



1 February 2022

• Hawkes Bay Regional Council  
c/o Sven Exeter  
Principal Advisor  
**Mott MacDonald**

Dear Sven

## APP126684 TECHNICAL REVIEW OF AIR QUALITY ASPECTS OF RAVENSDOWN AWATOTO

### 1.0 Introduction

Ravensdown Limited (Ravensdown) is applying to the Hawke's Bay Regional Council (HBRC) for new consents for its Awatoto manufacturing site. Ravensdown has submitted a number of technical documents to support its application, and Pattle Delamore Partners Limited (PDP) has been engaged by HBRC to undertake a review those that relate to air quality. This letter sets out PDP's review of the air quality assessment.

### 2.0 Scope

In an email dated 6 December 2021, Tania Diack of HBRC identified the following documents that it wanted PDP to review. Specifically, these were:

- R2 - Manufacturing Plant Process Report, prepared by JSEA Technologies, 4 November 2021
- R3 - Acid Plant Process Report, prepared by Chemetics Inc, November 2021
- R4 - Air Discharge Strategy, prepared by Ravensdown, November 2021
- A1 - Air Discharge Dispersion Modelling and Air Quality Effects Report, prepared by Tonkin & Taylor Ltd, November 2021 (Air Report)
- A6 – Human Health Effects, prepared by Environmental Medicine Ltd, November 2021
- Proposed conditions for the discharge to air consent, prepared by Mitchell Daysh, November 2021
- M1 - Source Control Management Plan, prepared by Ravensdown, November 2021 (SCMP)

### 3.0 Review of Draft Assessment

PDP has previously<sup>1</sup> undertaken a review draft copies of some of the documents provided by Ravensdown. This review identified some areas where additional information was required in order to undertake an appropriate review. The response to this review is discussed in Section 5.

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<sup>1</sup> PDP, Review of Draft Air Quality Assessment for Ravensdown, 12 November 2021

PDP staff have also undertaken a site visit as part of the review process to vary the consent to allow for the installation of the new scrubbing system for the manufacturing plant.

## 4.0 Review of Reference Documents

### 4.1 Manufacturing Plant Review

JESA Technologies (JSEA), one of the world's leading providers of phosphate technology, prepared the Manufacturing Plant Process Review. PDP consequently considers JSEA as being very appropriate for undertaking the process review. JSEA's review is comprehensive and considers all aspects of the manufacturing process, and benchmarks them against international practice.

PDP has briefly summarised the main findings for each of the main areas of the manufacturing plant.

#### 4.1.1 Rock Blending

JSEA summarises the rock blending process, which appears to be comparable with that elsewhere. JSEA notes that there is a baghouse that is used to control dust from some of the rock blending processes.

JSEA makes a number of recommendations about further controlling dust, noting in section 4.2.1.1 that:

*"The extraction unit in the roof above the conveyor that supplies rock to storage shed 1 and 2 is thought to be undersized, hence is not extracting the required volumes of particulate matter when rock is being dropped into the storage sheds. It is thought that the single above-mentioned baghouse would perform better if not overloaded with the storage rooms 1 and 2 extract system."*

And that:

*"On top of the storage shed roof are louvered filter panels. These are a known source of particulate emissions when the rock is being dropped into a storage shed."*

JSEA also recommends in section 5.1.

*"The extraction system from storage rooms 1 and 2 also supplies this bag house. It does not appear that all conveyor transfer points have ventilation connections. It is recommended that conveyor transfer points missing controls be ventilated to bag houses."*

*The bag house should also have a particulate detector to monitor the performance of the bag house.*

*The rock weigh belt feeding the conveyors that feed the various hoppers that feed the mill originally had a ventilation system that reported to an existing bag house. This system has been disconnected for reasons unknown. A new design for dedusting these items should be implemented to achieve IBP even though these remain enclosed inside the plant building. The bag house should also have a particulate detector to monitor its performance."*

PDP agrees that JSEA'S recommendations are reasonable and as discussed in a Section 4.4 below the majority appear to have been adopted by Ravensdown for implementation in the SCMP.

