

Our Ref: 21999_R01_Haerses Road Quarry MOD 5_RFI Covering Letter_Final

17 March 2022

Jessie Evans
Director, Resource Assessments
Department of Planning and Environment

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Dear Jessie

**RE: Haerses Road Quarry Modification 5 (DA 165-7-2005 MOD 5)
Relocation of Site Office, Workshop and Weighbridge**

1.0 Introduction

Dixon Sand (No. 1) Pty Ltd (Dixon Sand) is seeking a minor modification to DA 165-7-2005 for the Haerses Road Quarry (the Quarry) at Maroota in New South Wales (NSW).

In January 2022, Dixon Sand submitted a Modification Application pursuant to section 4.55(1A) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Proposed Modification (MOD 5) involves the relocation of an approved site office, workshop and weighbridge, and sandstone cutting activities both within the extraction area and relocated workshop.

The Department of Planning and Environment (the Department) placed the Modification Application and supporting Modification Report on the Major Projects website and sought comments from relevant Government agencies. In response, the Department received submissions from the Environment Protection Authority (EPA) and the Hills Shire Council, with concerns raised in relation to proposed sandstone cutting activities within the Quarry's approved Friable Sandstone Extraction Area. Accordingly, the Department requested additional information in a letter dated 25 January 2022.

This letter provides a consolidated response to:

- the EPA's letter dated 17 February 2022
- the Hills Shire Council's letter dated 25 January 2022, and
- the Department's letter dated 25 January 2022.

2.0 Responses to Government Agencies

The following section provides a response to the issues raised in agency submissions. Issues raised in submissions are included in **bold italic text** with the response provided below in normal text.

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2.1 EPA

The EPA is concerned that the relocation of quarry activities within the quarry may create noise, vibration, and dust impacts for sensitive receptors.

To avoid any doubt, no relocation of extraction activities is proposed. Dixon Sand currently extracts large blocks of sandstone from the approved Friable Sandstone Extraction Area (see **Figure 2.1**), by way of dozer ripping. The Proposed Modification would allow Dixon Sand to instead use an excavator with a hydraulic saw attachment for this purpose. This activity would occur wholly within the Quarry's approved extraction areas.

The only 'relocation' of activities proposed under MOD 5 involves the relocation of the approved site office, workshop, and weighbridge. As indicated in the MOD 5 Modification Report, Dixon Sand proposes to undertake final cutting and storage of sandstone blocks within the relocated workshop. This would involve wet cutting only, to suppress dust. Additionally, final cutting would occur within the enclosed shed structure, which would be engineered and constructed to achieve the necessary noise attenuation to ensure compliance with existing noise criteria under DA 165-7-2005 at all sensitive receivers (except where landowner agreements are in place).

The EPA is also concerned that the modelling used relates to development -modification 3, as such, the modelling may not be sufficient to understand the potential noise, vibration and dust impacts this proposed modification may have.

The EPA recommends the following:

- ***The impact of noise, vibration and dust on sensitive receptors must be assessed and adequately managed to ensure compliance with both the consent and the EPA's Licence.***

Further consideration of noise and air quality impacts associated with proposed sandstone cutting activities is provided in **Appendix A** and **Appendix B**, with key findings summarised below.

Noise

- Attended noise monitoring indicates that an excavator and hydraulic saw attachment can be operated in compliance with the Quarry's existing noise criteria under DA 165-7-2005, even during noise enhancing southeast wind conditions.
- For testing purposes, noise levels from two types of hydraulic saw attachments were measured. While compliance may be achieved with either a hollow drum or enclosed drum saw, it is recommended that enclosed drum saw is used at the Quarry, as this is approximately 2 dB quieter than the hollow drum saw.
- The dozer and excavator with the enclosed drum saw attachment can typically be operated concurrently while maintaining compliance with the existing noise criteria under DA 165-7-2005. However, it is recommended that the concurrent operation of the dozer and enclosed drum saw is avoided if either machine is operating in an exposed location or during noise-enhancing conditions.

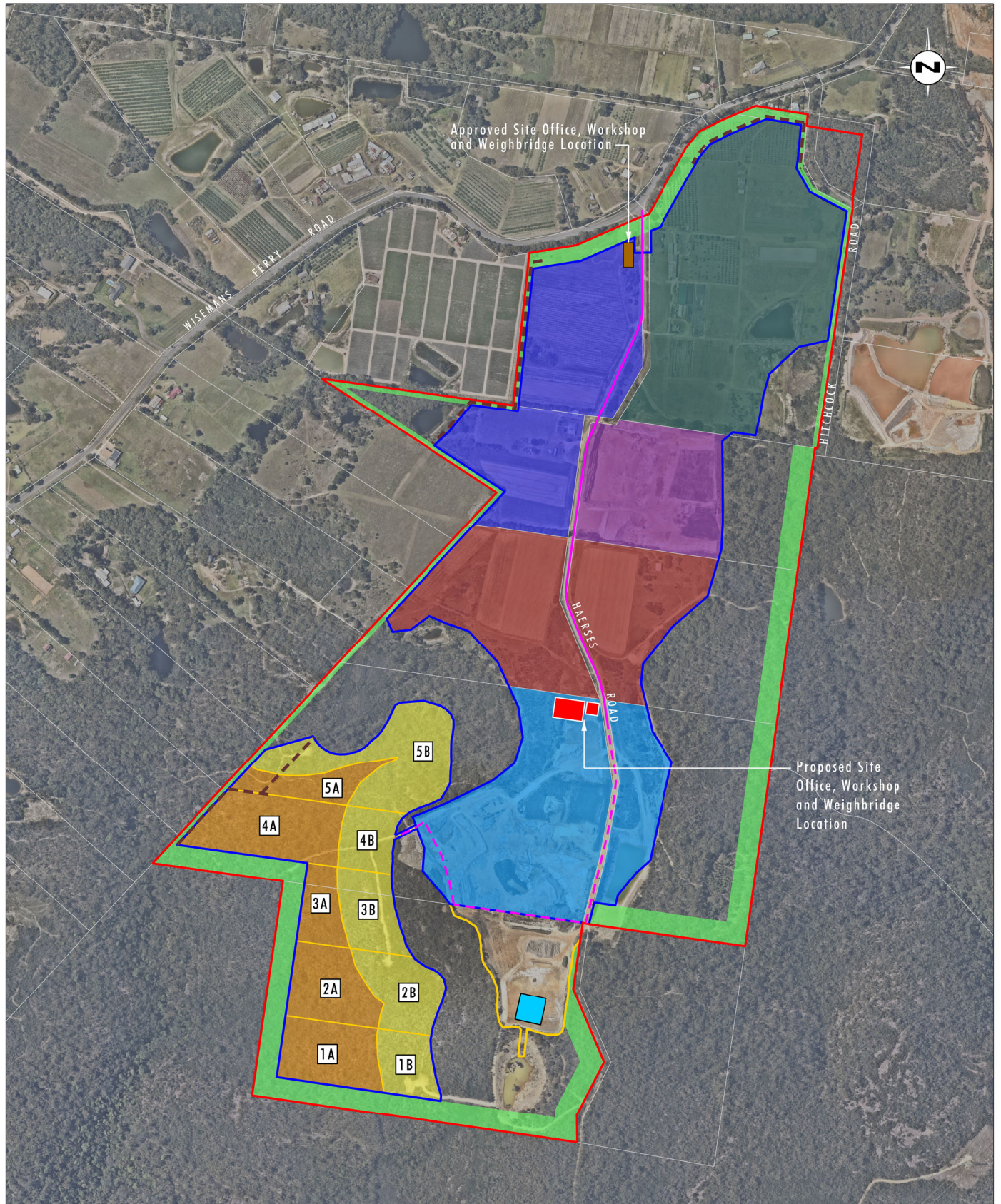


Image Source: Nearmap (Dec 2018)

