11 February 2013

CONSTRUCTION AIR QUALITY (DUST) MANAGEMENT PLAN – UNDERGROUNDING

Wellington Inner City Improvements

National War Memorial Park (Pukeahu)

CAQMP2-U

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1.0	Draft	Andrew Curtis	Dr Bruce Graham	4 December 2012
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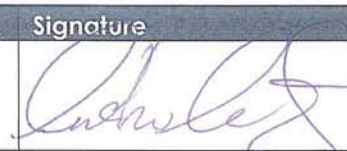
Name	Position	Date	Signature
Andrew Curtis	Air Quality Leader	11/2/13	
Ed Breese	Environmental Manager	11/2/13	

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GLOSSARY

Acronym	Definition
(CAQMP2-U).	Construction Air Quality (Dust) Management Plan – Undergrounding
CEPM	Construction Environment Management Plan
MPA	Memorial Park Alliance
SH1	State Highway 1
TSP	Total Suspended Particulate

1. INTRODUCTION

A requirement of the National War Memorial Park (Pukeahu) Empowering Act 2012 is the preparation of a Construction Air Quality (Dust) Management Plan – Undergrounding (CAQMP2-U), which is intended to outline how the project team will manage the potential for dust, generated by the construction of the Buckle Street Underpass between Tasman Street and Taranaki Street.

This document forms part of the wider Construction Environmental Management Plan (CEMP) that has been developed for the site.

This document has been developed using guidance from a number of sources including:

- The Ministry for the Environment Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions
- The Draft London Code of Practice, Part 1: The Control of Dust from Construction
- New Zealand Transport Agency (2012): Draft Guide to Assessing Air Quality Effects for State Highway Asset Improvement Projects. V 0.6.

2. PROJECT OVERVIEW

As part of the Wellington Inner City Improvements, the alignment of State Highway 1 (SH1) in the vicinity of the Basin Reserve and the National War Memorial Park is being altered. The current SH1 at Buckle Street will be re-aligned through an underpass below the new National War Memorial Park (Pukeahu). Once traffic has been diverted from Buckle Street onto the interim road, the underpass will be constructed, using what is essentially a cut and cover methodology. The approximate location of the underpass is shown on Figure 1. The works are described in detail in the Construction Environmental Management Plan, however Table 1 provides a brief outline of the construction methodology.

Table 1 - Outline construction methodology

Activity	Description
1	Construct site fence, haul road and divert Buckle Street Services
2	Construction of Trench retaining walls
3	Begin construction of First Bench (3 m depth)
4	Begin construction of Second Bench, ground anchors and underpass floor piling
5	Begin Construction of third bench, installation of second Bench Ground Anchors and commence underpass concrete works.
6	Continuation of benching and construction of underpass slab, walls and roof.
7	Completion of underpass, removal of piling and backfill of trench.

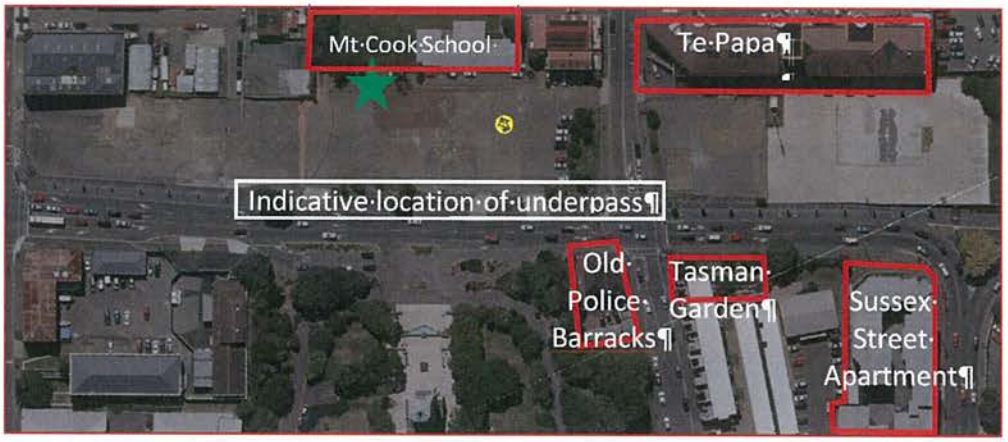
2.1 Timeframe

Table 2 presents the outline programme for the works. This will be updated as the construction methodology is refined.

Table 2 - Outline programme for construction

Activity	Start date	End date
Commence Site Works	7 February 2013	6 March 2013
Commence Retaining Works	7 March 2013	13 May 2013
Commence Excavations	8 April 2013	November 2014
Commence Concrete Works	7 May 2013	November 2014
Decommissioning Works	November 2014	16 December 2014
Underpass Open		23 December 2014

Figure 1 – Site layout



The star is the indicative location of the weather station and dust monitor

2.2 Hours of operation

The works will generally be carried out seven days a week during daytime hours (0600h to 2300h). Works after 2000h will be avoided as far as practicable near residential buildings

3. POTENTIALLY SENSITIVE PARTIES

There are potentially a number of parties that will be affected by dust during the construction of the underpass. Those identified on Figure 1 are considered to be at the greatest risk of experiencing effects. In addition there is the potential that those parties affected by the construction of the temporary road could also be affected when it is removed. Below is a brief outline of the reason for identifying these parties.

3.1 Sussex Street Apartments

These apartments are located on the south side of, and very close to Buckle Street. The ground floor apartments are in particular at risk of dust nuisance effects as their windows are essentially at ground level, with no alternatives for ventilation. As the site entrance will be adjacent to this property it will potentially be affected throughout the works.

