of any blasting undertaken. The following will be included in the notification:~~

- ~~• The proposed date and time of the blast;~~
- ~~• The proposed location and size of the blast(s) including the rock type is to be blasted;~~
- ~~• The proposed dust suppression methods to be undertaken; and~~
- ~~• Any other relevant details.~~

The Three Kings Quarry Site Liaison Group, at the site liaison group meetings, will be informed of the monitoring results for the previous quarter.

11.54 Records

The following records will be kept on site available for review with prior arrangement ~~arrangement, in the Environmental Coordinators office:~~

- Copies of all monitoring results (up-dated monthly).
- Copies of all Quarterly and Bi-annual Reports.
- Copies of all relevant correspondence with the Auckland Council.
- Copies of all consents, permits, SLG meeting notes and management plans associated with the quarry operation and rehabilitation.
- Daily air permit logs.
- Copies of exceedance Air Quality ~~Investigation~~ reports.
- Training and environmental audits and reviews.

An electronic file of all monitoring results will also be maintained.

12 Contingency Plan for Air Quality Exceedances

Monitoring of ambient air conditions at Three Kings Quarry Site is outlined in section 10. A programme of emergency response will be undertaken if the total suspended particulate concentration exceeds 6080 micrograms per cubic meter as a 24-hour average as recorded in either BAM.

The emergency response programme is:

Step 1:

When the total suspended particulate concentration level in ambient air monitoring exceeds 6080 micrograms per cubic meter as a 24 hour average, the Manager (AC) will be informed as soon as practicable.

Step 2:

An investigation will be undertaken by Winstone personnel to ascertain of the probable causes of exceedance. The results of this investigation are to be reported to the Auckland Council.

This may involve the following:

- Analysis of wind speed and wind direction
- Analysis of video TLVCR-records of the site
- Analysis of ~~Hi-vol &~~ BAM samples for inorganic composition
- Source analysis of the ~~Hi-vol &~~ BAM samples

Step 3:

If the cause of the elevated levels of total suspended particulate is identified as being from an activity undertaken within the Three Kings Quarry then appropriate action will be undertaken to reduce those discharges to the satisfaction of the Manager (AC).

13 Audit and Review of Air Quality Management Plan

Winstone carries out periodic internal and external environmental reviews and audits. These are undertaken by senior Winstone personnel or external consultants.

A Health, Safety and Environmental meeting is held monthly where site staff attendance is mandatory. These meetings assess the activities and any incidents of the previous month and commit to any required actions for the next.

~~Quarry personnel hold a monthly meeting to review and evaluate environmental issues taking into account:~~

- ~~• Any internal and external audit reports;~~
- ~~• Reports of Council officers;~~
- ~~• Environmental incident reports;~~
- ~~• Complaints received; and~~
- ~~• Results of TSP monitoring~~

Any revision of the Air Quality Management Plan will be submitted to the Auckland Council for review of consistency with consent conditions prior to a change being implemented.

Condition ~~3231~~ of the Air Discharge Permit ~~air-discharge permit~~ provides for a review of the conditions of consent by the Auckland Council in March 2016 and March 2018 ~~May 2004 and every two years thereafter~~ in order to:

- ~~To deal with any significant adverse effect on the environment arising from the exercise of this consent which was not foreseen at the time the application was considered and is appropriate to deal with at the time of the review;~~
- ~~To consider the adequacy of the conditions which prevent nuisance beyond the boundary of the site, particularly if regular or frequent complaints have been received and validated by an enforcement officer;~~
- ~~To consider developments in control technology and management practices that would enable practicable reductions in the discharge of contaminants;~~
- ~~To alter the monitoring requirements, including requiring further monitoring, or increasing or reducing the frequency of monitoring, reviewing the TSP Monitoring Plan, or altering the trigger level as given in Condition 2120, if it is considered that the monitoring requirements are not appropriate to assess any nuisance beyond the boundary of the site; or~~

(e) ~~To~~ consider the adequacy of the conditions which relate to preventing nuisance and controlling discharges to air from blasting operations on site.

APPENDIX 1

Key Monitoring Features Layout~~Operational Location~~ Plan



Limit of Extraction and Processing



Weather Station



BAM Monitor



Camera



APPENDIX 2

Air Discharge Permit

Decision on resource consent application under section 88 of the Resource Management Act 1991



Discretionary activity under the Auckland Council Regional Plan (Air, Land and Water) and the Proposed Auckland unitary Plan.

Application number:	40041 (discharge to air consent)
Applicant:	Winstone Aggregates (A Division of Fletcher Concrete & Infrastructure Limited)
Site address:	985 Mt Eden Road, Three Kings
Legal description:	Lot 1 DP37020
Proposal:	To authorise the discharge of contaminants into air from the quarrying, crushing, screening, transport and storage of aggregate and rock for a 5 year period following commencement of consent.

The resource consents are:

- The discharge of contaminants into air from the quarrying, crushing, screening, transport and storage of aggregate and rock as required by the following rules:

Auckland Council Regional Plan: Air, Land and Water (ACRP(ALW))

Rule 4.5.63 – To discharge contaminants into air from the quarrying, crushing, screening and processing of aggregates at a rate of up to 200 tonnes per hour within an Urban Air Quality Management Area, as a discretionary activity.

Proposed Auckland Unitary Plan (PAUP)

Rule H.4.1 Air Quality, Dust generating activities – To discharge contaminants into air from quarrying at a rate between 5 and 200 tonnes/ hour occurring within 200m of any dwelling (where the quarrying activity is located in a special purpose – quarry zone), as a discretionary activity.

Having read the application, supporting documents, specialist comments and the council air quality advisors report and recommendations on the application, I am satisfied that I

have sufficient information to consider the matters required by the Resource Management Act 1991 (RMA) and make a decision under delegated authority on the application(s).

Under sections 104, 104B, 105, and Part 2 of the RMA, this resource consent is

GRANTED. The reasons for this decision are:

- The proposal will promote the sustainable management of natural and physical resources as contemplated by Part 2 of the RMA because the receiving environment will not be compromised as the overall adverse effects are less than minor and subject to the conditions that have been imposed the adverse effects can be further avoided, remedied or mitigated.
- The proposal is in general consistent with the relevant provisions of the Auckland Regional Policy Statement, in particular the integrated management of the Region's natural and physical resources.
- The proposal is consistent with the relevant objectives and policies of the ACRP(ALW) and PAUP. In particular, Objective 4.3.2 and Policies 4.4.7 and 4.4.9 of the ACRP(ALW), and PAUP Objectives 1 and 3, and Policies 4, 6, 12, 13 and (relevant clauses of) 14 (Part 2, Chapter C, Section 5.1).
- The overall adverse effects on the receiving environment are less than minor. Subject to the imposition of conditions, the effects can be further avoided, remedied or mitigated.
- The sensitivity of the receiving environment to the adverse effects of the discharge will not be compromised given the level of the discharge, the application of suitable dust control measures and appropriate on site management techniques.