Data Source: Mc Kinlay Morgan & Associates Pty Ltd (2019)

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Legend

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|--|---|--|
| Haesers Road Quarry Site | Tertiary Sands Extraction Area Stage 1 | Sealed Access Road |
| Processing and Stockpiling Area | Tertiary Sands Extraction Area Stage 2 | Proposed Site Office, Workshop and Weighbridge Location |
| Buffer Zone | Tertiary Sands Extraction Area Stage 3 | |
| Approved Extraction Area | Tertiary Sands Extraction Area Stage 4 | |
| Sandstone Extraction Area A | Tertiary Sands Extraction Area Stage 5 | |
| Sandstone Extraction Area B | Site Office, Weighbridge and Workshop | Indicative Unsealed Haul Road |
| 1 Extraction Cell Number | Approved Acoustic Bund | |
| Wet Processing Plant | | |

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FIGURE 2.1
Proposed Modification

Air Quality

- Previous air quality modelling undertaken for Modification 3 (MOD 3) predicted that worst case dust emissions from quarrying operations would remain below the relevant performance criteria under DA 165-7-2005 and EPL 12513 at sensitive receivers (ERM 2020).
- A comparative assessment of dust emissions from dozer ripping and the operation of the hydraulic saw attachment has been undertaken (refer to **Appendix B**). This assessment concludes that the Proposed Modification may result in a minor increase in total site emissions (less than 4%), relative to approved operations. This increase is not likely to result in any measurable change to predictions of off-site pollutant concentrations and therefore will not change the outcomes of the MOD 3 air quality impact assessment.
- It is noted that **Appendix B** provides a conservative, worst-case assessment of dust impacts, on the basis that:
 - emissions rates assumed that the saw attachment would be in operation 7 hours per day, 35 hours per week, 40 weeks per year. However, it is likely that the saw would operate less frequently than this
 - emissions rates were based on the use of an open saw attachment. As indicated below, and in **Appendix C**, Dixon Sand has committed to the use of an enclosed drum saw, which would likely reduce dust emissions.

Vibration

- Vibration impacts have not been identified as a key issue of concern at the Quarry and detailed vibration assessments have not been required in support of the original Environmental Impact Statement for the Quarry or its subsequent modifications.
- The Proposed Modification would not change vibration source locations, relative to the approved development. Rather, the proposal would simply replace dozer ripping with the use of a hydraulic saw to facilitate the removal of large blocks of sandstone within the Quarry's approved Friable Sandstone Extraction Area.
- As **Appendix A** and **Appendix B** demonstrate, the nature and scale of impacts associated with the operation of the hydraulic saw are expected to be generally consistent with approved dozer ripping activities, when observed at sensitive receivers.
- ***All potential noise, vibration and dust impacts on sensitive receivers must be minimised through the implementation of mitigation measures.***

As identified above, noise, vibration and dust impacts associated within the operation of the hydraulic saw attachment are expected to be generally consistent with impacts previously assessed and approved under MOD 3. Accordingly, existing impact mitigation and management measures remain relevant and appropriate for the development as it is proposed to be modified. These measures are detailed in the updated summary of mitigation measures for the modified development (refer to **Appendix C**) and the Quarry's approved Noise and Air Quality Management Plans.

Additionally, Dixon Sand will commit to the following measures:

- the quieter enclosed drum saw, rather than the hollow drum saw, will be used at the Quarry

- the concurrent operation of the dozer and enclosed drum saw will be avoided if either machine is operating in an exposed location or during noise-enhancing conditions.

These commitments are also reflected in **Appendix C**.

- ***The Applicant is required to comply with Licence No. 12513 and the EPA specifically highlights Licence conditions L3 “Noise” and O3 “Dust”. The EPA will seek to include, if necessary, additional Licence conditions relating to noise, vibration and air monitoring requirements, mitigation measures and limit conditions.***

As identified in **Appendix A**, noise criteria under EPL 12513 are inconsistent with DA 165-7-2005 (as modified). Consistent with section 4.42 of the EP&A Act, Dixon Sand is currently seeking a variation to EPL 12513 to align with limits under the modified development consent. In all other respects, the development (as it is proposed to be modified) can continue to operate in compliance with EPL 12513.

Dixon Sand will implement all existing and proposed noise and dust mitigation measures as described above and set out in **Appendix C**, in relation to proposed sandstone cutting activities. Accordingly, it is submitted that no additional licence conditions relating to noise, vibration and air quality monitoring or mitigation are required.

2.2 The Hills Shire Council

The proposed modification has been reviewed and no objection is raised in principle to the proposed modifications to the workshop and weighbridge location.

However concern is raised that the applicant now seeks to include sandstone cutting. It is considered that the proposed sandstone cutting will result in an application that is not substantially the same development and as such a separate Development Application should be lodged for this component.

Sandstone ‘cutting’, through the extraction of large blocks of sandstone, already occurs within the Quarry’s approved Friable Sandstone Extraction Area. While this activity is currently undertaken by way of dozer ripping, the Proposed Modification would simply allow Dixon Sand to instead utilise a hydraulic saw, fitted to an excavator, for this purpose.

As **Appendix A** and **Appendix B** demonstrate, the amenity impacts associated with the operation of the hydraulic saw attachment are generally consistent with impacts previously assessed and approved under MOD 3, and no changes to existing noise and air quality performance criteria under DA 165-7-2005 are sought.

Additionally, it is noted that no changes are proposed with respect to the key elements of the approved development, such as the approved quarry life, annual extraction rate, extraction methods or trucking movements. Consequently, Dixon Sand submits that the development, as it is proposed to be modified, is ‘substantially the same’ as the development which was last modified under section 75W of the EP&A Act.¹

I note that Umwelt has separately contacted Council’s Special Projects, Property and Building Manager in regard to the provision of owner’s consent for the Modification Application from The Hills Shire Council. To date, owner’s consent has not been provided for the Modification Application to Umwelt.

¹ Clause 3BA(6)(b) of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017*

Council provided landowner's consent for the lodgement of the Modification Application on 17 February 2022. A copy was provided to the Department by email on 17 February 2022.

2.3 Department of Planning and Environment

The Department considers that use of a hydraulic saw attachment can produce a different sound profile to that of dozer ripping extraction, accordingly a noise assessment in accordance with the Noise Policy for Industry (2017) maybe required.

Please refer to the noise specialist response in **Appendix A**.

Further please advise if this change in equipment would require an amendment to the Environment Protection Licence for the project.

Please refer to **Section 2.1** above. Variation to the EPL for the purpose of scheduled activity is not required, however, Dixon Sand is seeking a variation to align existing EPL noise limits with DA 165-7-2005 (as modified). This variation application is currently pending.

