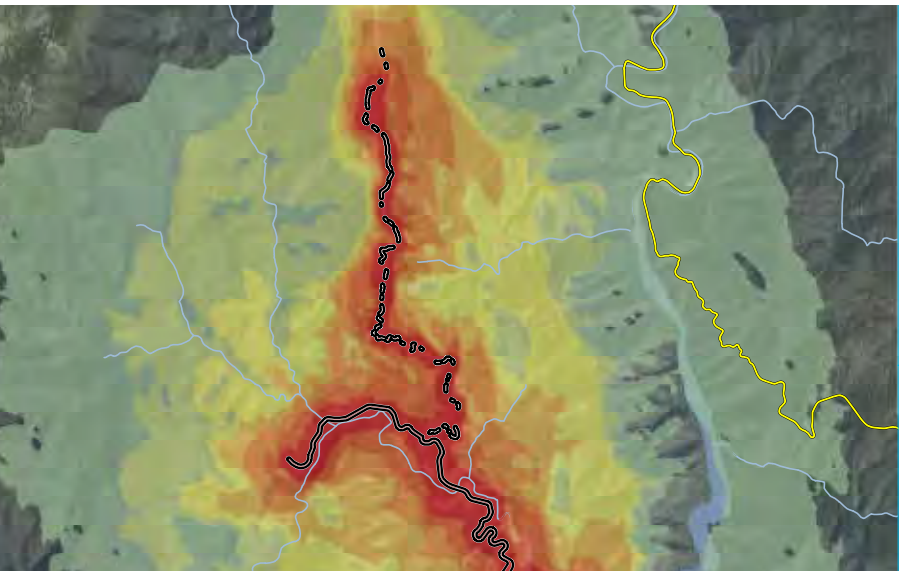
Luddenham Quarry

Noise Management Plan

Prepared for Luddenham Operations Pty Ltd
September 2021



EMM
creating opportunities

EMM
creating opportunities

Servicing projects throughout Australia and internationally

SYDNEY
Ground floor, 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE
Level 3, 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
Level 1, 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

ADELAIDE
Level 4, 74 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE
Ground floor, 188 Normanby Road
Southbank VIC 3006
T 03 9993 1900

PERTH
Level 9, Suite 2, 109 St Georges Terrace
Perth WA 6000

CANBERRA
Level 2, Suite 2.04
15 London Circuit
Canberra City ACT 2601

Luddenham Quarry

Noise management plan

Prepared for Luddenham Operations Pty Ltd
September 2021

EMM Sydney
Ground floor, 20 Chandos Street
St Leonards NSW 2065

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

Luddenham Quarry

Noise management plan

Report Number

J190749 R48

Client

Luddenham Operations Pty Ltd

Date

30 September 2021

Version

v4 Final

Prepared by

Carl Fokkema
Associate - Acoustics
30 September 2021

Approved by

Najah Ishac
Director - Acoustics
30 September 2021

Table of Contents

Tables

Figures

1 Introduction

Luddenham Quarry is located at 275 Adams Road, Luddenham NSW (Lot 3 in DP 623799, 'the site') within the Liverpool City Council municipality. The existing shale/clay quarry is approved by state significant development (SSD) consent DA 315-7-2003, issued by the NSW Minister for Planning under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The site is owned by CFT No 13 Pty Ltd, a member of the Coombes Property Group (CPG).

Luddenham Operations Pty Ltd will reactivate and operate the quarry in accordance with Modification 5 (MOD 5) of DA 315-7-2003 which was granted on 24 May 2021.

Development Consent 315-7-2003 (as modified) permits the production and transportation of up to 300,000 tonnes per annum (tpa) of clay and shale product up to 31 December 2024.

An existing *Noise Management Plan* was developed in March 2009 for the operation of the quarry (Golder 2009). This NMP replaces and updates the 2009 document, including changes to the monitoring for the reactivation described in Section 4.

The regional context of the site is shown in Figure 1.1 and approved site layout is provided in Figure 1.2.

1.1 Purpose and scope

Schedule 4, condition 14 of the approval (DA No. 315-7-2003) requires the preparation of noise management plan (NMP) for the site, including the following specific requirements:

14. Prior to recommencing quarrying operations under Modification 5, the Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:

(a) be prepared by a suitably qualified and experienced person/s;

(b) be prepared in consultation with the EPA;

(c) describe the measures to be implemented to ensure:

(i) compliance with the noise criteria and operating conditions in this consent;

(ii) best practice management is being employed;

(iii) noise impacts of the development are minimised during noise-enhancing meteorological conditions when the noise criteria in this consent do not apply (see NPfI);

(d) describe the noise management system in detail; and

(e) include a monitoring program that:

(i) is capable of evaluating the performance of the development;

(ii) monitors noise at the nearest and/or most affected residences;

(iii) adequately supports the noise management system;

(iv) includes a protocol for distinguishing noise emissions of the development from any neighbouring developments; and

(v) includes a protocol for identifying any noise-related exceedance, incident or non-compliance and for notifying the Department and relevant stakeholders of any such event.