#### 4.1.2 Mills

JSEA notes that fugitive dust from each of the mills is controlled by a baghouse. Ravensdown is currently upgrading the broken bag detectors to improve the ability to detect bag failures, which may temporarily result in excessive dust emissions.

PDP considers that the efficacy of the mill bag-filters appears to be appropriate.

#### 4.1.3 Powder Bunkers

JSEA states that using an enclosure to control the fugitive emissions from the powder bunkers as is done at Awatoto is reasonably standard.

JSEA recommends that:

*“Controls such as ventilation to a baghouse with particulate detector would be needed for areas that exhibit visible dust emissions from buildings or create safety risk inside the building where personnel are working to meet IBP [International Best Practices]”.*

#### 4.1.4 Manufacture

JSEA’s review of the manufacturing system and scrubbing system concludes that the general operation at Ravensdown appears to be consistent with that used elsewhere.

JSEA indicates that particulate controls are appropriate and there is generally sufficient extraction to control the particulate. The report references a separate Beca report that PDP has not seen that identifies additional measures that could be implemented to minimise particulate.

For fluoride control, JSEA indicates that the current two Den scrubbers do not meet IBP for fluoride emissions (expressed as mg F/Nm<sup>3</sup>) but that the proposed combined stack emissions will meet IBP.

JSEA makes three overall recommendations which are reproduced below:

- For the new scrubber: *As normally required by environmental authorities, the expected performance of the new system should be backed up by calculations provided by the vendor. These calculations should take into account the fluoride vapor pressure in each stage, as the flu[r]osilicic acid increases in concentration from stage to stage. Ravensdown should consider requesting a lower guarantee than has currently been provided since it is so much higher than what is currently achieved.*
- *Except for the mills, the dust control provisions in the materials handling system are very rudimentary and should be upgraded to include a series of dust extraction points at each transfer point together with associated baghouses equipped with broken bag detectors.*
- *The existing data supplied is insufficient to develop a detailed design for sizing the ventilation and scrubber system. However, the current system has several design deficiencies which would be expected to cause blockages to frequently occur. If this is confirmed by Ravensdown Operations, a re-design of the system is recommended.*

PDP considers these recommendations are reasonable and should be incorporated in the SCMP.

## 4.2 Acid Plant Review

The Acid plant review was undertaken by Chemetics Inc (Chemetics), which is company that provides specialist engineering and design to the sulphuric acid industry. PDP considers Chemetics is an appropriate organisation to have undertaken the Acid plant review.

Chemetics’ review follows a similar format to the manufacturing plant, providing an overview of the process and then indicating how the acid plant performance compares with international standards.

#### 4.2.1 Stack Flow Measurement

In Section 4.3.1 of its report, Chemetics highlights that it appears that the continuous gas flow meter in the acid plant stack has been incorrectly calibrated for a period of time, and consequently the plant had been under-reporting emission rates until the error was identified and corrected in July 2021. It is unclear how

long this under-reporting has occurred for and therefore Chemetics **multiplies all the monitoring results by 1.7** when undertaking its analysis.

It appears that Tonkin & Taylor (T+T) was not aware of this issue, or the correction, and consequently it is possible that the portion of the Air Review dealing with acid plant emissions may need to be reviewed. At a minimum, PDP considers that additional information will be needed to assess the impact of the updated emission rate information.

#### 4.2.2 Plant Performance

Chemetics' report considers that based on the sulphur dioxide (SO<sub>2</sub>) and sulphur trioxide (SO<sub>3</sub>) emissions that the plant is operating well. The approximate discharge rate of 1.7 kgSO<sub>2</sub>/ t H<sub>2</sub>SO<sub>4</sub> compares to an international benchmark of 2 kgSO<sub>2</sub>/ t H<sub>2</sub>SO<sub>4</sub>, and 0.007 kgSO<sub>3</sub>/ t H<sub>2</sub>SO<sub>4</sub> compared to the benchmark of 0.075 kgSO<sub>3</sub>/ t H<sub>2</sub>SO<sub>4</sub>. Chemetics states that the SO<sub>3</sub> emission rate is the lowest known in the industry.

