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Dear Simon

CLARIFICATION OF MATTERS RAISED IN TONKIN & TAYLOR'S REVIEW OF PDP'S REQUEST FOR FURTHER INFORMATION RESPONSE - CRC193565

1.0 Introduction

Lands and Survey (South) Ltd (Lands and Survey) have applied for resource consents on behalf of SOL Quarries Ltd (SOL) to expand their quarry, located at 81 Conservators Road, Yaldhurst.

Tonkin & Taylor Limited (T+T) has been engaged by Environment Canterbury (ECan) to review the assessment of environmental effects (AEE) prepared in support of SOL's application for consent to discharge of contaminants into air. Following the T+T's review of the AEE, on behalf of ECan they issued a request for further information[1]. Lands and Survey provided T+T's request for further information to Pattle Delamore Partners Limited (PDP) and engaged PDP to prepare and submit a response[2] to ECan.

T+T have now reviewed the PDP response and issued a letter[3] which summarises the outcome of their review. T+T's letter highlights a number of issues which have not been addressed to their satisfaction. Lands and Survey have engaged PDP to address the issues raised by T+T in their review of the PDP's response to the request for further information. This letter addresses the follow up questions and comments made by T+T which relate to the technical aspects of PDP's assessment. T&T's comments and recommendation on the notification of SOL's consent have not be considered by PDP and will be addressed by SOL's legal and planning experts.

2.0 Processing plant

T&T did not agree with SOL's proposal to operate the screening and crushing plant without a dust suppression system. SOL quarries have subsequently confirmed that they will install and utilise a dust suppression system on their screening and crushing plant within the proposed quarry extension. Each piece of equipment used in the screening and crushing plant will be fitted with high pressure, low volume

[1] Letter to Steve Pearce. SOL Quarries Limited – Section 92 Request for additional information Air Quality Assessment. Simon Hedley, Lands and Survey (South) Limited. 2 May 2019.
[2] Letter to Simon Hedley. REQUEST FOR FURTHER INFORMATION - CRC184072; CRC184073; RMA/2019/373. Sima Bagheri, Environmental Engineer PDP.
[3] Further technical review of application to discharge contaminants into air from a quarry expansion, (CRC193564) – SOL Quarries Limited, 93 Conservators Road, Yaldhurst. Richard Chilton. Senior Air Quality Consultant, Tonkin and Taylor. 8 July 2109.

nebulizing nozzles at the points of product transfer and other key process points where dust may be emitted. The nebulizing nozzles will be linked by a pipe system which is fed by a water supply tank (approximately 2.5 m^3 capacity) and high-pressure petrol driven pump. The detailed design of the screening and crushing plant dust suppression system is yet to be finalised. But each nozzle will have a flow rate of between 0.08 and 0.11 litres per minute. The 2.5 m^3 water supply tank will provide sufficient capacity to supply water to up to 30 nozzles over an 11-hour operating day. A dust suppression system will be fitted to the two sets of screening and crushing plant which will be used within the quarry extension. The total water demand of the screening and crushing plant dust suppression systems will be 5 m^3 and this water requirement is factored in to the assessment of the quarry's available water (Section 3.0).

3.0 Water availability

3.1 Additional water supply

SOL have secured an additional supply of water from Selwyn District Council's (SDC) Paparua Water Race Scheme which runs alongside the boundary of the existing quarry and through the middle of the proposed quarry extension. As part of the quarry extension it is proposed to re-route the water race along the northern boundary of the proposed quarry.

The agreement is appended to this letter as Appendix A.

The agreement between SOL and SDC provides for 0.6 litres/second/ha with a maximum extraction rate of 1.2 litres/second (which effectively constrains the maximum daily supply volume). This provides irrigation rights of 104 m^3 per day. In their application to SDC, SOL defined that the water would be used for suppressing dust on the following areas:

- Bunds;
- Stockpiles of soil scraped back to expose the working surface; and
- Cleanfill rehabilitation areas.

SOL have secured an irrigation agreement to take 104 m^3 of water from Selwyn District Council's Paparua Water Race Scheme for a period of two years. At the end of the initial two years, SOL has the have the right renew the irrigation agreement for another 10 years subject to the SOL not being in breach of the agreement. To demonstrate that the proposed quarry has sufficient water for dust suppression, SOL propose that the consent conditions allow the quarry to operate only when the water from the Paparua Water Race Scheme is available.

3.2 Additional areas requiring dust supression

T+T identified the following areas requiring dust suppression that appeared not to be included in PDP's calculated area:

- The stockpiles;
- Clean-filling activities, including haul routes to the tip head; and
- Any water required for establishing vegetation cover of bunds or rehabilitated land, or for establishing shelter belts.

