



Hanson

ABN: 90 009 679 734

Response to Submissions

for the

Installation and Operation of a Crushing System at the Calga Sand Quarry

Prepared by:



R.W. CORKERY & CO. PTY. LIMITED

February 2017

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Installation and Operation of a Crushing System at the Calga Sand Quarry

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1. INTRODUCTION

This document has been prepared by RW Corkery & Co Pty Limited (RWC) on behalf of Hanson Construction Materials Pty Ltd (Hanson) to respond to submissions received by the Department of Planning and Environment (DPE) following the public exhibition of an *Environmental Assessment* (EA) accompanying an application to modify Development Consent DA 94-4-2004 (DA 94-4-2004) under Section 75W of the *Environmental Planning and Assessment Act* (EP&A Act) to install and operate a crushing system within the existing approved processing operations at the Calga Sand Quarry (the Quarry).

A total of four submissions were received from the following government agencies.

- Department of Planning and Environment
- Environment Protection Authority
- Department of Industry - Division of Resources and Energy
- Office of Environment and Heritage

A total of 26 submissions by way of objections were received from the public and non-government organisations.

This document has been prepared to provide a response to the issues raised in the submissions. The submission from DPE effectively summarised the issues raised in the majority of government and public submissions and has been addressed first, followed by consideration of the remaining issues in the government agency submissions. Due to the number of public submissions and the fact that several of these submissions were form letters, copied to indicate the individual's agreement with the sentiments presented elsewhere, the public submissions have been separated into subject areas with representative quotes from the submissions presented before a response is provided.

It should be noted from the outset that the proposed modification does not present an application to extend operations at the Quarry but simply seeks approval that the approved operations continue with the inclusion of a crushing system within the processing operations. Several public submissions include strong emotional reactions to the ongoing operation of the Quarry generally. Submissions that addressed the validity of ongoing operations in this manner have not been addressed in this document as they are considered to not be relevant to the proposed modification. These submissions are however acknowledged by Hanson in terms of providing an indication of the sentiments held by elements of the local community towards the operation.

It is noted that several of the public submissions make inferences regarding components of the ongoing operation of the Quarry that are not currently approved and not included in the modification application. Section 2 of this document provides a summary of the existing and proposed ongoing operations including the proposed crushing system. A response to government agency and public submissions follows this summary.

An amended Noise and Vibration Assessment has been prepared by Wilkinson Murray Pty Ltd to address comments raised by the EPA in its submission and to assess potential vibration impacts. This document is provided as **Appendix 1**.



2. OVERVIEW OF OPERATIONS

2.1 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

The EA presented with the application to modify DA 94-4-2004 included a description of the proposed placement and operation of a crushing system within the processing operations undertaken at the Calga Sand Quarry. The principal objective of including this additional equipment in processing operations is to maximise the quantity of material available for processing, and decrease the quantity of material classified as “oversize”. The intention in describing only the placement and operation of a crushing system was to limit the scope of the EA to only those matters relating to the operation of the Quarry that were going to change under the proposed modification. That is, a crushing system is proposed to be located within the area currently designated for processing and stockpiling activities. Other components of the operations such as the extraction operations, sand washing using the existing sand plant and the approach to progressive and final rehabilitation are not intended to change under the proposed modification. **Plate 1** presents the existing processing and stockpiling area with labels to identify the equipment as well as an indicative location for the crushing system, approximately 18m from an existing 6m to 8m high extraction face and at an elevation of approximately 195m AHD.



Plate 1 Processing and Stockpiling Area – Calga Sand Quarry

It is noted that the previous quarry operator, Rocla, sought approval to extend its existing sand extraction and processing operations to the south of the existing Quarry onto Lots 1 and 2, DP 805358 (the Southern Extension). This application was initially approved by the Planning Assessment Commission on 23 December 2013 but refused by the NSW Land and Environment Court (LEC) on 17 November 2015. In the final judgement of the LEC, it was confirmed that predicted residual impacts associated with the proposed operations for the Southern Extension, which included two separate processing plant locations and two crushing systems, was able to be resolved through conditions of consent for matters of visual amenity, noise, acoustics, vibration, water, traffic and ecology but was refused on the grounds of uncertainty concerning potential impacts to an area of significant Aboriginal heritage value. Considering that the LEC was satisfied that a much larger processing plant and operation satisfied environmental criteria, Hanson is confident that the potential impacts associated with the implementation of a single crushing system within the existing processing operations would

also satisfy relevant environmental assessment criteria, as described in the EA. In addition, potential impacts associated with the installation of a crushing system within existing processing operations would not result in significant changes to existing levels of noise, vibration, visual amenity or air quality impacts to the extent that any sites of Aboriginal heritage significance would be damaged, destroyed or removed. This is particularly relevant for the 'Women's Site' identified to the south of the Quarry. Potential impacts to matters of Aboriginal heritage significance are discussed in Section 3.2

2.2 EXISTING QUARRY OPERATIONS

This subsection presents an overview of the existing operations at the Calga Sand Quarry, undertaken in accordance with DA 94-4-2004. The description is simplified to suit the purposes of this document, however greater detail is available in the *Environmental Impact Assessment for the Calga Sand Quarry Extension* (RWC, 2004) and the *Environmental Assessment for the Relocation of the Administration Centre* (RWC, 2012).

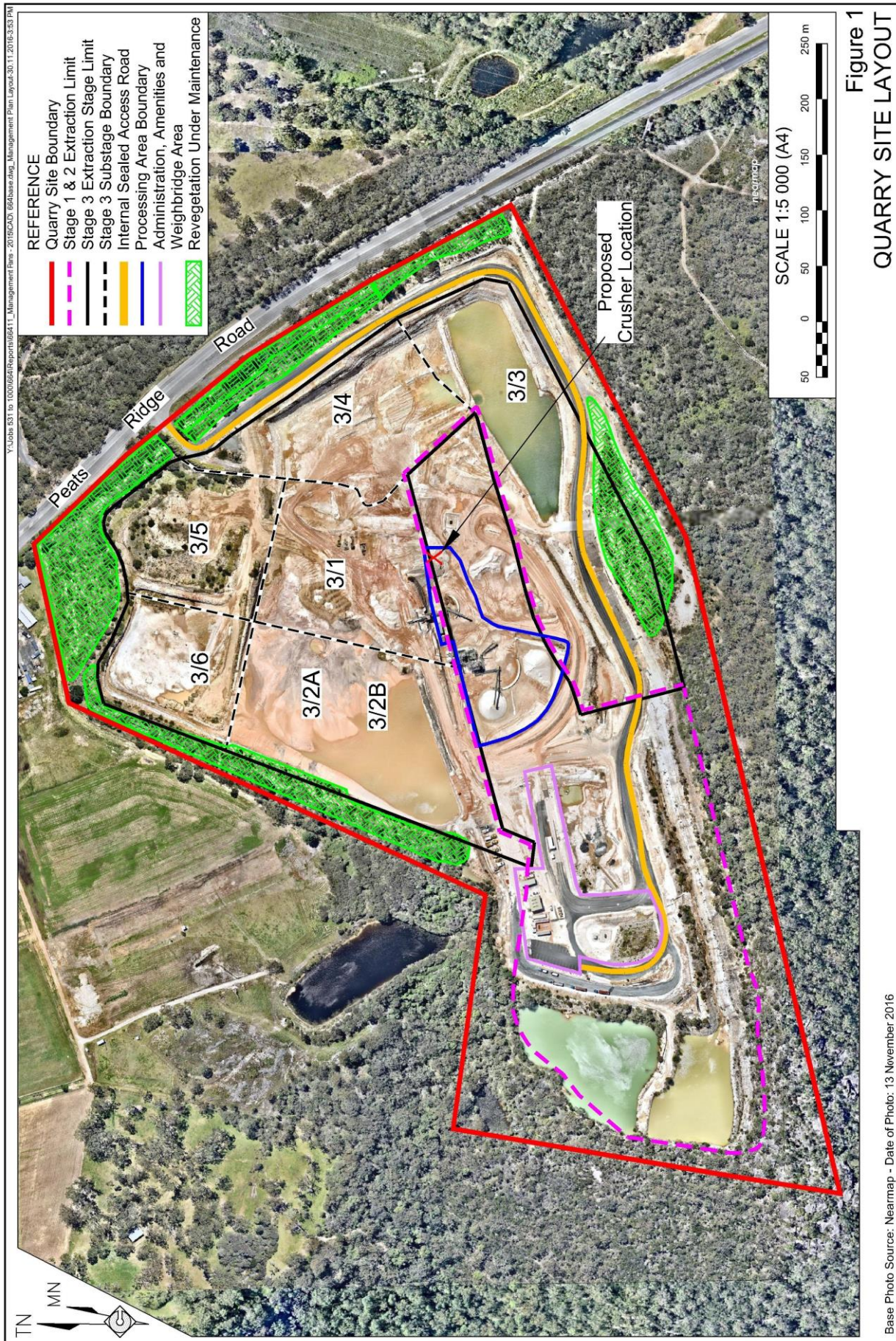
Each subsection includes a summary of any changes expected under the proposed modification. Where elements of the existing operations are not expected to change, this is also described. This text is presented in italics.

2.2.1 Development Consent DA 94-4-2004

The layout of the approved Quarry including extraction areas, processing plant locations and other infrastructure such as the administration centre is displayed in **Figure 1**. Development Consent DA 94-4-2004 was granted on 28 October 2005 to extend sand operations into Stage 3 of the extraction schedule. A modification to DA 94-4-2004 was granted on 2 July 2012 to permit the relocation of the administration facilities at the Quarry to their current location in the Quarry Site (see **Figure 1**).

DA 94-4-2004 includes the following general administrative conditions relevant to the proposed modification.

- Condition 2, Schedule 2 - The Applicant shall carry out the development in accordance with the:
 - DA 94-4-2004;
 - EIS titled *Environmental Impact Statement for the Proposed Calga Sand Quarry Extension*, dated May 2004;
 - Amendment Report titled *Amendment to a Proposal Submitted as Development Application (DA 94-4-2004) for an Extension to the Calga Sand Quarry*, dated June 2005;
 - Modification application DA 94-4-2004 – MOD 1 and the accompanying Environmental Assessment prepared by Rocla Materials Pty Ltd and dated January 2012; and
 - conditions of this development consent.



- In accordance with Condition 5 of Schedule 2, DA 94-4-2004 will lapse on 1 July 2030.
- Condition 6 of Schedule 2 limits operations to Stage 3 only.
- Condition 7 of Schedule 2 limits product transport from the Quarry to 400 000t per year.

Schedule 3 of DA 94-4-2004 provides specific environmental conditions including impact assessment criteria for noise, air quality and groundwater and specifies the approved operating hours among other matters. Compliance with the environmental conditions of DA 94-4-2004 is presented in the Annual Environmental Management Report (AEMR) with the most recent report covering the period from 1 January 2015 to 31 December 2015.

In addition, an independent compliance audit was completed by Umwelt (Australia) Pty Limited for operations up to 9 April 2014 while a DPE compliance audit was undertaken as part of State Sand Quarries Campaign (May – August 2015) on 20 July 2015.

All AEMRs, compliance audits and a report prepared by DPE as a result of its audit are publicly available through the Hanson website or through DPE.

As a result of the proposed modification, Condition 2 of Schedule 2 would be updated to include reference to the Environmental Assessment for the Installation and Operation of a Crushing System at the Calga Sand Quarry (RWC, 2016). Regarding modification to specific environmental conditions, it is proposed that the Condition 2 of Schedule 3 of DA 94-4-2004 relating to noise impact assessment criteria be updated based on available background monitoring and the results of noise modelling at privately-owned residences such that noise criteria for these residences be specifically referenced rather than these residences being included in DA 94-4-2004 as 'other residences'.

2.2.2 Extraction Areas and Methods

The approved extraction area and stages are displayed in **Figure 1**. Extraction is currently occurring within Stage 3/4 and is expected to progress to Stage 3/5 during 2017.

Due to the progressive nature of the operation, very little vegetation clearing and stockpiling of topsoil and overburden is currently required. Overburden is generally placed directly on the completed silt cells in order to continue capping and rehabilitation of these areas. The friable sandstone is cross-ripped, pushed into small stockpiles and loaded into a haul truck for transportation to either the wash plant or mortar sand plant. Oversize material generally comprises harder sandstone material extracted with the friable sandstone. It typically represents approximately 10% of the total quantity of raw friable sandstone.

Each haul truck tips the raw sandstone either into a feed bin for the vibrating screen of the wash plant or places it in a stockpile adjacent to the mortar sand plant. A water truck is used for dust suppression in the active extraction area and along the haul road between the active extraction area and the processing area.

The use of blasting or other methods for sandstone extraction are not approved under DA 94-4-2004. As a result, the limit of extraction is defined by the depth of friable sandstone where harder sandstone is interspersed with shale lenses, making cross-ripping impractical. The EIS for the 2004 extension describes this depth as between 180m AHD and 190m AHD, although this would ultimately be dependent on the available resource in each extraction stage.

The proposed modification does not include any changes to extraction activities and as such the approved extraction methods, extent of the extraction area and depth of the extraction activities would not be modified. The proposed modification would not modify the scheduling of extraction stages.

2.2.3 Processing Operations and Product Stockpiling

As described in Section 1.5 of the EA (RWC, 2016), the existing processing operations involve the use of two plants, namely a wash plant and mortar sand plant involving the following components.