Chemetics also mentions oxides of nitrogen (NO<sub>x</sub>) and hydrogen sulphide (H<sub>2</sub>S). Chemetics states that, due to the plant configuration no H<sub>2</sub>S is likely to be emitted from the acid plant, and there is no data provided on NO<sub>x</sub> emissions other than citing the World Bank Standards. Given that there is a National Environmental Standard for nitrogen dioxide (NO<sub>2</sub>), PDP considers that there would be merit in understanding what level of emission may be occurring at Awatoto.

Chemetics has reviewed plant start-ups and indicates that measures already implemented by Ravensdown are consistent with best practice, and Chemetics considers that Ravensdown has minimised emissions from this activity.

Overall, Chemetics concludes that while the plant is currently operating well within international standards, there are further measures that Ravensdown could implement to further minimise emissions of SO<sub>2</sub>. Measures include:

- *Replacing bed 4 conventional catalyst with caesium promoted catalyst*
- *Increasing the size of the converter to increase catalyst volume*
- *Installing a ventilation system for the acid pump tanks if testing indicates a requirement (gas to blower, a new package scrubber, or a new vent gas blower to the Dry Tower)*
- *Adding a tail gas scrubber*

Ravensdown has already committed to increasing catalyst capacity when it replaces the convertor, which is approaching the end of its life. Chemetics also notes that installing ventilation systems on the acid pump tanks and/or the sulphur melter area and adding a tail gas scrubber would go beyond what is required to meet international best practice. Chemetics considers these further additional measures would only be required if there were health and safety or environmental impacts needing to be addressed.

### 4.3 Air Discharge Strategy

Ravensdown has documented an Air Discharge Strategy (the Strategy) that sets out measures being adopted to reduce air discharges across its site. The Strategy sets out information on the current site and air emissions and the assessments that have been undertaken to understand the potential effects of these emissions. The Strategy documents the projects that Ravensdown has already committed to, i.e. replacement of the Dens scrubbers and installing a single manufacturing plant stack, as well as replacing the acid plant converter, which has reached the end of its life. All of these projects are scheduled to be implemented in 2023.

The Strategy discusses source control via the SCMP and specifically in Section 4.6 states the following:

*A Source Control Management Plan for both Air and Water will be prepared as part of the resource consent application documents. This will include relevant management controls for fugitive emissions to air such as:*

- *Improvement to housekeeping around site.*
- *Maintenance of existing assets, such as building claddings and gas ducting.*
- *Identification of problem sources and investment in keeping contaminants on site, such as fast-acting doorways on buildings.*

PDP supports the SCMP approach and considers it is an appropriate way to manage a range of sources which might not otherwise be controlled. Section 4.4 below sets out PDP's review of the SCMP.

Section 5 of the Strategy outlines "Air Discharge Targets" for various parts of the plant. In general, PDP considers that the targets are appropriate although there are some targets that PDP consider could be set to gain greater improvements, as discussed in the following section.

#### 4.3.1 Air Quality Targets

Mill Vents: PDP considers that it would be appropriate to measure PM<sub>10</sub> and PM<sub>2.5</sub> from the mill vents fine particulate matter is the pollutant of concern relating to current and proposed NES regulations. In addition, the measured total suspended particulate (TSP) emission rates are well below the current limit, and therefore it is unclear why a more stringent standard relating to the finer fractions should not be applied. At this stage, due to the lack of information it is not clear what emission limit should be applied for PM<sub>10</sub> or PM<sub>2.5</sub> but this could be considered once monitoring information was available.

Fugitive particulate emissions from Manufacturing PDP considers that monitoring to better quantify the effectiveness of any measures that might be implemented as part of the SCMP would be beneficial.

## 4.4 Source Control Management Plan

Ravensdown has developed the SCMP as part of its Napier Works Sustainability Site Project. This project has the objective:

*"To establish the most sustainable long-term solution for treatment and discharges from the Ravensdown Napier works to enable the continued operation of the site."*

Consequently, the SCMP cover all of the discharges from the site. With respect to air quality the objective of the SCMP is to:

*"To eliminate if possible, or otherwise minimise fugitive emissions to the local air shed environment."*

The main output of the SCMP is the Site Improvement Action Schedule in Section 8, which prioritises the various action and provides an indication of when the action will be implemented. PDP considers that this is useful and supports the approach.