3.2 Tasman Gardens

The apartment at the Buckle Street end of complex overlooks the works on the south side of Buckle Street. While the complex has a solid fence around it there is some potential for dust nuisance effects.

3.3 Former Police Barracks

The former police barracks building is located on the south side of Buckle Street close to the construction zone and has the potential to be affected by dust from the construction works while these are occurring close to the building. In particular it is understood that the building uses windows for ventilation and has the main entrance opening onto Buckle Street.

3.4 Te Papa

Te Papa occupies a property on Tory Street immediately adjacent to the northern boundary of the temporary road. There are a number of air intakes along the southern side of its premises, and consequently Te Papa staff have concerns that dust entering the buildings could result in the need for additional cleaning of its collection.

The potential for any effect on Te Papa will occur while any works are occurring adjacent to the site.

3.5 Mt Cook School

Mount Cook School is located immediately adjacent to the northern boundary of the temporary road. The closest buildings to the temporary road are classrooms used to teach technology, and are used by students from other schools as well as Mt Cook. Adjacent to these classrooms is the school field which is used both in break times by pupils and for more formal physical education at other times.

The potential for effects on the school will occur as long as construction works are adjacent to it.

3.6 Other Parties

There are other buildings (such as that owned by the Defence Force, Tory Hall Apartments, and the National War Memorial) in the area that have the potential to be affected by the works if the mitigation measures described in Section 5, are not appropriately implemented. However it is not considered that specific mitigation is required for them.

It is noted that there are separate measures contained in the Construction Environment Management Plan that detail what works will be conducted when ceremonies are being held at the National War Memorial.

4. CONSTRUCTION ACTIVITIES

Set out are the three broad categories that the proposed construction activities fall into and the potential for dust nuisance.

4.1 Site Set up

The first phase of work will involve site set up and will involve archaeological investigations, as well as establishment of the haul road and some excavations on the northern side of Buckle Street. There will also be installation of retaining walls on the northern and southern sides of the trench.

4.1.1 Nuisance Dust Potential

There is a potential for dust nuisance from the excavation activity as well as establishment of the haul road, unless appropriate mitigation is used. In addition there may be dust associated with any concrete cutting and removal unless appropriate mitigation is used. The dust particles associated with this activity are generally large (100 microns or greater) and result in a gritty feeling on surfaces. In addition concrete dust is quite abrasive and can result in a pH increase in water.

4.2 Excavation

This will involve the excavation of the trench, and off-site disposal of the excavated material. This will occur using standard excavation construction techniques most likely involving excavators loading directly into trucks. Because of the depth of the excavation there is likely to be double (or triple) handling of material prior to it being removed from site. While this will be within the trench there is some potential for dust from this activity.

4.2.1 Nuisance Dust Potential

It is considered that the greatest potential for dust nuisance from this activity occurs during the removal of the excavated material as well as the movement of vehicles on the haul road.

4.3 Tunnel Construction

It is not considered that there are any particular dust sources associated with the construction of the tunnel. However any grinding or cutting of concrete has some potential to generate nuisance dust, which will need to be controlled.

4.3.1 Nuisance Dust Potential

It is considered that the greatest potential for dust nuisance from this activity occurs from vehicles accessing the site to bring in reinforcing steel and concrete. In addition there is some potential for concrete dust. The effects of both of these activities can be controlled through the use of appropriate mitigation.

4.4 Road Construction

It is not considered that there are any particular dust sources associated with the road construction. However any grinding or cutting of concrete has some potential to generate nuisance dust, which will need to be controlled.

4.4.1 Nuisance Dust Potential

It is considered that the greatest potential for dust nuisance from this activity occurs from vehicles accessing the site to bring in asphalt etc. The effects of this can be controlled through the use of appropriate mitigation.

4.5 Site Decommissioning

This will involve the backfilling of the trench and general site decommissioning activities. It is considered that backfilling of the trench has the greatest potential for dust, particularly as this activity reaches the top of the trench.

4.5.1 Nuisance Dust Potential

It is considered that the greatest potential for dust nuisance comes from the placement and compact of any fill material as well as from vehicles accessing the site to bring in the fill. The effects of both of these activities can be controlled through the use of appropriate mitigation.

5. MITIGATION

As the works being undertaken are all standard ones that can occur on any construction site, the mitigation measures that will be used on the site are all ones that are commonly used. This section outlines the basic mitigation measures that are to be used as well as the responsibilities.

5.1 Dust Mitigation Measures

The following identifies mitigation measures that will be used to control the potential for dust nuisance.

5.1.1 Vehicle Speed

All vehicles moving within the site will be limited to 10 kilometres per hour.

5.1.2 Water Truck

A water truck will be available on site at all times to control dust from unconsolidated surfaces. Apart from the instrumental monitoring triggers discussed in Section 6, the water truck will be used at any time visible dust is higher than 1.5 m behind a vehicle. Hand held hoses and or sprayers will be available to control peripheral areas that cannot be reached by the water trucks.

5.1.3 Concrete Cutting and Grinding

All concrete cutting or grinding will occur using equipment fitted with appropriate either wet or dry (dust extraction) mitigation.

5.1.4 Concrete Removal

In dry conditions the surface of any concrete being removed will be dampened to prevent dust being generated.

5.1.5 Removal of Excavated Material

As far as practical material that is being excavated shall be placed directly into trucks for off-site disposal.

When material is being excavated from the section between Tory and Taranaki Streets, it will be dampened prior to removal if the wind speed is greater than 10 m/s.

Where practical, trucks carrying potentially dusty material will be covered or otherwise controlled by dampening the material with a hose prior to leaving site.

5.1.6 Placement of Fill Material

Trucks delivering material to site that has the potential to be dusty will be covered.