Wash Plant

- Feed bin/hopper
- Vibrating screen
- Cyclones
- Dewatering screen
- Silt pump
- Radial stacking conveyor
- Product stockpiles

Mortar Sand Plant

- Vibrating screen
- Mobile conveyor
- Product stockpiles

The combined capacity of both the existing wash plant and mortar sand plant is estimated to be in the order of 400 000tpa i.e. consistent with the production limit imposed by DA 94-4-2004. Oversize material is generally separated from friable sand through the use of the vibrating screen in both the wash plant and mortar sand plant before being separately stockpiled for use in capping of silt cells and rehabilitation.

The processing of the raw friable sandstone results in the production of two principal products, namely, concrete sand (a washed sand product) and mortar sand (a dry-screened product which comprises 50% washed sand and 50% raw sandstone). Within these two broad classifications, products are also sold according to colour and with specified size grading.

In accordance with DA 94-4-2004, and as described in Section 3.3.2 of the EIS for the 2004 extension of the Quarry (RWC, 2004), extracted materials (i.e. soils, fine aggregates and excavated sandstone) and other materials are imported to the Quarry to be reprocessed and blended onsite before being sold as construction materials and landscaping products. Blended products may include blends incorporating imported materials and washed sand. Materials imported to site for blending are stockpiled adjacent to the processing plants and combined with the extracted sand to achieve the customer required specification(s) for the particular product. The specific products could include material for asphalt, block manufacture (e.g. Hebel blocks) and for plasterboard manufacture. Up to 20% of the overall products produced on site are blended products. The importation and blending of material in this manner is considered good environmental practice as this material may otherwise be disposed of at a landfill and Hanson are able to meet its clients' requirements for these products.

The proposed modification does not include any changes to the operation of the wash plant or mortar sand plant, the products produced or rate at which products are produced at the Quarry.

2.2.4 Transportation and Site Access

Access to the Calga Sand Quarry is via a designated intersection on Peats Ridge Road. The intersection provides acceleration and deceleration slip lanes for trucks approaching and leaving the intersection. The transportation of all sand and blended products produced at the Calga Sand Quarry would continue to be by road, via Peats Ridge Road and the M1 Motorway.

Transport operations are limited by Condition 7 of Schedule 2 of DA 94-4-2004 under which products transported from the Quarry are limited to 400 000 tonnes per year.

Access to the Quarry, routes used for transportation and the number of trucks used for transportation operations would not change from that currently approved under DA 94-4-2004.

2.2.5 Water Use

The two primary uses of water at the Calga Sand Quarry are for the suppression of dust and sand washing. Water use is licenced under four Water Access Licences that provide a total water use allocation of 114ML per year.

The majority of water used for processing has been recycled from within the Quarry Site. Water that is used, and not recycled within the Quarry, results from the moisture content of final despatched products and water retained in silt removed from the sand during the sand processing operation. It is estimated that approximately 90% of water retained in silt is recycled within the water management system for the Quarry and reused for processing activities. Based on production of 400 000t of washed sand product, it is estimated that approximately 41ML of water is used per year in this manner.

Water is also used for dust suppression on the roads, stockpiles and other exposed surfaces around the Quarry. Based on existing operational requirements, it is estimated that water used for dust suppression is approximately 5ML per year.

Based on an evaporation rate of approximately 1 650mm/year calculated using the Monthly Evaporation Calculator developed by the National Centre for Engineering in Agriculture (NCEA)¹ and an average total water surface area of 45 000m², the water loss through evaporation from storage dams and silt cells within the Quarry is up to 66ML per year. As the silt cells within Stage 3/1 and Stage 3/2 are progressively rehabilitated, the volume of water lost to evaporation will decrease.

Water is not required for the operation of the crushing system as the moisture content of the oversize material is suitable for dust suppression. As a result, water use will not change as a result of the proposed modification.

¹ The Monthly Evaporation Calculator is available from the National Centre for Engineering in Agriculture (NCEA) website at <http://readyreckoner.nceaprd.usq.edu.au/>

2.2.6 Hours of Operation

Existing approved hours of operation are specified in Condition 5 of Schedule 3 of DA 94-4-2004 and are displayed in **Table 1**.

Table 1
Approved Hours of Operation

Activity	Day	Time
Extraction and processing	Monday – Friday	7:00am to 6:00pm
	Saturday	7:00am to 4:00pm
	Sunday and Public Holidays	Nil
Delivery and distribution	Monday – Friday	5:00am to 10:00pm
	Saturday	5:00am to 4:00pm
	Sunday and Public Holidays	Nil
Maintenance (if inaudible at neighbouring residences)	Any day	Anytime

It is not proposed to change operating hours under the proposed modification.

2.2.7 Quarry Life and Remaining Resources

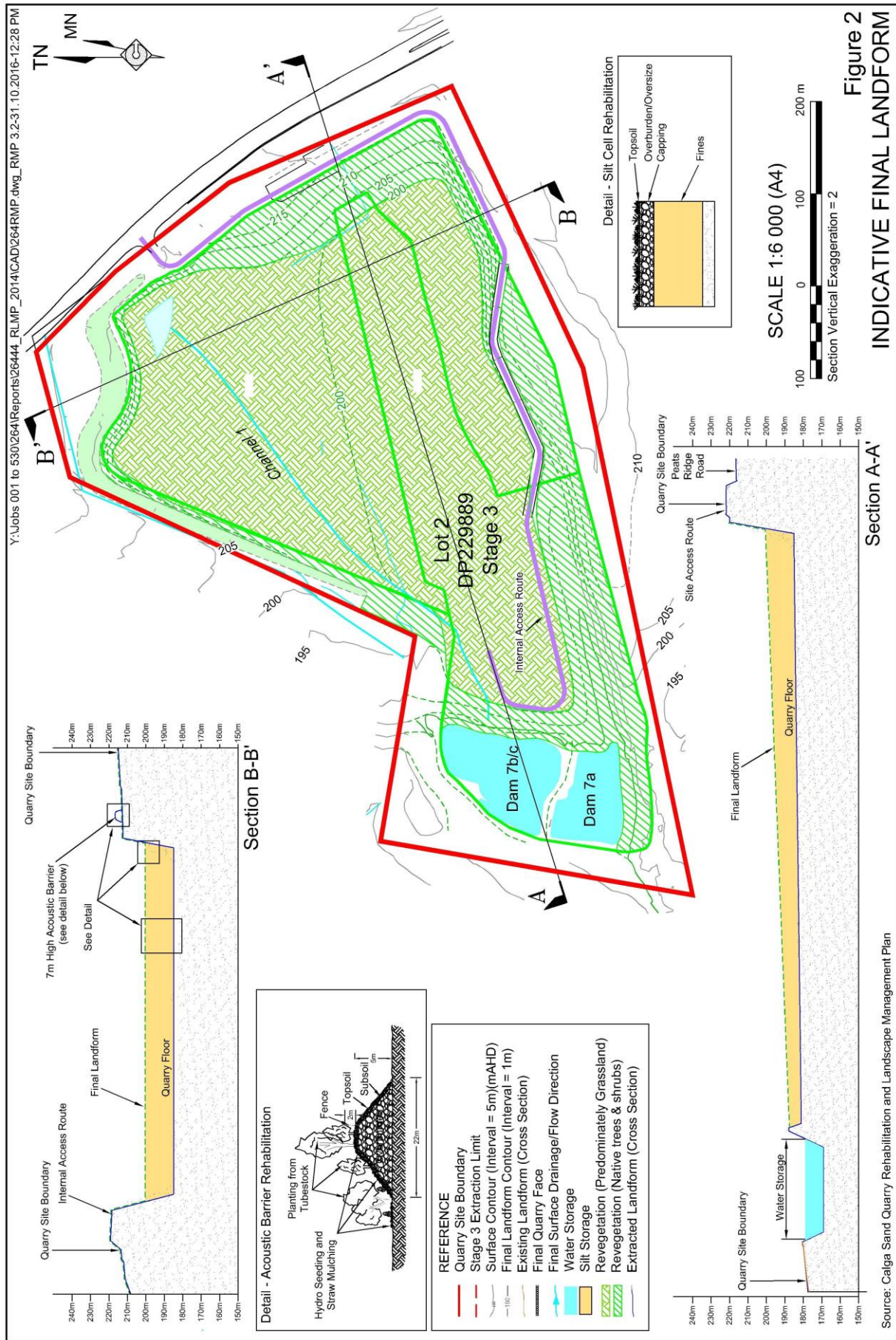
The life of the Quarry is limited by Condition 5 of Schedule 2 of DA 94-4-2004 which specifies that the consent will lapse on 1 July 2030. It is estimated that approximately 1.8 million tonnes of resource remain within Stage 3. Approximately 10% or 180 000t would be extracted as oversize material and is currently not able to be utilised in Quarry products. Based on projected annual sales of up to 400 000 tonnes, estimates of resources remaining within the approved Stage 3 extraction area and production of approximately 20% blended products, it is anticipated that the Quarry will operate for a further four to five years.

Through the more efficient resource processing and production capabilities associated with the inclusion of a crushing system, the projected life of the Quarry may be extended by one or two years, though this would remain within the approved Quarry life to 1 July 2030.

2.2.8 Rehabilitation

The approved *Rehabilitation and Landscape Management Plan* describes the approach that would be taken for rehabilitation of the Quarry upon closure. An indicative final landform is displayed in **Figure 2**.

In the long term, the final landform, designed as free draining and gently sloping to the southwest, would be approximately 15m to 25m below the pre-extraction elevation and will be fully formed and stabilised. It is proposed that the vegetation progressively established on the rehabilitated silt cells will provide for bands of native vegetation interspersed with open areas that will be suitable for ongoing agricultural or horticultural use.



As described in Section 3.5 of the EA (RWC, 2016), the introduction of a crushing system would result in a reduction of the quantity of oversize material available for use in the rehabilitation of the Quarry. Hanson proposes to continue to cap the completed silt cells with overburden material together with a quantity of oversize friable sandstone that will either not be crushed or remains as oversize (>50mm) from the crushing system. The adoption of this approach would ensure that rehabilitation of the Quarry Site is not compromised by the introduction of a crushing system.

2.3 PROPOSED QUARRY OPERATIONS

Section 2.3 of the EA (RWC, 2016) presents the proposed crushing system and an overview of an indicative location for the crushing system within the processing and stockpiling area at the Quarry.

As described above, the proposed modification would not result in changes to the following approved Quarry operations.

- Extraction methods.
- Extraction area extent.
- Extraction depth.
- The scheduling of extraction stages.
- Use of the wash plant and mortar sand plant to process raw sandstone material.
- Product stockpiling with the processing and stockpiling area prior to despatch.
- Access to the Quarry or the use of internal roads.
- The transportation routes used by heavy vehicles.
- The rate of product transport.
- The hours of operation and the Quarry life.
- The final rehabilitation of the Quarry.

The proposed modification seeks approval to include a crushing system within the existing processing operations. Oversize material, screened out of the wash plant or mortar sand plant would be crushed to reduce the size of material to less than 50mm and therefore capable of being processed. This would effectively reduce the proportion of material removed from the processing activities as 'oversize' material and increase the proportion of material processed and despatched as sand product.

In addition, the installation of the crushing system would allow for more efficient sandstone ripping (extraction) activities, as current practice requires that the bulldozer(s) rip the sandstone multiple times to reduce it to sufficient size for the vibrating screen of the wash plant or mortar sand plant. Operating efficiencies would be created by reducing the time required for extraction activities and wear on machinery, ultimately reducing greenhouse gas emissions (as a result of fuel combustion) and providing cost improvements for labour, maintenance and fuel expenses which would go towards offsetting the cost to install the crushing system.

3. GOVERNMENT AGENCY SUBMISSIONS

3.1 INTRODUCTION

The following subsections present a summary of the government agency submissions received following public exhibition of the EA (RWC, 2016). The submission received from DPE summarised other submissions and is prioritised in this response. It is expected that several of the comments will have been addressed in Section 2.2 of this document. Where this is the case, the relevant section is referenced.

3.2 DEPARTMENT OF PLANNING AND ENVIRONMENT

3.2.1 Scope of the Environmental Assessment

There is an overall lack of information in the EA regarding how the crusher may affect the operations of the quarry, including extraction methods, depth and sequencing, processing operations (including the import of other materials on to the site), potential traffic generation, water use and rehabilitation. The RTS should elaborate on the intention behind installing a crusher and how it will affect the existing operations of the quarry.

Response

Section 2 of this Response to Submissions has been included in order to address this comment and several of the comments made in public submissions regarding ongoing operations.

The principal objective in installing a crushing system within the existing processing facilities at the Quarry is to improve the efficiency of resources recovery by processing the approximately 10% of material that is currently extracted as oversize and not able to yield sand products. An overview of existing and proposed operations is provided in Section 2.2 and Section 2.3 respectively. A secondary benefit from the installation of the crushing system would be that extraction equipment would no longer be used to reduce oversize material, as it is current practice to use the blade/bucket or tracks of the equipment for this purpose. This would not be necessary under the proposed modification and would simplify extraction activities.

It should be noted that the following would not change with the proposed installation of the crushing system.

- Extraction methods, extent of the extraction area and depth of the extraction activities would not be modified.
- The scheduling of extraction stages would not change and production levels would continue to rely on customer demand.
- The operation of the wash plant, mortar sand plant, the products produced and rate at which products are produced at the Quarry would remain within approved limits.
- Access to and from the Quarry and the routes used for transportation would not change.

- The number of trucks used for transportation operations would remain within approved limits.
- Water use is not expected to exceed licenced limits.
- Operating hours would not change and there is no proposed extension to the 1 July 2030 expiry date of DA 94-4-2004.

Operational activities that would be modified under the proposed modification include the following.