Conditions

Under section 108 of the RMA, this consent is subject to the conditions below:

GENERAL CONDITIONS

1. This consent shall expire on 01 March 2020, unless it has lapsed, been surrendered or been cancelled at an earlier date pursuant to the RMA.
2. The servants or agents of the Council shall be permitted access to the relevant parts of the property at all reasonable times for the purpose of carrying out inspections, surveys, investigations, tests, measurements or taking samples.
3. The quarry's plant and associated processes shall be operated in accordance with the documentation submitted to the council as part of this application 40041, except where amended by the conditions of this resource consent. No alterations shall be made to plant or processes that do not, or are not likely to, comply with the provisions of this consent, a regional rule, or regulations under the Resource Management Act 1991.
4. All discharges of contaminants into air arising within the site boundary are the responsibility of the Consent Holder. Any person responsible for operations and discharges into air associated with the process or site shall be made aware of relevant conditions of this consent.
5. At least one copy of this consent and reference documentation, including management plans, shall be retained and available for use on-site at all times for all personnel.

LIMIT CONDITIONS

6. At all times, quarrying processes on site shall be operated, maintained, supervised, monitored and controlled so that emissions authorised by this consent are maintained at the minimum practicable level.
7. Beyond the boundary of the site there shall be no odour, fume or dust caused by discharges from the sites which, in the opinion of an enforcement officer, are noxious offensive or objectionable.
8. Quarrying activities, including blasting, crushing, screening, and transporting of rock on site with the potential to generate dust shall be undertaken to ensure visible discharges to air are kept

below levels which, in the opinion of an enforcement officer, are noxious, offensive or objectionable.

9. The operation of the Three Kings Quarry shall not exceed:

- (a) an extraction rate of 100 tonnes per hour;
- (b) a crushing rate of 200 tonnes per hour; and
- (c) a screening rate of 200 tonnes per hour.

OPERATIONAL CONDITIONS

- 10. Techniques adopted for excavating rock, including drilling and blasting, shall practicably minimise dust emissions.
- 11. Dust emissions from all crushing, screening and transfer operations shall be kept to a practicable minimum. Where practicable, all rock processed on site shall be kept in a visibly damp condition.
- 12. In order to ensure that dust from the yard, quarry and all internal roads is kept to a practicable minimum at all times (including during non-working hours) the yard, quarry floor and all internal roads shall, where necessary, be maintained in a visibly damp condition either by the use of a water cart and /or a reticulated water system. Any sealed roads, including road exits from the site, shall be regularly cleaned to ensure dust from these sources is kept to a practicable minimum.
- 13. All vehicle speeds on unsealed roads, or routes, shall be limited to a maximum of 20 kilometres per hour unless the road, or route, is visibly damp and vehicles do not raise dust.
- 14. A suitably designed wheel washing facility for vehicles shall be provided and maintained. All vehicles that have traversed over unsealed parts of the quarry, or have otherwise come into direct contact with aggregate material, shall use this wheel wash when exiting the quarry.
- 15. An automatic reticulated dust suppression system (water sprinkler system) or similar, shall be operated around the perimeter of the quarry working area to aid in minimising dust emissions.

16. Water supplies to the site, are to be maintained at such capacities that the application of water as a dust control measure is not limited.
17. When necessary, and where practicable, rehabilitation on site by grassing or preferably hydroseeding shall be undertaken on all batters and on all areas where the resource is depleted or material is not to be extracted within a period of one year.
18. No extraction, processing or unapproved stockpiling of aggregate, shall occur outside the line "The Limit of Extraction and Processing" shown on Figure 1 of the consent application and also attached to these conditions in Appendix A.

MONITORING CONDITIONS

Total Suspended Particulate Monitoring

19. Monitoring of total suspended particulate (TSP) in ambient air in the vicinity of the site, shall be undertaken in accordance with the recommendations of the report "A Review of the TSP Monitoring Plan for Three Kings Quarry", dated April 2007, and the subsequent information submitted as part of this application 40041, except where amended by the conditions of this resource consent.
20. The TSP monitoring requirements specified in the recommendations of the TSP report "A Review of the TSP Monitoring Plan for Three Kings Quarry", dated April 2007, and the subsequent information submitted as part of this application may be changed from time to time subject to the following procedure:
 - (a) Within two months of either:
 - (i) the date written notice is given by the Team Leader – Air Quality to the Consent Holder of the intention to change the TSP monitoring requirements; or
 - (ii) the date written notice is given by the Consent Holder to the Team Leader – Air Quality of a proposed amendment to the TSP monitoring requirements

a suitably qualified and appropriate expert in ambient particulate monitoring ("TSP Monitoring Advisor") shall be jointly selected by the Consent Holder, the Team Leader – Air Quality and representatives of Three Kings United Group Incorporated and South Epsom Planning Group Incorporated;

- (b) The TSP Monitoring Advisor will, at the Consent Holder's expense, prepare a Report which details the recommended revisions to the TSP monitoring requirements which:
 - (i) Is consistent with United States Environmental Protection Agency standard methodologies or similar;
 - (ii) Specifies the number, type and location of the TSP monitors to be employed by the Consent Holder to monitor TSP in ambient air in the vicinity of the site; and
 - (iii) Contains recommendations as to the methodology and frequency for testing of mineralogical composition and radioactivity of dust;
- (c) The Report shall be provided to the Team Leader – Air Quality, Consent Holder, and representatives of Three Kings United Group Incorporated and South Epsom Planning Group Incorporated within two months of the appointment of the TSP Monitoring Advisor referred to in sub-paragraph (a);
- (d) On receipt of the Report, the persons to whom the Report has been provided as listed in sub-paragraph (c) may commission, at their own expense, a review of the Report by a suitably qualified and appropriate expert in ambient particulate monitoring, whose report shall then be provided to the Team Leader – Air Quality within one month of the event in sub-paragraph (c) occurring;
- (e) The Team Leader – Air Quality shall consider the revised TSP monitoring requirements for approval, having regard to the Report detailed in sub-paragraph (b) and any reviews of that Report provided to the Team Leader – Air Quality pursuant to sub-paragraph (d). Approval of the TSP monitoring requirements will be deemed to be given if there is no response from the Team Leader within one month of the period in sub-paragraph (d) being completed; and
- (f) If approved, the revised TSP monitoring requirements shall be implemented and the monitoring shall be performed to the satisfaction of the Team Leader – Air Quality.

21. Without prejudice to the generality of conditions 6 and 7, if monitoring by continuous Beta Attenuation Monitoring methodology shows that the concentration of TSP in ambient air at or beyond the boundary of the site, and measured in accordance with Condition 19, exceeds a trigger value of 60 micrograms per cubic metre ($\mu\text{g.m}^{-3}$) as a 24 hour average, an investigation shall be initiated by the Consent Holder as to the probable causes of the exceedance.