Fill material will not be placed when wind speeds are greater than 10 m/s (as measured by the onsite weather station) unless the material being placed is damp or free from fines that could give rise to dust.

5.1.7 Truck Exit

There will be the facility to wash vehicle wheels prior to leaving site to avoid the tracking of material onto public roads that could give rise to dust.

Periodically the section of public road adjacent to the site exit will be swept to remove any material that may have built up.

5.1.8 Stabilisation of Exposed Areas After Construction

Where possible stabilise exposed areas remaining after construction as soon as practical using techniques such as: revegetation; mulch; or hydroseeding.

5.1.9 Stockpiling

While it is not anticipated that there will be a need for stockpiles of material that could generate dust, if any such stockpiles are required, they will be covered or otherwise controlled to prevent dust emissions in dry windy conditions.

5.2 Specific Dust Mitigation Measures

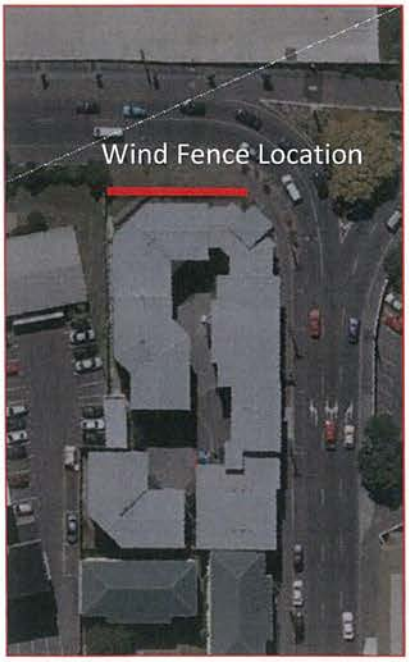
As mentioned in Section 3, there are there are five properties that could be affected by construction. In particular it is considered that specific mitigation is required for the Sussex Street apartment and the Old Police Barracks.

5.2.1 Sussex Street Apartment

A 2 m high dust fence will be constructed along the northern boundary of the property as shown on Figure 2. This fence will be designed to withstand Wellington weather conditions and utilise shade cloth with a porosity of about 50%.

The fence will be constructed prior to any works being undertaken on Buckle Street and be maintained until the works are complete.

Figure 2 – Sussex Street Apartments Dust Fence



5.2.2 Old Police Barracks

There are two options for a dust fence in this location. The first is in the immediate proximity of the building frontage. At this location the fence will need to be 2 m high.

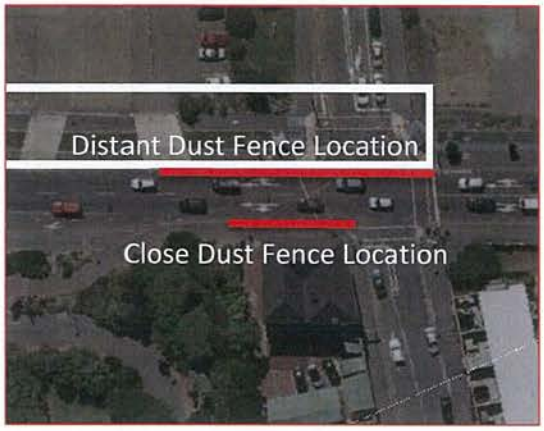
If it is not practical to install the dust fence at this location then it will need to be incorporated as a section of the fence around the construction. Because this location is further away it will need to be 4 m high in order to provide the same degree of protection, and also longer to avoid eddy effects around the ends.

The possible locations are shown in Figure 3.

This fence will be designed to withstand Wellington weather conditions and utilise shade cloth with a porosity of about 50%.

The fence will be constructed prior to any works being undertaken on Buckle Street and be maintained until the works are complete.

Figure 3 – Old Police Barracks Dust Fence



5.3 Odour Mitigation

While it is not anticipated that odour will be a significant issue, there is some contaminated material within the proposed alignment, and there is the potential that there may be some odour associated with its removal. The following mitigation measures can be used to deal with this potential in the event that odour is an issue:

- Material will be transported from the site to an appropriate facility for disposal as soon as practicable. Trucks used to transport the material will be covered by a tarpaulin or clean soil/fill to reduce the potential odour effects as the material is being disposed of;
- Minimising the open areas of excavations as much as practicable at all times, including ensuring that odorous sources are covered or temporarily backfilled when not excavating; and
- Having the ability to use an odour masking agent or deodoriser such as "Power Green", on to the surface of odorous material as it is encountered. The deodoriser can be applied by a worker using a back-pack pressurised sprayer.

5.4 Contingency Measures

While it is considered that the mitigation measures proposed will minimise as far as practical the potential for nuisance effects from the construction process, there is a requirement in the Empowering Act to identify contingency measures that can be used if required.

With respect to dust there are three main contingency measures that can be used if there are dust effects. Depending on the situation there may be a need to use some combination of these measures.

5.4.1 Cleaning Services

The first of contingency measure is to offer some form of property cleaning service. Depending on the degree or extent of any effects, this could involve exterior or interior cleaning or both. The decision as to whether to offer a cleaning service would be the responsibility of the Environmental Manager and only be implemented when it could be demonstrated that the soiling experienced could be attributed to the construction works and the degree of soiling was significantly greater than might occur normally. In making a decision as to whether to implement this contingency measure, the Environmental Manger will review recent construction activities as well as dust monitoring results.

5.4.2 Relocation

Where it can be demonstrated by a complainant that the degree of dust nuisance being experienced is sufficient that it is not tenable for them to remain in their premises e.g. they have a health condition

exacerbated by dust, or there is a repeated requirement to provide cleaning services then relocation can be offered. The period of relocation will be dependent on what is causing the nuisance dust, i.e. is it an activity that will shortly cease or move to a new location.