- Oversize material would be processed using the crushing system in order that the size of the material is reduced to less than 50mm so that it may be processed using the wash plant or mortar sand plant. This would reduce the proportion of material removed as 'oversize' material and increase the proportion of material processed and despatched as sand products.
- Through the more efficient resource processing and production capabilities associated with the inclusion of a crushing system, the projected life of the Quarry may be extended by approximately one year, though this would remain within the approved Quarry life to 1 July 2030.
- As oversize material is proposed to be processed, this would reduce material available for use in rehabilitation. Material that remains greater than 50mm in size would be stockpiled for rehabilitation and progressive capping of the silt cells would continue using this material and stockpiled overburden.

3.2.2 Aboriginal Heritage

The EA has not considered the location of the quarry in relation to significant Aboriginal culture heritage sites. Provide further detail on the proximity of the crusher to these sites and an assessment of any impacts that may occur.

Response

The EPA submission on the proposed modification queries whether the Women's Site may be considered a place of worship or place of learning and should therefore be considered a sensitive receiver for the purpose of assessment of potential noise-related impacts (see Section 3.3.5). The EPA also acknowledges that it is not aware of any precedent to include Aboriginal heritage sites as sensitive receivers in NSW. In addition, several public submissions raised the issue of potential impacts at this location, including potential dust, vibration, light intrusion and visual impacts as well as changes to access to the Women's Site (these submissions are addressed in Section 4.1.1).

It is important to acknowledge that the existing operations are approved activities and assessment is only required to consider the potential impacts of the modification proposed including cumulative impacts, where relevant. The proposed modification would not result in direct disturbance to any sites of Aboriginal cultural heritage significance, as the extent of extraction, processing and ancillary operations would remain within the existing approved Quarry Site boundary. This is supported in the response provided by the Office of Environment and Heritage (OEH) that concluded the following.

'Due to the proposed modification not resulting in additional impacts to Biodiversity, Aboriginal Cultural Heritage or Flooding OEH has no comment to make.'

An archaeological assessment of the proposed modification is therefore not necessary. Whether the Women's Site should be considered as a sensitive receiver for the purpose of assessment of potential noise, air quality or vibration impacts remains unclear as there has been no preference provided by DPE or the EPA on this matter.

The *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005) defines a sensitive receptor as a location where people are likely to work or reside and includes dwellings, schools, hospitals, offices or public recreational areas. It is common practice to include places of worship in this definition for assessment purposes. The *Industrial Noise Policy* (INP) (EPA, 2000) defines noise-sensitive locations as residential premises, schools, hospitals, places of worship, parks and wilderness areas and provides a specific amenity criteria of 40dB(A) for internal measures of noise at places of worship. This is the most stringent amenity criteria applied for assessment purposes (see Table 2.1 of the INP (EPA, 2000)).

As neither of these documents refers to sites of Aboriginal heritage significance and as no advice has been received from DPE or the EPA, Hanson is not in a position to confirm whether the Women's Site should be considered a sensitive receiver and makes no assertion on this matter. However, in recognition of the cultural heritage significance of the Women's Site and the concerns raised by the community, the assessment criteria applied at the Women's Site is based on that used for places of worship (i.e. 40dB(A)). The following subsections present an overview of Aboriginal heritage sites in the vicinity of the Quarry, as well as a response to the issues raised in the EPA and public submissions.

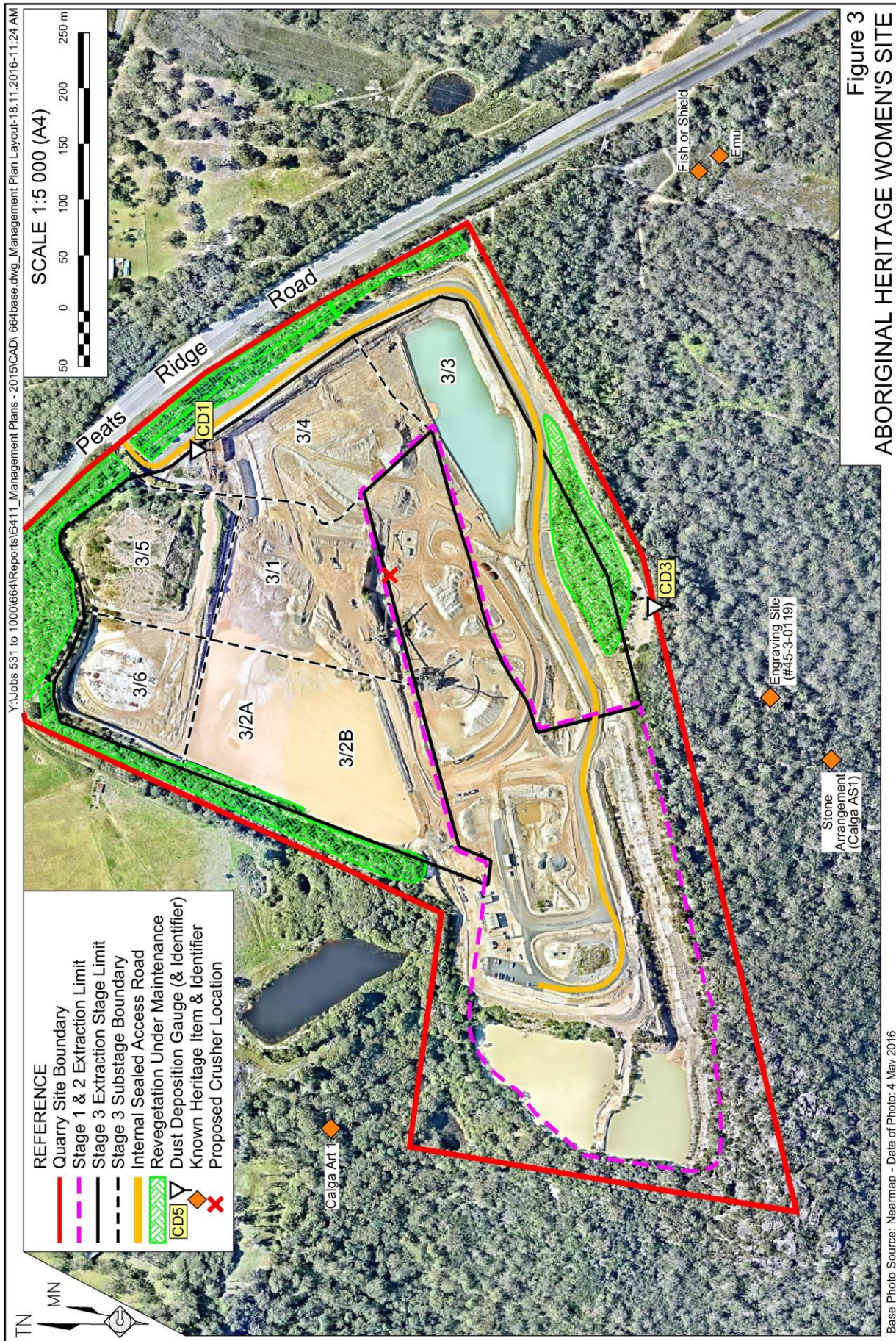
Aboriginal Heritage Sites in the Vicinity of the Quarry

Figure 3 displays the location of the existing approved Quarry, the proposed location for the crushing system and the locations of the stone arrangement (Calga SA1) and rock engravings (AHIMS reference 45-3-00119 or 45-3-2195), collectively referred to as the 'Women's Site'. The rock engravings are considered in this response due to the proximity to the existing operation and the proposed crushing system (approximately 360m from the location of the crushing system). Compliance with the relevant criteria at this location is taken to infer compliance at the other known Aboriginal heritage sites in the vicinity of the Quarry.

Noise

An amended Noise and Vibration Assessment has been prepared by Wilkinson Murray Pty Limited and includes assessment of potential noise and vibration impacts at the Women's Site. The amended assessment is provided as **Appendix 1**.

As described above, the criterion for "places of worship" specified within the INP has been used in the assessment as the most closely related criteria relevant to the Women's Site. Specifically, a criterion of 40dB(A) (internal) was used for the assessment with the $L_{Aeq,period}$ based on a period of 11 hours in accordance with the INP. Wilkinson Murray note that based on previous experience an $L_{Aeq,15min}$ for a typical busy period is 2-3dB higher than the $L_{Aeq,period}$ level. The location of the Aboriginal rock engravings was included in the noise model used by Wilkinson Murray. The $L_{Aeq,15min}$ noise levels at the Women's Site are predicted to be 42dB(A) with and without the inclusion of the crushing system. Wilkinson Murray concluded that this is equivalent to an $L_{Aeq,period}$ level of 39-40dB(A).



It is therefore concluded that predicted noise levels at the Women's Site would be compliant with the amenity noise criteria for places of worship with the inclusion of the crushing system. However, it should be noted that the noise modelling predicted no change in noise levels with or without the inclusion of the crushing system.

Vibration

As there is also no suitable assessment criteria relating to the potential for vibration damage to rock carvings or engravings on sandstone existing in the natural environment, Wilkinson Murray considered assessment criteria used for assessing damage to buildings and public infrastructure such as buried pipelines. These criteria vary from 3mm/s to up to 50-100mm/s for buried pipework.

Vibration measurements of the existing approved processing infrastructure were taken on 6 September 2014 and are provided in **Table 2**. In the context of the much larger approved processing infrastructure, Wilkinson Murray considered that any change to vibration as a result of the installation of the crushing system would be negligible. Given that the closest heritage site (the Women's Site engravings) is approximately 360m from the processing infrastructure, Wilkinson Murray finally concluded that the operation of the processing plant together with the proposed crushing system would be unlikely to cause damage to the Women's Site.

Table 2
Vibration Measurements at the Existing Processing Plant

Distance from Processing Plant (m)	Peak Particle Velocity (mm/s)
10	0.44
20	0.35
30	0.39
55	0.23
Source: Wilkinson Murray (2017)	

Dust

As noted in Section 2.3, it is expected that due to the moisture content of the sandstone that would be processed in the crushing system, additional dust suppression is not necessary. In addition, the crushing system would be located in the floor of the Quarry and the majority of the equipment is enclosed to limit potential dust impacts.

Deposited dust monitoring is undertaken around the Quarry on a monthly basis with annual average results recorded between 2007 and 2015 presented in the EA (see Table 3.5 of RWC, 2016). Monitoring location CD-3 is directly to the south of the existing Quarry boundary and is located approximately 250m from the proposed crushing system, between the existing processing facilities and the Women's Site (the location of this monitoring point is displayed on **Figure 3**). It is therefore reasonable to infer compliance with deposited dust criteria at the Women's Site through compliance at CD-3. **Table 3** presents the monthly results at CD-3 between 2007 and 2015.

Table 3
Deposited Dust Monitoring Results (g/m²/month) – CD-3

Year	Month												Annual Average	Criteria
	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec		
2007	0.6	1.2	1.6	0.4	0.4	0.4	0.6	0.9	0.5	1.3	1.1	1.4	0.9	3.7
2008	0.5	1.2	0.5	0.4	0.3	0.4	0.2	0.3	0.6	1.3	0.8	0.6	0.6	3.7
2009	1.3	1.8	1.1	0.4	1.8	0.1	2.1	1.0	3.0	1.1	1.7	2.4	1.5	3.7
2010	0.6	0.7	0.7	0.6	0.7	0.3	0.3	0.1	0.4	0.3	0.4	0.5	0.5	3.7
2011	0.3	0.7	1.0	0.6	0.2	0.3	1.9	0.2	2.0	0.3	0.3	0.4	0.7	3.7
2012	0.7	0.7	0.6	0.7	0.7	0.7	0.6	1.1	1.1	1.1	1.2	1.3	1.3	3.7
2013	1.1	0.5	1.0	0.4	0.5	0.6	0.5	0.8	1.7	15.3	1.6	2.0	2.2	3.7
2014	0.8	1.2	0.6	1.2	1.4	4.2	0.6	0.7	0.4	2.0	2.3	1.5	1.4	3.7
2015	1.3	0.7	0.8	1.7	1.0	0.2	0.5	0.8	0.6	0.8	0.9	0.6	0.8	3.7
Source: Hanson														

The assessment criteria for deposited dust is based on an annual average level. Therefore only a 12 month average is considered in terms of compliance. However, the monthly data indicates that only two months over the past nine years exceeded the assessment criteria. The annual average results have remained compliant in each calendar year. Given the dust mitigation and design controls that would be applied for the crushing system and the relatively low historic levels of deposited dust at CD-3, it is considered unlikely that deposited dust levels would exceed the assessment criteria at the Women's Site.

Particulate matter levels predicted by PAEHolmes (2009) for operation of the Southern Extension at a production level of one million tonnes per annum are presented in Table 3.6 of the EA (RWC, 2016). These results predict compliance with the relevant assessment criteria for PM₁₀ and PM_{2.5} at this production level. The proposed modification would not change the approved production level of 400 000 tonnes per annum and it is therefore conservatively predicted that particulate matter emissions would remain below criteria levels with the inclusion of the crushing system. Hanson proposes to install a continuous particulate matter monitor in the vicinity of deposited dust gauge CD-3 in early 2017 in order to monitor particulate matter at this location.

Visibility and Light Intrusion

Several public submissions raised concerns regarding the potential visual and lighting impacts at the Women's Site due to the operation of the crushing system. While it is acknowledged that visitors to the Women's Site may be able to see the Quarry as they approach the location of the site and there may be lighting from the Quarry visible during winter, these components of the operation do not represent changes as a result of the proposed modification. The installation of a crushing system would not require lighting in addition to the existing operation. **Plate 1** presents the view of the existing processing plant looking to the north from a location adjacent

to dust monitoring point CD-3 (see **Figure 3**). The crushing system would not modify the view of the horizon, is not a significant piece of infrastructure compared to the existing wash plant and as a result would not modify the field of view such that significant additional impacts can be expected.