22. If the cause of the elevated levels of TSP is identified as being an activity undertaken on the Consent Holder's site, then as far as practicable, action shall be taken by the Consent Holder to reduce those discharges to the satisfaction of the Team Leader – Air Quality.

Video Monitoring

23. All blasting events and any associated dust emissions within the quarry area shall be recorded on video. The recordings shall be labelled with the date and time of the blast and other appropriate details sufficient to identify the blast. Recordings shall be kept for a minimum period of six months from the date of the blast and shall be made available, on request to an enforcement officer, during operating hours.
24. For any period requested in writing by the Team Leader – Air Quality, video monitoring of the general operations occurring on site shall be undertaken. The recordings shall be labelled with the date and time, shall be kept for a minimum period of six months from the date of each entry and shall be made available, on request, to an enforcement officer, during operating hours.

Meteorological Monitoring

25. A weather station shall be provided, maintained and operated to the satisfaction of the Team Leader – Air Quality. The station shall continuously record, and be able to make available, wind speed, wind direction and rainfall.

LOGGING AND REPORTING CONDITIONS

26. An Air Quality Management Plan (AQMP) which accurately records all management, monitoring and operation procedures necessary to comply with the conditions of this consent shall be maintained. The AQMP shall include, but not be limited to, details regarding the following:
- (a) dust suppression methods for stockpiles, crushing, screening and transfer operations including details relating to water sprays on any permanent stockpiling equipment;
 - (b) operation of the reticulated dust suppression system;
 - (c) any other relevant dust suppression techniques to be used on site; and
 - (d) all relevant monitoring procedures required by conditions 19 to 24 including procedures for dealing with elevated dust levels as required by conditions 21 and 22.

The AQMP shall be submitted to the Team Leader – Air Quality for review on the written request of the Team Leader – Air Quality. Any subsequent changes shall also be submitted for review.

The Team Leader – Air Quality will advise the Consent Holder, in writing, if any aspects of the

Management Plan are considered to be inconsistent with achieving the provisions of this consent.

27. TSP monitoring showing exceedances of the trigger value given in Condition 21, shall be reported to the Team Leader – Air Quality as soon as practicable. A summary of all monitoring results, including references where applicable to wind and rainfall data, and any remedial actions taken shall be submitted to the Team Leader – Air Quality at the end of each quarter.
28. A daily log of all such information that is required to enable compliance with the conditions of this consent shall be kept and maintained. The log shall record, on a daily basis, information including, but not limited to:
 - (a) any dust control equipment malfunctions and any remedial action taken;
 - (b) any visible emissions of dust and the source;
 - (c) all relevant details relating to the TSP monitoring or other monitoring required by the TSP Monitoring Plan, to enable compliance with Conditions 19 to 24 of this consent;
 - (d) when a water cart was used and, if so, the frequency of use and the volume of water used; and
 - (e) the date and time of the entry and the signature of the person entering the information.

The log shall be made available on request, during operating hours, to an enforcement officer and shall be kept for the term of the consent. A summary of the information recorded shall be submitted to the Team Leader – Air Quality at the end of each quarter.

29. At least 24 hours prior to blasting being undertaken, written notification shall be provided to the Team Leader – Air Quality of any blasting to occur on the site. Included in the notification shall be details relating to the blast(s) including:
 - (a) the proposed date and time of the blast(s);
 - (b) the proposed location and size of the blast(s) including what rock type is to be excavated;
 - (c) the proposed dust suppression methods to be undertaken;
 - (d) any other relevant details; and
 - (e) If any of the information in the notification is changed the Team Leader – Air Quality shall be advised as soon as practicable.

30. That, by 1 November 2015 and every two years thereafter the Consent Holder shall provide a suitable report, including scale plans, to the Team Leader – Air Quality detailing:
- (a) the volume and type of rock and areas where extraction has occurred over the previous two years (include a 1:5000 scale plan);
 - (b) areas where rehabilitation has occurred over the previous two years, including the areas fully quarried out and replanted and those area where temporary planting and the periods when and areas where hydroseeding or grassing was undertaken (include a 1:5000 scale plan);
 - (c) location of stockpiles, including volumes and aggregate types;
 - (d) a summary of the weekly water usage, including water cart usage;
 - (e) projections for the coming two years for items (a) to (d) of this condition; and
 - (f) any dust trials or additional dust control measures undertaken for the past two years or proposed for the next two years.
31. All air quality complaints received at the site, or advised by the Team Leader – Air Quality, shall be logged by the Consent Holder. The log shall include:
- (a) the date, time, position and nature of the complaint;
 - (b) the name, phone number and address of the complaint, unless the complaint refuses to supply these details; and
 - (c) any remedial actions taken.

The log shall be made available on request, during operating hours, to the Team Leader – Air Quality and shall be kept for the duration of the consent. A summary of all complaints received and any remedial actions shall be submitted to the Team Leader – Air Quality at the end of each quarter.

REVIEW CONDITION:

32. The conditions of this consent may be reviewed by the Team Leader – Air Quality pursuant to Section 128 of the Resource Management Act 191, by the giving of notice pursuant to Section 129 of the Act, in March 2016 and March 2018 in order to:

- (a) deal with any significant adverse effect on the environment arising from the exercise of this consent which was not foreseen at the time the application was considered and its appropriate to deal with at the time of the review;
- (b) consider the adequacy of the conditions which prevent nuisance beyond the boundary of the site, particularly if regular or frequent complaints have been received and validated by an enforcement officer;
- (c) consider developments in control technology and management practices that would enable practicable reductions in the discharge of contaminants;
- (d) alter the monitoring requirements, including requiring further monitoring or increasing or reducing the frequency of monitoring, or altering the trigger level as given in Condition 21, if it is considered that the monitoring requirements are not appropriate to assess any nuisance beyond the boundary of the site; or
- (e) consider the adequacy of the conditions which relate to preventing nuisance and controlling discharges to air from blasting operations on site.

ADVICE NOTES:

1. The consent holder is advised that the date of the commencement of this consent will be as determined by Section 116 of the RMA, unless a later date is stated as a condition of this consent.
2. The consent holder is advised that they will be required to pay to the Council any reasonable administrative charge fixed in accordance with Section 36(1) of the Resource Management Act 1991, or any additional charge required pursuant to section 36(3) of the resource Management Act 1991 in respect of this consent. This will include any actual and reasonable costs associated with the review of the Air Quality Management Plan and any subsequent changes.
3. This resource consent will lapse five years after the date of Council's decision unless:
 - (a) It is given effect to before the end of that period. To give effect to this consent, the activity allowed by this consent must be established and the conditions contained in the consent complied with. Please note that there must be compliance with all of the consent conditions once the activity has been established; or
 - (b) An application is made and granted prior to the expiry of that period for a time extension. The statutory considerations that apply to extensions are set out in section 125 of the RMA.