The decision as to whether relocation is offered will be made by the Environment Manager and only implemented where there is no viable alternative. In making a decision the Environmental Manger will review recent construction activities as well as dust monitoring results and the frequency of complaint.

Where relocation is offered, the property will be cleaned prior to the owner returning and appropriate security provided for the period that the property is vacant.

5.4.3 Air Conditioning

An alternative to relocation in some instances may be the installation of an air conditioning system, which can be used to provide ventilation, and positive pressure within the building to minimise dust ingress. The installation of an air conditioning system will only be considered if the particular circumstances exclude the viability of other potential contingency measures.

The decision as to whether relocation is offered will be made by the Environment Manager in conjunction with the Project Manager and only be implemented where there is no viable alternative.

6. RESPONSIBILITIES

The primarily responsibility for dust control during the construction process will lie with Nigel McCreight as the Construction Manager.

He will delegate, as appropriate, responsibility for day to day dust control on the site to the Site Manager Ian Taylor, and the Site Engineer Michelle Brock.

In addition Ed Breese as Environment Manager will also have responsibility for ensuring that the construction activities are carried out in a way that is compliant with all environmental and legislative requirements, as well as the implementation of contingency measures.

The responsibilities are presented in Table 3.

Table 3 – Responsibilities

Title	Responsibility	Contact Number
Construction Manager Nigel McCreight	Overall Responsibility for ensuring that construction activities do not result in air quality nuisance	027 5027786
Environmental Manger Ed Breese	Overall responsibility for ensuring that all environmental effects including air quality are managed within the requirements of the enabling legislation. Responsible for investigating environmental incidents. Responsible for authorising the implementation of contingency mitigation measures.	021 333726
Site Manager Ian Taylor	Responsible for the day to day operation of the site and implementing dust mitigation	027 4472802
Site Engineer	Responsible implementing dust mitigation	0274 756892

Title	Responsibility	Contact Number
Michelle Brock		
All Construction staff	Carry out activities in a manner consistent with the requirements of this plan. Report any dust generation, and initiate mitigation.	

Table 4 contains a list of the regular checks that should be carried out by the site supervisors.

Table 4 – Regular On Site Checks

Monitoring Activities	Frequency
Check weather forecasts for strong winds and rainfall to plan appropriate dust management response (7 day forecasts available on www.metvuw.co.nz)	Daily
Inspect land adjacent to the site, construction exits and adjoining roads for the presence of dust deposits.	Twice daily
Observe weather conditions, wind via observations and data outputs from weather stations and presence of rain.	Daily and as conditions change
Inspect all unsealed surfaces for dampness and to ensure that surface exposure is minimised.	Daily and as conditions change
Inspect dust-generating activities to ensure dust emissions are effectively controlled.	Daily and as new activities are commenced
Inspect watering systems (sprays and water carts) to ensure equipment is maintained and functioning to effectively dampen exposed areas.	Weekly
Monitor dust generating activities and water application rate.	In winds over 5 m/s (11 knots or Beaufort scale 3) hourly average

6.1 Emergency Contacts for Dust Mitigation

Should emergency dust mitigation be required at any time during construction activities identified within this management plan, these measures as necessary will be arranged by either the Construction Manager (Nigel McCreight – 027 5027786) or the Site Manager (Ian Taylor – 027 447 2802).

7. COMPLAINT INVESTIGATION

The following procedure shall be followed for all air quality complaints:

- All air quality complaints should be immediately directed to Miranda Greer (Stakeholder Liaison 027 270 0593), and Ian Taylor or Michelle Brock.
- An initial response will be made and recorded. Depending on the nature of the complaint the initial response could be to immediately cease the activity pending investigation, or to replace an item of equipment. However, in some cases it might not be practicable to provide immediate relief. The complainant and the council will be informed of actions taken.

- Where the initial response does not address the complaint, further investigation, corrective action and follow-up monitoring shall be undertaken as appropriate. The complainant and the Council will be informed of actions taken.

All actions will be recorded on the project web page and the complaint will then be closed.

8. MONITORING

As part of this project a continuous total suspended particulate (TSP) dust monitor and weather station have been installed immediately between the project and Mt Cook School. The location of the monitor is shown as the green star on Figure 1. This monitor will be used to provide immediate feedback to the project team on the effectiveness of dust control. The weather station is at the same location, with the located approximately 5 m above the ground.

8.1 Dust Trigger Levels

This section sets out the preliminary trigger levels that will be used in this project and the actions that will be undertaken in the event that the trigger levels are exceeded.

Note these trigger levels have been identified as preliminary as there is currently no background TSP information available to identify what the baseline concentrations are. The baseline data will be established over the coming months and the trigger levels modified as appropriate to account for this data.

8.1.1 Alert Level 1

Alert Level 1 has been developed to identify that dust concentrations have reached a point where dust nuisance is likely to occur if action is not taken to implement mitigation measures. It would not be expected that dust concentrations would reach this level unless there are adverse weather conditions in conjunction with a failure of mitigation.

Alert Level 1 is 120 µg/m^3 as a 1 hour average

8.1.2 Alert Level 2

Alert Level 2 indicates that dust concentrations have reached a level which is unacceptable, and dust nuisance will occur. All activities that have the potential to generate dust on site, apart from dust mitigation, must cease until such time as dust concentrations drop below Alert Level 1.

If an investigation identifies that site activities are not responsible for the high dust concentrations on site activities may resume prior to concentrations dropping to below Alert Level 1.

Alert Level 2 is 150 µg/m^3 as a 1 hour average or 80 µg/m^3 as a 24 hour average

8.2 Individuals to be Alerted

The dust monitor has been configured to alert the following individuals on their cell phones if Alert Level 1 or 2 is reached.