Cultural Landscape

The issue of the cultural landscape was not specifically raised in any submissions, however was a feature of the LEC Hearing. Several public submissions, including that provided by the Darkinjung Local Aboriginal Land Council, referred to spiritual and cultural connections that Aboriginal people have to the land or the site. The LEC Hearing noted that the physical aspects of a site should not be considered in isolation but in association with its surrounding spiritual, cultural and physical environment.

In terms of potential impacts to the cultural landscape of the Women's Site, it is considered that the installation of a crushing system would be indistinguishable from existing operations when considered from a landscape perspective. The equipment and its operation would occur within an existing approved and disturbed area and would not result in significant additional noise or vibration impacts such that impacts to the cultural significance of the landscape would occur.

Conclusion

This response to the issues raised by government agency and public submissions regarding potential impacts to Aboriginal cultural heritage as a result of the proposed modification has concluded the following. It is noted that only the Women's Site has been considered, as this is the site closest to the Quarry. It may be inferred that the following conclusions would also apply to other known Aboriginal heritage sites that are in the vicinity of the Quarry but at a greater distance from the proposed crushing system.

- Noise levels at the Women's Site resulting from the operation of the processing plant, including the crushing system, would comply with assessment criteria provided by the EPA for places of worship.
- Vibration resulting from the processing plant, including the crushing system, would not result in damage to the Women's Site.
- Dust levels at the Women's Site would remain within approved levels.
- The processing plant would not change sufficiently to require additional lighting and, for the purpose of assessment of visual impacts, the view of the processing plant would be similar to the view of the existing processing plant.
- The operation of the crushing system would occur within an existing approved and disturbed area and would not modify the Aboriginal cultural heritage landscape.

It is therefore concluded that the proposed modification is not constrained by Aboriginal cultural heritage matters.

3.2.3 Noise Impacts

EPA has requested clarification on a number of issues in the Noise Impact Assessment (NIA) including:

- a) the noise level modelling scenario;*
- b) confirmation that the proposed activity would comply with the proposed noise limits;*
- c) attended noise monitoring results; and*
- d) how the predicted noise levels at CN1 and CN2 have been calculated.*

Response

The issues raised in the EPA submission have been addressed in Section 3.3.

3.2.4 Consultation

Many submissions expressed dissatisfaction with the extent of community consultation undertaken by Hanson in relation to this modification. The Department recommends Hanson engage with agencies and the public to provide further information about the installation of a crusher at the site, its purpose and potential impacts.

Response

Many of the public submissions on the proposed modification expressed the frustration felt in the local community that their voices had not been heard in relation to the proposed crushing system prior to the application being made available for public exhibition. However, the following should be noted in relation to consultation for Calga Sand Quarry.

- Hanson hosts two meetings of the Community Consultative Committee (CCC) each year. The CCC is chaired by an independent chairperson and several local community representatives are involved in the meetings. Complaints and the concerns of the community are raised by these representatives at these meetings with actions recorded in the minutes of each meeting (available from the Hanson website). The proposed modification was included as an item of discussion during the CCC meeting on 7 November 2016, with Hanson confirming that the concerns raised by the local community would be addressed in this document.
- Hanson maintains a consultation matrix with regards to consultation that lists those parties consulted or that would be kept informed of activities at the Quarry.
- Hanson personnel attempted to visit each property in the vicinity of the Quarry on the 4th August 2016 and where residents could not be reached, a fact sheet and project update was left with contact details available for further comment.
- The Quarry Manager is frequently in contact with a number of neighbouring residents and personally ensures that any complaints or concerns are addressed and where necessary issues are raised with senior management at Hanson.

- It should also be acknowledged that the public exhibition of the Environmental Assessment for the proposed modification is effectively a form of consultation, with feedback on the application considered in this document.
- Hanson has consulted with the EPA regarding the amended Noise and Vibration Impact Assessment with this correspondence included as **Appendix 2**.

Hanson contends that the installation of the crushing system would be a relatively minor modification to the operations at the quarry. This is supported by the conclusions of the Environmental Assessment (RWC, 2016). The concerns of the local community are acknowledged, however given the history of objection to the Quarry, it is not surprising that the submissions make unsupported claims and exaggerate possible impacts. Section 2.2 and 2.3 have been prepared to clearly summarise those areas of the operation that would change and those that would continue unchanged, so that the minor to negligible nature of the predicted impacts are clear.

Hanson acknowledges the community's desire to be informed regarding the ongoing operation of the Quarry, especially where changes to operations are proposed. Regardless of the outcome of this application, Hanson will continue to undertake the following consultation.

- Coordinate and attend CCC meetings and make the minutes of each meeting available on the Hanson website.
- Record and investigate complaints in a timely manner using the complaints register which is regularly updated on the Hanson website.
- The Quarry Manager will also be available to respond to complaints regarding noise, dust, transportation of Quarry products or other matters.

Where changes to the operations of the Quarry relevant to the local community are proposed, a door-knock campaign would be commenced to contact residents at properties in the vicinity of the Quarry. Brochures and other material would be left with people where this is appropriate and to invite further comment.

When they occur, Hanson invites the local community to respond to these door-knock campaigns so that their concerns are included in planning for any proposed modification. In addition, should any community members prefer to be contacted via email or phone call, Hanson invites this feedback so that these community members may be included. Requests for inclusion in these consultation programs will be restricted to residents in the Calga region, as broader consultation will occur during the development application process.

3.2.5 Agency and Public Submissions

DPE requests that the RTS consider and respond carefully to all agency and public submissions received, including advice presented and recommendations made therein.

Response

This document presents the results of the RWC and Hanson review and response to all government agency and public submissions.

3.3 ENVIRONMENT PROTECTION AUTHORITY

3.3.1 Introduction

The EPA submission sought additional information regarding the noise impact assessment for the proposed modification, specifically regarding the Noise and Vibration Assessment prepared by Wilkinson Murray Pty Limited. The Noise and Vibration Assessment has been updated to address the questions provided by the EPA and is included as **Appendix 1**. The EPA was consulted via telephone conversation and email with the amended Noise and Vibration Assessment provided to the EPA for review on 9 December 2016 and correspondence provided by the EPA in response on 16 January 2017. A copy of the above correspondence is included in **Appendix 2** in chronological order.

A response to the EPA requests for clarification or additional information is summarised below with reference to the amended Noise and Vibration Assessment (**Appendix 1**) made where relevant.

3.3.2 Predicted Noise Level Modelling Methodology

Representative Comment(s)

The NIA does not provide sufficient information regarding what scenario was modelled, including what quarrying activities were modelled, what meteorological conditions were modelled and which extraction areas in Stage 3 were assessed during the modelled scenario.

Response

A section has been added to the amended Noise and Vibration Assessment (**Appendix 1**) that describes the modelling methods in detail and incorporates a scenario figure.

In summary, the modelling approach used existing modelling of approved extraction activities during Stage 3/6, indicative mobile equipment locations and the use of the processing facilities including the mortar sand plant and wash plant located to the south of Stage 3/2. The crushing system was modelled separately and the results of the approved activities and the stand alone results for the crushing system combined to produce predictions of noise levels at the nearest residences. Predictions were made during a range of meteorological conditions. For example, for daytime calculations, 41 separate conditions were considered, including wind speeds of 0.5-3m/s in each of eight directions, and zero wind speed (representing both zero wind and wind speeds above 3m/s). Noise levels were calculated under each of these conditions, and the probability of occurrence of each condition for the day period in each season was then used to calculate the L_{Aeq} noise level which would be exceeded for 10% of 15-minute periods.

Correspondence from the EPA dated 16 January 2017 (see **Appendix 2**) confirmed that the EPA accepted the approach used for modelling noise settings and to generate predictions of noise levels under the proposed modification.

3.3.3 Noise Limits

Confirm that the proposed activity will comply with the proposed Noise Limits, at all receivers at all times, except during wind speeds greater than 3m/second.

Response

As a result of the modelling assessment undertaken by Wilkinson Murray it can be concluded that noise levels are predicted to comply with the noise limits provided in Environment Protection Licence (EPL) 11295 and noise limits determined from the more recently measured background noise levels under all meteorological conditions except for:

- a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
- b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Stability category G temperature inversion conditions.

3.3.4 Attended Noise Monitoring

Representative Comment(s)

Detail the noise results recorded during the attended noise monitoring, what activities were occurring at the quarry during the attended noise monitoring or the meteorological conditions experienced during the attended noise monitoring.

Response

Attended noise monitoring was undertaken at Residences C1 and C2 during a trial of the crushing system on 4 March 2013 to assess whether noise generated during operation of the crushing system would be audible amongst the rest of the operations.

The following mobile plant and equipment were in operation during the time of the trial.

- Dozer ripping and pushing sandstone in Stage 3/3.
- Excavator loading dump trucks with raw feed from Stage 3/3 to go to washplant.
- Dump trucks taking raw feed from Stage 3/3 to washplant and brickies raw feed stockpile.
- Front-end-loaders feeding washplant from surge pile, loading oversize from washplant onto dump truck and loading sales trucks.
- Dump trucks taking oversize from washplant to oversize stockpile on Stage 2.
- The transfer pump was in constant operation.
- The washplant was in full production.

The reported measurements were conducted in suitable meteorological conditions with negligible wind of less than 0.2m/s.

As a result of the noise measurements taken during this trial, it was concluded that noise levels generated during operation of all relevant noise sources did not change with and without the crushing system operating.

3.3.5 Predicted Noise Level Calculation of Crushing System Alone

Representative Comment(s)

Clearly articulate how the Predicted Noise Levels at CN1 and CN2 have been calculated

Response

Sound power levels for the crushing system were measured during an initial trial of the crushing system conducted on 18 December 2012.

Attended monitoring was undertaken during a second trial of the crushing system on 4 March 2013 to assess whether noise levels at Residences CN1 and CN2 changed during operations with and without the inclusion of the crushing system. The mobile plant and equipment operating during the attended monitoring are described in the response provided in Section 3.3.4. Measured noise levels during this trial were in the order of 40dB(A) with and without the inclusion of the crushing system which indicates the contribution from the crusher is less than 30dBA.

It is predicted that the noise levels produced by the crushing system alone would be approximately 30dB(A) at CN-1 and CN-2 consistent with predictions based on the measured sound power levels and the 10th percentile noise predictions for approved operations including the crushing system (that is, there is none to very little change between predicted noise levels at all nearby residences with and without the inclusion of the crushing system). This confirms that the measurements and predictions are in agreement.

3.3.6 Amendment of Noise Criteria Based on Updated Rating Background Levels

Representative Comment(s)

The EPA has considered this issue and inspected the general area a number of times and considers it appropriate to specify noise limits for residences south of the Quarry based on RBL's established in the 2009 Noise Impact Assessment.

Response

This response is noted on page 4 of the amended Noise and Vibration Impact Assessment (**Appendix 1**). The standard INP intrusive noise criteria was applied as assessment criteria for the assessment of noise levels at surrounding residences (that is, rating background level plus 5dB(A)). Both the intrusive noise criteria and the EPL 11295 criteria are presented in Table 2 of the amended Noise and Vibration Impact Assessment for the purpose of comparison. The predicted noise levels comply with the relevant intrusive noise criteria at all the identified receivers. At receivers CN-6, 7, 8 & 9 the predicted levels are at least 9dB and mostly 10dB below the relevant intrusive noise criteria.

The Noise and Vibration Assessment concluded that the predicted noise levels would comply with the limits set in EPL 11295, except for Residence CN-8, where noise levels are predicted to exceed the limit set in EPL 11295 by 1dB. It is noted that this limit was based on an assumed background level of 30dBA at the time of the initial assessment (the intrusive criteria at this location is 43dB(A) based on recorded background noise levels of 38dB(A) rather than the minimum rating background level of 30dB(A)).

3.3.7 Aboriginal Cultural Heritage Site – Sensitive Receiver

Representative Comment(s)

The NIA does not identify the Aboriginal Women's Site located to the south of the quarry as a sensitive receiver.

Response

As described in Section 3.2.2, Hanson is not in a position to confirm whether the Women's Site should be considered a sensitive receiver and makes no assertion on this matter. The Women's Site is displayed on **Figure 3** and the amended Noise and Vibration Assessment has considered noise levels at this location against the criteria presented in the INP for places of worship (i.e. 40dB(A)). In summary, the Women's Site has been assessed as though it were a sensitive receiver so that acoustic amenity at this location is considered. The results of this assessment are presented in Section 3.2.2 and the amended Noise and Vibration Assessment. Wilkinson Murray conclude that noise levels at the Women's Site are predicted to remain compliant with the assessment criteria for places of worship during operations incorporating the crushing system and note that noise levels are not predicted to change with and without the inclusion of the crushing system.

3.3.8 Predicted Noise Levels at the Women's Site

Representative Comment(s)

The EPA request that the proponent provide noise contours for the premises (or modelled results for the Aboriginal site) that are reflective of the predicted noise levels modelled in the 2015 NIA. Any assessment in this regard should compare predicted levels with the crusher (as proposed) to predicted levels in the absence of the crusher (status quo).

Response

The location of the Women's Site Engravings (approximately 360m from the location of the crushing system) has been included as a 'sensitive receiver' in the noise modelling for the proposed modification. This location was chosen as the engravings are closer to the crushing system than the stone arrangement.

The criterion for "places of worship" specified within the INP has been used in the assessment as the most closely related criteria relevant to the Women's Site. An amenity criterion of 40dB(A) (internal) was used for the assessment with the $L_{Aeq,period}$ of 11 hours used in accordance with the INP. Wilkinson Murray note that based on previous experience an $L_{Aeq,15min}$ for a typical busy period is 2-3dB higher than the $L_{Aeq,period}$ level. The $L_{Aeq,15min}$ noise

levels at the Women's Site are predicted to be 42dB(A) with and without the inclusion of the crushing system. This is equivalent to an $L_{Aeq,period}$ level of 39-40dB(A).

