PACIFIC BLUE METAL

ABN: 45 050 224 250

Environmental Impact Statement

for the Extension of

Farrawell's Quarry South Kempsey

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED

August 2014

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ABN: 45 050 224 250

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for the Extension of

Farrawell's Quarry South Kempsey

Prepared for:

Pacific Blue Metal Pty Ltd
ABN: 45 050 224 250
Possum Brush Rd
POSSUM BRUSH NSW 2430

Telephone: (02) 6554 3206
Facsimile: (02) 6554 3250
Email: pacificbluemetal@bigpond.com

Prepared by:

R.W. Corkery & Co. Pty. Limited
Geological & Environmental Consultants
ABN: 31 002 033 712

Brooklyn Office:
1st Floor, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083

Telephone: (02) 9985 8511
Facsimile: (02) 6361 3622
Email: brooklyn@rwcorkery.com

Orange Office:
62 Hill Street
ORANGE NSW 2800

Telephone: (02) 6362 5411
Facsimile: (02) 6361 3622
Email: orange@rwcorkery.com

Brisbane Office:
Suite 5, Building 3
Pine Rivers Office Park
205 Leitchs Road
BRENDALE QLD 4500

Telephone: (07) 3205 5400
Facsimile: (02) 6361 3622
Email: brisbane@rwcorkery.com

Ref No. 882/04

August 2014

R. W. CORKERY & CO. PTY. LIMITED

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Author's Certification

for the submission of an Environmental Impact Statement prepared in accordance with the *Environmental Planning and Assessment Act 1979.*

(a) EIS prepared by:

name:	Robert W. Corkery
qualifications:	M.Appl.Sc, B.Appl.Sc(Hons)
address:	12 Dangar Road BROOKLYN NSW 2083

(b) Development application by:

applicant name:	Pacific Blue Metal Pty Ltd
applicant address:	Possum Brush Road POSSUM BRUSH NSW 2430

(c) Address/land details:

Land Description:	Lot 2 DP 1194582

(d) Project Outline:

The proposal involves the continued extraction of up to 500 000tpa of hard rock at the existing Farrawell's Quarry. The Proposal would extend extraction activities beyond the approved limit by approximately 8ha, extend the depth of extraction in the existing approved extraction area by up to 8m, and would extend the operational life of the quarry to 15 to 20 years. The quarry extension is located wholly within an approved industrial subdivision.

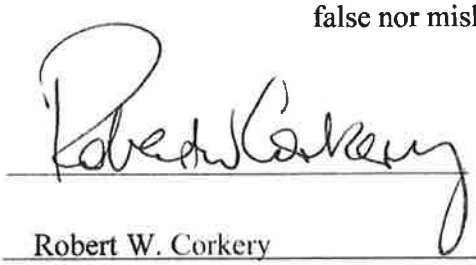
(e) Assessment of Environmental Impact:

The assessment of environmental impacts of this project includes the matters referred to in the Secretary's Environmental Assessment Requirements provided to the Applicant dated 13 May 2014 under Schedule 2, Part 2 of the *Environmental Planning and Assessment Regulation 2000.*

(f) Declaration:

I, Robert William Corkery, hereby declare that I have overseen the preparation of the contents of this document and to the best of my knowledge:

i) this EIS has been prepared in accordance with the requirements of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000;*
ii) the document contains all available information that is relevant to the environmental assessment of the proposed development; and
iii) that the information contained in the document is neither false nor misleading.

Signature: 

Name: Robert W. Corkery Date: 21 August 2014

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Executive Summary

INTRODUCTION

Farrawell's Quarry ("the quarry") is a hard rock quarry owned by Galban Pty Ltd (Galban) and operated by Pacific Blue Metal Pty Ltd (PBM) approximately 5km south of Kempsey (see **Figure A**). The quarry which commenced operations in August 2013 currently has an approved maximum rate of production of 500 000tpa and utilises drilling and blasting extraction and crushing and screening processing. The quarry currently supplies construction materials for the upgrade of the Pacific Highway north of Kempsey.

The quarry is located within an approved industrial subdivision which is yet to be developed with the exception of the construction of the Industrial Subdivision Access Road which provide access to the quarry (**Figure B**).

Since late 2013, it has been recognised that the road construction materials generated at the quarry are of high quality and that products of this quality would be beneficial for use on other sections of the upgraded Pacific Highway. Galban has agreed that PBM manages and obtains the additional approval for the extension of the quarry to provide these additional products.

This *Environmental Impact Statement* has been prepared by R.W. Corkery and Co Pty Limited, on behalf of PBM, to accompany an application to Kempsey Shire Council to extend the footprint of and slightly deepen Farrawell's Quarry.

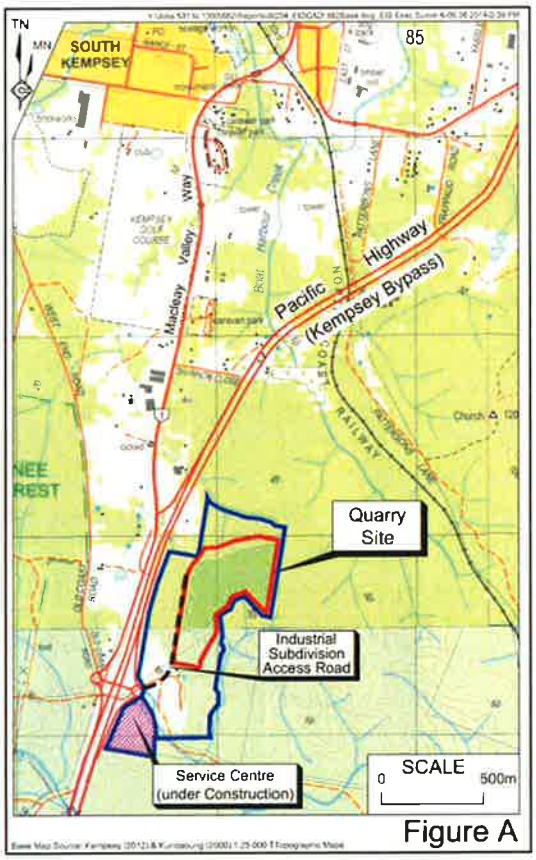

Figure A

OVERVIEW OF THE PROPOSAL

The key elements of the Proposal for which development consent is being sought are as follows.

i) Extend extraction activities beyond the approved limit of extraction (covering approximately 8ha) to the proposed limit of extraction (covering approximately 15ha) (**Figure B**).

ii) Extend the depth of extraction within the existing approved extraction area by up to 8m.

iii) Create a final landform conducive to the long term industrial subdivision.

iv) Extend the operational life of the quarry to 15 to 20 years.

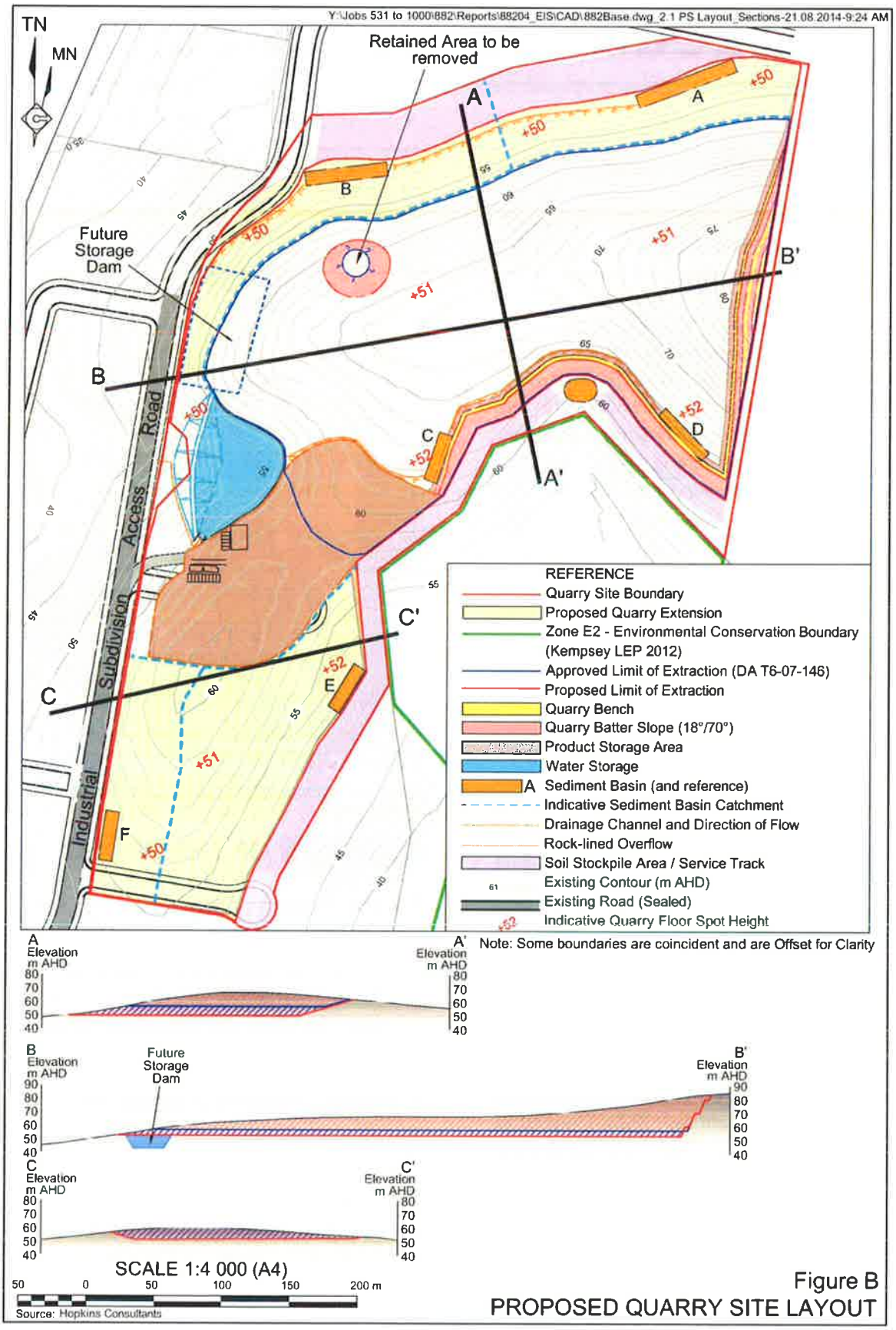

Figure B
PROPOSED QUARRY SITE LAYOUT

The proposed extension would not change the following aspects of the approved operations.

- Extraction or processing methods.
- Waste management.
- Infrastructure and services.
- Operational hours.
- Rehabilitation objectives and final land use.

The existing quarry currently despatches between 50 and 210 loads of quarry products per day generating 100 to 420 truck movements per day (i.e. one load generates two truck movements). The maximum number of daily truck loads despatched for highway upgrade projects would be approximately 250 (500 truck movements).

The quarry may also be used to supply local markets. The Applicant would ensure that, in order to satisfy the *Road Noise Policy*, truck movements for these local deliveries would initially be restricted to less than 7 loads (14 movements) per hour. The actual number of truck movements per hour would be reviewed on a project by project basis.

The extended quarry is wholly located within the approved industrial subdivision and has been designed with a final landform of a comparable elevation to the Industrial Subdivision Access Road for ease of access and so that the final landform, after extraction ceases, can be utilised for the proposed future industrial purposes.

KEY ENVIRONMENTAL ISSUES

The components and features of the existing environment on and around the Quarry Site have been studied in detail and the Proposal designed to avoid or minimise adverse impacts on that environment. Aspects considered have included the following.

- Environmental setting (topography, climate and land ownership and residences).
- Soil and water resources.
- Traffic and transportation.
- Air quality.
- Noise and vibration.
- Flora and fauna.
- Aboriginal heritage.
- Visibility.
- Socio-economic.

The key environmental issues, the proposed environmental safeguards and controls, and impacts of the Proposal include the following.

- All surface water runoff in contact with disturbed areas would continue to be contained within the Quarry Site and would be directed into sediment basins and/or ultimately the water storage dam within the footprint of the quarry. With the proposed measures in place, impacts on soil and water are expected to be minimal and manageable.
- The volume of product required to service the upgrade to the Pacific Highway will require transportation along the Pacific Highway regardless of its origin. Sourcing the product from the Farrawell's Quarry with its direct access to the highway would assist to minimise transportation of those materials on local roads and motorists.
- The Macleay Valley Way currently carries approximately 6 286 vehicles including 354 heavy vehicles each day and the road has until recently served as the Pacific Highway but now has substantially reduced numbers of vehicles with the opening of the Kempsey Bypass. On the days when

local projects are supplied with products from Farrawell's Quarry, the Proposal would result in an increase of approximately 1% of the existing number of vehicles and 17% of heavy vehicles. With the implementation of the Driver's Code of Conduct, traffic impacts on Macleay Valley Way supplying local projects are expected to be minimal and manageable.

- Air quality and noise modelling was undertaken for the four closest receptors and both determined no exceedances of NSW air quality or noise criteria are expected.
- As the Proposal is located within the approved industrial subdivision, it was determined no additional impact on flora or fauna would occur as a result of the extension.
- In 1988, an Aboriginal heritage site was identified within the existing quarry footprint. Extraction operations have proceeded around the location of the site leaving a 10m diameter buffer however for the extension proposed, the site would require removal. A further survey was undertaken during which it was not possible to relocate the Aboriginal heritage site. As such, it was determined that the site could not be "harmed" as defined by the *National Parks and Wildlife Act 1974* and an Aboriginal Heritage Impact Permit would not be required.
- The assessment of visual impacts determined there would be no line of sight between the Pacific Highway and the proposed Quarry operations, however, views of the activities within the southern part of the extended quarry would be visible from one residence to the west of the Pacific Highway. It was also noted that views from three other residences west of the Pacific Highway would be blocked by a substantial belt of native vegetation located within the industrial subdivision. While it is understood that the clearance of vegetation within the subdivision is already approved, clearance of this vegetation would be delayed as long as possible to maintain the visual screen. In addition, the actual extraction operations would be comparable with the approved earthworks involved with the cut and fill operation. It was determined that the proposed quarry extension is expected to have a minimal impact on the visibility for motorists travelling on the Pacific Highway and residents west of the highway.
- Regarding socio-economic impacts, the ongoing operation of the quarry in the manner proposed would provide greater long-term employment security for the existing workforce. It would also facilitate the ongoing construction in the local region as construction is currently the third largest source of employment. On a more local scale, the Proposal would assist to level the land for development of the already approved industrial subdivision, thereby making the construction of the industrial subdivision more cost effective. This in turn would facilitate development of the Industrial Estate which would bring more jobs to the Kempsey area.

In light of the assessments presented throughout the *Environmental Impact Statement*, it is concluded that the proposed continued operation and extension of the Farrawell's Quarry would be undertaken in a manner that would satisfy all relevant statutory goals and criteria, environmental objectives and reasonable community expectations.

Section 1

Introduction

PREAMBLE

This section introduces the proposed continued operation and extension of Farrawell's Quarry ("the Proposal"). The Proposal would extend extraction activities beyond the approved limit by approximately 8ha, extend the depth of extraction in the existing approved extraction area by up to 8m, and extend the operational life of the quarry to 15 to 20 years. This section reviews:

- *the format of the document;*
- *the Applicant and relevant background to the Proposal;*
- *the Quarry Site;*
- *the existing quarry development;*
- *consultation undertaken to inform stakeholders about the Proposal and to identify and prioritise issues for inclusion in the Environmental Impact Statement; and*
- *the team involved in the preparation of the Environmental Impact Statement and supporting documentation.*

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1.1 SCOPE

This *Environmental Impact Statement* (EIS) has been prepared by R.W. Corkery and Co Pty Limited (RWC), on behalf of Pacific Blue Metal Pty Ltd (the 'Applicant'), to accompany an application to Kempsey Shire Council ('Council') to extend the footprint of, and slightly deepen, the Farrawell's Quarry ('the quarry') located approximately 5km south of Kempsey (see **Figure 1.1**). The land on which the extended quarry is proposed is referred throughout this document as the "Quarry Site". For the purposes of this document, the extension and deepening of the quarry is referred to as "the Proposal".

It is proposed to increase the quarry's extraction area footprint by an additional 8ha and deepen the existing extraction area by up to 8m resulting in approximately 900 000m^3 of additional resource being available (or 2.25 million tonnes based upon a rock density of 2.5t/m^3). These two activities collectively form the Proposal being described and assessed in this document.

It is anticipated that the life of the quarry would be in the order of 15 to 20 years, if approved. No increase to the approved maximum rate of production of 500 000tpa is required.

The quarry is located within the footprint of an approved industrial subdivision for which a range of excavation works are already approved. The extraction activities would ultimately assist to create a final landform suited to the development of the subdivision. The coverage of environmental issues in this document is confined to those issues related to the extraction operation. Clearing of vegetation for example is already approved within the industrial subdivision. Reliance would be placed upon the continued use of the various infrastructure and services within the existing quarry and the access via the recently constructed Industrial Subdivision Access Road.

This document details the proposed ongoing extraction and processing operations, describes the existing environment within and surrounding the Quarry Site, and assesses the potential environmental impacts of the Proposal after a range of environmental safeguards have been adopted.

1.2 FORMAT OF THE STATEMENT

This EIS is set out in the following format, i.e. with seven sections and a set of appendices.

Section 1: introduces the Proposal, the Applicant (and Operator) of the quarry, outlines the background to the quarry and describes the existing approved activities within the Quarry Site. Government agency, stakeholder and surrounding landowner consultation is summarised and those issues of priority arising through the consultation identified. A summary of the investigations and personnel involved in the preparation of this document concludes this section.

Section 2: describes the proposed activities including extraction of the material, processing and stockpiling, product transportation, amenities, waste management and rehabilitation.

Section 3: outlines the planning context for the quarry and reviews the current approvals and licences, as well as outlining relevant legislative requirements and standards/ guidelines relating to the Proposal.

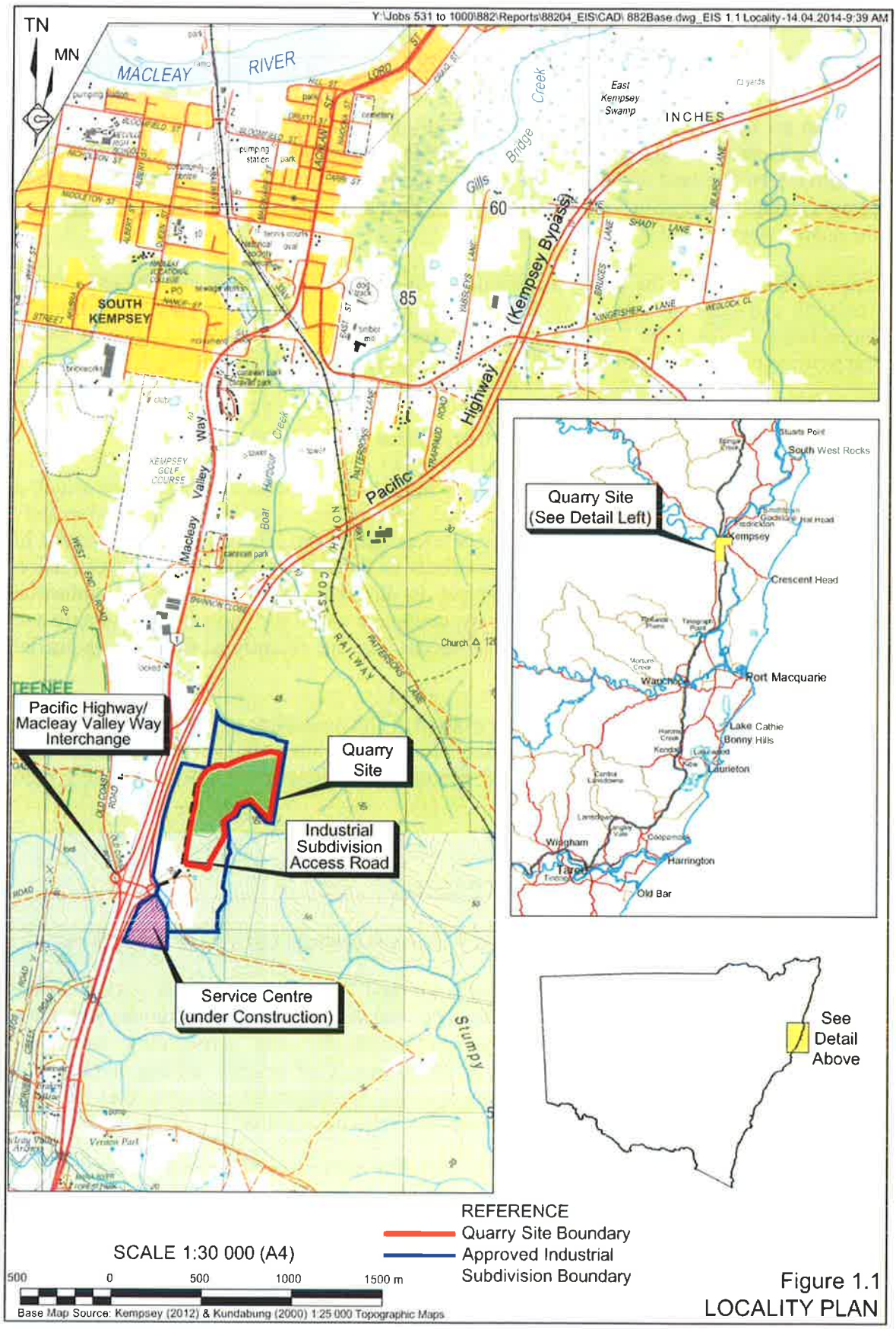

Figure 1.1
LOCALITY PLAN

Section 4: presents a description of features of the existing environment for key environmental aspects, together with the proposed safeguards and mitigation measures, an assessment of the potential environmental impacts and where relevant, outlines proposed monitoring.

Section 5: presents an evaluation and justification of the proposed extension in relation to the biophysical, economic and social considerations as well as sustainable development. The consequences of not proceeding with the proposed modification are also examined.

Section 6: presents a glossary of terms, acronyms and symbols.

Section 7: records the various documents referenced throughout this document.

Appendices: The following appendices are included with the EIS.

1. Development Application Form.
2. Secretary's Environmental Assessment Requirements and correspondence from consulted Government Agencies.
3. Development Consent DA T6-07-146 (Revision 06).
4. Driver's Code of Conduct.
5. Air Quality Report by ENVIRON Australia Pty Ltd.
6. Noise and Vibration Report by Spectrum Acoustics Pty Ltd.
7. Aboriginal Heritage Report by Archaeological Surveys and Reports Pty Ltd.

1.3 THE APPLICANT

The Applicant and Operator of the Farrawell's Quarry, Pacific Blue Metal Pty Ltd (PBM) has significant previous experience in developing and operating quarries including extraction, processing and product despatch activities within the mid-north coast of NSW, in particular at the Possum Brush and Failford Quarries in the Taree and Great Lakes Local Government Areas respectively.

1.4 BACKGROUND TO THE PROPOSAL

1.4.1 Industrial Subdivision Development

The quarry is located within an approved industrial subdivision that was originally granted to Galban Pty Ltd by Kempsey Shire Council (Development Consent DA T6-11-301). Galban was granted the construction certificate (CS-13-01) for the subdivision on 27 June 2013 which allowed the commencement of construction of the Industrial Subdivision Access Road and earthworks for the service centre. The approved industrial subdivision wholly encompasses both the existing approved and proposed quarry and is displayed on **Figure 1.2**. Access to the industrial subdivision from the Pacific Highway is provided at a grade separated interchange (see **Figure 1.2**). From this interchange, access is provided via a central access road (the

Industrial Subdivision Access Road) which services the quarry and would provide access to the industrial lots once the subdivision is completed. The interchange also provides access to a service centre which is currently under construction at the southern end of the industrial subdivision.

The industrial subdivision is yet to be developed with the exception of the construction of the Industrial Subdivision Access Road (to the extent shown on **Figure 1.2**) and the pre-construction work associated with the proposed service centre.

The extended quarry has been designed with a final landform of a comparable height to the Industrial Subdivision Access Road for ease of access and so that the final landform, after extraction ceases, can be utilised for the proposed future industrial purposes.

1.4.2 Existing Quarry Development

An EIS supporting the application for development consent for the existing quarry was compiled on behalf of the owner of the land, Galban Pty Ltd and submitted to Council in 2007. The EIS entitled *Proposed Extractive Industry – Gravel Quarry at Lot 100 and 104, DP 776239, Pacific Highway, South Kempsey*, is hereafter referred to as "GHD (2007)". Development Consent DA T6-07-146 was granted by Council in April 2007.

Since Development Consent DA T6-07-146 was originally granted, a total of six modifications have been approved by Council with the latest development consent, i.e. DA T6-07-146 (Revision 06), dated 13 August 2013 (**Appendix 3**) being the applicable development consent, permitting the extraction of a total of 590 000m^3 of material, comprising of 500 000m^3 (1.25 million tonnes) of road construction materials and 90 000m^3 of subsoil and topsoil material. The approved maximum extraction and processing rate is 500 000 tonnes per year. In July 2013, Galban Pty Ltd contracted PBM to undertake all extraction, processing and product despatch activities on its behalf at the quarry. In August 2013, PBM began initial site clearing and land preparation activities, including activities such as vegetation clearing, topsoil stripping and the construction of drainage structures, prior to the extraction of rock commencing in September 2013.

The approved activities within the existing quarry operating under Development Consent DA T6-07-146 (Revision 06) are as follows.

- Vegetation clearing, mulching and soil stockpiling.
- Ripping and pushing up weathered rock.
- Drilling and blasting competent rock.
- Loading and transportation of extracted rock for size reduction and sizing in mobile processing equipment.
- Construction of product stockpiles and loading/despatch of quarry products.
- Installation or adoption of all relevant environmental controls.
- Interim and final rehabilitation.

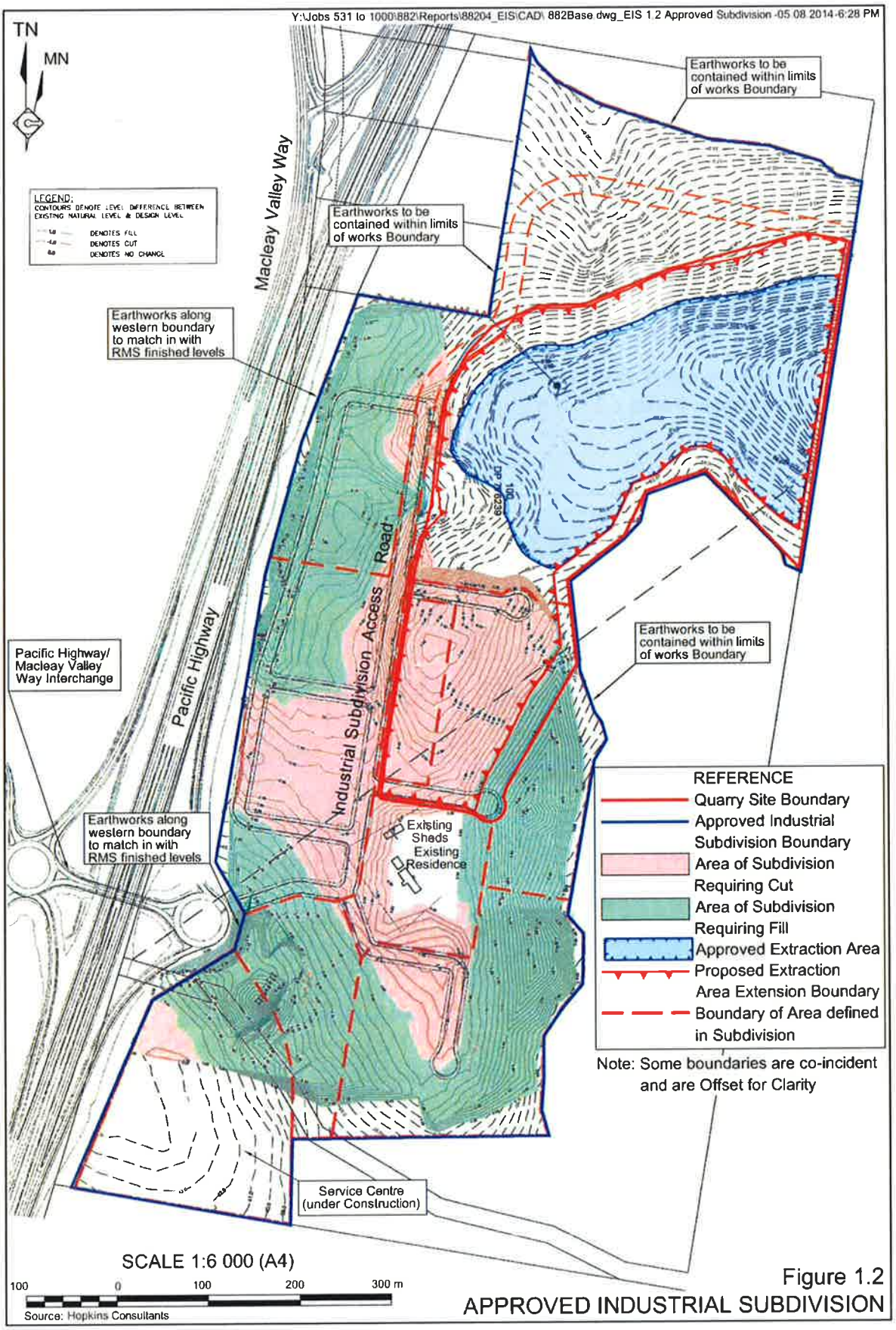

Figure 1.2
APPROVED INDUSTRIAL SUBDIVISION

Figure 1.3 displays the layout of the existing approved quarry. Extraction of the rock is undertaken by blasting after which excavators either feed the broken rock into the on-site mobile processing plant(s) or load the broken rock into off-road haul trucks for transportation a short distance to the plant(s). The processing typically generates a range of products that are relocated by off-road haul trucks to the product stockpile area near the quarry entrance. The various products are despatched from the quarry, as required, for the relevant section(s) of the Pacific Highway upgrade projects.

Since late 2013, it has been recognised that the road construction materials generated at the Farrawell's Quarry are of high quality and that products of this quality would be beneficial on other sections of the upgraded Pacific Highway. Galban Pty Ltd has agreed that PBM manages and obtains the additional approval for the extension of the quarry to provide these additional products.

Plate 1.1 displays a recent aerial photograph of the Quarry Site and its access to the Pacific Highway interchange. **Plates 1.2** to **1.5** display photographs of the existing quarry operations.

Base Photo Source: Google Earth (25 February 2014)

Plate 1.1

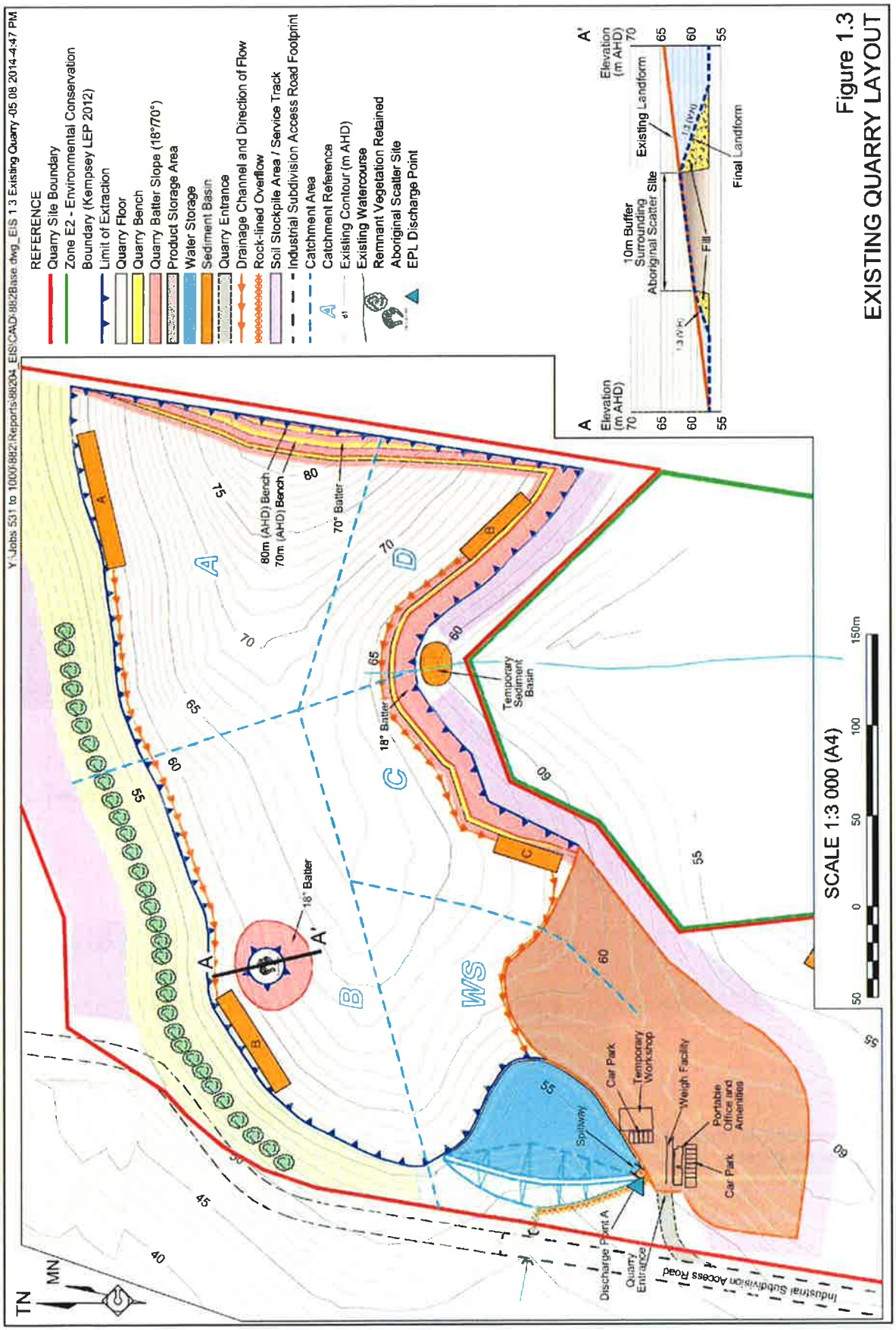

Figure 1.3
EXISTING QUARRY LAYOUT

Plate 1.2: Entrance to Industrial Subdivision from Grade-Separated Interchange
(Ref: E882F_001)

Plate 1.3: Excavator loading a Haul Truck within the Extraction Area
(Ref: E882F_037)

Plate 1.4: Crushing and Screening Activities
(Ref: E882F_023)

Plate 1.5: Sediment Basin D within the Extraction Area
(Ref: E882F_042)

1.4.3 The Quarry Site

The Quarry Site for this development application is located within Lot 2 DP 1194582, approximately 200m east of the Pacific Highway and 5km south of Kempsey. **Figure 1.4** displays the boundary of the Quarry Site.

The Quarry Site comprises a total area of approximately 18ha with access provided by the established quarry entrance from the Industrial Subdivision Access Road. The Quarry Site encompasses the western and southern side slopes of an elevated knoll on the eastern side of the property. Elevations within the Quarry Site are from approximately 84m AHD on the eastern knoll, to approximately 50m AHD on the northern and southern boundaries of the Quarry Site. Slopes within the northern section of the Quarry Site generally grade in a northwesterly direction and display gradients of between 5% to 15%. Slopes within the southern section of the Quarry Site head in a westerly or southwesterly direction and display gradients less than 10%. Drainage typically follows the slope direction within the Quarry Site.

1.5 CONSULTATION

1.5.1 Government Agencies

The *Request for the Secretary's Requirements* was submitted to the Department of Planning and Environment (DP&E) on 14 April 2014 with subsequent consultation undertaken with the following Council and government agencies regarding their requirements for the environmental impact assessment of the Proposal.

- Kempsey Shire Council (KSC).
- Environment Protection Authority (EPA).
- Office of Environment and Heritage (OEH).
- Roads and Maritime Services (RMS).
- NSW Office of Water (NOW).

Consultation was also undertaken with NOW in July/August 2013 regarding the requirement for a Controlled Activity Approval (see Section 3.2.3 for further detail). The NOW confirmed in correspondence on 12 August 2013 that it will not require a Controlled Activity Approval as the first order gully in question does not meet the definition of a watercourse under the *Water Management Act 2000* and therefore is not waterfront land.

1.5.2 Local Community

The Applicant established contact with the nearby residential occupants prior to the substantive commencement of operations at the existing quarry. Since then, the Applicant has continued to maintain periodic, open and honest communication with the surrounding landowners regarding the current operations.

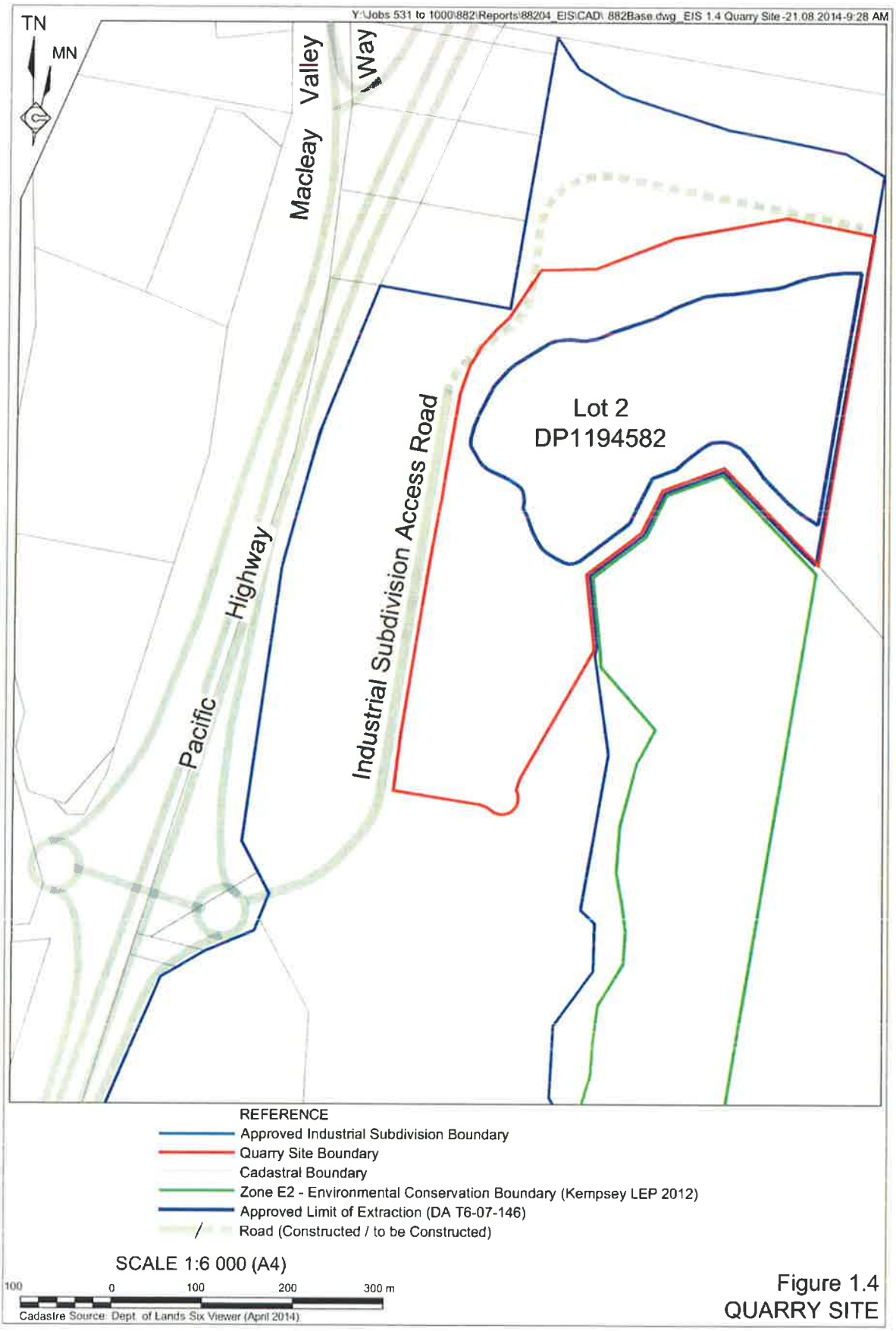

Figure 1.4
QUARRY SITE

The key issue raised during the consultation with the surrounding landowners which need to be addressed in the EIS is blasting and its effects.

Each of the closest landowners west of the Pacific Highway has been informed about the plans to extend the quarry within the footprint of the approved industrial subdivision.

1.6 MANAGEMENT OF INVESTIGATIONS

This document was prepared by Mr Rob Corkery, M.Appl.Sc., B.Sc (Hons), Principal of R.W. Corkery & Co Pty. Limited (RWC) with the assistance of Ms Christy Hill (B.Env Man. (Sus. Dev.)), Environmental Consultant with R W Corkery & Co Pty Limited.

Information regarding the Proposal and relevant background information were provided by Mr Charlie Kennett of Pacific Blue Metal Pty Ltd, Mr Kevin Farrawell and Mr Benn Farrawell, both of Galban Pty Ltd.

The following consultancy firms were commissioned by the Applicant to prepare nominated specialist consultant studies for the Proposal.

- Aboriginal Heritage – Archaeological Surveys & Reports Pty Ltd.
  - John Appleton (BA (Hons)).
- Air Quality – ENVIRON Australia Pty Ltd.
  - Scott Fishwick (BSc (Atmospheric Science)).
- Noise – Spectrum Acoustics Pty Ltd.
  - Ross Hodge (BSc (Hons)).
- Ecology – Kendall and Kendall Pty Ltd.
  - Keith Kendall (BA (Biological Sciences)).

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Section 2

Description of the Proposal

PREAMBLE

This section describes the continued operations and extension at Farrawell's Quarry ("the Proposal") including:

- *the objectives of the Proposal;*
- *an overview of the Proposal;*
- *a review of local geology, resources and quarry products;*
- *an overview of the site layout;*
- *a description of the proposed site establishment and extraction activities;*
- *a description of the processing operations;*
- *the proposed ongoing transportation of products from the Quarry Site;*
- *a description of infrastructure, utilities and services that would be located within the Quarry Site as well as proposed employment, hours of operation and Project life; and*
- *a description of the proposed rehabilitation of areas that would be disturbed within the Quarry Site.*

The Proposal is described in sufficient detail to provide the reader with an overall understanding of the nature and extent of all activities proposed throughout the life of the Proposal, how the various activities would be undertaken and to enable an assessment of the potential impacts on the surrounding environment. It is noted that the boundaries and dimensions of the various components described throughout this section are indicative only.

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2.1 OBJECTIVES OF THE PROPOSAL

The Applicant's principal objective in modifying the Farrawell's Quarry is to further utilise the available resource adjacent to and beneath the approved quarry to produce high quality road construction materials for use as select fill and road-base/sub-base materials to meet the current and future demand for these products created by construction activities associated with the Pacific Highway upgrade and other local uses. Furthermore, the extended quarry would be designed to achieve a final landform that displays a comparable elevation to the Industrial Subdivision Access Road for ease of access and so that the final Quarry Site can be utilised for the proposed future use for industrial purposes.

The Applicant would continue to operate the quarry to meet the following objectives.

- To continue to provide a source of high quality road construction materials that meet or exceed the quality of the currently operating quarries within the local area.
- To maximise the recovery of the natural resources.
- To develop and operate the quarry in a manner that is environmentally responsible and complies with all statutory requirements and reasonable community expectations.
- To create a final landform that is safe, stable and amenable to the proposed future use as industrial purposes.

These broad objectives would be achieved by:

i) planning, extracting and processing the resource in a manner that maximises the quality and quantity of materials removed;

ii) undertaking all activities in an environmentally responsible manner that enables compliance with all relevant statutory requirements; and

iii) monitoring and reviewing the operational and environmental performance of all activities.

2.2 OVERVIEW OF THE PROPOSAL

The key elements of the Proposal for which development consent is being sought are as follows.

i) Extend extraction activities beyond the approved limit of extraction (covering 8ha) to the proposed limit of extraction (covering approximately 16ha).

ii) Extend the depth of extraction within the existing approved extraction area by up to 8m.

iii) Create a final landform conducive to the long term industrial subdivision.

iv) Extend the operational life of the quarry to 15 to 20 years.

It is noted that approval is not being sought to remove the vegetation within the Quarry Site as that activity is already approved within the industrial subdivision. The Applicant does, however, plan to mulch the vegetation in the same manner as was undertaken for the existing quarry and blend it with the stripped topsoil. The blended mulch and topsoil would be placed around nominated margins of the Quarry Site.

2.3 GEOLOGY, RESOURCES AND PRODUCTS

2.3.1 Geology

Geological testing was undertaken within the footprint of the existing quarry, as part of the investigations that accompanied the original EIS in 2007, identifying that the Quarry Site is underlain by greywackes and indurated siltstones that are moderately well jointed and suited for the production of road construction materials. The upper surface of the Quarry Site is weathered, however, the depth of weathering is limited typically to less than 2m to 3m.

Geological testing undertaken by the Applicant in September 2013, utilising the on-site excavator to test the depth of weathered and characteristics of the fresh rock in both the approved quarry and proposed extension established the rock encountered within the initial sections of the approved quarry continues beneath the proposed quarry extension.

2.3.2 Quarry Resources

The resources remaining within the existing approved extraction area and the proposed extended and deeper extraction area amount to approximately 3.3 million tonnes.

2.3.3 Quarry Products, Properties and Uses

The Applicant provides a range of crushed and screened products used in the construction of the upgraded Pacific Highway and other construction projects in the Kempsey area. The products range from +200mm rock to 7mm aggregates with a range of graded products.

2.4 QUARRY SITE LAYOUT

Figure 2.1 displays the proposed Quarry Site layout highlighting that the majority of the installed infrastructure such as the office and amenities block, workshop and ancillary infrastructure would remain in the same location for the majority of the life of the Proposal and only moved when extraction activities progress through their current location, in which all infrastructure would be re-located to a finalised section of the extraction area.

The key components of the quarry layout are as follows.

1. The Quarry Site boundary defines the proposed fenced boundary of the extended quarry within which all quarry-related activities would be undertaken. The proposed Quarry Site covers an area of approximately 18ha.

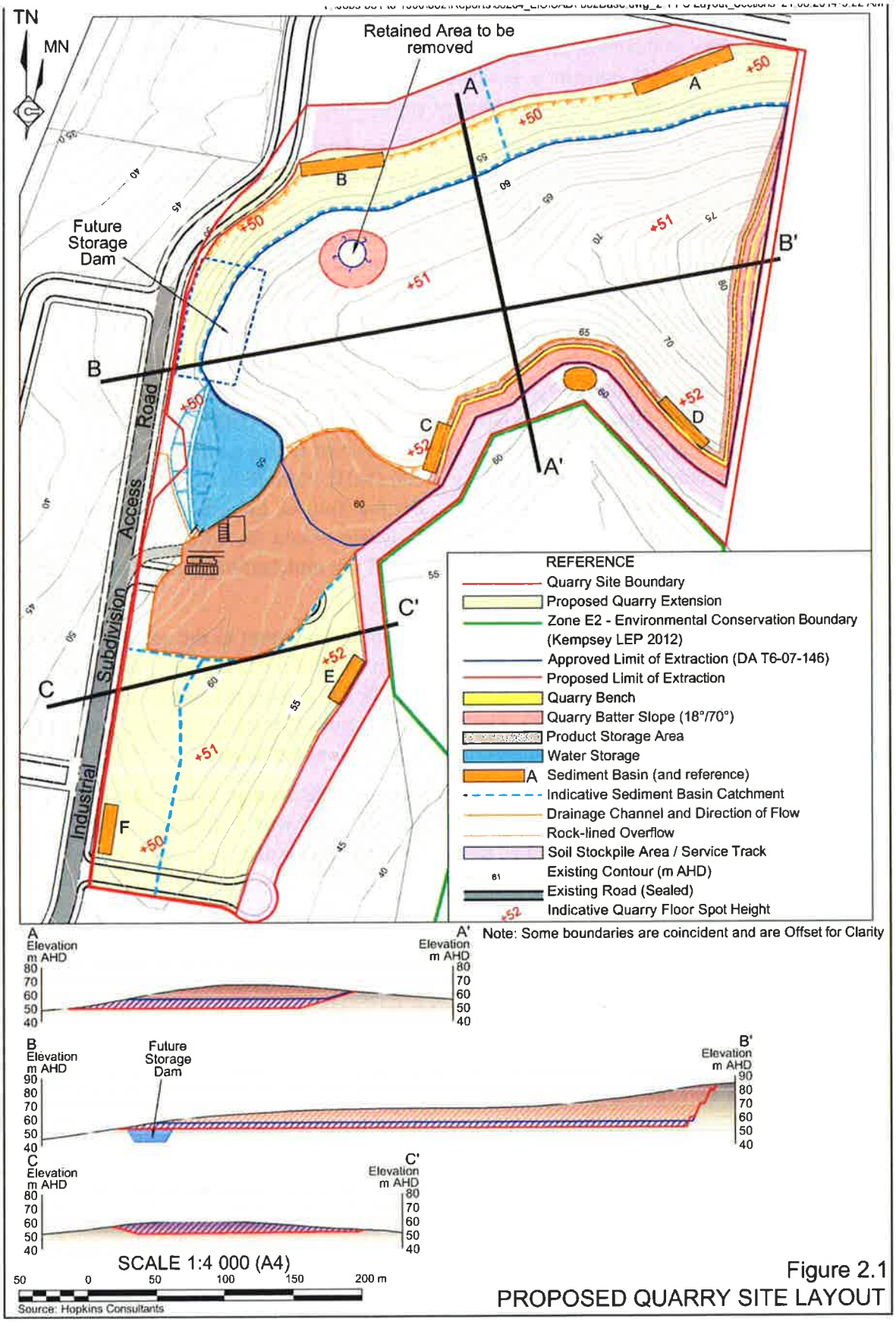

Figure 2.1
PROPOSED QUARRY SITE LAYOUT

2. A corridor between 15m and 35m wide is defined between the Quarry Site boundary and either the limit of extraction or the product storage area. This corridor would contain a perimeter service track and/or the longitudinal soil stockpiles pushed beyond the limit of extraction.

3. The defined limit of extraction would be positioned generally following the 50m AHD contour on its the southern and northern sides and levels adjacent to the Industrial Subdivision Access Road on its western side. The eastern limit of extraction is set back 6m from the eastern boundary fence. The defined limits of extraction are positioned in locations that would provide a practical final landform draining to the north and west, i.e. away from the land zoned "Environmental Conservation" south of the Quarry Site (see Section 3.1 for further detail).

4. The eastern side of the extraction area comprises batters of approximately 70° between 85m and 80m AHD and 80m and 70m AHD. Similar batters would be left between 70m and 60m AHD and 60m and 50m AHD. All quarry benches would be approximately 3m wide and constructed with a gentle slope towards the eastern boundary at approximately 1:200 (V:H). Runoff from each bench would be directed to drop-down locations near the limit of extraction. The benches at 80m AHD, 70m AHD and 60m AHD levels would be revegetated following placement of overburden and up to 0.3m of the mulched vegetation and soil mix on each bench.