The NMP has been prepared to provide a description of the measures to be implemented by Luddenham Operations to mitigate noise impacts and detail noise monitoring requirements associated with operations. The purpose of the NMP is to:

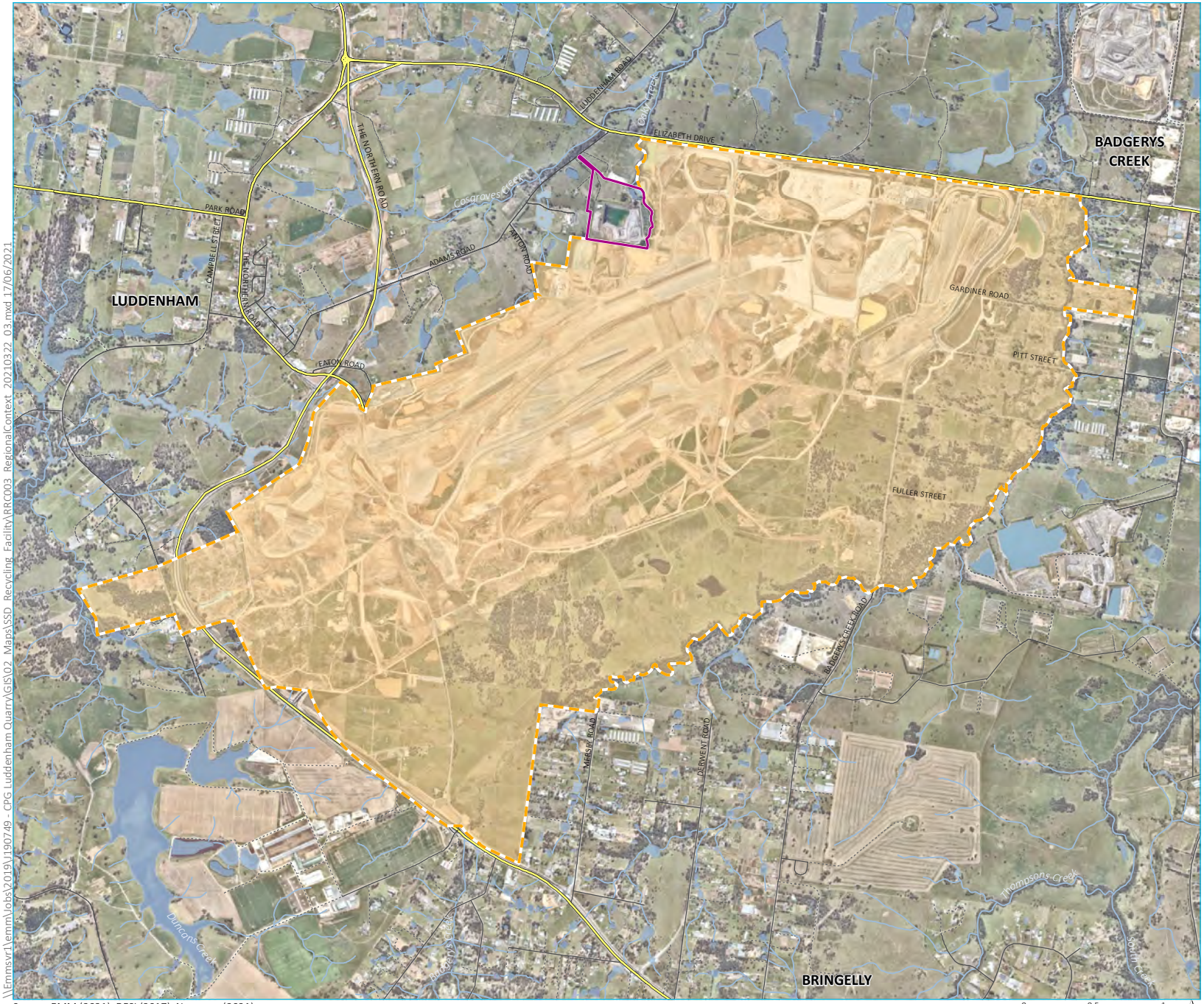
- provide Luddenham Quarry employees and contractors with a description of their responsibilities regarding noise management;
- address the relevant conditions/requirements in the Consent and other guidelines relevant to this document;
- describe the measures to be implemented to manage and monitor noise emissions from the operations against relevant regulatory criteria;
- provide a mechanism for assessing noise monitoring results against the relevant noise impact assessment criteria;
- provide a mechanism for assessing the effectiveness of the noise monitoring program; and
- provide mechanisms for the establishment of best practice with respect to minimising noise emissions/impacts.

This NMP forms part of the Environmental Management Strategy (EMS) (EMM 2021), the overarching document guiding environmental management and performance at Luddenham Quarry. The EMS provides a strategic framework for environmental management at Luddenham Quarry and commits the site to implement all Environmental Management Strategies, Plans, Programs and Protocols required. Luddenham Operations, in accordance with Schedule 6, Condition 11, will implement all strategies, plans and programs required under the development consent as approved by the Planning Secretary.

This NMP has been prepared by Carl Fokkema, Associate Acoustic Consultant with EMM Consulting Pty Limited. Carl has over 20 years' experience in acoustic consulting, a Bachelor of Science (Environmental Science) and is a Member of the Australian Acoustical Society.

1.2 Consultation

The draft NMP was sent to the NSW Environmental Protection Authority (EPA) for review and comment. The EPA responded that the EPA's role is to set environmental objectives for environmental management and not to be directly involved in the development of strategies to achieve those objectives and accordingly noted that they would not be providing comments on the draft NMP. This correspondence is contained in Appendix A.



KEY

- Subject property
- Western Sydney International (Nancy-Bird Walton) Airport
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line

Source: EMM (2021); DFSI (2017); Nearmap (2021)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

\\Emmsvr1\emm\Jobs\2019\190749 - CPG Luddenham Quarry\GIS\02 Maps\SSD Recycling Facility\RRC003 RegionalContext 20210322 03.mxd 17/06/2021

Regional context

Luddenham Quarry
Noise Management Plan
Figure 1.1

EMM
creating opportunities

KEY

- Study area
- Cadastral boundary

Proposed site modifications

- Approved extraction footprint
- Existing noise bunds
- Existing stockpiling area
- Extended stockpiling area
- Internal road
- Site entry infrastructure (incl. offices, amenities, weighbridge)
- Equipment laydown area

\\Emmsvr1\emm\Jobs\2019\190749 - CPG Luddenham Quarry\GIS\02 Maps\Modification Reporting\MR004 ProposedModification 20210422 05.mxd 17/06/2021

Source: EMM (2021); DFSI (2017); GA (2011); Nearmap (2020)

0 50 100 m

GDA 1994 MGA Zone 56

N

Approved site layout

Luddenham Quarry
Noise Management Plan
Figure 1.2

EMM
creating opportunities

2 Noise assessment criteria

Noise assessment criteria for the site are stipulated in Schedule 4, condition 12 of the consent for the quarrying and related activities associated with Luddenham Quarry. The noise assessment criteria are specified for the day period at locations which are considered to be representative of residences potentially most exposed to the site noise.