Air quality related projects are listed in the schedule, including all of those identified in the manufacturing and acid plant reviews.

PDP cannot comment on priorities that have been assigned to the projects because the scoring mechanism is not stated. PDP considers, however, that the air quality projects that have been assigned the highest priority all seem appropriate.

## 5.0 Air Quality Report

PDP undertook a review of a draft copy of the Air Quality Assessment (AQA) and identified matters where it was considered that additional information was required. Included with the assessment is a T+T memo<sup>2</sup>, which comments on each of PDP's questions and how they have been responded to. As T+T's responses have been incorporated into the AQA, PDP has where relevant commented on the replies as part of its overall review of the AQA. PDP's review of the various sections is set out below.

### 5.1 Sources of Emissions

PDP considers that the process description and sources of emissions in the AQA are generally appropriate. The JSEA Report, however, identifies some sources that are not covered in section 3.1.2 (stack emissions) of the AQA, which potentially could have been included in dispersion modelling.

PDP considers the other sources identified by JSEA that are included in Section 3.1.3 (fugitive emissions) of the AQA are appropriate.

In light of the comments later on the PM<sub>10</sub> monitoring at the former Winstone Aggregates site it is possible that the use of a qualitative assessment for some of the fugitive emissions sources may need to be reconsidered.

#### 5.1.1 Acid Plant

In section 3.2.2.2 of the AQA on SO<sub>2</sub> emissions, T+T indicates that the 2015 to 2021 stack emission data from the acid plant has been used as the basis of the assessment. Given the calibration issue identified by Chemetics, PDP is concerned that emissions of SO<sub>2</sub> and SO<sub>3</sub> used in the AQA are incorrect, which calls into question the entire assessment of the acid plant emissions.

PDP considers it likely that assessment of SO<sub>2</sub> will need to be repeated, or at a minimum analysis provided to demonstrate that the assessment is fit for purpose.

The AQA also discusses the SO<sub>2</sub> emissions during acid plant start-up. While PDP had previously suggested that these discharges should be modelled, we accept that the use of the ambient monitoring data is an acceptable alternative to confirm any impacts, particularly given the range of variables that exist. Ambient monitoring is discussed further in section 5.3 below.

#### 5.1.2 Manufacturing

The emissions of Total Suspended Particulate from the Brady Mills have been well less than the consent limits with only one occasions in the last seven years when the individual limit of 1 kg/hr was exceeded and all other measurements less than 0.5 kg/hr and no occasions when the combined limit of 2 kg/hr was exceeded and only three occasions when values exceeded 0.5 kg/hr. On this basis it appears that a lower emission limit may be appropriate to assist in minimising the potential for PM<sub>10</sub> and PM<sub>2.5</sub> emissions.

T+T has assumed that all particulate emissions from the Brady Mills are PM<sub>10</sub> and 90% of the emissions are PM<sub>2.5</sub>. These assumptions appear to be conservative and PDP considers the assumptions are acceptable for the assessment. PDP considers, however, that there is merit in undertaking some size fraction specific monitoring that can be used to improve understanding of the contributions of fine particles in future assessments.

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<sup>2</sup> Tonkin & Taylor, Responses to items in PDP technical review of pre-application draft of Works Air Quality Assessment, 26 November 2021

### 5.1.3 Other Sources

PDP agrees with T+T's comments on other emissions and accepts that emissions of other contaminants are unlikely to result in adverse effects. In particular, PDP notes, based on the additional reports cited by T+T, that it is unlikely that emissions from diesel combustion during start-up will result in any off-site effects, particularly with the increased stack heights.

PDP notes that section 5.3.3 of the Chemetics report mentions the potential for emissions of NO<sub>x</sub> from the acid plant. The report does not provide any monitoring information but mentions World Bank guidelines of 200 mg/Nm<sup>3</sup> as an emission concentration for NO<sub>x</sub>. Given that there is a New Zealand National Environmental Standard for NO<sub>2</sub>, PDP considers these acid plant emissions should be further investigated, and modelled if appropriate, to understand the potential off-site NO<sub>2</sub> concentrations from this source.