4. Pursuant to section 126 of the RMA, which provides for Auckland Council to cancel a resource consent by written notice, if this resource consent has been exercised, but is not subsequently exercised for a continuous period of five years, the consent may be cancelled by the Council unless other criteria contained within section 126 are met.
5. If you disagree with any of the above conditions, or disagree with the additional charges relating to the processing of the application, you have a right of objection pursuant to sections 357A or 357B of the RMA. Any objection must be made in writing to Council within 15 working days of notification of the decision.
6. It is recommended that the consent holder provide a summary of all monitoring results relating to this consent to the members of the Three Kings Quarry Site Liaison Group. If requested by either the consent holder or other members of the Group, Auckland Council will provide an officer to attend meetings for matters of clarification relating to the consent on an as required basis.
7. It is advised that a Memorandum of Understanding between Auckland Council, the consent holder, Three Kings United Group Incorporated, and South Epsom Planning Group Incorporated dated 17 July 2002 exists. This Memorandum of Understanding relates to any change of consent conditions pursuant to section 127 RMA or any other application to allow extraction or processing within the area to the north and east of the site beyond that used for quarry extraction operations at 1 May 2000 (as shown as the Limit of Extraction and Processing on Figure 1 – Site Plan, dated January 2012, and attached to this consent in Appendix A).



Les Simmons
Duty Commissioner

Date 11 February 2015

Appendix A: Limit of Extraction and Processing



Prepared by: WINSTONE
 Project: LINZ
 Date: 2011/11/15
 Scale: 1:1000
 Author: [Name]
 Checked: [Name]
 Approved: [Name]



THREE KINGS QUARRY
985 MOUNT EDEN ROAD

FIGURE 1 - SITE PLAN
 EXISTING & PROPOSED LOCATIONS
 FOR AIR PERMIT RENEWAL

JANUARY 2012

1 : 1000

FIGURE 1

APPENDIX 3

TSP Monitoring Plan and Correspondence

A REVIEW OF THE TSP MONITORING PLAN FOR THREE KINGS QUARRY

prepared by:

Kevin Rolfe
Independent Air Quality Management Specialist

April 2007

1. Existing Monitoring Programme

The Three Kings basalt quarry of Winstone Aggregates Limited is arguably the most sensitively located quarry in New Zealand. Not only are there nearby housing, to the east and north, but there are commercial premises adjoining the north east corner of the property, along part of the northern boundary and to the south. Many of those establishments, which include a food café, have appeared only in recent times. There is also the presence of busy Mt Eden Road.

Operations at the Three Kings quarry are subject to a discharges to air resource consent of the Auckland Regional Council. The resource consent¹, which was issued on 21 August 2002 as a Consent Order by the Environment Court following appeals, has 31 conditions and it is dated to expire on 1 August 2012.

As is common for this type of resource consent, the discharges to air consent issued for the Three Kings quarry requires an Air Quality Management Plan (condition 25). The Air Quality Management Plan is prepared by the Consent Holder and submitted to the Manager, Auckland Regional Council, for review. The Manager will advise the Consent Holder, in writing, if any aspects of the Management Plan are considered to be inconsistent with achieving the provisions of the resource consent. The Air Quality Management Plan thereby becomes a guiding document to air quality management at the Three Kings quarry.

The Management Plan includes information on the operation of dust suppression methods, details on all relevant air monitoring procedures, and the procedures to be followed for dealing with elevated dust levels. A feature of the dust suppression is the reticulated dust suppression system. There are also measures to minimise dust emissions from blasting and excavation, crushing and screening, stockpiling, and loading, transport and transfer operations. There is a vehicle speed limit, a water cart on haul roads, and a wheel wash.

The air monitoring procedures in the Air Quality Management Plan were developed through a process outlined in condition 19 of the discharges to air consent (and described in the next section of this report). This involved the appointment of a TSP Monitoring Adviser and the preparation of a TSP Monitoring Plan. The existing monitoring programme consists of the measurement of total suspended particulate (TSP), wind speed & direction and rainfall, and camera recording of general quarry operations and all blasting. The programme is detailed in the Table on the next page of this report.

The resource consent specifies the procedure for dealing with elevated dust levels (conditions 20 & 21). If the monitoring shows a TSP concentration at or beyond the boundary of the site in excess of 80 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$), as a 24-hour average, an investigation into the probable causes is initiated. If the cause is identified as being an activity undertaken on the site, then corrective action is required.

The use of a concentration of 80 $\mu\text{g}/\text{m}^3$, 24-hour average, as a dust level initiating follow-up action is in line with the TSP 'trigger level' for sensitive locations given in a relevant Ministry for the Environment (MfE) Good Practice Guide². The MfE document reviews dust monitoring methods. Although the recommended method for TSP monitoring is the high-volume sampler, use of a continuous monitor may be appropriate in specific situations. Because of the sensitivity of its location, the Three Kings quarry is one such situation.

¹ Permit No. 21875 of the Auckland Regional Council, issued to Winstone Aggregates Limited Three Kings Quarry.

² Ministry for the Environment, Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions, September 2001.

TABLE: EXISTING MONITORING PROGRAMME³

Parameter	Location(s)	Frequency	Period
TSP – high-volume samplers (three)	The quarry office, northern boundary, and eastern boundary	24-hour samples, one day in three	1 November to 30 April each year
	Same three sites as previous entry	24-hour samples, one day in six	1 May to 31 October each year
TSP- mini-volume sampler (one), with the possibility of chemical analyses of samples	At one site such as a residential property in the vicinity of the quarry	24-hour samples, about 12 samples per summer period	1 November to 30 April each year
Wind speed, wind direction, and rainfall	Top of the quarry office	Continuous	All year around
Time lapse camera recording of general quarry operations (under contract to Watercare Laboratory Services)	Roof of Foodtown Supermarket to the south of the quarry	Presumably useful data only during daylight hours	1 November to 30 April each year (the resource consent requires this monitoring be undertaken for any periods requested in writing by the Manager, Auckland Regional Council)
Video camera recording of blasting and associated dust emissions	Quarry working areas	Whenever a blast is undertaken	The period of and immediately following the blast, until any dust is dispersed
Visual emissions of dust and water cart usage	Within the quarry site	Daily during working hours	Whenever the quarry is operating
Air Permit Daily Log	Within the quarry site	Daily	Whenever the quarry is operating
Water use	Within the quarry site	Daily	Daily
Complaints	As reported to the quarry	Whenever a complaint is received	Whenever a complaint is received

³ Information as recorded in the Air Quality Management Plan, Winstone Aggregates Three Kings Quarry, August 2004.