2.1 Noise monitoring locations

Schedule 4, condition 12 of the Consent and EPL 21562 nominates noise monitoring locations for Luddenham Quarry which are reproduced in Table 2.1 and shown in Figure 3.1.

Table 2.1 Monitoring locations

EPA Identification No.	Type of monitoring point	Location description
R1	Residential	2161–2177 Elizabeth Drive, Luddenham
R2	Residential	2111–2141 Elizabeth Drive, Luddenham
R3	Residential	285 Adams Road, Luddenham
R4	Residential	5 Anton Road, Luddenham
R5	Residential	185 Adams Road, Luddenham
R6	Residential	225 Adams Road, Luddenham
R7	Residential	161 Adams Road, Luddenham
R8	Residential	2510–2550 Elizabeth Drive, Luddenham

2.2 Operational noise criteria

In accordance with Schedule 3, condition 6 and EPL 21562 the hours of operation are limited to between 7.00am and 6.00pm Monday to Friday. The Applicant must ensure that no haulage vehicles enter or leave the site between 6.00pm and 7.00am Monday to Friday, and on public holidays. Maintenance activities will be conducted between 7.00am and 6.00pm Monday to Friday or 7.00am and 1.00pm on Saturday. No other work is to be undertaken on Saturday, Sunday or public holidays.

Except for the carrying out of construction works, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 2.2 at any residence on privately-owned land.

Table 2.2 Noise limits - Day

Assessment location	Location description	Noise level dB $L_{Aeq,15min}$
R1	2161–2177 Elizabeth Drive, Luddenham	41
R2	2111–2141 Elizabeth Drive, Luddenham	43
R3	285 Adams Road, Luddenham	53
R4	5 Anton Road, Luddenham	46
R5	185 Adams Road, Luddenham	45

Table 2.2 Noise limits - Day

Assessment location	Location description	Noise level dB $L_{Aeq,15min}$
R6	225 Adams Road, Luddenham	52
R7	161 Adams Road, Luddenham	41
R8	2510–2550 Elizabeth Drive, Luddenham	41

Day means the period between 7 am-6 pm Monday to Saturday and 8 am-6 pm Sundays and Public Holidays.

Noise generated by the development must be monitored and measured in accordance with the relevant procedures and modifications (including certain meteorological conditions) of the NPfI.

The noise criteria in Table 2.2 do not apply if Luddenham Operations has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria and the Applicant has advised the Department in writing of the terms of such agreements. Luddenham Operations currently does not have any agreements in place with the owner/s of the assessment locations outlined in Table 2.2.

2.3 Additional Mitigation Upon Request

Schedule 4, conditions 12A and 12B provide a mechanism for the provision of additional noise mitigation measures at identified residences, specifically:

- R3 – 285 Adams Road, Luddenham; and
- R6 – 225 Adams Road, Luddenham

Upon receiving a written request from the owner of any land listed above, the Applicant must implement additional noise mitigation measures at the residence in consultation with the landowner. Letters were sent to the owners of these properties on 23 June 2021 informing them that they are entitled to request noise attenuation measures.

These measures must be feasible and reasonable, consistent with the measures outlined in the *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments* (2018), proportionate to the level of predicted impacts and directed towards reducing the noise impacts from the development.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

3 Noise Management System

3.1 Operation

This section outlines the noise management system and associated management measures Luddenham Operations will implement to meet specific performance measures and criteria established under the Development Consent.

The site shall be operated in accordance with proposed plans, configuration, best practice management and assumptions presented in MOD5 NVIA (EMM July 2020) including:

- hours of operation;
- specification of fixed and mobile plant and equipment;
- audits of site plant and equipment to ensure they are operating in accordance with the assumptions of the NVIA (EMM 2020) and ensure best practice management;
- maintaining of existing noise bunds; and
- traffic movements in accordance with the assumptions presented.

In addition, Luddenham Operations will ensure best practice management is being employed through the implementation of all reasonable and feasible measures to minimise noise impacts of the development on surrounding rural residential receivers.

3.1.1 Operational Noise Management Measures

All reasonable and feasible operational noise management measures will be implemented including:

- regular reinforcement via site inductions and toolbox talks of the need to minimise noise;
- during site inductions for all operators (eg truck drivers and mobile plant operators), identify the closest and potentially most affected noise sensitive receivers and present the applicable noise criteria for the site;
- encourage general environmental awareness of employees and contractors;
- avoiding the use of portable radios or other methods of site communication that may unnecessarily impact on nearby rural residents;
- carrying out site activities in a competent manner (including processing, handling, stockpiling and dispatch of materials);
- avoiding dropping materials from height as far as practicable;
- avoiding metal-to-metal contact on equipment as far as practicable;
- loading of quarry product for dispatch will occur as near as possible to the western noise bund;
- product stockpiles will also be used for noise screening purposes as appropriate;
- enforcing a speed limit of 20 km/hr on unsealed internal roads and 40 km/hr on the sealed access road;

- minimising the need for vehicles to reverse on site;
- providing site contact details at the site entrance and on the Luddenham Quarry website;
- installing a basic weather station on the site with real time monitoring available in site office to assist in managing site noise impacts during noise enhancing conditions;
- crushing activities will occur as far as practicable to the south and east of product stockpiles or within the quarry pit; and
- a noise complaints management system will be implemented to handle complaints promptly (refer Section 6.8).