Predicted noise levels at the Women's Site would be compliant with the amenity noise criteria for places of worship with the inclusion of the crushing system. However, it should be noted that the noise modelling predicted no change in noise levels with or without the inclusion of the crushing system.

3.4 DEPARTMENT OF INDUSTRY – DIVISION OF RESOURCES AND ENERGY

Representative Comment(s)

GSNSW has no concerns with the Environmental Assessment for the installation and operation of a crushing system at the Calga Sand Quarry..... The incorporation of a crushing system would allow for a greater recovery of the extracted resource in quarry production.

Response

The comments provided by the Geological Survey of New South Wales are noted and align with Hanson's principal objective for the proposed modification.

3.5 OFFICE OF ENVIRONMENT AND HERITAGE

Representative Comment(s)

Due to the proposed modification not resulting in additional impacts to Biodiversity, Aboriginal Cultural Heritage or Flooding OEH has no comment to make.

Response

The comments provided by the OEH are noted. There will be no additional areas of disturbance associated with the installation of the crushing system, with the most significant modification involving the more efficient use of the existing resource.

4. PUBLIC AND ORGANISATION SUBMISSIONS

4.1 INTRODUCTION

4.1.1 Aboriginal Heritage

Several public submissions expressed concern regarding potential impacts to the 'Women's Site' identified to the south of the existing Quarry. The installation of a crushing system would not result in direct disturbance to any land outside the existing approved Quarry Site boundary. This is acknowledged in the submission received from the OEH (see Section 3.5). However, the EPA submission queries whether this site is to be considered a sensitive receiver (Section 3.3.5). The following presents a summary of the submissions provided by local Aboriginal groups including the Darkinjung Local Aboriginal Land Council as well as individual submissions. A response to these submissions is presented.

Representative Comments

.....changing the context of an Aboriginal site by landscape degradation compromises the spiritual and cultural connection that Aboriginal people have to the land and or the site.

Recommendations:

- 1. The effects of noise, vibration and dust must be considered including the cultural values and physical impacts on the Calga Women's site and Aboriginal sites within the vicinity of the quarry and the surrounding Cultural Landscape.*
- 2. The outcomes of the Land and Environment Court in relation to the Calga Women's Site, Aboriginal cultural heritage and cultural landscape must be considered.*

Local Aboriginal Land Council Darkinjung Submission

This is a sensitive receptor site and should be protected from noise in the same way as a church or school.

Neil Evers Submission

Noise - this has the potential to directly impact aesthetic Aboriginal heritage, notably in those locations associated with key women's business. An increase in the noise levels has not been made in connection with relevant landscape locations and thus impacts resultant from the proposal are unknown.

Visibility - the Aboriginal heritage landscape connections extent along the ridgeline which form the southern boundary of the extant quarry. Therefore from certain locations the proposed crushing system would be entirely visible. The impact of this visibility on Aboriginal social and intangible values is unknown and not assessed.

There is no mention of vibration impacts, light intrusion or changes in access requirements, which all hold the potential for impact to Aboriginal heritage value. The effect on sandstone stability and cracking are not discussed.

Tim Owen Submission

I strongly object to.....the destruction of my ancestors land, sacred sites, water ways, and environment.

David Pross Submission

Changing the context of an Aboriginal site by landscape degradation compromises the spiritual and cultural connection that Aboriginal people have to the land and or the site.

Recommendations:

- 1. The effects of noise, vibration and dust must be considered including the cultural values and physical impacts on the Calga Women's site and Aboriginal sites within the vicinity of the quarry and the surrounding Cultural Landscape.*
- 2. The outcomes of the Land and Environment Court in relation to the Calga Women's Site, Aboriginal cultural heritage and cultural landscape must be considered.*

Local Aboriginal Land Council Darkinjung Submission

Response

The issue of potential impacts to sites of Aboriginal cultural heritage significance was raised by DPE and the potential for noise-related impacts noted by the EPA. These issues have been addressed in a comprehensive response presented in Section 3.2.2.

Several of the public submissions were strongly emotive and expressed concern that the proposed crushing system would lead to the destruction of the Women's Site. Potential impacts to the Women's Site resulting from noise, vibration, dust, visibility and lighting impacts have been addressed in Section 3.2.2 and confirmed that potential impacts would not exceed relevant assessment criteria. It should be noted that the assessment of the proposed modification considers the cumulative impact of operations involving the crushing system and concludes that existing impacts are not likely to change or as in the case of potential noise and visual impacts, the change would be practically indistinguishable from the existing approved operations. The consent authority must consider the significance of the change in impact and, where relevant, the cumulative impact based on the proposed modification.

4.1.2 Modified Operations

Several submissions inferred that the installation of a crushing system would require or include modifications to operations not currently approved or included in the proposed modification. The following presents a brief summary of these submissions and the issues raised.

Representative Comments

Doing what they propose to do seems to indicate a high probability that the whole operation, with the addition of an integrated rock crusher, is going to become significantly different to their operations to date.

The EIS needs to address how this new proposal changes Hanson's intentions for rehabilitation of the existing quarry.

Hanson should be required to address the specific details of the depths they might quarry to given the adding of a crusher and the new ability to process harder materials, which completed cells might be reopened, and how they intend managing water take from the aquifer at these levels and the potential impact water supplies for neighbours and for the environment.

The current 2016 EIS can reasonably be taken to imply an intention to develop the quarry as a processing plant, or hybrid processing and extraction plant.

Common sense dictates that Hanson would expect a general increase in noise levels.

- Noise levels from the crusher would exceed those reported as measured when using the mobile crusher during the trial. This is because any crushing would have been of materials currently available, i.e. currently extractable, using the current processing methods.*
- Hanson has also not reported any modelling of what noise levels are likely to be once they employ the new processes and extraction methods necessary to feed a crusher. These would include more ripping than currently; ripping of harder materials than currently; new machinery for removing harder materials; explosives use; on-site and offsite traffic moving the additional materials sourced on and off site, and increased product output.*

Australian Walkabout Wildlife Park Submission

The Central Coast Plateau Chamber of Commerce is extremely concerned to hear that Hanson has applied to almost double their production of sand products and to process hard sandstone as the implications of this are far reaching.

.....our main areas of concern are the increased numbers of heavy trucks and how they will affect the enjoyment of driving along the Harvest Trail and Tourist Route 33.

Central Coast Plateau Chamber of Commerce Submission

Now that the quarry has been refused permission to expand to the South, they have decided to go deeper into the aquifer, and possibly to also make themselves a processing center (sic) for quarries in the local area. It is noted that they do not rule out the future use of explosives to remove hard sandstone which, with the new crusher, they will have the ability to process.

Gerald Barnard Submission

Hanson has applied to add a crushing plant at their Calga Sand Quarry and to significantly increase production of sand product on site.

To achieve the large increase in production anticipated, would significantly increase traffic on Peats Ridge Road, but also on George Downes Drive and adversely impact on visitors to the area and along Tourist Drive 33.

We understand that, to access the anticipated increased materials in the volumes Hanson claims remain in the existing quarry, they will need to quarry much deeper than they have previously done.

We are extremely concerned about impacts of deep quarrying on water supplies in the long term.

Hanson may resort to the use of explosives to extract the harder materials that their new crushing plant will be able to process.

Wollombi Valley Chamber of Commerce Submission

Response

A summary of the existing and proposed ongoing operations is presented in Section 2.2 and Section 2.3. The concerns raised in these submissions were also acknowledged by DPE in its correspondence and a response concerning the ongoing operations is presented in Section 3.2.1. In summary, the only elements likely to change for the ongoing operation include the following

- Oversize material would be processed using the crushing system to ultimately reduce the proportion of material removed as ‘oversize’ material and increase the proportion of material processed and despatched as sand product.
- The projected life of the Quarry may be extended by one or two years, though this would remain within the approved Quarry life to 1 July 2030.
- There would be a reduction in oversize material available for use in rehabilitation, although material that cannot be reduced in the crushing system and existing overburden stockpiles would continue to be used.

As described in Section 2, the proposed modification does not include the following.

- Any increase to the approved depth of extraction, that is between 180m AHD and 190m AHD.
- Any use of explosives for extraction.
- Conversion of the processing facilities to a regional processing hub or ‘hybrid processing and extraction plant’.
- Any increase to the approved maximum annual production level of 400 000 tonnes per annum and the number of heavy truck movements required to transport material.
- Any increase to the approved and licenced water use at the Quarry including impacts associated with the aquifer underlying the Quarry.

4.1.3 Environmental Impacts Generally

Several submissions raised concerns regarding environmental impacts associated with the operation of a crushing system. The concerns are summarised in the comments provided below.

Representative Comments

I am opposed to the application for a large Rock Crushing System, because hard rock being crushed will be a lot noisier and dustier, it will produce much more vibration, will use more water, and process much deeper (harder) materials, than the sandstone washing that Hanson (previously Rocla) have always done on-site.

Kelia Keogh Submission

They will make so much noise and dust if they start digging hard rock. They will really shake the place to pieces. It's not the noise that's going to do it. It's the shaking that will do the damage. And they will take the water. Everything will change.

Barbara Grew Submission

Any rock crushing will cause more vibration the any previous works that have been going on there

Laurie Bimson Submission

Response

Potential environmental impacts have been assessed in the EA (RWC, 2016) and amended Noise and Vibration Assessment (Wilkinson Murray, 2017). In summary:

- As described in Section 3.2.3 and Section 3.3, the amended Noise and Vibration Assessment (**Appendix 1**) has assessed potential noise and vibration impacts that may result from the installation of a crushing system. The assessment concluded that noise levels would comply with the relevant assessment criteria and would remain below background noise levels at all assessed locations. In addition, vibration resulting from the crushing system is considered to be negligible.
- As described in the Section 3.4 of the EA (RWC, 2016), potential air quality impacts have been considered through review of the air quality impact assessment prepared for the Southern Extension (PAEHolmes, 2009). Given that this assessment presents a very conservative estimate of dust impacts resulting from the proposed modification, it is concluded that deposited dust levels and particulate matter emissions would remain below approved criteria and impacts resulting from PM_{2.5} or crystalline silica would remain below levels likely to result in health impacts to the local community.
- As described in Section 2.2.5, it is not likely that water use would increase significantly, if at all. Water use would remain within the existing licenced levels.
- As described in Section 2.2.4, it is not proposed to increase the rate of production at the Quarry beyond the currently approved levels, therefore, impacts resulting from Quarry access and traffic levels would not increase above approved levels.

As discussed in Section 3.2.2, the installation of the crushing system would not require lighting in addition to the existing operation and would not modify the view of the horizon, is not a significant piece of infrastructure compared to the existing wash plant and as a result would not modify the field of view such that significant additional impacts can be expected.

4.1.4 Consultation

Several submissions raised concerns regarding the level of consultation undertaken for the proposed modification.

Representative Comments

Any claims Corkery has made that the 2016 EIS has involved extensive consultation is a lie. The so called consultation with Walkabout Park is illustrative of this.

Australian Walkabout Wildlife Park Submission



It would appear that the company is using both misleading and deceptive conduct to give the impression it has undertaken public consultation when this is clearly not the case.

Our Land, Our Water, Our Future Submission

Response

The concerns raised by the local community were also addressed in the response to the DPE submission regarding community consultation in Section 3.2.4.

The community consultation program for the proposed modification involved a door-knock campaign on 4 August 2016, during which representatives of Hanson attempted to make personal contact with all privately-owned residents in the vicinity of the Quarry. The objective of the campaign was to inform the local community of the proposed modification, to discuss their concerns and to record any matters that they wished to have considered in the environmental assessment. Where residents could not be reached, a fact sheet and project update was left with contact details available for further comment. No feedback from the door-knock campaign was received. It should be noted that no consultation program will perfectly capture the views of all stakeholders, including the local community. In addition, the objective of the consultation program was not to reach consensus but to inform the community and invite input to the environmental assessment process.

As described in Section 3.2.4, Hanson will continue to consult with the local community through the following key actions.

- Coordinate and attend CCC meetings and make the minutes of each meeting available on the Hanson website.
- Record and investigate complaints in a timely manner using the complaints register which is regularly updated on the Hanson website.
- The Quarry Manager will also be available to respond to complaints regarding noise, dust, transportation of Quarry products or other matters.
- Where changes to the operations of the Quarry are proposed that are relevant to the local community, a door knock campaign would be commenced to contact residents at properties in the vicinity of the Quarry.

Hanson will continue to attempt consultation with the local community and invites residents to respond to these opportunities to consult with the Company.

4.1.5 Public Exhibition Document Availability

Two submissions expressed concerns that the EA documents were not available from the locations stated in public notifications regarding the public exhibition of the document.

Representative Comments

Given that the documentation supporting the application for Modification 3 was not available on the advertised date at the advertised place (Dept. of Planning in Gosford). Given the short time frame for responses, this failure of process has prevented concerned citizens from exercising their rights in the planning process.

Kate da Costa Submission

Response

Personal conversations with DPE and Central Coast Council officers confirmed that the EA and accompanying documents were available at the following locations, as advertised.

- Department of Planning and Environment: Information Centre, 23-33 Bridge Street, Sydney;
- Central Coast Council: Customer Service Centre, 49 Mann Street, Gosford; and
- Nature Conservation Council: 14/388 Pitt Street, Sydney.

It is noted that the submission refers to the Department of Planning offices in Gosford, which is a misreading of the advertisement as this was not an advertised location. The document was in fact exhibited at the offices of the former Central Coast Council in Gosford, as advertised. The appropriate protocol has been followed for the public exhibition of the documents. It is also noted that phone numbers were also presented in the advertisement for the public to contact in the case of any difficulties.