2. Review Process

The air monitoring procedures in the Air Quality Management Plan, namely the number, type and location of the TSP monitors and the monitoring sites, were developed through a process outlined in condition 19 of the discharges to air resource consent. The steps of the process were:

- Within 2 months of the commencement of the consent, a suitably qualified and appropriate expert in ambient particulate monitoring (the “TSP Monitoring Adviser”) is to be jointly selected by the Consent Holder, the Manager, Auckland Regional Council, and representatives of the Three Kings United Group Incorporated and the South Epsom Planning Group Incorporated (the “parties”).
- The TSP Monitoring Adviser to prepare a Recommended TSP Monitoring Plan, which:
 - i) is consistent with USEPA standard methodologies;
 - ii) specifies the number, type and location of the TSP monitors, and the frequency and duration of their operation;
 - iii) addresses the circumstances for future adoption of continuous monitoring of TSP; and
 - iv) contains recommendations on the methodology and frequency for testing the mineralogical and radioactivity of dust.
- The Recommended TSP Monitoring Plan is to be provided to the parties within 2 months of the appointment of the TSP Monitoring Adviser.
- On receipt of the Recommended TSP Monitoring Plan, any of the parties may commission a review of the Plan by a suitably qualified and appropriate expert in ambient particulate monitoring, whose report is to be provided to the Manager, Auckland Regional Council within 1 month of receipt of the Recommended TSP Monitoring Plan.
- Within 1 month of receipt of any review, the Manager, Auckland Regional Council, is to approve the TSP Monitoring Plan.

A “Dust Monitoring Plan” was prepared in February 2003. Then followed a period of correspondence between the Auckland Regional Council and Winstone Aggregates, with both a reviewer for Winstone Aggregates and the Three Kings United Group seeking clarification on aspects of the report. These were provided, but the time periods indicated above were not complied with. The TSP Monitoring Plan, as amended, was approved by the Manager, Auckland Regional Authority, on 6 August 2004. Its provisions were included in the Air Quality Management Plan for the Three Kings quarry, prepared in August 2004.

The resource consent provides for the above procedure to be used for a review of the TSP Monitoring Plan, following a request for a change from either the Manager, Auckland Regional Council, or the Consent Holder (conditions 19(h) & (i)). In a letter dated 14 August 2006 Winstone Aggregates requested a change, involving the introduction of continuous TSP monitoring.

This report is prepared to comply with the first part of the review procedure. The date of appointment of the author as the reviewer is within two months of 22 January 2007 (the latter having been set as the “commencement date”), and was complied with on 21 February 2007. The other time periods indicated above follow from that. For example, this review is required before 21 April 2007.

3. Shortcomings of the Existing TSP Monitoring

The main issue of concern with the existing TSP monitoring is one of interpretation. With the close proximity of Mt Eden Road (a major Auckland thoroughfare), it is extremely difficult to determine what is the most likely source of an elevated dust level. Quite simply, 24-hour samples of measured TSP concentrations, one-day-in-three or one-day-in-six, do not provide the type of short-term information that is required to be able to relate the impact of any dust generating activity within the quarry and the meteorological data. The latter data is collected continuously, and hence it is logical that measurement of dust levels should also be collected continuously.

An analysis, in the form of a letter⁴ from Winstone Aggregates Limited to the Auckland Regional Council, of exceedances by the TSP high-volume samplers of the trigger level of $80 \mu\text{g}/\text{m}^3$, 24-hour average, in late 2005, is a good example to prove the point. There were six exceedances, involving five days, of the TSP trigger level in that period, namely on 28 October 2005 (two sites), 31 October 2005, 3 November 2005, 15 November 2005, and 22 November 2005. The Winstone Aggregates analysis seems very fair. It involved consideration of meteorological data (especially the wind direction), the use of the reticulated dust suppression system, and the quantity of water applied to the haul roads by the water cart.

The primary outcome of the analysis was one of uncertainty. However, based on the best information available, the most likely explanations for the exceedances are quarry activities for three of the five days and Mt Eden Road for the other two. On three of the days the water cart usage was considered lower than what was usually required for the time of the year (that is, around 80 m^3 of water), with only 18 m^3 on 22 November 2005. A build up of fine dust at the crushing and screening plant was identified during the follow-up to the 15 November 2005 exceedance, leading to undertakings to increase the number of sprinklers in the area and implement a weekly clean-up of the accumulated dust. Other possible improvement measures mentioned in the Winstone letter are sealing of the haul road and overhead wetting of loads before they enter the haul road.

The TSP high-volume sampler for which most data exists is that at the Quarry Office. The period of data reviewed is September 2002 to December 2006. Over that 52 month period, a total of 401 samples of 24-hour TSP concentrations were taken. This complies with the one-day-in-three regime for half the year, and one-day-in-six for the other half. Deleting those days with no results and spurious results, including measurements less than or equal to $3 \mu\text{g}/\text{m}^3$, there are 379 valid results (that is, a satisfactory 94%). The following exceedances of the $80 \mu\text{g}/\text{m}^3$ trigger level were recorded at that site:

29 October 2002	$82.5 \mu\text{g}/\text{m}^3$
20 February 2004	$129 \mu\text{g}/\text{m}^3$
18 January 2005	$128 \mu\text{g}/\text{m}^3$
28 October 2005	$186 \mu\text{g}/\text{m}^3$
3 November 2005	$172 \mu\text{g}/\text{m}^3$
15 November 2005	$96.3 \mu\text{g}/\text{m}^3$
22 November 2005	$107 \mu\text{g}/\text{m}^3$

⁴ Winstone Aggregate Limited letter to Auckland Regional Council, 19 December 2005.

There are several ways these exceedances can be interpreted, including:

- they occurred on average 1.8% of valid results;
- 5 of the 7 occurred in the November to April period of more frequent sampling; and
- 4 of the 7 occurred in a four week period in late 2005.

There is data for the TSP high-volume samplers at the Northern Boundary and Eastern Boundary sites for July 2004 to December 2006. Over that 30 month period, there should be 14 months of one-day-in-three sampling and 16 months of one-day-in-six sampling. At 205 samples from each site during the period, that regime was largely complied with. Deleting those days with no results and spurious results, including measurements less than or equal to $3 \mu\text{g}/\text{m}^3$, there are 199 valid results for the Northern Boundary site and 192 valid results for the Eastern Boundary site. That is, a satisfactory 97% and 94%, respectively

None of the TSP monitoring at the Eastern Boundary site exceeded the $80 \mu\text{g}/\text{m}^3$ trigger level. The following exceedances were measured at the Northern Boundary site:

14 November 2004	$82.4 \mu\text{g}/\text{m}^3$
18 January 2005	$144 \mu\text{g}/\text{m}^3$
23 January 2005	$123 \mu\text{g}/\text{m}^3$
18 February 2005	$87.9 \mu\text{g}/\text{m}^3$
21 February 2005	$126 \mu\text{g}/\text{m}^3$
28 October 2005	$203 \mu\text{g}/\text{m}^3$
31 October 2005	$134 \mu\text{g}/\text{m}^3$
3 November 2005	$114 \mu\text{g}/\text{m}^3$

As before, there are several ways these exceedances can be interpreted, including:

- they occurred on average 4.0% of valid results;
- 2 of the 8 occurred on the same day as exceedances at the Quarry Office site;
- 6 of the 8 occurred in the November to April period of more frequent sampling;
- 4 of the 8 occurred in a five week period in early 2005; and
- 3 of the 8 occurred in a one week period in late 2005.