3.0 Additional Matters

Further to finalisation of the Modification Report (January 2022), Dixon Sand has commenced the preliminary engineering design of the relocated workshop structure. As part of this process, Dixon Sand has identified that the workshop structure may need to be separated into two buildings, within a separation distance of approximately 6 metres for fire safety purposes. Should this be the case, the combined floor area of the two workshop buildings would remain at or below 1,150 square metres, plus awnings, as indicated in the Modification Report. In all other respects, the Proposed Modification, as detailed in the Modification Report, remains unchanged.

4.0 Conclusion

In summary, the Proposed Modification will:

- not significantly increase noise, vibration, or air quality impacts, relative to the approved development
- not increase the Quarry's approved disturbance footprint or result in any impacts to biodiversity or heritage values, relative to the approved development
- reduce visual impacts associated with the construction and operation of the site office, workshop, and weighbridge facilities on sensitive receivers along Wisemans Ferry Road
- avoid the need to install a new electricity transformer.

On this basis, it is considered that the Proposed Modification is of minimal environmental impact and is in the public interest.

We trust this information meets with your current requirements. Please do not hesitate to contact the undersigned should you require clarification or further information.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'AI', is positioned above the printed name.

Alex Irwin

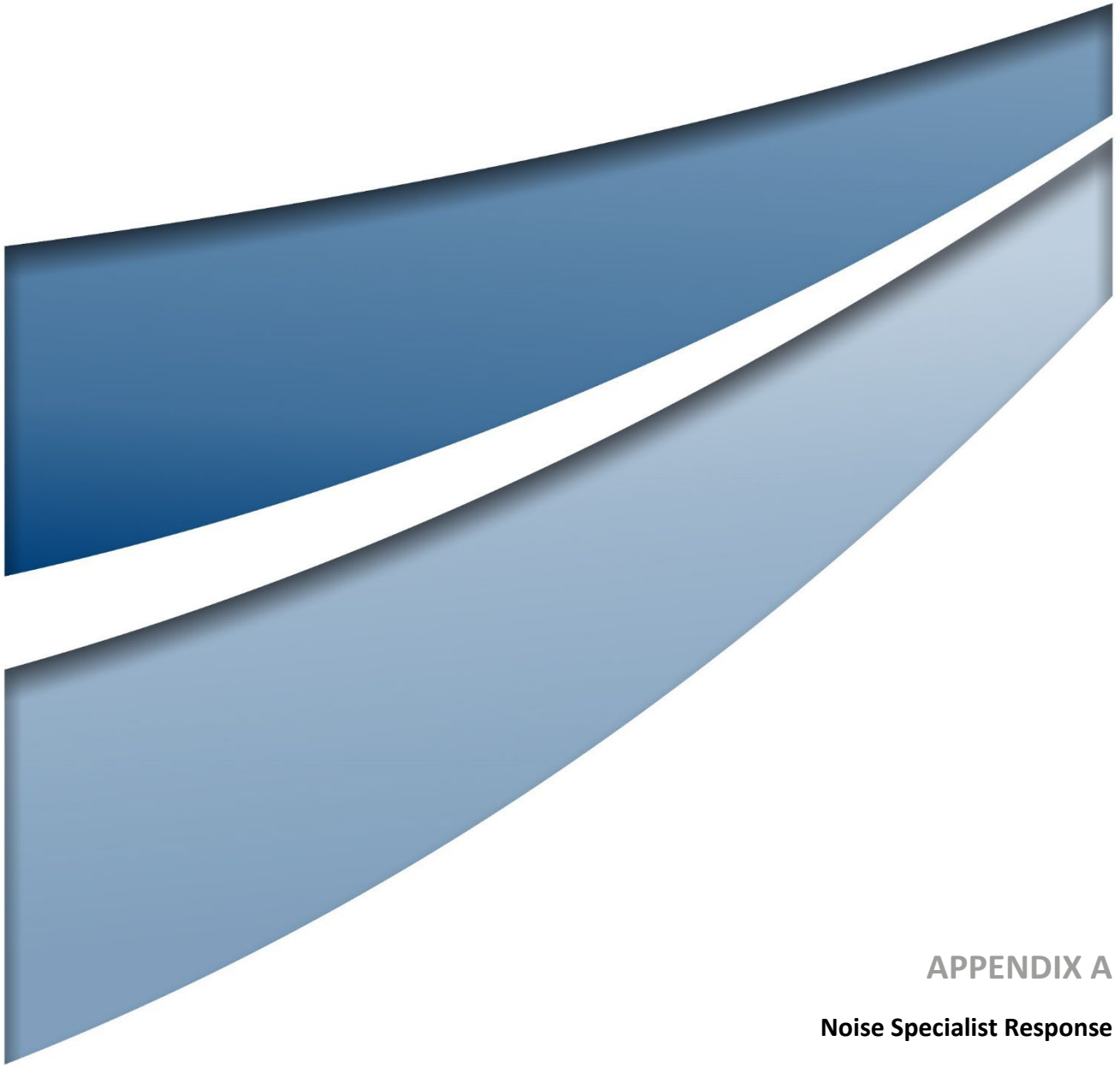
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References

ERM 2020. *Responses to EPA comments on Haerses Road Quarry Mod 3 Air Quality* (refer to Appendix B of MOD 3 Response to Submissions, Umwelt, March 2020)



APPENDIX A

Noise Specialist Response

Our Ref: 21999_DPIE_HRQ_NIA_v1_Final

17 March 2022

Jessie Evans
Director, Resource Assessments
Department of Planning and Environment

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Dear Jessie

**RE: Haerses Road Quarry Modification
Sandstone cutting activities within the extraction area**

Dixon Sand (No. 1) Pty Ltd (Dixon Sand) is seeking a minor modification (Mod 5) to DA 165-7-2005. As part of that modification, Dixon Sand is seeking to allow sandstone cutting activities within the approved friable sandstone extraction area using an excavator fitted with a hydraulic saw attachment, as an alternative to dozer ripping.

The Department of Planning and Environment (DPE) has requested further information (outlined in a letter dated 25th January 2022) regarding the noise impacts associated with the hydraulic saw attachment on the excavator. Specifically, they would like to clarify whether noise impacts will be consistent with worst case noise impacts previously modelled for Mod 3.

The purpose of this letter is to provide DPE with the necessary information to demonstrate that noise impacts associated with the operation of the hydraulic saw attachment are likely to be generally consistent with impacts previously assessed and approved under Mod 3.

Additionally, the Environment Protection Authority (EPA) has requested further information regarding the noise impacts of the hydraulic saw attachment to ensure compliance with both DA 165-7-2005 and Environment Protection Licence (EPL) 12513. The EPA has advised that where necessary, it will seek to include additional Licence conditions to ensure noise impacts are appropriately limited, mitigated and monitored.

This letter provides the EPA with additional information to demonstrate that hydraulic saw attachment can be operated in compliance with the existing conditions (including noise limits) imposed under EPL 12513 and additional conditions or mitigation measures are considered necessary.

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1.0 Existing Operations and noise limits

Dixon Sand operates the Haerses Road Quarry (the Quarry), located at Maroota in New South Wales (NSW). The Quarry is wholly located within the Hills Shire Local Government Area. The Quarry operates in conjunction with Dixon Sand's Old Northern Road Quarry (Old Northern Rd Quarry), located approximately 2 kilometres north of the site, and supplies concrete sand and specialty sands to the Sydney metropolitan market.