5. A batter of approximately 18° would be retained adjacent to the southern limit of the extraction area, typically from the 58m to 62m AHD contours to a 3m wide bench at approximately 58m AHD with a 70° batter to be the final extraction floor at approximately 52m AHD. The 18° batter would ultimately be shaped, topsoiled and mulched following completion of extraction of the batter.

6. A water storage dam is already constructed on the western side of the extraction area covering an area of approximately 0.5ha and with a storage capacity of at least 8ML. This dam would be replaced with a further dam excavated immediately north of the existing water storage.

7. Four sediment basins are located within the existing Quarry Site, i.e. Sediment Basins A, B, C and D. Basins A and B would be lowered and/or re-positioned within the extraction floor as the extraction area is deepened. Basins C and D would be no longer required. A further two sediment basins (E and F) would be excavated within the extended extraction area principally to manage sediment-laden runoff until all runoff is contained within the extraction area. Each basin would be approximately 10m wide and of varying lengths reflecting the area of their respective catchments. Each sediment basin has been designed to contain a 90th percentile, 5 day rainfall event (approximately 75mm), consistent with the requirements of '*Managing Urban Stormwater: Soils and Construction, Volume 1, 4th edition, 2004*' (Landcom 2004). The footprint of the sediment basins shown on **Figure 2.1** also incorporates the ramps into and out of each basin which in effect increases the capacity of each basin. It is anticipated that Sediment Basins A and B would overflow in the event of a rainfall event exceeding the

design criteria and flow towards the water storage dam within the footprint of the Proposed Quarry Site. The approach to the management of runoff within the Quarry Site is discussed further in Section 4.4.2.

8. The existing product storage area, covering approximately 1.8ha is located within the southwestern corner of the Quarry Site in an area that is comparatively flat. This area was reprofiled prior to its use for product storage to ensure all runoff from this area flows towards the water storage dam. Throughout the life of the quarry, the product storage area would be re-located to accommodate the changing levels within the Quarry Site. At times, the product storage area would be in two locations within the Quarry Site.

9. The quarry entrance would continue to be located on the southwestern side of the Quarry Site providing direct access from the product storage area to the Industrial Subdivision Access Road.

2.5 SITE ESTABLISHMENT

Following the receipt of development consent for the quarry extension and prior to extraction activities being undertaken within the extended quarry, the following outlines the sequential site establishment activities that would be undertaken to provide access to the extractive materials from the extended extraction area. These site establishment activities are consistent with those undertaken during the early stages of the existing quarry.

1. Survey and mark out the extended Quarry Site boundary.
2. Mark the mature trees within the proposed extended extraction area that require observation prior to felling (identified by Keith Kendall).
3. Fell, windrow, shear and mulch immature trees and shrubs within the proposed extraction area, providing they display a low fauna habitat value for roosting/nesting.
4. Remove remaining mature trees following fauna observations and clearance. The felled trees would also be sheared and mulched.
5. Establish and extend the perimeter service track immediately inside the boundary of the Quarry Site.
6. Progressively push/stockpile/blend all existing stockpiled and in situ topsoil (to depths determined by the soil structure and other physical and chemical) around the margins of the Quarry Site within the area defined on **Figure 2.1**. Where appropriate, the topsoil would be blended with some of the mulch. Stockpile heights of the blended materials would be up to an average of approximately 3m to 4m high.
7. Survey and mark the limit of extraction and location of the re-located Sediment Basins A and B and new Sediment Basins E and F (following topsoil removal).
8. Excavate the new and re-located sediment basins on a progressive basis.

Silt-stop fencing would be installed progressively throughout the site establishment period prior to soil disturbance. The fencing would be positioned downslope as close as practically possible to the areas of soil disturbance.

Where possible, emphasis would be placed upon directly transferring the soils and vegetative material removed from one area of extraction to a completed section or final benches awaiting revegetation.

2.6 EXTRACTION OPERATIONS

2.6.1 Extraction Method

The extraction method used within the proposed extraction areas would not differ to that which has been already approved under DA T6-07-146 (Revision 06).

Where practical, the exposed rock would be extracted by a bulldozer or excavator until refusal. The ripped rock would be pushed by bulldozer into a stockpile from where it would either be loaded into an off-road haul truck for transportation to the active processing area or loaded directly into the mobile crushing and screening plants strategically placed near the rip rock surge pile.

When ripping is no longer feasible, drilling and blasting would be undertaken. Each blast would involve the fragmentation of between 20 000 tonnes and 30 000 tonnes of rock. Blasted rock would either be loaded from the blasted rock pile into off-road haul trucks for transportation to the active processing area or loaded directly into the mobile crushing and screening plants strategically placed near the blasted rock pile.

2.6.2 Equipment

Table 2.1 lists the total items of equipment that would continue to be utilised by the Applicant during the life of the extended quarry. Any equipment not currently on site would be transported to the Quarry Site, as required.

Table 2.1
Quarry Equipment Fleet

Equipment	No.	Function	Frequency of Use
Bulldozer (Cat D9 to D10 size or similar)	2	Stripping topsoil, pushing subsoil, ripping weathered rock and stockpiling.	Continuous
Hydraulic Drill Rig	1	Drilling blast holes.	Weekly
Excavator (85t)	1	Loading ripped and blasted rock into haul trucks.	Continuous
Excavator (20t to 40t)	2	Loading processing plants.	Continuous
Haul Truck (40t)	4	Transporting ripped and blasted rock to the processing area.	Continuous
Front-end Loader (Cat 980 size or similar)	3	Loading product trucks & stockpiling.	Continuous
Water Cart	1	Watering of haul roads.	As required

2.6.3 Rate of Extraction

No change to the maximum annual extraction and processing rate of 500 000 tonnes of road construction materials is proposed. The actual rate of extraction would reflect the quantity of materials required for the respective road upgrading projects or local projects. The rate of extraction would be much lower during those periods when only local projects are being supplied from the quarry.

2.7 PROCESSING OPERATIONS

The ripped and blasted rock would be reduced in size and either separated into specific size gradings or produced as graded products through the use of two mobile crushing and screening units. Each unit comprises a jaw crusher with a reclaimer screen and/or horizontal impactor (see **Plate 1.3**). These units would continue to be positioned in close proximity to the active extraction areas to allow the blasted rock to be loaded directly into the crushing and screening units. The mobile nature of the plants would enable them to be readily re-located throughout the life of the quarry to accommodate the varying sources of material within the extraction area.

2.8 PRODUCT TRANSPORTATION

2.8.1 Site Access

Access to the quarry is provided via the quarry entrance from the Industrial Subdivision Access Road, constructed as part of the industrial subdivision works (see **Plate 1.1** and **Figure 2.1**). The Industrial Subdivision Access Road is a two-lane, bitumen sealed road with a 60km/hr speed limit which has been designed and constructed to accommodate up to 25m B-double road trains. Product trucks travelling to and from the quarry are substantially smaller than 25m road trains and typically comprise of a truck and dog configuration (up to 19m long) with up to a maximum of 33t capacity. A small number of the small capacity trucks with a capacity of 12t to 18t also transport products from the quarry for local users.

2.8.2 Public Road Network

The Quarry Site is situated close to the Pacific Highway and in close proximity to the Pacific Highway / Macleay Valley Way grade separated interchange. **Figure 1.2** displays the location and configuration of the interchange and the Industrial Subdivision Access Road.

It is envisaged that unladen trucks accessing the Quarry Site would exit the Pacific Highway at the Pacific Highway / Macleay Valley Way grade separated interchange before proceeding along the Industrial Subdivision Access Road to the quarry entrance. Similarly, trucks leaving the Quarry Site would follow the same route back onto the Pacific Highway.

Trucks delivering products to local markets within and around Kempsey would pass over the Pacific Highway / Macleay Valley Way grade separated interchange and proceed northwards on Macleay Valley Way into Kempsey. Trucks returning to the quarry from local destinations would use the same route.

2.8.3 Existing Road Conditions

As discussed in Section 2.7.1, the Industrial Subdivision Access Road is a two-lane, bitumen sealed road with a 60km/hr speed limit which has been designed and constructed to accommodate up to 25m B-double road trains. This road is in excellent condition since it was only recently constructed.

The Pacific Highway, Macleay Valley Way, and the Pacific Highway / Macleay Valley Way grade separated interchange are all constructed to accommodate 25m B-double road trains and are in excellent condition.

2.8.4 Traffic Levels

The existing quarry currently despatches between 50 and 210 loads of quarry products per day generating 100 to 420 truck movements per day (i.e. one load generates two truck movements). The maximum number of daily truck loads despatched would be approximately 250 (500 truck movements) throughout the ongoing life of the quarry. For the Pacific Highway upgrade projects, the quarry products would continue to be despatched throughout each operational day generally on a regular basis, however, the number of truck loads despatched can vary between 5 and 30 per hour. The maximum hourly number of truck loads despatched may occasionally approach 40 per hour.

Traffic levels when only local projects are being supplied would be variable and dependent upon the vehicle type and project location. The Applicant would ensure that, in order to satisfy the *Road Noise Policy*, truck movements for these local deliveries would initially be restricted to less than 7 loads (14 movements) per hour. The actual number of truck movements per hour would be reviewed on a project by project basis.

2.9 AMENITIES, SERVICES AND WASTE MANAGEMENT

2.9.1 Amenities

The Applicant would continue to utilise the established site office, car park, workshop and optical weight facility. All facilities are transportable units supplied with dedicated services and sewerage systems.

Diesel fuel is not stored on site. Rather, equipment is fuelled, as required with a mobile refuelling truck.

2.9.2 Services

Mains power is connected to the Quarry Site.

No potable mains water supply is connected to the Quarry Site. Water for human use is supplied and transported to the Quarry Site, as required. Water for dust suppression purposes is available through an existing dam (Water Storage Dam) located in the western area of the Quarry Site. This supply would continue to be supplemented by water held in the sediment basins.

Toilet facilities are provided on the Quarry Site within the amenities building adjacent to the quarry office.

2.9.3 Waste Management

No production wastes are generated on site as all materials extracted are incorporated into products despatched from the Quarry Site.

All non-production wastes are placed in a range of skips or bins and removed by local waste management contractors. Any recyclable wastes (e.g. paper, drink containers, cardboard, etc.) are collected separately.

Waste oil is stored in a bunded facility and collected by a waste oil contractor on a regular basis. All ferrous scrap is placed in a skip bin and collected by a recycling contractor.

2.10 EMPLOYMENT

The ongoing operation of the quarry in the manner proposed would provide full-time equivalent (FTE) employment for approximately 11 persons on site. A further 10 FTE persons would be directly or indirectly employed off site for the supply of services and equipment, maintenance and support.

2.11 HOURS OF OPERATION AND PROJECT LIFE

2.11.1 Hours of Operation

All extraction and processing activities would continue to be undertaken between the following hours i.e. identical to that as approved in Development Consent DA T6-07-146 (Revision 06).

- Monday to Friday – 7:00am to 5:00pm.
- Saturdays – 7:00am to 1:00pm.
- No work is proposed on Sundays or public holidays.

Maintenance activities would continue to be undertaken at any time, i.e. 24 hours per day/7 days per week to ensure all plant and equipment is maintained in a proper and efficient manner, with the provision that maintenance-related noise is not audible at any surrounding residence outside the hours of operation nominated above.

2.11.2 Life of the Extended Quarry

The Applicant proposes to continue to extract and process up to 500 000 tonnes of road construction materials annually from within the Quarry Site. The annual rate of production would reflect the specific requirements of the various Pacific Highway upgrade projects. As a consequence, there may be periods between and following the Pacific Highway upgrade projects when annual production levels may be substantially lower than the maximum quantity

proposed. For the purposes of predicting the project life, the Applicant estimates the average annual production at the quarry would be approximately 250 000 to 300 000 tonnes. It is anticipated that the life of the extended quarry would be in the order of 15 to 20 years. The actual period would largely depend upon the specific quantities of products required and the timetable for the delivery of products to the road construction sites along the Pacific Highway.

The Applicant anticipates that local sales throughout Kempsey Shire would also occur concurrently with, during and following Pacific Highway upgrade projects. It remains the intention of Galban Pty Ltd, the developer of the industrial subdivision, to progressively develop the subdivision concurrently with the operation of the quarry which could dictate the operational life of the quarry should the demand for further industrial land occur throughout the life of the quarry.

2.12 REHABILITATION

2.12.1 Final Land Use Objectives

In the short term, the Applicant's objective is to stabilise all earthworks, drainage lines and disturbed areas during site establishment and construction activities associated with the quarry extension in order to minimise erosion and sedimentation.

In the longer term, the Applicant's rehabilitation objective is to prepare the Quarry Site for development of the approved industrial subdivision.

2.12.2 Final Landform

The extended quarry has been designed with a final landform of a comparable elevation to the Industrial Subdivision Access Road for ease of access and so that the final landform, after extraction ceases, can be utilised for the proposed future industrial purposes. **Figure 2.2** shows the proposed final landform.

2.12.3 Rehabilitation Activities

2.12.3.1 Interim Rehabilitation Activities

The Operator would undertake a range of rehabilitation activities during the site establishment phase and specific stages throughout the life of the Quarry.

All disturbed areas external to the limits of extraction, i.e. all soil stockpiles would be stabilised with mulch and seeded, if required, immediately once each surface is completed. Initially, reliance would be placed upon natural regeneration of the outer slopes.

The approximate 18° internal batter slope on the southern side of the extraction area adjacent to Sediment Basins C and D would be covered with mulched to stabilise the slope during the operational life of the Quarry. The vegetation on the batter slope would be re-established following the completion of soil spreading activities at the end of the Quarry life.

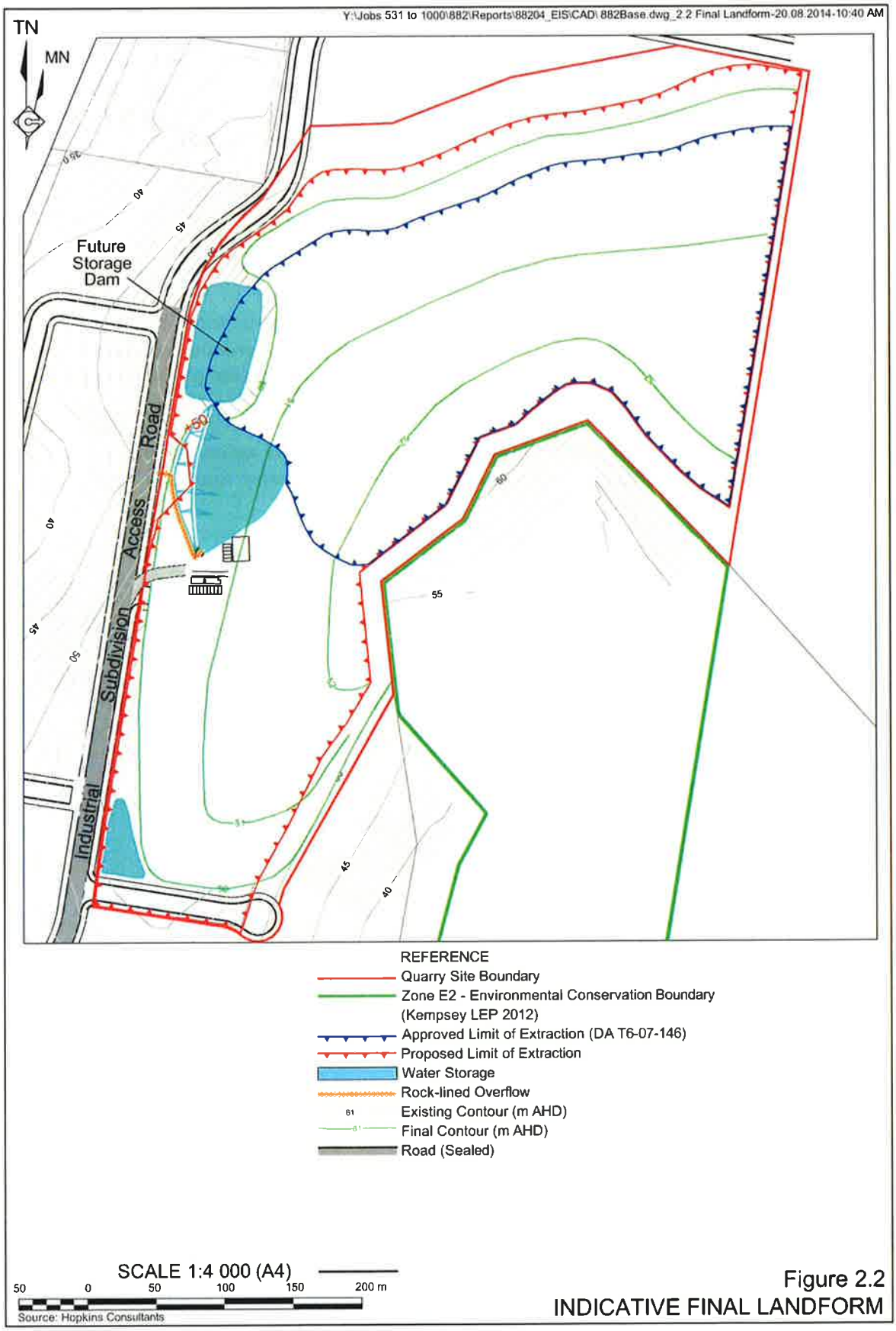

Figure 2.2
INDICATIVE FINAL LANDFORM

2.12.3.2 Long-term Rehabilitation Activities

The benches on the eastern side of the Quarry Site would be revegetated using a mixture of mulch and topsoil placed upon approximately 0.5m to 1m of overburden placed on the final bench. The mixture would be spread across the bench once extraction and haulage activities have ceased in this area and prior to the creation of the adjoining extraction face.

The approach to the long term rehabilitation of the floor of the Quarry Site would be largely dictated by the approved industrial land use within the Quarry Site. As such, it is proposed to push any remaining unusable subsoil/clay over the final landform within the extraction area and then spread the stockpiled topsoil/mulch mix across the entire profiled extraction area to a depth of approximately 15cm. The replaced topsoil would be allowed to regenerate naturally, however, any areas not sufficiently vegetated within 3 months would be seeded and fertilised to stabilise the surface of the Quarry Site until it is required for its use for industrial purposes. All rehabilitation work would be completed within approximately 12 months of the completion of extraction and processing activities, subject to suitable climatic conditions.

Galban proposes to retain Sediment Basins A and B and the surface water dam within the final landform to assist in the long-term water management of the Quarry Site until the industrial subdivision is developed.

Section 3

Planning and Legislative Requirements

PREAMBLE

This section considers the planning and legislative context within which the Quarry would operate and describes any environmental issues that are raised from these instruments that should be addressed within the EIS. Relevant NSW State environmental planning legislation and local government legislation is included in the review as well as any additional policies and guidelines that are relevant to the Proposal.

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3.1 PLANNING CONTEXT

The Quarry Site is located wholly within Zone IN1 – General Industrial as defined within the *Kempsey Local Environmental Plan 2012* (KLEP 2012) as identified on **Figure 3.1**. Extractive Industry is not identified as a prohibited land use within KLEP 2012 and is therefore permitted with consent.

It should be noted that adjacent land to the east and south of the Quarry Site is zoned Zone E2 – Environmental Management. No existing or proposed activities proposed by the Applicant are located within this area.

3.2 APPROVALS AND LICENCES

3.2.1 Development Consent

As outlined in Section 1.1, Development Consent DA T6-07-146 was originally issued by Council in April 2007 with various modifications resulting in Development Consent DA T6-07-146 (Revision 06) being issued in August 2013 and is the current version (provided in **Appendix 3**).

Given the successful commencement of the quarry and the recognition that further quantities of raw materials would be sought from Farrawell's Quarry beyond the current contract, both Galban Pty Ltd (the landowner) and the Applicant decided it would be appropriate to extend the quarry into the area designated for "cut" on **Figure 1.2**, thereby facilitating the excavation of the preferred landform for the industrial subdivision in that area. Hence, the Development Application (**Appendix 1**) and this EIS have been submitted to Council for development consent for the extended quarry.

Should Council approve the extended quarry, as outlined in this document with an appropriate set of conditions, Galban Pty Ltd would surrender Development Consent DA76-07-146 to enable the overall quarry operation to be conducted under one development consent.

3.2.2 Environment Protection Licence

Galban Pty Ltd was granted Environment Protection Licence (EPL) #20018 (EPL 20018) on 22 November 2011 by the Environment Protection Authority (EPA) as the quarry is designated as a "scheduled activity" under Section 48 of the *Protection of the Environment Operations Act 1997* (POEO Act). Prior to any extraction operations being undertaken at the quarry, an Application to Modify EPL 20018 was lodged by Galban Pty Ltd to the North Coast Region EPA Branch on 22 July 2013, to increase the annual production to 500 000tpa, reflecting the approved production limit under Development Consent DA T6-07-146 (Revision 06). The modification of EPL 20018 was subsequently approved on 30 July 2013.

Furthermore, an 'Application for the Transfer of Licence' was submitted to the EPA on 9 August 2013, requesting the licence be transferred to the Applicant, as the Operator given PBM would be undertaking all site extraction and processing activities. The EPL was transferred to the Applicant on 13 August 2013.

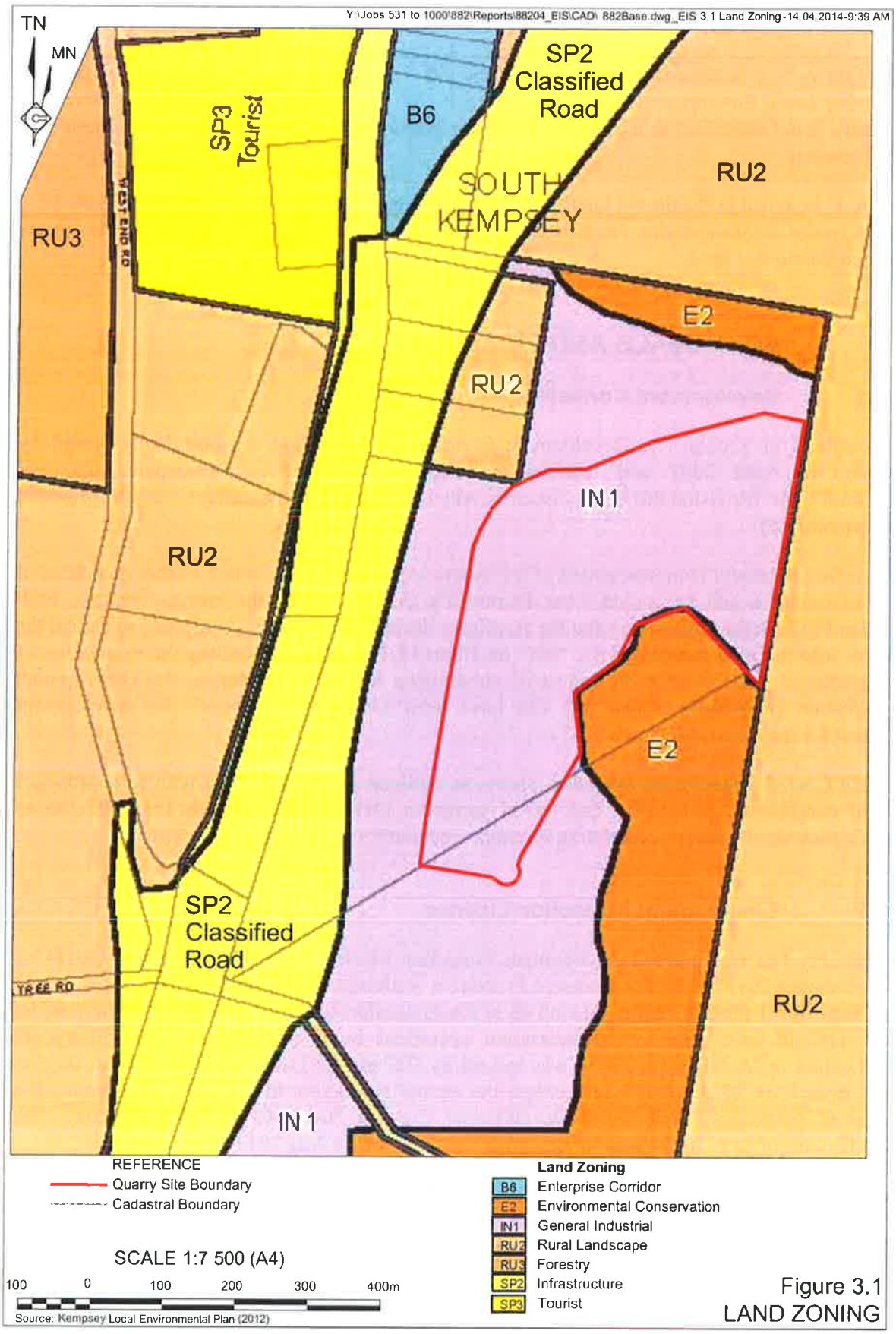

Figure 3.1
LAND ZONING

Should the Proposal be approved by Council, the Applicant would apply to modify EPL 20018 once more, to ensure that the EPL covers the entire Quarry Site before any clearing or extractions operations begin in those areas not currently approved.

3.2.3 Controlled Activity Approval

During the preparation of the Plan of Management (POM) for the quarry, the Applicant challenged the presence of a 30m section of a 1st order watercourse within the Quarry Site boundary which would have required a Controlled Activity Approval (CAA) i.e. a conditional requirement of Development Consent DAT6-07-146. On-site investigations were undertaken to ascertain the type and characteristics of a watercourse on the southern side of the approved extraction area and the surrounding landscape to determine whether the watercourse was would defined as a watercourse under the *Water Management Act 2000* (WM Act) and whether development on its banks constituted 'Waterfront land'.

As a result of the on-site investigations, discussions were held with the Grafton NOW office in late July 2013, where a description of and photos of the subject "watercourse" were provided for review, requesting NOW's acceptance that a topographic depression within the Quarry Site does not constitute waterfront land as defined in the WM Act and that the quarry could proceed without a CAA. On 12 August 2013, NOW confirmed that the subject topographic depression does not meet the definition of a watercourse under the WM Act and therefore is not waterfront land, effectively determining that a CAA is not required for the existing quarry or the proposed extended quarry.

3.3 LEGISLATION

The following identifies the key NSW legislation that is applicable to the Proposal and the proposed actions requiring consideration.

Environmental Planning and Assessment (EP&A) Act 1979

The EP&A Act provides a framework for the assessment and approval of development in NSW and is administered by the Department of Planning and Environment (DP&E) with a number of responsibilities for approvals assigned to local Councils. In order to extend the extraction area within the Quarry Site, the Applicant requires development consent in accordance with the provisions of Part 4 the EP&A Act. In order to obtain development consent, the development application for the Proposal needs to be accompanied by an *Environmental Impact Statement* (EIS) as the Proposal is classified as "Designated Development" given it is categorised as "Extractive Industries", under Schedule 3(1) of the *Environmental Planning & Assessment Regulation 2000* (EP&A Reg) and the threshold for the quantity of extractive material extracted (30 000m^3) would be exceeded.

The application for development consent for this Proposal (**Appendix 1**) is being lodged with Kempsey Shire Council in accordance with the provisions of the EP&A Act and would be determined by the Joint Regional Planning Panel, if nominated by Council. Should development consent be granted for the extension of the quarry, Development Consent DA T6-07-146 would be surrendered to Kempsey Shire Council.

National Parks and Wildlife Act 1974

The approval for industrial subdivision negates the need for any further survey within the proposed extension area, however for the Proposal to proceed fully, the previously located artefact scatter identified as Aboriginal Site 30-3-0111 within the existing approved extraction area (**Figure 1.3**) would require removal from within the footprint of the quarry. The Applicant originally intended (and has done so to date) to leave this site intact, however, the proposal to extract up to 8m deeper in the vicinity of the Quarry Site would result in an inappropriate landform.

Appendix 7 of this document presents an *Aboriginal Heritage Assessment* that has been compiled in consultation with interested Aboriginal Stakeholders. A survey undertaken in June 2014 was unable to locate any of the scattered artefacts within the Quarry Site, and as such it was concluded an Aboriginal Heritage Impact Permit would not be required to recover salvageable artefacts from within the recorded Aboriginal scatter site. Aboriginal stakeholders were invited to the visit to location of the recorded site on 1 and 8 August 2014, however, no stakeholders attended the site. In light of the investigations and consultation undertaken, the Applicant proposes to extract the materials beneath the area nominated on **Figure 1.3**.

Noxious Weeds Act 1993

Any noxious weeds on site would be disposed of and managed in accordance with this Act.

Protection of the Environment Operations Act 1997

Environment Protection Licence (EPL) 20018 would require an amendment via an "Application to Modify an Environment Protection Licence" to be submitted to the EPA for review and approval to encompass the proposed extraction area before any works can commence in those areas.

Threatened Species Conservation Act 1995

The Proposal is not expected to have a significant impact on threatened species, populations, and ecological communities, however, design features, operational controls and management measures have been proposed to avoid and/or minimise impacts on local flora and fauna. The existing development consent provides for the placement of 20 microbat boxes in areas outside the quarry footprint in accordance with *Condition 21e* of Development Consent DA76-07-146. These microbat boxes were installed in late 2013. No further ecologically-based activities are required for the industrial subdivision.

Waste Avoidance and Resource Recovery Act 2000

The *Waste Avoidance and Resource Recovery Act 2001* operates in conjunction with the POEO Act, and aims to minimise the consumption of natural resources by encouraging efficient use of resources and reducing environmental harm. The Proposal would comply with any relevant requirements of this Act.

Commonwealth Legislation

No Commonwealth legislation is relevant to the Proposal, including the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999*.

3.4 STATE ENVIRONMENTAL PLANNING POLICIES

State Environmental Planning Policy (State and Regional Development) 2011

This State Environmental Planning Policy (SEPP) was gazetted on 28 September 2011 and applies to all projects satisfying nominated criteria made following that date. One of the purposes of this SEPP is to confer functions on joint regional planning panels to determine development applications. As extractive industry with an annual production rate greater than 30 000m^3 per annum, the Proposal would be classified as "designated development" under Section 77A of the EP&A Act and Schedule 3(1)(19) of the EP&A Regulation. This classification allows the development application for the proposal to be determined by a Joint Regional Planning Panel (in accordance with Schedule 4A(8) of the EP&A Act and meeting the requirements of Part 4 of the *State Environmental Planning Policy (State and Regional Development 2011*). It remains Council's decision whether a development application is determined by a Joint Regional Planning Panel.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

This SEPP ("the Mining SEPP") was gazetted in recognition of the importance to New South Wales of mining, petroleum production and extractive industries and to provide proper management and orderly and economic use and development of land containing mineral, petroleum and extractive material resources and to establish appropriate planning controls to encourage ecologically sustainable development through environmental assessment, and sustainable management.

The SEPP specifies matters requiring consideration in the assessment of any mining, petroleum production and extractive industry development, as defined in NSW legislation. A summary of the matters that the consent authority needs to consider when assessing a new or modified proposal and where these have been addressed in this document is provided in **Table 3.1**.

Table 3.1
Application of SEPP (Mining, Petroleum Production and Extractive Industries) 2007

Page 1 of 3

Relevant SEPP Clause	Description	EIS Section
12: Compatibility with other land uses	Consideration is given to: • the existing uses and approved uses of land in the vicinity of the development;	4.1.4
	• the potential impact on the preferred land uses (as considered by the consent authority) in the vicinity of the development; and	4.1.4
	• any ways in which the development may be incompatible with any of those existing, approved or preferred land uses.	
	The respective public benefits of the development and the existing, approved or preferred land uses are evaluated and compared.	4.9.4 and 4.1.4
	Measures proposed to avoid or minimise any incompatibility are considered.	4.1.4

Table 3.1 (Cont'd)
Application of SEPP (Mining, Petroleum Production and Extractive Industries) 2007

Relevant SEPP Clause	Description	EIS Section
12AA: Significance of resource	Consideration is given to the significance of the resource that is the subject of the application, having regard to:	
	• the economic benefits, both to the State and the region; and	4.9
	• the advice provided by the DG of DTIRIS as to the relative significance of the resource in comparison with other mineral resources across the State.	NA
12AB: Non-discretionary development standards for mining	Consideration is given to development standards that, if complied with, prevents the consent authority from requiring more onerous standards for those matters	Various subsections of Section 4
13: Compatibility with mining, petroleum production or extractive industry	Consideration is given to whether the development is likely to have a significant impact on current or future mining, petroleum production or extractive industry and ways in which the development may be incompatible.	1.1 to 1.3
	Measures taken by the Applicant to avoid or minimise any incompatibility are considered.	NA
	The public benefits of the development and any existing or approved mining, petroleum production or extractive industry must be evaluated and compared.	4.9.4 and 5.2.2
14: Natural resource and environmental management	Consideration is given to ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure: • impacts on significant water resources, including surface and groundwater resources, are avoided or minimised;	4.2
	• impacts on threatened species and biodiversity are avoided or minimised; and	4.6
	• greenhouse gas emissions are minimised and an assessment of the greenhouse gas emissions (including downstream emissions) of the development is provided.	4.4.8
15: Resource recovery	The efficiency of resource recovery, including the reuse or recycling of material and minimisation of the creation of waste, is considered.	2.3
16: Transportation	The following transport-related issues are considered. • The transport of some or all of the materials from the Quarry Site by means other than public road.	2.8 and 4.3
	• Limitation of the number of truck movements that occur on roads within residential areas or roads near to schools.	2.8
	• The preparation of a code of conduct for the transportation of materials on public roads.	Appendix 4

Table 3.1 (Cont'd)
Application of SEPP (Mining, Petroleum Production and Extractive Industries) 2007

Relevant SEPP Clause	Description	EIS Section
17: Rehabilitation	The rehabilitation of the land affected by the development is considered including: • the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated;	Figure 2.2, Section 2.12
	• the appropriate management of development generated waste;	2.9.3
	• remediation of any soil contaminated by the development; and	NA
	• the steps to be taken to ensure that the state of the land does not jeopardize public safety, while being rehabilitated or at the completion of rehabilitation.	2.12

State Environmental Planning Policy (Rural Lands) 2008

The aims of the 'Rural Lands SEPP' are to facilitate development on rural land that is orderly and economic, promotes the social, economic and environmental welfare of the State and avoids land use conflicts with existing agriculture. It also allows government authorities to identify State significant agricultural land and ensure the ongoing viability of agriculture in the State.

Specifically, and as described in Clause 12, the objectives of the Rural Lands SEPP are to provide for the protection of agricultural land:

- *that is of State or regional agricultural significance, and*
- *that may be subject to demand for uses that are not compatible with agriculture, and*
- *if the protection will result in a public benefit.*

The Proposal is considered with respect to these aims.

- The land that would be affected by the Proposal has not been identified as State or regionally significant agricultural land by *Schedule 2* of the Rural Lands SEPP.
- The Proposal would not impact on any additional land currently managed for agriculture. The Proposal is located wholly within an approval Industrial Subdivision.

As a result, the Rural Lands SEPP is not considered further in this document.

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33)

Hazardous and offensive industries, and potentially hazardous and offensive industries, relate to industries that, without the implementation of appropriate impact minimisation measures, would, or potentially would, pose a significant risk in relation to the locality, to human health, life or property, or to the biophysical environment.

The hazardous substances and dangerous goods to be held or used within the Quarry Site are required to be identified and classified in accordance with the risk screening method contained within the document entitled *Applying SEPP 33 Final* (DP&I, 2011). Hazardous materials are defined within DP&I (2011) as substances falling within the classification of the *Australian Code for Transportation of Dangerous Goods by Road and Rail* (Dangerous Goods Code), (National Transport Commission, 2011). The substances used within the quarry site relevant to this policy are primarily diesel and ammonium nitrate.

The Proposal would involve the use of diesel fuel, a Class 3 C1 combustible liquid, and small amounts of other hydrocarbons including lubricating oils and combustible liquids. Small amounts of lubricating oils and greases would be stored on site on bunded pallets to contain any leaks or spillages. Refuelling of all equipment would occur at the fixed or mobile fuel tank, ensuring that adequate and appropriate spills kits are easily accessible. As the quantities of these materials do not trigger SEPP 33, it does not require further consideration.

Ammonium nitrate would not be stored on site. Rather, it would be transported to the Quarry Site for blasting on the day of the blast. As the quantity required for each blast does not exceed the relevant thresholds for Class 5.1 materials, this does not need to be considered further.

Finally, because no hazardous materials would be stored on the Quarry Site, no further consideration of SEPP 33 is required.

State Environmental Planning Policy No 44 – Koala Habitat Protection

SEPP 44 aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. Kempsey is identified in Schedule 1 of the SEPP as a local government area that could provide Koala habitat.

SEPP 44 requires an investigation be carried out to determine if potential or core Koala habitat is present on the areas of the Quarry Site likely to be disturbed. Core Koala habitat comprises land with a resident population of Koalas whereas potential Koala habitat comprises land with native vegetation with known Koala feed trees constituting at least 15% of the total number of trees present on a site.

A detailed SEPP 44 assessment was undertaken by flora and fauna consultant Idyll Spaces in 2007 as part of the original application for the quarry. This assessment revealed that the Quarry Site was not identified as potential or core Koala habitat pursuant to the requirements of SEPP 44.

Given that the land is already approved for clearing as part of the Industrial Subdivision, this SEPP has not been considered further.

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55)

SEPP 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. In particular, this policy requires consideration of whether a development requires a consent for remediation works or not and, where warranted, requires that remediation works meet certain standards and notification requirements.

As the areas proposed for disturbance within the Quarry Site have previously been used only for extractive industry or passive nature conservation, the Applicant is satisfied that no contaminated land occurs on the Quarry Site. SEPP 55 is therefore not considered further in this document.

3.5 STANDARDS AND GUIDELINES

The following standards and guidelines are potentially applicable to the Proposal.

- Australian Dangerous Goods Code 7th Edition.
- Managing Urban Stormwater: Soils and Construction published by Department of Housing in 2004.
- Managing Urban Stormwater: Soils and Construction – Volume 2C – Unsealed Roads published by Department of Environment and Climate Change (DECC) in 2008.
- Managing Urban Stormwater: Soils and Construction – Volume 2E – Mines and Quarries published by DECC in 2008.
- "Australian Standard (AS) AS 1940 2004 and Amendment 1 – 2004 The Storage and Handling of Flammable and Combustible Liquids".
- NSW Indu*strial Noise Policy* published by the EPA in 2000.

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Section 4

Assessment and Management of Key Environmental Issues

PREAMBLE

This section describes the environmental setting within which the Quarry Site is located and the specific environmental features of the Quarry Site and its surrounds that may be affected as the result of the Proposal.

Background information is provided on topography and drainage, climate, land ownership and nearby residences together with any constraints imposed by these features on the Proposal. The environmental features of the Quarry Site are described and all existing and/or proposed design and operational safeguards and management measures that would be implemented under the Proposal are presented. This is followed by an assessment of any predicted impacts the proposed activities may have after implementation of these measures. Where appropriate, proposed monitoring programs are also described.

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4.1 ENVIRONMENTAL SETTING

4.1.1 Introduction

This subsection describes aspects of the existing environment within and around Farrawell's Quarry which would potentially be affected by the Proposal together with the issues or constraints, if any, which have been taken into account in developing the Proposal.

4.1.2 Topography

4.1.2.1 Existing Topography

Figure 2.1 displays the topography within the Quarry Site prior to the commencement of extraction activities. The Quarry Site is located on the western and southern side slopes of an elevated knoll on the eastern side of the property. The topography within much of the Quarry Site has been altered substantially since extraction activities commenced. Elevations within the Quarry Site vary from approximately 84m AHD on the eastern knoll, to approximately 50m AHD on the northern and southern boundaries of the Quarry Site. Slopes within the northern section of the Quarry Site beyond the existing extraction area generally grade in a northwesterly direction and display gradients of between 5% and 15%. Slopes within the southern section of the Quarry Site grade in a westerly or southwesterly direction and display gradients less than 10%.

4.1.2.2 Constraints

The slopes within the northern section of the Quarry Site display relatively high gradients compared to the surrounding areas, which in turn increases the potential to cause erosive flows when significant rainfall events occur. Soils and water resources are discussed Section 4.2.

4.1.3 Climate

4.1.3.1 Introduction

Climatic conditions have the potential to influence a range of Proposal-related impacts at surrounding residences and throughout the local environment. The climate in the vicinity of Kempsey is referred to as "humid sub-tropical", i.e. warm to hot summers with a strong maritime influence and mild, dry winters with cold nights.

This subsection provides a brief overview of the climatic conditions surrounding the Quarry Site, focusing particularly on those aspects of the climate that are likely to influence the potential Proposal-related environmental impacts.

Meteorological data for the following subsections have been sourced from the Kempsey Airport Bureau of Meteorology (BOM) station (station number - 059007) as it provides the largest data range from 1907 to present. The Applicant has installed a rainfall gauge at the Quarry Site office near the quarry entrance and undertakes daily weather monitoring based upon rainfall gauge results and field observations.

4.1.3.2 Temperature

January is typically the hottest month, with a mean maximum temperature of 29.2°C and a mean minimum temperature of 17.7°C. July is the coldest month with a mean maximum temperature of 19.7°C and a mean minimum temperature of 5.7°C.

4.1.3.3 Rainfall

Mean annual rainfall is 1 220mm, with rainfall distributed unevenly throughout the year. September is the driest month while the mean monthly rainfalls in December to April inclusive are greater than 100mm. Rainfall can be extremely variable with infrequent high intensity rainfall events occurring with some maximum daily rainfall values between 2 and 3.5 times average monthly rainfall values.

4.1.3.4 Wind

Annual and seasonal wind roses for the Quarry Site, generated based on hourly wind speed and direction data extracted from the CALMET-predicted dataset (Environ (2014), **Appendix 5**), are provided in **Figure 4.1**.

Based on the annual wind rose, airflow is predominantly experienced from the southwest to west-northwest and northeastern quadrants at the Quarry Site. The northeasterly component is considered attributable to the topography of the Quarry Site. Calm conditions (wind speeds less than 0.5m/s) are considered to be a function of the surrounding land use and topography. The average predicted wind speed for the 2013 modelling period was 2.7m/s, with a frequency of calm conditions in the order of 21%.

Notable seasonal variation is evident in the wind regime generated for the Quarry Site. The westerly component is most dominant during the autumn and winter months. Summer is dominated by flow from the northeast, while spring experiences a mixture of both southwesterly and northeasterly flow.

4.1.3.5 Constraints

Climatic data provides a basis for planning with respect to air quality, water management, noise enhancement and rehabilitation.

The key season to ensure dust is controlled is summer given the warmer temperatures and the greater frequency of winds from the northeast and eastern sectors.

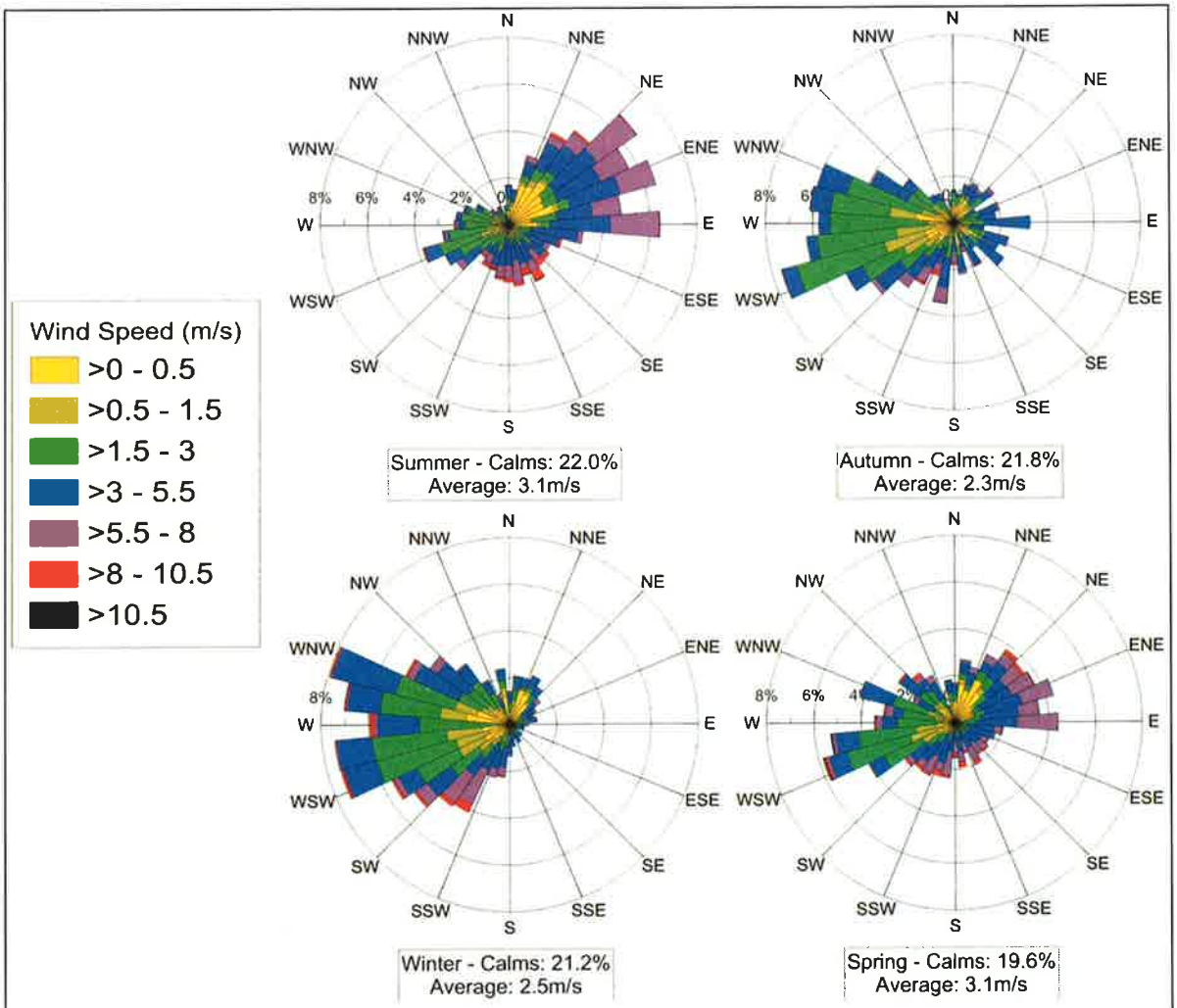

Figure 4.1
WIND ROSES

4.1.4 Local Setting and Land Ownership

4.1.4.1 Local Setting

Figure 4.2 displays the local setting of the Quarry Site. Key features of the local setting are as follows.

- The Quarry Site lies approximately 150m to 200m east of the recently opened dual carriageway for the Pacific Highway.
- Land to the north, east and southeast of the Quarry Site is remnant native vegetation.
- A highway service centre is also currently being constructed approximately 500m south of the Quarry Site, on the eastern side of the Pacific Highway/Macleay Valley Way grade separated interchange (see **Figure 4.2**).

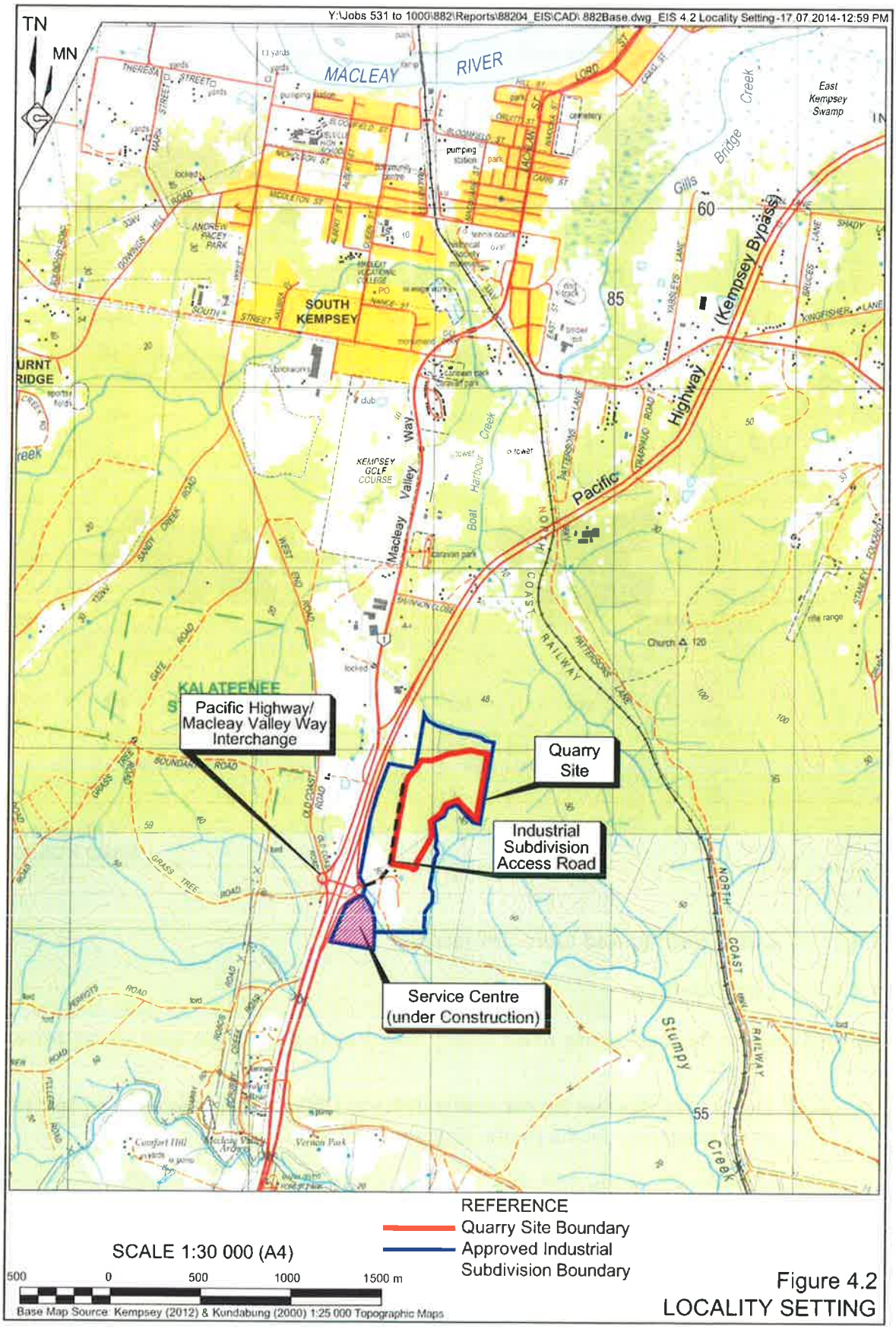

Figure 4.2
LOCALITY SETTING

- A total of four residences are located within 500m of the Quarry Site (see Section 4.1.4.2 for details).
- The Slim Dusty Centre (under construction) is located approximately 530m northwest of the Quarry Site (see **Figure 4.3**).