There is also data for TSP high-volume sampling at a site at Metro Water for the period November 2002 to May 2004. Metro Water is located to the south-east of the quarry, on the Three Kings corner formed by the intersection of Mt Eden and Mt Albert Roads. As for the TSP high-volume sampler measuring the impact of any dust generating activity within the quarry, north-westerly winds are uncommon in Auckland. Also the Metro Water property has many large trees which would have influenced the results of the monitoring. So, even though there are issues with this TSP monitoring, for completeness it is reported here.

Over that 19 month period, there should be 12 months of one-day-in-three sampling and 7 months of one-day-in-six sampling. At 171 samples from the site during the period, that regime was complied with. Deleting those days with no results and spurious results, including measurements less than or equal to $3 \mu\text{g}/\text{m}^3$, there are 152 valid results. Given the presence of many large trees, that is a reasonable 89%.

The following exceedances were measured at the Metro Water site:

15 November 2002	87.8 $\mu\text{g}/\text{m}^3$
22 April 2003	87.7 $\mu\text{g}/\text{m}^3$
19 September 2003	86.4 $\mu\text{g}/\text{m}^3$
17 October 2003	89.9 $\mu\text{g}/\text{m}^3$
30 December 2003	114 $\mu\text{g}/\text{m}^3$

Unlike the exceedances at the other sites, there are no blocks of exceedances of the TSP trigger level over a short time at the Metro Water site. The exceedances occurred on average 3.3% of valid results. 3 of the 5 occurred in the November to April period of more frequent sampling.

The reason for carrying out the above analyses of the TSP high-volume sampling is that the information may provide pointers for some of the considerations related to a move to continuous monitoring of TSP at the Three Kings quarry. Those considerations include the most appropriate sampling period to use and the frequency of operation, and they are addressed in the next section of this report.

A potential issue of concern with the existing TSP monitoring, because of its importance in the resource consent, is the lack of information gathered about the chemical composition of the dust. Clarification on this matter was the principal reason for the delay in finalising the air monitoring procedures in the Air Quality Management Plan, referred to earlier in this report. On the face of it, it would seem with the lack of information that this aspect of the TSP monitoring over the past few years has been less than satisfactory. Quite the opposite is the case. The lack of information results solely from the best of explanations – there has been no reasons to obtain it.

The “Dust Monitoring Plan”⁵, which was prepared in February 2003, was quite clear on what it saw as appropriate. That is, a TSP mini-volume sampler be used at particularly sensitive locations such as residential properties or in response to complaints. The aims of this monitoring were stated as to “provide more information on the spatial variability of dust levels” at locations in the vicinity of the quarry, and to “allow for material to be collected on media suitable for chemical analysis”.

Various suitable sites for the TSP mini-volume sampling were identified. It was recommended that a site be chosen for each summer and at least 12 samples be taken, on the same days as the TSP high-volume sampling. The non-destructive methods of analyses of x-ray fluorescence spectroscopy (XRF) or proton induced x-ray emission spectroscopy (PIXE) could be used to determine the chemical composition of the collected dust. But, and this is the important point, these analyses only be carried out if the monitoring results “regularly exceed the trigger value of 80 $\mu\text{g}/\text{m}^3$ ”. Because that caveat was not met, no analyses of the chemical composition have been carried out.

Data for TSP mini-volume sampling is available in the form of 12 samples in the summer of 2004-05 (November 2004 to April 2005) taken at the Northern Boundary site, and 14 samples in the summer of 2005-06 (November 2005 to April 2006) taken at 13 Queens Way. One of the latter set of samples is listed as ‘no result’, whereas a second is -34.4 $\mu\text{g}/\text{m}^3$, which is clearly spurious.

⁵ Philip Millichamp: “Three Kings Quarry Dust Monitoring Plan”, February 2003.

The Winstone Aggregates Environmental Coordinator⁶ has found operation of the TSP mini-volume sampler to be “most unsatisfactory”. The following is a comparison of the 12 measurements of the TSP mini-volume sampler and the TSP high-volume sampler at the Northern Boundary site, and the 12 measurements of the TSP mini-volume sampler at 13 Queens Way and the TSP high-volume sampler at the Quarry Office site. These latter two locations are down the same (south-west) wind direction and 200 metres apart:

	<u>Mini-volume TSP</u>	<u>High-volume TSP</u>
14 November 2004	47.9 $\mu\text{g}/\text{m}^3$	82.4 $\mu\text{g}/\text{m}^3$
23 November 2004	38.4 $\mu\text{g}/\text{m}^3$	35.7 $\mu\text{g}/\text{m}^3$
30 November 2004	63.3 $\mu\text{g}/\text{m}^3$	42.6 $\mu\text{g}/\text{m}^3$
14 December 2004	63.1 $\mu\text{g}/\text{m}^3$	23.1 $\mu\text{g}/\text{m}^3$
29 December 2004	19.8 $\mu\text{g}/\text{m}^3$	10.7 $\mu\text{g}/\text{m}^3$
14 January 2005	43.7 $\mu\text{g}/\text{m}^3$	40.6 $\mu\text{g}/\text{m}^3$
30 January 2005	49.6 $\mu\text{g}/\text{m}^3$	41.8 $\mu\text{g}/\text{m}^3$
18 February 2005	32.5 $\mu\text{g}/\text{m}^3$	87.9 $\mu\text{g}/\text{m}^3$
24 February 2005	59.5 $\mu\text{g}/\text{m}^3$	25.2 $\mu\text{g}/\text{m}^3$
12 March 2005	51.9 $\mu\text{g}/\text{m}^3$	22.5 $\mu\text{g}/\text{m}^3$
28 March 2005	115 $\mu\text{g}/\text{m}^3$	23.0 $\mu\text{g}/\text{m}^3$
13 April 2005	30.6 $\mu\text{g}/\text{m}^3$	35.9 $\mu\text{g}/\text{m}^3$
9 November 2005	11.3 $\mu\text{g}/\text{m}^3$	23.7 $\mu\text{g}/\text{m}^3$
22 November 2005	31.5 $\mu\text{g}/\text{m}^3$	107 $\mu\text{g}/\text{m}^3$
5 December 2005	20.3 $\mu\text{g}/\text{m}^3$	70.3 $\mu\text{g}/\text{m}^3$
16 December 2005	13.4 $\mu\text{g}/\text{m}^3$	32.7 $\mu\text{g}/\text{m}^3$
3 January 2006	7.1 $\mu\text{g}/\text{m}^3$	54.9 $\mu\text{g}/\text{m}^3$
6 February 2006	15.2 $\mu\text{g}/\text{m}^3$	67.6 $\mu\text{g}/\text{m}^3$
16 February 2006	26.9 $\mu\text{g}/\text{m}^3$	23.4 $\mu\text{g}/\text{m}^3$
17 March 2006	19.1 $\mu\text{g}/\text{m}^3$	10.3 $\mu\text{g}/\text{m}^3$
31 March 2006	19.9 $\mu\text{g}/\text{m}^3$	14.9 $\mu\text{g}/\text{m}^3$
7 April 2006	33.4 $\mu\text{g}/\text{m}^3$	no result
15 April 2006	20.2 $\mu\text{g}/\text{m}^3$	no result
22 April 2006	19.3 $\mu\text{g}/\text{m}^3$	no result