Title	Individual	Contact Number
Construction Manager	Nigel McCreight	027 5027786
Site Manager	Ian Taylor	027 4472802
Site Engineer	Michelle Brock	0274 756892

In the event that these individuals are going to be off-site for extended periods of time then it is their responsibility to provide information on their approved delegate to Peter Stacey on 09 355 1331 or 021 644842 or by email to peter.stacey@urs.com. At least 24 hours' notice is required to ensure that the individuals can be added to the alert system.

8.3 Monitoring Data

All monitoring data from the dust monitor and the onsite weather station are available on line at the following URL

http://www.harvestnz.com/w.cgi?hsn=40409

If required User name = mpa

Password = envdata

8.4 Monitoring Equipment Maintenance

Peter Stacey is responsible for the operation and maintenance of the monitoring equipment. If there are any issues or problems with the equipment or data then contact him on 09 355 1331 or 021 644842 or peter.stacey@urs.com.

Alan Benton will be assisting Peter Stacey and can be contacted on 021 537 523.

8.5 Wind Speed Monitoring

At this stage the wind speed data is being displayed on the MPA monitoring web page as both hourly average and wind gusts. Typically it is the wind gusts that are responsible for dust generation, therefore construction staff will regularly monitor the wind data and when wind gust speed approaches or exceeds 10 m/s ensure appropriate mitigation is being undertaken.

8.6 Contingency Plan for Instrument Downtime

Periodically there will be the need for the TSP monitor to be shut down for periods for regular maintenance and from time to time the instruments fail. During these times when the monitor is not operating, the following contingency plans should be implemented.

8.6.1 Planned shutdowns

Peter Stacey will advise the Site Manager prior to shutting down the TSP monitor for regular maintenance. During the shutdown period, site personnel should take the following steps, unless it is raining or wind speeds are less than 5 m/s:

- Water any potentially dusty surfaces whether or not dust is being generated. If the instrument is to be off-line for more than 2 hours, the surface may need to be rewatered.

8.6.2 Unplanned shutdowns

Unplanned shutdowns can occur due to power failures or instrument faults. The system monitoring the data will alert Peter Stacey in the event that an instrument failure has occurred. He will then inform the Site Manager and Site Engineer by phone. As soon as site management becomes aware that the dust monitor has failed, the following steps should be taken unless it is raining steadily or the wind speed is less than 5 m/s: -

- Water all potentially dusty surfaces whether or not dust is being generated. Periodically rewater areas until the monitor is back on line.

Wind data can be obtained from the web page mentioned in Section 7.3 on computer or smart phone. Alternately the Beaufort Wind Scale can be used to estimate wind speed. A copy of the Beaufort scale is

attached as Appendix A. If manual wind speed and direction observations are made these observations should be kept in the site log, as they may be required for investigation of complaints.

9. TRAINING

Environmental training for all staff will be undertaken as part of the site induction programme. The environmental induction will include the following information specific to this Plan:

- Information about the activities and stages of construction that may cause dust and odour impacts within the construction area
- Consent requirements
- Complaints management procedures
- Dust and odour monitoring and management procedures
- Description of dust monitoring for the Project.

10. EXTERNAL REVIEW

As part of the certification process this Management Plan has been externally reviewed by Dr Bruce Graham of Graham Environmental Consulting. A copy of his review is included as Appendix B.

In addition, a copy of the draft Management Plan was provided to Wellington City Council and Greater Wellington Regional Council for comment. As can be seen in the emails attached to Appendix B, Wellington City Council raised some questions which were responded to. Following the responses the Council has indicated that it is happy.

Greater Wellington had no comment. A copy of their emails to this effect, are also included in Appendix B.

11. APPENDIX A BEAUFORT SCALE

Beaufort Force	Description	Specification on land	Speed Knots	Speed Km/h	Speed m/s
0	Calm	Smoke rises vertically.	Less than 1	Less than 1	Less than 1
1	Very Light	Direction of wind shown by smoke drift but not by wind vanes.	1-Mar	1-May	0.3 – 1.4
2	Light breeze	Wind felt on face, leaves rustle, ordinary wind vane moved by wind.	4-Jun	6-Nov	1.67 - 3
3	Gentle breeze	Leaves and small twigs in constant motion, wind extends light flag.	7-Oct	Dec-19	3.3 – 5.3
4	Moderate breeze	Wind raises dust and loose paper, small branches move.	Nov-16	20 -29	5.6 - 8
5	Fresh breeze	Small trees in leaf start to sway, crested wavelets on inland waters.	17 - 21	30 - 39	8.3 – 10.8
6	Strong breeze	Large branches in motion, whistling in telegraph wires, umbrellas used with difficulty.	22 - 27	40 - 50	11.1 – 13.9
7	Near gale	Whole trees in motion, inconvenient to walk against wind.	28 - 33	51 - 61	14.2 – 16.9
8	Gale	Twigs break from trees, difficult to walk.	34 - 40	62 - 74	17.2 – 20.6
9	Strong gale	Slight structural damage occurs, chimney pots and slates removed.	41 - 47	75 - 87	20.8 – 24.2
10	Storm	Trees uprooted, considerable structural damage occurs.	48 - 55	88 - 101	24.4 - 28
11	Violent storm	Widespread damage.	56 - 63	102 - 117	28.3 – 32.5
12	Hurricane	Widespread damage.	>64	>119	>33

12. APPENDIX B PEER REVIEW AND EXTERNAL FEEDBACK

Wellington Inner City Improvements - National War Memorial Park (Pukeahu)

Peer Review of the Construction Air Quality (Dust) Management Plan – Undergrounding (CAQMP2-U)

Prepared by Dr Bruce Graham

February 2013

GRAHAM ENVIRONMENTAL CONSULTING LTD

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Wellington Inner City Improvements - National War Memorial Park (Pukeahu): Peer Review of the Air Quality (Dust) Management Plan – Undergrounding (CAQMP2-U)

1. Introduction

A National War Memorial Park is to be created in inner Wellington, on the area of land known to Maori as Pukeahu. One part of that development involves the creation of an underpass to replace the section of Buckle Street between Taranaki and Tasman Streets.