Of the areas listed above, haul roads to the clean fill tip head were previously accounted for in PDP's calculation of areas requiring dust suppression.

Any water required for the establishment of vegetation cover of bunds or rehabilitated land, or for establishing shelter belts will be provided from the additional water supply sourced from SDC discussed

above in Section 3.1. The SDC supply will also provide any water required to vegetate stockpiles of soil scraped back to expose the working surface.

It is not planned to provide dust suppression for the stockpiles of product. As noted in T+T's review, stockpiles are only a potential dust source during strong winds and often form a crust minimising the likelihood of dust entrainment. In order to mitigate the potential dust effects from product stockpiles, they are located adjacent to the two crushing plants which are to be located a minimum of 350 m from the nearest property boundary not owned by SOL. The property for which written approval has not been obtained is located a further 200 m past the quarry boundary providing approximately a 550 m buffer to the product stockpiles.

3.3 PDP's calculated application rate

T+T believe that PDP's calculated water application rate of 0.9 litres/m^2/hr based on an area requiring dust suppression of 1.48 ha and 100 m^3 of water availability for an 11 hr working day to be incorrect and the correct value to be 0.61 litres/m^2/hr.

T+T based their calculation on 100 m^3 of water being applied to an area of 1.48 ha over an 11 hr working day which gives the 0.61 litres/m^2/hr stated in their letter.

PDP's application rate was calculated as follows:

- The 1.48 ha area requiring dust suppression comprises of the 0.52 ha heavy haul road and 0.96 ha of internal pit haul roads and working face/loader areas.
- PDP stated on p35 of their 12 June 2019 letter that in order to minimise the dust creation potential and consequently reduce dust suppression water demand, main (heavy) haul road has been surfaced with crushed used asphalt which has a lower dust generating propensity than gravel. It was also noted that the heavy haul road currently has dust suppression water applied once per day which, in combination with the other dust mitigations employed, has been successful in managing dust generation.
- Assuming a dust suppression water application rate of 0.9 litres/m^2/hr, the daily dust suppression water requirement is calculated as:
  - 0.52 ha @ 0.9 litres/m^2 = 4.68 m^3 per day
  - 0.96 ha @ 0.9 litres/m^2/hr for 11 hrs = 95.04 m^3 per day
  - Total daily dust suppression water requirement = 99.72 m^3 per day
- PDP's calculated application rate is therefore 0.9 litres/m^2/hr.

As discussed above in Section 2.0, SOL have confirmed that they are going to install dust mitigation on their crushing plant which will use up to 5 m^3 of water per day. The available water for dust suppression of the 1.48 ha area requiring dust suppression is therefore 95 m^3/day and the recalculated water application rate using the methodology above is 0.86 litres/m^2/hr.

MFE's Good Practice Guide for the Management of Dust gives a figure of 1 litre per m^2 per hour as being a conservative water application rate for dust suppression. PDP believes that SOL's water application rate of 0.86 litres/m^2/hr will provide effective dust suppression mitigation. If required, SOL will be able to apply water at a reduced rate to a larger area in order to provide dust suppression when and where required.

3.4 Dust suppresion water availability

PDP have used the definition of a 'dry day' as when the daily evaporation (Penman ET) exceeds daily rainfall by more than 1 mm. This definition of a dry day is consistent with that previously used by Golder Associates (NZ) Limited (Golder) [4] and NZ Air Limited (NZ Air)[5] in assessments of effects from quarrying activities. Using this definition results in a slightly lower daily water requirement to offset evaporation than that assumed by T+T.

T+T note that while sufficient water is available, the calculation is sensitive to area requiring suppression and would only need to increase to 1.65 ha for there to be insufficient water available.

With the clarification above of the water application rate available being 0.86 litres/m^2/hr and the confirmation of an additional 104m^3 per day of water for irrigation from SDC, PDP believes that T+T's concerns can be adequately managed. A summary of water availability and use is given in and .