4.1.6 Legal Basis for Application

Several submissions questioned the legal basis for changes to the Quarry operations given that the Land and Environment Court had refused the Southern Extension proposal.

Representative Comments

Since that time another company has bought that original business (Rocla) whom had legally lost their right to expand. The new company (Hanson Aust Pty Ltd) has now applied to the Planning Dept for an extension that is not possible after that court determination.

Response

The development approval process in NSW does not limit the right to apply to modify an existing development consent following refusal of a previous application, as long as the application is not the same as the previous application or does not result in a similar level of impact deemed to be the justification for the refusal. The Southern Extension proposal was refused on the grounds of uncertainty regarding potential impacts to known and unknown sites of Aboriginal cultural heritage significance. The proposed modification application does not include additional disturbance outside of the existing approved Quarry boundary and would not result in direct impacts to sites of Aboriginal cultural heritage significance. It is therefore sufficiently different for the application to be considered on its merits, which in this case relate to the efficient extraction and recovery of the identified sand resource with minimal additional environmental impact.

4.1.7 Use of Air Quality Impact Assessment Results From An Assessment Undertaken in 2009

Several submissions questioned Hanson's reliance on information provided in the Air Quality Impact Assessment completed for the Southern Extension proposal.

Representative Comments

Attached figures and information, are from the Environmental Assessment undertaken in 2012 and would seem to be from part of the previous submission to the Department of Planning and Infrastructure in 2012, which was refused by the Land and Environment Court on 17 November 2015.

Other information relates to predicted (not actual) noise levels based upon the Southern Extension noise study which is not relevant, out of date and previously rejected by the Land and Environment Court.

Our Land, Our Water, Our Future Submission.

The Air quality report is a repeat of a study undertaken in 2009 for the Southern Extension. It does not model the impact on air quality of a crushing plant at the site. Changes to legislation related to dust have occurred since 2009 (NEPM, Clean Air Regulations 2010, and the National Clean Air Agreement in 2015).

Kate da Costa Submission.

Response

While it is acknowledged that the air quality impact assessment for the proposed modification uses information presented in the 2009 assessment for the Southern Extension, the reference to this assessment is considered suitable for the following reasons.

- The dust emission sources at the Quarry have not changed significantly, such that the results of the assessment are no longer valid.
- Inputs to this assessment such as meteorological data and topography have not significantly changed.
- The guidelines and therefore the assessment criteria for the assessment of potential dust impacts as a result of the operation have not changed.

It should be noted that the air quality impact assessment is considered to be indicative of a highly conservative representation of potential impacts for operations under the proposed modification as the assessment was based on operation of two separate processing facilities and a production level of one million tonnes per annum, i.e. 2.5 times the currently approved maximum production level of 400 000 tonnes per annum.

4.1.8 Silica and PM_{2.5}/PM₄

Several submissions raised concerns regarding the potential impact associated with airborne silica and particulate matter.

Representative Comments

The EIS does not monitor breathable tiny particles of PM_{2.5} crushed silica sand, which are dangerous to human health. Any change to the quarry's DA should require a proper EIS which addresses both PM_{2.5} and PM₄ particles.

Our Land, Our Water, Our Future Submission

Response

As described in Section 4.1.7, the Air Quality Impact Assessment (PAEHolmes, 2009) undertaken for the Southern Extension proposal provides a conservative representation of potential impacts given the assessment was made on a more intensive operation.

Section 6 of PAEHolmes (2009) notes the following regarding the distribution of particles in total suspended particulates (TSP) derived from measurements published by the SPCC (1986).

- PM_{2.5} is 4.7% of the TSP.
- PM_{2.5-10} is 34.4% of TSP.
- PM₁₀₋₃₀ is 60.9% of TSP.

The assessment predicted maximum cumulative annual average TSP emissions of 4µg/m³, which suggests that maximum cumulative annual average PM_{2.5} (as 4.7% of TSP) would be much lower than 8µg/m³, which is the most recently published standard for PM_{2.5} concentrations (Ambient Air National Environment Protection Measures (NEPMs) (NEPC, 2016)).

PAE Holmes (2009) also predicted levels of crystalline silica based on the percentage of dust emissions expected to be crystalline silica and the predicted emissions of PM₁₀. An assessment criterion of 3 µg/m³ was applied based on reference exposure levels recommended by the California EPA Office of Environmental Health Hazard Assessment. The estimated annual average respirable concentration of crystalline silica (as PM₄) was approximately 14 times lower than the Californian REL of 3µg/m³ (see Section 7.3.2 of PEL (2009)).

Crystalline silica was also considered at the LEC hearing with experts for both Rocla and the Australian Walkabout Wildlife Park agreeing with the following statement, submitted as Exhibit S26 p7 Air Quality JR p7

"Lifetime risk of silicosis amongst the general population is very low ... We agree that 3pg/m³ annual average (as PM₄) is an adequate demonstration of protection against adverse health effects associated with exposure to respirable crystalline silica (RCS). Performance against the 3pg/m³ annual average RCS criterion can be adequately demonstrated through atmospheric dispersion modelling. The predictive modelling indicates that the annual average RCS criterion is unlikely to be exceeded at nearby sensitive receptors."

Reference: Darkinjung Local Aboriginal Land Council v Minister for Planning and Infrastructure & Anor; Australian Walkabout Wildlife Park Pty Limited (ACN 115 219 791) as Trustee for the Gerald and Catherine Barnard Family Trust v Minister for Planning and Infrastructure & Anor - [2015] NSWLEC 1465 para.417

5. CONCLUSION

The proposed modification would involve the installation of a crushing system within the existing processing operations at the Calga Sand Quarry. The Environmental Assessment (RWC, 2016) concluded that Hanson would continue to satisfy all relevant statutory goals and criteria and environmental objectives following installation of the crushing system.

Submissions received following the public exhibition of the Environmental Assessment (RWC, 2016) included submissions from DPE and the EPA seeking additional information, from OEH and DRE either in support or offering no comment and a total of 26 public submissions objecting proposed modification.

Many of the public submissions sought further confirmation regarding those elements of the ongoing operation that would not change, such as the use of blasting, transport levels and import of materials for blending. This document has provided a detailed description of the existing and proposed ongoing operations in order to confirm for the local community the minor changes to the extraction and processing activities designed to improve the efficiency of resource recovery.

Potential impacts at the Aboriginal cultural heritage Women's Site were raised in the submissions. It has been concluded that potential impacts at this location would not occur or be negligible for people accessing the site as well as for any potential physical damage to the site.

The EPA requested additional information regarding the noise assessment and the updated Noise and Vibration Impact Assessment is presented as **Appendix 1**. The update to this report did not change the conclusions of the assessment that the noise levels predicted for privately-owned residences in the vicinity of the Quarry would experience negligible or imperceptible changes to the noise environment. The EPA confirmed in correspondence that it was satisfied that the amended Noise and Vibration Impact Assessment addressed its concerns, noting one final concern which has been addressed in the final draft of the document (see **Appendix 2**).

Importantly, as a result of the assessment presented in the Environmental Assessment (RWC, 2016) and this document it is concluded that predicted environmental impacts as a result of the proposed medication would be minor or negligible, with some elements such as water management and rehabilitation not changing.

6. REFERENCES

SPCC (1986) "Particle size distributions in dust from open cut coal mines in the Hunter Valley", Report Number 10636-002-71, Prepared for the State Pollution Control Commission of NSW (now EPA) by Dames & Moore, 41 McLaren Street, North Sydney, NSW 2060.

National Environment Protection Council (NEPC) (2016). Ambient Air – National Environment Protection Measures (Ambient Air Quality) Measure as amended. 25 February 2016..

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Appendix 1

Amended Noise Impact Assessment – Wilkinson Murray (January 2017)



30 January 2017

WM Project Number: 01127-AC
Our Ref: 01127-AC_eltr_Noise Assessment VerD Final

Hanson Construction Materials Pty Ltd
Lot 151 Peats Ridge Road
CALGA NSW 2250

Re: Calga Sand Quarry - Stage 3 Noise & Vibration Assessment of Proposed Crushing System

INTRODUCTION

Hanson Construction Materials Pty Ltd (Hanson) proposes to install and operate a crushing system within the existing approved processing operations at the Calga Sand Quarry ("the Quarry").

Figure 1 displays the proposed location of the crushing system and the monitoring locations that have been used for noise monitoring to establish compliance with noise limits provided in Development Consent DA 94-4-2004 and Environment Protection Licence (EPL) 11295. These monitoring locations were also used for assessments undertaken for the previously proposed Southern Extension to the Quarry, which has since been refused development approval.

An Aboriginal cultural heritage assessment undertaken for the proposed Southern Extension identified a significant Aboriginal heritage 'Women's Site' to the south of the existing Quarry. The Women's Site consists of two separate sites; a series of engravings located approximately 360m from the location of the proposed crushing system and a stone arrangement located approximately 420m from the proposed crushing system. For the purpose of this report, potential impacts at the Women's Site Engravings has been assessed as this location is closer to the proposed location for the crushing system. This point has been included as an extra assessment location and is hereafter referred to as the Women's Site.

The crushing system is proposed to operate in conjunction with the existing wash plant between 7.00am and 6.00pm Monday to Friday and 7.00am and 4.00pm on Saturdays.

The receivers addressed in this assessment and shown in Figure 1 are listed below. A more detailed site plan and land ownership plan are appended to this letter.

- Residence 3 (CN-1) – Power
- Residence 4 (CN-2) – King
- Residence 5 (CN-3) – Kashouli
- Residence 6 (CN-4) – Townsend
- Residence 8 (CN-6) – Cauchi
- Residence 9 (CN-7) – White
- Residence 20 (CN-8) – O'Bryan
- Residence 13 (CN-9) – Barnard
- Women's Site Engravings

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ACOUSTICS AND AIR

Figure 1 Crushing System Location & Noise Receivers



ASSESSMENT OF APPROVED OPERATIONS WITH WASH PLANT AND CRUSHING SYSTEM

There have been a number of separate noise studies relating to the various developments on this site. Since all the attended site monitoring has indicated there are minimal noise impacts from the current operations, it was felt that the assessment of the additional crusher could be undertaken by combining the predicted levels associated with the approved operations and an assessment of the crusher in isolation. A measurement of the crusher during the trial period also indicated its contribution to overall noise levels to be negligible, in line with predictions (refer later).

One aspect which is noted, but was considered to have minimal influence on the assessment outcomes, was that the location of the processing plant in the model for approved operations is not the actual location on the quarry floor currently being used. The modelled location for the processing plant is based on that used for the Southern Extension proposal. However, given the distance to the residences is not significantly different between the current location and the modelled location (estimated to be 100m) and the processing plant is shielded to all receivers by the existing extraction faces and vegetation, the acoustic outcomes are considered to be similar. The crusher is modelled in the correct location.

The number of Front End Loaders included in the model is higher than currently utilised on site, hence an element of conservatism exists to compensate for small changes that may result from the location modelled for the processing plant.

In line with an EPA accepted approach to noise assessment our predictions have also considered a 10th percentile approach to overall noise emission in the worst case season, rather than for one specific set of meteorological conditions.

The *Industrial Noise Policy (INP)* requires that in calculating noise levels, wind speed and direction should be taken into account if wind speeds of up to 3m/s in the source-to-receiver direction occur more than 30% of the time in any season.

When the model was initially developed records of wind speed and direction were obtained for the meteorological station at Gosford, for a full calendar year (2002) to be representative of any typical year. Table 4-2 indicates that winds at between approximately 0.5 and 3m per second occur for over 30% of the time from a range of directions in each season, particularly in the day and evening periods. The effect of the component of wind on noise levels from source to receiver therefore needs to be taken into account in daytime calculations.

Table 1 Percentage Occurrence of Wind Speeds between approx. 0.5-3m/sec from within 160° of Direction shown during Day Period

Period	Season	N	NE	E	SE	S	SW	W	NW
Day	Autumn	28%	36%	41%	41%	34%	28%	18%	24%
	Spring	24%	35%	36%	34%	20%	13%	10%	15%
	Summer	27%	38%	39%	35%	22%	14%	9%	17%
	Winter	36%	36%	27%	27%	21%	24%	28%	33%

For daytime calculations, 41 separate conditions were considered – wind speeds of 0.5-3m/s in each of eight (8) directions, and zero (0) wind speed (representing both zero wind and wind speeds above 3m/s). Noise levels were calculated under each of these conditions, and the probability of occurrence of each condition for the day period in each season was then used to calculate the L_{Aeq} noise level which would be exceeded for 10% of 15-minute periods.

EPA have also acknowledged that noise limits can be based upon standard *INP* intrusive criteria rather than the EPL which didn't specifically address some residences (CN-6, 7, 8 & 9).