This report provides a peer review of the air quality management plan that has been prepared in support of the activities involved in construction of the underpass[1]. The management plan (CAQMP2-U) is required under the conditions (specifically NZTA 30) applying to the exercise of the Designation authorised by the *National War Memorial Park (Pukeahu) Empowering Act 2012*.

1.1 Outline of the Proposal

The construction of the underpass will involve the following activities:

(i) site set up, including installation of site fences and retaining walls, archaeological investigations, construction of a haul road, and diversion of Buckle St services;

(ii) site excavations, which are to be done in 3 stages (benches), supported by the installation of ground anchors and floor pilings;

(iii) tunnel construction, which mainly involves the placement of concrete slabs to form the base, walls and roof, and laying of a road surface;

(iv) completion of the underpass, including removal of piling, backfilling, and other decommissioning activities.

The trench excavated for the underpass will be about 150m long, but the full work site will extend over about 300m, covering most of the distance between Taranaki Street and Sussex Street. The maximum depth of the excavations will be 9m.

1.2 Potential for Discharges to Air

Dust Effects

The air discharges of most relevance to the construction activities are dust emissions. These have the potential to cause a variety of nuisance effects beyond the site boundaries although, in this case, the effects should be mainly limited to within a few tens of metres of the site activities, because of the built-up environment. The potential for dust nuisance effects is strongly related to weather conditions, with strong winds increasing the potential for dust releases, while wet weather will have the opposite effect.

Odour

Some of the areas within the work site are known to be contaminated. This raises the possibility of odour releases while the material is being disturbed. However it is not known at this stage whether there is any potential for significant odour problems to arise. This will only become clear as the excavation work proceeds

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[1] Wellington Inner City Improvements - National War Memorial Park (Pukeahu): Construction Air Quality (Dust) Management Plan – Undergrounding, (CAQMP2-U). Prepared by URS New Zealand Ltd for the WICI Alliance, version. 1, dated 11 February 2013.

1.3 Potentially Sensitive Parties

Five potentially sensitive locations are identified in the management plan; namely the Sussex Street Apartments, Tasman Gardens (apartments), the former Police Barracks (now used for commercial offices), a building used for storage and research by the National Museum (Te Papa) and Mt Cook School. The first three of these properties are immediately adjacent to the southern side of the proposed works, while the latter two are on the northern side, but separated from the works by the temporary bypass road. I agree that these properties all have the greatest potential for adverse effects, especially due to dust.

There are several other nearby properties that may also be affected by dust. However the proposed dust mitigation measures are to be applied across the entire work site, as necessary. Hence, I don't see any reason for singling out any other properties for particular attention.

1.4 Report Content and Scope

This report is laid out as follows:

> Section 2 summarises the measures proposed for controlling the air quality impacts of the development along with an assessment of their likely effectiveness.
>
> Section 3 summarises and assesses the systems and procedures that will be used for managing the air quality aspects of the development.
>
> Section 4 provides an overall summary and conclusions.

As required by section 21(2)(a) of the *National War Memorial Park (Pukeahu) Empowering Act 2012*, the main purpose of this review is to certify that the management plan is consistent with, and gives effect to condition NZTA 30 of the Designation. This condition requires that the plan should provide a methodology for managing the effects of dust, and should include as a minimum:

> *c) identification and implementation of dust suppression measures appropriate to the environment in which the works are located, and the sensitivity of nearby receptors; and*
>
> *(d) identification of contingency measures to address identified and verified adverse effects on sensitive receptors. Contingency measures may include options such as:*
>
> > *(i) cleaning of houses; and*
> >
> > *(ii) cleaning of other buildings and infrastructure*

These requirements have been kept in mind while carrying out this review.

2. Measures Proposed for Managing the Air Quality Impacts

2.1 Potential for Dust Releases

Section 4 of the management plan provides an assessment of the potential for dust releases during each stage of the proposed works. The key elements of this assessment are summarised below.

Site Establishment

The greatest potential for dust generation during this stage will occur during surface excavations and establishment of the haul road, and the associated vehicle activities. Dust may also be produced from concrete cutting, should this be required.

Trench Excavations

Dust may be generated during this phase when excavated material is dumped into trucks, and also from the truck movements across the site.

Tunnel Construction

The main dust source during this phase will be concrete cutting and grinding. Dust may also be produced from truck movements across the site

Road Construction

There should be minimal potential for dust generation during this phase other than from any concrete cutting and grinding, if this is required.

Site Decommissioning

The main sources of dust here will be from the dumping of fill material and the associated vehicle movements across the site.

I agree that these are the activities with the greatest potential for dust releases.

2.2 Dust Mitigation Methods

The procedures to be used for dust mitigation are described in section 5 of the management plan, and are summarised below.