## 5.2 Environmental Setting

PDP is comfortable that the information set out in Section 4 of the AQA appropriately represents the local environment and meteorology.

## 5.3 Ambient Monitoring

PDP is comfortable with the analysis that has been undertaken of the fluoride monitoring and the conclusions that have been reached from that data about appropriate background concentrations.

For the SO<sub>2</sub> monitoring, PDP considers that it would be helpful if there was a discussion on when start-ups occurred and whether there was any measurable change in ambient SO<sub>2</sub> concentrations. PDP considers that this analysis would be consistent with section 3.2.2.2 of the AQA that discusses using the monitoring data to assess the effects during start-ups.

Analysis of HBRC monitoring data indicates that Ravensdown is not a major contributor to PM<sub>10</sub> and PM<sub>2.5</sub> at the HBRC's monitoring location, although Ravensdown is clearly shown to make some contribution.

The monitoring undertaken by Ravensdown at the former Winstone Aggregates sites presents a quite different picture. PDP is not aware of another PM<sub>10</sub> monitoring site in New Zealand where concentrations are consistently at or above 50 µg/m<sup>3</sup>. In PDP's view, the data at the Winstone's site strongly indicate that Ravensdown is the main source. While the same impacts have not been measured at the HBRC site, that site is considerably further from the Manufacturing plant than the Winstone site, and therefore it will naturally experience a reduced impact from Ravensdown as is indicated in Figure 5.13 of the AQA. PDP is concerned, however, that the higher concentrations measured at Winstone's may be occurring at other locations within the Awatoto airshed.

Consequently, PDP considers that additional information is required to demonstrate the level of impact on PM<sub>10</sub> levels that is occurring within the Awatoto airshed from the manufacturing plant in general. Specifically, it would be helpful to understand the contribution the current and proposed scrubber systems might be making to off-site PM<sub>10</sub> and how much reduction in PM<sub>10</sub> might occur from implementing the mitigation outlined in the SCMP.

## 5.4 Dispersion Modelling

PDP is comfortable that the model selection, methodology used to develop the meteorological data, and way the dispersion modelling has been undertaken is all appropriate. As discussed above PDP has concerns about some of the emission rates that have been used.



## 5.5 Assessment Criteria

PDP considers that the assessment criteria which have been selected are appropriate, and are protective of both human health and the environment.

The AQA discusses the recently released World Health Organisation air quality guidelines. Why these are generally lower than those used by T+T, PDP agrees that those guidelines currently have no legal weight, and as T+T state, are often exceeded in coastal areas of New Zealand as a result of natural emissions, and consequently would be difficult to meet. Consequently PDP agrees with T+T that it is not appropriate to use them.

## 5.6 Dispersion Modelling results

### 5.6.1 Fluoride

PDP considers that the air dispersion modelling, including the allowance for fugitive emissions provides a realistic prediction of both the current (Section 6.2.2) and future (Section 6.3.2) off-site concentrations of fluoride.

The current and future predicted concentrations are well below the concentrations that would give rise to adverse health or environmental in all locations apart from within an area of industrial land (the former Winstone Aggregate site) and foreshore to the immediate east of the site where concentrations are above the New Zealand Ambient Air Quality guidelines for vegetation.

Overall, the fluoride modelling indicates that the emissions from the current and future stacks do not result in significant effects, with the highest concentrations occurring from the fugitive emissions. The modelling results indicate the importance of the investigations outlined in the SCMP for the Manufacturing plant.

### 5.6.2 Sulphur Dioxide

Given the calibration issue identified with the SO<sub>2</sub> emission data, PDP has not undertaken a detailed review of the SO<sub>2</sub> modelling results. However if the emissions have been maintained within the current emission limit, then off-site concentrations from the site will be below the relevant guidelines, albeit that the maximum predicted one hour concentrations are close to the guideline value.

Once the convertor has been upgraded, the modelling indicates that the maximum one hour off site SO<sub>2</sub> concentrations will be well below the NES for SO<sub>2</sub>, based on the emission limit proposed.