The Quarry Site is located on an elevated area east of the Pacific Highway. The existing quarry is centred on a northeast-southwest ridge whereas the bulk of the extension to the extraction area is located on a smaller north-south ridge.

Runoff from the Quarry Site flows to the west of the Pacific Highway and then northwards within a tributary of Gills Bridge Creek (see **Figure 4.2**). Gills Bridge Creek is a tributary of the Macleay River.

4.1.4.2 Land Ownership

The land within the approved industrial subdivision is owned by Galban Pty Ltd. **Figure 4.4** displays the ownership of the adjoining land and the residences located on these properties. The closest residences to the Quarry Site are located between 330m and 460m west of closest boundary of the Quarry Site, albeit on the western side of the Pacific Highway with a substantial band of trees between the industrial subdivision and the Pacific Highway (see **Plates 4.1** and **4.2**). No residences are present within 1km of the eastern, northern or southern boundaries of the Quarry Site.

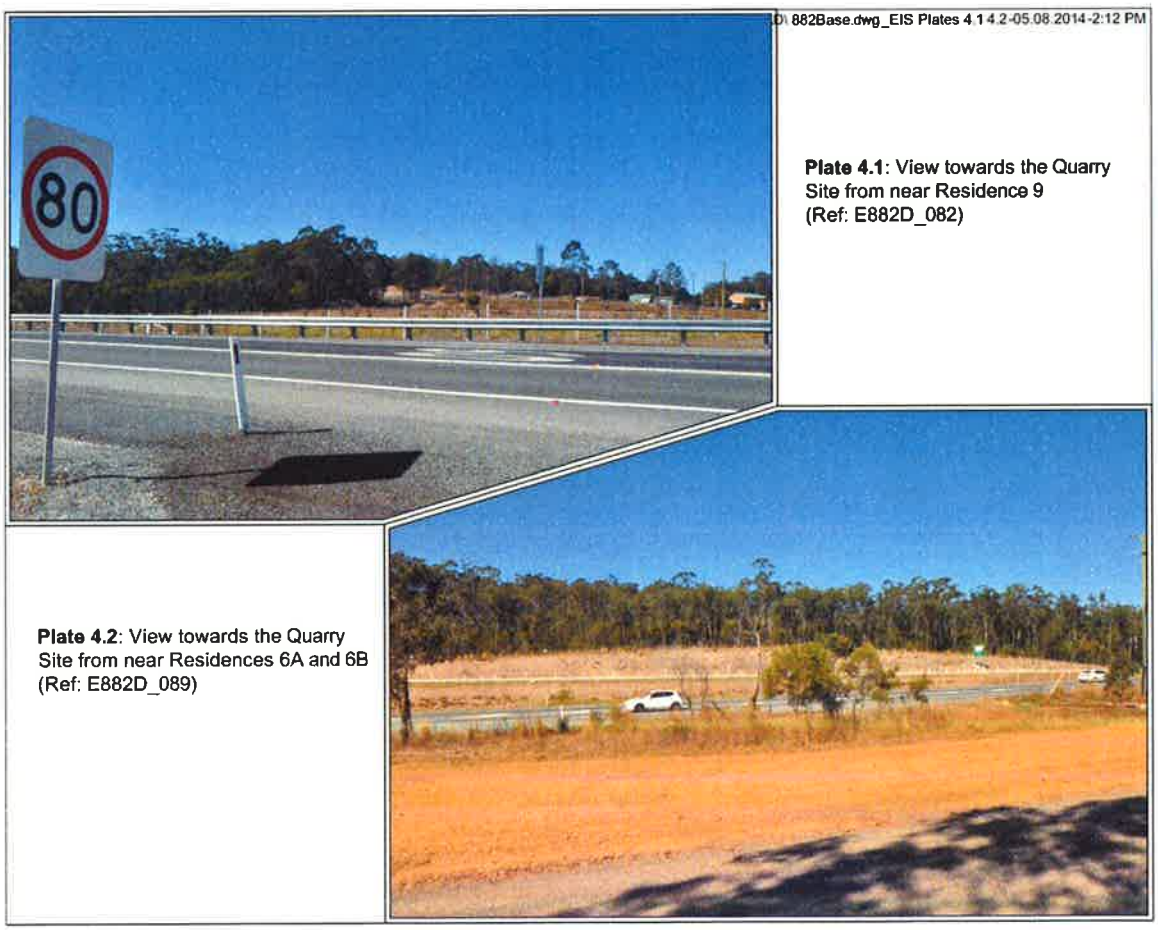

Plate 4.1: View towards the Quarry Site from near Residence 9 (Ref: E882D_082)

Plate 4.2: View towards the Quarry Site from near Residences 6A and 6B (Ref: E882D_089)

Figure 4.3
QUARRY SITE AND SURROUNDS

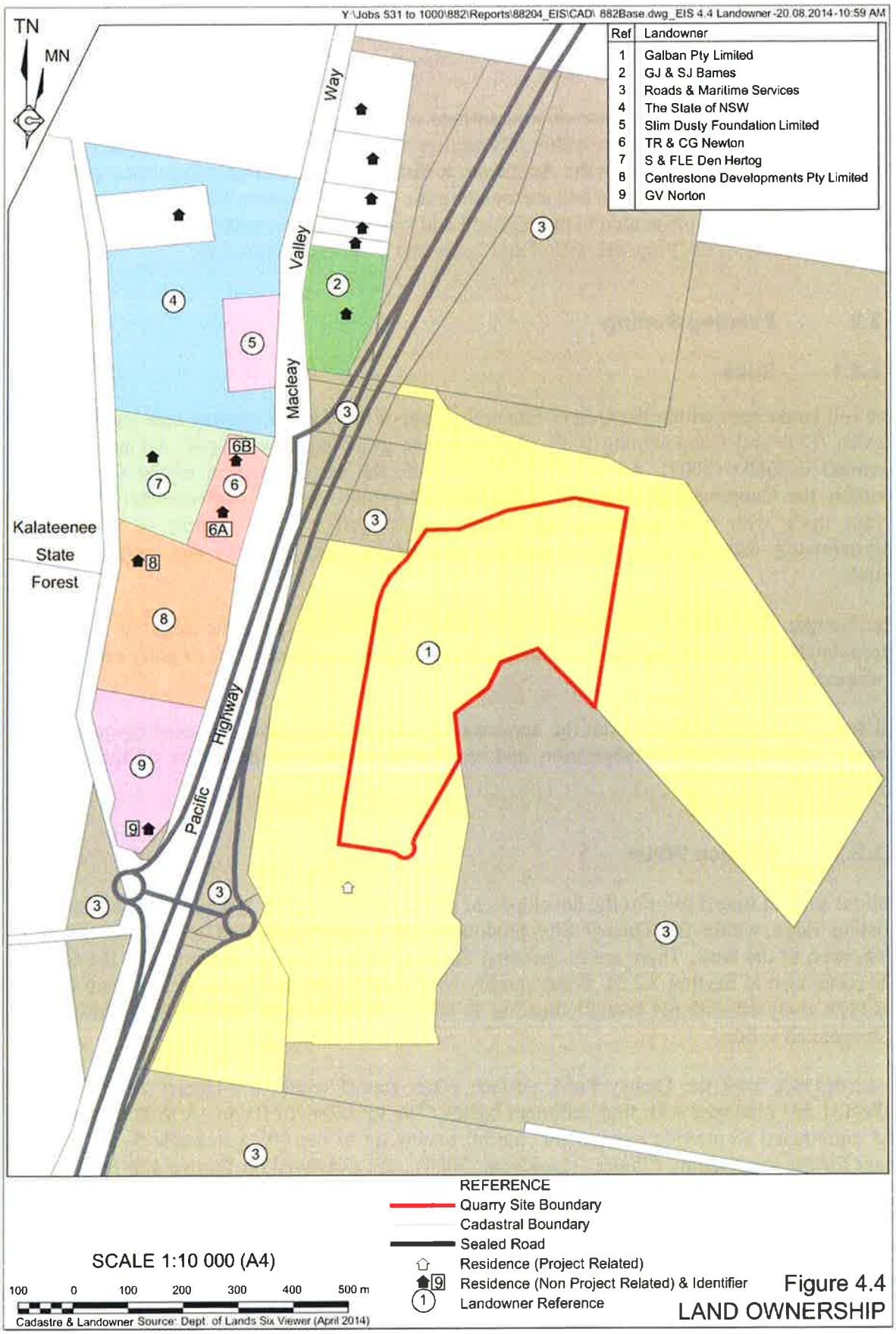

Figure 4.4
LAND OWNERSHIP

4.2 SOIL AND WATER RESOURCES

4.2.1 Introduction

This section provides an overview of soil, surface water and groundwater issues as they relate to the Proposal. The information within this section has been prepared by R.W. Corkery & Co. Pty Limited in consultation with the Applicant. It discusses the existing soil, surface water and groundwater environment within and surrounding the proposed Quarry Site, the safeguards and procedures that are implemented to manage soil and water-related impacts, an assessment of the potential impacts of the Proposal on soil and water and proposed monitoring.

4.2.2 Existing Setting

4.2.2.1 Soils

The soil landscapes within the Quarry Site are typical of the South Kempsey area and comprise Euroka (EU) and Cooperabung (CP) soil landscape groupings based upon Atkinson (1999) recorded in GHD (2007). As shown on **Figure 4.5**, the eastern section of the Quarry Site contains the Cooperabung soils with dark brown topsoils typically approximately 0.05m to 0.15m thick with well-structured red, brown and/or yellow clay subsoils to a depth of approximately 0.2m to 0.8m. These subsoils can display high erosivity and high erodibility values.

The Euroka soils consist of shallow red, yellow and brown podzolic soils to depths of approximately 0.15m which are moderately erodible with a moderate risk to gully erosion due to dispersible subsoils.

All soils have been stripped from the approved extraction area within the existing quarry and blended with the mulched vegetation and stockpiled around the perimeter of the existing extraction area.

4.2.2.2 Surface Water

Natural surface runoff prior to the development of the existing quarry typically flowed from the existing ridge within the Quarry Site predominantly to the north and south with a lesser proportion to the west. There are no existing defined watercourses or dams within the Quarry Site (refer also to Section 3.2.3). Water quality within the basins and water storage dam on site has been analysed with pH levels indicating an acidic signature with comparatively low levels of suspended solids.

In accordance with the Quarry PoM, surface water runoff within the Quarry Site has been collected and managed with four sediment basins. The locations of Basins A to D, constructed and maintained to provide storage for rainfall events up to the 90th percentile 5-day rainfall event for the local setting (75mm – Landcom, 2004)[1], are displayed on **Figure 4.5**. Notably, as the quarry has progressed to its approved perimeter, which is below the surrounding surface elevation, Sediment Basins C and D have been decommissioned. Internal runoff now flows to the main water storage dam located adjacent to the approved western quarry perimeter.

[1] Kempsey is located approximately midway between Coffs Harbour and Port Macquarie. Data from Coffs Harbour, having higher average annual rainfall was used.

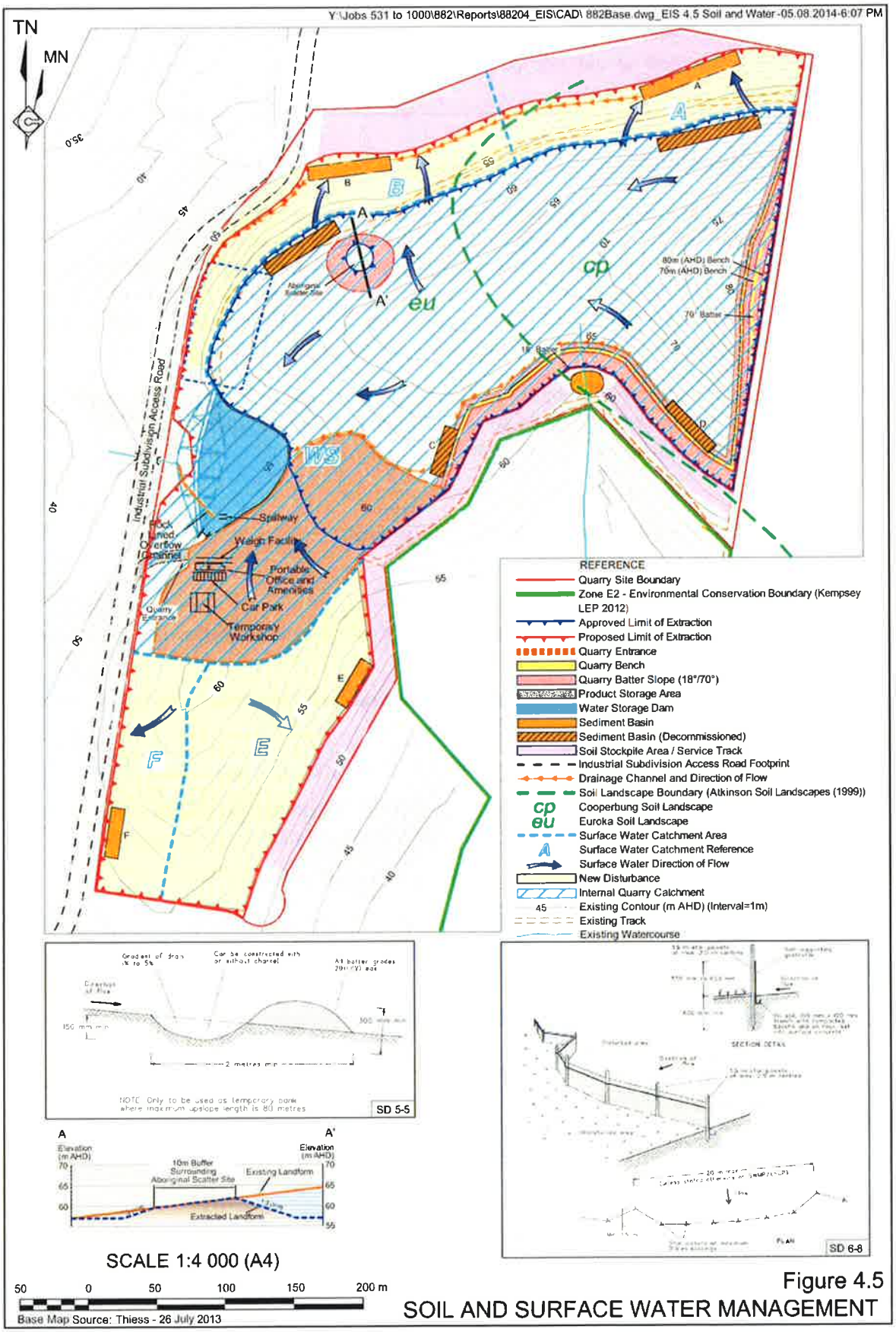

Figure 4.5
SOIL AND SURFACE WATER MANAGEMENT

4.2.2.3 Groundwater

Groundwater has not and would not be intercepted by any quarry operations and is not discussed further in this document.

4.2.2.4 Constraint(s)

Potential soil-related issues in constraining the development of the quarry relate to the high erosivity and erodibility values and the potential for the soils to be washed from the Quarry Site and impacting downstream users and ecosystems. These issues have been alleviated to date by stripping topsoils ahead of extraction activities and stockpiling for future/temporary rehabilitation use and ensuring that the quarry is designed with sufficient surface water controls to manage surface water run-off from disturbed areas of the Quarry Site.

The existing surface water system within the existing quarry has effectively managed rainfall runoff to date and should continue to do so with the extended quarry. Hence, surface water is not considered a major constraint for the Proposal.

4.2.3 Environmental Safeguards and Controls

4.2.3.1 Objectives

The Applicant would continue to operate Farrawell's Quarry with the following objectives in relation to the management of soil and water resources.

- Minimise the potential erosion of natural and stockpiled soils and related sedimentation.
- Minimise the potential for creating high velocity erosive stormwater flows.
- Ensure management practices are in place to minimise the risk of contamination of soils and water by various pollutants throughout the life of the quarry.
- Maintain water quality within downstream watercourses.
- Ensure the quality of runoff discharged from the premises does not exceed pollutant concentration limits currently specified in the current EPL.

4.2.3.2 Operational Safeguards, Controls and Management Procedures

The key management measures to control soil erosion and avoid sediment-laden water (containing >50mg/L of Total Suspended Solids) as they relate to specific areas within the Proposed Quarry Site are as follows.

Extraction Area

Future surface disturbance for the purpose of the extended extraction area would diverted to four sediment basins located on the extraction area perimeter (see **Figure 4.5**). As noted in Section 4.2.2.2, the original sediment basins for the Quarry have been decommissioned as the extraction area has progressed to the approved perimeter resulting in all drainage daring

internally to the main water storage. Basins A and B represent the relocation of the sediment basins constructed and operated in accordance with the existing Quarry PoM to account for runoff from the additional disturbance proposed within Catchments A and B. Basins E and F provide for the capture and management of runoff from disturbance within the previously undisturbed Catchments E and F.

The capacity of each basin has been designed in accordance with Landcom (2004) to capture all water on site, up to a 90th percentile, 5-day event (75mm), and will retain the following minimum capacities.

- Basin A: Capacity 0.6ML / 0.9ha.
- Basin B: Capacity 0.8ML / 1.2ha.
- Basin E: Capacity 0.6ML / 0.9ha.
- Basin F: Capacity 1.2ML / 1.9ha.

Boxes 1 and **2** present the worksheets used to calculate the storage requirements of Basins A, B, E and F. Based on the predicted annual soil loss within each catchment, calculated by considering rainfall erosivity, soil erodibility, slope length and slope gradient, the soil loss rate and classes for each of the catchments have been calculated as follows.

- Catchment A: 590t/ha/yr – Soil Loss Class 5.
- Catchment B: 509t/ha/yr – Soil Loss Class 5.
- Catchment E: 467t/ha/yr – Soil Loss Class 5.
- Catchment F: 481t/ha/yr – Soil Loss Class 5.

Considering the Rainfall Distribution Zone within which the Quarry Site is located (Zone 1) (refer to *Figure 4.9* of Landcom, 2004), the Applicant would avoid soil stripping in Catchments A and B between February and March.

The construction of each sediment basin would precede new disturbance within the affected catchment, i.e. vegetation clearing and soil stripping. Runoff within each catchment would be diverted to the sediment basin by low flow earth bank structures constructed in accordance with Standard Drawing 5-5 of Landcom (2004) (see **Figure 4.5**).

The Applicant notes that the final location of Basins A, B, E and F may be subject to some minor variation at the time of construction to account for practical or operational issues. However, on the basis of the identified catchment sizes and assumptions made regarding other critical parameters (see **Boxes 1** and **2**), the design capacity would equal or exceed that noted above. It is also possible that, depending on the scheduling of vegetation clearing and soil stripping within Catchment F, Basin F may be constructed as two separate smaller basins. Should this be the preferred approach to surface water runoff management, the basin capacities would be recalculated in accordance with the methodology recommended by Landcom (2004).

1. Site Data Sheet

Site Name: Farrawell's Quarry

Site Location: Pacific Highway, 5km South of Kempsey

Precinct:

Description of Site: Basins A, B, E and F

Site area	Sub-catchments						Remarks
	A	B	E	F			
Total catchment area (ha)	0.9	1.2	0.9	1.9			
Disturbed catchment area (ha)	0.9	1.2	0.9	1.9			

Soil analysis (enter sediment type if known, or laboratory particle size data)

Sediment Type (C, F or D) if known:	D	D	D	D			From Appendix C
% sand (fraction 0.02 to 2.00 mm)							Soil texture should be assessed through mechanical dispersion only. Dispersing agents (e.g. Calgon) should not be used
% silt (fraction 0.002 to 0.02 mm)							
% clay (fraction finer than 0.002 mm)							
Dispersion percentage							E.g. enter 10 for dispersion of 10%
% of whole soil dispersible							See Section 6.3.3(e). Auto-calculated
Soil Texture Group	D	D	D	D			Automatic calculation from above

Rainfall data

Design rainfall depth (days)	5	5	5	5			See Sections 6.3.4 (d) and (e)
Design rainfall depth (percentile)	95	95	95	95			See Sections 6.3.4 (f) and (g)
x-day, y-percentile rainfall event	70	70	70	70			See Section 6.3.4 (h)
Rainfall R-factor (if known)	4900	4900	4900	4900			See Appendix B
IFD: 2-year, 6-hour storm (if known)	15.1	15.1	15.1	15.1			See IFD chart for the site

RUSLE Factors

Rainfall erosivity (*R*-factor)	4900	4900	4900	4900			Auto-filled from above
Soil erodibility (*K*-factor)	0.05	0.05	0.05	0.05			RUSLE LS factor calculated for a high rill/interrill ratio.
Slope length (m)	30	35	60	50			
Slope gradient (%)	12	10	7	8			
Length/gradient (*LS*-factor)	1.85	1.60	1.47	1.51			
Erosion control practice (*P*-factor)	1.3	1.3	1.3	1.3	1.3	1.3	
Ground cover (*C*-factor)	1	1	1	1	1	1	

Calculations

Soil loss (t/ha/yr)	590	509	467	481			
Soil Loss Class	5	5	4	4			See Section 4.4.2(b)
Soil loss (m^3/ha/yr)	454	391	359	370			
Sediment basin storage volume, m^3	69	80	55	120			See Sections 6.3.4(i) and 6.3.5 (e)

BOX 1
SOIL LOSS, RUNOFF AND SEDIMENT BASIN DESIGN – SITE DATA WORKSHEET

4. Volume of Sediment Basins, *Type D* and *Type F* Soils

Basin volume = settling zone volume + sediment storage zone volume

Settling Zone Volume

The settling zone volume for *Type F* and *Type D* soils is calculated to provide capacity to contain all runoff expected from up to the y-percentile rainfall event. The volume of the basin's settling zone (V) can be determined as a function of the basin's surface area and depth to allow for particles to settle and can be determined by the following equation:

$$V = 10 \times C_v \times A \times R_{x\text{-day, y-\%ile}} \ (m^3)$$

where:

10 = a unit conversion factor

C_v = the volumetric runoff coefficient defined as that portion of rainfall that runs off as stormwater over the x-day period

$R_{x\text{-day, y-\%ile}}$ = is the x-day total rainfall depth (mm) that is not exceeded in y percent of rainfall events. (See Sections 6.3.4(d), (e), (f), (g) and (h)).

A = total catchment area (ha)

Sediment Storage Zone Volume

In the detailed calculation on Soil Loss Classes 1 to 4 lands, the sediment storage zone can be taken as 50 percent of the settling zone capacity. Alternately designers can design the zone to store the 2-month soil loss as calculated by the RUSLE (Section 6.3.4(i)(ii)). However, on Soil Loss Classes 5, 6 and 7 lands, the zone must contain the 2-month soil loss as calculated by the RUSLE (Section 6.3.4(i)(iii).

Place an "X" in the box below to show the sediment storage zone design parameters used here:

	50% of settling zone capacity,
X	2 months soil loss calculated by RUSLE

Total Basin Volume

Site	C_v	$R_{x\text{-day, y-\%ile}}$	Total catchment area (ha)	Settling zone volume (m^3)	Sediment storage volume (m^3)	Total basin volume (m^3)
A	0.79	70	0.9	497.7	69	566.7
B	0.79	70	1.2	663.6	80	743.6
E	0.79	70	0.9	497.7	55	552.7
F	0.79	70	1.9	1050.7	120	1170.7

Note that designers should achieve a minimum 3:1 length:width ratio in Type D or F basins

BOX 2
SOIL LOSS, RUNOFF AND SEDIMENT BASIN DESIGN –SEDIMENT BASINS WORKSHEET

As is the current management practice, overflow from Basins A and B would continue to be diverted to the main water storage, initially to the current location and then to the proposed future location as the quarry extension results in the decommissioning of this (refer to notes on the water storage dam below). The diversion channels would be constructed in accordance with Standard Drawing 5-5 of Landcom (2004). Further, a pumping arrangement would be implemented to ensure that the storage capacity within each basin is re-instated within 5 days of the cessation of any rainfall event resulting in accumulation of water within the sediment basin(s).

The Applicant also notes a small sediment basin (Basin S), with a capacity of 0.4ML, is located adjacent to the southern boundary of the existing extraction area. Basin S was initially constructed to collect sediment-laden runoff from an adjacent soil stockpile, however, is no longer required. The Applicant proposes to retain Basin S, however, for a possible use towards the end of the quarry life.

Water Storage Dam

The water storage dam was constructed with a 1:2.5 (V:H) outer embankment with a 5m wide rock-lined horizontal spillway on its southern side (see **Figure 4.5**). The overflow from the spillway is rock lined with a drain under the Industrial Subdivision Access Road, allowing runoff to continue on its natural drainage path. The water storage dam would be retained to assist in the management of surface water until the extraction floor approaches 54m AHD. At that stage, a second (long term) water storage dam would be excavated to the north of the existing dam and the existing dam decommissioned and the area around the dam incorporated into the final landform (see Section 2.12.2). The design specifications of the second water storage dam would replicate those of the existing dam.

Soil Stockpiles

The blended soil/mulch stockpiles would continue to be constructed to a maximum average height of approximately 3m to 4m within the 16m to 20m wide corridor around the perimeter of the extended extraction area. The existing topsoil/mulch blended stockpile on the northern side of the extraction area would be pushed further northwards and blended with the in situ topsoil in the northern section of the quarry extension.

The internal face of stockpiles would be constructed to a slope of approximately 30° and effectively form a channel directing flow towards the sediment basins and ultimately the water storage dam. The outer face of each stockpile would be managed in accordance with Standard Drawing 4-1, with sediment fencing installed in accordance with the design detail provided in Standard Drawing 6-8, of Landcom (2004) to minimise the potential generation of suspended material. All sediment fencing would be inspected at least monthly and following substantial rainfall events (i.e. >25mm in 24 hours).

Product Storage Area

The product storage area would drain to the water storage dam via cross flow created by the 1% - 2% slope across the area, i.e. from south to north.

4.2.4 Assessment of Impacts

Soil erosion has the potential to cause sediment-laden water to flow beyond the boundary of the extraction area into the surrounding natural bushland and downstream of the Quarry Site. Potential soil and surface water impacts may include:

- elevated suspended solids in stormwater runoff and subsequent adverse effect on downstream water quality; and
- erosion and sedimentation of downstream waterways through concentrated flows.

The greatest potential impacts would likely occur to the south of the Quarry Site where the land is zoned E2 – Environmental Conservation (as defined in Kempsey LEP 2012).

Accordingly, exposure of soil through clearing and the subsequent stockpiling would be undertaken as proposed. In particular, soil stripping between February and March would be avoided within Catchments A and B with soil stockpiles to be managed in accordance with Standard Drawings 4-1 and 6-8 of Landcom (2004). All surface water runoff in contact with disturbed areas would continue to be contained within the Quarry Site and would be directed into a sediment basin and/or the water storage dam. With these measures in place, impacts on soil and water are expected to be minimal and manageable.

4.2.5 Monitoring

In order to provide information to support the ongoing management of soil and water within the Quarry Site, the following surface water monitoring program would be undertaken throughout the life of the Quarry.

- Collect surface water samples at Discharge Point A i.e. at the overflow from the water storage dam (see **Figure 4.5**) 24 hours prior to discharge.
- Analyse surface water samples for total suspended solids/turbidity and pH through water analysis and probes. Total suspended solids (or equivalent turbidity) levels would be reduced to below 50mg/L before being released with EPA approved flocculants to be used, if required.
- Ensure the following water quality limits are met before discharging from the water storage dam (excluding when the 5 day, 90th percentile rainfall event is exceeded (i.e. >75mm in 5 days).
  - Oil and Grease – not visible (10mg/L)
  - pH – 6.5-8.5 pH units
  - Total Suspended Solids – 50mg/L
- Measure and record rainfall in mm for 24hrs at the same time each day at the on-site rainfall gauge located close to Discharge Point A.
- Maintain records of all samples collected for laboratory and field analysis including the time, date, location, collector's name, results of the analysis and the rainfall amount for the previous 24 hours / 5 days (from the on-site rain gauge).

The results of all surface water monitoring undertaken prior to discharges from Dam A would be kept at the PBM Head Office for at least 4 years.

4.3 TRANSPORTATION AND TRAFFIC

4.3.1 Introduction

This section provides an overview of transportation and traffic issues as they relate to the Proposal. The information within this section has been prepared by R.W. Corkery & Co. Pty Limited in consultation with Pacific Blue Metal Pty Ltd. It discusses the transportation environment surrounding the Quarry Site, the safeguards and procedures that are implemented to manage transport-related impacts and an assessment of the potential impacts of the Proposal on traffic and transportation.

4.3.2 Existing Environment

Access to the Quarry Site is provided by the recently constructed Industrial Subdivision Access Road, which proceeds in a southerly direction before connecting with an interchange that either provides direct access onto the Pacific Highway (i.e. access to the south), or onto Macleay Valley Way that provides direct access to Kempsey township or northwards onto the Pacific Highway.

Macleay Valley Way is a two lane road with a speed limit of 80km/hr from the Pacific Highway interchange to the start of the built-up area of South Kempsey where the speed limit drops to 60km/hr. Prior to the construction of the Kempsey Bypass, Macleay Valley Way formed the section of Pacific Highway through Kempsey and now acts as an urban arterial road.

Daily traffic counts were undertaken in December 2013 on Macleay Valley Way by Kempsey Shire Council approximately 12m north of Shennons Close and reflect current traffic levels on Macleay Valley Way with the Kempsey Bypass in operation. These are provided in **Table 4.1**.

Table 4.1
June 2013 Traffic Counts on Macleay Valley Way

Date	AADT	AADT Heavy Vehicles (Class 5 to 12)	% Heavy Vehicles	Location
Dec 2013	6286	354	5.6%	12m north of Shennons Cl
Source: Kempsey Shire Council				

The quarry entrance was completed during the construction of the Industrial Subdivision Access Road and provides for light and heavy vehicle movements into and out of the Quarry Site.

Due to the construction of the Industrial Subdivision Access Road and Pacific Highway interchange and the fact that the Kempsey Bypass has substantially reduced traffic volumes on Macleay Valley Way, there are no predicted constraints for transportation and traffic relating to the Proposal.

4.3.3 Environmental Safeguards and Controls

A Driver's Code of Conduct was implemented on 14 October 2013 and remains in force. This code would continue to be implemented for personnel and contractors. A copy of the Driver's Code of Conduct is provided in **Appendix 4**.

4.3.4 Assessment of Impacts

4.3.4.1 Trucks Despatched via the Pacific Highway

As discussed in Section 2.8.4, the existing quarry currently despatches from the Quarry Site to the Pacific Highway between 50 and 210 loads of quarry products per day generating 100 to 420 truck movements per day (i.e. one load generates two truck movements). With the approval of the proposed extension to the quarry, this would increase to a maximum number of approximately 250 (500 truck movements) per day throughout the ongoing life of the quarry. Minimum daily movements would typically be between 0 and 20 per day (i.e.10 loads).

The quarry products would continue to be despatched throughout each operational day generally on a regular basis, however, the number of truck loads despatched directly to Pacific Highway upgrade project sites could vary between 5 and 30 per hour. The maximum hourly number of truck loads despatched may occasionally approach 40 per hour.

Given that the trucks would be servicing the upgrade to the Pacific Highway, the volume of product would require transport along the Pacific Highway regardless of its origin. Sourcing the product from Farrawell's Quarry would assist to minimise haulage distances and therefore minimise the distance, and the respective impacts these trucks would generate whilst travelling on the Pacific Highway.

4.3.4.2 Trucks despatched via Macleay Valley Way

Traffic levels when only local projects are being supplied are envisaged to be quite variable and dependent upon the carrying capacity of the trucks used and daily requirements. The number of loads would initially be kept below the limit established through the NSW *Road Noise Policy*, i.e. 14 movements per hour. These trucks would access Kempsey via Macleay Valley Way. The actual number of truck movements per hour would be reviewed on a project by project basis.

The Macleay Valley Way currently carries approximately 6 286 vehicles including 354 heavy vehicles each day (see **Table 4.1**) and the road has until recently served as the Pacific Highway but now has substantially reduced numbers since the opening of the Kempsey Bypass. Overall, the increases in traffic levels attributed to the quarry are considered minor and with the implementation of the Driver's Code of Conduct, traffic impacts on Macleay Valley Way associated with the Proposal are expected to be minimal and manageable.

4.4 AIR QUALITY

4.4.1 Introduction

An *Air Quality Assessment* has been prepared by Environ Australia Pty Ltd (Environ) in consultation with the Applicant and R.W. Corkery & Co. Pty Limited and is provided in **Appendix 5**. This section draws on the information provided in that report and discusses the air quality implications associated with the Proposal, the safeguards and procedures that are implemented to manage impacts on air quality and an assessment of the potential impacts of the Proposal on air quality.

4.4.2 Existing Environment

4.4.2.1 Meteorology

Meteorological mechanisms govern the generation, dispersion, transformation and eventual removal of pollutants from the atmosphere. Dust generation rates are particularly dependent on wind energy and on the moisture budget, which is a function of rainfall and evaporation rates.

Environ used a combination of the following climate data sources together with meteorological modelling to undertake an analysis of the meteorology of the Quarry Site then used in the modelling of the impacts of particulate matter emissions.

- Long-term climate statistics (1939 to 2014) obtained from the Bureau of Meteorology (BoM) Kempsey (Wide Street) climate station (Station Number 059017) located 5.5km north of the Quarry Site.
- 1-hour average meteorological data from the BoM Automatic Weather Station (AWS) at Kempsey Airport (Station Number 059007) located 8km northwest of the Quarry Site.

The meteorological modelling undertaken by Environ identified the following key points.

- Airflow is predominantly experienced from the southwest to west-northwest and northeastern quadrants at the Quarry Site. Flow direction is considered attributable to the topography of the Quarry Site.
- The average predicted wind speed for the 2013 modelling period was 2.7m/s, with a frequency of calm conditions (wind speeds less than 0.5m/s) in the order of 21%. The calm conditions are considered to be a function of the surrounding land use and topography.
- Based on historical data recorded since 1882 in Kempsey, the region is characterised by high rainfall, with a mean annual rainfall of approximately 1 220mm, and an annual rainfall range between 497mm and 2 359mm. Rainfall is most pronounced between December and March, with significantly lower rainfall during the colder months of the year. According to the records, an average of 111 rain days occur per year.
- Autumn and winter typically experience a higher occurrence of neutral to stable atmospheric conditions than spring and summer. Atmospheric instability increases during daylight hours as convective energy increases, while stable atmospheric conditions prevail during night periods due to the occurrence of lower wind speeds and reduced convective mixing

4.4.2.2 Air Quality

The National Pollutant Inventory (NPI) and NSW EPA environment protection licence (EPL) databases were reviewed for significant existing sources of air pollutants in the surrounding region.

The NPI database listed three reporting air emission sources in the Kempsey local government area; two fuel storage operations (2.8km and 4.5km north of the Quarry Site) and the Nestle Beverages facility at Smithtown (15km northeast of the Quarry Site). The NSW EPA EPL database listed a number of minor sources in the surrounding 5km to the Quarry Site, including the Kempsey Shire Council landfill (3.9km to the east) and sewage treatment plant (2.7km to the north).

It was not considered likely that any of the above identified industrial sources would cause significant direct cumulative impacts with emissions from the Quarry Site.

In addition to the above operations, it is considered that the following sources contribute to particulate matter emissions in the vicinity of the Quarry Site.

- Dust entrainment due to vehicle movements along unsealed and sealed public roads.
- Diesel emission from vehicle movements along unsealed and sealed public roads, including the nearby Pacific Highway.
- Wind-generated dust from exposed areas within the surrounding region.
- Dust and diesel emissions from agricultural activities in the Kempsey area.
- Seasonal emissions from household wood burning fires.
- Episodic emissions from vegetation (e.g. bush and grass) fires.
- Sea salts contained in sea breezes.

During the Environmental Assessment stage of the Pacific Highway upgrade between Sapphire and Woolgoolga, the NSW Roads and Traffic Authority (RTA) commissioned the establishment of a real-time air quality monitoring station at Korora, approximately 55km north-northeast of the Quarry Site. This air quality monitoring station was configured to record a range of meteorological and air quality parameters, including PM_{10}.

The results of this monitoring were published in Working Paper 8 of the Environmental Assessment for the Sapphire and Woolgoolga (RTA, 2007). The monitoring station was situated approximately 20 m from the Pacific Highway, 1 km west of the Pacific Ocean and 5 km north-northeast of the central business district of Coffs Harbour. The monitoring station was sited along a section of the Pacific Highway marked with a 100km/hr speed limit. Monitoring was conducted for the period between 14 October 2005 and 31 January 2006.

It was determined that adoption of the Korora RTA monitoring dataset would provide a conservative estimate of baseline air quality in the area surrounding the Quarry Site in the absence of a more recent, local air quality monitoring dataset. Accordingly, the following background concentrations were adopted for use in the air quality assessment.

- Maximum 24-hour average PM_{10} background concentration – $37\mu g/m^3$.
- Annual average PM_{10} background concentration – $18\mu g/m^3$.

4.4.3 Air Quality Criteria

The air quality assessment criteria that would be applicable to the Quarry are those specified by the NSW Environment Protection Authority (NSW EPA) within the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2005), hereafter referred to as the Approved Methods.

Based on Environ's experience, impacts from PM_{10} is the most critical pollutant regarding compliance with NSW EPA assessment criteria. The specific PM_{10} goals that would be applied at surrounding receptors are as follows:

- PM_{10}: A 24-hour maximum of $50\mu g/m^3$.
- PM_{10}: An Annual average of $30\mu g/m^3$.

4.4.4 Environmental Safeguards and Controls

4.4.4.1 Objectives

The Applicant would continue to operate Farrawell's Quarry with the following objectives in relation to the management of air quality.

- Comply with relevant legislation and conditions of the applicable Development Consent and Environment Protection Licence.
- Undertake activities in a manner that would minimise dust generation.
- Maintain the premises in a condition that would minimise dust emissions.
- Minimise adverse air quality-related impacts on the community.

4.4.4.2 Operational Safeguards, Controls and Management Procedures

Air quality management measures that would be implemented throughout the life of the extended quarry are as follows.

- Confine the area of disturbance to the approved area.
- Use of water sprays/trucks to minimise dust emissions from exposed areas on the internal roads.
- Use of dust collection equipment on the blast hole drilling rig.
- Minimise earthmoving activities during periods of high winds (>5m/sec) when blowing towards the residences to the west and northwest of the Quarry Site.
- Apply water (via water sprays) at transfer points on processing equipment, if necessary.
- Ensure vehicles travel within the 30 km/hour speed limit at all times within the Quarry Site and on the Industrial Subdivision Access Road, as well as ensuring all product trucks leaving the Quarry Site are covered as outlined within the Driver's Code of Conduct (**Appendix 4**).

4.4.5 Assessment Methodology

4.4.5.1 Air Quality Assessment Inputs and Assumptions

The following inputs were included in the air quality assessment undertaken by Environ (2014).

Sensitive Receivers

The four closest residences were identified as potential sensitive receivers for the Proposal, as displayed in **Figure 4.3**. Consideration of residences more distant than these was considered unnecessary and the impacts would be less than for those assessed.

Operational Scenarios

To assess the worst case air quality scenarios for the operation of the Proposal, two operational scenarios were considered. They provide representative operational activities at two alternative stages of development of the Proposal. Scenario 1 represents future operations with deepening of existing quarry pit; and Scenario 2 represents future operations with southwestward progression of the active extraction area.

Indicative operational scenario layouts for Scenario 1 and 2 are illustrated in **Figures 4.6** and **4.7** and the activities being undertaken by the equipment summarised in **Table 4.2**.

Table 4.2
Summary of Activities for Scenarios 1 and 2

Page 1 of 2

Source	Scenario 1	Scenario 2
Extraction Operations		
Bulldozer (B1) (Cat D10)	Clearing vegetation	Clearing vegetation
Bulldozer (B2) (Cat D10)	Stripping topsoil	Stripping topsoil
Drill Rig (DR)	Drilling in preparation for a blast	Drilling in preparation for a blast
Excavator (EX) (85t)	Loading ripped and blasted rock into haul trucks	Loading ripped and blasted rock into haul trucks
Haul truck (HT1) (40t)	Being loaded for transfer of material to be processed	Transporting material to be processed at CP2
Haul truck (HT2) (40t)	Unloading material at the CP1	Returning empty from unloading material at CP2
Processing Operations		
Crusher Plant (CP1)	Operating	Operating
Crusher Plant (CP2)	Operating	Operating
Excavator (Ex1) (20t or 40t)	Loading material into the CP1	Loading material into the CP2
Excavator (Ex2) (20t or 40t)	Loading material into the CP2	Loading material into the CP1
Haul truck (HT3) (40t)	Transporting product to Product Storage Area	Transporting product to Product Storage Area
Haul truck (HT4) (40t)	Returning empty from unloading material at CP2	Transporting product to Product Storage Area
Water Cart (WC)	Undertaking dust suppression on internal haul road	-

Table 4.2 (Cont'd)
Summary of Activities for Scenarios 1 and 2

Source	Scenario 1	Scenario 2
Product Loading and Despatch		
Front-end Loaders (FeL1, FeL2 and FeL3) (Cat 980)	Loading trucks at Product Storage Area	Loading trucks at Product Storage Area
Two Product Trucks (PT1 and PT3)	Accessing the Quarry unladen via the Industrial Subdivision Access Road	Accessing the Quarry unladen via the Industrial Subdivision Access Road
Two Product Trucks	PT2 and PT5 exiting the Quarry laden via the Industrial Subdivision Access Road	PT2 and PT4 exiting the Quarry laden via the Industrial Subdivision Access Road.
Three Product Trucks (PT4, PT6 and PT7)	Being loaded within the Product Storage Area	-
One Product Truck (PT8)	Sitting idle waiting to be loaded	-

Emissions Estimation

Fugitive dust sources associated with the operation the quarry were principally quantified through the application of Australian National Pollutant Inventory (NPI) emission estimation techniques, in particular the NPI Emission Estimation Technique Manual for Mining (NPI EETMM, 2012) and United States Environmental Protection Agency (US-EPA) AP-42 emission factors. For this assessment, emissions were estimated for the PM_{10} size fraction only.

Air emissions associated with the quarry would primarily comprise fugitive particulate matter releases. Potential sources of emission were identified as follows.

- Clearing of vegetation, topsoil and overburden by bulldozer.
- Drill and blast activities.
- Loading of blasted rock material to haul trucks for transportation to mobile crush/screen plants.
- Unloading of material and loading to hopper at mobile crush/screen plants.
- Crush/screen plant operation and crushed material stockpile loading.
- Loading of crushed material to haul trucks for transportation to product storage area.
- Unloading from trucks and stockpiling operations at product storage area.
- Loading product material to road trucks for transportation to market.
- Wheel Generated emissions from unpaved (transportation of extracted rock and crushed rock) and paved (Industrial Subdivision Access Road) roads.
- Wind erosion of exposed surfaces at topsoil and overburden emplacement, open pit and active stockpiling areas.

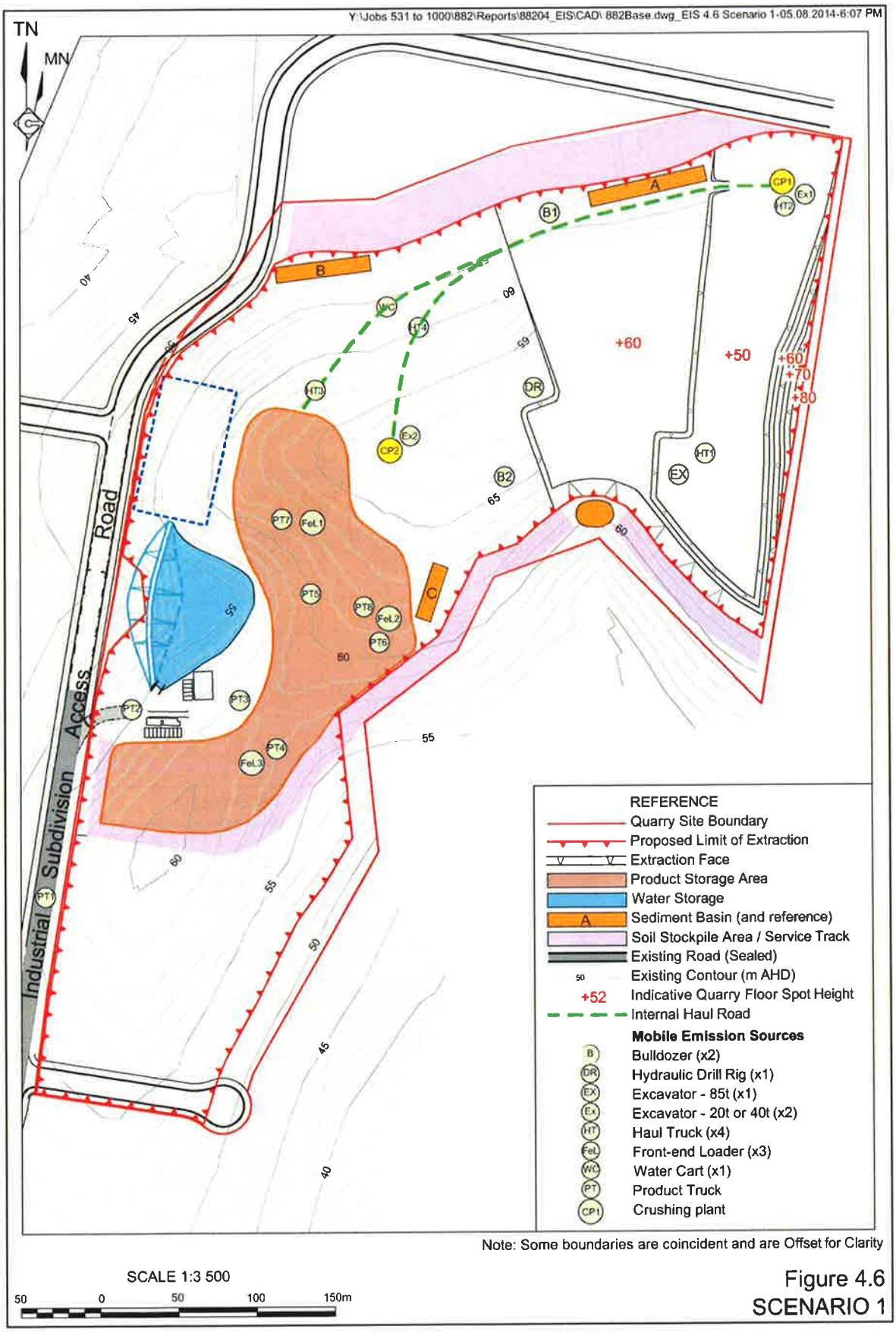

Figure 4.6
SCENARIO 1

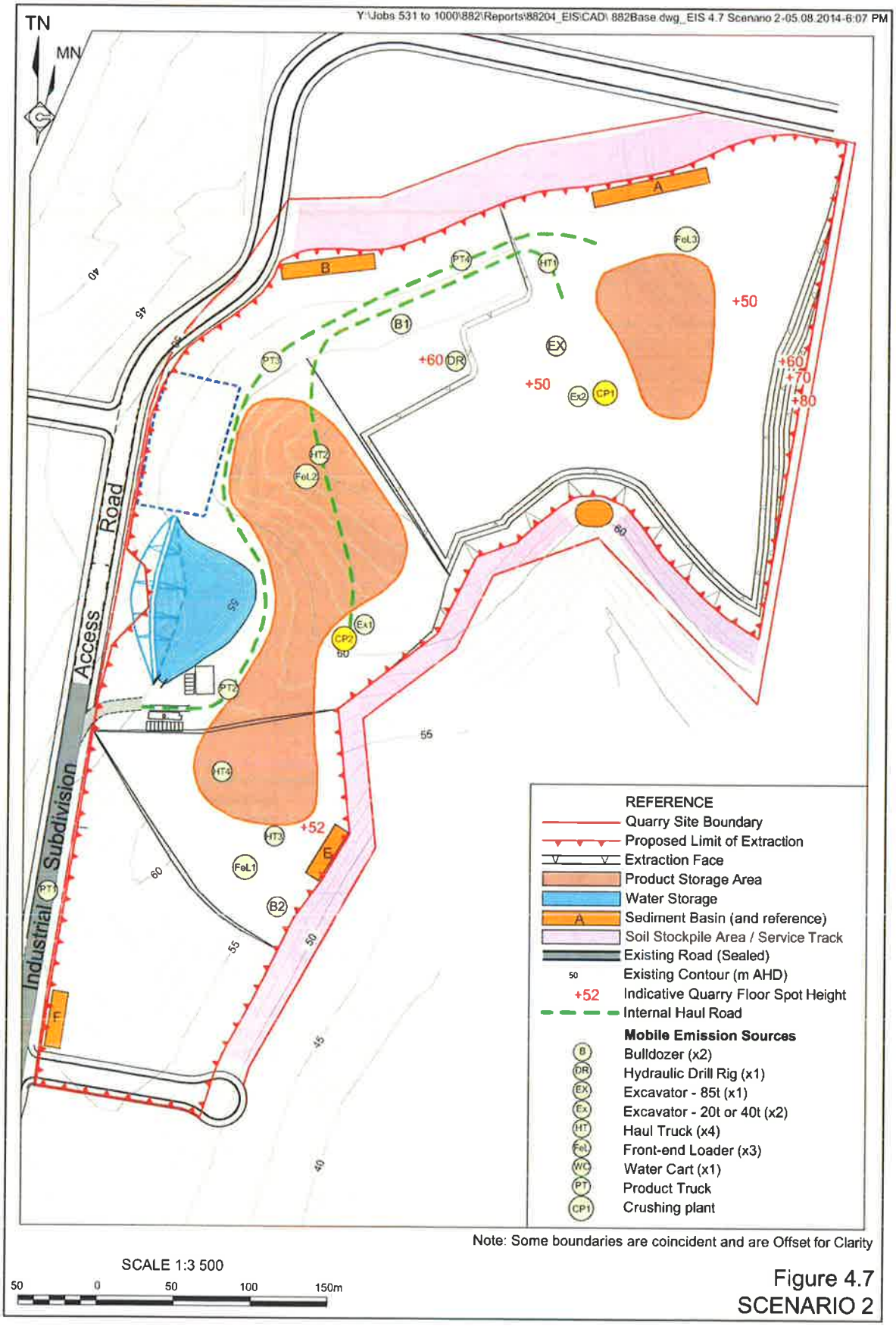

Figure 4.7
SCENARIO 2

Emission Reduction Factors

Based on information provided by RWC and the Applicant, the following control measures have been implemented in the emission calculation process.

- Unpaved roads – 75% reduction for water application (NPI, 2012).
- Crushing and Screening Plant – controlled emission factor (crushing and screening, US-EPA, 2004) and 50% reduction (post crusher transfer, NPI 2012).
- Wind erosion from stockpiles and exposed areas - 50% reduction for watering (NPI, 2012).