Umwelt previously prepared the *Haerses Road Quarry Modification 3 Noise Impact Assessment Final – 4607/R06/V2*, dated November 2019 (Mod 3 NIA). The Mod 3 NIA demonstrated that the worst-case predictions under worst-case meteorological conditions were expected to comply with the Project Trigger Noise Levels (PTNLs) at all receivers for all quarry stages. These predictions were based on a dozer with a sound power level of 109 dB(A) and other supporting equipment.

1.1 Development Consent

Condition 3 of Schedule 3 within the Development Consent (165-7-2005), outlines the following noise criteria for the Quarry:

3. The Applicant must ensure that operational noise generated by the development (excluding acoustic bund construction) does not exceed the criteria in Table 2 at any residence on privately-owned land.

Table 2: Operational noise criteria dB(A)

Receiver	Day	Shoulder (6.00 am to 7.00 am)	
	LAeq (15 minute)	LAeq (15 minute)	LA(max)
R05, R06	41	35	52
R03	40	37	
R13, R14	40	36	
All other receivers	40	35	

Noise generated by the development must be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NSW Noise Policy for Industry.

1.2 EPL 12513

The current EPL noise limits (Licence 12513, dated 5 February 2020) for the Quarry, are inconsistent with the noise criteria within the development consent. In addition, EPL Condition L3.5 specifies that the noise limits are to apply for winds speeds up to 3m/s. We note that the Mod 3 NIA demonstrated that prevailing winds were a significant feature of the area but only for a particular direction, which was from the SSW.

It is noted that a variation to align the EPL noise criteria with the development consent is now pending.

The current EPL noise limits are outlined below.

L3 Noise Limits

L3.1 The Noise generated at the premises must not exceed the noise limits presented in the table below. Note that the noise limits represent the noise contribution from the Haerses Road sand quarry site at Maroota.

Receiver	Location	Day	Shoulder (6am to 7am)	Shoulder (6am to 7am)
		LAeq(15 minutes)	LAeq(15 minutes)	LA(max)
R1	1725 Wisemans Ferry Road	37	37	45
R2	1700 Wisemans Ferry Road	40	40	45
R3	1643 Wisemans Ferry Road	38	38	45
R4	1617 Wisemans Ferry Road	37	37	45
R6	1543 Wisemans Ferry Road	37	35	45
R7	1539 Wisemans Ferry Road	36	35	45
R8	1521 Wisemans Ferry Road	36	35	45
All other residences on privately owned land		35	35	45

L3.5 The noise emission limits identified in condition L3.1 apply under all meteorological conditions (wind speed up to 3m/s at 10 metres above ground level, except under conditions of temperature inversions must be addressed by:

- Documenting noise complaints received to identify any higher level of impacts or patterns of temperature inversions; and
- Where levels of noise complaints indicate a higher level of impact then actions to quantify and ameliorate any enhanced impacts under temperature inversions conditions should be developed and implemented.

2.0 Existing Noise Environment and Noise Sources

2.1 Onsite equipment noise level measurements

A site visit was undertaken on Thursday 10th February 2022, to undertake noise simulation trials for the following equipment and establish the sound power levels in **Table 1**.

- Dozer (CAT 10T) - tracking forward and ripping rock and reversing
- Excavator (Hitachi ZAXIS 350 LCH) with hydraulic saw (hollow drum / 14 inch teeth) - cutting hard rock
- Excavator (Hitachi ZAXIS 360 LCH) with hydraulic saw (solid drum / 18 inch teeth) - cutting hard rock.

Table 1 Equipment sound power level data, Lw dB re 10⁻¹²W



Meas No.	Equipment	Octave Band (Hz)									Overall dB(A)
		31.5	63	125	250	500	1000	2000	4000	8000	
1	Dozer CAT 10T	103	116	111	99	104	103	101	96	91	108
2	Excavator ZAXIS 350 with saw (hollow drum)	99	107	112	104	108	108	106	102	99	113
3	Excavator ZAXIS 360 with saw (enclosed drum)	98	105	105	105	101	102	98	92	84	106

Based on site observations and measurements presented in **Table 1**, the following commentary is made:

- The noise level of the measured dozer is comparable (1dB(A) lower) to the dozer modelled in the Mod 3 NIA.

- The noise level of the hollow drum saw was 5dB(A) higher than the measured dozer, whilst the enclosed drum saw was 2dB(A) lower than the measured dozer.
- For the saw measurements, the rock hardness and excavator size/models were comparable.
- The difference in noise level between the two saw measurements (113dB(A) versus 106dB(A)) was attributed to the type of saw attachment (i.e. hollow versus enclosed). Photos of the saw attachments are shown in **Table 2**.
- The hollow drum saw had a thinner metal construction and smaller cutting teeth. The drum was observed to resonate and dominated the noise level when the saw was engaged.
- The enclosed drum saw had a thicker metal construction and larger cutting teeth. The drum wasn't observed to resonate for this measurement. The sawing/rock interaction was the dominant noise source for this measurement.

Table 2 Photos of saw attachments

Saw – hollow drum	Saw – enclosed drum
	

2.2 Attended Noise Monitoring

On Thursday 10th February 2022, attended noise monitoring was undertaken along the southern road verge of Wisemans Ferry Road, adjacent to the northern boundary of 1517 Wisemans Ferry Rd. Of the assessment locations within Figure 3.1 of the Mod 3 NIA, the measurement location is considered representative of R10. This location was chosen as it was the nearest accessible monitoring point to the hydraulic saw.

The monitoring was undertaken during the following quarry activities and meteorological conditions:

- The Quarry was fully operational (i.e. processing plant and associated equipment, dump and product trucks) and for simulated noise testing purposes the hollow drum saw was operating at the approved extraction area (Cell 1A).
- It was not raining and a slight wind (approx. 1-2m/s) from the southeast was blowing throughout the measurement. Note, in the Mod 3 NIA a southeast wind was not determined to be prevailing.

Table 3 provides a summary of the attended noise monitoring.

Table 3 Attended noise monitoring results summary

Location	Date/time	Measured noise levels			Estimated Quarry noise contribution (L_{Aeq} , 15min dB)	Mod 3 NIA predicted noise levels at R10 ¹ (L_{Aeq} , 15min dB)
		L_{Aeq}	L_{A90}	L_{Amin}		
Wisemans Ferry Road, adjacent to 1517 Wisemans Ferry Rd (representative of R10)	10/02/22 2:45pm to 3:00pm	76	40	35	<36	35

Notes:

¹ Taken from Table 5.4 of the Mod 3 NIA

² Measured at the Quarry

The monitoring location was heavily affected by local traffic noise which is representative of the L_{Aeq} . The hollow drum saw was audible in lulls in traffic. The remaining quarry equipment (i.e. product trucks, dump trucks and screens) was not audible. The Quarry was estimated to have a contribution of less than 36dB(A) which is in compliance with the development consent daytime noise criteria of 40dB(A) and is consistent with the Mod 3 NIA prediction of 35 dB(A).