3.1.2 Hours of operation

In accordance with Schedule 3, condition 6 and EPL 21562 the hours of operation are limited to between 7.00am and 6.00pm Monday to Friday. Luddenham Operations will ensure that no haulage vehicles enter or leave the site between 6.00pm and 7.00am Monday to Friday, and on public holidays. Maintenance activities will be conducted between6.00am and 6.00pm Monday to Friday and 7.00am and 1.00pm on Saturday. No other work is to be undertaken on Saturday, Sunday or public holidays.

3.1.3 Plant and equipment

The following reasonable and feasible management measures will be implemented on all plant and equipment:

- all plant and equipment used onsite will be properly maintained and serviced to avoid any deterioration that could lead to increased sound power levels (SWLs) of the equipment;
- all plant and equipment will be operated in a proper and efficient manner;
- plant and equipment will be turned off when not in use (ie no idling);
- where practicable, the crusher will be positioned behind temporary stockpiles or within the pit; and
- all plant and equipment used on site will be selected to minimise noise where reasonable and feasible and will be consistent with the equipment SWLs assumed in the MOD 5 NVIA.

3.1.4 Product transport

The following measures will be implemented at Luddenham Quarry to manage potential noise impacts from the haulage of quarry product. These measures are in addition to those outlined in the Road Transport Protocol.

- truck drivers will be instructed to maintain best operational practices at all times and made aware of potential adverse noise impacts on the local community;
- all drivers accessing the site will be advised of the following requirements as part of the site induction:
  - operate vehicle to minimise noise emissions;
  - limit extended periods of engine idling including turning off engine during loading; and
  - limit engine revving, exhaust brakes and heavy braking when entering and leaving and whilst on site.

- ensure the road haulage fleet is regularly serviced and maintained.

3.1.5 Noise bunds

As required under the development consent, two noise bunds have been constructed by the previous quarry operator, one to the north of the extraction and stockpile area and one to the west of the extraction and stockpile area. These noise bunds will be maintained for the operational life of the quarry. This will include maintenance of the vegetative cover (pasture grass) on the noise bunds carried out by the previous quarry operator in accordance with Schedule 4 Condition 34(e) of the development consent (refer Section 4.3 of the Biodiversity Management Plan).

3.1.6 Noise enhancing meteorological conditions

Adverse meteorological conditions such as temperature inversion conditions and high winds can increase noise levels from the quarry. Temperature inversions occur during the night time period and therefore are not expected to affect operations onsite. The MOD 5 NVIA identified wind is a feature of the area and as such wind was incorporated into the noise modelling.

Notwithstanding, the following reasonable and feasible management measures will be implemented to address potential noise-enhancing meteorological conditions:

- the site environmental representative or site supervisor will regularly monitor the real-time data from the onsite meteorological station to identify direction and speed of winds and hence the potential for noise-enhancing meteorological conditions;
- if noise-enhancing conditions are present, the site supervisor or environmental site representative will assess the potential for these conditions to unduly impact upon sensitive receptors with consideration of activities and location of activities onsite;
- if required supplementary reasonable and feasible measures will be implemented as appropriate including:
    - use of a handheld noise meter to verify noise levels at the subject property boundary;
    - modifying, limiting or relocating of site activities for the duration of noise-enhancing meteorological conditions; and
    - temporary restriction and/or cessation of operations until noise-enhancing meteorological conditions have eased.

3.1.7 Best practice management

Luddenham Operations will implement noise mitigation measures in line with industry best practice quarry noise management where reasonable and feasible to do so.

Noise management practices will be reviewed annually to ensure current practices align with contemporary industry best practice. If warranted, this noise management plan will be updated to include additional practices and their implementation monitored for effectiveness. Luddenham Operations will maintain awareness of new technologies for noise mitigation through participation in relevant industry groups.

3.2 Construction

3.2.1 General

The EPA's NSW ICNG requires that construction noise levels are assessed against NMLs.

Noise levels above NMLs have been predicted for residential assessment locations. It is not uncommon for construction projects to exceed NMLs. For this reason, they are not considered as noise criteria, but as a trigger for all feasible and reasonable noise mitigation and management to be considered, once exceeded.

There is limited opportunity due to proximity of residential assessment locations, site location and local topography to provide significant noise mitigation. Duration of the construction works are short (<4 weeks) and during standard day hours only. Management measures that could be implemented on site are provided in the following sections.

3.2.2 Work practices

Best practice management work methods include:

- regular reinforcement (such as at toolbox talks) of the need to minimise noise and vibration;
- review and implementation of feasible and reasonable mitigation measures that reduce construction noise levels;
- avoiding the use of portable radios, public address systems or other methods of site communication that may unnecessarily impact upon nearby residents;
- develop routes for the delivery of materials and parking of vehicles to minimise noise;
- where possible, avoid the use of equipment that generates impulsive noise; and
- notify residents prior to the commencement of intensive works.

3.2.3 Plant and equipment

Additional best practice measures for plant and equipment include:

- where possible, choose quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks;
- operate plant and equipment in the quietest and most efficient manner; and
- regularly inspect and maintain plant and equipment to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively.

3.2.4 Quantifying noise reductions

Approximate noise reductions provided by some of these measures are provided in Table 3.1.