Dispersion Modelling

The CALPUFF (Version 6.2) Modelling system was selected for application within the air quality assessment. It comprises three main components: the CALMET meteorological model, the CALPUFF air dispersion model and the CALPOST post-processor, in addition to a large set of pre-processing programs designed to interface the model to standard routinely available meteorological and geophysical databases.

In addition, in the absence of a suitably complete upper air monitoring dataset, the CSIRO's The Air Pollution Model (TAPM) software was used to generate the upper air meteorological parameters required for input within CALMET.

4.4.6 Assessment Results

Dispersion simulations were undertaken and results analysed for PM_{10} concentrations from the Quarry. Cumulative impacts have been assessed by pairing the maximum 24-hour average or annual average Quarry-only PM_{10} increment concentration with the maximum 24-hour average and annual average PM_{10} concentration from the Korora RTA dataset (37µg/m^3 and 18µg/m^3 respectively).

Table 4.3 presents the predicted incremental and cumulative 24-hour average and annual average ground level concentrations of PM_{10} at the selected receptor locations as a result of the proposed future operations at the Quarry Site during each assessed modelling scenario.

Table 4.3
Predicted PM_{10} Concentrations from the Proposal

Receptor	Scenario 1		Scenario 2	
	Quarry-only Increment	Cumulative (Quarry-only + Background)	Quarry-only Increment	Cumulative (Quarry-only + Background)
Maximum 24hr Average PM_{10} Concentration (µg/m^3)- Criterion 50µg/m^3				
R9	5.7	42.7	6.7	43.7
R8	6.6	43.6	5.6	42.6
R6A	5.8	42.8	4.4	41.4
R6B	5.0	42.0	4.6	41.6
Annual Average PM_{10} Concentration (µg/m^3)- Criterion 30µg/m^3				
R9	1.1	19.1	1.5	19.5
R8	1.1	19.1	0.9	18.9
R6A	1.2	19.2	0.9	18.9
R6B	1.0	19.0	0.8	18.8

Source: Environ (2014) – modified after Tables 7 and 8

It can be seen from the results presented in **Table 4.3** that maximum cumulative 24-hour PM_{10} concentrations associated with the proposed extension of the Quarry are predicted to be below the NSW EPA assessment criterion at all surrounding receptors for the two emission scenarios assessed.

It can also be seen that cumulative annual average PM_{10} concentrations associated with the proposed extension of the Quarry are predicted to be below the NSW EPA assessment criterion at all surrounding receptors for the two emission scenarios assessed.

4.4.7 Assessment of Impacts

Model predictions of 24-hour average and annual average PM_{10} concentrations made at the four neighbouring receptors indicate that for the two operational emission scenarios assessed, the potential impacts generated by the quarry would be low. Furthermore, the likelihood of exceedance of the applicable NSW EPA assessment criteria taking background air quality into consideration is low. On the basis of the modelling conducted, it is considered unlikely that the proposed future operations at the Quarry would adversely impact upon the local air quality environment.

4.4.8 Greenhouse Gas Assessment

4.4.8.1 Introduction

Environ has also prepared a greenhouse gas assessment for the Proposal. The following sub-sections have been drawn from Environ (2014) (**Appendix 5**).

4.4.8.2 Greenhouse Gas Emission Sources

A review of existing and future Quarry operations highlighted that there are limited sources of GHG emissions. The key source of emissions would be the consumption of diesel fuel by both mobile quarrying equipment and for the purpose of electricity generation. The Applicant estimates the annual diesel consumption rate for on-site equipment is approximately 504 000L.

GHG emissions would also be generated by the detonation of explosives during blasting operations. Based on assumptions made for blasting at the Quarry Site, an annual explosives use of 153.6t per annum was calculated.

Other minor sources of GHG emissions may be associated with the Quarry, including those generated by waste disposal. These emissions were anticipated to be relatively negligible in comparison with the emission sources listed above and therefore were not considered further in the assessment.

The Quarry Site work shop and office areas have only recently been connected to mains power, while the remainder of plant and equipment would remain diesel powered. Consequently, the consumption of purchased electricity by the Quarry is considered negligible.

4.4.8.3 Calculated Annual Greenhouse Gas Emissions

Table 4.4 provides the calculated annual greenhouse gas emissions (as CO_2-e) for each source detailed above, based on peak operations of the Quarry.

Table 4.4
Predicted Annual Greenhouse Gas Emissions for the Quarry

Emission Source	Total (t CO2-e)
Diesel – On-site Usage	1359.6
Explosives	27.7
TOTAL	1387.3
Source: Environ (2014) – Table 10	

The diesel usage for the trucks delivering the quarry products to the Pacific Highway upgrade sites would be approximately 225 000 litres per year.

4.4.8.4 Assessment of Impacts

The most recently published annual GHG emissions for NSW and Australia were sourced from the State and Territory Greenhouse Gas Inventories 2011-2012 (DoE, 2014). According to this Inventory, annual GHG emissions for NSW and Australia in 2011-2012 totalled 165.6 Mt and 554.9 Mt CO2-e/yr respectively.

Quarry-generated direct GHG emissions represent 0.0008% and 0.0003% of annual NSW and Australian GHG emissions.

4.5 NOISE AND VIBRATION

4.5.1 Introduction

A *Noise and Vibration Impact Assessment* has been prepared by Spectrum Acoustics Pty Ltd in consultation with the Applicant and R.W. Corkery & Co. Pty Limited and is provided in **Appendix 6**. This section draws on the information provided in that report and discusses the noise and vibration implications associated with the Proposal, the safeguards and procedures that are implemented to manage impacts on noise levels and an assessment of the potential impacts of the Proposal.

4.5.2 Existing Environment

4.5.2.1 Meteorology

Section 4.1.3 provides a summary of the existing climate, however for the purposes of the noise assessment a review of the atmospheric conditions most relevant to a day time noise assessment was undertaken and determined that:

- the extremes of relative humidity are rarely experienced in the South Kempsey area. For modelling purposes a value of 70% was adopted; and

- wind data from the Kempsey Airport for 2011 established that winds occur for greater than 30% of the time at a speed of 3m/s or less from the east in summer and from the west in autumn and winter.

A wind speed of 3m/s at 10m above ground level from the east and also from the west was used in the modelling to determine the noise impact under each of these prevailing wind conditions.

4.5.2.2 Ambient Noise Levels

The ambient acoustic environment around the Quarry Site was established through a program of unattended noise logging undertaken at two locations in July/August 2013 prior to the commencement of extraction activities. The noise logging locations are shown in **Figure 4.3**. Noise levels were measured at each location for a period of at least seven days. Each logger was programmed to continuously register environmental noise levels over the 15 minute intervals. **Tables 4.5** and **4.6** show the tabulated results for the Leq and L90 levels for the day, evening and night time periods. Leq is the equivalent continuous noise level which is indicative of an "average" noise level. L90 is the 90% of the total sample period and is referred to as the background noise level.

Table 4.5
Measured Ambient Noise Levels – Logger 1

Date	Leq (day)	Leq (eve)	Leq (night)	L90 (day)	L90 (eve)	L90 (night)
30/7/13	61.9	61.2	60.5	51.1	46.6	39.3
31/7/13	60.7	59.8	59.1	49.2	41.7	36.6
01/8/13	60.9	61.1	60.5	49.9	48.3	40.9
02/8/13	60.5	59.7	58.5	48.2	45.1	36.2
03/8/13	58.7	57.2	53.9	47.0	37.9	25.4
04/8/13	59.4	60.9	57.4	45.2	46.0	28.7
05/8/13	60.5	61.4	61.1	47.5	48.3	39.0
LAeq	**60**	**60**	**59**			
L90				**48**	**46**	**37**
Source: Spectrum Acoustics (2014) – Table 2						

Table 4.6
Measured Ambient Noise Levels – Logger 2

Date	Leq (day)	Leq (eve)	Leq (night)	L90 (day)	L90 (eve)	L90 (night)
30/7/13	56.4	56.1	55.2	49.2	46.0	38.7
31/7/13	55.5	54.9	54.1	48.6	41.1	36.0
01/8/13	55.7	56.1	55.4	48.9	47.3	39.8
02/8/13	55.0	54.5	53.1	47.0	44.5	36.8
03/8/13	53.2	53.0	49.6	45.4	39.3	24.5
04/8/13	54.1	56.1	53.0	44.6	45.1	29.8
05/8/13	55.3	56.1	56.0	46.6	47.4	37.3
LAeq	**55**	**55**	**54**			
L90				**47**	**45**	**37**
Source: Spectrum Acoustics (2014) – Table 3						

4.5.2.3 Constraint(s)

The presence of the Pacific Highway between the Industrial Subdivision Access Road and the closest residences would result in noise not being a major constraint. Notwithstanding this, the Applicant is aware that on-site noise controls are required when equipment is operating in more exposed locations. The Applicant would continue to consult with the occupants of the closest residences to ensure that noise is not an issue for concern.

4.5.3 Noise Criteria

Quarry Operations

As the quarry would only be operated during the day time and the Quarry Site is not subject to any significant industrial noise, the Intrusiveness criterion is the applicable noise criteria for the Proposal. The Intrusiveness criteria is set based on the Rating Background Level (RBL) for the time period plus 5dB(A). The RBL is defined as the overall single figure background level (L90) representing each assessment period (in this case daytime only). The L90 for Logger 2 was adopted as this would result in a more stringent criterion. The applicable noise criterion for the activities undertaken within the Quarry Site is therefore 52dB(A) Leq (15 min).

Product Transportation

Traffic generated by the Proposal would continue to travel from the quarry entrance via the Industrial Subdivision Access Road and onto the Pacific Highway via the short section of Macleay Valley Way. Vehicles travelling to other local projects would continue along Macleay Valley Way before eventually disseminating into the local road network. Potential noise impacts in the vicinity of the quarry are therefore assessed against the criteria for traffic noise on a freeway/arterial/sub-arterial road and a local road in accordance with the definitions in the *NSW Road Noise Policy* (RNP). **Table 4.7** provides the applicable criteria for the traffic generated noise.

Table 4.7
Traffic Noise Criteria

Situation	Recommended Criteria	
	Day (7am – 10pm)	Night (10pm – 7am)
3. Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments.	60 Leq (15 hr) External	55 Leq (9 hr) External
6. Existing residences affected by additional traffic on existing local roads generated by land use developments.	55 Leq (1 hr) External	50 Leq (1 hr) External
Source: Spectrum Acoustics (2014) – Table 5		

Blasting

For blasting, the annoyance criteria have been adopted as these are the most stringent. The Annoyance Criteria (Australian and New Zealand Environment and Conservation Council (ANZECC), *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration – September 1990*) are summarised as follows.

- The recommended maximum overpressure level for blasting is 115dB.

- The level of 115dB may be exceeded for up to 5% of the total number of blasts over a 12-month period, but should not exceed 120dB at any time.
- The recommended maximum vibration velocity for blasting is 5mm/s Peak Vector Sum (PVS).
- The PVS level of 5mm/s may be exceeded for up to 5% of the total number of blasts over a 12 month period, but should not exceed 10mm/s at any time.
- Blasting should generally only be permitted during the hours of 9am to 5pm Monday to Saturday and should not take place on Sundays and public holidays.
- Blasting should generally take place no more than once per day.

4.5.4 Environmental Safeguards and Controls

4.5.4.1 Objectives

The Applicant would continue to operate Farrawell's Quarry with the following objectives in relation to the management of noise.

- Comply with relevant legislation and consent conditions.
- Undertake activities in a manner that would minimise noise generation from the quarry.
- Maintain the premises in a condition that would minimise noise emissions from the quarry.
- Minimise adverse noise impacts on the community.

4.5.4.2 Operational Safeguards, Controls and Management Procedures

Noise management measures that would be implemented throughout the life of the quarry to manage potential impacts and achieve compliance are as follows.

- Ensure haul trucks do not enter, or leave the quarry outside of the nominated hours of operation.
- Ensure all mobile equipment operating on site is maintained in good working order.
- Operate all plant and machinery with factory-fitted controls such as engine covers and mufflers.
- Maintain a stockpile of pushed-up or blasted rock (up to 4m high) adjacent to the crushing and screening units as long as possible to shield noise from the crushing and screening activities.
- Reduce drop heights during the loading of blasted rock to reduce the generation of impact noise.
- Ensure internal roads are well maintained to minimise body noise from empty trucks.

As nominated in correspondence from Kempsey Shire Council (**Appendix 2**), the vegetation adjacent to the western boundary of the Proposed Quarry Site would be retained as long as possible to achieve a visual screen between the operations and the Pacific Highway. This would also assist to minimise dust and noise impacts at residences west of the Pacific Highway.

4.5.5 Assessment Methodology

4.5.5.1 Noise Assessment Inputs and Assumptions

The following inputs were included in the operational noise assessment undertaken by Spectrum (2014).

Sensitive Receivers

The four closest residences were identified as potential sensitive receivers for the Proposal, as displayed in **Figure 4.3**.

Operational Noise Scenarios

Two worst case operational noise scenarios were considered by Spectrum (2014). These scenarios, which are described in Section 4.4.5.1 and displayed in **Figures 4.7** and **4.8**, provide representative operational activities at two representative stages of development of the Proposal.

Operational Noise Modelling

Predictive noise modelling was undertaken by Spectrum (2014) using the Renzo Tonin and Associate's *Environmental Noise Model v3.06* (ENM) software for each of the atmospheric scenarios described earlier (Section 4.5.2.1).

Road Transport Scenarios and Modelling

In preparing the assessment of road transport noise levels, the methodology adopted was sourced from the commonly accepted US Environmental Protection Agency document No. 550/9-74-004 *Information on Levels of Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974*. The assessment was undertaken to calculate the minimum distance to achieve compliance with the noise criteria for each of a local road and freeway-arterial road.

The following inputs/assumptions were included in the assessment of road transport noise levels.

Scenario 1 involved 500 truck movements on the Pacific Highway over a 10 hour day time period. Vehicles were assumed to be travelling on the highway at an average speed of 90km/hr.

Scenario 2 involved the identification of the maximum number of truck movements per hour that could travel on the Macleay Valley Way and remain in compliance with the NSW *Road Noise Policy*. Vehicles were assumed to be travelling on local roads at an average speed of 60km/hr.

Blasting Scenarios

Each proposed blast would be designed to fragment between approximately 20 000 and 30 000 tonnes of material. This would equate to about two production blasts per month. A number of smaller, development blasts may also occur to restructure areas for rehabilitation or prepare areas for production blasts.

Typical hydraulic blast hole rigs would be utilised drilling holes of approximately 150mm diameter, charging the holes with explosive and firing shots using non-electric detonators with appropriate delays to control airblast overpressure and ground vibration.

Standard equations for predicting blast overpressure and ground vibration levels were sourced from the United States Bureau of Mines. These are described in Section 5.4 of Spectrum (2014) (**Appendix 6**).

4.5.6 Assessment Results

4.5.6.1 Predicted Operational Noise Levels

Predicted noise levels under neutral atmospheric conditions and with a modelled prevailing wind direction from the east and west are provided in **Table 4.8**. All modelled results predict noise levels below the Proposal-specific noise criteria of 52dB(A)$_{Leq(15min)}$.

Table 4.8
Modelled Calculation Results

Receiver	Neutral Atmospheric Conditions	Modelled East Wind	Modelled West Wind	Criterion
Scenario 1				
8	37.8	49.2	40.0	52
6A	36.6	49.8	41.1	52
6B	39.9	48.2	40.6	52
9	41.1	47.8	38.4	52
Scenario 2				
8	44.0	50.1	40.7	52
6A	42.0	47.7	39.1	52
6B	44.2	47.8	41.1	52
9	45.6	50.4	41.9	52
Source: Spectrum Acoustics (2014) – modified after Tables 9 to 11				

4.5.6.2 Road Traffic Noise Assessment

Table 4.9 records that traffic noise levels would be below the day time criterion for a freeway/arterial road at the façade of all receivers greater than 15m from the centre of traffic on the Pacific Highway. There are no receivers in this zone.

Table 4.9 also records that traffic noise levels would be below the day time criterion for a local road at the façade of all receivers greater than 10m from the centre of traffic. It is unlikely that there would be any receivers in this zone.

Table 4.9
Daytime Road Traffic Noise

	Unit	Freeway/Arterial Road	Local Road
Assumed speed of vehicles	km/hr	90	60
Typical Operating Sound Power at assumed speed	dB(A)	110	107
Distance loss to receiver	m	32	28
Received maximum noise	dB(A)	78	79
Traffic volume	vehicles/hr	500	12
Time each vehicle audible	mins	0.07	0.04
Background noise level	dB(A)	48	48
Calculated traffic noise	dB(A)(Leq 1hr)	60	55
Criterion	dB(A)(Leq 1hr)	60	55
Source: Spectrum Acoustics – modified after Tables 12 and 13			

4.5.6.3 Blasting and Vibration Assessment

Table 4.10 lists the predicted overpressure and ground vibration levels at a sequence of distances from a blast within the Quarry Site. The nearest residence to blasting would be approximately 500m to the west of the closest sections of the pit.

Table 4.10
Predicted Blast Noise and Vibration Levels

Distance	Peak Particle Vibration (mm/s)	Overpressure dB Linear
Criterion	5 + exceedances for up to 5% per year but not exceeding 10	115 + exceedances for up to 5% per year but not exceeding 120
500m	0.95	114
750m	0.50	110
1000m	0.31	107
1500m	0.16	103
Source: Spectrum Acoustics – Table 14		

The results in **Table 4.10** demonstrate that received noise and vibration levels from a typical blast would not exceed the relevant criteria at the nearest receiver. As all other receivers are more distant from the quarry, further assessment of impacts at these receivers is not considered warranted.

4.5.7 Assessment of Impacts

Based on the predictive assessments undertaken by Spectrum Acoustics (2014) and the results of blast monitoring to date, the extension of Farrawell's Quarry is not expected to exceed the adopted criteria for noise or vibrations and therefore would result in negligible impact to residential properties surrounding the Quarry Site and residences along the transport routes used by quarry-related trucks. This conclusion is supported by blast monitoring results recorded to date with airblast overpressure levels all ≤112dB(L) and ground vibrations typically <1mm/sec.

4.5.8 Monitoring

The Applicant proposes to commission independent noise monitoring in the event of a justified noise-related complaint.

All blasts would continue to be monitored at Residence 6A.

4.6 FLORA AND FAUNA

4.6.1 Introduction

This section provides an overview of flora and fauna issues as they relate to the Proposal. The information within this section has been prepared by R.W. Corkery & Co. Pty Limited in consultation with the Applicant and draws on the information from a number of other reports as referenced. In addition, Kendall and Kendall (2014) undertook a survey to identify hollow-bearing trees within the proposed extraction area, which is also referred to.

This section discusses the flora and fauna environment surrounding the Quarry Site, the safeguards and procedures that are implemented to manage impacts on flora and fauna and an assessment of the potential impacts of the Proposal on flora and fauna.

4.6.2 Existing Environment

A Flora Assessment (Idyll Spaces, 2007) was undertaken as part of the 2007 EIS, identifying that the vegetation within the Quarry Site was characterised as Clarence-Macleay Dry Sclerophyll Forest, comprising three distinct forest vegetation associations within this community. They include:

- *Corymbia maculata* – Eucalyptus siderophloia Open Forest;
- *Eucalyptus seeana* – Eucalyptus globoidea Open Forest; and
- *Eucalyptus siderophloia* – Eucalyptus carnea Open Forest.

No threatened flora species, populations and endangered communities, as well as no critical habitats, were observed by Idyll Spaces during the 2007 field survey.

A Fauna Assessment (Kendall and Kendall, 2007) was also undertaken as part of the 2007 EIS, identifying the likely presence of the following four threatened microbat species listed in Schedule 2 of the TSC Act (1995).

- East Coast Freetail-bat (Confident) *Mormopterus norfolkensis.*
- Hoary Wattled Bat (Probable) *Chalinolobus nigrogriseus.*
- Little Bentwing-bat (Confident) *Miniopterus australis.*
- Eastern Bentwing-bat (Confident) *Miniopterus schreibersii oceanensis.*

Other threatened species listed under the schedules of the TSC Act (1995) were considered possible to occur within the Quarry Site but were not recorded during the fauna survey.

The Quarry Site does not contain potential Koala habitat as defined in SEPP 44.

Kendall and Kendall undertook a further survey in 2014 to identify hollow-bearing trees within the proposed extension area. Eleven hollow-bearing trees were identified as shown in **Figure 4.3**, eight within the proposed extension area.

Due to the vegetation clearing activities undertaken to date and approval to clear the remainder of the vegetation within the Quarry Site (as approved within the industrial subdivision Development Consent), there are minimal ecological constraints upon the Proposal.

4.6.3 Environmental Safeguards and controls

4.6.3.1 Objectives

The Applicant would continue to operate Farrawell's Quarry with the following objectives in relation to the management of flora and fauna.

- Comply with relevant legislation and consent conditions.
- Avoid injuring to individual fauna species during vegetation clearing.
- Minimise disturbance to vegetation outside the defined extraction area throughout the life of the quarry.

4.6.3.2 Operational Safeguards, Controls and Management Procedures

Flora and fauna management measures that would be implemented throughout the life of the quarry to manage potential impacts are as follows.

- The extended Quarry Site boundary would be defined prior to operations within the extended quarry to ensure vegetation to the southeast of the Quarry Site within the E2 Environmental Conservation Zone is not disturbed.
- A trained wildlife carer would be engaged to inspect the eight hollow-bearing trees to be felled that may contain possible fauna habitat (see **Figure 4.3**). All potential habitat trees would be subjected to minor noise and/or vibration actions for at least 48 hours to encourage any fauna within the hollows to relocate to another area. Following the 48 hours, hollow-bearing trees would be felled under the supervision of the carer.
- All cleared vegetation would be mulched and blended with soil stockpiles and placed adjacent to the extraction boundary, see **Figure 2.1**. At no time would any cleared vegetation be burnt.
- Erosion and sediment control structures would be maintained and operated correctly to prevent potential ecological impacts occurring downstream of the Quarry Site, particularly to the south.
- All earthmoving equipment brought to the Quarry Site would continue to be comprehensively washed prior to arrival.

- Ongoing weed eradication programs would be conducted within the quarry focusing on the perimeter stockpiled topsoil/mulch mix, if necessary.

As indicated in the correspondence from Kempsey Shire Council, the vegetation adjacent to the western boundary of the Quarry Site would be retained as long as possible to achieve a visual screen between the operations and the Pacific Highway. This would assist to minimise dust and noise impacts on residences west of the Pacific Highway.

4.6.4 Assessment of Impacts

Potential impacts to existing flora and fauna communities during the operation of the proposed quarry include:

- clearing of vegetation;
- loss of overall habitat;
- modified landscape and soil conditions; and
- potential introduction and spread of weeds, including noxious species.

As the clearing of the vegetation is already approved within the industrial subdivision Development Consent, and impacts associated with the clearing of the vegetation can be minimised and managed through the proposed safeguards and controls, impacts on flora and fauna associated with the Proposal are expected to be minimal.

4.7 ABORIGINAL HERITAGE

4.7.1 Introduction

An *Aboriginal Heritage Report* has been prepared by Archaeological Surveys and Reports Pty Ltd (ASR) in consultation with the Applicant and R.W. Corkery & Co. Pty Limited and is provided in **Appendix 7**. This section draws on the information provided in that report and discusses the implications on Aboriginal heritage associated with the Proposal, the safeguards and procedures that are implemented to manage impacts, and an assessment of the potential impacts of the Proposal on Aboriginal heritage.

4.7.2 Existing Setting

4.7.2.1 Local Setting

An initial cultural heritage investigation was undertaken in 1988 with the results of the fieldwork identifying a single scatter site located in the northwestern section of the extraction area, NPWS Site no. 30-3-111 (see **Figure 2.1**). The site was recorded in a cleared paddock of grasses and bracken and introduced pasture grasses. It was described as being on an access track to service an electricity line, neither of which exists today. The scatter was identified as approximately a dozen quartz flakes and two highly weathered chert flakes in an area of 25m by 25m.

In 2003, a secondary detailed cultural heritage investigation was undertaken by ASR (ASR 2003), in conjunction with the Kempsey Local Aboriginal Land Council over the entire industrial subdivision, identifying no additional sites. During the 2003 fieldwork, the scatter site identified in 1988 could not be relocated. ASR (2003) concluded that there was a very low likelihood for archaeological material to be present within the area of the industrial subdivision principally due to the site's proximity to water and its slopes and dense vegetation.

Following approval of the existing quarry, a "no-go" area was established around the recorded location of the scatter including a buffer of 10m (see **Figure 1.3**). Extraction then proceeded leaving the recorded site as an island within the extraction area.

4.7.2.2 Constraints

In order to deepen the current extraction area, the recorded scatter would require removal, i.e. if it could be re-located. In the event it cannot be re-located, no further approval is required.

4.7.3 Methodology

On 28 May 2014, ASR advertised for registered Aboriginal stakeholder groups in the Macleay Argus newspaper and subsequently received responses from two of the 14 Aboriginal Stakeholder groups in the area.

On 18 June 2014, ASR attended the quarry to inspect the recorded location of the scatter, however, the scatter could again not be relocated.

As the scatter cannot be located, an AHIP is not relevant and the scatter cannot be "harmed" as defined by the *National Parks and Wildlife Act 1974*. The scatter also cannot be removed from the AHIMS site register.

ASR has now prepared their report (provided in **Appendix 7**) stating the artefactual material could not be found and as such an AHIP is not relevant. The report has been sent to the 14 Aboriginal stakeholder groups for comment, and the groups invited to attend the site for an inspection.

Invitations were despatched to all stakeholders for a site inspection on 30 July 2014. Given no stakeholders attended this inspection, a further invitation was despatched for an inspection on 8 August 2014. Again, no stakeholders attended on this inspection day. As a consequence of these arrangements, ASR concluded that "Aboriginal people were satisfied with the draft report".

4.7.4 Environmental Safeguards and Controls

4.7.4.1 Objectives

The Applicant would continue to operate Farrawell's Quarry with the following objectives in relation to the management of heritage.

- Maintain effective heritage management practices throughout the quarry.
- Minimise potential heritage impacts during quarry-related activities.

4.7.4.2 Operational Safeguards, Controls and Management Procedures

Cultural heritage management measures that would be implemented throughout the ongoing operation of the quarry to manage the potential impacts are as follows.

- The Operator would provide for induction training, detailing how to identify Aboriginal artefacts should they be unearthed during clearing and excavation works. Records would be kept of personnel who have undertaken and completed the induction training.
- If an Aboriginal object is identified, the Operator would instigate an Unanticipated Finds Protocol as detailed below.

In the event that previously unrecorded or unanticipated Aboriginal object(s) are encountered:

1. All ground surface disturbance in the area of the find(s) would cease immediately.
   a) The discoverer of the find(s) would notify machinery operators in the immediate vicinity of the find(s) so that work can be halted; and
   b) the Quarry Manager would be informed of the find(s).
2. If there is substantial doubt regarding an Aboriginal origin for the find(s), the qualified opinion from an archaeologist would be sought as soon as possible. If clarification cannot be gained quickly, or the identification is positive, then proceed to (3).
3. The following authorities or personnel would be immediately informed of the discovery:
   a) OEH (Grafton Office; ph. 02 6641 1500); and
   b) Kempsey LALC: ph. 02 6562 8971.
4. In co-operation with the appropriate authorities and Kempsey LALC, the following would be facilitated:
   a) the recording and assessment of the finds;
   b) fulfilling any legal constraints arising from the find(s); and
   c) the development and conduct of appropriate management strategies (which would depend on Aboriginal consultation and the assessment of the significance of the find(s)).
5. Where the find(s) are determined to be Aboriginal Objects as defined by the NPW Act (1974), any re-commencement of surface disturbance would only resume in the area of the find(s) following compliance with any consequential legal requirements and gaining written approval from OEH (as required).

In the event that unanticipated suspected human remains are uncovered:

- all ground surface disturbance in the area of the find(s) would be ceased immediately, the remains would not be touched.

- the Quarry Manager would be immediately informed and he/she would organise for a qualified professional opinion – usually the police in the first instance.
- a temporary buffer zone of 20m x 20m would be established around the find spot. No authorised entry or earth disturbance would be allowed until the identified find has been assessed.
- Only when the item or relic has been adequately assessed, addressed and dealt with by the aforementioned parties would work resume in the vicinity of the find.

4.7.5 Assessment of Impacts

As the scatter cannot be located, the scatter cannot be "harmed" as defined by the NPW Act 1974, nor is an AHIP relevant.

Due to the low likelihood of further archaeological sites, minimal constraints in relation to cultural heritage exist within the Quarry Site. The management and mitigation methods outlined in Section 4.7.4 would ensure that if encountered, sites or objects of heritage value would be protected.

4.8 VISIBILITY

4.8.1 Introduction

This section provides an overview of visibility issues as they relate to the Proposal. The information within this section has been prepared by R.W. Corkery & Co. Pty Limited in consultation with the Applicant. It discusses the visual environment surrounding the proposed Quarry Site, the safeguards and procedures that are implemented to manage visual impacts and an assessment of the potential impacts of the Proposal on visibility.

4.8.2 Existing Environment

As can be seen on **Figure 4.3** and **Plate 1.1**, there is considerable vegetation currently surrounding the Quarry Site. As such, the Quarry Site is screened from the residences to the east and the four residences west of the Pacific Highway (see **Plates 4.1** and **4.2**).

Due to the elevation of the newly constructed Pacific Highway (located within a cut when opposite to the existing Quarry Site) and the 100m to 150m of native vegetation currently retained between the Quarry Site and the residences west of the Pacific Highway, there is no visible line of sight between the Pacific Highway and the quarry.

Whilst the clearing of vegetation and earthmoving equipment operations within the Quarry Site would currently be screened from the Pacific Highway and most residences, the screening vegetation is approved for clearing as part of the industrial subdivision development. As such over the life of the quarry it is possible the quarry may become visible from the Pacific Highway particularly from near Residence 9, however, it is an approved industrial subdivision, with that development also likely to become a screen. Therefore, the visibility of the Proposal is assessed not to be a major constraint.

4.8.3 Environmental Safeguards and Controls

4.8.3.1 Objectives

The Applicant would continue to operate Farrawell's Quarry with the following objectives in relation to the management of visual impacts.

- Minimise the time available by the residents to see any quarry-related operations (particularly during the initial extraction phase in the extended quarry); and
- Reduce the potential to visualise ongoing quarry operations.

4.8.3.2 Operational Safeguards, Controls and Management Procedures

To manage visibility-related issues, the Operator would:

- operate the quarry behind the existing vegetation (20m high established trees) located between the Quarry Site and the residences to the west; and
- rehabilitate the benches within the extraction area as soon as practical.

As indicated in the Secretary's Environmental Assessment Requirements specified by the Kempsey Shire Council, the vegetation adjacent to the western boundary of the Proposed Quarry Site would be retained as long as possible to achieve a visual screen between the operations and the Pacific Highway. It would also assist to minimise dust and noise impacts at the residences west of the Pacific Highway.

4.8.4 Assessment of Impacts

The potential visual-related impacts from the Proposal relate to the possibility of residents west of the Pacific Highway and motorists on the Pacific Highway viewing quarrying operations. Due to the elevation of the newly constructed Pacific Highway (located within a cut when opposite to the Quarry Site) and the 100m to 150m of native vegetation currently retained between the Quarry Site and the Pacific Highway, there would be no visible line of sight between the Pacific Highway and the proposed Quarry operations.

Views of the activities within the extended quarry would be visible from Residence 9, however, views from Residences 6A, 6B and 8 would be blocked by the substantial belt of native vegetation between the Pacific Highway and Quarry Site (see **Plate 4.2**). While it is understood that the clearance of vegetation within the subdivision is already approved, the actual extraction operations (as a quarry) would be comparable with the approved earthworks involved with the cut and fill operation within the subdivision.

Given this and the proposed safeguards, controls and management procedures, the proposed quarry extension is expected to have a minimal impact on the visibility for vehicles on the Pacific Highway and residences west of the highway.

4.9 SOCIO-ECONOMIC

4.9.1 Introduction

This section provides an overview of the socio-economic setting as it relates to the Proposal. The information within this section has been prepared by R.W. Corkery & Co. Pty Limited in consultation with the Applicant. It discusses the socio-economic setting surrounding the Quarry Site, the safeguards and procedures that are implemented to manage socio-economic impacts and an assessment of the potential impacts of the Proposal on the socio-economic setting.

4.9.2 Existing Setting

4.9.2.1 Local Setting

Communities surrounding the Quarry Site include the following.

- The Local Community – includes nearby landowners, residents west of the Pacific Highway identified on **Figure 4.3** who are considered to have in interest in the Proposal due to the proximity of the quarry to their homes, and owner/managers of the Slim Dusty Centre.
- Kempsey LGA – the Quarry Site is located within the Kempsey LGA, and as such the impacts on the LGA have been considered.

4.9.2.2 2011 Census Data

Introduction

The socio-economic setting around the Quarry Site is described in this subsection to provide an overview of the interaction between the local and wider community and the proposed quarry operation. The analysis is based on data drawn from the 2011 population statistics for the South Kempsey State Suburb (SSC10106), Kempsey Statistical Area Level 2 (code 108021155) and NSW (1) (Australian Bureau of Statistics (ABS), 2011).

Population

The Census data indicates that, within the South Kempsey area, the proportion of school aged children 5 to 14 years (18%) was higher than for NSW as a whole (13%) and the Kempsey (14%). South Kempsey and Kempsey also have a comparatively lower rate of people working aged 25 to 54 years (36% and 35% respectively) compared to NSW as a whole (41%). However, overall, there does not appear to be a significant difference in the age distribution between the South Kempsey and Kempsey areas compared to NSW as a whole.

Table 4.11
2011 Census Population Statistics

Age Group		South Kempsey		Kempsey		NSW	
		Persons	Percent	Persons	Percent	Persons	Percent
Children	0-4 years	201	8	1 044	7	458 735	7
	5-14 years	437	18	2 063	14	873 776	13
Studying or Working	15-24 years	324	13	1 783	12	893 103	13
	25-54 years	881	36	4 943	35	2 863 576	41
Approaching Retirement or Retired	55-64 years	275	11	1 844	13	810 290	12
	65 years and over	348	14	2 616	18	1 018 178	15
Total		2 466		14 293		6 917 658	
Source: Australian Bureau of Statistics, 2011							

Employment

Table 4.12 presents the employment statistics for the 2011 Census. This data indicates that the unemployment rate in South Kempsey (15%) on the date of the census was markedly higher than Kempsey (10%) and NSW (6%). Full time work appears to be less available in South Kempsey (46%) and Kempsey (49%) than NSW as a whole (60%).

Table 4.12
2011 Census Employment Statistics

	South Kempsey		Kempsey		NSW	
	Persons	Percent	Persons	Percent	Persons	Percent
Full-time	374	46	2 436	49	2 007 925	60
Part-time	262	33	1 683	34	939 464	28
Away from work	30	4	199	4	120 121	4
Hours worked not stated	20	2	107	2	70 821	2
Unemployed	119	15	505	10	196 526	6
Total Labour Force	805		4 930		3 334 857	
Source: Australian Bureau of Statistics, 2011						

Industry of Employment

Table 4.13 presents a summary of the 2011 Census statistics relating to industry of employment. This data indicates that the top two leading industries of employment in South Kempsey, Kempsey and NSW are all "Health care and social assistance" and "Retail Trade". Within the South Kempsey area, "Construction" (8.3%) was the third leading industry of employment, while in South Kempsey it was "Education and Training" (8.3%) and in NSW it was "Manufacturing" (8.4%).

The Kempsey Shire Council website lists the local industries as being manufacturing, rural (beef, dairying, timber, maize, potatoes, bananas, fishing, prawning, oysters, deer, avocados and horticulture), tourism (beach, country and aboriginal experiences) and cottage industry (arts, crafts and aboriginal artefacts).

Table 4.13
2011 Census Employment Statistics

	South Kempsey		Kempsey		NSW	
	Persons	Percent	Persons	Percent	Persons	Percent
Agriculture, forestry and fishing	7	1.0	104	2.3	69 576	2.2
Mining	0	0.0	12	0.3	31 186	1.0
Manufacturing	54	7.9	344	7.8	264 865	8.4
Electricity, gas, water and waste services	12	1.7	57	1.3	34 203	1.1
Construction	57	8.3	345	7.8	230 057	7.3
Wholesale trade	19	2.8	121	2.7	138 890	4.4
Retail trade	93	13.5	679	15.3	324 727	10.3
Accommodation and food services	50	7.3	345	7.8	210 380	6.7
Transport, postal and warehousing	43	6.3	234	5.3	155 027	4.9
Information media and telecommunications	3	0.4	28	0.6	72 488	2.3
Financial and insurance services	6	0.9	64	1.4	158 422	5.0
Rental, hiring and real estate services	6	0.9	40	0.9	51 554	1.6
Professional, scientific and technical services	15	2.2	133	3.0	247 295	7.9
Administrative and support services	30	4.4	165	3.7	102 354	3.3
Public administration and safety	47	6.8	302	6.8	192 634	6.1
Education and training	56	8.2	368	8.3	248 951	7.9
Health care and social assistance	124	18.0	772	17.4	364 321	11.6
Arts and recreation services	10	1.5	38	0.9	46 330	1.5
Other services	31	4.5	183	4.1	117 615	3.7
Inadequately described/Not stated	24	3.5	92	2.1	77 455	2.5
Total	687		4 426		3 138 330	

Source: Australian Bureau of Statistics, 2011

Socio-Economic Indexes for Areas

The Socio Economic Indexes for Areas (SEIFA) (ABS, 2011b), is a suite of four summary measures prepared by the ABS from the 2011 Census information that provide a reference for a given area on issues of advantage, disadvantage, education and opportunity, and finally access to economic resources. For each index, geographic areas in Australia are given a SEIFA number. The ABS defines relative socio-economic advantage or disadvantage in terms of people's access to material and social resources, and their ability to participate in society with the designated numbers indicating how disadvantaged that area is compared with other areas in Australia.

The South Kempsey State Suburb is in the 1st decile for the index of Relative Socio-economic Disadvantage. The nearby Frederickton and Smithtown are also in the 1st decile while Kundabung to the south of Kempsey is in the 3rd decile. This indicates that, relative to the rest of the country, the Kempsey area has a high level of disadvantage. Kempsey was also in the 1st decile for the index of Education and Occupation indicating that the area has a low proportion of people with qualifications and skilled jobs.

4.9.3 Environmental Safeguards and Controls

No specific socio-economic safeguards or procedures are proposed although it is recognised that the ongoing operation of Farrawell's Quarry in the manner proposed would have worthwhile socio-economic benefits through sustained employment, local spending and the supply of construction materials for local projects.

4.9.4 Assessment of Impacts

The ongoing operation of the quarry would provide greater long-term employment security for the existing workforce. It would also facilitate the ongoing construction in the local region as construction is the 3rd leading industry of employment.

On a more local scale, the Proposal would assist to level the land for development of the industrial subdivision, thereby making the construction of the industrial subdivision more cost effective. This in turn would facilitate development of the Industrial Estate which would bring more jobs to the area.

Section 5

Evaluation of the Proposal

PREAMBLE

This section concludes the assessment of the proposed continued operation and extension of Farrawell's Quarry. The residual impacts associated with the Proposal are evaluated through consideration of the residual impacts and the principles of ecologically sustainable development (ESD).

A justification for the Proposal is then provided based on the residual impacts to the biophysical environment, the likely economic and social benefits that would continue to be generated, the consequences of the Proposal not proceeding and assessment against the objects of the EP&A Act.

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5.1 INTRODUCTION

The Proposal for the extension of Farrawell's Quarry as presented in this document involves the ongoing extraction, processing and transportation of a gravel resource in an economical and environmentally responsible manner. The following subsections justify the Proposal in terms of its impacts upon biophysical, social and economic considerations, as well the consequences of not proceeding with the Proposal. This section also incorporates a brief conclusion.

5.2 EVALUATION OF THE RESIDUAL EFFECTS OF THE PROPOSAL

5.2.1 Biophysical Considerations

5.2.1.1 Introduction

Section 4 presents a range of residual impacts on the biophysical environment that are predicted should the Proposal proceed, after the adoption of a number of design and operational procedures and mitigation measures. These impacts are provided with a level of confidence reflecting the experience within the existing quarry. The residual impacts considered of greatest significance, and the proposed management of these, are summarised as follows.

5.2.1.2 Soil and Water

Soil erosion has the potential to cause sediment-laden water to flow beyond the boundary of the extraction area into the surrounding natural bushland and downstream of the Quarry Site. However, exposure of soil and the subsequent stockpiling would continue to be undertaken in a controlled manner designed to minimise erosion and all surface water runoff in contact with disturbed areas would continue to be contained within the Quarry Site and directed into a sediment basin and/or ultimately the water storage dam. With these measures in place, impacts on soil and water are expected to be minimal and manageable.

5.2.1.3 Transportation and Traffic

Product trucks servicing the various upgrade projects along the Pacific Highway would require transport along the Pacific Highway regardless of their origin. Sourcing the product from the Farrawell's Quarry would assist to minimise haulage distances and therefore minimise the distance these trucks would be travelling on the Pacific Highway. There would be no impacts upon local roads for those trucks delivering products for the Pacific Highway upgrade projects.

Traffic levels when only local projects are being supplied are envisaged to be quite variable and dependent upon the carrying capacity of the trucks used and daily requirements. The number of loads would initially be kept below the limit established through the NSW *Road Noise Policy*, i.e. 14 movements per hour. These trucks would access Kempsey via Macleay Valley Way. The actual number of truck movements per hour would be reviewed on a project by project basis.

The Macleay Valley Way currently carries approximately 6 286 vehicles including 354 heavy vehicles each day (see **Table 4.1**) and the road has until recently served as the Pacific Highway but now has substantially reduced numbers since the opening of the Kempsey Bypass. Overall,

the increases in traffic levels attributed to the quarry are considered minor and with the implementation of the Driver's Code of Conduct, traffic impacts on Macleay Valley Way associated with the Proposal are expected to be minimal and manageable.

5.2.1.4 Air Quality

Air quality modelling of two future operational scenarios for the Proposal identified that with proposed controls including watering of haul roads a minimal increase of particulates would occur at the four closest residences to the quarry. The results also indicated the Proposal would not result in exceedances to air quality 24 hour or annual criteria. Impacts on air quality from the Proposal are therefore expected to be minimal and manageable.

5.2.1.5 Noise and Vibration

Modelling of the impacts from the Proposal on noise at the four closest residences for the two future operational scenarios indicated that the extension of the quarry would not exceed the adopted criteria for noise or vibration and would therefore result in negligible impacts to residential properties surrounding the Quarry Site. Noise modelling also confirmed minimal impacts on residences along the transport routes used by quarry-related trucks.

5.2.1.6 Flora and Fauna

The removal of vegetation would be a consequence of the Proposal, although it is noted the clearing of the vegetation within the proposed extended quarry is already approved as it is within the industrial subdivision Development Consent. The impacts associated with the clearing of the vegetation by the Applicant would be minimised and managed through the proposed safeguards and controls. Impacts on flora and fauna associated with the Proposal are expected to be minimal.

5.2.1.7 Aboriginal Heritage

In 2003, a detailed cultural heritage investigation undertaken by ASR (ASR 2003) concluded that there was a very low likelihood for archaeological material to be present within the area of the industrial subdivision principally due to the site's proximity to water and its slopes and dense vegetation.

During the 2003 survey and a subsequent survey in 2014, an identified scatter (first recorded in 1988) was unable to be located. ASR (2014) concludes that without the scatter being present, it cannot be harmed as defined by the NPW Act 1974, nor is an AHIP required.

The residual risk to Aboriginal heritage is therefore assessed to be low. All future clearing operations would be completed in accordance with the protocols established in Section 4.7.4.2, which include a procedure to be followed in the event that potential Aboriginal artefacts are uncovered during vegetation clearing activities.

5.2.1.8 Visibility

Views of the activities within the Quarry Site would be visible from Residence 9, however, views from Residences 6A, 6B and 8 would be blocked by the substantial belt of native vegetation between the Pacific Highway and Quarry Site. While it is understood that the clearance of vegetation within the subdivision is already approved, the level of extraction operations (as a quarry) would be comparable with the approved earthworks involved with the cut and fill operation within the subdivision.

Given this and the proposed safeguards, controls and management procedures, the proposed quarry extension is expected to have a minimal impact on the visibility for motorists on the Pacific Highway and residents west of the highway.

5.2.2 Socio-Economic Considerations

The principal socio-economic impacts of the Proposal would relate to the continued operation and lengthening of the life of the Farrawell's Quarry. As such, the potential social impacts would generally be similar to those currently experienced by surrounding property owners and the community of South Kempsey. Potential social impacts relate to a possible loss of amenity for neighbours living in the vicinity of the Quarry Site and, to a lesser extent, motorists travelling along the Pacific Highway. However, the actual extraction operations (as a quarry) would be comparable with the already approved earthworks involved with the cut and fill operation within the subdivision.

Ongoing provision of economic benefits through the operation of the quarry would include long-term employment security for the existing workforce. On a local scale, the Proposal would assist to level the land for development of the industrial subdivision, thereby making the construction of the industrial subdivision more cost effective. This in turn would facilitate development of the Industrial Estate which would bring more jobs to the area.

5.3 SECTION 79C CONSIDERATIONS

Section 79C of the *Environmental Planning and Assessment Act 1979* requires the consent authority, when determining a development application, takes into consideration the following matters:

a) the provision of:

i) *any environment planning instrument;*

As discussed in Section 3.1, the Kempsey Local Environmental Plan 2012 environmental planning instruments has been considered.

The Quarry Site is located wholly within Zone IN1 – General Industrial as defined. Extractive Industry is not identified as a prohibited land use within KLEP 2012 and is therefore permitted with consent

ii) *any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Director-General has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved; and*

At the time of preparing this report, the authors were not aware of any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority that may have implications for the Proposal.

iii) *any development control plan and any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F; and*

At the time of preparing this report, the authors were not aware of any development control plan or planning agreement entered into under Section 93F of the EP&A Act or any draft planning agreement that a developer has offered to enter into under Section 93F that may have implications for the Proposal.

iv) *any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F; and*

At the time of preparing this report, the authors were not aware of any planning agreement or draft planning agreement under Section 93F of the EP&A Act that may have implications for the Proposal.

v) *the regulations (to the extent that they prescribe matters for the purposes of this paragraph); and*

At the time of preparing this report, the authors were not aware of any regulation that may have implications for the Proposal.

vi) *any coastal zone management plan (within the meaning of the Coastal Protection Act 1979); and*

At the time of preparing this report, the authors were not aware of any coastal zone management plan that may have implications for the Proposal.

b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality; and

The likely impacts of the Proposal on both the natural and built environments and social and economic impacts in the locality have been described in Section 4 and summarised in Section 5.2.

In light of the assessments presented, it is concluded that the proposed continued operation and extension of the Farrawell's Quarry would be undertaken in a manner that would satisfy all relevant statutory goals and criteria, environmental objectives and reasonable community expectations.

c) the suitability of the site for the development; and

The site of the Proposal is an existing quarry which is located within an approved industrial subdivision development. The quarry would serve to level the site in preparation for the future industrial activities.

d) any submissions made in accordance with this Act or the regulations; and

At the time of preparing this report, the authors were not aware of any submissions made in accordance with the EP&A Act or the regulations that may have implications for the Proposal.

e) the public interest.

Ongoing provision of economic benefits through the operation of the quarry would include long-term employment security for the existing workforce.

Given the quarry is supplying the materials required in the construction of the Pacific Highway, development of this quarry closer to where the Pacific Highway upgrade works are occurring would ensure less travel distances for the product trucks along the highway.

On a more local scale, the Proposal would assist to level the land for development of the already approved industrial subdivision, thereby making the construction of the industrial subdivision more cost effective. This in turn would facilitate development of the Industrial Estate which would bring more jobs to the area.

5.4 CONSEQUENCES OF NOT PROCEEDING WITH THE PROPOSAL

The consequences of not extending or deepening the extraction area at the Farrawell's Quarry relate principally to the products that would be extracted by the Applicant and used as a supply of raw materials principally used in the construction of the Pacific Highway but also construction projects in the local area. Given that the demand for these products would remain, it would be expected that alternative sources of products would be required, many of which would almost certainly result in much greater impacts to the biophysical environment than the impacts addressed for the Proposal. The opportunity to undertake the preparatory work for the industrial subdivision development would also be foregone.

In addition, the opportunity to provide ongoing secure employment for eleven people and the associated benefits to the economy within the Kempsey Shire LGA would be foregone. This includes the disposable wages for the workforce, a substantial proportion of which would be spent in the Kempsey Shire LGA.

Should the Proposal not proceed, the minor impacts on the local biophysical environment would not eventuate.

It is considered that the benefits of proceeding with the Proposal therefore outweigh the minor impacts on the environment that would result. The nominated consequences of not proceeding with the Proposal also weigh heavily in favour of proceeding with the Proposal.

5.5 CONCLUSION

The Proposal to extend and deepen Farrawell's Quarry has been designed to address the issues raised by the community and all levels of government, as well as the principles of ecologically sustainable development. The Proposal provides for the continued extraction of raw material which would be significant in extending employment opportunities and maintaining stimulus to the local economy of the Kempsey Shire. The ongoing operation of Farrawell's Quarry would provide important raw materials for the upgrade of the Pacific Highway as well as the local construction industry.

This document and the range of specialist consultant studies undertaken have identified that the Proposal should proceed because it would:

- contribute towards supply of the raw materials necessary for the continued upgrade of the Pacific Highway and to satisfy the demand for local products;
- have a minimal and manageable impact on the biophysical environment;
- prepare the Quarry Site for development as the approved industrial subdivision; and
- promote continued economic growth throughout Kempsey Shire.

In light of the assessments presented throughout the *Environmental Impact Statement*, it is concluded that the proposed ongoing operation and extension of Farrawell's Quarry would be undertaken in a manner that would satisfy all relevant statutory goals and criteria, environmental objectives and reasonable community expectations.

Section 6

Glossary of Technical Terms, Acronyms, Symbols and Units

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Technical Terms

AADT – Annual Average Daily Traffic.

ABS - Australian Bureau of Statistics.

aerial photographs – photographs of landscape taken from a plane (typically areas several kilometres across) used for the surveying and interpretation of vegetation type, geology, land use, etc.

AHD - Australian height datum (in metres).

air pollution emissions inventory – all information, collection and processing system containing data on emissions of, and sources of, air pollution from both man-made and natural causes.

ambient air quality – the quality of the ambient air near ground level, expressed as concentrations or deposition rates of air pollutants – also expressed as existing air quality.

ambient air quality criteria – quantitative relationship between a pollutant's dose, concentration, deposition rate or any other air quality-related factors, and the related effects on receptors, e.g. humans, animals, plants, or materials. Air quality criteria serve as the scientific basis for formulating ambient air quality standards or objectives.

amenity – the desirability of an area.