Table 1: Summary of dust suppression water availability

Area	Daily Water Availability (m^3/day)
SDC Paparoa Water Race	104
SOL Quarry water bore	100
Total	**204**
Onsite storage (in excess of daily permitted water take)	30
Total availability for one day only	**230**

Table 2: Summary of dust suppression water use

Area	Daily Water Use (m^3/day)
Bunds Stockpiles of soil scraped back to expose the working surface Cleanfill rehabilitation areas	104
Processing plant	5
Heavy haul road	4.46
Internal pit haul roads and working face/loader areas	90.54
Total	**204**

PDP notes that the results of the wind analysis presented in its s92 response indicate that the dominant wind direction during summer months is from the north east direction away from the nearest sensitive receptors (Figure 5, p 11). Thus, while dust suppression is required on dry days, the application of water

[4] "Fulton Hogan Limited. Assessment of Air Quality Effects – Proposed 'Roydon Quarry', Templeton", Golder Associates (NZ) Limited, November 2018 p28

[5] "Assessment of Air Quality Effects - SOL Quarries – Yaldhurst Expansion", NZ Air Limited, 12 February 2019, p10

for dust management can be optimised based on the weather forecast to ensure that the available water capacity is utilised so that there are no potential offsite effects on the identified sensitive receptors.

PDP agree that the consent conditions recommended by T+T are sensible, will be effective and can be complied with by SOL. In addition to the supplementary water supply SOL have sourced from SDC, will serve to ensure that dust generation from the proposed quarry extension is adequately mitigated.

PDP notes that SOL have an existing Quarry Management Plan which includes a section on dust management measures to be undertaken during the operation of the quarry. To ensure that all operational management plans are in one place, PDP recommends that the Quarry Management Plan be updated to incorporate the T+T's recommendations rather than create a separate Air Discharge Management Plan.

4.0 Review of complaints

T&T requested a detailed analysis of the non-substantiated complaints, specifically seeking a better understanding of the complaints which relate to dust sources other than the dust discharged from the site entrance and heavy vehicle haul Road. SOL undertook a detailed analysis of the 53 dust complaints received by ECan over the period 4 July 2017 and 1 April 2019. The outcomes of the SOL complaints analysis were recorded in spreadsheet named "CRC184072 CRC184073.xlsx". SOL provided this spreadsheet to T&T for consideration. PDP followed this issue up with T&T[6] who confirmed that the spreadsheet provided by SOL meet their requirements for a detailed analysis of the non-substantiated complaints.

5.0 PM_{10} monitoring trigger limits

To ensure that SOL's dust mitigation measures are effective and to minimise the risk of any dust impacts beyond the boundary being offensive or objectionable, SOL propose to adopt PM_{10} monitoring trigger limits. A trigger limit is a concentration above which either additional dust mitigation will be implemented, or quarrying activities ceased. SOL proposed the following PM_{10} monitoring trigger limits:

a. 1-hour average at 55 µg/m^3 or higher shall require immediate actions to investigate and reduce site dust emissions.

b. 1-hour average at 65 µg/m^3 or higher shall require immediate cessation of potentially dusty activities (as defined by the conditions of consent) and taking actions to investigate and reduce site emissions.

It is proposed that these PM_{10} monitoring trigger limits will be implemented when there are any quarrying activities within 250 m of 119 Conservators Road and when the wind direction is between southerly and west-southwest (measured as 180 and 260 °N) which puts 119 Conservators Road downwind of the quarry.

6.0 Sensitive location – 119 Conservators Road

The T&T review concurs with the PDP assessment of dust effects at 119 Conservators Road as being less than minor, but notes that the following matters weaken the PDP conclusion:

- There is no restriction proposed for quarrying activities when within 250 m of this residence;
- The amount of water available to control dust may not be sufficient; and,
- Aggregate processing is proposed to occur without water suppression.

[6] Phone call from Jeff Bluett (PDP) to Richard Chilton (T&T) 6 August 2019 2:36 PM.

The information provided in this letter addresses each of the above points raised by T&T and further strengthens the PDP conclusion that any dust effects at 119 Conservators Road will less than minor. The relevant information is provided in:

- Restriction proposed for quarrying activities - Section 5;
- Amount of water available to control – Section 3; and,
- Aggregate processing water suppression – Section 2.

7.0 Closing

T+T's review of PDPs dust assessment highlighted a number of issues which had not been addressed to their satisfaction. This letter provides information that addresses the follow up questions and comments made by T+T which relate to the technical aspects of PDP's assessment. The information provided demonstrates that SOL have sufficient water to meet the dust suppression requirements of the proposed quarrying activity and provides further confirmation that any dust impacts at sensitive receptors will be less than minor.

PDP trust that this information will satisfy T&T's requirements. If there any follow up questions, we would be happy to answer these. Please contact Jeff Bluett on 021 232 5584.

8.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Lands and Survey (South) Ltd and others (not directly contracted by PDP for the work), including NZAir. 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.
This report has been prepared by PDP on the specific instructions of Lands and Survey (South) Ltd for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

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Approved by

Steve Pearce
Technical Director – Environmental Management

Appendix A – Paparua Water Race Scheme Irrigation Agreement