Compliance with the consent criteria was established even though:

- The hollow drum saw is approximately 4 dB(A) louder than the dozer modelled within the Mod 3 NIA; and
- The monitoring was undertaken during noise-enhancing source to receiver southeast wind conditions, whereas, prevailing south-easterly winds were not determined in the Mod 3 NIA.

3.0 Discussion and Recommendations

The attended noise monitoring determined that compliance with the hollow drum saw is possible even during noise enhancing southeast wind conditions, which in accordance with the NPfl is not a significant feature of the area. It is also noted that noise measurements were completed when noise sources were operating at ground level, as extraction within these cells has only recently commenced, maximising the likely noise level received. As extraction progresses to the west and closer to the Wisemans Ferry Road receivers, noise levels are expected to increase. However, noise levels will progressively decrease with increased extraction depth and the establishment of acoustic bunds, and existing mitigation commitments will continue to be implemented in accordance with the modified consent to maintain compliance with the noise criteria.

Notwithstanding the assessment of compliance with hollow drum saw operation, for the dozer substitution it is recommended that the enclosed drum saw is utilised. The enclosed drum saw was measured on site to be 2dB quieter than the dozer measured on site and 3dB quieter than the dozer adopted in the Mod 3 NIA. On this basis, noise levels are expected to be lower than what the Mod 3 NIA predicted. In terms of spectrum, as shown in **Table 1**, except for the dozer having a 'spike' at 125Hz, the spectrums are comparable and noise propagation is expected to be similar.

It is noted that if operated concurrently the measured noise levels from the dozer (108dB(A)) and the enclosed drum saw (106dB(A)) have a combined noise level of 110dB(A) which is comparable to the dozer modelled in the Mod 3 NIA (109 dB(A)). While the noise impacts from the concurrent dozer and enclosed drum saw operation could be expected to be comparable to that predicted within the Mod 3 NIA, it is recommended the practice is avoided if either machine is operating in an exposed location or during noise-enhancing meteorological conditions. In regards to 'exposed location', if equipment has localised shielding from the pit face or from an earth bund, which blocks line of sight to the nearest receivers along Wisemans Ferry Road, the equipment is not considered to be exposed.

Further, it is recommended that the EPL is updated so that it is consistent with the noise criteria within the development consent. It is noted that an EPL variation in this regard is currently pending.

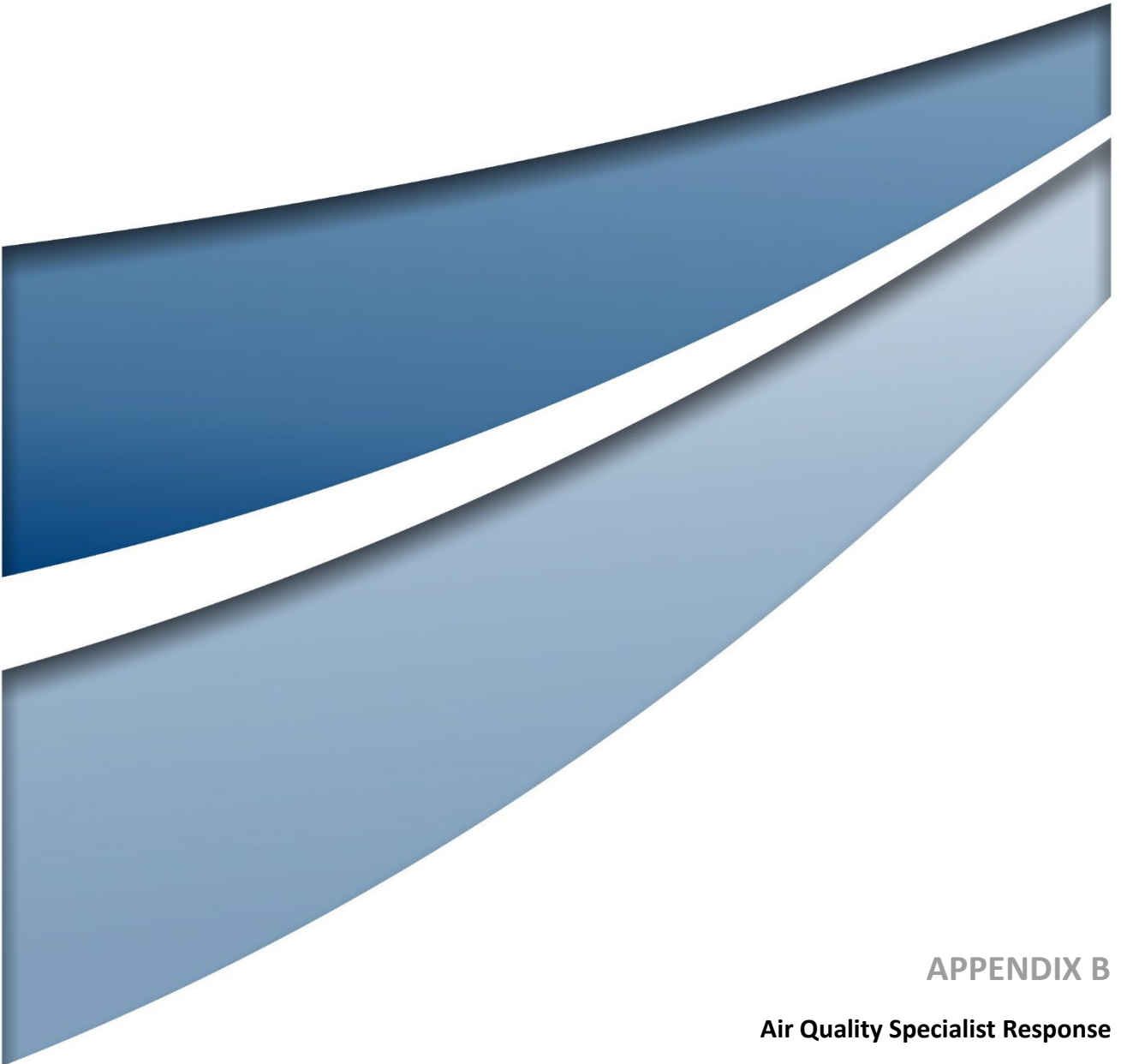
We trust this information meets with your current requirements. Please do not hesitate to contact the undersigned should you require clarification or further information.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Tim Procter', is written over a light blue horizontal line.

Tim Procter
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APPENDIX B

Air Quality Specialist Response

Alex Irwin
Principal Environmental Consultant
NSW Major Projects
Umwelt (Australia) Pty Ltd

Sent via email to airwin@umwelt.com.au

14 March 2022

Re: Dust emissions from enclosed rock saw – Dixon Sand Haerses Road Quarry

This letter provides a semi-quantitative assessment by Zephyr Environmental (Zephyr), of the potential impact of a change in the method of sandstone extraction at Haerses Road Quarry.

An Air Quality Impact Assessment for the site was prepared in 2019, to support a Modification Report prepared by Umwelt for an application by Dixon Sand (No.1) Pty Ltd to modify DA 165-7-2005 for Haerses Road Quarry (Modification 3). During the response to submissions phase in 2020, further work was carried out to respond to questions raised by the EPA regarding particulate emissions and model predictions at sensitive receptors. These issues were addressed to the satisfaction of the EPA.

The quarry operators, Dixon Sand, are now proposing a change to the sandstone excavation method, from that which was originally assessed. Rather than using dozers to rip the material, they propose to cut it using a rock saw.