There is no clear correlation between either of the two sets of data. One of the samples of the TSP mini-volume sampler, on 28 March 2005, exceeded the 80 $\mu\text{g}/\text{m}^3$ trigger level. It is beyond the scope of this review to address problems with the TSP mini-volume sampler, or any equivalent methodology. All that can be said is that it would be desirable to have the ability to carry out monitoring so that the chemical composition of the collected dust could be determined. However, it would be unrealistic to require the analyses be done if a lack of public concern and a lack of occurrence of elevated dust levels continue to indicate there is no need for it.

⁶ Arisini Hanna, personal communication 13 March 2007.

4. Considerations for Changes to the TSP Monitoring

The desirability of continuous monitoring of TSP at the Three Kings quarry is obvious. What is more problematic are some of the other considerations, such as the choice of instrument, the sampling period, the frequency of operation, and an appropriate short-term indicator of elevated dust levels. Those matters are addressed here.

After a period of rapid expansion with different methodologies in the 1990s, the measurement of particulate matter in New Zealand has been more tightly controlled in recent times. This control began in 2000 with the review of the ambient air quality guidelines. In one of the background documents for the review⁷, various sections discuss monitoring methods for each of the 'common' air contaminants. For TSP monitoring the recommended method is the high-volume sampler, in accordance with Australian Standard AS2724.3-1984.

When it came to PM10 monitoring, the authors of that report were faced with the situation of many low-volume samplers and continuous monitors in use in New Zealand. Hence they decided against recommending the equivalent Australian Standard, AS3580.9.6-1990, which is the high-volume sampler adapted for PM10 monitoring by use of a size selective inlet. Instead they specify as the recommended method for PM10 monitoring the requirements of the United States Environmental Protection Agency (US EPA), namely US 40 CFR Part 50, Appendix J, or an equivalent method. This 'equivalency approach' allows the use of most of the low-volume samplers and continuous monitors. Two examples of low-volume samplers given equivalency status by the US EPA are the Partisol Air Sampler and the Dichotomous Sampler, and two examples of continuous monitors with equivalency status are the Beta Attenuation Monitor and the Tapered Element Oscillating Microbalance (TEOM) Monitor.

Subsequent Ministry for the Environment documents have generally, but not precisely, followed the approach outlined above. For example, the Good Practice Guide for Air Quality Monitoring and Data Management⁸ recommends for TSP monitoring the high-volume sampler as specified in AS2724.3-1984 and US 40 CFR Part 50, Appendix B. There are no significant differences between these two specifications. For PM10 monitoring the Good Practice Guide recommends high-volume sampling as specified in US 40 CFR Part 50, Appendix J, or an equivalent method. In the text, reference is made to the low-volume (actually referred to as medium-volume) samplers and continuous monitors mentioned previously, that have been given equivalency status for PM10 monitoring by the US EPA.

More relevant to this review, the Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions⁹ gives as the preferred method for TSP monitoring the high-volume sampler specified in AS2724.3-1984 (although in one part of the document it is incorrectly given as AS3580.9.6-1990). Mention is made of low/medium-volume samplers and continuous monitors, with TSP sampling heads. However, it is noted that there is no standard specification for the size selectivity of those inlets.

⁷ Lynette Denison, Kevin Rolfe & Bruce Graham: "Health Effects of Five Common Air Contaminants and Recommended Protective Ranges", Ministry for the Environment Air Quality Technical Report No. 12, October 2000.

⁸ Ministry for the Environment, Good Practice Guide for Air Quality Monitoring and Data Management, December 2000.

⁹ Ministry for the Environment, Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions, September 2001.

Now with the introduction of National Environmental Standards (NES) for Air Quality, which includes a 24-hour average standard for PM₁₀, the Regulation (as recorded in the Users Guide¹⁰) has requirements for PM₁₀ monitoring. They are either the method in US 40 CFR Part 50, Appendix J, or the method in the Australian Standard AS3580.9.6-1990, these being the high-volume sampler adapted for PM₁₀ monitoring by use of a size selective inlet. For the former method there are also the various low volume samplers and continuous monitors given equivalency status by the US EPA. A list of such monitors is included in the Users Guide, which is taken (and updated) from the US EPA website www.epa.gov/ttn/amt/criteria.html. The US EPA listing of designated reference and equivalent methods was last updated on 6 March 2007.

A feature of the PM₁₀ monitoring required by the NES is that the monitoring must be continuous (no more one-day-in-three, etc monitoring). There are particular issues associated with the use of TEOMs, including that they have an operating temperature of 40°C, rather than the 50°C recommended by the manufacturers. Also, a TEOM should either have a site-specific adjustment factor or include the use of a Filter Dynamics Measurement System (FDMS), the latter having been successfully introduced by the Canterbury Regional Council into its urban PM₁₀ monitoring. These concerns with TEOMs relate to ensuring inclusion of the volatile fraction of PM₁₀ in the measurement, and so they are specific to the urban particle aerosol. Hence they have nothing much to do with continuous monitoring of TSP at the Three Kings quarry.

The reason for having all this information on the monitoring of PM₁₀, in a report about TSP monitoring, is that much of it is related to the choice of the most appropriate methodology for continuous TSP monitoring at the Three Kings quarry. The Auckland Regional Council (ARC) measures PM₁₀ using continuous monitors throughout Auckland. The ARC¹¹ has a preference for the Beta Attenuation Monitor. Hence it would make sense for Winstone Aggregates to use a similar instrument, but using a TSP sampling head rather than a PM₁₀ sampling head. The particular instrument is the Thermo Electron FH62 C14 Series Beta Attenuation Monitor. It is included, in its PM₁₀ form, in the US EPA list of equivalent methods referred to above.