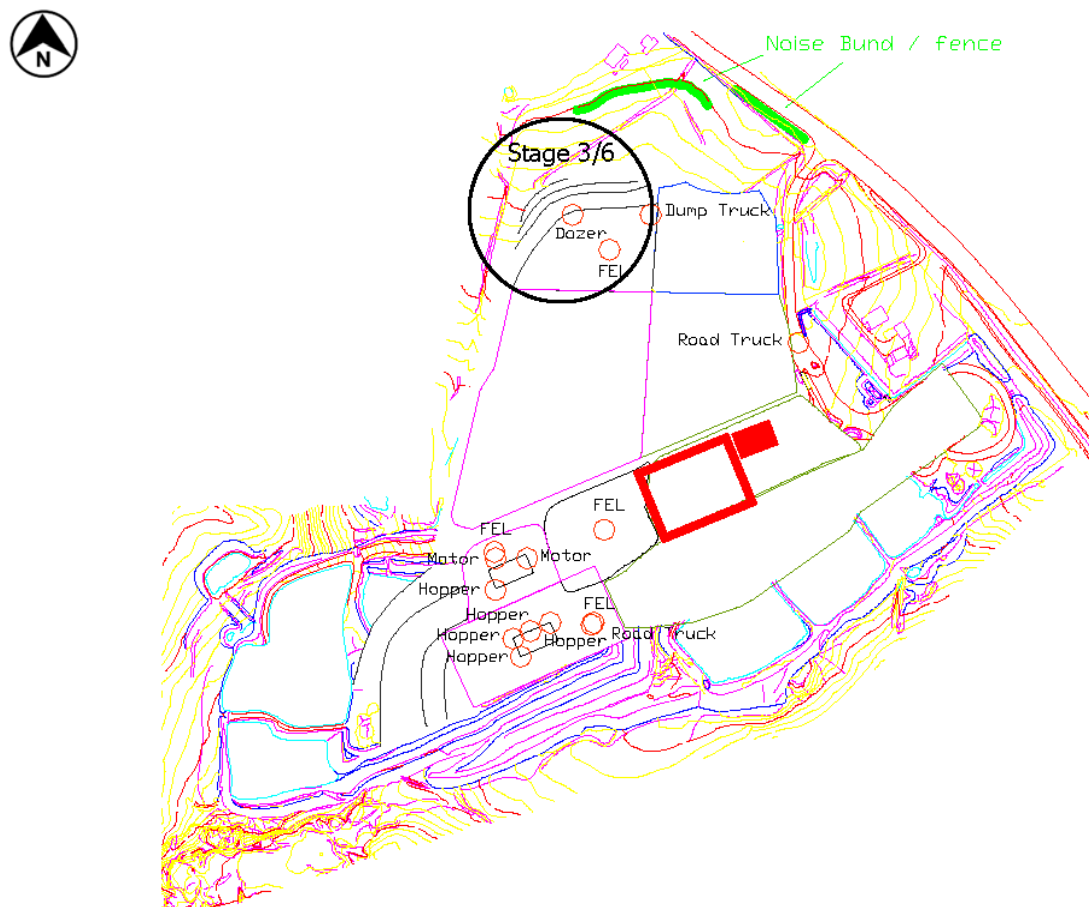
Approved Operations – Modelling Assumptions

Noise predictions associated with the Stage 3 approved operations relate to the following scenario:

- Extraction activities in the Stage 3/6 area; and
- processing at the mortar sand plant and wash plant located to the south of Stage 3/2

Figure 2 shows the source locations (Dozer, FEL, Dump Truck, Road Truck, Processing Plant) assumed for the original modelling of the Stage 3 approved operation, and the current processing plant (red rectangle) to the east, with the crushing plant also shown as a solid red rectangle.

Figure 2 Stage 3 Approved Operations - Source Location



Proposed Crushing System – Modelling Assumptions

Noise predictions associated with the crushing system were extracted from the noise model that was used as part of the 2009 noise assessment for the Southern Extension based on the ENM software. The only source modelled was that of the crushing system with a sound power level of 109dBA (based on on-site measurements conducted during a brief trial on Tuesday, 18 December 2012).

Noise levels were calculated using the same 10% exceedance procedure and meteorological dataset as described above for the modelling of the Stage 3 approved operations.

Figure 1&2 both show the location assumed for the modelling of the crushing system.

Approved Operations and Proposed Crushing System – Noise Predictions at Residences

Table 2 summarises noise predictions associated with the combined Stage 3 approved operation and proposed crushing system. The noise predictions refer to calculated noise levels exceeded for 10% of 15-minute periods during the worst-case season for the daytime period (7.00am - 6.00pm).

Table 2 also includes the noise limits provided in EPL 11295 and noise limits determined from the more recently measured background noise levels by adding 5dBA, which is the standard *INP* method for determining suitable intrusiveness noise criteria for an operation. It is anticipated that following approval, a modification to EPL 11295 would be required to establish more appropriate noise limits at residences that are based upon measured background levels plus 5dB.

Table 2 Predicted Daytime Noise Levels – Approved Operations with Crushing System

Location	EPL 11295 Noise Limits ($L_{Aeq,15min}$)	Intrusive Noise Criteria RBL + 5dB ($L_{Aeq,15min}$)	Predicted Level ($L_{Aeq,15min}$)	
			Stage 3 Approved Operation	Stage 3 Approved Operation + Proposed Crushing System
Residence 3 (CN-1) – Power	41	41	41	41
Residence 4 (CN-2) – King	40	40	40	40
Residence 5 (CN-3) – Kashouli	39	39	39	39
Residence 6 (CN-4) – Townsend	35	-	35	35
Residence 8 (CN-6) – 3 Jones Road	35	43 ⁽¹⁾	35	36
Residence 9 (CN-7) – 24 Jones Road	35	43 ⁽¹⁾	<35	35
Residence 20 (CN-8) – 30 Jones Road	35	48 ⁽¹⁾	<35	<35
Residence 13 (CN-9) – Walkabout Park	35	46 ⁽¹⁾	<35	<35

Note 1: Intrusiveness noise criteria recommended as part of the Calga Sand Quarry Southern Extension EA Noise Assessment (Wilkinson Murray, 2009)

The predicted noise levels comply with the relevant intrusive criteria at all the identified receivers. At receivers CN-6, 7, 8 & 9 the predicted levels are at least 9dB and mostly 10dB below the intrusive criteria. At residence CN-8 noise levels are predicted to exceed the limit set in EPL 11295 by 1dB, noting this limit was based on an assumed background level of 30dBA at the time, since this residence (and other residences) were not the potentially most affected.

On this basis, the potential uncertainty in overall predicted noise levels as a result of the differences between the location of the processing plant in the model and on site is considered small (less than 1dBA) at the "southern" residences, where levels are well below the intrusive criteria. The northern residences are dominated by noise levels from the extraction process much closer to the northern boundary where the processing plant has negligible influence.

Approved Operations and Proposed Crushing System – Noise Predictions at Women's Site

No noise limits are currently applicable for that location which is not considered to be a residential receiver in accordance with the *INP*.

The only criterion within the *INP* which may have some relevance is for "places of worship". This requires an amenity criterion of 40dBA to be achieved internally. An amenity criterion is normally assessed over the whole daytime period of 11 hours, rather than the 15 minute period used to assess intrusiveness.

Based on past assessments of similar operations, a $L_{Aeq,15min}$ for a typical busy period is generally expected to be 2-3dB higher than the $L_{Aeq,period}$ level.

Since the contribution from the crusher is low, noise levels with and without the proposed crushing system have been predicted to be 42dBA at the Women's Site Engraving location. As such, noise levels at the Women's Site are not expected to change following installation of the crushing system (i.e. with and without the crushing system). The predicted level of 42dBA is expected to be equivalent to an $L_{Aeq,period}$ level ranging 39-40dBA. This is lower than the level provided in the *INP* as assessment criteria for predicted noise levels inside a place of worship.

RELEVANT METEOROLOGICAL CONDITIONS FOR COMPLIANCE ASSESSMENT

The predicted noise levels are expected to comply with the noise limits provided in EPL 11295 and noise limits determined from the more recently measured background noise levels under all meteorological conditions except for:

- a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
- b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Stability category G temperature inversion conditions.

TRIAL OF CRUSHING SYSTEM

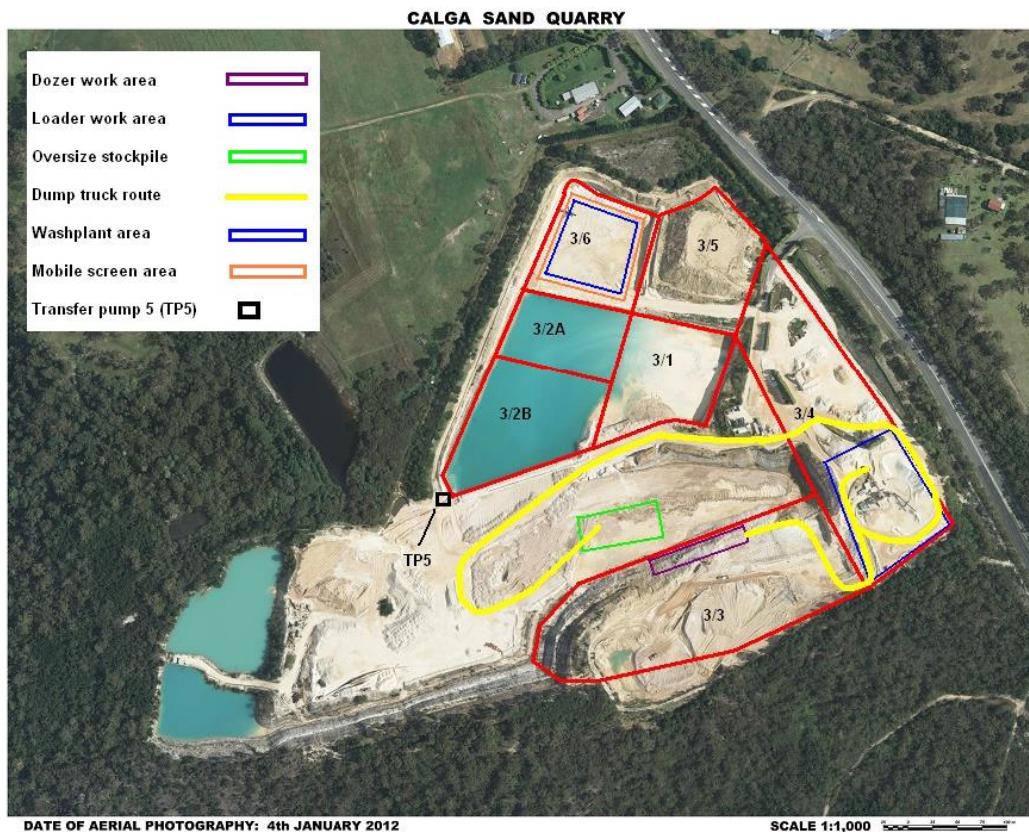
As mentioned above, a brief trial was conducted on Tuesday, 18 December 2012 to conduct near field measurements of the crushing system and establish the sound power level of the plant.

To confirm the noise contribution from the crusher was expected to be minimal and in line with predictions, noise measurements were conducted as part of a second trial on Monday, 4 March 2013 at

CN1 and CN2 to establish whether noise generated during a trial of the crushing system would be audible amongst the rest of the operations.

Figure 3 presents an aerial of the quarry site with operational areas during the trial. Note that the processing area during the trial is located in the southeast corner of the site. This would not have affected the noise levels generated by the crushing system which was located near the intended location as shown in Figure 1.

Figure 3 Quarry Operational Areas during Trial Monitoring Period



The reported measurements were conducted in suitable meteorological conditions with negligible wind of less than 0.2m/s.

The second trial involved taking noise measurements of processing facilities during operation, including and excluding the crushing system. The following mobile plant and equipment were in operation during the time of the trial:

- Dozer ripping and pushing sandstone in Stage 3/3.
- Excavator loading dump trucks with raw feed from Stage 3/3 to go to washplant.
- Dump trucks taking raw feed from Stage 3/3 to washplant and brickies raw feed stockpile.
- Front-end-loaders feeding washplant from surge pile, loading oversize from washplant onto dump truck and loading sales trucks.
- Dump trucks taking oversize from washplant to oversize stockpile on Stage 2.

- Transfer pump 5 (TP5) was in constant operation.
- Washplant was in full production.

Table 3 presents the 10th percentile calculated noise levels due to the crushing system alone at two of the receiver locations where monitoring was undertaken.

Noise levels generated by all noise sources within the whole site did not change with and without the crusher operating. Measured levels were in the order of 40dBA, which confirms noise levels from the crusher alone are estimated to be approximately 30dBA at CN-1 and CN-2. These attended monitoring results are consistent with the 10th percentile noise predictions presented in Table 2.

Table 3 Predicted Noise Levels – Mobile Crushing System Alone

Item	Calculated $L_{Aeq,15min}$ Noise Level, dBA	
	CN-1	CN-2
Crushing System	31	29

VIBRATION ASSESSMENT OF PROPOSED CRUSHING SYSTEM AT WOMEN'S SITE

There are no criteria relating to the potential for vibration damage to rock carvings or engravings on sandstone existing in the natural environment. In addition, we have not been able to inspect the carvings but we are informed that they "sit" on exposed sandstone outcrops.

There are a number of Standards which deal with potential vibration damage to structures (mostly buildings) that are commonly used in Australia including a British Standard BS 7385 and German Standard DIN4150 Part 3. These include vibration limits over a range of frequencies.

For conventional residential construction, vibration criteria of 5mm/s based on the German Standard DIN 4150 Part 3 are commonly used. In addition, this Standard also considers heritage structures (albeit this is considered to be heritage within European timeframes) where a lower 3mm/s limit is often adopted. The British Standard has marginally higher criteria of 7.5mm/s.

Vibration and damage to structures is also considered in blasting guidelines (*ANZECC*); however, as these are short term transient events they are not considered relevant in this situation dealing with crushing.

In the absence of inspection of the carvings, we consider the most appropriate criteria to adopt is to consider the effect of vibration on buried pipework. The DIN4150 recommends a range from 50mm/s – 100mm/s for masonry/plastic, through clay / concrete / metal and steel pipes. We consider a much more conservative criterion should be adopted on the basis that we are protecting a natural piece of sandstone rather than a man-made masonry or steel construction and also the consideration of how much of the sandstone rock could be considered as "buried".