ANZECC – Australian and New Zealand Environment and Conservation Council.

archaeology – the scientific study of human history, particularly the relics and cultural remains of the distant past.

ARI – see average recurrence interval.

artefact – anything made by human workmanship, particularly by previous cultures (such as chipped and modified stones used as tools).

AS – Australian Standard.

average annual daily traffic (AADT) – unit of assessment of traffic flow along a road.

Average Recurrence Interval (ARI) - statistical period in years for a design storm event.

background – the conditions (e.g. noise levels, bird populations) already present in an area before the commencement of a specific activity (e.g. a mining operation).

background level – the concentration (deposition) level of a pollutant which must be added to the concentration (deposition) level of the modelled sources in order to obtain a total.

background dust level – dust level in the absence of mining and processing activities.

background noise levels - the level of the ambient sound indicated on a sound level meter in the absence of the sound under investigation (e.g. sound from a particular noise source; or sound generated for test purposes).

baseline data – a body of information collected over time to define specific characteristics of an area (e.g. species occurrence or noise levels) prior to the commencement of an activity (e.g. a mining operation); baseline data allows any impacts arising from the activity to be identified by comparison with previously existing conditions.

baseline monitoring – monitoring performed prior to site development.

bcm – bank cubic metre – a volume of 1 m^3 in the ground prior to disturbance.

blasting – the operation of breaking rock by means of explosives.

catchment - drainage area of a reservoir, river, creek, etc.

dB – decibel, unit used to express sound intensity.

dB(A) - unit of measurement of human appreciation of noise level.

dB(A) – decibels, A-weighted scale; unit used for most measurements of environmental noise; the scale is based upon typical responses of the human ear to sounds of different frequencies.

deposition – laying down of particulate material (e.g. sediment in a lake or tailings solids in a tailings storage).

development application - an application to the local council for approval of an activity deemed to require an approval prior to commencement.

dispersibility - a characteristic of soils relating to their structural breakdown in water into individual particles.

dispersion model – a set of mathematical equations relating to the release of air pollutant to the corresponding concentrations in the ambient atmosphere or deposition on the surface.

drainage line – a passage along which water concentrates and flows towards a stream, drainage plain or swamp intermittently during or following rain.

dust - particles of mostly mineral origin generated by erosion of surfaces and the mining and handling of materials.

dust gauge – instrument set up to record the rate of deposition of dust.

ecologically sustainable development (ESD) – using, conserving and enhancing the community's resources so that ecological processes on which life depends are maintained and the total quality of life, now and in the future can be increased.

emission factor – an expression for the rate at which a pollutant is generated as a result of some activity, divided by the level of that activity.

Environmental Impact Statement (EIS) – a formal description of a project and an assessment of its likely impact on the physical, social and economic environment. It includes an evaluation of alternatives and an overall justification of the project. The EIS is used as a vehicle to facilitate public comment and as the basis for analysing the project with respect to granting approval under relevant legislation.

EP&A Act – Environmental Planning and Assessment Act 1979.

erosion – the wearing away of the land surface (whether natural or artificial) by the action of water, wind and ice.

haul road – road used in a quarry for haulage of rock from the active face to the crusher and for general site access.

heritage – the things of value which are inherited.

infrastructure – the necessary buildings, roads and equipment associated with a quarrying operation.

landform – a specific feature of a landscape (such as a hill) or the general shape of the land.

LEP – local environmental plan.

Local Environmental Plan (LEP) - a plan developed by a council to control development in part or all of their shire or municipality.

management strategy – a policy or direction that assists in actions required to address issues.

mitigation measures – measures employed to reduce (mitigate) an impact (such as the construction of a perimeter bund to reduce sound emissions).

mobile equipment - wheeled or tracked self propelled equipment such as trucks and front-end loaders.

monitoring - the regular measurement of components of the environment to establish environmental standards are being met.

quarry – the area from which rock is extracted.

receptor – a designated place at which an impact may occur (e.g. a dwelling).

rehabilitation - the preparation of a final landform after quarrying and its stabilisation with grasses, trees and shrubs.

sediment basin – a small excavation designed to trap the coarse material washed from disturbed areas.

sedimentation dam – an earth embankment constructed so as to catch surface runoff and thus allow sediment carried to be deposited by reduction in runoff velocity.

setting pond – an artificially constructed pond designed to allow particulate matter to settle out of water.

stockpile – a pile used to store material (such as low-grade ore) for future use.

stripping – removal of vegetation and topsoil.

surface waters – all water flowing over, or contained on, a landscape (e.g. runoff, streams, lakes, etc.).

topography – the physical relief and contour of a region.

topsoil – the surface layer of a poorly-developed or well-developed soil profile containing the main percentage of organic material.

vehicle movement – a one-way trip.

visual amenity – attractiveness to the eye.

wind rose – diagrammatic representation of wind direction, strength, and frequency of occurrence over a specified period.

Acronyms, Symbols and Units

~ - approximately.

°C – degrees Celsius.

µg/g – micrograms per gram.

µg/L – micrograms per litre.

µg/m^3 – micrograms per cubic metre.

% – percentage.

< – less than.

> – greater than.

AADT – Average Annual Daily Traffic.

AHD – Australian Height Data; in metres above mean sea level.

ANZECC – Australian and New Zealand Environment and Conservation Council.

ARI – average recurrence interval.

AS – Australian Standard.

dB – decibel, unit used to express sound intensity.

dB(A) – the unit of measurement of sound pressure level heard by the human ear, expressed in "A" scale.

EIS – Environmental Impact Statement.

EP&A Act – Environmental Planning and Assessment Act 1979 (NSW).

EPA – Environment Protection Authority (NSW).

ESD – Ecologically Sustainable Development.

g/m^2/month – grams per square metre per month unit for deposited dust.

ha – hectare (100 m x 100 m).

kg – kilogram (weight measure).

km – kilometre (= 1 000 metres).

L – litre.

m^2 – square metre.

m^3 – cubic metre.

PM10 – particulate matter <10µm in diameter.

t – tonnes.

tpa – tonnes per annum.

Section 7

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Appendices

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Appendix 1

Development Application Form

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APPLICATION FORM

KEMPSEY SHIRE COUNCIL

Civic Centre, 22 Tozer Street, Kempsey 2440
PO Box 3078, West Kempsey 2440
Phone 02 6566 3200 Fax 02 6566 3205
Web: www.kempsey.nsw.gov.au Email: ksc@kempsey.nsw.gov.au

KEMPSEY Shire Council

DATE OF LODGEMENT:	APPLICATION NO:

TYPE OF APPROVAL(S) – Please tick type of application required

☒ Development Consent	☐ Construction Certificate
☐ Subdivision/Boundary Adjustment	☐ Complying Development Certificate - SEPP (Exempt & Complying Development Codes)
☒ Designated Development	☐ Approval under Section 138 of the Roads Act (relevant section)
☐ Staged Development	☐ Approval under Section 68 of the Local Government Act (relevant section)
☒ Integrated Development (relevant section)	

See Development Application Information Notes:
www.kempsey.nsw.gov.au/forms.html#da-notes

DESCRIPTION OF PROPOSAL

To increase the footprint and depth of the extraction area of the existing Farrawell's Quarry.

Proposed cost of work (including GST)	

Please Note:
(a) For development up to $100,000, the estimated cost is to be determined by the applicant, or a suitably qualified person, with the methodology to calculate the cost submitted with the DA.
(b) For development between $100,000 and $3,000,000, a suitably qualified person is to prepare the cost estimate and submit it, along with their methodology, with the DA.
(c) For development more than $3,000,000 a detailed cost report prepared by a registered quantity surveyor should be provided verifying the cost of the development and submitted with the DA.
Council reserves the right to request a cost report for projects with a proposed cost of work of less than $3,000,000.

PROPERTY DESCRIPTION

Address	511 and 627 Pacific Highway, SOUTH KEMPSEY NSW 2440
Lot & DP/SP	Lot 2 DP1194582

APPLICANTS DETAILS

Name(s)	Pacific Blue Metal Pty Limited				
Contact Person	Charlie Kennett				
Address	PO Box 6				
Suburb	NABIAC NSW 2312				
Phone No	02 6554 3206	Mobile No:	0428 684 115	Email:	charlie@pacificbluemetal.com.au
Applicants Signature					

Would you like to track your application online on Council's website? ☑ Yes ☐ No
(Password and Access ID will be emailed to you)

Would you like to be notified by email of the progress of your application? ☑ Yes ☐ No

DA FORM

APPLICATION FORM

OWNERS DETAILS

As the owner(s) of the above property, I/we consent to this application and to the entry of an authorised officer of Council to enter the subject property at any reasonable time for the purpose of carrying out an inspection in connection with the assessment of this application. I/we undertake to take all necessary steps to make access available to the property to enable the inspection to be carried out.

Name	Galban Pty Ltd				
Address:	511 Pacific Highway, South Kempsey				
Phone No		Mobile No:	0438 627 244	Email:	kevin@farrawell.com.au
Signature(s) of **all** owners to give consent to the lodgement of this application.					

Please Note: **This section is to be completed by all property owners. If the owner is a company, then a director or secretary of the company must sign the application. A statement on company letterhead verifying the signatory's position is to be included in the application. If the property is within a strata title, the consent of the strata management is also required.**

INTEGRATED DEVELOPMENT

Do you require an integrated development approval under the following Acts? ☐ Yes ☐ No
If you are not sure, please contact Council's Duty Officer for clarification on 6566 3200.

Tick Box if Approval is required	Act	Approval Body
☐	*Rural Fires Act 1997* section 100B	NSW Rural Fire Service
☐	*Roads Act 1993* section 138	NSW Roads and Traffic Authority
☐	*Water Management Act 2000* sections 89, 90 & 91	NSW Office of Water
☒	*Protection of the Environment Operations Act 1997* sections 43(a), 47 and 55; sections 43(b), 48 and 55; sections 43(d), 55 and 122	NSW Department of Environment, Climate Change and Water
☒	*Heritage Act 1977* section 58	NSW Department of Planning – Heritage
☐	*Fisheries Management Act 1994* section 144; section 201; section 205; section 219	NSW Department of Industry and Investment
☐	*National Parks and Wildlife Act 1974* section 90	NSW Department of Environment, Climate change and Water
☐	Other	

Please Note:
(a) Should your project require an Integrated development approval, a cheque payable to the relevant approval body for an amount of $320 is to be included with your development application. A Council referral fee of $140 also applies.
(b) Nominated Integrated development (approvals under the *Heritage Act, Water Management Act 2000*) requires advertising in a local newspaper for a minimum period of 30 days. Accordingly, an advertising fee of $1,105 is also required to be paid at lodgement.

SECTION 68 APPROVALS

Do you require an approval under Section 68 of the Local Government Act? ☐ Yes ☒ No
If you are not sure, please contact Council's Customer First Centre for clarification on 6566 3200.

Tick Box if Approval is required	Type of Approval	
☐ Sewer (BF)	☐ Septic (CE)	☐ Other – Please specify
☐ Solid Fuel Heater (FD)	☐ Stormwater (to interlot drainage)	

APPLICATION FORM

SEWERAGE WORK

A site plan is required showing the connection point to Council's main. Includes drainage to Council's main disposal system. Indicate whether domestic or commercial.

☐ Domestic ☐ Commercial

Plumbers/Drainers Name:		Licence No.	
Address:			
Suburb:		Postcode	
Phone No:	Mobile	Email	

LIQUID TRADE WASTE APPROVAL

Is the development required to obtain a Liquid Trade Waste Approval?

☐ Yes ☐ No

ONSITE WASTE MANAGEMENT SYSTEM (SEPTIC TANK)

If you require approval under Section 68 of the Local Government Act for a septic tank you are required to supply the following information and provide plans and specifications. A site plan is required showing location of tank, trenches and irrigation area and distances from boundaries and dwellings. A minimum distance of 40 metres to dams and watercourses, 100 metres to rivers and creeks is required.

☐ Aerated System ☐ Site Disposal System

Number of People & No. of bedrooms	
Brand and Model of System:	
Septic Tank Capacity	
Collection Well Capacity	
Disposal area and site area (m^2)	

WATER WORK

All water connections are required to complete a separate Water Service Application form.

SECTION 138 APPROVALS

Do you require an approval under Section 138 of the Roads Act? ☐ Yes ☒ No
If you are not sure, please contact Council's Customer First Centre for clarification on 6566 3200.

☐ Driveways (To be shown on plan)	☐ Stormwater (to street)
☐ Alfresco Dining	☐ Hoarding

BUILDER/OWNER BUILDER DETAILS

Name(s)	
Address	

APPLICATION FORM

Suburb					
Phone No		Mobile No:		Email:	
LICENCE NO					

APPOINTMENT OF PRINCIPAL CERTIFYING AUTHORITY (PCA)

Council: (cross appropriate box) ☐ Yes ☐ No

Private Accredited Certifier: (cross appropriate box) ☐ Yes ☐ No

If council is appointed as the P.C.A., please complete Kempsey Shire Council's "PCA Agreement Form" and submit to council two days prior to commencement of building works.
http://www.kempsey.nsw.gov.au/pdfsForms/commencement_building_work.pdf

PRIVACY DETAILS

The information you provide in this application will enable your application to be assessed by us and any relevant state agency. If the information is not provided, we can refuse the application. Your application will be notified or advertised to the public for comment if the development is designated development, integrated development or advertised development. The application will also be kept in a register by the Council that can be viewed by the public at any time. Please contact the Council if the information in your application is incorrect or changes *(Environmental Planning and Assessment Regulation 2000, Clause 56).*

REPRESENTING AN ARCHITECT

Only a person whose name is on the NSW Register of Architects (Register) may use the title "architect" or its derivatives to describe the services he or she offers. In the case of a corporation or firm, the Act requires the corporation or firm to notify the Board of the nominated architect or architects who are responsible for the provision of architectural services in order for them to use the title and thereby provide architectural services.

DISCLOSURE STATEMENT OF POLITICAL DONATIONS AND GIFTS

A disclosure statement of a reportable political donation or gift must accompany a development application if the reportable donation or gift was made within 2 years of the application being lodged. If the donation or gift is made after the lodgement of the application, a disclosure statement must be sent to Council within 7 days of the donation or gift being made.
Further information and disclosure forms are available from Council's Customer First Centre or may be downloaded from Council's website at www.kempsey.nsw.gov.au.

BASIX *(Note 5 – Page 6)*

BASIX Certificate Details: Residential development only – including alterations and additions valued at over $50,000

☐ Yes – Certificate Details: (Certificate to be attached)
☐ No (not required)

"BASIX Certificate" The Building Sustainability Index (BASIX) is a web-based planning tool designed to assess the potential performance of residential buildings against a range of sustainability indices.

A BASIX Certificate identifies the sustainability features required to be incorporated in the building design. These features may include sustainable design elements such as recycled water, rainwater tanks, AAA-rated showerheads and taps, native landscaping, heat pump or solar water heaters, gas space heaters, roof eaves/awnings and wall/ceiling insulation.

You need a BASIX Certificate in Kempsey Shire when BASIX applies to the type of development for which you require approval. Commencement dates and details of types of development are at www.basix.nsw.gov.au.

APPLICATION FORM

The applicant is required to submit the BASIX Certificate with the Development Application or Complying Development Certificate application. The plans and specifications must also identify the BASIX commitments which will be checked by a professional building certifier during construction. Where submitted plans or specifications are inconsistent with the relevant BASIX Certificate, Council should require applicants to submit consistent applications before progressing the assessment process, either by amending plans/specifications or by submitting a new BASIX Certificate with commitments that match the rest of the application.

Applicants can generate the BASIX Certificate ONLY ON THE NSW Department of Planning and Infrastructure's BASIX website: www.basix.nsw.gov.au. For more information phone Department of Planning and Infrastructure's BASIX Help Line on 1300 650 908.

SCHEDULE FOR BUILDING WORK ONLY *(For Australian Bureau of Statistics Information – complete if Construction)*

Gross floor area of **existing building** (m^2)		What is the current uses of all existing or parts of building(s)/land (*if vacant, state vacant*)	
Gross floor area of **proposed addition** or **new building** (m^2)		What are the proposed uses of all parts of building(s)/land?	
Does this site contain a dual occupancy?		Number of dwellings to be demolished	
Number of pre-existing dwellings?		How many storeys will the building consist of?	
How many dwellings are proposed?			

MATERIALS TO BE USED *Place a tick (✓) in the box which best describes the materials that the new work will be constructed of:)*

Frame	Code	Walls	Code	Roof	Code	Floor	Code
☐ Concrete	20	☐ Brick single/double	11	☐ Tiles (Concrete/terracotta)	10	☐ Concrete	20
☐ Timber	40	☐ Brick veneer	12	☐ Concrete or slate	20	☐ Timber	40
☐ Steel	60	☐ Concrete/masonry	20	☐ Fibrous cement	30	☐ Other	80
☐ Aluminium	70	☐ Fibrous cement	30	☐ Steel	60	☐ Unknown	90
☐ Other	80	☐ Hardiplank	30	☐ Aluminium	70		
☐ Unknown	90	☐ Timber/weatherboard	40	☐ Other	80		
				☐ Unknown	90		

STATEMENT OF ENVIRONMENTAL EFFECTS

Schedule 1 of the *Environmental Planning & Assessment Regulation 2000* requires a Statement of Environmental Effects to be submitted as part of a Development Application. Should one not be submitted, the Development Application may be rejected by Council and returned to the applicant. A Statement of Environmental Effects should describe the proposed development, address any variations the proposed development may be seeking to planning instruments or policies, identify any potential adverse environmental impacts and provide an explanation on what measures have been taken to minimise these impacts.

Please note: The Statement of Environmental Effects provided below is only to be used for minor developments, such as new dwellings, alterations and additions etc. More complex development applications will require a detailed Statement of Environmental Effects which may need to be prepared by a suitably qualified and practising professional. Should you require clarification on this matter, please contact Council's Duty Officer on 6566-3200.

APPLICATION FORM

1. PROPOSAL DESCRIPTION

Provide a description of the proposed development

The Proposal is to extend extraction activities of the Farrawell's Quarry both in depth (by up to 8m) and beyond the approved limit (from approximately 8ha to approximately 15ha). This would facilitate creation of a final landform conducive to the long term industrial subdivision and extend the operational life of the quarry to 15 to 20 years. Please find attached a Environmental Impact Statement.

Comments:

2. PLANNING INFORMATION

What is the zoning of the subject land? IN1 - General Industrial as defined within the Kempsey Local Environmental Plan 2012.

What is the current use of the land/building? Existing quarry and remnant native vegetation. The property has an existing approved Industrial subdivision.

Is your proposal:

- **permissible in the zone?** **Yes ☒ No ☐**
- **consistent with the zone objectives?** **Yes ☒ No ☐**

Does your proposal comply with the relevant:

- **Development Standards (i.e. FSR, heights) in the Local Environmental Plan?** **Yes ☒ No ☐**
- **Development Control Plan (e.g. setbacks, car parking)?** **Yes ☒ No ☐**

If you answered "no" to any of the above questions, a detailed justification is required. Additionally, you should discuss your proposal with the Duty Officer before lodging your development application.

APPLICATION FORM

3. SITE SUITABILITY

Will the development:

- **affect any neighbouring residences by overshadowing or loss of privacy?** **Yes ☐ No ☒**
- **result in the loss or reduction of views?** **Yes ☐ No ☒**
- **impact on any item of heritage or cultural significance?** **Yes ☐ No ☒**
- **result in land use conflict or incompatibility with neighbouring premises?** **Yes ☐ No ☒**
- **be out of character with the surrounding area?** **Yes ☐ No ☒**
- **be visually prominent within the existing landscape/streetscape?** **Yes ☐ No ☒**
- **require excavation or filling in excess of 1 metre?** **Yes ☒ No ☐**
- **require the erection or display of any advertising signage?** **Yes ☐ No ☒**

Comments: While a AHIMs registered Aboriginal Heritage site is located within the proposed disturbance area, a Due Diligence Assessment was unable to substantiate the presence of the site. This is addressed in the EIS.

4. ENVIRONMENTAL IMPACTS

Is the site affected by any of the following natural hazards? **Yes ☐ No ☒**
If yes, please indicate which hazard.
Flooding ☐ Bushfire ☐ Acid Sulfate Soils ☐

(Note: Information on natural hazards available from Council)

Will the proposal:

- **result in any form of air pollution (smoke, dust, odour, etc)?** **Yes ☒ No ☐**
- **have the potential to cause any form of water pollution?** **Yes ☒ No ☐**
- **emit noise levels that could affect neighbouring properties?** **Yes ☒ No ☐**

APPLICATION FORM

- **be considered potentially hazardous or offensive (refer SEPP 33 for definitions)?** **Yes ☐ No ☒**
- **affect native or aquatic habitat?** **Yes ☒ No ☐**
- **have an impact on a threatened species or habitat?** **Yes ☐ No ☒**
- **involve the removal of any trees? (If yes, detail type and number below.)** **Yes ☒ No ☐**

If the answer is yes, what measures are employed to mitigate the impact/s?

Comments: The EIS contains impact assessments for air quality, water, noise and ecology and determined the impacts to be minimal. It is noteworthy that the site is already approved for clearing for an Industrial Subdivision.

5. ACCESS, TRAFFIC & UTILITIES

Are electricity and telecommunications services available to the site? **Yes ☒ No ☐**

Does the site have access to town water? **Yes ☐ No ☒**

Does the site have access to town sewer? **Yes ☐ No ☒**

If you answered no to the above, is a waste water report attached? **Yes ☐ No ☒**

Provide details of on-site parking, including number of spaces.

Suitable parking facilities are provided within the site.

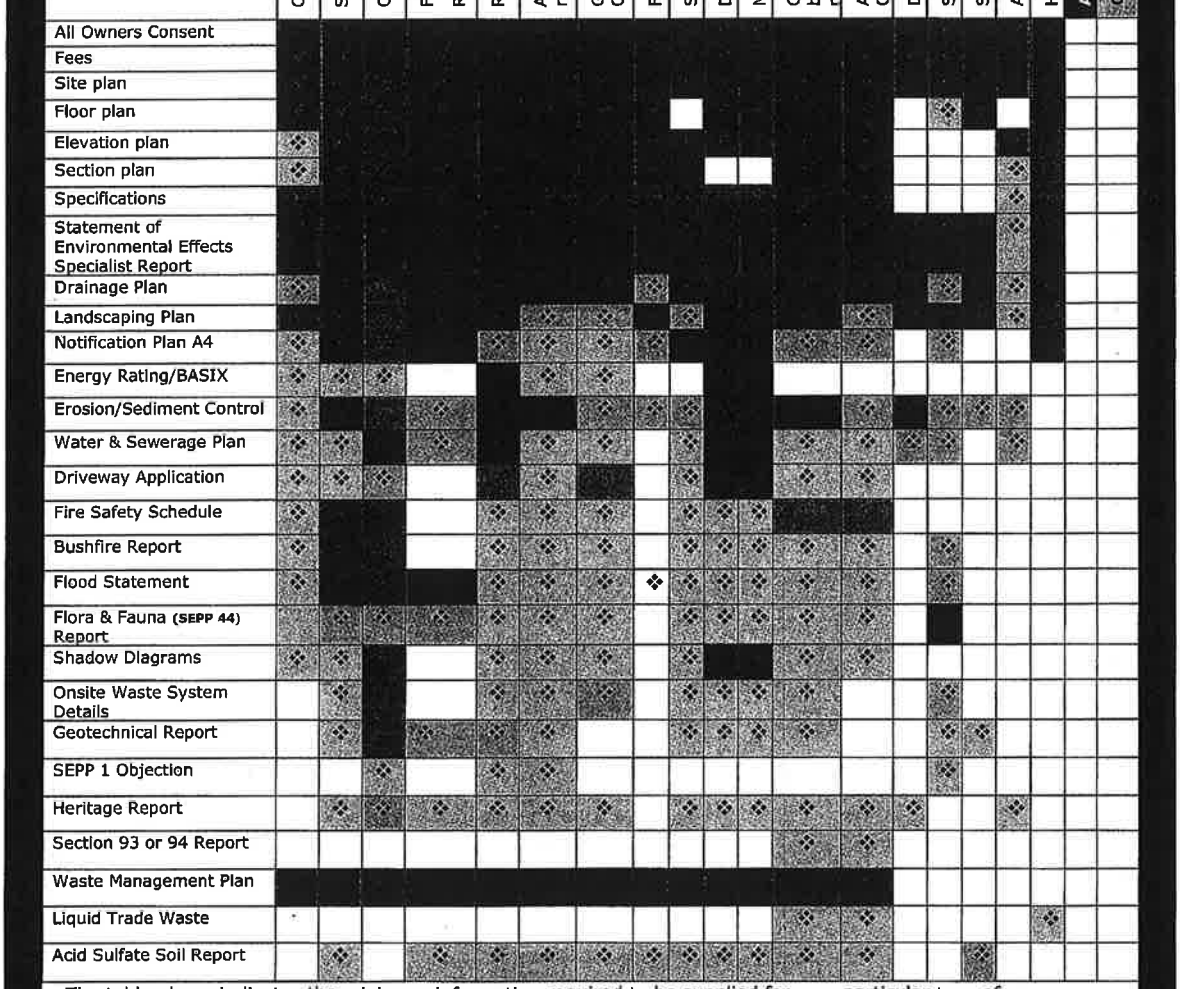
Is lawful and practical access available to the site? **Yes ☒ No ☐**

Provide details of proposed method of stormwater disposal (e.g. street, rubble drain, rainwater tank)

A series of sediment dams would capture all water from within the area of disturbance.

Comments:

MATRIX OF INFORMATION TO ACCOMPANY APPLICATION



The table above indicates the minimum information required to be supplied for your particular type of application. **Please note that the development application will not be accepted without this minimum information.**

Indicates this information is mandatory.

Indicates this information is required if you are applying for a Construction Certificate or Complying Development Certificate.

Indicates this information may be required.

Certain applications may require the submission of additional information that has not been listed above. Council encourages consultation prior to lodging your application. This ensures that many issues may be resolved before an application is lodged and that each application contains all necessary information to enable prompt processing by Council.

COUNCIL APPLICATION FEES

FEES	CODE	AMOUNT
DA FEE	AA	$
DA SUBDIVISION	AU	$
COMPLYING DEVELOPMENT	AJ	$
CONSTRUCTION CERTIFICATE	AI	$
MODIFICATION	AZ	$
INSPECTIONS	AF	$
PLAN FIRST	AP	$
LONG SERVICE LEVY	AL	$
REGISTERS		
Sewer	BF ID	$
Septic	CE ID	$
Driveways	RA ID	$
Water	BC ID	$
Other		$
REFERRAL FEE	RF	$
ADVERTISING	AV	$
TOTAL		$

APPLICATION NUMBER	
ID:	
RECEIPT NO:	
DATE:	
LA:	
SIGN GIVEN:	YES/NO
WATER AGREEMENT FORM FILLED OUT	YES/NO
GIVEN TO CUSTOMER	YES/NO

OFFICE USE ONLY

APPLICATION ACCEPTANCE – TO BE COMPLETED BY COUNCIL

Additional information required before the application will be accepted

Satisfactory to lodge	YES / NO	Responsible Officer		Date	

April 2013

Appendix 2

Secretary's Environmental Assessment Requirements and Correspondence from Government Agencies Consulted

(Total No. of pages including blank pages = 56)

(Note: Attachments to all correspondence is included only on the Project CD)

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Development Assessment Systems & Approvals
Mining Projects
Contact: David Schwebel
Phone: (02) 9228 6443
Email: david.schwebel@planning.nsw.gov.au

Mr Robert Corkery
R.W. Corkery and Co Pty Ltd
PO Box 239
BROOKLYN NSW 2083

Dear Mr Corkery

Farrawell's Quarry Expansion (EAR 830)
Secretary's Environmental Assessment Requirements

I refer to your request for the Secretary's Environmental Assessment Requirements (EARs) for the above development, which is designated local development under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). I have attached a copy of the EARs for the Environmental Impact Statement (EIS) required for this development. These requirements have been prepared in consultation with relevant State agencies and are based on the information your company has provided to date. I have also attached the agencies' input into the formation of the EARs, which you are also advised to consider closely during your preparation of the EIS.

In your request for EARs, it was indicated that the proposal will require approval under the *Protection of the Environment Operations Act 1997* and the *National Parks and Wildlife Act 1974*. Accordingly, the proposal is classified as integrated development under section 91 of the EP&A Act. If further integrated approvals are identified, you must undertake your own consultation with the relevant public authorities, and address their requirements in the EIS.

When you lodge your DA with the consent authority, you must provide:
- one hard and one electronic copy of the EIS to the Department of Planning and Environment;
- one hard and one electronic copy of the EIS to each identified integrated approval authority; and
- a cheque for $320 to each identified integrated approval authority, to offset costs involved in the review of the DA and EIS. No cheque is required for the Department as it is not an approval authority.

If your proposal contains any actions that could have a significant impact on matters of National Environmental Significance, then it will require an additional approval under the Commonwealth's *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act). This approval is in addition to any approvals required under NSW legislation. If you have any questions about the application of the EPBC Act to your proposal, you should contact the Department of the Environment in Canberra (6274 1111 or www.environment.gov.au).

Should the consent authority approve the proposal, then under section 22 of the *Mine Health and Safety Act 2004*, the owner or general manager of a mine or quarry must not undertake mining or quarrying operations without first nominating a person as the operator of the mine or quarry to the Chief Inspector of Mines. The Applicant should contact the local Mine Safety Operations Branch of the Division of Resources and Energy within the Department of Trade, Investment, Regional Infrastructure and Services in regard to this and other matters relating to compliance with the *Mine Health and Safety Act 2004*.

If you have any enquiries about these requirements, please contact David Schwebel.

Yours sincerely
DKitto 13/5/14
David Kitto
Director
Mining Projects
as delegate for the Secretary

Secretary's Environmental Assessment Requirements

Section 78A(8) of the *Environmental Planning and Assessment Act 1979* and Schedule 2 of the *Environmental Planning and Assessment Regulation 2000.*

Designated Development

EAR Number	830
Proposal	Expansion of an existing hard rock quarry, to extract an additional 2.25 million tonnes of material, extending the life of the quarry up to 20 years.
Location	Lots 51 and 55 DP 1165099, via Pacific Highway, South Kempsey
Applicant	Pacific Blue Metal Pty Ltd
Date of Expiry	13 May 2016
General Requirements (refer Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*)	The Environmental Impact Statement (EIS) must include: • an executive summary; • a full/detailed description of the proposal, including: - identification of the resource, particularly size and quality; - description of the site; - a history of any previous quarrying operations on the site; - the proposed works (including rehabilitation works); - the duration and intensity of extraction operations; - any likely interactions between the proposed operations and existing/approved development and land use in the area; and - a detailed justification for the development; • a conclusion justifying the development on economic, social and environmental grounds, taking into consideration whether the proposal is consistent with the objects of the *Environmental Planning & Assessment Act 1979*; and • a signed declaration from the author of the EIS, certifying that the information contained within the document is neither false nor misleading.
Key Issues	The EIS must also assess the potential impacts of the proposal during the establishment, operation and decommissioning of the proposal. The EIS must describe what measures would be implemented to avoid, minimise, mitigate, offset, manage and/or monitor the potential impacts on: • **Land Resources** – including a assessment of the potential impacts on: - soils and land capability, including an assessment of activities that would cause erosion and the measures proposed to minimise erosion and sedimentation; - landforms and topography; and - land use, including industrial, agricultural and conservation lands; • **Water Resources** – including: - identification of any licensing requirements or other approvals under the *Water Act 1912* and/or *Water Management Act 2000*; - an assessment of potential impacts on the quality and quantity of existing surface and ground water resources; - a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant Water Sharing Plan or water source embargo; - an annual site water balance for representative years of the proposed life of the project; and - a detailed description of the proposed water management system (including sewage), water monitoring program and other measures to mitigate surface and groundwater impacts; • **Biodiversity** – including: - accurate predictions of any vegetation clearing on site or for any road upgrades;

	- a detailed assessment of the potential impacts of the development on any threatened species or populations or their habitats, endangered ecological communities and groundwater dependent ecosystems; - a detailed description of the measures to maintain or improve the biodiversity values within the site in the medium to long term; and - consideration of a Biodiversity Offset Strategy; • **Heritage** – including: - an Aboriginal cultural heritage assessment (addressing both cultural and archaeological significance) which must demonstrate effective consultation with Aboriginal communities in determining and assessing impacts, and developing and selecting mitigation options and measures; and - a Historic heritage assessment (including archaeology) which must include a statement of heritage impact (including significance assessment) for any State significant or locally significant historic heritage items; • **Traffic and Transport** – including: - an assessment of potential traffic impacts on the capacity, efficiency and safety of the road network, in particular the assessment must include a Road Safety Audit to review the condition of the proposed routes and identify any safety issues which may exacerbated by the development; and - a description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network in the surrounding area over the life of the project; • **Noise and Vibration** - particularly any potential noise and vibration impacts on any nearby private receptors due to construction, operation or road haulage; • **Air Quality** – particularly any potential dust impacts on any nearby private receptors from construction, operation or road haulage; • **Rehabilitation** – including: - a detailed description of the proposed rehabilitation measures that would be undertaken during quarry closure; - a detailed rehabilitation strategy, including justification for the proposed final land form and consideration of the objectives of any relevant strategic land use plans or policies; and - the measures that would be undertaken to ensure sufficient financial resources are available to implement the proposed rehabilitation strategy; • **Waste Management** – including importation of any waste material to the site; • **Hazards and Risks** – paying particular attention to public safety, including bushfires and transport or storage of any dangerous goods; • **Visual Amenity**; • **Agricultural Impacts**; • **Utilities and Services**; and • **Social and Economic Impacts.**
Environmental Planning Instruments	The EIS must assess the proposal against the relevant environmental planning instruments, including (but not limited to): • *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007;* • *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development;* • *State Environmental Planning Policy No. 55 – Remediation of Land;* • *Kempsey Local Environmental Plan 2013;* and • relevant development control plans and section 94 plans, strategies and management plans.

References	The assessment of the key issues listed above must take into account relevant State Government guidelines, policies and plans. While not exhaustive, the following attachment contains a list of some guidelines, policies and plans that may be relevant to the environmental assessment of this development. During the preparation of the EIS you must also consult the Department's EIS Guideline – Extractive Industries – Quarries. This guideline is available for purchase from the Department's Information Centre, 23-33 Bridge Street, Sydney or by calling 1300 305 695.
Consultation	During the preparation of the EIS, you should consult with the relevant local, State and Commonwealth government authorities, service providers and community groups, and address any issues they may raise in the EIS. In particular, you should consult surrounding landowners and occupiers that are likely to be impacted by the proposal. Details of the consultations carried out and issues raised must be included in the EIS.

Attachment 1
Technical and Policy Guidelines

The following guidelines may assist in the preparation of the Environmental Impact Statement. This list is not exhaustive and not all these guidelines may be relevant to your proposal.

Many of these documents can be found on the following websites:
http://www.planning.nsw.gov.au
http://www.bookshop.nsw.gov.au
http://www.publications.gov.au

Policies, Guidelines & Plans

Risk Assessment	
	AS/NZS 4360:2004 Risk Management (Standards Australia)
	HB 203: 203:2006 Environmental Risk Management – Principles & Process (Standards Australia)
Water Resources	
	National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ)
	Using the ANZECC Guideline and Water Quality Objectives in NSW (DEC)
	Managing Urban Stormwater: Soils & Construction (Landcom)
	Aquifer Interference Policy (DPI) 2012
Soil Resources and Agricultural Land	
	Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC)
	Guidelines for Consultants Reporting on Contaminated Sites (EPA)
	Rural Land Capability Mapping (DLWC)
	Agricultural Land Classification (DPI)
Biodiversity	
	Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft (DECC) 2004
	The Threatened Species Assessment Guideline – The Assessment of Significance (DECC) 2007
	NSW Groundwater Dependent Ecosystem Policy (DLWC)
	Policy & Guidelines - Aquatic Habitat Management and Fish Conservation (NSW Fisheries)
	Draft Guidelines for the Assessment of Aquatic Ecology in EIA (DUAP 1998)
Heritage	
	Guide to investigation, assessing and reporting on Aboriginal cultural heritage in NSW (OEH) 2011
	Code of Practice of the Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW) 2010
	Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW) 2010
	Draft Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation (DEC) 2005

Air Quality	
	Protection of the Environment Operations (Clean Air) Regulation 2002
	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC)
	Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC)
	Assessment and Management of Odour from Stationary Sources in NSW (DEC)
Noise	
	NSW Industrial Noise Policy (DECC)
	NSW Road Noise Policy (EPA)
	Interim Construction Noise Guideline (DECC)
	Environmental Noise Management – Assessing Vibration: a technical guide (DEC)
Hazards	
	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
	Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (DUAP)
	Multi-Level Risk Assessment
	Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis
Traffic & Transport	
	Guide to Traffic Generating Development (RTA)
	Road Design Guide (RTA)
Waste	
	Waste Classification Guidelines: Part 1 Classification of Waste (DECC) 2008
	Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes 1999 (EPA)

Kempsey Shire Council
www.kempsey.nsw.gov.au
ksc@kempsey.nsw.gov.au
ABN: 70 706 618 663
Your council Our community

PCU53157

Ref: D14/12500, LA 33043, LA 33046
IS:IS

7 May 2014

Department of Planning
12 MAY 2014
Scanning Room

The Director – Mining Projects
Department of Planning & Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attn: David Schwebel

SUBJECT: **Director General's Requirements for the Environmental Impact Statement for the Expansion of Farrawell's Quarry, South Kempsey DGR ID No.830**
PROPERTY: **Lots 51 & 55 DP1165099, 627 Pacific Highway, South Kempsey**

I refer to your email correspondence of 15 April 2014, seeking Council's requirements for the Environmental Impact Statement (EIS) for the above proposal to be included in the Director General's Requirements (DGR's).

Council requests that the EIS address the following:

(a) Visual impact of the proposal as viewed from the Pacific Highway. It is considered that trees along the western boundary of the site should be retained as long as possible to achieve visual screening.

(b) Identification of the main haul route for while the quarry is supplying the Pacific Highway Upgrade project.

(c) Traffic Assessment taking into consideration use of the main access road for the approved subdivision concurrently with the proposed quarry expansion, in addition to wider assessment of the associated traffic impacts.

(d) Detailed noise and vibration assessment.

(e) Assessment against relevant environmental planning instruments, including:

(i) Kempsey Local Environmental Plan 2013;
(ii) Kempsey Development Control Plan 2013;
(iii) State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

22 Tozer Street West Kempsey | PO Box 3078 West Kempsey NSW 2440 | Customer Service Tel: 02 6566 3200 Fax: 02 6566 3205 | Library Tel: 02 6566 3210 Fax: 02 6566 3215

(f) A Flora and Fauna Assessment for the additional quarry area.

(g) Environmental Management Principles or Plan.

(h) Identification of a conflicting land use buffer for the quarry, provided in terms of minimum radius from the quarry operations.

(i) An Aboriginal Cultural Heritage Assessment.

Should you have any further information please call 6566 3200 or email ilija.susnja@kempsey.nsw.gov.au

Yours faithfully,

Ilija Susnja
TOWN PLANNER
SUSTAINABLE ENVIRONMENT

NSW EPA

Christy Hill

Notice Number
File Number EF13/3955 DOC14/58274-01
Date 9 MAY 2014

EIS Requirements for the extension of Farrawell's Quarry, South Kempsey

I refer to your request for the Environment Protection Authority's (EPA) requirements for the environmental impact statement (EIS) in regard EIS Requirements for the extension of Farrawell's Quarry, South Kempsey received by EPA on 17 April 2014.

The EPA has considered the details of the proposal as provided by the Department of Planning & Infrastructure and has identified the information it requires to issue its general terms of approval in Attachment A. Attachment B provides a list of Guidance Material for assessing environmental impacts.

In summary, EPA's key information requirements for the proposal include an adequate assessment of:

1. Air quality impacts, particularly relating to dust management

2. Noise impacts;

3. Soil and water management, particularly relating to groundwater and acid sulphate soils management; and

4. Waste

Pacific Blue Metals Pty Ltd is currently the holder of POEO Licence 20018 for of Farrawell's Quarry at 511 & 627 Pacific Highway, , South Kempsey, NSW, 2440. The licence permits land-based extractive activity which involves the extraction, processing or storage 100000-500000 tonnes per year of extractive materials.

To assist the EPA in assessing the EIS it is requested that the EIS follow the format of the Department of Planning and Infrastructure Register of Development Assessment Guidelines and addresses the EPA's specific EIS requirements outlined in the following attachments. If the necessary information is not adequately provided in the EIS then delays in the development application process may occur.

The EPA requests that the applicant provide one (1) electronic copy of the EIS.
The electronic copy should be lodged at the Grafton office of the EPA at PO Box 498, GRAFTON NSW

2460.

If you have any queries regarding this matter please contact Graeme Budd of the Grafton office on 66402505.

Yours sincerely

GRAEME BUDD
Head Environmental Management Unit – North Coast Region
Environment Protection Authority
(by Delegation)

ATTACHMENT A: EIS Requirements for for the extension of Farrawell's Quarry, South Kempsey : ID No 882

How to use these requirements

The EPA requirements have been structured in accordance with the Department of Planning and Infrastructure Register of Development Assessment Guidelines (http://www.planning.nsw.gov.au/DevelopmentAssessments/RegisterofDevelopmentAssessmentGuidelines/tabid/207/language/en-AU/Default.aspx), as follows. It is suggested that the EIS follow the same structure:

A. Executive summary

B. The proposal

C. The location

D. Identification and prioritisation of issues

E. The environmental issues

F. List of approvals and licences

G. Compilation of mitigation measures

H. Justification for the proposal

✓

NSW EPA

A Executive summary

The executive summary should include a brief discussion of the extent to which the proposal achieves identified environmental outcomes.

B The proposal

1. Objectives of the proposal

- The objectives of the proposal should be clearly stated and refer to:
  a) the size and type of the operation, the nature of the processes and the products, by-products and wastes produced.
  b) a life cycle approach to the production, use or disposal of products.
  c) the anticipated level of performance in meeting required environmental standards and cleaner production principles.
  d) the staging and timing of the proposal and any plans for future expansion.
  e) the proposal's relationship to any other industry or facility.

2. Description of the proposal

General

- Outline the production process including:
  a) the environmental "mass balance" for the process – quantify in-flow and out-flow of materials, any points of discharge to the environment and their respective destinations (sewer, stormwater, atmosphere, recycling, landfill etc).
  b) any life-cycle strategies for the products.

- Outline cleaner production actions, including:
  a) measures to minimise waste (typically through addressing source reduction)
  b) proposals for use or recycling of by-products
  c) proposed disposal methods for solid and liquid waste
  d) air management systems including all potential sources of air emissions, measures to minimise dust generated, proposals to re-use or treat emissions, emission levels relative to relevant standards in regulations, discharge points.
  e) water management system including all potential sources of water pollution, details of proposals for re-use, treatment etc, emission levels of any wastewater discharged, discharge points, summary of options explored to avoid a discharge, reduce its frequency or reduce its impacts, and rationale for selection of option to discharge.

✓

f) soil contamination treatment and prevention systems.

- Outline construction works including:
  - actions to address any existing soil contamination
  - any earthworks or site clearing; re-use and disposal of cleared material, including details of stockpiling of topsoil and spoil on-site and associated erosion and sedimemt control
  - construction timetable and staging; hours of construction; proposed construction methods
  - environment protection measures, including:
    - noise mitigation measures,
    - dust control measures and details of water supply for dust suppression .e.g details of as water re-use pond.
    - erosion and sediment control measures in accordance with *Managing Urban Stormwater Soils and Construction: Volume 1 and Volume 2 E. Mines and quarries..*

Air

- Identify all sources of air emissions from the development.
  Note: emissions can be classed as either:
  - *point (eg emissions from stack or vent) or*
  - *fugitive (from wind erosion, leakages or spillages, associated with loading or unloading, conveyors, storage facilities, plant and yard operation, vehicle movements (dust from road, exhausts, loss from load), land clearing and construction works).*
- Provide details of the project that are essential for predicting and assessing air impacts including:
  a) the quantities and physio-chemical parameters (eg concentration, moisture content, bulk density, particle sizes etc) of materials to be used, transported, produced or stored
  b) an outline of procedures for handling, transport, production and storage
  c) the management of solid, liquid and gaseous waste streams with potential for significant air impacts.

Noise and vibration

- Identify all noise sources from the development (including both construction and operation phases). Detail all potentially noisy activities including ancillary activities such as transport of goods and raw materials.
- Specify the times of operation for all phases of the development and for all noise producing activities.
- For projects with a significant potential traffic noise impact provide details of road alignment (include gradients, road surface, topography, bridges, culverts etc), and land use along the proposed road and measurement locations – diagrams should be to a scale sufficient to delineate individual residential blocks.

J

NSW EPA

Water

- Provide details of the project that are essential for predicting and assessing impacts to waters, including:
  a) the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on www.environment.nsw.gov.au/ieo, using technical criteria derived from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC 2000)
  b) the management of surrounding groundwater levels and potential to expose potential acid sulphate soils
  c) the management of discharges with potential for water impacts
  d) drainage works and associated infrastructure; land-forming and excavations; working capacity of structures; and water resource requirements of the proposal.
- Outline site layout, demonstrating efforts to avoid proximity to water resources (especially for activities with significant potential impacts eg effluent ponds) and showing potential areas of modification of contours, drainage etc.
- Outline how total water cycle considerations are to be addressed showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.

Waste and chemicals

- Provide details of the quantity and type of both liquid waste and non-liquid waste generated, handled, processed or disposed of at the premises. Waste must be classified according to the *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-liquid Wastes* (NSW EPA, 1999).
- Provide details of liquid waste and non-liquid waste management at the facility, including:
  a) the transportation, assessment and handling of waste arriving at or generated at the site
  b) any stockpiling of wastes or recovered materials at the site
  c) any waste processing related to the facility, including reuse, recycling, reprocessing (including composting) or treatment both on- and off-site
  d) the method for disposing of all wastes or recovered materials at the facility
  e) the emissions arising from the handling, storage, processing and reprocessing of waste at the facility
  f) the proposed controls for managing the environmental impacts of these activities.
- Provide details of spoil disposal with particular attention to:
  a) the quantity of spoil material likely to be generated
  b) proposed strategies for the handling, stockpiling, reuse/recycling and disposal of spoil
  c) the need to maximise reuse of spoil material in the construction industry

d) identification of the history of spoil material and whether there is any likelihood of contaminated material, and if so, measures for the management of any contaminated material

e) designation of transportation routes for transport of spoil.

- Provide details of procedures for the assessment, handling, storage, transport and disposal of all hazardous and dangerous materials used, stored, processed or disposed of at the site, in addition to the requirements for liquid and non-liquid wastes.
- Provide details of the type and quantity of any chemical substances to be used or stored and describe arrangements for their safe use and storage.
- Reference should be made to the guidelines: *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (NSW EPA, 1999).

3. Rehabilitation

Outline considerations of site maintenance, and proposed plans for the final condition of the site (ensuring its suitability for future uses). Details for the storage of topsoil and appropriate erosion and sediment control to manage the storage of topsoil are to be included.

4. Consideration of alternatives and justification for the proposal

- Consider the environmental consequences of adopting alternatives, including alternative:
  a) sites and site layouts
  b) access modes and routes
  c) materials handling and production processes
  d) waste and water management
  e) impact mitigation measures
  f) energy sources
- Selection of the preferred option should be justified in terms of:
  a) ability to satisfy the objectives of the proposal
  b) relative environmental and other costs of each alternative
  c) acceptability of environmental impacts and contribution to identified environmental objectives
  d) acceptability of any environmental risks or uncertainties
  e) reliability of proposed environmental impact mitigation measures
  f) efficient use (including maximising re-use) of land, raw materials, energy and other resources.

C The location

1. General

In preparing the site description the proponent should consider:

- Using map(s) showing the locality of the proposed development in a regional and local context. Local context maps should be based on 1:25000 topographic plans. Photographs of the site's key attributes may provide useful documentation.
- The area subject to development should be clearly identified on an appropriately scaled plan. This includes all ancillary works such as buildings and other structures, parking areas, loading / processing / treatment areas, access roads, and material stockpiling areas.
- The applicability or otherwise of Local Environment Plans (LEP), Regional Environment Plans (REP) and State Environmental Planning Policies (SEPP).
- Provide an overview of the affected environment to place the proposal in its local and regional environmental context including:
  a) meteorological data (eg rainfall, temperature and evaporation, wind speed and direction)
  b) topography (landform element, slope type, gradient and length)
  c) surrounding land uses (potential synergies and conflicts)
  d) geomorphology (rates of landform change and current erosion and deposition processes)
  e) soil types and properties (including erodibility; engineering and structural properties; dispersibility; permeability; presence of acid sulfate soils and potential acid sulfate soils)
  f) ecological information (water system habitat, vegetation, fauna)
  g) availability of services and the accessibility of the site for passenger and freight transport.

2. Air

- Describe the topography and surrounding land uses. Provide details of the exact locations of dwellings, schools and hospitals. Where appropriate provide a perspective view of the study area such as the terrain file used in dispersion models.
- Describe surrounding buildings that may effect plume dispersion.
- Provide and analyse site representative data on following meteorological parameters:
  a) temperature and humidity
  b) rainfall, evaporation and cloud cover
  c) wind speed and direction
  d) atmospheric stability class
  e) mixing height (the height that emissions will be ultimately mixed in the atmosphere)
  f) katabatic air drainage
  g) air re-circulation.

3. Noise and vibration

- Identify any noise sensitive locations likely to be affected by activities at the site, such as residential properties, schools, churches, and hospitals. Typically the location of any noise sensitive locations in relation to the site should be included on a map of the locality.
- Identify the land use zoning of the site and the immediate vicinity and the potentially affected areas.

4. Water

- Describe the catchment including proximity of the development to any waterways including groundwater and provide an assessment of their sensitivity/significance from a public health, ecological and/or economic perspective. The Water Quality and River Flow Objectives on the website: www.environment.nsw.gov.au/ieo should be used to identify the agreed environmental values and human uses for any affected waterways. This will help with the description of the local and regional area.

5. Soil Contamination Issues

- Provide details of site history – if earthworks are proposed, this needs to be considered with regard to possible soil contamination, for example if the site was previously a landfill site or if irrigation of effluent has occurred.

D Identification and prioritisation of issues / scoping of impact assessment

- Provide an overview of the methodology used to identify and prioritise issues. The methodology should take into account:
  a) relevant NSW government guidelines
  b) industry guidelines
  c) EISs for similar projects
  d) relevant research and reference material
  e) relevant preliminary studies or reports for the proposal
  f) consultation with stakeholders.
- Provide a summary of the outcomes of the process including:
  a) key issues which will require a full analysis (including comprehensive baseline assessment)
  b) issues not needing full analysis though they may be addressed in the mitigation strategy

c) justification for the level of analysis proposed (the capacity of the proposal to give rise to high concentrations of pollution compared with the ambient environment or environmental outcomes is an important factor in setting the level of assessment).