The purpose of this letter is to assess what impact this change may have on the emissions from the site, and therefore any potential changes in impacts at the nearest sensitive receptors.

1 ORIGINAL AIR QUALITY ASSESSMENT

As noted above, an Air Quality Impact Assessment (AQIA) was prepared in 2019 for the Haerses Road Quarry (Modification 3), as part of the Modification Report. The EPA lodged a submission in February 2020, requesting clarification and recommending further information be provided in relation to the AQIA prior to determination. Those responses were provided in March 2020. Further information was again requested by the EPA, which was provided in June 2020. The project was approved in July 2021.

The total estimated annual emissions for the approved operations are shown in Table 1 below.

Table 1: Total TSP, PM₁₀ and PM_{2.5} emissions for approved operations

TSP (kg/y)	PM ₁₀ (kg/y)	PM _{2.5} (kg/y)
50,593	15,433	6,744

The estimated emissions from individual activities are shown in Table 2. This shows that of the total PM₁₀ emissions for the site (15,433 kg/y), approximately 974 kg/y (6.3%) was calculated to be due to dozers ripping sandstone (shaded cells). The assessment in Section 2 focuses on PM₁₀ as it is the most relevant particle size fraction for crustal material disturbed during mechanical activities such as quarrying. It is also the air quality metric that was predicted to be closest to the relevant impact assessment criteria in the 2020 Modification Report.

Table 2: TSP, PM₁₀ and PM_{2.5} emissions for each activity

Activity	TSP (kg/y)	PM ₁₀ (kg/y)	PM _{2.5} (kg/y)
Tertiary Sand Extraction Area - Approved			
Dozer stripping topsoil - approved Stage 5	233	57	24
Excavator loading tertiary sand to trucks for transfer to Processing Area (from Approved Stage 5)	19	9	1
Hauling from Approved Stage 5 to Processing Area (unsealed - extraction to sealed road)	2,395	647	65
Hauling from Approved Stage 5 to Processing Area (sealed to processing area)	550	105	26
Hauling of Approved Stage 5 to and in Processing Area (sealed)	268	51	12
Tertiary Sand Extraction Area - Proposed			
Dozer stripping topsoil – Proposed	233	57	24
Excavator loading tertiary sand to trucks for transfer to Processing Area (from proposed extension)	19	9	1
Hauling from proposed to Processing Area (unsealed - extraction to sealed road)	2,395	647	65
Hauling from proposed to Processing Area (sealed to processing area)	550	105	26
Hauling of proposed to and in Processing Area (sealed)	268	51	12
Friable Sand Extraction Area			
Dozer stripping topsoil/ripping friable sandstone (from Cell 5A & 5B)	4,137	974	434
Excavator loading friable sand to trucks for transfer to Processing Area (from Cell 5A & 5B)	71	33	5
Hauling from Cell 5A & 5B to Processing Area (unsealed)	11,678	3,153	315
VENM/ENM placement in Friable area			
Hauling VENM/ENM on-site from entrance to friable extraction area (Cells 4A & 4B) (sealed)	1,596	306	74

Hauling of VENM/ENM to placement area (sealed)	766	147	36
Unloading VENM/ENM to cell	55	26	4
Dozer spreading/compacting VENM/ENM	3,036	732	319
Processing Area			
Friable Sand processing			
Unloading friable sand to stockpile at Processing Area	71	33	5
Loading friable sand from stockpile at Processing Area	71	33	5
Unloading friable sand to Dry Processing at Processing Area	71	33	5
Crushing friable sand (uncontrolled) at Processing area	6,240	2,400	2,400
Transfer friable sand (Crusher to Screen) [conveyor transfer point]	35	17	3
Screen friable sand (uncontrolled)	4,000	1,376	1,376
Transfer friable processed at plant to product stockpile	35	17	3
Tertiary Sand processing			
Unloading tertiary sand to stockpile at Processing Area	47	22	3
Loading tertiary sand from stockpile at Processing Area	47	22	3
Unloading tertiary sand to Dry Processing at Processing Area	47	22	3
Screen tertiary sand (uncontrolled)	2,669	918	918
Transfer (Screen to Wet Processing) [conveyor transfer point]	24	11	2
Wet Processing (no expected emissions)	0	0	0
Transfer tertiary processed at plant to product stockpile	24	11	2
Product Sand			
Loading sand from Product Stockpile to haul trucks	70	33	5
Hauling out of Site (sealed)	1,130	217	52
Hauling out of Site (sealed)	2,327	447	108
Wind erosion			
All exposed areas	5,419	2,709	407
Total	50,593	15,433	6,744

2 ASSESSMENT OF PROPOSED CHANGES

Instead of using dozers to rip the sandstone, Dixon Sand is proposing to use an enclosed circular rock saw. An example of this type of saw is shown in Figure 1.



Figure 1: Example of the type of rock saw proposed

There are no published particulate matter emission factors for this type of rock saw. However, there have been studies completed measuring the concentrations in the immediate vicinity of equipment of this type. One such study (Thorpe, 1999)¹ measured an average PM₁₀ concentration of 184 mg/m³ and a maximum of approximately 250 mg/m³ directly in the vicinity of rock sawing activity. The measurements from this paper are presented in Appendix A, showing the PM₁₀ concentrations observed during a series of cuts.

The average wind speed for the site is approximately 1.2 m/s², as noted in the original AQIA. Assuming that the particulate-laden air is advected through 1 m², gives an average volumetric flow rate of 1.2 m³/s. Thus, a PM₁₀ concentration of 250 mg/m³ within the immediate vicinity of the rock saw (i.e. 1 m³) results in an emission rate of approximately 1.1 kg/h. Dixon's Sand have advised that a conservative estimate of usage would be 1,400 h/y, resulting in an emission of 1,512 kg/y.

Table 3 summarises the changes in total PM₁₀ emissions by changing the method of extraction. Removing the emissions from the dozer ripping, and instead using a rock saw, slightly increases the emissions by less than 4%. This increase is not considered significant and would be unlikely to result in any measurable change to off-site concentrations and will not change the outcomes of the air quality impact assessment.

¹ Thorpe, A., Ritchie, A. S., Gibson, M. J. and Brown, R. C.: Measurements of the Effectiveness of Dust Control on Cut-off Saws Used in the Construction Industry. *Ann. occup. Hyg.*, Vol. 43, No. 7, pp. 443-456, 1999.

² Section 5.2 of the AQIA

<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=DA165-7-2005-MOD-3%2120200106T053136.705%20GMT>

Table 3: Changes in total emissions replacing ripping with rock sawing

Metric	PM ₁₀ (kg/y)
Total using dozer	15,433
Total using rock saw	15,971
Increase in total emissions	3.5%

Additionally, it is noted that the rock saw would not operate concurrently with the two other emission sources within the Friable Sandstone Extraction Area in Table 2 above. That is, sandstone cutting would not occur concurrently with:

- Excavator loading friable sand to trucks for transfer to Processing Area
- Hauling from extraction cell to the Processing Area (unsealed).

As such, emissions generated within the Friable Sandstone Extraction Area during the operation of the rock saw are likely to remain below worst case predictions for Modification 3.