Table 3.1 Relative effectiveness of various forms of noise control

Noise control	Nominal noise reduction possible, in total A-weighted sound pressure level, dB
Increase source to receiver distance[1]	approximately 6 dB for each doubling of distance
Reduce equipment operating times or turn off idling machinery[2]	approximately 3 dB per halving of operating time
Operating training on quiet operation[2]	Up to 3 to 5 dB
Screening (eg noise barrier)[1]	normally 5 dB to 10 dB, maximum 15 dB
Enclosure (eg shed/building)[1]	normally 15 dB to 25 dB, maximum 50 dB
Silencing (eg exhaust mufflers) [1]	normally 5 dB to 10 dB, maximum 20 dB

1. Sourced from AS2436-2010
2. Based on EMM's measurement experience at construction and mining sites

KEY

- Study area
- Cadastral boundary
- Noise monitoring locations

Assessment location

- Active recreation
- Commercial

\\Emmsvr1\emm\Jobs\2019\I190749 - CPG Luddenham Quarry\GIS\02 Maps\Modification Reporting\Noise Management Plan\NMP001 AssessmentLocations 20210525 01.mxd 17/06/2021

Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2020)

0 100 200 m

GDA 1994 MGA Zone 56

N

Noise monitoring locations

Luddenham Quarry
Noise Management Plan
Figure 2.1

EMM
creating opportunities

4 Noise monitoring

The monitoring program is designed to ensure that noise is measured at representative locations in the vicinity of the Luddenham Quarry site. Data from the monitoring program will be used to determine the noise contribution of Luddenham Quarry operations at the surrounding receivers and the compliance status of the quarrying operations in relation to the relevant conditions (Table 2.2).

The noise monitoring program will support the noise management system. The site supervisor and environmental site representative will regularly review monitoring results in the context of site operations to proactively schedule site activities to proactively manage noise emissions from operations.

4.1 Monitoring Standards

Noise monitoring will be undertaken in accordance with the relevant Australian Standards and EPA guidelines including:

- AS 1055.1-1997 Acoustics - Description and measurement of environmental noise - General procedures;
- AS IEC 61672.1-2004 Electroacoustics - Sound level meters – Specifications; and
- NSW EPA Noise Policy for Industry (EPA 2017).

All acoustic instrumentation used for monitoring under the noise monitoring program will have current NATA or manufacturer calibration certificates and be field calibrated.

4.2 Noise monitoring program

The operator attended noise monitoring is used to quantify and describe the acoustic environment at each monitoring location at the time of monitoring. The results are compared with the noise criteria defined in the Consent and Table 2.2 to assess compliance. The attended noise monitoring program will be used to:

- identify the noise sources contributing to the ambient noise environment wherever possible;
- estimate the contribution from quarry noise sources from the total measured noise levels;
- determine whether a modifying factor is be applied to the contributing quarry noise levels (in accordance with the NPfI (EPA 2017)); and
- gain an understanding of the effects of meteorological conditions on the propagation of the noise from Luddenham Quarry to the monitoring location.

Luddenham Quarry's NMP proposes bi-annual attended noise monitoring in accordance with EPL 21562 which must include, as a minimum, two 15-minute measurement at each of the eight attended noise monitoring locations on two consecutive days for day operations (7am to 6pm Monday to Friday, and as relevant to operations at the time). Monitoring on the second day would allow any anomalous measures from the first day to be investigated and corrected.

For each 15 minute attended noise monitoring period, the following information will be recorded:

- name of monitoring personnel;

- monitoring location;
- dates and times that monitoring began and ended at each location;
- height of the microphone above the ground and, if relevant, distances to building facades or property boundaries (including GPS coordinates of monitoring position);
- quantitative meteorological data such as wind speed (including the height above ground at which the measurement was taken), wind direction, humidity and sigma theta data (Schedule 4, condition 20);
- qualitative meteorological information such as cloud cover, fog or rainfall;
- instrument type and field calibration details before and after the monitoring period;
- statistical and other noise level descriptors over the 15-minute interval including L_{Amax}, L_{A1}, L_{A50}, L_{A90}, L_{Amin} and L_{Aeq}, using 'fast' time response;
- notes that identify the noise source that contribute to the overall noise environment or for periods of time when a specific noise source is audible presented on a run-chart of the recorded noise levels;
- an estimate of the noise contribution from operations from Luddenham Quarry or from other identifiable noise sources;
- measurements in one-third octave bands from 10 Hz to 8 kHz inclusive (or a broader range of bands) for the 15-minute interval to assess if any of the noise sources exhibit tonal characteristics that require modifying factors to be applied;
- measurement of C-weighted and A-weighted level to assess low frequency noise in accordance with Fact Sheet C of the NPfI;
- data suitable for assessing the relative contribution of quarry-generated noise to the overall noise being measured (eg by using a low-pass filter with a suitable cut-off third-octave band centre frequency);
- utilise isolated assessment locations, midfield measurement locations and/or nearfield measurements to determine site plant and equipment sound power levels where necessary to assist in determining noise contribution;
- notes that identify the noise source that contributed to the overall noise environment; and
- recommendations or comments where considered appropriate.

In accordance with the methodology outlined in Fact Sheet A of the NPfI (EPA 2017), if any of the data in a 15 minute period is affected by rain or wind speeds in excess of 5 m/s then, if possible, another entire 15 minute period of data unaffected by rain or excessive wind shall be undertaken. Forecast of weather conditions would be reviewed prior to deployment of monitoring to minimise the likelihood of monitoring during excess winds or rain.

Where access to a relevant monitoring point cannot be agreed with the landholder, the noise levels at that monitoring point will be determined based on an appropriate alternative monitoring location that is representative of the point that cannot be accessed, or will be calculated based on the noise levels measured at other points (whichever is more appropriate).