E The environmental issues

1. General

- The potential impacts identified in the scoping study need to be assessed to determine their significance, particularly in terms of achieving environmental outcomes, and minimising environmental pollution.
- Identify gaps in information and data relevant to significant impacts of the proposal and any actions proposed to fill those information gaps so as to enable development of appropriate management and mitigation measures. This is in accordance with ESD requirements.

Note: The level of detail should match the level of importance of the issue in decision making which is dependent on the environmental risk.

Describe baseline conditions

- Provide a description of existing environmental conditions for any potential impacts.

Assess impacts

- For any potential impacts relevant for the assessment of the proposal provide a detailed analysis of the impacts of the proposal on the environment including the cumulative impact of the proposal on the receiving environment especially where there are sensitive receivers.
- Describe the methodology used and assumptions made in undertaking this analysis (including any modelling or monitoring undertaken) and indicate the level of confidence in the predicted outcomes and the resilience of the environment to cope with the predicted impacts.
- The analysis should also make linkages between different areas of assessment where necessary to enable a full assessment of environmental impacts, e.g. assessment of impacts on air quality will often need to draw on the analysis of traffic, health, social, soil and/or ecological systems impacts; etc.
- The assessment needs to consider impacts at all phases of the project cycle including: exploration (if relevant or significant), construction, routine operation, start-up operations, upset operations and decommissioning if relevant.
- The level of assessment should be commensurate with the risk to the environment.

Describe management and mitigation measures

- Describe any mitigation measures and management options proposed to prevent, control, abate or mitigate identified environmental impacts associated with the proposal and to reduce risks to human health and prevent the degradation of the environment. This should include an assessment of the

effectiveness and reliability of the measures and any residual impacts after these measures are implemented.

- Proponents are expected to implement a 'reasonable level of performance' to minimise environmental impacts. The proponent must indicate how the proposal meets reasonable levels of performance. For example, reference technology based criteria if available, or identify good practice for this type of activity or development. A 'reasonable level of performance' involves adopting and implementing technology and management practices to achieve certain pollutant emissions levels in economically viable operations. Technology-based criteria evolve gradually over time as technologies and practices change.
- Use environmental impacts as key criteria in selecting between alternative sites, designs and technologies, and to avoid options having the highest environmental impacts.
- Outline any proposed approach (such as an Environmental Management Plan) that will demonstrate how commitments made in the EIS will be implemented. Areas that should be described include:

  a) operational procedures to manage environmental impacts

  b) monitoring procedures

  c) training programs

  d) community consultation

  e) complaint mechanisms including site contacts

  f) strategies to use monitoring information to improve performance

  g) strategies to achieve acceptable environmental impacts and to respond in event of exceedences.

a) Air

Describe baseline conditions

- Provide a description of existing air quality and meteorology, using existing information and site representative ambient monitoring data.

Assess impacts

- Identify all pollutants of concern and estimate emissions by quantity (and size for particles), source and discharge point.
- Estimate the resulting ground level concentrations of all pollutants. Where necessary (e.g. potentially significant impacts and complex terrain effects), use an appropriate dispersion model to estimate ambient pollutant concentrations. Discuss choice of model and parameters with the EPA.
- Describe the effects and significance of pollutant concentration on the environment, human health, amenity and regional ambient air quality standards or goals.
- Reference should be made to *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW* (EPA, 2001); *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (EPA, 2001).

Describe management and mitigation measures

- Outline specifications of pollution control equipment (including manufacturer's performance guarantees where available) and management protocols for both point and fugitive emissions. Where possible, this should include cleaner production processes.

b) Noise and vibration

Any residences that surround the proposed site could be subject to unacceptable noise impacts if not managed appropriately.
A Noise Impact Assessment (NIA) for the proposal must be conducted by an appropriately qualified acoustics consultant. The NIA must be conducted in accordance with the State Government's *Industrial Noise Policy* and address the potential impacts of the quarry operations on any nearby residents including the following:

Describe baseline conditions

- Determine the existing background (LA90) and ambient (LAeq) noise levels in accordance with the *NSW Industrial Noise Policy*.
- Determine the existing road traffic noise levels in accordance with the *NSW Road Noise Policy*, where road traffic noise impacts may occur.
- The noise impact assessment report should provide details of all monitoring of existing ambient noise levels including:
  1. Details of equipment used for the measurements
  2. A brief description of where the equipment was positioned
  3. A statement justifying the choice of monitoring site, including the procedure used to choose the site, having regards to the definition of 'noise sensitive locations(s)' and 'most affected locations(s)' described in Section 3.1.2 of the *NSW Industrial Noise Policy*
  4. Details of the exact location of the monitoring site and a description of land uses in surrounding areas
  5. A description of the dominant and background noise sources at the site
  6. Day, evening and night assessment background levels for each day of the monitoring period
  7. The final Rating Background Level (RBL) value
  8. Graphs of the measured noise levels for each day should be provided
  9. A record of periods of affected data (due to adverse weather and extraneous noise), methods used to exclude invalid data and a statement indicating the need for any re-monitoring under Step 1 in Section B1.3 of the *NSW Industrial Noise Policy*
  10. Determination of LAeq noise levels from existing industry.

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NSW EPA

Assess impacts

- Determine the project specific noise levels for the site. For each identified potentially affected receiver, this should include:
  a) determination of the intrusive criterion for each identified potentially affected receiver
  b) selection and justification of the appropriate amenity category for each identified potentially affected receiver
  c) determination of the amenity criterion for each receiver
  d) determination of the appropriate sleep disturbance limit.
- Maximum noise levels during night-time period (10pm-7am) should be assessed to analyse possible affects on sleep. Where LA1(1min) noise levels from the site are less than 15 dB above the background LA90 noise level, sleep disturbance impacts are unlikely. Where this is not the case, further analysis is required. Additional guidance is provided in Appendix B of the *NSW Road Noise Policy*.
- Determine expected noise level and noise character (eg tonality, impulsiveness, vibration, etc) likely to be generated from noise sources during:
  a) site establishment
  b) construction
  c) operational phases
  d) transport including traffic noise generated by the proposal
  e) other services.

  Note: The noise impact assessment report should include noise source data for each source in 1/1 or 1/3 octave band frequencies including methods for references used to determine noise source levels. Noise source levels and characteristics can be sourced from direct measurement of similar activities or from literature (if full references are provided).
- Determine the noise levels likely to be received at the most sensitive locations (these may vary for different activities at each phase of the development). Potential impacts should be determined for any identified significant adverse meteorological conditions. Predicted noise levels under calm conditions may also aid in quantifying the extent of impact where this is not the most adverse condition.
- The noise impact assessment report should include:
  a) a plan showing the assumed location of each noise source for each prediction scenario
  b) a list of the number and type of noise sources used in each prediction scenario to simulate all potential significant operating conditions on the site
  c) any assumptions made in the predictions in terms of source heights, directivity effects, shielding from topography, buildings or barriers, etc
  d) methods used to predict noise impacts including identification of any noise models used. Where modelling approaches other than the use of the ENM or SoundPlan computer models are adopted, the approach should be appropriately justified and validated
  e) an assessment of appropriate weather conditions for the noise predictions including reference to any weather data used to justify the assumed conditions

f) the predicted noise impacts from each noise source as well as the combined noise level for each prediction scenario under any identified significant adverse weather conditions as well as calm conditions where appropriate

g) for developments where a significant level of noise impact is likely to occur, noise contours for the key prediction scenarios should be derived

h) an assessment of the need to include modification factors as detailed in Section 4 of the *NSW Industrial Noise Policy*.

- Discuss the findings from the predictive modelling and, where relevant noise criteria have not been met, recommend additional mitigation measures.
- The noise impact assessment report should include details of any mitigation proposed including the attenuation that will be achieved and the revised noise impact predictions following mitigation.
- Where relevant noise/vibration criteria cannot be met after application of all feasible and cost effective mitigation measures the residual level of noise impact needs to be quantified by identifying:

  a) locations where the noise level exceeds the criteria and extent of exceedence

  b) numbers of people (or areas) affected

  c) times when criteria will be exceeded

  d) likely impact on activities (speech, sleep, relaxation, listening, etc)

  e) change on ambient conditions

  f) the result of any community consultation or negotiated agreement.

- For the assessment of existing and future traffic noise, details of data for the road should be included such as assumed traffic volume; percentage heavy vehicles by time of day; and details of the calculation process. These details should be consistent with any traffic study carried out in the EIS.
- Where blasting is intended an assessment in accordance with the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990) should be undertaken. The following details of the blast design should be included in the noise assessment:

  a) bench height, burden spacing, spacing burden ratio

  b) blast hole diameter, inclination and spacing

  c) type of explosive, maximum instantaneous charge, initiation, blast block size, blast frequency.

Describe management and mitigation measures

- Determine the most appropriate noise mitigation measures and expected noise reduction including both noise controls and management of impacts for both construction and operational noise. This will include selecting quiet equipment and construction methods, noise barriers or acoustic screens, location of stockpiles, temporary offices, compounds and vehicle routes, scheduling of activities, etc.
- For traffic noise impacts, provide a description of the ameliorative measures considered (if required), reasons for inclusion or exclusion, and procedures for calculation of noise levels including ameliorative measures. Also include, where necessary, a discussion of any potential problems associated with the proposed ameliorative measures, such as overshadowing effects from barriers. Appropriate ameliorative measures may include:

a) use of alternative transportation modes, alternative routes, or other methods of avoiding the new road usage

b) control of traffic (eg: limiting times of access or speed limitations)

c) resurfacing of the road using a quiet surface

d) use of (additional) noise barriers or bunds

e) treatment of the façade to reduce internal noise levels buildings where the night-time criteria is a major concern

f) more stringent limits for noise emission from vehicles (i.e. using specially designed 'quite' trucks and/or trucks to use air bag suspension

g) driver education

h) appropriate truck routes

i) limit usage of exhaust breaks

j) use of premium muffles on trucks

k) reducing speed limits for trucks

l) ongoing community liaison and monitoring of complaints

m) phasing in the increased road use.

a) Water

Describe baseline conditions

- Describe existing surface and groundwater quality and levels – an assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions (e.g. a wet weather sampling program is needed if runoff events may cause impacts).

  Note: Methods of sampling and analysis need to conform with an accepted standard (e.g. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DECCW 2004) *or be approved and analyses undertaken by accredited laboratories).*

- Provide site drainage details and surface runoff yield.
- Provide local groundwater conditions including seasonal variations.
- State the ambient Water Quality and River Flow Objectives for the receiving waters. These refer to the community's agreed environmental values and human uses endorsed by the Government as goals for the ambient waters. These environmental values are published on the website: www.environment.nsw.gov.au/ieo. The EIS should state the environmental values listed for the catchment and waterway type relevant to your proposal. NB: A consolidated and approved list of environmental values are not available for groundwater resources. Where groundwater may be affected the EIS should identify appropriate groundwater environmental values and justify the choice.
- State the indicators and associated trigger values or criteria for the identified environmental values. This information should be sourced from the ANZECC 2000 *Guidelines for Fresh and Marine Water Quality* (http://www.environment.gov.au/water/publications/quality/nwqms-guidelines-4-vol1.html) (Note that, as at 2004, the NSW Water Quality Objectives booklets and website contain technical criteria

derived from the 1992 version of the ANZECC Guidelines. The Water Quality Objectives remain as Government Policy, reflecting the community's environmental values and long-term goals, but the technical criteria are replaced by the more recent ANZECC 2000 Guidelines). NB: While specific guidelines for groundwater are not available, the ANCECC 2000 Guidelines endorse the application of the trigger values and decision trees as a tool to assess risk to environmental values in groundwater.

State any locally specific objectives, criteria or targets, which have been endorsed by the government e.g. the Healthy Rivers Commission Inquiries (www.hrc.nsw.gov.au) or the NSW Salinity Strategy (DLWC, 2000) (www.dlwc.nsw.gov.au/care/salinity/#Strategy).

- Where site specific studies are proposed to revise the trigger values supporting the ambient Water Quality and River Flow Objectives, and the results are to be used for regulatory purposes (e.g. to assess whether a licensed discharge impacts on water quality objectives), then prior agreement from the EPA on the approach and study design must be obtained.
- Describe the state of the receiving waters and relate this to the relevant Water Quality and River Flow Objectives (i.e. are Water Quality and River Flow Objectives being achieved?). Proponents are generally only expected to source available data and information. However, proponents of large or high risk developments may be required to collect some ambient water quality / river flow / groundwater data to enable a suitable level of impact assessment. Issues to include in the description of the receiving waters could include:
    - lake or estuary flushing characteristics
    - specific human uses (e.g. exact location of drinking water offtake)
    - sensitive ecosystems or species conservation values
    - a description of the condition of the local catchment e.g. erosion levels, soils, vegetation cover, etc
    - an outline of baseline groundwater information, including, but not restricted to, depth to watertable, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment
    - historic river flow data where available for the catchment.

Assess Impacts

- No proposal should breach clause 120 of the *Protection of the Environment Operations Act* 1997 (i.e. pollution of waters is prohibited unless undertaken in accordance with relevant regulations).
- Identify and estimate the quantity of all pollutants that may be introduced into the water cycle by source and discharge point including residual discharges after mitigation measures are implemented.
- Include a rationale, along with relevant calculations, supporting the prediction of the discharges.
- Describe the effects and significance of any pollutant loads on the receiving environment. This should include impacts of residual discharges through modelling, monitoring or both, depending on the scale of the proposal. Determine changes to hydrology (including drainage patterns, surface runoff yield, flow regimes, wetland hydrologic regimes and groundwater).
- Describe water quality impacts resulting from changes to hydrologic flow regimes (such as nutrient enrichment or turbidity resulting from changes in frequency and magnitude of stream flow).
- Identify any potential impacts on quality or quantity of groundwater describing their source.

- Identify potential impacts associated with geomorphological activities with potential to increase surface water and sediment runoff or to reduce surface runoff and sediment transport. Also consider possible impacts such as bed lowering, bank lowering, instream siltation, floodplain erosion and floodplain siltation.
- Identify impacts associated with the disturbance of acid sulfate soils and potential acid sulfate soils and/or acid forming rock.
- Containment of spills and leaks shall be in accordance with Australian Standard 1940-2004 Storage and Handling of Flammable & Combustible Liquids. Containment should be designed for no-discharge.
- The significance of the impacts listed above should be predicted. When doing this it is important to predict the ambient water quality and river flow outcomes associated with the proposal and to demonstrate whether these are acceptable in terms of achieving protection of the Water Quality and River Flow Objectives. In particular the following questions should be answered:
  a) will the proposal protect Water Quality and River Flow Objectives where they are currently achieved in the ambient waters; and
  b) will the proposal contribute towards the achievement of Water Quality and River Flow Objectives over time, where they are not currently achieved in the ambient waters.
- Consult with the EPA as soon as possible if a mixing zone is proposed (a mixing zone could exist where effluent is discharged into a receiving water body, where the quality of the water being discharged does not immediately meet water quality objectives. The mixing zone could result in dilution, assimilation and decay of the effluent to allow water quality objectives to be met further downstream, at the edge of the mixing zone). The EPA will advise the proponent under what conditions a mixing zone will and will not be acceptable, as well as the information and modelling requirements for assessment.

  Note: The assessment of water quality impacts needs to be undertaken in a total catchment management context to provide a wide perspective on development impacts, in particular cumulative impacts.

- Where a licensed discharge is proposed, provide the rationale as to why it cannot be avoided through application of a reasonable level of performance, using available technology, management practice and industry guidelines.
- Where a licensed discharge is proposed, provide the rationale as to why it represents the best environmental outcome and what measures can be taken to reduce its environmental impact.
- Reference should be made to *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004), *Guidelines for Fresh and Marine Water Quality* ANZECC 2000).

Describe management and mitigation measures

A Soil and Water Management Plan should be developed which outlines all management and mitigation measures relating to stormwater management and erosion control. The Soil and Water Management Plan should:

- Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls.
- Outline erosion and sediment control measures directed at minimising disturbance of land, minimising water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls as well as rehabilitation strategies. Details of method of storage of topsoil and associated erosion and sediment control are to be detailed.

- Describe waste water treatment measures that are appropriate to the type and volume of waste water and are based on a hierarchy of avoiding generation of waste water; capturing all contaminated water (including stormwater) on the site; reusing/recycling waste water; and treating any unavoidable discharge from the site to meet specified water quality requirements.
- Describe the size at location of the sediment ponds for each stage of the development of the quarry. The sediment basins must meet the design and operational standards of *Managing Urban Stormwater Soils and Construction: Volume 1 and Volume 2 E. Mines and quarries.* This document requires that at a minimum 90 percentile five-day rainfall event (standard: greater than three years) be used to determine basin sizing for quarries. Detail calculations of sediment basin size. Describe proposed measures for managing sediment basins.
- Outline pollution control measures relating to storage of materials, possibility of accidental spills (eg preparation of contingency plans), appropriate disposal methods, and generation of leachate.
- Describe hydrological impact mitigation measures including:
  a) site selection (avoiding sites prone to flooding and water-logging, actively eroding or affected by deposition)
  b) minimising runoff
  c) minimising reductions or modifications to flow regimes
  d) avoiding modifications to groundwater.
- Describe groundwater impact mitigation measures including:
  a) site selection
  b) retention of native vegetation and revegetation
  c) artificial recharge
  d) providing surface storages with impervious linings
  e) monitoring program.
- Describe geomorphological impact mitigation measures including:
  a) site selection
  b) erosion and sediment controls
  c) minimising instream works
  d) treating existing accelerated erosion and deposition
  e) monitoring program.
- Any proposed monitoring should be undertaken in accordance with the *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (DECCW 2004).

5. Soils and contamination

Describe baseline conditions

- Provide any details (in addition to those provided in the location description - Section C) that are needed to describe the existing situation in terms of soil types and properties and soil contamination.

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Assess Impacts

- Identify any likely impacts resulting from the construction or operation of the proposal, including the likelihood of:
  a) disturbing any existing contaminated soil
  b) contamination of soil by operation of the activity
  c) subsidence or instability
  d) soil erosion
  e) disturbing acid sulfate or potential acid sulfate soils.
- Reference should be made to *Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites* (EPA, 1997); *Contaminated Sites – Guidelines on Significant Risk of Harm and Duty to Report* (EPA, 1999).

Describe management and mitigation measures

- Describe and assess the effectiveness or adequacy of any soil management and mitigation measures during construction and operation of the proposal including:
  a) erosion and sediment control measures, including stabilisation of discharge point
  b) proposals for site remediation – see *Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land* (Department of Urban Affairs and Planning and Environment Protection Authority, 1998)
  c) proposals for the management of these soils – see *Acid Sulfate Soil Manual, ASSMAC, 1998.*

6. Waste and chemicals

Describe baseline conditions

- Describe any existing waste or chemicals operations related to the proposal.

Assess Impacts

- Assess the adequacy of proposed measures to minimise natural resource consumption and minimise impacts from the handling, transporting, storage, processing and reprocessing of waste and/or chemicals.
- Reference should be made to *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (EPA, 1999).

Describe management and mitigation measures

- Outline measures to minimise the consumption of natural resources.

- Outline measures to avoid the generation of waste and promote the re-use and recycling and reprocessing of any waste.Outline measures to support any approved regional or industry waste plans.

7. Cumulative impacts

- Identify the extent that the receiving environment is already stressed by existing development and background levels of emissions to which this proposal will contribute.
- Assess the impact of the proposal against the long term air, noise and water quality objectives for the area or region.
- Identify infrastructure requirements flowing from the proposal (eg water and sewerage services, transport infrastructure upgrades).
- Assess likely impacts from such additional infrastructure and measures reasonably available to the proponent to contain such requirements or mitigate their impacts (eg travel demand management strategies).

F. List of approvals and licences

- Identify all approvals and licences required under environment protection legislation including details of all scheduled activities, types of ancillary activities and types of discharges (to air, land, water).

G. Compilation of mitigation measures

- Outline how the proposal and its environmental protection measures would be implemented and managed in an integrated manner so as to demonstrate that the proposal is capable of complying with statutory obligations under EPA licences or approvals (eg outline of an environmental management plan).
- The mitigation strategy should include the environmental management and cleaner production principles which would be followed when planning, designing, establishing and operating the proposal. It should include two sections, one setting out the program for managing the proposal and the other outlining the monitoring program with a feedback loop to the management program.

H. Justification for the Proposal

- Reasons should be included which justify undertaking the proposal in the manner proposed, having regard to the potential environmental impacts.


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ATTACHMENT B - GUIDANCE MATERIAL

Assessing Environmental Impacts

1. Water and Soils

Water quality

- National Water Quality Management Strategy: Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000)
- NWQMS Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC 2000)
- Australian Standard 1940-2004 Storage and Handling of Flammable & Combustible Liquids
- Approve Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004)

Acid Sulphate Soils or Acid forming rock

- Acid Sulphate Soil Manual – ASSMAC, 1998

Sediment & Erosion Control

- *Managing Urban Stormwater: Soils and Construction: Volume 1* (DECC 2009)
- Managing Urban Stormwater: *Volume 2 E. Mines and quarries.*
- Managing Urban Stormwater: Harvest and Re-use (DEC 2006)

(These publications available from: http://www.environment.nsw.gov.au/stormwater/publications.htm)

Groundwater

- The NSW State Groundwater Quality Protection Policy (DLWC 1998)
- NSW State Groundwater Dependent Ecosystems Policy (DLWC, 2002)
- National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia
- (ARMCANZ & ANZECC, 1995).

Contaminated sites

- Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites (EPA, 1997)
- Contaminated Sites – Guidelines on Significant Risk of Harm and Duty to Report (EPA, 1999)
- Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land (Department of Urban Affairs and Planning and Environment Protection Authority, 1998)

2. Air

- Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW (EPA, 2001);
- Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA, 2001).

3. Noise and vibration

- NSW Industrial Noise Policy (EPA, 1999)
- NSW Road Noise Policy (DECCW, 2011)
- Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (ANZECC, 1990)
- Chapter 171 Noise Control Guideline, Construction Site Noise, Environmental Noise Control Manual, 1994; NSW Interim Construction Noise Guideline (DECC, August 2008).

4. Waste

- Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes.

NSW GOVERNMENT | Department of Primary Industries

OUT14/12529

01 May 2014

David Schwebel
Student Planner – Mining Projects
NSW Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Dear Mr Schwebel,

Re: Expansion of Farrawell's Quarry_Kempsey Shire LGA DGR ID No. 830

Thankyou for the opportunity to provide advice on the requirements for the preparation of an Environmental Impact Statement (EIS) for the expansion of the existing extractive industry detailed above.

Agriculture NSW, a division within the Department of Primary Industries have produced a guideline that sets out the relevant agricultural issues to consider for extractive industry developments. This guideline is titled *Agriculture issues for extractive industry development* and can be accessed from the Agriculture Land Use Planning webpage at the following link:
http://www.dpi.nsw.gov.au/agriculture/resources/lup/development-assessment/extractive-industries

Please refer to this guideline in the preparation of the EIS where relevant.

Yours Sincerely

Selina Stillman
Resource Management Officer – North Coast

NSW Department of Primary Industries
Wollongbar Primary Industries Institute, 1243 Bruxner Highway, Wollongbar NSW 2477
Tel: 02 66261215 Fax: 02 66281744 www.dpi.nsw.gov.au ABN: 72 189 919 072

NSW GOVERNMENT Office of Environment & Heritage

Your reference: DGR ID No. 830
Our reference: DOC14/53736
Contact: Nicky Owner 6659 8254

Mr David Schwebel
Student Planner
Mining Projects
Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Dear Mr Schwebel

Re: Request for EIS Requirements – Farrawell's Quarry, South Kempsey

Thank you for your email of 15 April 2013 inviting input from the Office of Environment and Heritage (OEH) for the preparation of Director-General Requirements (DGRs) for the above proposal. OEH notes that the project is deemed to be Designated Development and as such will be assessed in accordance with Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

OEH has reviewed the locality in which the proposal is located and advises that the Environmental Impact Statement (EIS) DGRs must address the following:

- Aboriginal cultural heritage, given the location of the proposed quarry site in a landscape known to contain items of significance to the Aboriginal community; and
- Biodiversity considerations, given the recording of a number of threatened species in close proximity to the proposed quarry site, including the Glossy Black-cockatoo, Koala, Varied Sittella, Brush-tailed Phascogale, Little Bent-wing Bat and Masked Owl.

The proponent should ensure that the EIS will be sufficiently comprehensive to enable unambiguous determination of the extent of the direct and indirect impact(s) of the proposal. In addition to the matters raised above, the EIS should include an appropriate assessment of the potential impacts on biodiversity, including populations, ecological communities, or their habitats likely to occur on or near the subject site, and where deemed appropriate, historic heritage values and flooding. OEH considers that this information is necessary to assess an EIS for the proposal.

The full list of OEH requirements that may need to be addressed in the EIS is provided in **Attachment 1**. In preparing the EIS, the proponent should refer to the relevant guidance material listed in **Attachment 2** regarding best practice environment and heritage management.

If you require any further information or clarification regarding this matter please contact Ms Nicky Owner, Conservation Planning Officer via email nicky.owner@environment.nsw.gov.au or by telephone 02 6659 8254. Please note that Nicky works part time, Tuesday to Thursday only.

Yours sincerely

2 May 2014

DIMITRI YOUNG
Senior Team Leader Planning - North East
Regional Operations

Locked Bag 914, Coffs Harbour NSW 2450
Federation House, Level 7, 24 Moonee Street
Coffs Harbour NSW
Tel: (02) 6651 5946 Fax: (02) 6651 6187
ABN 30 841 387 271
www.environment.nsw.gov.au

ATTACHMENT 1:
FARRAWELL'S QUARRY– OEH REQUIREMENTS FOR PREPARATION OF EIS

GENERAL INFORMATION

The Environmental Impact Statement (EIS) should identify the environmental objectives for the proposal. These environmental objectives will guide decisions on environmental controls and management throughout the life of the development. The EIS should fully detail the existing environment including a description of Aboriginal cultural heritage and flora and fauna characteristics.

Impacts related to the following environmental issues need to be assessed, quantified and reported on:

- Aboriginal cultural heritage; and
- Biodiversity

The EIS should address the specific requirements outlined below and assess impacts in accordance with the relevant guidelines mentioned. A full list of guidelines is provided at **Attachment 2**.

THE PROPOSAL

The objectives of the proposal should be clearly stated and refer to the:

- the size and type of the proposal and its operation;
- all anticipated environment impacts, both direct and indirect, including level of vegetation / habitat clearing
- the anticipated level of performance in meeting required environmental standards;
- threatened species, populations, ecological communities and / or habitats impacted upon
- the staging and timing of the proposal; and
- the proposal's relationship to any other proposal and/or developments.

THE PROJECT AREA

The EIS should fully identify all of the processes and activities intended for the site and during the life of the project, including details of:

- the location of the proposed development and details of the surrounding environment, including the biodiversity value the two lots to the north and east of the site that are zoned E2 Environmental Conservation;
- the proposed layout of the site;
- appropriate land use zoning;
- ownership details of any residence and/or land likely to be affected by the proposal;
- maps/diagrams showing the location of residences and properties likely to be affected and other industrial developments, conservation areas, wetlands, etc in the locality that may be affected by the facility;
- all equipment proposed for use at the site;
- chemicals, including fuel, used on the site and proposed methods for the transportation, storage, use and emergency management;
- waste generation, storage and disposal;
- a plan showing the distribution of any threatened flora or fauna species and the vegetation communities on or adjacent to the subject site, and the extent of vegetation proposed to be cleared should be provided; and
- methods to mitigate any expected environmental impacts of the development.

Attachment 1: Farrawell's Quarry South Kempsey– OEH Requirements for Preparation of EIS

ABORIGINAL CULTURAL HERITAGE

Existing Aboriginal cultural heritage values

OEH acknowledges the existence of numerous registered Aboriginal sites in the regional locality. These include culturally Aboriginal ceremonial and dreaming sites, conflict sites, resourcing and gathering sites, isolated finds, camp sites, artefact scatters and potential artefact deposits (PADs). It is also acknowledged that the project area contains landforms which have yielded a significant volume of evidence of Aboriginal occupation It is therefore recommended that the proponent consider any potential impacts of the proposal on these known Aboriginal sites/objects, the sensitivity and significance of these sites to the traditional Aboriginal knowledge holders and any relationship that may exist between these sites and any Aboriginal cultural heritage values of the project area.

Potential impacts of the project on Aboriginal cultural heritage values

The EIS report should contain:

1. A description of any Aboriginal objects and declared Aboriginal places located or associated with the area of the proposed development.

2. A description of the cultural heritage values, including the significance of the Aboriginal objects and declared Aboriginal places, that exist across the whole area that will be affected by the proposed development, and the significance of these values for the Aboriginal people who have a cultural association with the land.

3. A description of how the requirements for consultation with Aboriginal people as specified in clause 80C of the *National Parks and Wildlife Regulation 2009* have been met.

4. The views of those Aboriginal people regarding the likely impact of the proposed development on their cultural heritage. If any submissions have been received as a part of the consultation requirements, then the report must include a copy of each submission and your response.

5. A description of the actual or likely harm posed to the Aboriginal objects or declared Aboriginal places from the proposed activity, with reference to the Aboriginal cultural heritage values identified.

6. A description of any practical measures that may be taken to protect and conserve those Aboriginal objects or declared Aboriginal places.

7. A description of any practical measures that may be taken to avoid or mitigate any actual or likely harm, alternatives to harm or, if this is not possible, to manage (minimise) harm.

In addressing these requirements, the applicant must refer to the following documents:

a) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (OEH, 2010) - www.environment.nsw.gov.au/resources/cultureheritage/ddcop/10798ddcop.pdf. These guidelines identify the factors to be considered in Aboriginal cultural heritage assessments for development proposals under Part 4 of the *Environmental Planning and Assessment Act 1979*.

b) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (OEH, 2010) - www.environment.nsw.gov.au/licences/consultation.htm. This document further explains the consultation requirements that are set out in clause 80C of the *National Parks and Wildlife Regulation 2009*. The process set out in this document must be followed and documented in the EIS.

c) *Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales* (OEH, 2010) - www.environment.nsw.gov.au/licences/archinvestigations.htm. The process described in this

Code should be followed and documented where the assessment of Aboriginal cultural heritage requires an archaeological investigation to be undertaken.

Notes:

i An Aboriginal Site Impact Recording Form (www.environment.nsw.gov.au/licences/DECCAHIMSSiteRecordingForm.htm) must be completed and submitted to the Aboriginal Heritage Information Management System (AHIMS) Registrar, for each AHIMS site that is harmed through archaeological investigations required or permitted following the determination of the development consent.

ii Under Section 89A of the *National Parks and Wildlife Act* 1974, it is an offence for a person not to notify OEH of the location of any Aboriginal object the person becomes aware of, not already recorded on the AHIMS. An AHIMS Site Recording Form should be completed and submitted to the AHIMS Registrar (www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm), for each Aboriginal site found during investigations.

HISTORIC HERITAGE

Where relevant, the EIS report should address the following:

1. The heritage significance of the site and any impacts the development may have upon this significance should be assessed. This assessment should include natural areas and places of Aboriginal, historic or archaeological significance. It should also include a consideration of wider heritage impacts in the area surrounding the site.

2. The Heritage Council maintains the State Heritage Inventory which lists some items protected under the *Heritage Act 1977* and other statutory instruments. This register can be accessed through the Heritage Branch home page on the internet (http:www.heritage.nsw.gov.au). In addition, lists maintained by the National Trust, any heritage listed under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* and the local council should be consulted in order to identify any known items of heritage significance in the area affected by the proposal. These lists are constantly evolving and items with potential heritage significance may not yet be listed

3. Non-Aboriginal heritage items within the area affected by the proposal should be identified by field survey. This should include any buildings, works, relics (including relics underwater), gardens, landscapes, views, trees or places of non-Aboriginal heritage significance. A statement of significance and an assessment of the impact of the proposal on the heritage significance of these items should be undertaken. Any policies/measures to conserve their heritage significance should be identified. This assessment should be undertaken in accordance with the guidelines in the NSW Heritage Manual. The field survey and assessment should be undertaken by a qualified practitioner/consultant with historic sites experience. The Manager, OEH Heritage Division Conservation Team, can be contacted on telephone (02) 9873 8599 for a list of suitable consultants.

BIODIVERSITY ISSUES

The EIS must detail the existing environment including discussion on flora and fauna characteristics. The following requirements should be addressed at a level of investigation appropriate to the site's current condition. Attention is also drawn to the Commonwealth legislation, the *Environment Protection and Biodiversity Conservation Act 1999*. If any species requiring consideration under this legislation may be affected by the proposal, approval for the works may also be required from the Commonwealth Department of Environment.

Flora
A comprehensive description of the vegetation of the subject site should be prepared. This will include an assessment of the condition of the plant communities present, including the designation of conservation significance at a local, regional and State level, and an assessment of the likely occurrence of any threatened species, populations and / or ecological communities listed under Schedules 1 or 2 of the *Threatened Species Conservation Act 1995* and any Rare or Threatened Australian Plant (ROTAP) species.

A plan showing the distribution of any threatened or ROTAP species and the vegetation communities on the subject site, and the extent of vegetation proposed to be cleared should be provided. This plan should be at the same scale as the plan of the area subject to development, and preferably showing the footprint of the proposed development superimposed on the vegetation, in order to assist in the assessment of impacts on existing vegetation.

Where the assessment concludes that threatened species, populations or their habitats, or endangered ecological communities exist on or are in close proximity to the subject site, the effect of the proposed development should be determined by an assessment pursuant to Section 5A of the *Environmental Planning and Assessment Act 1979*. An assessment of the impact of the development on the plant communities and / or ROTAP species should also be provided. A description of the measures proposed to mitigate and / or ameliorate the impact of the development on the plant communities, threatened and ROTAP species.

Fauna
A fauna survey to identify the distribution and abundance of fauna species known or likely to use the subject site should be undertaken. This should include a description of available fauna habitats and an assessment of the conservation status of each of the faunal components at a local, regional and State level.

A plan showing the results of the above survey should be provided. The plan should be at the same scale as (or as an overlay to) the plan of the development footprint and overall site, to assist in the assessment of potential impacts of the proposal on fauna.

An assessment of the potential impact of the development on fauna should be provided.

An assessment of the occurrence or likely occurrence of threatened species or populations, or their habitats, on the subject land should be provided. Where the assessment concludes that threatened species or populations, or their habitats, exist on or in close proximity to the subject site, the effect of the proposal should be determined in accordance with an assessment pursuant to Section 5A of the *Environmental Planning and Assessment Act 1979*. A description of the measures proposed to mitigate and/or ameliorate the impact of the development on fauna should be provided.

Surveys and Assessments
Records of flora and fauna on or near the construction site can be obtained from:

- The Wildlife Atlas http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp.
- Rare or Threatened Australian Plants (ROTAP) database.
- Threatened Species, Populations & Ecological Communities of NSW Catchments www.threatenedspecies.environment.nsw.gov.au.

It should be noted that these databases are not comprehensive, should only be used as a guide and do not negate the need for specific site investigations.

To address likely impacts on threatened species (including their habitat), populations and ecological communities, the proponent will need to engage a suitably qualified environmental consultant to conduct an appropriate flora and fauna survey and provide an assessment report. This report will need to evaluate and

mitigate any adverse impacts on such species, populations and communities on the subject site and within the immediate vicinity. Surveys and assessments should not be confined to the immediate development footprint, but also include any areas where ancillary works may be undertaken, for example, any upgrade in site access roads or other supporting infrastructure.

Surveys should be undertaken in accordance with OEH's Threatened Species survey and assessment guidelines (available at www.environment.nsw.gov.au)

Surveys are required to be undertaken during optimal climatic and seasonal conditions for all potentially occurring flora and fauna species and need to consider issues such as migratory species movements, the availability of shelter, breeding, pollination patterns and prerequisites, and also the relative availability of food resources and habitat.

FLOODING ISSUES

The EIS should include an assessment of the following (where applicable) referring to the guidelines in Attachment 2:

1. Whether the proposal is consistent with any floodplain risk management plans.
2. Whether the proposal is compatible with the flood hazard of the land.
3. Whether the proposal will significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties.
4. Whether the proposal will significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.
5. Whether the proposal incorporates appropriate measures to manage risk to life from flood.
6. Whether the proposal is likely to result in unsustainable social and economic costs to the community as a consequence of flooding.
7. The EIS needs to provide full details of the flood assessment and modelling undertaken in determining any design flood levels (if applicable), including the 1 in 100 year flood levels.
8. In addition, the assessment should include a sensitivity assessment of the potential impacts of an increase in rainfall intensity and runoff (10%, 20% and 30%) due to climate change on the flood behaviour for the 1 in 100 year design flood.

OEH ESTATE

The EIS should address the potential impact (if any) of the proposal on nearby national parks and nature reserves.

ATTACHMENT 2 – GUIDANCE MATERIAL

Title	Web address
Relevant Legislation	
Commonwealth Environment Protection and Biodiversity Conservation Act 1999	http://www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
National Parks and Wildlife Act 1974	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
Threatened Species Conservation Act 1995	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+101+1995+cd+0+N
Greenhouse Gas	
The Greenhouse Gas Protocol: Corporate Standard, World Council for Sustainable Business Development & World Resources Institute	http://www.ghgprotocol.org/standards/corporate-standard
National Greenhouse Accounts (NGA) Factors, Australian Department of Climate Change (Latest relEISse),	http://www.climatechange.gov.au/publications/greenhouse-acctg/national-greenhouse-factors.aspx
National Greenhouse and Energy Reporting System, Technical Guidelines (latest relEISse)	http://www.climatechange.gov.au/en/government/initiatives/national-greenhouse-energy-reporting/tools-resources.aspx
National Carbon Accounting Toolbox	http://www.climatechange.gov.au/government/initiatives/ncat.aspx
Australian Greenhouse Emissions Information System (AGEIS)	http://ageis.climatechange.gov.au/
Aboriginal Cultural Heritage	
Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (2005)	Available from DoP
Aboriginal Cultural Heritage Consultation Requirements for Proponents (EPA, 2010)	http://www.environment.nsw.gov.au/licences/consultation.htm
Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (EPA, 2010)	http://www.environment.nsw.gov.au/licences/archinvestigations.htm
Aboriginal Site Impact Recording Form	http://www.environment.nsw.gov.au/licences/DECCAHIMSSiteRecordingForm.htm
Aboriginal Heritage Information Management System (AHIMS) Registrar	http://www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm
Biodiversity	
BioBanking Assessment Methodology (DECC, 2008)	http://www.environment.nsw.gov.au/resources/biobanking/08385bbassessmethod.pdf

1 of 2

Attachment 2: Guidance Material

Title	Web address
BioBanking Assessment Methodology and Credit Calculator Operational Manual (EPA, 2008)	http://www.environment.nsw.gov.au/biobanking/operationalmanual.htm
Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna -Amphibians (EPA, 2009)	http://www.environment.nsw.gov.au/resources/Threatenedspecies/09213amphibians.pdf
Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft (DEC, 2004)	http://www.environment.nsw.gov.au/resources/nature/TBSAGuidelinesDraft.pdf
Guidelines for Threatened Species Assessment (Department of Planning, July 2005)	Draft available from DoP
EPA Threatened Species website	http://www.environment.nsw.gov.au/Threatenedspecies/
Atlas of NSW Wildlife	http://wildlifeIStlas.nationalparks.nsw.gov.au/wildlifeIStlas/watlas.jsp
BioBanking Threatened Species Database	http://www.environment.nsw.gov.au/biobanking/biobankingtspd.htm
Vegetation Types databases	http://www.environment.nsw.gov.au/biobanking/vegtypedatabase.htm
PlantNET	http://plantnet.rbgsyd.nsw.gov.au/
Online Zoological Collections of Australian Museums	http://www.ozcam.org/
Threatened Species Assessment Guideline - The Assessment of Significance (EPA, 2007)	http://www.environment.nsw.gov.au/resources/Threatenedspecies/tsaguide07393.pdf
Principles for the use of biodiversity offsets in NSW	http://www.environment.nsw.gov.au/biocertification/offsets.htm
OEH Estate	
Land reserved or acquired under the NPW Act	
List of National Parks	http://www.environment.nsw.gov.au/NationalParks/parksEISchatoz.aspx
Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water (EPA, 2010)	http://www.environment.nsw.gov.au/resources/protectedareas/10509devadjEPA.pdf

NSW GOVERNMENT | Trade & Investment Resources & Energy

17 April 2014

David Schwebel
Student Planner – Mining Projects
NSW Planning & Infrastructure
GPO Box 39
SYDNEY NSW 2001

Emailed: david.schwebel@planning.nsw.gov.au

Your Reference: DGR ID No. 830
Our Reference: OUT14/11954

Dear Mr Schwebel,

Re: Request for Director General Requirements
Proposal – Farrawell's Quarry, South Kempsey DGR ID No. 830

Thank you for the opportunity to provide advice on the subject proposal.

This is a response from NSW Trade & Investment, incorporating advice from its Agriculture, Fisheries, and Mineral Resources Branches. Specific Forests issues arising may be provided in separate correspondence.

Mineral Resources Issues
Road construction materials (including sand and gravel) and soil are not prescribed minerals under the Mining Act, 1992. Therefore, DTIRIS – Mineral Resources Branch has no statutory role in authorising or regulating the extraction of this commodity, apart from its role under the *Work Health & Safety Act 2011* and associated regulations and the *Mine Health and Safety Act 2004* and associated regulations, for ensuring the safe operation of mines and quarries.

All environmental reports (EISs or similar) accompanying Development Applications for extractive industry lodged under the Environmental Planning & Assessment Act 1979 should include a resource assessment (as detailed in Attachment A) which:

- Documents the size and quality of the resource and demonstrates that both have been adequately assessed; and
- Documents the methods used to assess the resource and its suitability for the intended applications.

Applications to modify, expand, extend or intensify an existing consent that has already been adequately reported using the above protocol in publicly available documents, may restrict detailed documentation to the additional resources to be used, if accompanied by a summary of past resource assessments and of past production.

DTIRIS - Mineral Resources Branch collects data on the quantity and value of construction materials produced annually throughout the State. Forms are sent to all

NSW Department of Trade and Investment, Regional Infrastructure and Services
RESOURCES & ENERGY DIVISION
PO Box 344 Hunter Region Mail Centre NSW 2310
Tel: 02 4931 6666 Fax: 02 4931 6726
ABN 51 734 124 190
www.dtiris.nsw.gov.au

operating quarries at the end of each financial year for this purpose. The statistical data thus collected is of great value to Government and industry in planning and resource management, particularly as a basis for analysing trends in production and for estimating future demand for particular commodities or in particular regions. In order to assist in the collection of construction material production data, the proponent should be required to provide annual production data for the subject site to DTIRIS - Mineral Resources Branch as a condition of any new or amended development consent.

Queries regarding the above information, and future requests for advice in relation to this matter, should be directed to the MRB Land Use team at landuse.minerals@industry.nsw.gov.au.

Agricultural Issues for Extractive Industries (Quarries)

The relevant agricultural issues to consider when preparing and also when assessing extractive industry proposals are set out in the Departments' Guideline: *Agricultural issues for Extractive Industries* available on our website; http://www.dpi.nsw.gov.au/environment/landuse-planning/agriculture/extractive-industries. The guideline also documents recommended project design and mitigatory responses.

The guideline is part of a series designed to help consent authorities identify potential agricultural impacts, and assess whether such proposals can avoid conflict with existing agricultural developments; and protect valuable food and fibre production resources. The guidelines can similarly help consultants and proponents and are available from the Department of Primary Industries land use planning web portal: http://www.dpi.nsw.gov.au/environment/landuse-planning/agriculture .

Fisheries Issues
General issues are summarised in Attachment B.

Yours sincerely

Cressida Gilmore
Team Leader Land Use

Encl. Attachments "A to B"

ATTACHMENT A

TRADE & INVESTMENT NSW
RESOURCES & ENERGY DIVISION (Mineral Resources Branch)

ENVIRONMENTAL and WORK HEALTH & SAFETY ASSESSMENT REQUIREMENTS FOR CONSTRUCTION MATERIAL QUARRY PROPOSALS

It is in the best interests of both the proponent and the community to fully assess the resources which are to be extracted. This means that a thorough geological assessment should be undertaken to determine the nature, quality and extent of the resource. Failure to undertake such an assessment could lead to operational problems and possibly even failure of the proposal.

The following issues need to be addressed when preparing an environmental assessment (EA) or environmental impact statement (EIS) for a proposed construction materials (extractive materials) quarry:

Resource Assessment

1. A summary of the regional and local geology including information on the stratigraphic unit or units within which the resource is located.

2. The amount of material to be extracted and the method or methods used to determine the size of the resource (e.g. drilling, trenching, geophysical methods). Plans and cross-sections summarising this data, at a standard scale, showing location of drillholes and/or trenches, and the area proposed for extraction, should be included in the EA or EIS. Relevant supporting documentation such as drill logs should be included or appended. Major resource proposals should be subject to extensive drilling programs to identify the nature and extent of the resource.

3. Characteristics of the material or materials to be produced:
   a) For structural clay/shale extraction proposals, ceramic properties such as plasticity, drying characteristics (e.g. dry green strength, linear drying shrinkage), and firing characteristics (e.g. shrinkage, water absorption, fired colour) should be described.
   b) For sand extraction proposals, properties such as composition, grainsize, grading, clay content and contaminants should be indicated. The inclusion of indicative grading curves for all anticipated products as well as the overall deposit is recommended.
   c) For hard rock aggregate proposals, information should be provided on properties such as grainsize and mineralogy, nature and extent of weathering or alteration, and amount and type of deleterious minerals, if any.

d) For other proposals, properties relevant to the range of intended uses for the particular material should be indicated.

Details of tests carried out to determine the characteristics of the material should be included or appended. Such tests should be undertaken by NATA registered testing laboratories.

4. An assessment of the quality of the material and its suitability for the anticipated range of applications should be given.

5. The amount of material anticipated to be produced annually should be indicated. If the proposal includes a staged extraction sequence, details of the staging sequence needs to be provided. The intended life of the operation should be indicated.

6. If the proposal is an extension to an existing operation, details of history and past production should be provided.

7. An assessment of alternative sources to the proposal and the availability of these sources. The impact of not proceeding with the proposal should be addressed.

8. Justification for the proposal in terms of the local and, if appropriate, the regional context.

9. Information on the location and size of markets to be supplied from the site.

10. Route(s) used to transport quarry products to market.

11. Disposal of waste products and the location and size of stockpiles.

12. Assessment of noise, vibration, dust and visual impacts, and proposed measures to minimise these impacts.

13. Proposed rehabilitation procedures during, and after completion of, extraction operations, and proposed final use of site.

14. Assessment of the ecological sustainability of the proposal.

Health and Safety Issues

In relation to the health & safety of mining and quarrying operations, the following issues should be addressed:

1. All operations are to comply with the following Acts & Regulations
   a. *Work Health & Safety Act 2011*
   b. Work *Health & Safety Regulations 2011*
   c. *Mine Health & Safety Act 2004*
   d. *Mine Health & Safety Regulations 2007*

2. The mine holder must nominate the mine operator in writing on the prescribed form to the Chief Inspector as required by the *Mine Health & Safety Act 2004* Section 22 prior to the commencement of extraction.

3. The operator of the mine must appoint a production manager as required by the *Mine Health & Safety Regulation 2007* Clause 16 and the operator must notify the Chief Inspector of the appointment in writing as required by the *Mine Health & Safety Regulation 2007* Clause 18 prior to the commencement of extraction.

4. Any blasting operations carried out by the mine operator must comply with the *Explosives Act 2003* and the *Explosives Regulations 2005*.

Mineral Ownership

The *Mining Act 1992* applies to those commodities prescribed by the regulations of the Act (Schedule 2, Mining Regulation 2003). Most construction materials are not prescribed minerals under the *Mining Act 1992*. In general terms, this means these materials are owned by the Crown where they occur on Crown land and by the landowner in the case of freehold land. A Mining Title is not required for their extraction although a Crown Lands licence is required where they occur on Crown land.

Construction materials such as s*and (other than marine aggregate), loam, river gravel, and coarse aggregate materials such as basalt, sandstone, and granite* are not prescribed minerals under the *Mining Act 1992*. Therefore, Trade & Investment NSW has no statutory responsibility for authorising or regulating the extraction of these commodities, apart from its role under the *Mine Health and Safety Act 2004* with respect to the safe operation of mines and quarries. However, the Department is the principal government authority responsible for assessing the State's resources of construction materials and for advising State and local government on their planning and management.

Some commodities, notably *structural clay (ie clay for brick, tile and pipe manufacture), dimension stone (except for sandstone), quartzite, kaolin, limestone and marine aggregate* are prescribed minerals under the *Mining Act 1992*. Minerals which are prescribed as minerals under the terms of the Mining Act may, in some cases belong either to the Crown or to the landowner, depending on a number of factors including the date on which the mineral was proclaimed and the date of alienation of the land. The proponent needs to determine whether the material is privately owned or Crown mineral (publicly owned). If it is privately owned, then either a notification under Section 8 of the Mining Act 1992 or, alternatively, a mining lease or mineral claim would be required. If it is a Crown mineral, an application for a mining lease or mineral claim will have to be lodged.

If you are unsure whether a mining title is required for your proposal you should contact NSW Trade & Investment, Resources & Energy Division.

NSW GOVERNMENT | Trade & Investment

ATTACHMENT B

Primary Industries Division - Aquatic Habitat Protection Requirements

Matters to be Addressed

Definitions
The definitions given below are relevant to these requirements:

Fish means any part of marine, estuarine or freshwater fish or other aquatic animal life at any stage of their life history (whether alive or dead). This includes aquatic molluscs, crustaceans, echinoderms, worms, aquatic insect larvae and other macroinvertebrates .

Marine vegetation means any species of plant that at any time in its life must inhabit water (other than fresh water).

Waters refers to all waters including tidal waters as well as flowing streams, irregularly flowing streams, gullies, rivers, lakes, coastal lagoons, wetlands and other forms of natural or man made water bodies on both private and public land.