3 CONCLUSIONS

This brief study was carried out to understand the impact, if any, that the change in equipment may have on the emissions from the site, and therefore any potential change in impact to offsite receptors. In this case the operation of a rock saw to remove friable sandstone was considered in place of a dozer to rip the material.

The calculations of changes at the emissions inventory level have shown that removing the emissions from the dozer and replacing them with those from a rock saw, may result in a slight increase in total site emissions of less than 4%. This increase is not likely to result in any measurable change to off-site concentrations predicted in the impact assessment and will not change the outcomes of the air quality impact assessment.

Please contact the undersigned if you have any further questions regarding this assessment.

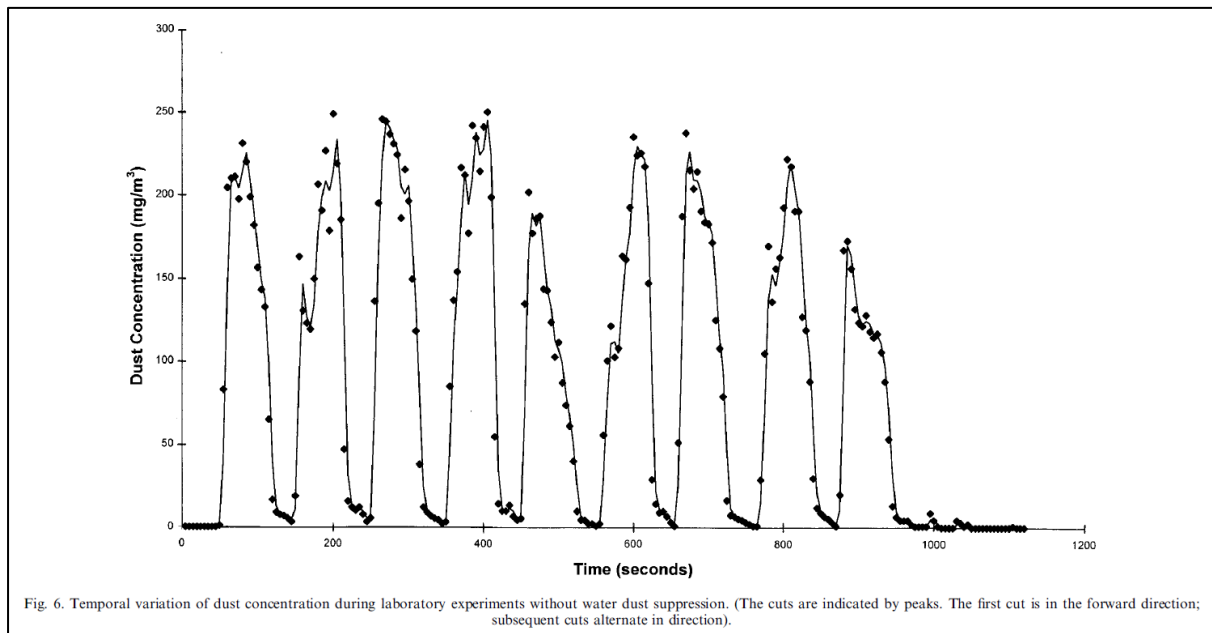
Yours sincerely

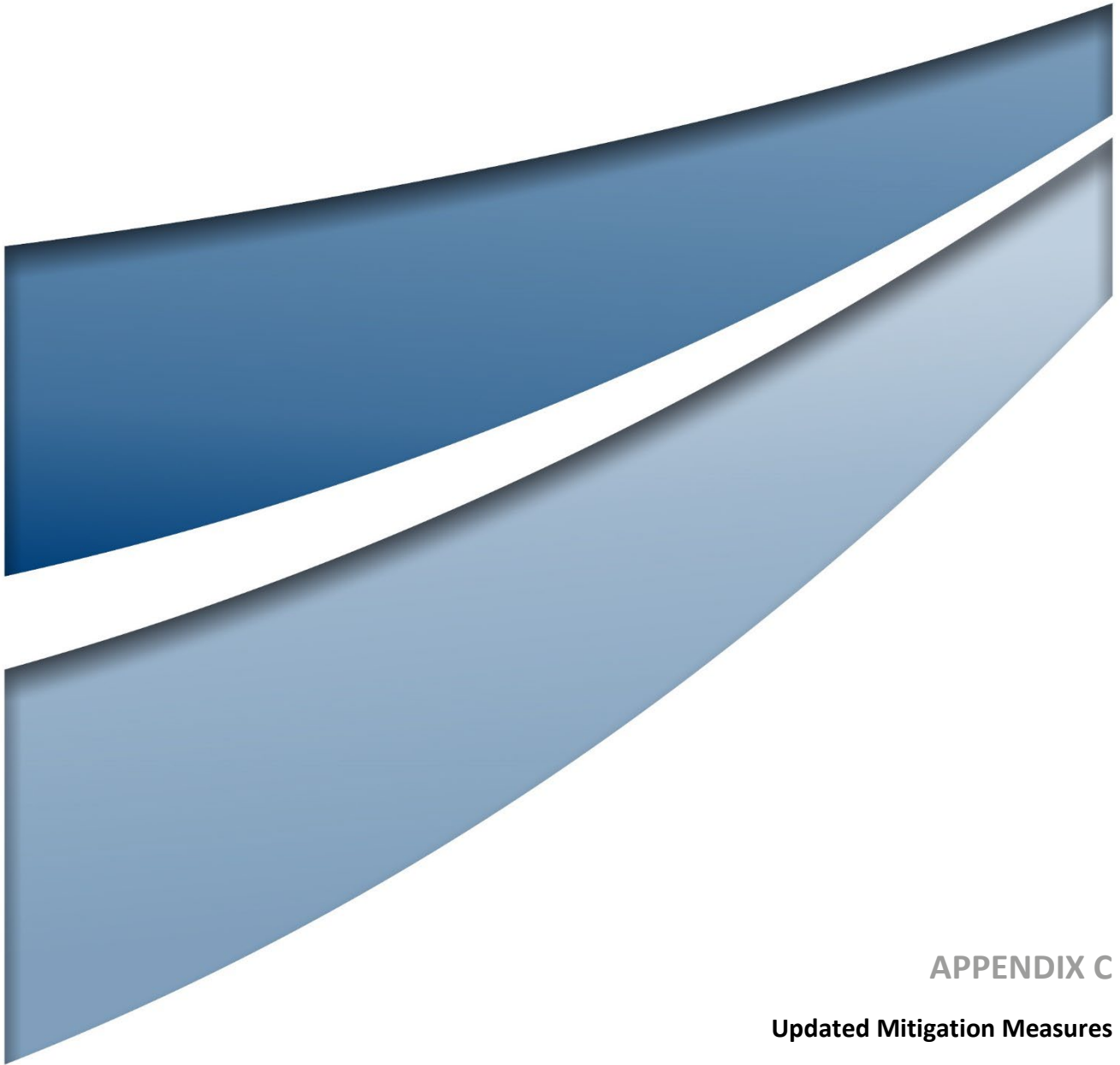


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Appendix A

Figure presented in Thorpe (1999) indicating measured concentrations during a series of rock saw cuts over time.





APPENDIX C

Updated Mitigation Measures

Updated Mitigation Measures

Table C1 below provides an updated summary of mitigation measures for DA 165-7-2005 as modified (incorporating MOD 5).