A major reason for the introduction of continuous TSP monitoring is so that its results are able to be directly related to the meteorological data. The latter are measured at the Quarry Office site, and so it is logical to co-locate the Beta Attenuation Monitor at that site. Various initial operating parameters for the monitor will need to be determined. These include the measurement cycle and the data averages. The default measurement cycle is a single filter spot in position for 24 hours, and there are selectable options between 30 minutes and 24 hours. The minimum detection limits for the monitor are 1 µg/m³, 24-hour average, and 4 µg/m³, 1-hour average.

As for data averages, the Beta Attenuation Monitor has various selectable options, with each ½-hour and 24-hour values automatically stored, and each ½, 1, 3 and 24-hour values displayed. It is suggested that for at least the first 12 months of operation both 1-hour and 24-hour averages of the TSP data should be determined. After that, a review of the data could be carried out to decide on an appropriate regime for subsequent monitoring.

¹⁰ Ministry for the Environment, Updated Users Guide to Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004 (including Amendments 2005), October 2005.

¹¹ Janet Petersen, personal communication 12 March 2007.

Although a key feature of the Beta Attenuation Monitor is continuous monitoring, that may be excessive on a long-term basis. Hence, the review after 12 months should also address a desirable frequency of operation of the TSP monitor. A difference based on the time of the year may be appropriate. From the analyses of high-volume TSP monitoring data given above, it may be desirable to extend the 'summer' (more frequent) monitoring by one month, to be October to April.

The resource consent issued to the Winstone Aggregates Three Kings quarry refers to US EPA standard methodologies. It is unfortunate that there is only the high-volume sampler reference method for TSP, and no equivalent methods, approved by the US EPA. This difficulty could be overcome by continuing to operate, for at least 12 months, the TSP high-volume sampler at the Quarry Office site, side-by-side with the Beta Attenuation Monitor. Ideally, if feasible, the frequency of operation of the high-volume sampler should be increased, maybe even to daily operation. After the 12-month period, a day-by-day comparison of the 24-hour average Beta Attenuation Monitor data and the results of the high-volume sampler TSP monitoring could be carried out.

5. Recommendations

It is recommended that:

1. Continuous monitoring of TSP be implemented at the Three Kings quarry.
2. A Thermo Electron FH62 C14 Series Beta Attenuation Monitor with a TSP sampling head be purchased, installed and brought into operation at the Quarry Office site, preferably by October 2007.
3. For a period of at least 12 months, the Beta Attenuation monitor be operated continuously, with 1-hour and 24-hour TSP averages determined, followed by a review of the data to decide on an appropriate regime for subsequent monitoring.
4. The two TSP high-volume samplers at the Northern Boundary and the Eastern Boundary sites be decommissioned.
5. For a period of at least 12 months, the TSP high-volume sampler at the Quarry Office site continue to operate, with, if feasible, an increase in the frequency of operation of the sampler.
6. After the completion of the period of parallel sampling, a day-by-day comparison of the two sets of 24-hour average TSP data from the Beta Attenuation monitor and the high-volume sampler be carried out.
7. The issue of the chemical composition of the dust not be lost sight of, and there be an ability to obtain such information, at a site in the vicinity of the quarry, if both public concern and elevated dust levels indicate a need.
8. Following acceptance, and/or modifications, to these recommendations by the "parties", appropriate changes be made to the Air Quality Management Plan for the Three Kings quarry.

3 July 2007

Alan Happy
Environmental Manager
Winstone Aggregates
PO Box 17-195
Auckland

Dear Alan

Review of the TSP Monitoring Plan for Three Kings Quarry

I refer to the review of TSP monitoring at Three Kings Quarry dated April 2007 undertaken for Winstone Aggregates Ltd by Kevin Rolfe. My apologies for the delay in responding.

The Auckland Regional Council (ARC) accepts recommendations 1, 2, 3 and 5 – 8 of the review, but I have reservations about accepting recommendation 4 as written.

Mr Rolfe's report identifies that a greater frequency of exceedance of the 80 mg/m³ trigger level has been recorded for the sampler located on the northern boundary than the one at the Quarry Office site. Therefore, the ARC considers that this high-volume sampler should continue in operation in addition to that at the Quarry Office site for at least the first 12 months, with continued operation subject to review after 12 months, in line with the planned review and comparison of results from the proposed Beta Attenuation Monitor and the high-volume sampler located at the Quarry Office site.

In order to facilitate progress on this matter, I can confirm that, subject to agreement with amendments to recommendation 4 as outlined above, the ARC considers that the proposed changes to the Air Management Plan be put into place, and that continuous monitoring of TSP discharges from Three Kings Quarry commence as soon as practicable.

I will be away from the office for the next few weeks, returning on 06 August 2007. Should you wish to clarify anything contained in this letter prior to that date, please contact Mike Harvey on 09 366 2000 x 7088.

Yours sincerely



Charles Kirkby
**Acting Manager, Air Quality Consents
Regulatory Services**



Auckland
Regional Council
TE RAUHITANGA TAIAO

21 Pitt Street
Private Bag 92 012, Auckland
New Zealand
DX CP 28 008 Pitt St
Telephone +64 9 366 2000
Facsimile +64 9 366 2155
www.arc.govt.nz

File Ref 12821

26 June 2009

Winstone Aggregates (A Division of Fletcher Concrete & Infrastructure Limited)
PO Box 17195
Greenlane 1546

Attention: Andrea Sprosen

Dear Andrea

RESOURCE CONSENT

Consent Details:

Consent Number:	21875
Consent Holder:	Winstone Aggregates (A Division of Fletcher Concrete & Infrastructure Limited)
Site Name:	Three Kings Quarry
Activity Type:	Discharge To Air
Location:	985 Mount Eden Road Three Kings Auckland City
Expiry Date:	01 August 2012

The Auckland Regional Council (ARC) acknowledges receipt of the updated Air Quality Management Plan (AQMP) dated March 2009, the quarterly reports for December 2008 to May 2009 inclusive, the two yearly report dated April 2009, and the TSP exceedance investigation report dated 13 March 2009.

The AQMP is approved and the monitoring reports are acknowledged. The TSP exceedance explanation is accepted, however please take all steps necessary to ensure future compliance with the TSP standard in Condition 20.

If you have any queries regarding your consent, please contact Barry MacDonell, ARC Quarry Consultant, on 027 228 2386.



Yours faithfully

Gareth Noble
Manager- Air Quality



Auckland
Regional Council
TE RAUHI TANGA TAIAO

21 Pitt Street, Auckland Central
Private Bag 92 012

Auckland 1142, New Zealand

DX CP 28 008 Pitt St

Telephone +64 9 366 2000

Facsimile +64 9 366 2166

www.arc.govt.nz
File Ref: 12821