Whilst criteria for these buried structures are relatively high (50-100mm/s), on the basis the rock is considered competent and much of it is buried, even reducing by a factor of 10, we consider that a vibration limit in the order of 5-10mm/s would still be appropriate.

On Saturday, 6 September 2014, vibration measurements were carried out at the sand quarry to establish levels likely to be generated by the processing plant (excluding the proposed crushing system). Table 4 gives the results of these measurements.

Table 4 Vibration measurement Results

Distance from Processing Plant	PPV (mm/s)
10m	0.44
20m	0.35
20m	0.39
55m	0.23

Based on these measurement results, vibration levels generated by the processing plant (located approximately 300m away from the Women's Site Engravings) and the proposed crushing system (located approximately 360m away from the Women's Site Engravings) are expected to be less than 0.5mm/s PPV at the Women's Site Engravings.

Such levels are well below the criterion of 5-10mm/s which has been set to avoid damage to sandstone rock.

The operation of the processing plant together with the proposed crushing system are therefore unlikely to cause damage to the Women's Site Engravings.

CONCLUSION

Based upon the above, it is concluded that the incorporation of a crushing system in the wash plant would not contribute to any non-compliance of the noise limits nominated in DA 94-4-2004 and EPL 11295 excluding a minor 1dB(A) exceedance at Residence 8 (CN-6) although the predicted noise level is 7dB(A) below the project specific noise level at this location.

The incorporation of a crushing system in the processing facilities is unlikely to generate noise levels that exceed the amenity criteria provided in the *INP* for places of worship. Furthermore, noise levels at the Women's Site are not expected to change following installation of the crushing system (i.e. with and without the crushing system).

The vibration associated with operation of the crushing system is unlikely to cause damage to the Women's Site Engravings.

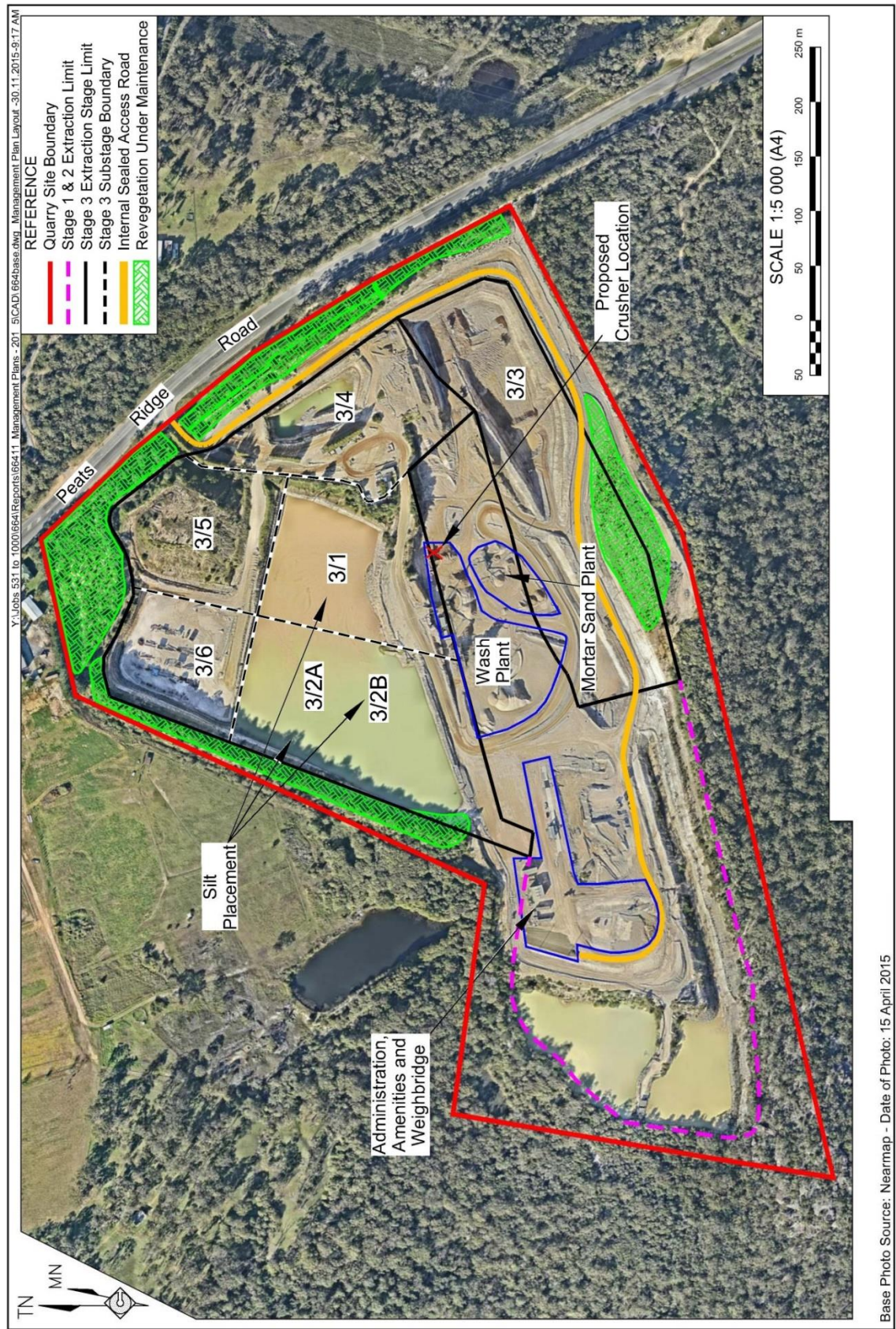
We trust this information is sufficient. Please contact us if you have any further queries.

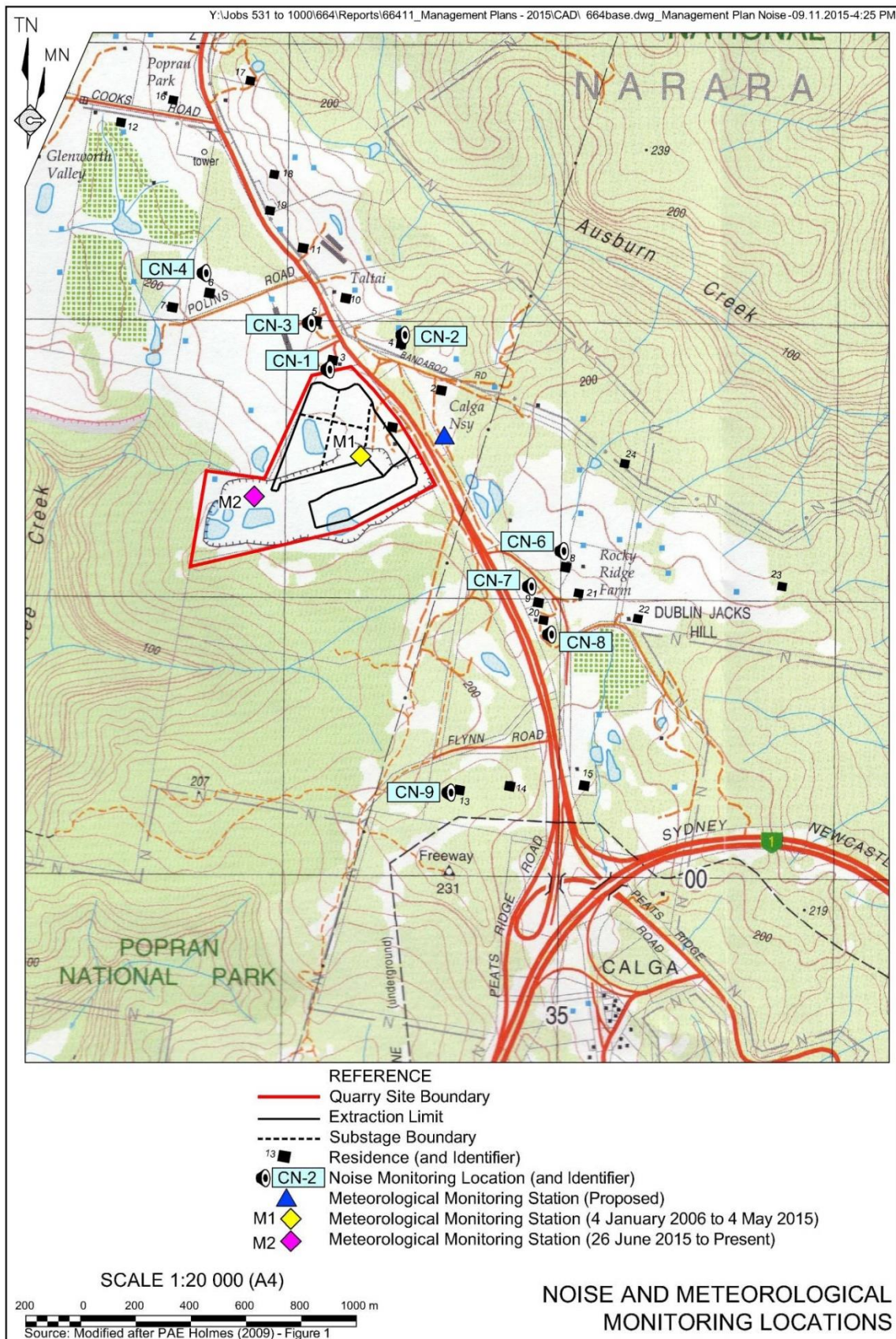
Yours faithfully

WILKINSON MURRAY



Roman Haverkamp
Senior Engineer





Appendix 2

EPA Correspondence (January 2017)

From: Nicholas Warren
Sent: Friday, 9 December, 2016 1:58 PM
To: Alexander Beavis (Alexander.Beavis@epa.nsw.gov.au)
Cc: Driver, Andrew (Parramatta) AUS (Andrew.Driver@hanson.com.au); Neil Gross (neilg@wilkinsonmurray.com.au); romanh@wilkinsonmurray.com.au; EPA RSD Hunter Region Mailbox (hunter.region@epa.nsw.gov.au)
Subject: 264 - Calga Sand Quarry - Noise Impact Assessment
Attachments: 01127-AC_RH_eltr_Noise Assessment VerC Final.pdf

Greetings Alex,

As discussed, I have attached a copy of the updated Noise Impact Assessment prepared by Wilkinson Murray to assess potential noise impacts associated with the proposed installation of a crushing system at the Calga Sand Quarry.

The report has been updated to address the comments provided by the EPA following the public exhibition of the *Environmental Assessment* for the proposed modification.

Can you please review the attached document and pass it on to the relevant people in the EPA specialist noise team who reviewed the *Environmental Assessment* for the proposed modification. Can you please confirm an appropriate time for a teleconference that would be hosted between the EPA, myself and representatives of Hanson and Wilkinson Murray. RWC has a teleconference system that can be used to host the teleconference (details to be provided). It is intended that we would review the EPA comments and the updated report during the teleconference with the objective to confirm that the EPA is satisfied that the updated assessment adequately addresses the comments provided by the EPA on the proposed modification and that the assessment justifies approval of the proposed modification with respect to noise-related issues.

DPE has not provided Hanson with guidance regarding whether the Aboriginal heritage 'Women's Site' should be considered a sensitive receiver in accordance with the Industrial Noise Policy. However, the assessment has considered the noise levels at this location against the criteria for a place of worship (internal) of 40 dB(A). It is worth noting that the noise levels predicted at the Women's Site are not predicted to change from existing levels following installation of the crushing system and remain below the assessment criteria level.

Please feel free to contact me with any queries on the above. I look forward to confirming a date and time for the teleconference, hopefully during the next week.

Regards,
Nick

Nick Warren
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Christmas Office Closure

We take this opportunity to wish you a very Merry Christmas and advise that our offices will be closed from midday Friday 23 December 2016 and will reopen 8:15am Monday 9 January 2017

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From: Jackie Teal <Jackie.Teal@epa.nsw.gov.au>
Sent: Monday, 16 January, 2017 9:27 AM
To: Nicholas Warren
Subject: Calga Sand Quarry - Stage 3 Noise & Vibration Assessment of Proposed Crushing System
Attachments: 201701160858.pdf

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DOC16/625937-01, EF16/5974

Mr Nick R Warren
Environmental Consultant
RW Corkery & Co Pty Limited
nick@rwcorkery.com

Dear Mr Warren

Calga Sand Quarry - Stage 3 Noise & Vibration Assessment of Proposed Crushing System

Reference is made to your email to the NSW Environment Protection Authority (EPA) dated 9 December 2016, submitting a copy of the Wilkinson Murray report titled "Calga Sand Quarry - Stage 3 Noise & Vibration Assessment of Proposed Crushing System" (the **Report**). The Report was prepared in response to the EPA's comments on the 'Calga Sand Quarry - Modification 3 (DA 94-4-2004)', as detailed in the letter to the NSW Department of Planning dated 19 September 2016.

While the EPA can accept the modelling approach used, the EPA requires further detail on the modelled meteorological conditions to develop appropriate noise limit conditions.

Page 2 of the EPA's letter dated 19 September 2016, requested the proponent provide confirmation that the operations will comply with the proposed Noise Limits, at all receivers at all times, except for during specific weather conditions. This information is not provided in the Report.

The proponent must advise if, based on the modelled scenario, the activity will comply with the EPA's standard noise conditions, which state that the noise limits apply under all meteorological conditions except for:

- a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
- b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- c) Stability category G temperature inversion conditions.

Alternatively, the proponent must provide detail on the modelled meteorological conditions that correspond with the 10th percentile noise levels predicted.

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If you have any further questions please contact Alexander Beavis in our Newcastle office on (02) 4908 6804.

Yours sincerely,



ALEXANDER BEAVIS
Operations Officer – Hunter
Environment Protection Authority

Contact officer: ALEXANDER BEAVIS
(02) 4908 6804

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