1. Vehicle speeds will be limited to no more than 10 km per hour;
2. A water truck will be available on site at all times and will be used as necessary to control dust from unconsolidated surfaces. Hand-held hoses or sprinklers will also be available for damping down any surfaces not accessible by the water truck;
3. All concrete cutting and grinding will be done under wet conditions, or with machinery fitted with dust extraction equipment;
4. Water will also be used for dust control during the removal of concrete during dry weather conditions;
5. As far as practicable excavated material will be placed directly into trucks rather than being stored on site, and the material will be sprayed with water prior to removal if the wind is stronger than 10 m/s;
6. Trucks exiting the site with potentially dusty materials will be covered wherever practicable, as will trucks delivering dusty fill materials;
7. Fill material will not be placed when wind speeds are greater than 10 m/s unless the material is damp and/or unlikely to give rise to dust;
8. A vehicle wheel wash facility will be available at the site exit to minimise the potential for tracking of materials onto public roads, and the section of road adjacent to the site exit will be swept from time to time;

9. Any exposed areas remaining after the works will be stabilised using re-vegetation, covering with mulch or hydroseeding;
10. It is not expected that there will be any stockpiling done on site. However if any stockpiles are needed, they will be covered or otherwise controlled to prevent dust emissions during dry windy conditions;
11. Wind fences will be erected along or near the northern property boundaries of the Sussex Street Apartments and the former Police Barracks. The Tasman Gardens property already has a solid boundary fence.

The above measures are all appropriate for the construction activities and, if applied consistently and conscientiously, will be effective in minimising any nuisance effects due to dust.

2.3 Dust Monitoring

Section 8 of the management plan addresses the use of a continuous dust monitor to assist with dust control. The dust monitor will be linked to an alarm system and operated around alert levels; the first of these will give a warning that dust concentrations may be rising to unacceptable levels, while the second will indicate that all dust generating activities should cease.

There will also be an on-site weather station, which will provide the wind speed and direction information relevant to some of the control measures noted above.

The use of real-time dust monitoring can be a very effective way of managing potential dust emissions because it allows for a rapid response to increasing dust concentrations. In combination with the on-site weather station, this should help to ensure that the dust emissions from the site are effectively controlled.

2.4 Potential for Odour Releases

As indicated previously, there is some potential for odour emissions from the site when contaminated materials are being excavated. However, the specific nature of the contaminants and the extent of the contamination are currently uncertain. These will only become clear as the excavations proceed.

2.5 Odour Management Methods

The measures proposed for odour mitigation are as follows:

1. Removal of odorous materials off-site as soon as practicable after excavation using covered trucks and/or covering the materials with clean spoil or fill material;
2. Minimising the open areas of excavations as much as practicable, including covering or temporary backfilling when necessary;
3. Holding supplies of an odour masking agent or deodoriser on site for use as and when necessary.

These measures should be quite adequate for the majority of odorous materials likely to be encountered on the site. More extensive measures would only be required if extreme levels of contamination were revealed, such as a pooled concentrated liquid. Any necessary responses to that sort of situation would be best developed on a case-by-case basis, at the time it arises.

2.6 Contingency Measures

The contingency measures to be applied in the event that dust emissions cannot be adequately controlled are described in section 5.4 of the management plan. These cover the provision of cleaning services, temporary relocation of the residents, and the installation of air conditioning equipment. The proposed measures and the associated decision-making processes (to decide when they should be applied) are appropriate.

3. Management Systems and Procedures

The overall systems and procedures for managing the air quality aspects of the project are covered under sections 6, 7 and 9 of the management plan, which deal with, respectively, staff responsibilities, complaint investigation, and training. These are all essential components of an effective dust management system.

The day to day responsibilities for dust control on the site are clearly laid out in section 6, along with a list of the regular checks that should be carried out by the site supervisors. Emergency contact details are also provided.

The maintenance of a complaints register and the associated investigation and response procedures are an essential element of activities such as those proposed here. Procedures for complaint recording and investigation are laid out in section 7 of the management plan and cover all of the steps that I would expect to see. The use of a website for recording each of the complaints, and the resulting actions, is a potentially useful innovation.

All staff are to be given a site induction program which will include specific training on environmental matters including those relating to dust and odour management. Section 9 of the management plan gives a list of the information to be covered under the training. This should provide an adequate coverage of all of the relevant matters.

4. Summary and Conclusions

The activities involved in the construction of the Buckle St underpass have the potential to cause off-site dust nuisance effects and there may also be some potential for odour nuisance effects. The systems and procedures to be applied for managing and mitigating these potential effects are laid out in the Construction Air Quality (Dust) Management Plan - Undergrounding, CAQMP2-U. Having reviewed this plan, my conclusions are as follows:

1. The range of dust management methods proposed for the site, if applied consistently and conscientiously, should be effective in minimising any nuisance effects due to dust.

2. The potential for odour releases from the site is highly uncertain. However, the range of measures proposed for responding to any such releases should be quite adequate for dealing with most situations.

3. The proposed contingency measures in the event that dust effects cannot be adequately controlled are appropriate.

4. The systems and procedures that will be used for managing the air quality aspects of the operation are described with an appropriate level of detail in section 6, 7 and 9 of the plan.

I consider that that the management plan is consistent with, and gives effect to condition NZTA 30 of the Designation authorised under the *National War Memorial Park (Pukeahu) Empowering Act 2012* .

Bruce W Graham

11 February 2013

Curtis, Andrew

From: David Grant <David.Grant@nzta.govt.nz>
Sent: Thursday, 24 January 2013 11:22 a.m.
To: Curtis, Andrew
Cc: Mark Ashby (Apecx)
Subject: FW: Memorial Park Alliance - CAQMP2-U

Andrew
No specific feedback or change sought to draft CAQMP2-U from GWRC
Regards
David Grant

From: Richard Percy [mailto:Richard.Percy@gw.govt.nz]
Sent: Wednesday, 23 January 2013 12:02 p.m.
To: David Grant
Subject: RE: Memorial Park Alliance

Hi David,

Thanks for the reminder email. We have no comments to make on the plan. Were WCC comfortable with the plan?