Table C1 Updated Mitigation Measures

Environmental Management Measures
Traffic and Transport
Continue to implement the latest version of the <i>Traffic Management Plan</i> approved by the Secretary
Continue to enforce the Maroota Local Traffic Management Policy
Noise
Continue to implement the latest version of the Noise Management Plan approved by the Secretary
Undertake noise monitoring at the potentially most affected locations near the south-western end of the site, such as Location R6 and R8, when extraction operations are being conducted in the additional extraction area
Prepare a Noise Management Protocol prior to commencing campaign works such as clearing of the extraction cells, early pre-stripping works and construction of the noise bunds. Measures to be included in the Protocol are:
<ul style="list-style-type: none"> consultation with the nearest residents prior to work commencement advising them of the potential for elevated noise levels, the timing of works, duration and taking into consideration times that might be of least disturbance to them provision of a contact and telephone number to raise any concerns during the works
Extend noise agreement with Landowner of Receiver R02
Install dump truck noise mitigation (of at least 6 dB(A)) prior to commencement within Stage 4 of the Tertiary Sand Extraction Area (or equivalent on-site noise mitigation and management)
<u>Sandstone cutting within the Friable Sandstone Extraction Area will be limited to an enclosed drum saw only (MOD 5)</u>
<u>The concurrent operation of the dozer and enclosed drum saw will be avoided if either machine is operating in an exposed location or during noise-enhancing conditions (MOD 5). If the machine has localised shielding from the pit face or from an earth bund (i.e. blocking line of sight to receivers along Wisemans Ferry Road, irrespective of any vegetation), it is not considered to be in an exposed location).</u>
<u>The shed structure will be designed, engineered and constructed (in consultation with a suitably qualified noise specialist) to ensure that it provides the necessary noise attenuation to maintain compliance with the existing noise criteria in Condition 3 of Schedule 3 of the development consent.</u>

Environmental Management Measures
Air Quality
<p>Continue to implement the latest version of the <i>Air Quality Management Plan</i> approved by the Secretary</p> <p>Use of a water cart to control emissions from haul roads (unsealed)</p> <p>Enforcement of speed limits onsite</p> <p>Progressive rehabilitation of exposed areas</p> <p>Minimising drop height of material during truck loading and unloading where possible</p> <p>Management of dust-generating activities during unfavourable meteorological conditions</p> <p><u>Sandstone cutting will not occur concurrently with:</u></p> <ul style="list-style-type: none"> • <u>excavator loading in the Friable Sandstone Extraction Area or</u> • <u>hauling of friable sand to the processing area.</u> <p><u>Sandstone cutting undertaken in the relocated workshop will be limited to wet cutting only, to suppress dust.</u></p>
Greenhouse Gas and Energy
<p>Regularly tuning and maintaining mobile and fixed equipment to minimise exhaust and greenhouse gas emissions</p> <p>Reviewing opportunities for improvement in diesel use and energy efficiency when purchasing or replacing equipment at the quarry to reduce greenhouse gas emissions.</p>
Groundwater
<p>Maintain the maximum extraction depth at least 2 m above the wet weather groundwater level</p> <p>The wet weather groundwater level will be reviewed at least every three years and extraction levels modified as required</p> <p>Develop and implement a Trigger Action Response Plan (TARP) for which identifies appropriate trigger and response actions for the management or mitigation of any unpredicted groundwater impacts</p> <p>Continue to implement the latest version of the <i>Soil and Water Management Plan</i> approved by the Secretary</p>
Surface Water
<p>Continue to operate the Water Management System (WMS) in accordance with latest version of the <i>Soil and Water Management Plan</i> approved by the Secretary</p> <p>Following the completion of construction works, inspect work areas monthly and after any rainfall events generating runoff until revegetation and stabilisation of drainage structures are complete</p> <p>During operations, inspect water management controls on a monthly basis and after storm events (i.e. greater than 50 mm in 24 hours)</p> <p>Monthly surface monitoring of the in-pit sump will be undertaken to provide for ongoing monitoring of site water quality</p> <p>Monthly monitoring of site water usage and changes in dam water volumes to determine an annual site water balance</p>

Environmental Management Measures
Visual Amenity
<p>Relocation of the 5 m high earth bund to the revised northern perimeter of the extraction area and revegetate with stabilising groundcover and fast-growing shrub and tree species prior to the commencement of extraction within the extension area</p> <p>Tree screens will be planted along the remaining northern perimeter of the Quarry site</p> <p>Progressive rehabilitation of the Quarry to limit the area of exposed surfaces at any one time</p> <p>Dust suppression to limit visibility of dust</p> <p>Direct lighting away from residences and vantage points</p>
Biodiversity
<p>Fence and/or signpost areas of biodiversity value outside the proposed extraction area extension</p> <p>Implement a tree felling procedure to minimise the potential for impacts on native fauna species (focusing on threatened species) as a result of the clearing of hollow-bearing trees</p> <p>Provide employee education and training including inductions for staff, contractors, and visitors to the site, to inform personnel of the biodiversity issues present at the site and their role and responsibilities in relation to the protection and/or minimisation of impacts to biodiversity</p> <p>Implement traffic control measures/speed limits/signage on haul roads and access roads to minimise fauna injury/road kills</p> <p>Minimise vegetation clearance to that required for operational purposes</p> <p>Inspect and clean (if required) vehicles or equipment brought onto, or leaving the Quarry for ground disturbance activities or travelling throughout the site to limit the spread of plant material between sites</p> <p>Clearly demarcate area to be cleared to ensure no unnecessary disturbance is undertaken outside of these areas</p> <p>Complete regular inspections to monitor the spread of weed species</p> <p>Provide environmental with relevant training on the identification of target weed species</p> <p>Complete weed control and eradication as required</p> <p>Complete progressive rehabilitation and stabilisation of disturbed land with native vegetation</p>
Heritage
<p>All persons working on site that are involved in ground disturbing works should be made aware of their obligations under the NPW Act and the Heritage Act</p> <p>In the unlikely event that an Aboriginal object is identified whilst carrying out the proposed works, all activities in the immediate vicinity of the identified Aboriginal object should cease and a suitably qualified archaeologist should be contacted to confirm the validity of the object</p>

Environmental Management Measures
Rehabilitation and Final Landform
<p>Complete progressive rehabilitation of the Quarry</p> <p>Produce a final landform which can sustain ongoing agricultural land uses</p> <p>As part of the detailed quarry planning process, a detailed Quarry Closure Plan will be developed approximately three years prior to cessation of quarrying activities. The Quarry Closure Plan will describe in detail the proposed operational and progressive rehabilitation procedures for the remainder of the quarry life and subsequent to the quarry closure</p>
Social
<p>Continued implementation and enforcement of the <i>Maroota Local Traffic Management Policy</i></p> <p>Continue toolbox talks, inductions, and other training to remind personnel and drivers of obligations under the <i>Maroota Local Traffic Management Policy</i></p> <p>Conduct random monitoring of trucks along the internal haul route</p> <p>Prepare and distribute documentation on matters of key environmental concern to the CCC over the life of the Quarry</p>

Note: Mitigation measures which have been superseded by conditions of consent and more recent environmental assessment documents have been omitted from this table.