### 5.6.3 PM<sub>10</sub> and PM<sub>2.5</sub> Emissions

The dispersion modelling assessment of the Brady Mills demonstrates that PM<sub>10</sub> and PM<sub>2.5</sub> emissions from the sources modelled are well below the relevant NES and guideline values and any effects will be at an acceptable level.

Given the Winstone PM<sub>10</sub> monitoring data PDP is, however, concerned that the impacts may be greater than those demonstrated by the dispersion modelling. This section may need to be revised, once additional investigations are carried out on the contribution of PM<sub>10</sub> associated with the non-stack sources at the manufacturing plant to off-site concentrations.

### 5.6.4 Dust and Odour Assessment

T+T has undertaken a qualitative assessment of the effects of odour and dust using the FIDOL assessment methodology. PDP considers assessment using the FIDOL factors to be an appropriate methodology for the amenity effects.



During the site visit PDP staff noted significant quantities of dust in areas around the Manufacturing plant. PDP is concerned regarding the potential that the finer components of this dust may be associated with the high concentrations of PM<sub>10</sub> measured at the Winstone site. PDP considers that the FIDOL assessment of fugitive dust is not the appropriate tool to assess the potential off-site health impacts of these emissions. PDP agrees that the FIDOL assessment has adequately assessed the amenity effects at the closest sensitive receptor as being less than minor.

Based on PDP's site visit and knowledge of the area there is a distinct odour in the immediate area surrounding the site, which is considered acceptable given the industrial zoning of Awatoto.

PDP considers that the FIDOL assessment of odour is reasonable for assessing effects at the closest sensitive receptor. PDP agrees that it is unlikely that odour from the site is causing effects at the closest receptor.

### 5.7 Overall Assessment of Assessment

Overall PDP considers that the T+T AQA is comprehensive. Other than the matters raised in this review, PDP considers the assessment methods and scope are appropriate and accord with good practice.

### 6.0 Health Effects Assessment

The health effects assessment has been prepared by Dr Francesca Kelly of Environmental Medicine Limited. Dr Kelly is highly experienced in undertaking this type of assessment.

Dr Kelly has based her assessment on the work undertaken by T+T and therefore it is possible that aspects of her assessment, primarily those associated with the acid plant emissions, may need to be revised once T+T has provided the additional information discussed in the previous section.

Dr Kelly's overall conclusions, subject to any revision that may be required, are:

*Assessment of inhalation contaminant exposure patterns among the community at residential locations indicates less than minor health effects. Maximal particulate concentrations are located in a coastal carpark with short recreational exposures and correspondingly minor health effects.*

In other words there less than minor potential for health effects at the closest residential locations from all emissions, with a slightly elevated risk from short term exposure to individuals in the coastal area to the east of the site.

Dr Kelly makes a number of recommendations in response to her conclusions. PDP considers that these recommendations are all reasonable, and has for convenience repeated them here:

#### *Particulate*

- *Recommend a review of the ongoing suitability of the ambient monitoring sites.*
- *Recommend that the monitoring site selection includes representative community residential exposure.*
- *Recommend that PM<sub>2.5</sub> monitoring is included, together with PM<sub>10</sub>.*
- *Recommend the further development and use of management plan(s) to reduce fugitive particulates from the Napier Works.*

#### *Sulphur dioxide*

- *Recommend that incident event investigation and mitigation continues, in case of any future unexpected events.*
- *Note that the planned replacement of the Acid Plant converter will reduce SO<sub>2</sub> emissions and this will further reduce and minimise effects.*

- *Recommend continued ambient monitoring, with a site representative of community exposure as well as an impacted site.*

#### *Fluorides*

- *Recommend continued ambient monitoring at a site representative of community exposure.*

## **7.0 Further information required**

As has been identified in previous sections, PDP considers that additional information is required prior to being able to make any recommendations on this assessment. Set out below is a compilation of various questions where further information is required.