4.3 Instrumentation

All acoustic monitoring equipment shall meet the requirements *of AS IEC 61672.1-2004 Electroacoustics - Sound level meters - Specifications* and carry current NATA or manufacturer calibration certificates. Sound level meters or analysers used must be calibrated in the field before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dB.

4.4 Meteorological parameters

There are two existing automatic weather stations (AWS) in close proximity to the site, both of which can be used to characterise and describe the prevailing meteorology of the local area, as follows:

- Bureau of Meteorology (BoM) AWS at Badgerys Creek is located approximately 2.4 km south of the site; and
- Department of Planning, Industry and Environment (DPIE) Air Quality Monitoring Station (AQMS) at Bringelly is located approximately 6 km south-east of the site.

In accordance with Condition 20 (Schedule 4) both sites comply with the requirements in the Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales (DEC 2007) and provide measurements of meteorological conditions in accordance with the NSW Noise Policy for Industry (NPfI)[1].

A summary of the parameters measured and reported at the sites is provided in Table 4.1.

Table 4.1 Meteorological parameters measured in the vicinity of the development

Parameter	Measured or reported at
Wind speed and direction	BoM Badgerys Creek and DPIE Bringelly
Sigma theta (standard deviation of wind direction)	BoM Badgerys Creek and DPIE Bringelly
Air temperature (2m)	BoM Badgerys Creek and DPIE Bringelly
Relative humidity	BoM Badgerys Creek and DPIE Bringelly
Atmospheric pressure	BoM Badgerys Creek
Solar radiation	DPIE Bringelly

Data from both sites will be collected on a monthly basis. In addition, a basic onsite weather station (not compliant with Australian Standard) with a real-time readout in the site office will be installed on site. This will be used to inform site operations including modifying site activities during adverse weather conditions.

All noise measurements shall be accompanied by both qualitative description (including cloud cover) and quantitative measurements of prevailing local weather conditions throughout the survey period.

Assessment of the meteorological conditions during the noise surveys will be made using the following parameters from a site operated or nearby Bureau of Meteorology (Badgerys Creek) weather station as required under Schedule 4, condition 20:

- mean wind speed;

[1] Estimates of noise enhancing conditions (stability class or significance of temperature inversions) can be made using existing data for the area, based on measurements of sigma theta and solar radiation.

- mean wind direction; and
- aggregate rainfall.

Noise limits apply under Stability Categories A, B, C and D with wind speeds up to and including 3 m/s at 10 m above ground level. For alternate meteorological conditions not referred to above, the applicable noise limits are the noise limits in Table 2.2 plus 5 dB. A basic weather station would be installed on the site with real time monitoring available in site office to assist in managing site noise impacts during noise enhancing conditions.

4.5 Protocol to distinguish noise emissions of the development from neighbouring developments

The following protocol will be followed during monitoring activities to distinguish noise emissions from the quarry from neighbouring developments such as the construction of the WSA and road network upgrades:

- site inspection prior to monitoring to determine what is operating and 'character' of site noise; and
- aural observations to determine offsite noise sources and direction of noise being received.

If noise levels at neighbouring developments are suspected of exceeding the quarry's noise criteria, the protocol will be expanded to include:

- observation of response of analyser (where applicable) to audible sounds and /or via post analysis (eg low pass filtering);
- if warranted, additional midfield audits will be carried out; and
- band pass filters will be used as required for dominant frequencies to determine noise contribution.

4.6 Data analysis

The $L_{Aeq\ (15minute)}$ noise level contributions from all quarrying operations as well as the overall ambient noise levels together with the weather and quarry operating conditions shall be reported.

The contributed noise emissions from quarrying operations shall be evaluated and assessed against the noise level criteria given in Table 2.2. Compliance will be determined by:

- post analysis of audio recordings;
- direct measurement against the Consent criteria - $L_{Aeq(15minute)}$;
- operator estimated $L_{Aeq(15minute)}$ contribution;
- by calculation from near field measurements and extrapolating to assessment locations consistent with the NPfI;
- by measurement at a representative location; or
- a combination of any or all the above methods as approved by the EPA or in accordance with the NPfI.

4.7 Noise exceedance protocol

In the event the noise monitoring records an exceedance of the operational noise criteria the following protocol will be implemented:

- confirmation through the protocol to distinguish site noise emissions from neighbouring developments that the exceedances are associated with site activities;
- review of onsite weather station to confirm suitable meteorological conditions;
- notification of the site supervisor who is to review and modify operations within 30 minutes of receiving notification from noise consultant;
- noise consultant will remonitor noise levels and advise site supervisor;
- process will be repeated until measured noise is below criteria; and
- reporting of non-compliance will be carried out in accordance with the development consent (refer Section 6.6).

5 Responsibilities

Table 5.1 provides the quarry's employees and contractors with a description of their responsibilities regarding noise management.