Thanks
Richard

From: David Grant [mailto:David.Grant@nzta.govt.nz]
Sent: Tuesday, 22 January 2013 4:12 p.m.
To: Richard Percy
Subject: RE: Memorial Park Alliance

Hi Richard
A quick follow up to see if you had any feedback on the Draft Dust Plan for main undergrounding works?
If not I'll now pass onto our independent certifier for certification.

Weather this week is assisting completion works on the temporary diversion road for Buckle St - traffic will be shifted onto it as of this Friday.

Regards
David Grant
Memorial Park Alliance

From: Richard Percy [mailto:Richard.Percy@gw.govt.nz]
Sent: Monday, 14 January 2013 2:39 p.m.
To: David Grant
Subject: RE: Memorial Park Alliance

Hi David,

Happy new year to you too, had a good break thanks, over all too rapidly!

Thanks for the copy of the dust plan, I will have a quick look over it, however, as with the previous plan, provided WCC is comfortable with it we will be.

Trust all is going well on site.

Thanks
Richard

From: David Grant [mailto:David.Grant@nzta.govt.nz]
Sent: Monday, 14 January 2013 2:03 p.m.
To: Richard Percy
Subject: Memorial Park Alliance

Hi Richard

Happy New Year - trust a relaxing break and good start to the year?

Attached for your information and any review comments (as relevant) is the draft dust management plan for the undergrounding construction phase of the Memorial Park project.
This management plan has been based on the initially certified dust management plan implemented for construction of the Buckle St diversion road (due to open to traffic 25 January).
I'm seeking any feedback on this draft plan by the end of this week if possible.

Regards

David Grant
Memorial Park Alliance
DDI 04 931 8926
M 021 334 213
E david.grant@nzta.govt.nz

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Curtis, Andrew

From: David Grant <David.Grant@nzta.govt.nz>
Sent: Thursday, 24 January 2013 11:21 a.m.
To: Curtis, Andrew
Cc: Mark Ashby (Apecx)
Subject: Memorial Park Alliance - CAQMP2-U

Hi Andrew
As below WCC confirm no further feedback from their initial comments/queries when supplied the draft CAQMP2 - U.
GWRC also have no further comment as per email to follow this one.
Thus we can forward the finalised document to Mark Ashby for certification review.
Regards
David Grant

From: Ben Brown [mailto:Ben.Brown@wcc.govt.nz]
Sent: Wednesday, 23 January 2013 12:39 p.m.
To: David Grant
Subject: RE: Memorial Park Alliance

Hi David,

I have no further comments/concerns other than what I have outlined in my email below.

Regards,

Ben

From: David Grant [mailto:David.Grant@nzta.govt.nz]
Sent: Tuesday, 22 January 2013 4:03 p.m.
To: Ben Brown
Subject: FW: Memorial Park Alliance

Hi Ben
Could you advise if you had any further feedback comments on the draft Dust Management Plan for the main undergrounding works?
If not I'll now pass the draft plan onto our independent certifier with the initial comments supplied below for their information.
Regards
David Grant
Memorial Park Alliance

From: David Grant
Sent: Wednesday, 16 January 2013 4:20 p.m.
To: 'Ben Brown'
Cc: andrew.curtis@urs.com
Subject: RE: Memorial Park Alliance

Hi Ben
Many thanks for taking a look over the Dust Plan and the associated queries.
I have had a quick chat to Andrew Curtis who drafted the plan and have added some **text in response** below to your queries.

Please do give me a call if you want to discuss any of these points further.

Attached are a couple of snap shots of our construction sequencing methodology at April 2013 and 2014 which will help give a sense of how focused the main construction site is.

Regards
David Grant
931 8926

From: Ben Brown [mailto:Ben.Brown@wcc.govt.nz]
Sent: Tuesday, 15 January 2013 12:21 p.m.
To: David Grant
Subject: FW: Memorial Park Alliance

Hi David,

I have been asked to look at 'Construction Air Quality (Dust) Management Plan - Undergrounding' for the upgrade works.

As I have had limited involvement (to reviewing this plan) some of my comments/questions listed below may have already been answered.

- section 5.1.8 - 'where possible' exposed areas will be stabilised. Will alternatives be used when the techniques used are not possible or will these areas of exposed earthworks be left bare?

The main cut and cover trench stage of the Memorial Park Project will not generally involve any large or significant areas of exposed earthworks.
Water carts are an alternative method that will used to dampen down areas of any accessible ground level exposed earthworks. Exposed areas on the sides of the trench will be managed with temporary retaining walls.
The exposed active working areas within the trench itself are not anticipated to generate any significant dust issues given the circumstances (trench environment).

- section 5.2 - why hasn't Mt Cook School been addressed in this section given its' close proximity to the works?

Mount Cook School will no longer be immediately adjacent to the construction work as they have been during the initial phase to construct the temporary diversion road for Buckle St.
The School will from here on in now be part of the monitored and managed local environment context for the construction site during the Buckle St undergrounding component of the project.

- will the earthworks be staged to mitigate dust nuisances?

No - this isn't considered to be necessary given the nature of this trenched project.
The staged construction sequence for the underpass works will itself minimise dust generation.

- it is assumed the the core site will be fenced off from the public. Will this be designed in a similar fashion to the 'dust fences' outlined in section 5.2.1? I am particularly interested in the areas of the site adjacent to footpaths and the Buckle St diversion.

Yes the construction site will be fenced off with a security fence. This design is being finalised and will involve cyclone type fencing as well as areas of solid hoarding and multiple gates along the northern side to allow construction vehicle entry and exit as staging progresses.

Regards,

Ben

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