1. General Requirements

- Area which may be affected either directly or indirectly by the development or activity should be identified and shown on an appropriately scaled map (1:25000) and aerial photographs.
- All waterbodies and waterways within the proposed area of development are to be identified.
- Description and maps of aquatic vegetation, snags, gravel beds and any other protected, threatened or dominant habitats should be presented. Description should include area, density and species composition.
- A survey of fish species should be carried out and results included. Existing data should be used only if collected less than 5 years previously.
- Identification of recognised recreational and commercial fishing grounds, aquaculture farms and/or other waterways users.
- Details of the location of all component parts of the proposal, including any auxiliary infrastructure, timetable for construction of the proposal with details of various phases of construction
- Aspects of the management of the proposal, both during construction and after completion, which relate to impact minimisation and site rehabilitation eg Environment Management Plans, Rehabilitation Plans, Compensatory offsets
- For each freshwater body identified on the plan, the plan should include, either by annotation or by an accompanying table, hydrological and stream morphology information such as: flow characteristics, including any seasonal variations, bed substrate, and bed width
- For each marine or estuarine area identified on the plan, the plan should include, either by annotation or by an accompanying table, hydrological and stream morphology information such as: tidal characteristics, bed substrate, and depth contours

DREDGING AND RECLAMATION ACTIVITIES
- Purpose of works
- Type(s) and distribution of marine vegetation in the vicinity of the proposed works
- Method of dredging to be used

- Timing and Duration of works
- Dimension of area of works including levels and volume of material to be extracted or placed as fill
- Nature of sediment to be dredged, including Acid Sulphate Soil, contaminated soils etc
- Method of marking area subject to works
- Environmental safeguards to be used during and after works
- Measures for minimising harm to fish habitat under the proposal
- Spoil type and source location for reclamation activities
- Method of disposal of dredge material
- Location and duration of spoil stockpiling, if planned

ACTIVITIES THAT DAMAGE MARINE VEGETATION

- Type of marine vegetation to be harmed
- Map and density distribution of marine vegetation
- Reasons for harming marine vegetation
- Methods of harming marine vegetation
- Construction details
- Duration of works/activities
- Measures for minimising harm to marine vegetation under the proposal and details of compensatory habitat development to replace lost vegetation.
- Method and location of transplanting activities or disposal of marine vegetation

ACTIVITIES THAT BLOCK FISH PASSAGE

- Type of activity eg works in a stream that change flow or morphological characteristics of the stream, including culvert and causeway construction, sediment and erosion control measures, stormwater diversion structures.
- Length of time fish passage is to be restricted, whether permanent or temporary
- Timing of proposed restriction. Should be timed to avoid interfering with migratory movements of fish.
- Remediation or compensatory works to offset any impacts

THREATENED SPECIES

- Threatened aquatic species assessment (Section 5c, EP&A Act 1979). This must be addressed even if there are no Threatened Species present on the site.
- Seven Part Test

FISHING AND AQUACULTURE

- Outline and document commercial, recreational and indigenous fishing activities that may be affected by the activity, including regular commercial fishing grounds, popular recreational fishing sites, recognised indigenous harvesting sites.
- Will the activity interfere with or cause an impact on the continuing operation and viability of nearby aquaculture or mariculture ventures.

2. Initial Assessment

A list of threatened species, endangered populations and endangered ecological communities must be provided. In determining these species, consideration must be given to the habitat types present within the study area, recent records of threatened species in the locality and the known distributions of these species.

In describing the locality in the vicinity of the proposal, discussion must be provided in regard to the previous land and water uses and the effect of these on the proposed site. Relevant historical events may include land clearing, agricultural activities, water

abstraction/diversion, dredging, de-snagging, reclamation, siltation, commercial and recreational activities.

A description of habitat including such components as stream morphology, in-stream and riparian vegetation, water quality and flow characteristics, bed morphology, vegetation (both aquatic and adjacent terrestrial), water quality and tide/flow characteristics must be given. The condition of the habitat within the area must be described and discussed, including the presence and prevalence of introduced species. A description of the habitat requirements of threatened species likely to occur in the study area must be provided.

In defining the proposal area, discussion must be provided in regard to possible indirect effects of the proposal on species/habitats in the area surrounding the subject site: for example, through altered hydrological regimes, soil erosion or pollution. The study area must extend downstream and/or upstream as far as is necessary to take all potential impacts into account.

Please Note: Persons undertaking aquatic surveys may be required to hold or obtain appropriate permits or licences under relevant legislation. For example:

Fisheries Management Act 1994
- Permit to take fish or marine vegetation for research or other authorised purposes (Section 37)
- Licence to harm threatened (aquatic) species, and/or damage the habitat of a threatened species (Section 220ZW).

Animal Research Act 1985:
- Animal Research Authority to undertake fauna surveys.

It is recommend that, prior to any field survey activities taking place, those persons proposing to undertake those activities give consideration to their obligation to obtain appropriate permits or licences which may be required in the specific context of the proposed survey activities.

3. Assessment of Likely Impacts

The EIS must:
- describe and discuss significant habitat areas within the study area;
- outline the habitat requirements of threatened species likely to occur in the study area;
- indicate the location, nature and extent of habitat removal or modification which may result from the proposed action;
- discuss the potential impact of the modification or removal of habitat;
- identify and discuss any potential for the proposal to introduce barriers to the movement of fish species; and
- describe and discuss any other potential impacts of the proposal on fish species or their habitat.

For all species likely to have their lifecycle patterns disrupted by the proposal to the extent that individuals will cease to occupy any location within the subject site, the EIS must describe and discuss other locally occurring populations of such species. The relative significance of this location for these species in the general locality must be discussed in terms of the extent, security and viability of remaining habitat in the locality.

4. Ameliorative Measures

The EIS must consider how the proposal has been or may be modified and managed to conserve fisheries habitat on the subject site and in the study area.

In discussing alternatives to the proposal, and the measures proposed to mitigate any effects of the proposal, consideration must be given to developing long term management strategies to protect areas within the study area which are of particular importance for fish species. This may include proposals to restore or improve habitat.

Any proposed pre-construction monitoring plans or on-going monitoring of the effectiveness of the mitigation measures must be outlined in detail, including the objectives of the monitoring program, method of monitoring, reporting framework, duration and frequency.

In the event of a request for concurrence or consultation of the Director of Industry & Investment NSW, one (1) copy of the EIS should be provided to Industry & Investment NSW in order for the request to be processed.

It should be noted that Industry & Investment NSW has no regulatory or statutory role to review draft EISs unless they are accompanied by or are requested as part of a licence application under Part 7A of the FM Act. However, Industry & Investment NSW is available to provide advice to consent and determining authorities regarding Fisheries' opinion as to whether the requirements have been met if requested, pending the availability of resources and other statutory priorities.

Useful Information
To help you in the preparation of an EIS, the publication "*Guidelines for the Assessment of Aquatic Ecology in EIA*" (Draft 1998) produced by the Department for Urban Affairs and Planning may prove useful in outlining appropriate procedures and methodologies for conducting aquatic surveys.

Should you require any further information on these requirements please contact the Aquatic Habitat Protection Office at Port Stephens on 4916 3931.

Transport Roads & Maritime Services

File No: NTH09/01629; CR2014/002126
Your Ref: DGR No. 830

The Director
Mining Projects
NSW Planning & Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attn: Mr David Schwebel – Student Planner

Dear Mr Schwebel,

Director-General's Environmental Assessment Requirements (DGRs) for the Proposed Expansion of Farrawell's Quarry, Pacific Highway, Kempsey LGA, DGR No.830.

I refer to your email correspondence of 15 April 2014 requesting Roads and Maritime Services to provide details of key issues and assessment requirements regarding the abovementioned development for inclusion in the Director General's Environmental Assessment (EA) requirements.

Roles & Responsibilities

The key interests for Roads and Maritime are the safety and efficiency of the road network, traffic management, the integrity of infrastructure assets and the integration of land use and transport.

The Pacific Highway (HW10) is a classified (state) road. Roads and Maritime is the Roads Authority for the upgraded Pacific Highway and Kempsey Shire Council is the 'Roads Authority' for all other public roads in the subject area. Roads and Maritime concurrence to Council's approval of works on a classified road is required under Section 138 of the *Roads Act 1993*.

In accordance with Clause 101 of the *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) the Consent Authority is to have consideration for the safety, efficiency and ongoing operation of the classified road where development has frontage to a classified road.

In accordance with *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* Clause 16(3), RMS is given the opportunity to review and provide comment on the subject development application.

Roads and Maritime Response

RMS would like the following issues to be included in the transport and traffic impact assessment of the proposed development:

- The total impact of existing and proposed development on the state road network with consideration for a 10 year horizon.
- The volume and distribution of traffic generated.
- Intersection sight distances at affected intersections along the primary haul route.

Roads & Maritime Services

31 Victoria Street, Grafton NSW 2460 | PO Box 576 Grafton NSW 2460
T 02 6640 1300 | F 02 6640 1304 | E development.northern@rms.nsw.gov.au

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- Existing and proposed access conditions.
- Details of improvements for road intersections along the primary haul route.
- Detail of staff, servicing and parking arrangements.
- Traffic Management for construction and operational phases of the development.
- Impact on public transport (public and school bus routes) and consideration for alternative transport modes such as cyclists and pedestrians
- Consideration for the impacts of blasting on the adjacent Pacific Highway corridor.
- Details of any proposed Road Maintenance Contributions Plan.
- Consideration for Clause 16(1) of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* regarding;
    - Impact on school zones and residential areas.
    - Truck Management Plan
    - Code of Conduct for Haulage Operators
    - Road Safety Assessment of key haulage routes

Where any Road Safety Assessment of the key haulage routes identifies potential safety concerns, Road and Maritime recommends that the Traffic Impact Assessment be supported by a Road Safety Audit undertaken by suitably qualified persons.

The current Austroads Guidelines, Australian Standards and RMS Supplements are to be adopted for any proposed works on the classified road network. The Developer would be required to enter into a 'Works Authorisation Deed' (WAD) with Roads and Maritime for any works deemed necessary on the classified state road network. The developer would be responsible for all costs associated with the works and administration for the WAD

Further information on undertaking Private Developments adjacent to classified roads can be accessed at:

http://www.rms.nsw.gov.au/roadprojects/community_environment/private_developments.html

It is recommended that developers familiarise themselves with the requirements of the WAD process and contact our office to obtain further advice where necessary.

Advice to the Consent Authority

Roads and Maritime highlights that in determining any application under Part 4 of the *Environmental Planning and Assessment Act 1979* it is the Consent Authority's responsibility to consider the environmental impacts of any road works which are ancillary to the development. This includes any works which form part of the proposal and/or any works which are deemed necessary to include as requirements in the conditions of development consent. Depending on the level of environmental assessment undertaken to date and nature of the works, the consent authority may require the developer to undertake further environmental assessment for any ancillary road works.

If you have any further enquiries regarding the above comments please do not hesitate to contact Matt Adams on 6640 1362 or email development.northern@rms.nsw.gov.au.

Yours sincerely

22 May 2014

Monica Sirol
Network & Safety Manager, Northern Region

CC: Rob Corkery – R.W.Corkery, Brooklyn Office – brooklyn@rwcorkery.com

Department of Primary Industries
Office of Water

Contact: Peter Hackett
Phone: 02 6641 6563
Fax: 02 6641 6642
Email: peter.hackett@water.nsw.gov.au

RW Corkery & Co Pty Ltd
Suite 5 Building 3
Pine Rivers Office Park
205 Leitchs Road
BRENDALE QLD 4500

Our ref: 30 ERM2014/0455
File No:
Your Ref: 882/05

Attention: Christy Hill

23rd May 2014

Dear Christy,

Reference: Director General's Requirements for Preparation of Environmental Impact Statement – Extension of Farrawell's Quarry, South Kempsey.

I refer to your recent correspondence and request for Director General's requirements for the preparation of an Environmental Impact Statement for the Extension of Farrawell's Quarry, South Kempsey. NSW 2440.

The EIS must assess the following potential impacts of the proposal during construction and operation, and describe what measures would be implemented to avoid, minimise, mitigate, offset, manage and/or monitor these potential impacts.

Key Issues;

- Location of facilities, including access roads and fuel storages in relation to water bodies.
- Impacts on surface or groundwater and details of requirements for water, its proposed use, and proposed source of supply.
- Water budget, including storage, reuse, treatment, and proposed source of water supply.
- Management of storm water on site including methods of disposal off site.
- Locality plans and schematic design plans for all major works and structures required for water management including stormwater.
- Soils suitability and depth to groundwater water table. Where groundwater dewatering is required for construction purposes detailed analysis of groundwater quality, methods of management of groundwater disposal and volumes of water required fro disposal.
- Flora and fauna assessment.

- Vegetation to be cleared, and the management of remaining native vegetation.
- Measures to prevent soil erosion (an erosion and sediment control plan)
- A rehabilitation and revegetation plan.
- Proposed monitoring of water quality impacts.
- Threatened Species Impact Report – Species Impact Statement, if relevant.
- Aboriginal Cultural Heritage – An Aboriginal Heritage Information Management System Report is required, as a minimum.
- Consultation with the Local Aboriginal Community and an archaeological survey, if required.
- Soils & Land – Acid Sulphate Soil Assessment is required where proposals are located within 500 metres of an area mapped on the Department's Acid Sulphate Soils Risk Maps where ground disturbance is required. Where a development is within the above criteria an Acid Sulphate Soils Management Plan is required.
- Geomorphology – Where proposals are within or within the zone likely to affect a watercourse, river, lake or estuary or coastal zone.
- Guidelines for Controlled Activities – refer to the guidelines for "Riparian Corridors", for details located on the Department's web site @ www.water.nsw.gov.au .

I trust the information is helpful, however, if you have any queries please do not hesitate to contact the Department here at the Grafton office on telephone 0266 416500.

Yours sincerely

Peter Hackett
Water Regulation Officer
Office of Water - Water Regulatory Operations North

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Appendix 3

Development Consent DA T6-07-146 (Revision 06)

(Total No. of pages including blank pages = 24)

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ksc@kempsey.nsw.gov.au
ABN 70 705 618 663

15 AUG 2013

Ref: T6-07-146 (Rev 06), LA6183, LA6186
KJA:JH

13 August 2013

HOPKINS CONSULTANTS
PO BOX 1556
PORT MACQUARIE NSW 2444

Dear Sir/Madam

MODIFICATION OF A DEVELOPMENT CONSENT T6-07-146 (Rev 06)
(LA 6183 & 6186) LOT 100 & 104 DP 776239, 511 & 627 PACIFIC HIGHWAY, SOUTH KEMPSEY
MODIFICATION TO APPROVED GRAVEL QUARRY

Please find appended a Notice to Applicant of Modification of a Development Application.

It is strongly recommended that prior to commencing any work associated with this consent that you read the conditions carefully.

Should you have any further enquires please contact Council's Manager Development Assessment – Kate Alberry on 6566 3200.

Yours faithfully

Kate Alberry
MANAGER DEVELOPMENT ASSESSMENT
SUSTAINABLE ENVIRONMENT

PLEASE NOTE:
When making enquiries concerning this application, please quote our reference number, which will enable us to expedite your enquiry.

22 Tozer Street
West Kempsey
PO Box 3078
West Kempsey NSW 2440
Customer Service Tel: 02 6566 3200
Fax: 02 6566 3205
Library Tel: 02 6566 3210
Fax: 02 6566 3215

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ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

NOTICE TO APPLICANT OF MODIFICATION OF A DEVELOPMENT CONSENT

To HOPKINS CONSULTANTS PTY LTD of SUITE 1, 109 WILLIAMS STREET, PORT MACQUARIE 2444, being the applicant in respect of modification to Development Application No. T6-07-146 (LA6183, LA6183), seeking to modify conditions of an approved GRAVEL QUARRY, refers.

Pursuant to Section

96 (1) Modification involving minor error, misdescription or miscalculation

of the Act, notice is hereby given of the modification of the consent issued in respect to the Development Application No T6-07-146 relating to the land described as follows:

LOT 100 & 104 DP 776239, 511 & 627 PACIFIC HIGHWAY, SOUTH KEMPSEY

Details of Amendment

Condition 31 - Deleted - Inconsistent with condition 10

Modified Conditions of Consent

1. **Development is to be in accordance with approved plans**
The development is to be implemented in accordance with the plans and supporting documents set out in the following table except where modified by any conditions of this consent.

Plan No./ Supporting Document	Version	Prepared by	Dated
Document - S96 Modification to DA T6-07-146		GHD	3 November 2010
Document – Airblast Overpressure (Noise) and Ground Vibration Assessment		GHD	04 July 2011
Environmental Impact Statement	22/12135/10927	GHD	30/3/07
SEPP1	22/12135/12318	GHD	30/10/07
Extraction Strategy – Stage 1 – Rev A	22/14028/ES01	GHD	28/05/09
Extraction Strategy – Stage 2 – Rev A	22/14028/ES02	GHD	28/05/09
Extraction Strategy – Stage 3 – Rev A	22/14028/ES03	GHD	28/05/09

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Plan No./ Supporting Document	Version	Prepared by	Dated
Rev A			
Extraction Strategy – Stage 4 – Rev A	22/14028/ES04	GHD	28/05/09
Additional information		GHD	2/12/09
Amended Noise Impact Assessment		GHD	01/10
GHD – Noise Impact Assessment		GHD	8/01/10

In the event of any inconsistency between conditions of this development consent and the plans/supporting documents referred to above, the conditions of this development consent prevail.

2. This consent permits the quarry to operate for a period of four (4) years from the date of commencement of operation. Separate consent will be required to operate the quarry beyond the specified period.

3. In the event of the construction of the Kempsey Bypass and prior to the commencement of the quarry:

(a) Separate application shall be made for construction of amended access arrangements in accordance with the requirements of the Roads & Traffic Authority; and

(b) Lots 100 and 104 are required to be consolidated into one parcel of land ensuring that Lot 100 is not land locked.

4. Submission of written advice to Council of the nominated date on which it is intended to commence operations following compliance with all relevant conditions of this consent.

5. Submission of a separate application providing for a workers toilet in accordance with the Building Code of Australia (BCA) prior to commencement of extraction activities.

6. Submission of an application(s) to Council pursuant to Section 68 of the Local Government Act 1993 for the following, prior to the issue of a Construction Certificate:-

- Installing, constructing or altering a waste treatment device or a human waste storage facility or a drain connected to any such device or facility.

7. Excavated material from the site is not to be placed within the road reserve or any other public place.

Permitted Extraction

8. a) This consent permits a total extraction volume of 500,000m^3 of gravel from the quarry. The consent also permits excavation of 90,000m^3 of material

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consisting of stripped topsoil which will be utilised in the rehabilitation of the site.

Hours of Operation

9. Deleted – GTA condition 30 (Rev 1 - 30 March 2010).

Blasting

10. (a) The operator/blasting contractor is required to monitor airblast overpressure (noise) and ground vibration at the closest/ most affect premise for every blast to insure that the operations are in compliance with the *Protection of the Environment Operations Act 1997.* These reports are to be made available to Council Officers at any time or if requested.

A report is to be prepared by the operator/ blasting contractor within 7 days of the initial blast. This report is to be provided to Kempsey Shire Council and the Office of Environment and Heritage to ensure compliance with the relevant airblast overpressure (noise) and vibration standards.

(b) Temporary noise barriers shall be used to attenuate Drill Rig noise. The shall be capable of reducing the noise level by 10dB(A), and be at least 2 meters in height and have no gaps. The barrier shall be located to shield residential receivers.

The drill rig shall be orientated in such as way that the noisiest side is facing away from any residential receiver.

(c) The airblast overpressure (Noise) level from blasting operations on the premise must not exceed:

1. 115dB (Lin Peak) for no more than 5% of the total number of blasts during each reporting period, and

2. 120 dB (Lin Peak) at any time.

(d) The ground vibration peak article velocity from blasting operations carried out on the premises must not exceed:

1. 5mm/s for more than 5% of the total number of blasts carried out on the premises during each reporting period, and

2. 10mm/s at any time.

Plan of Management

11. Submission of a Plan of Management, which may be varied from time to time, depending on the results of monitoring prior to commencement of any works, to include of the following:-

A. Monitoring

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The Plan of Management is to provide for monitoring in accordance with the following program to ensure compliance with all criteria prescribed by relevant conditions of this consent. The results of such monitoring shall form the basis of required performance criteria and are to be reported to Council as specified by this consent.

a) Noise

i) Details of the proposed means of monitoring the effects of operational including but not limited to airblast overpressure and traffic noise on adjoining residences are to be included.

ii) Monitoring is to be carried out by a suitably qualified acoustic consultant. The results of monitoring are to be reported to Council within three (3) months from the nominated date of commencement, except if monitoring is required as part of any other specific condition or as requested by Kempsey Shire Council following receipt of any complaints which, in the opinion of Council, are justified.

b) Dust

I) The Plan of Management is to include the means proposed to monitor the effects of dust on adjoining residences so as to ensure that dust levels meet the criteria prescribed by relevant conditions of this consent.

ii) The plan is to provide for placement of sufficient dust monitors on the subject land and adjoining allotments which contain dwellings (with the consent of owners).

iii) Monitoring is to be carried out by a suitably qualified environmental consultant. The results of monitoring are to be submitted to Council on a quarterly basis for the first twelve (12) months from the nominated date of commencement and thereafter immediately following the anniversary of the nominated date of commencement.

c) Water Quality

i) Details of the means of monitoring the quality of water at the point of discharge from the lowest required sediment control pond.

ii) Monitoring shall be carried out in accordance with the relevant Australian Standard by a suitably qualified person. The results of monitoring shall be submitted to Council on a quarterly basis for the first twelve (12) months from the nominated date of commencement and thereafter immediately following the anniversary of the nominate date of commencement.

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B. Sediment Control

The Plan of Management shall include the following information relating to sediment control measures.

a) Details providing for the construction of sediment control pond to be designed to collect runoff from all extraction and rehabilitated areas suitable to cater for the 1 in 20 year ARI 24-hour event.

b) No extraction or clearing, except required for constructing and maintaining the required sediment control pond(s), shall occur within fifty (50) metres of any gully or water course.

c) Details of the means proposed for de-silting the required settlement pond.

d) The Erosion and Sediment Control Plan shall:

i) be consistent with the requirements of *Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition, 2004* (Landcom);
ii) identify activities that could cause soil erosion and generate sediment;
iii) describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters;
iv) describe the location, function, and capacity of erosion and sediment control structures; and
v) describe what measures would be implemented to maintain (and if necessary decommission) the structures over time.

C. Landscaping/Rehabilitation

The Plan of Management shall include the following information relating to landscaping and rehabilitation.

a) Details of the means of stabilising proposed topsoil stockpiles.

b) A detailed contingency for controlling the emergence of weed species.

c) Details of the means proposed to propagate species proposed to be replanted.

d) Details of the proposed rehabilitation including time frames *(rehabilitation is to be completed within four (4) years from the commencement of operations)* for rehabilitation, areas to be rehabilitated, including a list of endemic species to be planted and ongoing maintenance of the site.

D. Bushfire Management

The Plan of Management is to incorporate a Bushfire Management Strategy prepared in consultation with the Rural Fire Service.

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E. Method of Extraction

The Plan of Management is to provide for a clearing and extraction program within clearly defined quarry perimeter incorporating the following:-

a) Deleted (Rev 1 – 30 March 2010)

b) Deleted (Rev 1 – 30 March 2010)

c) Deleted (Rev 1 – 30 March 2010)

d) A plan specifying proposed extraction levels to Australian Height Datum.

e) A check survey to be carried out upon the anniversary of commencing quarry operations each year confirming compliance with design levels.

f) Deleted (Rev 1 – 30 March 2010)

g) The extraction program shall be consistent with all recommendations of the Amended - Noise Impact Assessment dated January 2010 and noise impact assessment contained within the approved Environmental Impact Statement (EIS).

h) Deleted (Rev 1 – 30 March 2010)

i) The area nominated for exclusion from quarrying activities shall be fenced and maintained in accordance with any requirements of the required Bushfire Management Strategy.

F. Check List

The Plan of Management is to contain a check list including all management procedures and conditions of this consent to be included in required reporting.

Environmental Audit

12. An Environmental Audit Report prepared by a suitably qualified person shall be submitted to Council on the anniversary of the nominated date of commencement certifying that the quarry meets all relevant requirements of the Plan of Management and conditions of this consent.

13. a) The operator is to employ such measures as are necessary to achieve noise criteria at an adjoining residence not associated with the operation of the quarry in compliance with the relevant conditions of this consent. Such measures shall include, but not necessarily be limited to, all recommendations of the Noise Impact Statement contained within the approved EIS.

b) In the event monitoring indicates non-compliance with any relevant noise criteria, all quarrying activities are to cease and are not to recommence until such time as a revised Noise Impact Assessment has been provided to Council incorporating additional measures to ensure compliance and the carrying out of such measures.

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14. a) The operator shall employ such measures as are necessary to achieve the criteria specified by relevant conditions of this consent in respect to dust generated by the proposed development.

b) In the event monitoring indicates non-compliance with any relevant dust criteria, all quarrying activities are to cease and are not to recommence until such time as a revised assessment has been provided to Council incorporating additional measures to ensure compliance and the carrying out of such measures.

Internal Access Road

15. Detailed Engineering Plans prepared by an appropriately qualified person are to be submitted to and endorsed by Council providing for construction of the internal haul access road from the intersection of Pacific Highway South Kempsey to the quarry site within the subject property, incorporating the following: -

a) Details of the Pacific Highway bypass works corridor.

b) Provision of a dust-free wearing surface for the following sections of the internal haul access road:

(i) From the road's intersection with the Highway and for the first 30m into the property;

(ii) All sections of the access road measured within 50m of the existing dwelling;

(iii) The minimum wearing surface treatment is to be a two coat bitumen seal.

c) The proposed road pavement (depth and width) and associated stormwater drainage structures are to be designed to support the anticipated traffic loadings over the life of the quarry.

d) Submission of a separate Sediment and Erosion Control Plan for the proposed roadwork for the construction consistent with the requirements contained in *Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition, 2004* (Landcom).

e) The speed limit is to be restricted to 30km/hr. The applicant is to supply and erect adequate signage.

f) Installation of a shake-down or similar facility immediately prior to the sealed sections of the road.

All works are to be carried out in accordance with such plans, as endorsed by Council, prior to commencement of extraction activities.

16. The quarry operator shall prepare a Drivers Code of Conduct (DCC) to address noise and dust issues associated with heavy vehicle haulage to and from the quarry. The DCC shall be prepared and presented to Council for approval prior to any operations commencing at the quarry.

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The applicant shall adopt and enforce the DCC approved by Council and ensure:

- That all contractors and drivers receive a copy of the DCC and acknowledge in writing having received and understood same. Such written acknowledgments are to be retained by the applicant to be produced to Council for inspection when required.
- That all truck drivers and contractors responsible for the movement of vehicles to and from the site shall comply with the DCC.

17. A water tanker or trailer is to be provided to ensure all manoeuvring areas are to be kept damp at all times, so as to minimise potential for dust.

18. A sign is to be provided in a prominent and visible position (on the building or fence) stating "Unauthorised entry to the site is not permitted", together with the name of the person responsible for the site and a contact number outside working hours.

Waste Management Plan required

19. A Waste Management Plan is to be submitted to and approved by Council to ensure all waste is collected, stored and disposed of to the satisfaction of Council. The plan must incorporate measures to separate recyclable materials and describe the methods for collection of waste containers from the site.

20. Burning of felled trees prohibited

The burning of trees and associated vegetation felled during clearing operations is not permitted. Where possible, vegetation is to be mulched and reused on the site.

Flora and Fauna

21. The quarry operator shall:

a) Mark the clearing envelope before commencement of clearing, and exclude movement of plant, machinery or materials beyond the clearing boundary.

b) Reserve topsoil for future re-establishment of native vegetation in disturbed areas at completion of operations.

c) Prepare and implement a Vegetation Management Plan (VMP) that revegetates the extraction area with the same species of vegetation that currently exists at the site as soon as extraction is complete.

d) Implement appropriate sediment and erosion control measures to ensure minimal sedimentation and flooding of downstream environments.

e) Install and maintain twenty microbat nesting boxes of a design that has proved successful elsewhere, and shall be placed appropriately within the landscape to maximise their usefulness and shall be monitored and maintained for the life of the proposal.

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f) Have a qualified ecologist inspect trees for possible fauna, prior to their removal.

g) Retain hollow logs, large rocks, etc so they can be replaced during the restoration Works.

Water Quality

22. The quarry operator shall:

a) Prepare and maintain an Emergency Response Plan for spills or leakages of fuels and chemicals.

b) Ensure fuels and chemicals will be located away from natural drainage paths and stored in a covered and bunded area in accordance with the requirements of the DECC and WorkCover NSW.

Archaeology

23. The quarry operator shall ensure that all earthmoving contractors and operators are instructed that, in the event of any bone, or stone artefacts, or discrete distributions of shell, being unearthed during earthmoving, work must cease immediately in the affected area, and the Local Aboriginal Land Council and officers of the National Parks and Wildlife Service, informed of the discovery. Work must not recommence until the material has been inspected by those officials and permission has been given to proceed. Those failing to report a discovery and those responsible for the damage or destruction occasioned by unauthorised removal or alteration to a site or to archaeological material may be prosecuted under the National Parks and Wildlife Act 1974, as amended.

Department of Environment, Climate Change and Water (DECCW)

The following conditions have been imposed by the NSW Department of Environment, Climate Change and Water under the Integrated Development provisions of the *Environmental Planning and Assessment Act, 1979* and the *Protection of the Environment Operations Act 1997* (ref:FIL07/1661-02, dated 11 Feb 2010).

24. Information supplied to the EPA

a) Except as expressly provided by these general terms of approval, works and activities must be carried out in accordance with the proposal contained in:

the development application DA number T6-07-146 submitted to the Kempsey Shire Council in April 2007;
the environmental impact statement *"Kevin Farrawell- Proposed Extractive Industry - Gravel Quarry at Lot 100 and 104, DP 776239, Pacific Highway, South Kempsey: Environmental Impact Statement, (prepared by GHD Pty Ltd, 30 March 2007"* relating to the development; and
additional documents supplied to the EPA in relation to the development, including the following:

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a) Information received by DECC on 4 June 2007 via email from Shaun Lawer (GHD Pty Ltd)
b) Information received by DECC on 6 June 2007 via email from Shaun Lawer (GHD Pty Ltd)
c) Correspondence received by the Department of Environment, Climate Change and Water (DECCW) from Kempsey Shire Council dated 2 October 2009.
d) An amended Noise Impact Assessment report (GHD, January 2010) received by DECCW via email from Mike Graver (GHD) dated 14 January 2010.

b) These general terms of approval apply to all activities carried on at the premises, including but not limited to extraction, crushing, grinding and separating activities.

25. Fit and Proper Person

a) The applicant must, in the opinion of the EPA, be a fit and proper person to hold a licence under the Protection of the Environment Operations Act 1997, having regard to the matters in s.83 of that Act.

LIMIT CONDITIONS

26. Pollution of waters

a) Except as may be expressly provided by a licence under the Protection of the Environment Operations Act 1997 in relation of the development, section 120 of the Protection of the Environment Operations Act 1997 must be complied with in and in connection with the carrying out of the development.

b) Rainfall runoff from all disturbed areas of the premises arising from up to 70mm (up to five day event duration) must, prior to discharge from the premises, be captured and treated to the standards set out in condition 27 below.

27. Concentration Limits

a) The quality of rainfall runoff referred to in condition 26 (b) which discharges from the premises must not exceed the concentration limit(s) specified for that pollutant in the table.

Pollutant	Units of Measure	50th percentile concentration limit	90th percentile concentration limit	100th percentile concentration limit
Total Suspended Solids	mg/L			50
pH	pH			6.5-8.5
Oil and Grease	mg/L			10

b) To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in 27 (a) above.

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28. Waste

a) The applicant must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by a licence under the Protection of the Environment Operations Act 1997.

b) This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the premises if it requires an environment protection licence under the Protection of the Environment Operations Act 1997.

29. Noise

a) Noise from the premises must not exceed the noise emission criteria specified in the table below:

Receiver Location	Noise emission limit [$L_{Aeq\ (15\ minute)}$]
1	46
2	46
3	46
4	47
5	46

b) To determine compliance with condition(s) 29 and 10 noise must be measured at the affected noise sensitive receiver locations 1 - 5 identified in the amended Noise Impact Assessment (GHD, January 2010) referred to in condition A1.1. A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (NSW EPA, January 2000)".

c) The noise emission limits identified in these conditions apply under all meteorological conditions except:

(a) during rain and wind speeds (at 10m height) greater than 3m/s; and

(b) under "non-significant weather conditions".

Note: Field meteorological indicators for non-significant weather conditions are described in the NSW Industrial Noise Policy, Chapter 5 and Appendix E in relation to wind and temperature inversions.

30. Hours of operation

a) Activities covered by this licence must only be carried out between the hours of 0700 and 1700 Monday to Friday, and 0700 and 1300 Saturday, and at no time on Sundays and Public Holidays.

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b) This condition does not apply to the delivery of material outside the hours of operation permitted by condition 30, if that delivery is required by police or other authorities for safety reasons; and/or the operation or personnel or equipment are endangered. In such circumstances, prior notification is provided to the EPA and affected residents as soon as possible, or within a reasonable period in the case of emergency.

c) The hours of operation may be varied with prior written consent if the EPA is satisfied that the amenity of the residents in the locality of the premise will not be adversely affected.

31. Deleted

OPERATING CONDITIONS

32. General

a) Activities must be carried out in a competent manner. This includes:
- the processing, handling, movement and storage of materials and substances used to carry out the activity; and
- the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

b) All plant and equipment installed at the premises:
- Must be maintained in a proper and efficient condition; and
- Must be operated in a proper and efficient manner.

33. Air quality

a) The applicant must prepare and submit an Air Quality Management Program to the Environment Protection Authority (EPA) with any application for an environment protection licence to develop and operate the quarry. The Program must include, as a minimum:

- Detailed prevention and mitigation measures proposed to be implemented at the premises designed to ensure that the assessment criteria prescribed in the EPA document *"Approved methods for the Modelling and Assessment of Air Pollutants in New South Wales" (DEC, August 2005)* for Total Suspended Particles (TSP), PM_{10} and dust are achieved.

b) All operations and activities occurring at the premises must be carried out in a manner that will minimise dust at the boundary of the premises.

c) Trucks entering and leaving the premises that are carrying loads must be covered at all times, except during loading and unloading.

34. Soil and Water Management

a) The applicant must prepare and submit a Soil and Water Management Plan (SWMP) to the EPA with any application for an environment protection licence to develop and operate the quarry. The plan must:

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- be prepared in accordance with the document *Managing Urban Stormwater: Soils and Construction (LANDCOM, 2004)*, and;
- include a waste water monitoring program, proposing monitoring locations, monitoring frequencies and monitoring procedures.

35. Noise Management Plan

a) The applicant must prepare and submit a Noise Management Plan to the EPA with any application for an environment protection licence to develop and operate the quarry. The Plan must, as a minimum:

- identify detailed measures to attenuate and mitigate noise so as not to exceed the compliance limits set in conditions 10 and 29.
- include a noise monitoring program, including:
  - monitoring locations;
  - monitoring procedures;
  - monitoring frequencies; and
  - community consultation/complaint handling and reporting procedures.

MONITORING AND RECORDING CONDITIONS

36. Monitoring Records

a) The results of any monitoring required to be conducted by these EPA's general terms of approval must be recorded and retained as set out in conditions 36 (b) and 36 (c).

b) All records required to be kept by the applicant must be:

- in a legible form, or in a form that can readily be reduced to a legible form;
- kept for at least 4 years after the monitoring or event to which they relate took place; and
- produced in a legible form to any authorised officer of the EPA who asks to see them.

c) The following records must be kept in respect of any samples required to be collected:

- the date(s) on which the sample was taken;
- the time(s) at which the sample was collected;
- the point at which the sample was taken; and
- the name of the person who collected the sample.

37. Requirement to monitor concentration of pollutants discharged

a) For all waste water discharge points from the premises the applicant must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The applicant must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

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Pollutant	Units of measure	Frequency	Sampling Method
Total Suspended Solids	mg/L	Daily during discharge	Grab Sample
Oil and Grease	mg/L	Daily during discharge	Grab Sample
pH	pH	Daily during discharge	Grab sample

38. Requirement to Monitor Noise Impacts

a) The applicant must conduct an initial noise monitoring round in accordance with conditions 29 (b) and 29 (c) of these General Terms of Approval within 21 days of commencing operations after the issue of this licence in order to determine whether the noise emissions from the premises comply with the noise limits established in 29 (a).

b) The applicant must submit a report on the compliance noise monitoring conducted under 38 (a) above to the EPA within 21 days of undertaking the monitoring.

39. Requirement to Monitor Weather

a) The applicant must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1 for the purposes of demonstrating compliance with 26 (a). The licensee must use the sampling method, units of measure, averaging period and sample at the frequency, specified opposite in the other columns.

Parameter	Units of Measure	Frequency	Averaging Period	Sampling Method
Rainfall	mm	Continuous	24 hour	AM-4

Note: Methods AM-4 are specified in the Approved Methods for Sampling and Analysis of Air Pollutants in NSW and all monitoring must be conducted strictly in accordance with the requirements outlined in this document.

40. Recording of pollution complaints

a) The licensee must keep a legible record of all complaints made to the applicant or any employee or agent of the applicant in relation to pollution arising from any activity to which this licence applies. The record must include details of the following:

- the date and time of the complaint;
- the method by which the complaint was made;
- any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- the nature of the complaint;
- the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and

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- if no action was taken by the licensee, the reasons why no action was taken.

b) The record of each complaint must be kept for at least 4 years after the complaint was made.

c) The records must be produced to any authorised officer of the EPA who asks to see them.

41. Telephone complaints line

a) The applicant must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in these general terms of approval.

b) The applicant must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint. This condition does not apply until 3 months after this condition takes effect.

REPORTING CONDITIONS

42. Annual Returns

a) The applicant must provide an annual return to the EPA in relation to the development as required by any licence under the Protection of the Environment Operations Act 1997 in relation to the development. In the return the applicant must report on the annual monitoring undertaken (where the activity results in pollutant discharges), provide a summary of complaints relating to the development, report on compliance with licence conditions and provide a calculation of licence fees (administrative fees and, where relevant, load-based fees) that are payable. If load-based fees apply to the activity the applicant will be required to submit load-based fee calculation worksheets with the return.

b) The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

a Statement of Compliance; and
a Monitoring and Complaints Summary.

c) The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period.

d) Licensee must retain copy of Annual Return
The applicant must retain a copy of the annual return supplied to the EPA for a period of at least 4 years after the annual return was due to be supplied to the EPA.

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e) Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:

(a) the licence holder; or
(b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

43. Notification of environmental harm

a) The licensee must notify the EPA of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

b) Notifications must be made by telephoning the EPA's Pollution Line service on 131 555.

c) The applicant must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

d) Where an authorised officer of the EPA suspects on reasonable grounds that an event has occurred at the premises and the event has caused, is causing or is likely to cause material harm to the environment the authorised officer may request a written report of the event.

e) The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request. The request may require a report which includes any or all of the following information:

- the cause, time and duration of the event;
- the type, volume and concentration of every pollutant discharged as a result of the event;
- the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event; and the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
- action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
- details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event;
- any other relevant matters.

The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided and such further details must be provided to the EPA within the time specified in the request.

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Department of Lands

44. In relation to the Crown Public road located passing through the southern section of Lot 104 DP 776239, the quarry operator shall ensure:

a) That the road environment is not interfered with or degraded by any activities as a result of the new development.

b) All quarry works and improvements are restricted within freehold land with appropriate offsets to avoid encroachments onto the Crown public road.

c) That any upgrading of pedestrian access or public use generally (including vehicular access) within the road boundaries are to be authorized by the Department of Lands.

Former Department of Natural Resources

45. An ecologically based Fire Management Plan shall be prepared by the applicant to manage the site to exclude some fires in order to re-establish ground and mid-storey plant species.

46. A comprehensive drainage line vegetation rehabilitation plan shall be developed for the entire property and this plan shall be implemented for the duration of the project.

47. A Part 3A permit under the Rivers and Foreshores Improvement Act 1948 will need to be obtained from the new Department of Water and Energy. This permit will include the following special conditions and the attached general conditions.

48. Site Sediment and erosion control plan to be provided and implemented.

49. Drainage line rehabilitation/revegetation plan to be provided and implemented.

Rivers and Foreshores Improvement Act 1948

General Terms of Approval

50. Irrespective of the granting of this consent or approval by any other Authority, work is not to commence in or within a horizontal distance of 40m from the top of the bank of the watercourse, without the prior issue of a Part 3A permit by the Department of Natural Resource (DRN).

51. The Part 3A permit will be issued upon application to DRN comprising:

52. A copy of Council's development consent including all conditions of approval;

53. Plans and/or other documentation (1 copy) that satisfy the DNR General Terms of Approval and recommendations which are included in Council's consent conditions; and,

54. The appropriate permit fee paid to DNR.

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55. Work is to be carried out in accordance with drawings and any management plans required by these conditions and approved by DNR that will accompany the Part 3A permit.

56. Any Part 3A permit issued is to be renewed on an annual basis until all works and all rehabilitation, including maintenance provisions, have been satisfactorily completed on accordance with the permit expiry date.

57. Work shall not cause damage to, or increase erosion of, the stream bed or banks. The permit holder shall carry out any instructions given DNR with a view to preventing degradation of the stream bed or banks.

58. Any vegetation or other material removed from the area of works shall be disposed of in such a way that the material cannot be swept back into the stream during a flood.

59. Any stormwater outlet to the watercourse is to be designed and constructed to minimize any erosion or scour of the banks or bed of the watercourse.

60. All works proposed must be designed, constructed and operated so they do not cause erosion of sedimentation and do minimise adverse impacts on aquatic and riparian environments.

61. Erosion and sediment measures are required to be implemented prior to any works to commencing and must be maintained for as long as necessary after the completion of works, to prevent sediment and dirty water entering the river system. These measures are to be in accordance with Council's requirements and follow best management practice as outlined in the NSW Department of Housing's "Managing Urban Stormwater: Soils and Construction" (1998) manual (the "Blue Book").

62. The excavation of soil/spoil and its removal is the responsibility of the permit holder and the owner or occupier of the land.

63. These conditions are issued with the provision that operations shall be carried-out on freehold land. Should operations be on crowned land, these conditions are rendered null and void and the occupier of Crown land should contact the Department of Lands.

64. Work is to be carried out in accordance with any conditions imposed by other government agencies, provided such conditions do not conflict with these conditions on the Part 3A permit.

65. The permit holder and the owner or occupier of the land is responsible for any works undertaken by other person or company on this site.

66. The rehabilitation of the area in accordance with the Part 3A permit conditions is the responsibility of the permit holder and the owner or occupier of the land.

67. Any Part 3A permit granted is not transferable to any other person or company without the written approval of DNR and doses not authorize works at any other site.

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68. Any Part 3A permit granted does not give the holder of any obligation which may exist to also obtain permission from local government and other authorities who may have some form of control over the site and/or the activities proposed.

69. Work as executed survey plans of a professional standard shall be provided to DNR upon request.

70. If, in the opinion of a DNR officer, any activity is being carried out in such a manner that it may degrade the riparian zone, stream lake or foreshore environment, all work shall cease immediately upon oral or written direction of such an officer.

71. If the permit conditions have been breached, the permit holder shall restore the site in accordance with the permit conditions and/or as directed by DNR. If any breach of the permit conditions required a special site inspection by DNR. If any breach of the permit conditions requires an inspection and all subsequent breach inspection.

72. If works are to cease prior to completion, DNR must to be notified in writing one month in advance of the cessation of the operation.

73. Any changes to plans/drawings are to be prepared in consultation with, will require the approval of DNR.

Department of Primary Industries

74. The operator shall provide annual production data to DPI Mineral Resources in the manner required and on the standard form supplied for that purpose.

Roads and Traffic Authority

75. If the development proceeds prior to the upgrade of the Pacific Highway then the following will be required:

a) All access to the Pacific Highway for the development shall be taken from the existing driveway described as Option 2 in the EIS.

b) The driveway (Option 2) will need to be upgraded to AUSTROADS and RTA requirements to maintain the safety and efficiency of the highway.

c) The western side of the highway will need to be widened to provide an RTA modified BAR treatment to enable northbound highway traffic to safely negotiate right-turning traffic. The eastern side will need to be widened to provide an AUSTROADS AUL left-turn deceleration lane.

d) The above improvements are the minimum required and will need to take into consideration the impact on the other access opposite and could require further upgrading to cater for it.

e) The driveway will need to be upgraded to an RTA Rural Access Standard and sealed for at least 30m back into the property to prevent the fouling of the highway.

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f) Hinged "Truck Entering" signs are to be erected on the highway, either side of the access and displayed during operational hours.

g) These road works are to be undertaken at no cost to the RTA.

h) Any further development of this area will require the highway to be fully upgraded.

i) Any road works on the highway will require the execution of a Works Authorisation Deed with the RTA and is subject to fees to cover the cost of processing the documentation.

Endorsement of date of consent ___21 May 2008_____ (See Notes 1 & 2)

Notes

1 To ascertain the date upon which the consent becomes effective refer to Section 83 of the Act.

2 To ascertain the extent to which the consent is liable to lapse refer to Section 95 of the Act.

3 Section 97 of the Act confers on an applicant who is dissatisfied with the determination of a consent authority a right of appeal to the Land and Environment Court exercisable within six (6) months after receipt of this notice.

Signature on behalf of consent authority: _____

Kate Alberry
MANAGER DEVELOPMENT ASSESSMENT
SUSTAINABLE ENVIRONMENT

Date: 13 August 2013

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Appendix 4

Driver's Code of Conduct

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Revision 1
Revision Date 14/10/13
Next Review Date 14/10/15

LEVEL 2 INDUCTION -
DELIVERY TRUCK OPERATORS / DRIVERS CODE OF CONDUCT

1. Pacific Blue Metal - Farrawells Site has a fully operational Occupational Health and Safety Management Plan to provide a healthy and safe workplace for employees, subcontractors and visitors.

2. All people at Pacific Blue Metal - Farrawells Site are subject to the authority of the Quarry Manager & Site Supervisor.

3. A copy of a Certificate of Currency for Insurances must be provided to the site office.

4. Pre-start checks must be conducted on vehicles prior to use to ensure they are roadworthy. Ensure any issues found are reported immediately to the Quarry Manager or Site Supervisor.

5. Observe and obey all road rules including Heavy Vehicle legislation requirements.

6. Abide by respective RMS load limits.

7. Seat belts to be worn at all times when vehicle is moving.

8. Only use mobile phones in an approved mobile phone cradle while driving.

9. Be aware of safe work practices when loading and unloading.

10. Restrict speed to 30 km/hr along the Industrial Subdivision Access Road and 20 km/hr within the Quarry Site.

11. Ensure loads are properly contained within truck bodies and side rails and tailgates are clean. All loads must be covered prior to leaving the Industrial Subdivision Access Road.

12. Observe quarry entry and exit hours:
    - Monday to Friday 7.00am – 5.00pm
    - Saturday 7.00am – 1.00pm

    Trucks are not to enter or leave the site outside of these hours.

13. Obey Safety and Procedural signs posted within the quarry.

14. If equipped with UHF Radio switch to channel 12, maintain a listening watch and make other traffic aware of your position in the quarry.

15. Compulsory radio calls are :
    1. On entering the Quarry Access Road **"Truck entering quarry"**
    2. On departing the quarry gates **"Truck Leaving quarry"**

16. Personal protective equipment must be worn when requested. Safety footwear and hi-vis clothing, must be worn at all times and hard hats must be worn in the vicinity of the crushing plant when it is operating.

17. Specifically prohibited are wearing thongs, drinking alcohol and use of illegal drugs.

18. In the event of an emergency, all persons within Pacific Blue Metal - Farrawells Site will be notified by UHF Radio, mobile phone, siren or Quarry Staff, and will assemble at the safe area / emergency evacuation area at the site office.

19. To notify an accident or emergency, you must contact the site office. This can be done by UHF CH 12, Phone 0428 684 030, inform an operator of mobile plant, or proceeding directly to the site office. In all cases, you must give your state "emergency, emergency, emergency" name, location, and details of the emergency.

20. First aid kit is located in the site office. Contact the site supervisor 0428 684 030 for the site first aid officer.

21. Quarry equipment always has right of way.

22. If leaving the cabin of your truck when either getting loaded or within 20m of mobile equipment, you must advise the operator of the mobile quarry plant of your intentions so that he/she are aware of where you intend to walk.

23. If on foot, you are not to approach within 20m of mobile plant until you have notified the operator and the operator has acknowledged your intent and bought the machine to a halt and engaged the park brake.

24. All driving behavior will be seen by the general public and breaches may result in a complaint being received by the company. Should this happen, the driver may be subject to disciplinary action.

Instructions for Using Tally Clerk:

1. Approach the weighbridge slowly and wait for "Proceed" signal to be displayed on the electronic display.
2. Proceed at a slow steady speed, no faster than walking pace.
3. Continue until "Stop" signal is displayed on the board.
4. Collect docket from printer.
5. Ensure load is covered before moving from weighbridge.