Table 5.1 Employee and contractor responsibilities

Person	Responsibilities
Employees	Responsible for: - Observing any noise control instructions and procedures that apply to their work or operations; - Taking action to minimise or prevent noise incidents; and - Reporting noise incidents where apparent.
Site supervisor	Responsible for: - Reviewing operational conditions daily, including forecast conditions; - Identifying, reducing and minimise excessive noise emissions; - Monitoring operations and maintenance work to ensure noise emissions are maintained within approved levels; - Reviewing operations daily and implementing strategies to reduce noise emissions from the operations; - Initiating action to mitigate against potential noise incidents; - Identifying, reporting and making a record of noise incidents; and - Implementing corrective actions in response to noise incidents, such as modifying or stopping site activities.
Environmental site representative	Responsible for: - Ensuring staff are trained with respect to noise awareness, responsibilities, instructions and procedures; - Ensuring operations comply with the conditions of Development Approvals, Environmental Protection Licence and relevant legislation; - Ensuring periodic noise monitoring is carried out. - Ensuring all noise incidents are investigated; - Ensuring that an appropriate plan is developed and implemented if noise limits are found to have been exceeded. - Reviewing noise complaints received to determine if particular noise issues/trends are being identified; and - Recognising and responding to community concerns.
Operations Manager	Responsible for: - Ensuring all personnel are aware of DA, EPL and other regulatory requirements relating to noise. - Implementing site environmental policy; - Ensuring site environment performance objectives and targets are established, monitored and achieved; - Communicating the importance of this NMP to operational personnel and meeting the statutory and regulatory requirements; - Ensuring that material environmental incidents are immediately reported to relevant Government Authorities as soon as practical and no longer than 7 days in accordance with Schedule 5 Condition 3 of consent; - Verifying the implementation of corrective and preventive actions; and - Approving any communications to external parties on noise generating activities before their release.

6 Reporting and review

6.1 Reporting requirements

Luddenham operations reporting requirements are provided in Table 6.1. In accordance with DA 315-7-2003, Section 66(6) of the POEO Act, requirements issued by the EPA, and approved Management plans, regular reporting of environmental performance of the quarry site will be made publicly available on the Luddenham operations website.

Table 6.1 Luddenham Quarry Reporting Requirements

Report Name	Due Date	Due To	Submission Method	Responsibility
Annual Review	End of September annually	DPIE Council Any other relevant government agencies Any other interested person upon request	In writing via the Major Projects Website	Operations Manager
Annual Return	Annually	EPA	EPA website	Operations Manager
Environmental incident	Upon becoming aware of the incident	DPIE Any other relevant government agencies	In writing via the Major Projects Website	Operations Manager
Environmental Incident Report	Within 7 days following a reportable incident	DPIE EPA Any other relevant government agencies	In writing via the Major Projects Website	Operations Manager
Environmental non-compliance	Within 7 days of becoming aware of the non-compliance	DPIE Any other relevant government agencies	In writing via the Major Projects Website	Operations Manager

6.2 Annual review

Luddenham Quarry prepares an annual review (previously named an annual environmental management report) that reviews the performance of operations, provides an overview of environmental management actions taken and summarises the monitoring results over the 12 month reporting period.

6.3 Auditing

In accordance with DA 315-7-2003, Schedule 6, Condition 7 and 8 an Independent Environmental Audit (IEA) of the development will be conducted every 3 years by a suitably qualified, experienced, and independent team of experts whose appointment has been endorsed by the Secretary. The audit team will include experts in rehabilitation and any other field specified by the Planning Secretary. The IEA will be conducted in consultation with relevant government agencies in order to:

- assess the environmental performance of the development, and whether it is complying with the relevant requirements in this consent and any relevant EPL (including any assessment, plan or program required under these approvals);

- review the adequacy of any approved strategy, plan or program required under these approvals; and
- recommend measures or actions to improve the environmental performance of the development, and/or any assessment, plan or program required under these approvals;

Within six weeks of the completion of the audit, or as otherwise agreed by the Planning Secretary, Luddenham operations will submit a copy of the audit report to the Planning Secretary, together with its response to any recommendations contained in the audit report.

6.4 Noise monitoring report

All routine monitoring results will be documented and reported to government in accordance with the consent.

Reports would consist of the following information:

- summary of all attended noise monitoring results;
- measured, calculated and/or operator estimated Luddenham Quarry $L_{Aeq(15minute)}$ contributed noise levels for each monitoring and Table 2.2 locations;
- statement of compliance/non-compliance; and
- details of any reported or known complaints made to the operators relating to noise and their state of resolution.

6.5 Review of results and reporting

The noise monitoring contractor undertaking the monitoring on behalf of Luddenham Quarry will provide the Luddenham Quarry HSE Advisor or Operations Manager with a monitoring summary outlining results of the survey within 24 hours.

The Quarry representative will review the monitoring report provided by the contractor to assess compliance with the criteria outlined in Condition 12 and reproduced in Table 2.2.

Where monitoring indicates that the site contributed noise level exceeds the noise impact assessment criteria, then additional monitoring will be undertaken (with the approval of the land owner) across the property to gain a full understanding of the extent of the impact.

The results of the noise monitoring will be made available on the Luddenham Clay Quarry website, in accordance with DA 315-7-2003, Schedule 4, Condition 14. All noise monitoring reports will be collated in the Annual Review and made publicly available on the Luddenham Clay Quarry website.

6.6 Reporting non-compliances

In the event of a potential exceedance of the relevant noise emission criteria, an investigation will be undertaken. Consideration will be given to the margin of exceedance and the source of emission, if it has been identified. The noise, weather and plant operating data shall be collated, reviewed and documented so that the matter can be investigated and appropriate actions developed and undertaken accordingly.

Additional noise measurement methods such as near field attended monitoring will be utilised to investigate noise emissions in relation to noise complaints, or to determine compliance with the Condition 12 where potential non-

compliances have been measured or are difficult to quantify from operator-attended noise measurements at the nominated residences.

Within seven days of becoming aware of a non-compliance, the Luddenham Operations will notify DPIE in writing to compliance@planning.nsw.gov.au or via the major projects website. The notification will identify the non-compliance, the reasons for non-compliance and what actions have and will be undertaken to address the non-compliance.

As soon as practicable and no longer than 7 days after obtaining monitoring results showing an exceedance of any noise limit outlined in Table 2.2, the Luddenham Operations must provide the details of the exceedance to any affected landowners and/or tenants.