1. Please provide further information on the issue with the acid plant discharge flowrates, including updated information identifying when the calibration issue occurred, and information to demonstrate whether emissions from the plant have been compliant with the limits in the resource consent.
2. Please provide information on monitoring options that Ravensdown might implement for assessing fugitive emissions of particulate from the manufacturing plant in order to better understand them and reduce the potential contributions to fine particulate measured at the former Winstone site.
3. Please provide an updated assessment of emissions associated with the acid plant based on corrected emission data.
4. Please update the section on ambient monitoring of sulphur dioxide to clearly demonstrate the contribution from normal acid plant start-ups.
5. Please provide information on the potential effects associated with nitrogen dioxide emissions from the acid plant.
6. Please provide additional information on particulate emissions from the manufacturing plant stacks and how these might be responsible for the high concentrations of PM<sub>10</sub> measured on the Winstone site.
7. What mitigation will be implemented to reduce particulate emissions from the manufacturing plant to acceptable levels?
8. Please also assess whether there is potential for similar levels of PM<sub>10</sub> as those measured at the Winstone site to be experienced at other locations within the Awatoto airshed.

## **8.0 Proposed Consent Conditions**

PDP has reviewed the draft resource consent conditions proposed by Ravensdown and generally considers that they are appropriate. PDP has set out in Table 1 comments on conditions where either further information is required or a change is considered necessary to what is proposed, together with additional conditions that are considered appropriate.

Table 1: Comments of Proposed Conditions	
Condition number	Comment
New	PDP proposes a general condition be added that requires appropriate maintenance of all emission control equipment.
New	PDP proposes that a general condition be added that requires that plant be shut down if the emission control equipment associated with that piece of equipment is not operational.
New	PDP proposes that a new condition is included to require implementation of the high priority dust mitigation measures outlined in the SCMP to occur within 1 year of the granting of consent.
New	PDP proposes that a new condition is included to require investigation into fugitive particulate emissions from the manufacturing plant and material storage area to occur within 1 year, with the findings to be provided to the council along with a timeframe for implementation.
7	PDP likes the certainty by providing firm dates for the change in mass emission rates in the acid plant but has concerns that a consent variation would be required if that date could not be met for some reason. An alternative could be to reword the condition and use the terms such as, for example, before or after the replacement of the convertor.
8	Given the low level of SO <sub>3</sub> measured in the convertor exit it is unclear why the limit should be retained at 2 kg/h as a 1 hour average.
9	It is unclear why this condition provides a limit in terms of concentration rather than mass emissions like the other acid plant limits.
15	It is unclear why, based on the data provided with this application, why the consent limits should not be reduced to better reflect plant performance. PDP recommends reducing the limits to no more than 0.5 kg/hr per mill, with a combined limit of 1 kg/hr when two mills are operating.
New	PDP proposes that a new condition is included to require the investigation into fugitive particulate emissions proposed in the SCMP to occur within 1 year, with the findings to be provided to the council along with a timeframe for implementation of any recommendations.
New	PDP proposes a condition requiring annual calibration of the flow meter on the converter discharge and any other monitoring conditions required to demonstrate compliance with conditions 7, 8 and 9.
New	PDP proposes that a condition is added which requires Ravensdown undertakes a single round of PM <sub>10</sub> and PM <sub>2.5</sub> monitoring on the Brady Mills. This monitoring should occur within in six months of granting consent or in combination with the next round of TSP monitoring associated with the Brady Mills.
New	PDP proposes that a conditions is added which requires Ravensdown undertakes a single round of PM <sub>10</sub> and PM <sub>2.5</sub> monitoring on the Manufacturing Stack once it is commissioned.

Table 1: Comments of Proposed Conditions	
Condition number	Comment
38	As written Condition 38 anticipates the introduction of an NES for PM <sub>2.5</sub> . PDP supports the proposal but considers that it would be better to reference a monitoring method rather than make this condition conditional on NES.
New	Following on from the comment above PDP considers that Ravensdown should continue to monitor PM <sub>10</sub> until such time that there is no longer a NES for it. Therefore there should be a condition requiring that to occur. This is also consistent with the recommendation of Dr Kelly.
New	PDP proposes that there is a condition that requires Ravensdown to maintain review and report on the SCMP at two yearly intervals.

### 9. Closure

If you have any questions on this review, please contact the undersigned.

Yours faithfully

#### PATTLE DELAMORE PARTNERS LIMITED

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### Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Ravensdown Limited. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

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Copy to: Malcolm Miller