6.7 Non-compliance response strategy

Response measures, which would be adopted following noise complaints or noise exceedances, would include:

- identifying the noise source that has caused the complaint/exceedance. This would be carried out in consultation with the complainant and by conducting a noise survey to quantify the level of disturbance;
- reassessing the Best Management Practice (BMP) mitigation techniques employed at the site to reduce the impact of the noise source in question; and
- if a management strategy is unsuccessful, re-evaluate the Best Available Technology Economically Achievable (BATEA) mitigation strategies being used.

Following the adoption of noise mitigation, a further noise survey would be conducted at the complainant's residence to ensure the success of the mitigation strategy.

6.8 Recording noise complaints

As per condition 14 of the Consent, Luddenham Quarry will keep a record of any noise complaint made to Luddenham Quarry or any employee or any agent of Luddenham Quarry in relation to noise from the quarry. Records must include details of the following:

- date and time of complaint;
- method by which complaint was made;
- personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- nature of the complaint;
- action taken by Luddenham Quarry and any follow up contact; and
- if no action was taken, the reason why no action was taken.

The details of any complaint will be logged in the complaints register, with investigation findings and actions noted. The record of a complaint will be kept for at least four years after the complaint was made. The record will be produced to any authorised officer of the EPA who asks to see them.

The complaints register will be available on the project website and will be updated monthly.

If the complaint is relevant to any of the conditions of the Approval, it will be handled as per the Approval conditions relevant to that environmental aspect.

The record of a complaint must be kept for at least five years after the complaint was made and made available to government upon request.

6.9 Records

All noise monitoring records will be maintained for at least five years.

This noise management plan; a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs; the complaints register and any Independent Environmental Audit; and further information as described in Section 9 of the EMS will be provided on the Luddenham Operations website as required by Schedule 6 condition 15. This information will be kept up-to-date, to the satisfaction of the Planning Secretary.

6.10 Review and improvement

This Noise Management Plan will be reviewed, and if necessary, revised to the satisfaction of the Secretary, in accordance with DA 315-7-2003, Schedule 6, Condition 9, ie within three months of:

a) the submission of an incident report under Schedule 6 condition 12;

b) the submission of an Annual Review under Schedule 6 condition 5;

c) the submission of an Independent Environmental Audit under condition Schedule 6 condition 7; or

d) the approval of any modification of the conditions of this consent (unless the conditions require otherwise).

This plan will be updated to the satisfaction of the Planning Secretary if necessary to improve the environmental performance of the development, cater for a modification or comply with a direction. The plan will be submitted to the Planning Secretary for approval within six weeks of the review.

The noise monitoring results will be reviewed regularly by the site supervisor and site environmental representative in the context of site operations to proactively schedule site activities to proactively manage noise emissions from operations. Noise monitoring results will also be reviewed annually as part of the site Environmental Review. Review of the management plan will also take place if monitoring records indicate that it is warranted or in the event of any significant change to noise quality management procedures at Luddenham Quarry.

In accordance with Schedule 6, Condition 10, if necessary, to either improve the environmental performance of the development, cater for a modification or comply with a direction, the NMP (as well as all strategies, plans and programs required under the development consent) will be revised, to the satisfaction of the Planning Secretary and submitted to the Planning Secretary for approval within six weeks of the review.

Any modifications to the NMP will be undertaken in consultation with the appropriate government agencies.

7 Access information

For the duration of the development Luddenham Operations will maintain a website and ensure the website keeps up-to-date information on the following:

- Environmental Impact Statement / Environmental Assessment and Modification reports;
- current statutory approvals for the development;
- approved strategies, plans and programs required under the conditions of the consent;
- a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;
- a complaints register, which is to be updated monthly;
- the annual reviews of the development (from the recommencement of quarrying under MOD 5);
- any independent environmental audit of the development, and response to the recommendations in any audit;
- any other matter required by the Secretary.

Luddenham Operations will provide regular reporting on the environmental performance of the development on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent. Information on the website will be kept up to date to the satisfaction of the Planning Secretary.

References

Australian Standard AS 1055-1997 - *Acoustics - Description and Measurement of Environmental Noise*.

Australian Standard AS IEC 61672.1-2004 *Electroacoustics - Sound level meters – Specifications*

DEC 2007, *Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales*. Department of Environment and Conservation.

EMM 2020, *Luddenham Quarry Modification 5 - Modification Report*

EMM 2021, *Luddenham Quarry Environmental Management System*

NSW Environment Protection Authority (EPA) 2017, *Noise Policy for Industry*

Appendix A

Consultation

Janet Krick

From: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Sent: Wednesday, 28 July 2021 2:33 PM
To: Janet Krick
Cc: Phil Towler
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Hi Janet,

The EPA's position on post approval management plans (including the NMP, AQMP and SWMP) is to encourage the development of such plans to ensure that proponents have determined how they will meet their statutory obligations and designated environmental objectives.

However, we do not approve or endorse these documents as our role is to set environmental objectives for environmental management and not to be directly involved in the development of strategies to achieve those objectives. Therefore we will not be providing comments on the NMP, AQMP and SWMP.

These documents are important for our decision making, such as with the licence application, and ensure compliance with s45 of the POEO Act and to support those decisions.

I expect to send a draft EPL to Luddenham Operations Pty Ltd by the end of the week.

Regards,

Kieran

From: Janet Krick <jkrick@emmconsulting.com.au>
Sent: Wednesday, 28 July 2021 7:58 AM
To: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Cc: Phil Towler <ptowler@emmconsulting.com.au>
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Good morning Kieran,

Following up on my email below – are you able to provide an update on when we may expect EPA's comments on the draft management plans and status of the EPL application?

Many thanks

Janet Krick
Associate Environmental Planner

T 02 4907 4811
M 0456 664 212
www.emmconsulting.com.au

From: Janet Krick
Sent: Wednesday, 14 July 2021 2:39 PM
To: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>