The Occupational Health and Safety Induction requirements have been explained to me. I understand these requirements and also that compliance with these requirements is a condition of entry into Pacific Blue Metal - Farrawells Site.		
DATE OF INDUCTION	**INDUCTEE : NAME**	**INDUCTEE : SIGNATURE**
Witnessed on behalf of the Quarry Manager:		

Competency Assessment

Name of Inductee:	
Signature:	

Assessment Marked by:

Name:	**Signature:**
Result:	**/5**

Please circle the correct answer:

1. Farrawells quarry hours of operation are:
   a). Monday to Wednesday 7.00am to 3.00pm
   b). Monday to Friday 7.00am to 5.00pm and Saturday 7.00am to 1.30pm
   c). Monday to Saturday 7.00am to 5.00pm

2. Speed limits are:
   a). 30 km/hr on Industrial access road and 20 km/h within the Quarry Site.
   b). 50 km/hr around the site
   c). Same as road speed limits
   d). Whatever you think is a safe speed

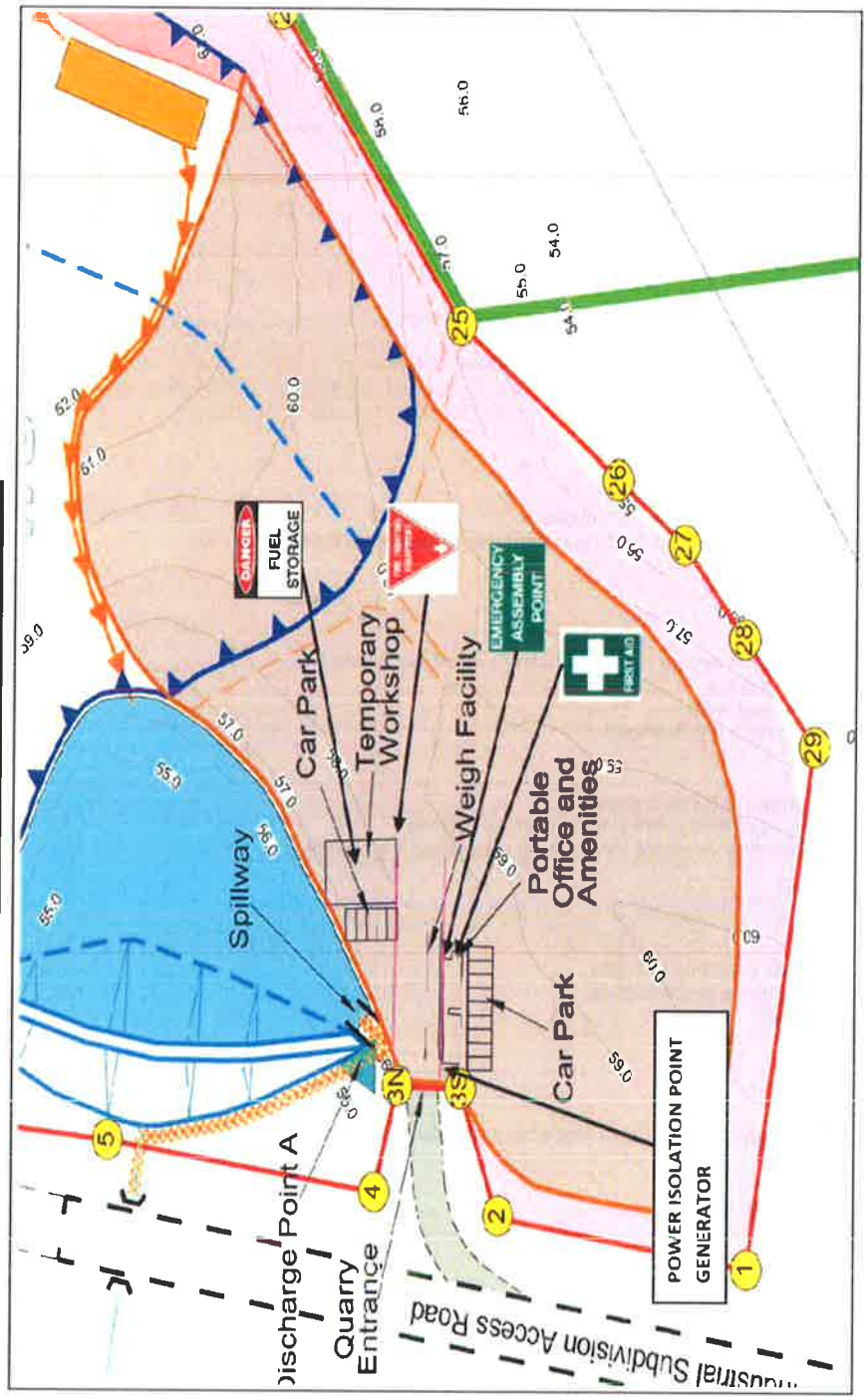
3. Mandatory PPE on site is (circle 2 answers):
   a). Safety footwear and hi-vis clothing to be worn at all times
   b). Hard hats when in the vicinity of the crushing plant when it is operating
   c). Thongs
   d). Hard hats at all times

4. Who has right of way on site at all times:
   a). Whoever is driving the largest vehicle
   b). Quarry equipment
   c). Pedestrians
   d). Visitors

5. After collecting your docket from Tally Clerk what must you do before leaving the weighbridge:
   a). Cover your load
   b). Look at the site map
   c). Wait for the proceed signal
   d). Check the weather forecast

PACIFIC BLUE METAL FARRAWELL'S QUARRY

EMERGENCY SITE PLAN



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Appendix 5

Air Quality Impact Assessment by ENVIRON Australia Pty Ltd

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Farrawell's Quarry Extension

Prepared for:
R.W. Corkery & Co. Pty Limited
1st Floor, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083

Tel: (02) 9985 8511
Fax: (02) 6361 3622
Email: brooklyn@rwcorkery.com

On behalf of:
Pacific Blue Metal Pty Ltd
Possum Brush Road
POSSUM BRUSH NSW 2430

Tel: (02) 6554 3206
Fax: (02) 6554 3250
Email: pacificbluemetal@bigpond.com

Prepared by:
ENVIRON Australia Pty Ltd
PO Box 560
Level 3, 100 Pacific Highway
NORTH SYDNEY NSW 2060

Tel: (02) 9954 8100
Fax: (02) 9954 8150
Email: sfishwick@environcorp.com

July 2014

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EXECUTIVE SUMMARY

Pacific Blue Metal Pty Ltd (the Applicant) is seeking development consent to increase the footprint and depth of the extraction area at the existing Farrawell's Quarry (the Quarry), located approximately 5km south of Kempsey on the mid-north coast of NSW. The Quarry is a hard rock extraction operation producing road construction material for the Pacific Highway upgrade and other local uses.

ENVIRON Australia Pty Ltd (ENVIRON) has been commissioned by R.W. Corkery & Co. Pty. Limited (RWC) on behalf of the Applicant to conduct an air quality assessment to review potential impacts of the Quarry.

This air quality assessment addresses the following aspects:

- Characterisation of the existing environment, specifically the existing air quality, prevailing meteorology and regulatory context;
- Review of potential emission sources and mitigation measures;
- Calculation of annual emissions from the Quarry, with a specific focus on particulate matter less than 10microns in aerodynamic diameter (PM_{10}); and
- A screening-level analysis of potential PM_{10} impacts at the closest surrounding receptors using dispersion modelling techniques.

The focus of this assessment was emissions and associated impacts of PM_{10}. Annual emissions of PM_{10} from the Quarry were estimated utilising published emission factors from the US-EPA AP-42 Air Pollutant Emission Factors data base and from National Pollutant Inventory emission estimation manuals. Emissions were calculated for two future scenarios.

Atmospheric dispersion modelling for the Quarry was conducted using the CALPUFF modelling system. Local meteorology was incorporated into the dispersion modelling using observations from the Bureau of Meteorology Kempsey Airport monitoring location (located 8km from the Quarry Site) and meteorological modelling techniques.

In assessing potential air quality impacts from the Quarry, model predictions of daily-varying (maximum 24-hour average) and annual average PM_{10} concentrations were made at four neighbouring receptors. The results of the dispersion modelling conducted indicated that for both operational scenarios assessed, the potential impacts generated by the Quarry were low and exceedance of the applicable NSW EPA assessment criteria was therefore unlikely.

To evaluate the Quarry's greenhouse gas (GHG) emissions and determine the associated contribution to NSW and Australian annual GHG emissions, emissions were estimated based on information provided by the Applicant and relevant GHG emission factors.

GHG emissions were calculated for direct emissions from the combustion of diesel fuel and detonation of explosives.

The GHG assessment's key findings are as follows:

- Annual Quarry GHG emissions were estimated to be 141t of Carbon Dioxide Equivalent per year (CO_2–e/yr);
- Emissions generated by the Quarry represent 0.0008% of annual NSW GHG emissions and 0.0003% of annual Australian GHG emissions.

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1. INTRODUCTION

Pacific Blue Metal Pty Ltd (the Applicant) is seeking development consent to increase the footprint and depth of the extraction area at the existing Farrawell's Quarry (the Quarry), located approximately 5km south of Kempsey on the mid-north coast of NSW. The Quarry is a hard rock extraction operation producing road construction material for the Pacific Highway upgrade and other local uses.

The Applicant is seeking consent to extend the existing extraction area beyond the approved limit of extraction (covering 8ha) to the proposed limit of extraction (covering 15.8ha). Production levels would not exceed the currently approved limit of 500,000tpa, with the annual average production level expected to be approximately 250,000tpa to 300,000tpa.

ENVIRON Australia Pty Ltd (ENVIRON) has been commissioned by R.W. Corkery & Co. Pty. Limited (RWC) on behalf of the Applicant to conduct an air quality assessment to review potential impacts of the Quarry.

This air quality assessment will cover the following aspects:

- Characterisation of the existing environment, specifically the existing air quality, prevailing meteorology and regulatory context;
- Review of potential emission sources and mitigation measures;
- Calculation of annual emissions from the Quarry, with a specific focus on particulate matter less than 10microns in aerodynamic diameter (PM_{10});
- A screening-level analysis of potential PM_{10} impacts at the four closest surrounding receptors only using dispersion modelling techniques. Modelling of impacts elsewhere in the surrounding region has not been conducted within this assessment; and
- A quantitative greenhouse gas assessment focusing on emissions generated by the Quarry.

2. PROJECT DESCRIPTION

2.1 EXISTING AND PROPOSED QUARRY OPERATIONS

As stated, the Quarry is a hard rock extraction operation located 5km south of Kempsey, NSW. **Figure 1** illustrates the regional setting of the Quarry. The Quarry is located within an approved Industrial Subdivision, on an area of land totalling 17.6ha in area (the Quarry Site).

Extractive operations at the Quarry Site involve the following key stages:

- Removal of vegetation, topsoil and overburden by bulldozer;
- Extraction of rock by drill and blast, excavator and bulldozer as required;
- Loading of extracted rock to off-highway haul trucks for transportation to mobile crushing and screening plants;
- Processing of extracted rock by crushing and screening plants;
- Transportation of processed rock to product storage area; and
- Loading of product material to highway trucks for transportation off-site.

The proposed extension to the Quarry (the Proposal) would not involve a change to the existing maximum extraction rate (500,000tpa). The key elements of the Proposal for which development consent is being sought are as follows.

- Extend extraction activities beyond the approved limit of extraction (covering 8ha) to the proposed limit of extraction (covering 15.8ha).
- Extend the depth of extraction within the existing approved extraction area by up to 8m.
- Create a final landform conducive to the long term Industrial Subdivision.
- Extend the operational life of the quarry to 15 to 20 years.

The existing layout of the Quarry Site and proposed layout changes are illustrated in **Figure 2**.

2.2 STUDY AREA LAND USE AND TOPOGRAPHY

The Quarry Site is located within an approved industrial subdivision. Immediately surrounding the Quarry Site is dense forested areas with several scattered residential properties. To the south of the Quarry Site is the South Kempsey service centre, which is currently under construction, while to the west is the Pacific Highway.

The Quarry Site is cut into the side of a small hill, with elevation ranging between approximately 47m (Australian Height Datum (AHD)) at the western boundary to 80m AHD at the eastern boundary. The surrounding topography marked by undulating terrain that decreases to the north approaching the Macleay River.

A three-dimensional representation of the topography immediately surrounding the Quarry Site is presented in **Figure 3**.

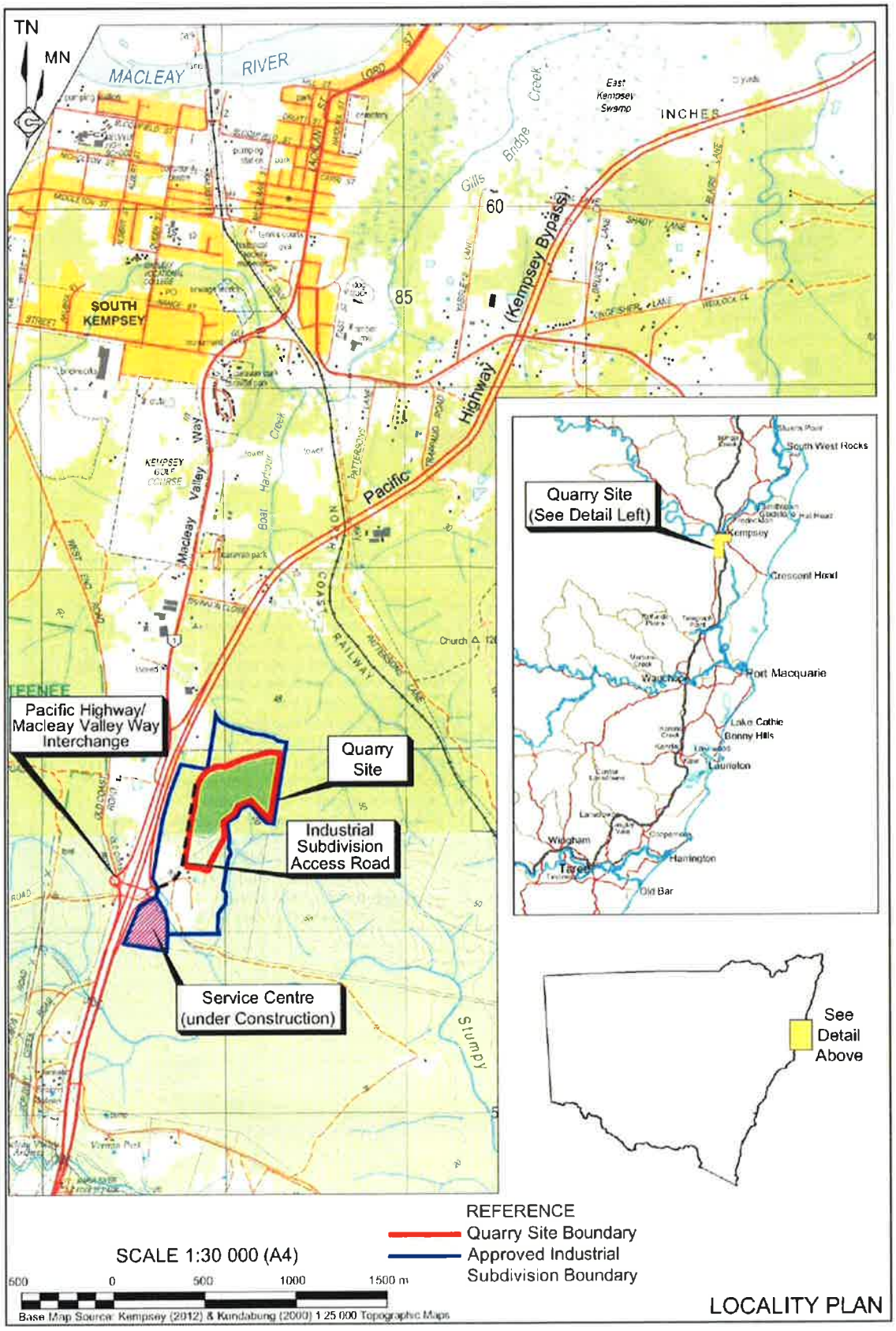
2.3 SURROUNDING RESIDENCES

The Quarry Site is located in proximity of a number of rural-residential properties. These locations will be used to assess air quality impacts from the Quarry. The selected receptor locations are presented in **Table 1** and illustrated in **Figure 4**.

Table 1
Selected Sensitive Receptor Locations Surrounding Quarry Site

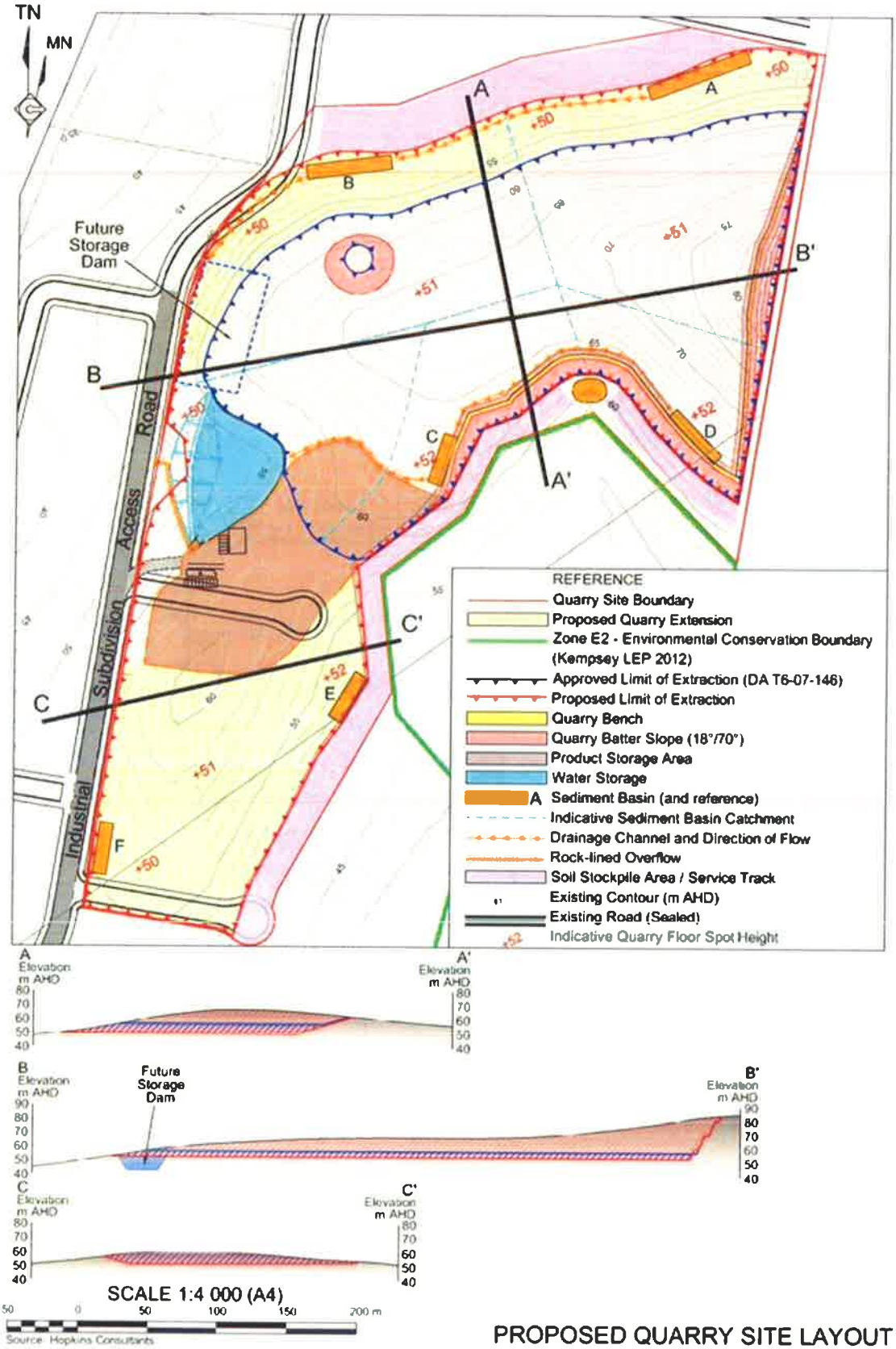
Receptor ID	Location (m, MGA56S)		Distance (m) / Direction from Quarry Site Boundary	Elevation (m, AHD)
	Easting	Northing		
9	406218	6790241	350 / W	51
8	406085	6791470	450 / W	42
6A	405655	6792008	320 / WNW	34
6B	405648	6790638	360 / WNW	32

Figure 1 Locality Plan



Source: RWC (2014)

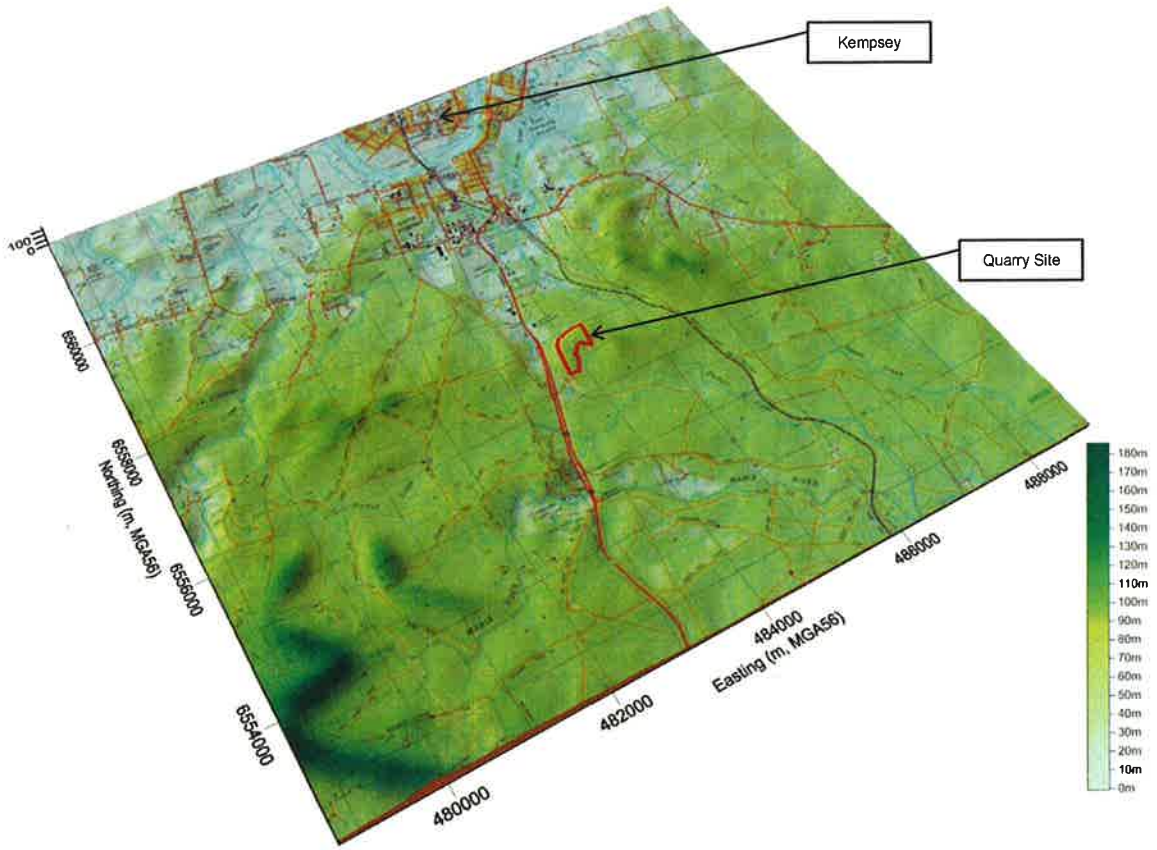
Figure 2 Proposed Quarry Site Layout



PROPOSED QUARRY SITE LAYOUT

Source: RWC (2014)

Figure 3 Surrounding Topographical Features



- NOTE: Vertical exaggeration of two applied

Figure 4 Quarry Site and Surrounds

Source: RWC (2014)

3. AIR QUALITY ASSESSMENT CRITERIA

The air quality assessment criteria that would be applicable to the Quarry are those specified by the NSW Environment Protection Authority (NSW EPA) within the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2005), hereafter referred to as Approved Methods for Modelling. The primary pollutants generated by the Quarry are expected to be particulate matter, including Total Suspended Particulates (TSP), particulate matter less than 10microns in aerodynamic diameter (PM_{10}) and particulate matter less than 2.5microns in aerodynamic diameter ($PM_{2.5}$). Gaseous pollutants associated with diesel combustion and blasting activities may also be generated by the Quarry, however it is expected that these emissions would be minor.

As stated previously, this air quality impact assessment will focus only on emissions of PM_{10} from the Quarry. Based on ENVIRON experience, impacts from PM_{10} is the most critical pollutant regarding compliance with NSW EPA assessment criteria. The specific PM_{10} goals that would be applied at surrounding receptors are as follows:

- PM_{10}: A 24-hour maximum of 50µg/m^3.
  An Annual average of 30µg/m^3.

To be in compliance with specific goals for PM_{10}, operations must demonstrate that cumulative air pollutant concentrations, taking into account incremental concentrations due to the operation's emissions and existing background concentrations, are within ambient air quality limits.

4. CLIMATE AND DISPERSION METEOROLOGY

Meteorological mechanisms govern the generation, dispersion, transformation and eventual removal of pollutants from the atmosphere. Dust generation rates are particularly dependent on wind energy and on the moisture budget, which is a function of rainfall and evaporation rates.

No meteorological monitoring is conducted at the Quarry Site. The NSW EPA specifies in Section 4.1 of the Approved Methods for Modelling that meteorological data representative of a site should be used in the absence of actual onsite observations. Data should cover a period of at least one year with a percentage completeness of at least 90%. Site representative data can be obtained from either a nearby meteorological monitoring station or synthetically generated using the CSIRO prognostic meteorological model The Air Pollution Model (TAPM).

In the absence of onsite meteorological monitoring data, a combination of meteorological modelling and regional monitoring datasets were drawn upon. Details regarding the meteorological modelling conducted are presented in **Section 4.1**. The following regional data sets were used in the meteorological analysis:

- Long-term climate statistics (1939 to 2014) obtained from the Bureau of Meteorology (BoM) Kempsey (Wide Street) climate station (Station Number 059017) located 5.5km north of the Quarry Site, and;
- 1-hour average meteorological data from the BoM Automatic Weather Station (AWS) at Kempsey Airport (Station Number 059007) located 8km northwest of the Quarry Site.

Wind roses and frequency histograms of recorded wind speed and direction data have been generated for the period between 2009 and 2013 for the Kempsey Airport AWS location. These figures are presented within **Appendix A** and indicate that minimal inter-annual variation in wind desertion and speed occurred across this period. On the basis of illustrated inter-annual consistency in recorded wind speed and direction the most recent complete calendar year, 2013, has been adopted as the modelling period for this assessment.

4.1 METEOROLOGICAL MODELLING

Due to an absence of meteorological observations at the Quarry Site, meteorological modelling has been conducted to generate hourly varying meteorological data for use in the air pollution dispersion modelling for this assessment.

Due to the distance between the Quarry Site and the Kempsey Airport AWS (approximately 8km) and the difference in surrounding terrain and land use at the two locations (cleared, river plain at Kempsey Airport compared with forested undulating terrain at the Quarry Site), it was considered that the meteorological conditions, particularly wind speed and direction, recorded by the Kempsey Airport AWS might not be completely representative of the Quarry Site. Consequently, the CALPUFF (Version 6.2) modelling system was been selected for application in this assessment.

The CALPUFF Modelling system comprises three main components: the CALMET meteorological model, the CALPUFF air dispersion model and the CALPOST post-processor, in addition to a large set of pre-processing programs designed to interface the model to standard routinely available meteorological and geophysical databases.

The CALMET meteorological model develops wind and temperature fields on a three-dimensional gridded modelling domain (Scire *et. al.*, 2000). Associated two dimensional fields such as mixing height, surface characteristics, and dispersion properties are also included in the file produced by CALMET. The interpolated wind field is then modified within the model to account for the influences of topography, as well as differential heating and surface roughness associated with different land uses across the modelling domain. These modifications are applied to the winds at each grid point to develop a final wind field. The final wind field thus reflects regional airflow patterns in addition to the influences of local topography and land uses.

The CALMET model can integrate hourly average surface meteorological data as input, including wind speed, wind direction, mixing depth, cloud cover, temperature, relative humidity, pressure and precipitation. Additionally, CALMET can adopt concurrent upper air meteorological data containing similar parameters in order to calculate the conditions at heights above ground level.

For this assessment, CALMET was configured for a 20km x 20km domain centred on the Quarry Site. The model incorporated the hourly observations for 2013 from the Kempsey Airport AWS. Gridded datasets of topographical features and land use categories for the model domain were accounted for to refine meteorological predictions at the Quarry Site taking the Kempsey Airport observations into consideration.

The configuration of the CALMET model applied within this assessment is outlined in **Table 2**.

Table 2
CALMET Configuration

Meteorological grid domain	20km x 20km
Meteorological grid resolution	100m
Vertical resolution (cell heights)	10 (0m, 20m, 40m, 80m, 160m, 320m, 640m, 1,200m, 2,000m, 3,000m, 4,000m,)
Modelling year	November 2009 to October 2010
Surface meteorological stations	Kempsey Airport (BoM)
Upper air meteorological stations	TAPM 3-Dimensional Prognostic Dataset

In the absence of a suitably complete upper air monitoring dataset, the CSIRO's The Air Pollution Model (TAPM) software was used to generate the upper air meteorological parameters required for input within CALMET. TAPM is a prognostic model which outputs three-dimensional, time-resolved meteorological data including: wind speed and direction, temperature, pressure, water vapour, cloud, rain water and turbulence. TAPM relies on region-specific data drawn from data bases covering terrain, vegetation and soil type, sea surface temperature and synoptic scale meteorological analyses to produce site-specific hourly meteorological observations at various heights above the ground.

The configuration of CALMET using a combination of Prognostic Model output data from TAPM and surface observations is in general accordance with the Hybrid Mode configuration as specified within Table 2-1 of the *Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia* TRC Environmental, 2011.

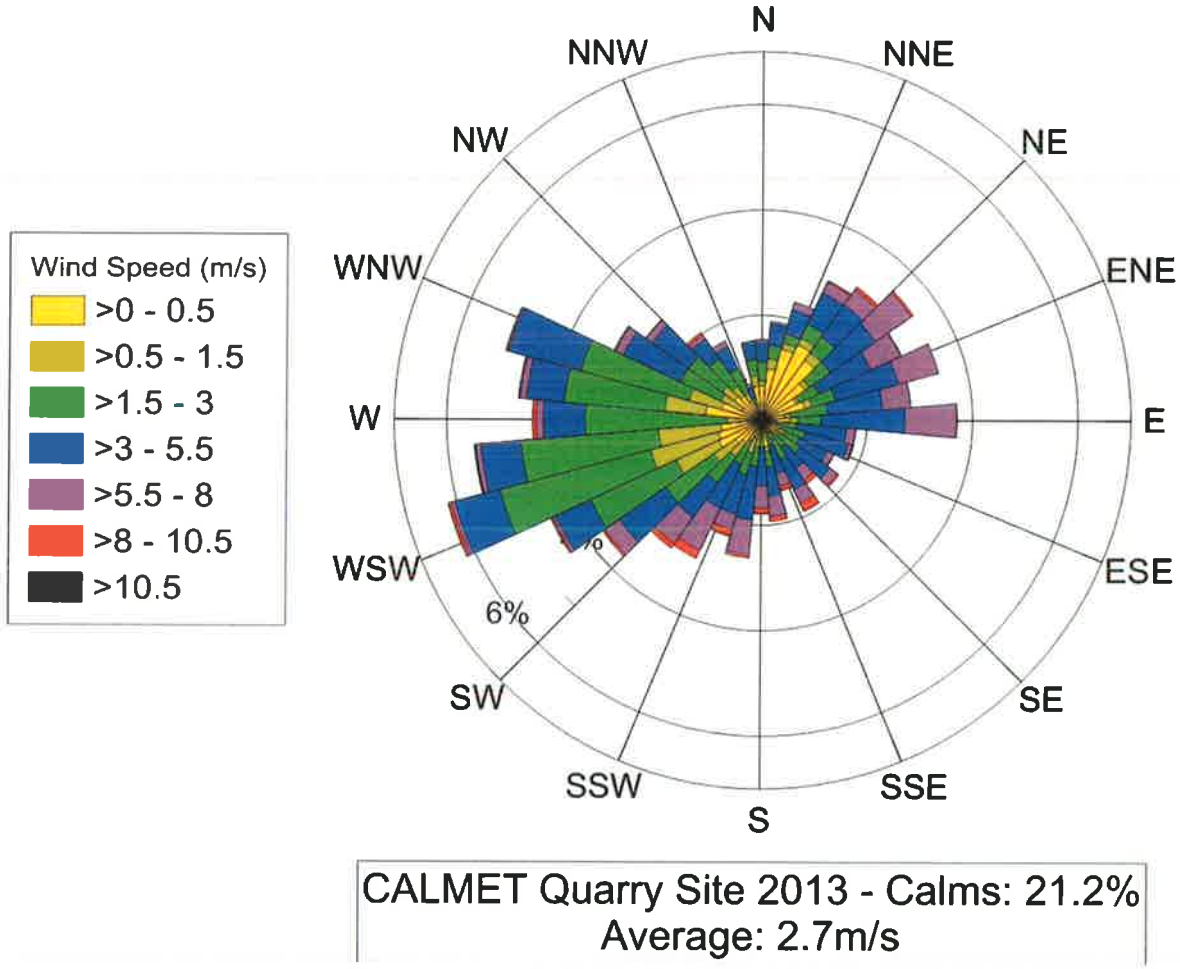
4.2 PREVAILING ANNUAL WIND REGIME

Annual, seasonal and diurnal wind roses for the Quarry Site, generated based on hourly wind speed and direction data extracted from the CALMET-predicted dataset, are provided in **Appendix 1**.

Based on the annual wind rose illustrated in **Figure 5**, airflow is predominately experienced from the southwest to west-northwest and northeastern quadrants at the Quarry Site. This airflow pattern is similar to the data recorded at the BoM Kempsey Airport AWS location, however the northeasterly component in the Quarry Site dataset is more easterly aligned at the BoM site. The variance in flow direction is considered attributable to the topography of the Quarry Site. Calm conditions (wind speeds less than 0.5m/s) are also higher in the Quarry Site dataset, considered to be a function of the surrounding land use and topography relative to the more exposed setting of the Kempsey Airport AWS.

The average predicted wind speed for the 2013 modelling period was 2.7m/s, with a frequency of calm conditions in the order of 21%.

Figure 5 CALMET-Predicted Annual Average Wind Rose – Quarry Site – 2013



4.3 SEASONAL AND DIURNAL WIND REGIME

Seasonal and diurnal (dividing the day into four periods) wind roses for the 2013 CALMET-generated Quarry Site dataset are presented within **Appendix 1**.

Notable seasonal variation is evident in the wind regime generated for the Quarry Site. The westerly component is most dominant during the autumn and winter months. Summer is dominated by flow from the northeast, while spring experiences a mixture of both southwesterly and northeasterly flow.

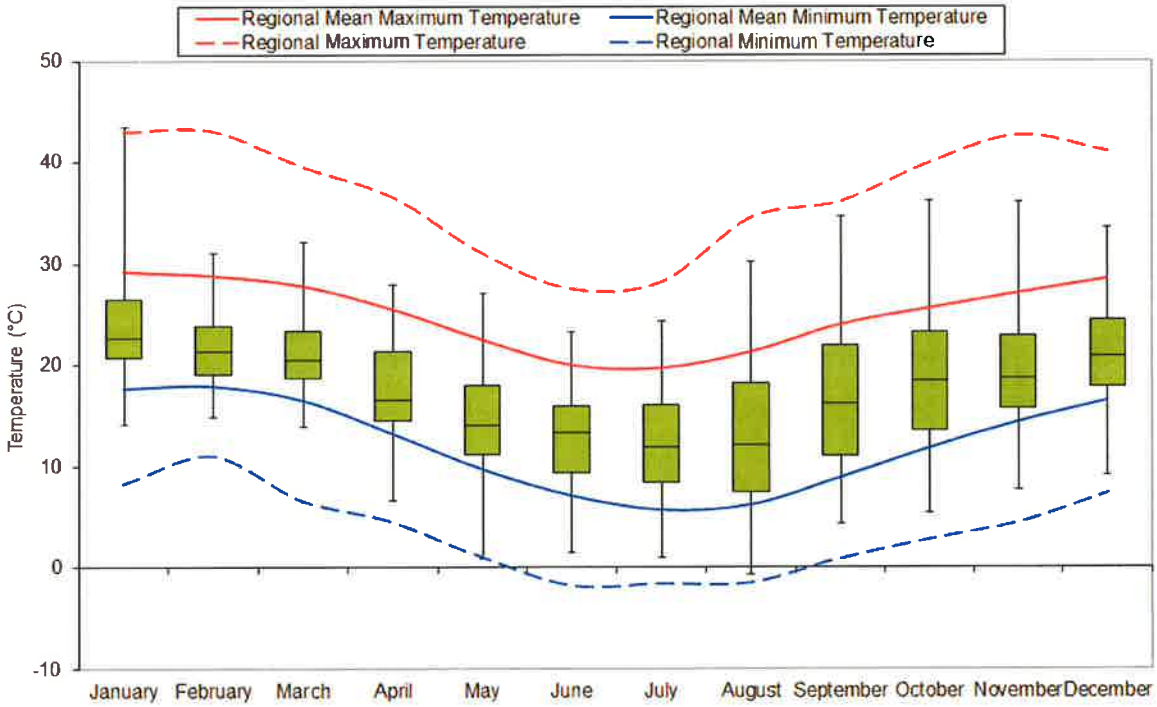
Diurnal variation is also notable in the 2013 CALMET-generated meteorological dataset for the Quarry Site. The westerly component is most defined during the night and early morning hours before shifting to the northeast quadrant by midday and late afternoon. This predicted diurnal shift in air flow is considered to be a function of the proximity to the coastline. The wind speed increases during the daylight hours, with the lowest wind speed recorded during the early hours of the day (00:00hrs to 05:00hrs).

4.4 AMBIENT TEMPERATURE

Monthly mean minimum temperatures are in the range of 6°C to 18°C, with mean maxima of 20°C to 29°C, based on the long-term average record from the BoM Kempsey (Wide Street) climate station. Peaks occur during summer months with the highest temperatures typically being recorded between November and March. The lowest temperatures are usually experienced between June and August.

The CALMET-generated temperature for the Quarry Site during 2013 has been compared with long-term trends recorded at the BoM Kempsey (Wide Street) climate station to determine the representativeness of the dataset. **Figure 6** presents the monthly variation in predicted temperature during 2013 compared with the recorded regional mean, minimum and maximum temperatures. There is good agreement between temperatures predicted during 2013 and the recorded historical trends, indicating that the dataset is representative of conditions likely to be experienced in the region.

Figure 6 Temperature Comparison between CALMET-generated Quarry Site 2013 dataset and Historical Averages (1907-2014) – Kempsey



Note: CALMET-generated temperatures for the Quarry Site are illustrated by the 'box and whisker' indicators. Boxes indicate 25th, median and 75th percentile temperature values while upper and lower whiskers indicate maximum and minimum values. Maximum and minimum temperatures from long-term measurements at Kempsey are depicted as line graphs.

4.5 RAINFALL AND EVAPORATION

Precipitation is important to air pollution studies since it impacts on dust generation potentials and represents a removal mechanism for atmospheric pollutants.

Based on historical data recorded since 1882 in Kempsey, the region is characterised by high rainfall, with a mean annual rainfall of approximately 1,217mm, and an annual rainfall range

between 497mm and 2,359mm. Rainfall is most pronounced between December and March, with significantly lower rainfall during the colder months of the year. According to the records, an average of 111 rain days occur per year.

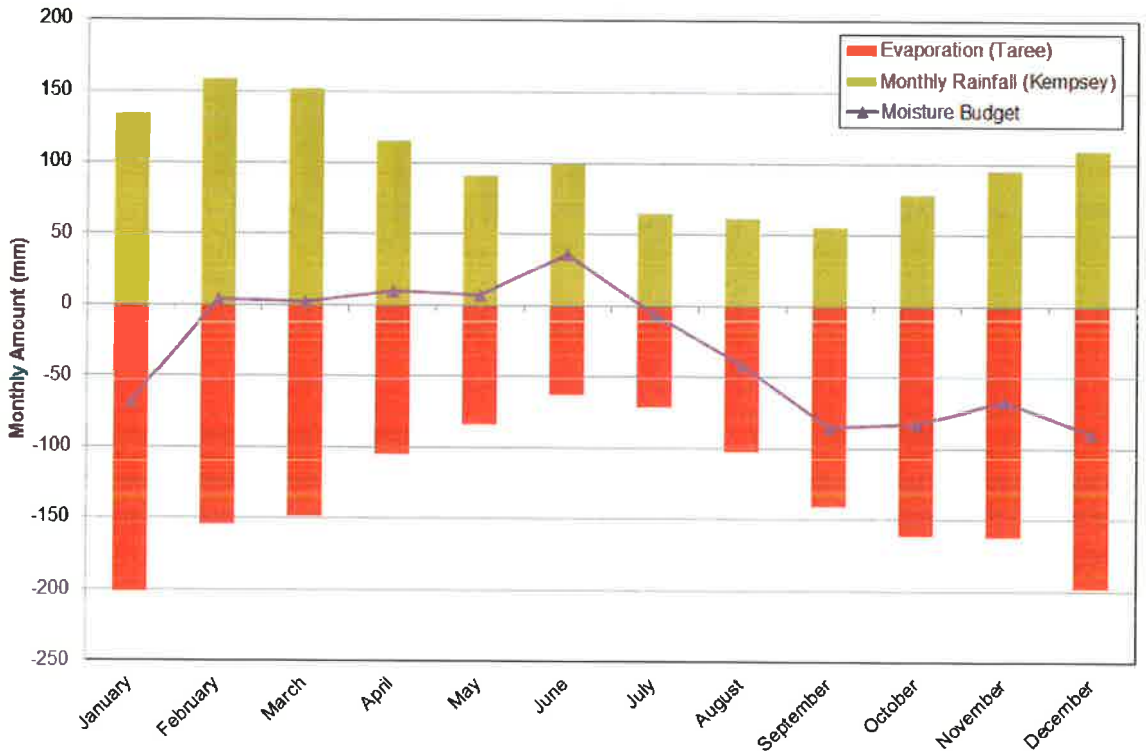
Evaporation is a function of ambient temperature, wind and the saturation deficit of the air. The closest evaporation measurement station to the Quarry is the BoM Taree Airport station (Station Number 060141), approximately 90km south-southwest. Whilst spatially distant from the Quarry Site, the Taree Airport station is located in a similar proximity to the coastline to the Kempsey region and is considered the most appropriate for use in this assessment in the absence of more localised evaporation data. On average, the region experiences an annual evaporation rate of 1,590mm/year, with greatest evaporation rates occurring during the summer months.

Mean monthly rainfall amounts recorded by the BoM at Kempsey were compared with mean monthly evaporation rates recorded by the BoM at Taree to determine the likely moisture budget at the Quarry. The monthly variation in moisture budget is illustrated in **Figure 7**.

This figure illustrates that a moisture deficit occurs (evaporation exceeds rainfall) between August and January. The deficit is greatest during the spring and summer months.

To provide a conservative (upper bound) estimate of the airborne particulate matter concentrations occurring due to the Quarry, wet deposition (removal of particles from the air by rainfall) was excluded from the dispersion modelling simulations undertaken in this report.

Figure 7 Monthly Moisture Budget - Kempsey



4.6 ATMOSPHERIC STABILITY

Atmospheric stability refers to the degree of turbulence or mixing that occurs on the atmosphere and is a controlling factor in the rate of atmospheric dispersion of pollutants. The Pasquill-Turner assignment scheme identifies six Stability Classes, "A" to "F", to categorise the degree of atmospheric stability prevailing at a given time (defined in **Table 3**).

Table 3 Description of Atmospheric Stability Classes

Atmospheric Stability Class	Category	Description
A	Very unstable	Low wind, clear skies, daytime conditions
B	Unstable	Clear skies, daytime conditions
C	Moderately unstable	Moderate wind, slightly overcast daytime conditions
D	Neutral	High winds or cloudy days and nights
E	Stable	Moderate wind, slightly overcast night-time conditions
F	Very stable	Low winds, clear skies, cold night-time conditions

The frequency of occurrence of each atmospheric stability class predicted by CALMET at the Quarry Site for the modelling period is illustrated in **Figure 8**. Stability classes E and F, corresponding to a stable atmosphere, were predicted to occur cumulatively 47% of the time. Stability class D, corresponding to a neutral atmosphere, was predicted to occur approximately 14% of the time.

The predicted seasonal variation in atmospheric stability at the Quarry Site is presented in **Figure 9**. Autumn and winter typically experience a higher occurrence of neutral to stable atmospheric conditions than spring and summer.

The diurnal variation in CALMET predicted atmospheric stability is presented in **Figure 10**. The presented profiles illustrate that atmospheric instability increases during daylight hours as convective energy increases, while stable atmospheric conditions prevail during night periods due to the occurrence of lower wind speeds and reduced convective mixing.

4.7 MIXING DEPTH

Diurnal variations in CALMET-predicted atmospheric mixing depth for the Quarry Site are illustrated in **Figure 11**. The atmospheric mixing depth increases during the day as the heat from the sun promotes convective mixing and higher wind speeds result in mechanical mixing, with maximum depths occurring in the afternoon coinciding with peak solar energy and wind speeds. Mixing depth reduces as the sun sets and solar energy decreases.

Figure 8 **CALMET-Predicted Annual Occurrence of Atmospheric Stability Classes at the Quarry Site**

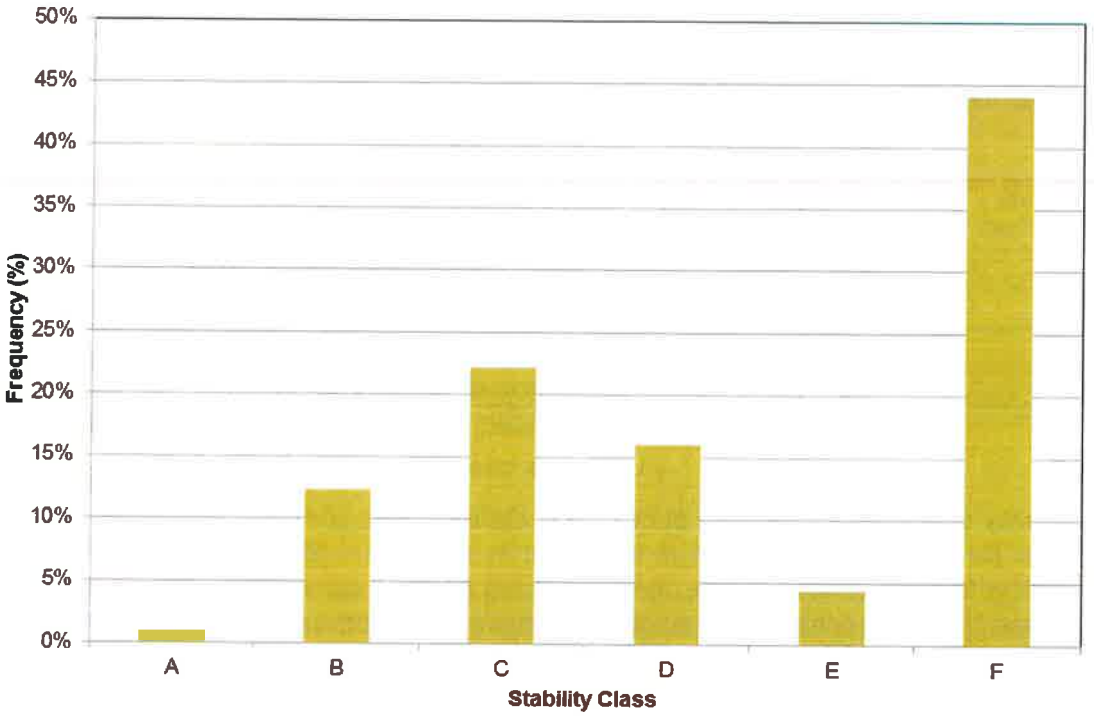


Figure 9 **CALMET-Predicted Seasonal Occurrence of Atmospheric Stability Classes at the Quarry Site**

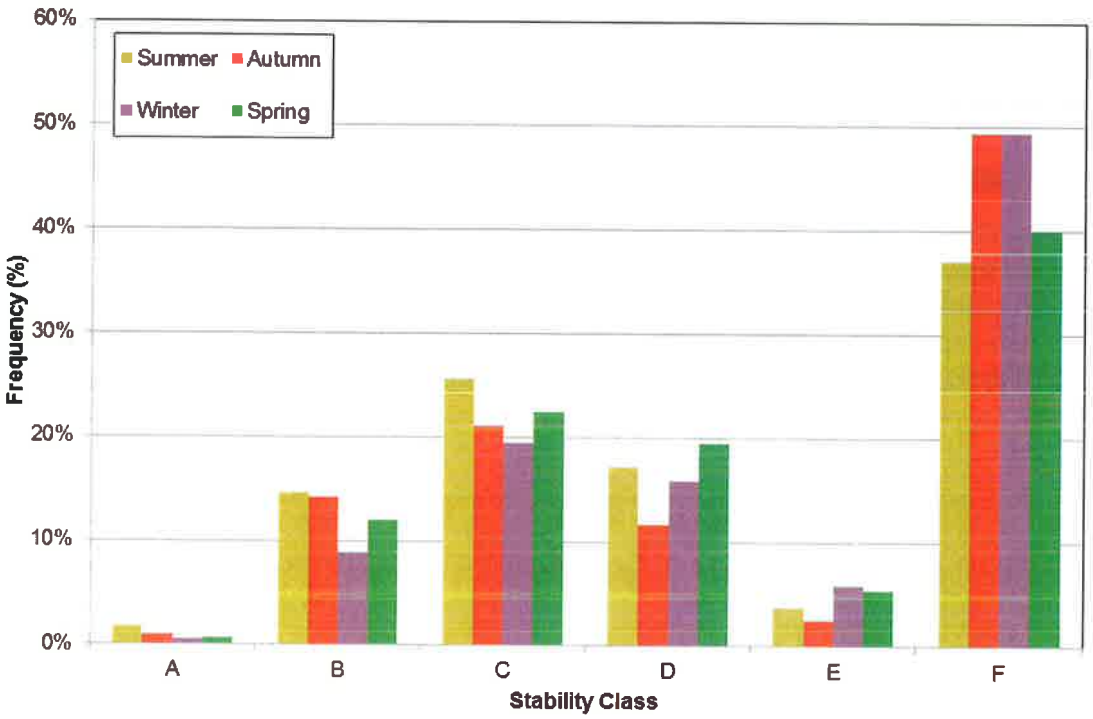


Figure 10 CALMET-Predicted Diurnal Variation in Atmospheric Stability Classes at the Quarry Site

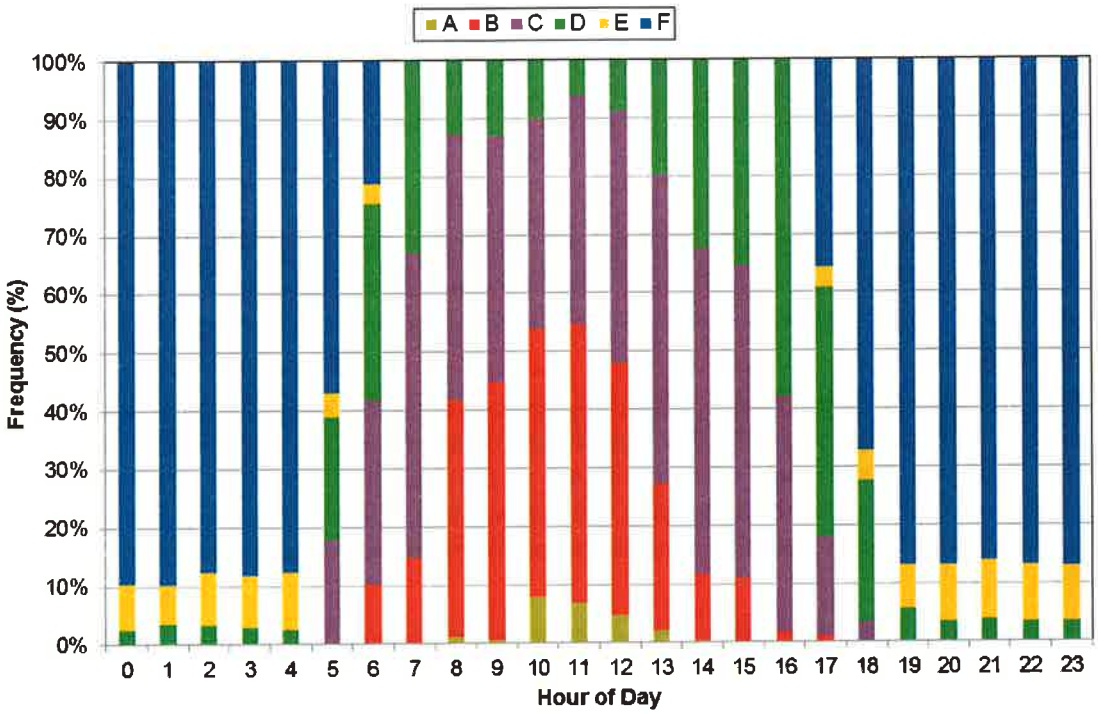
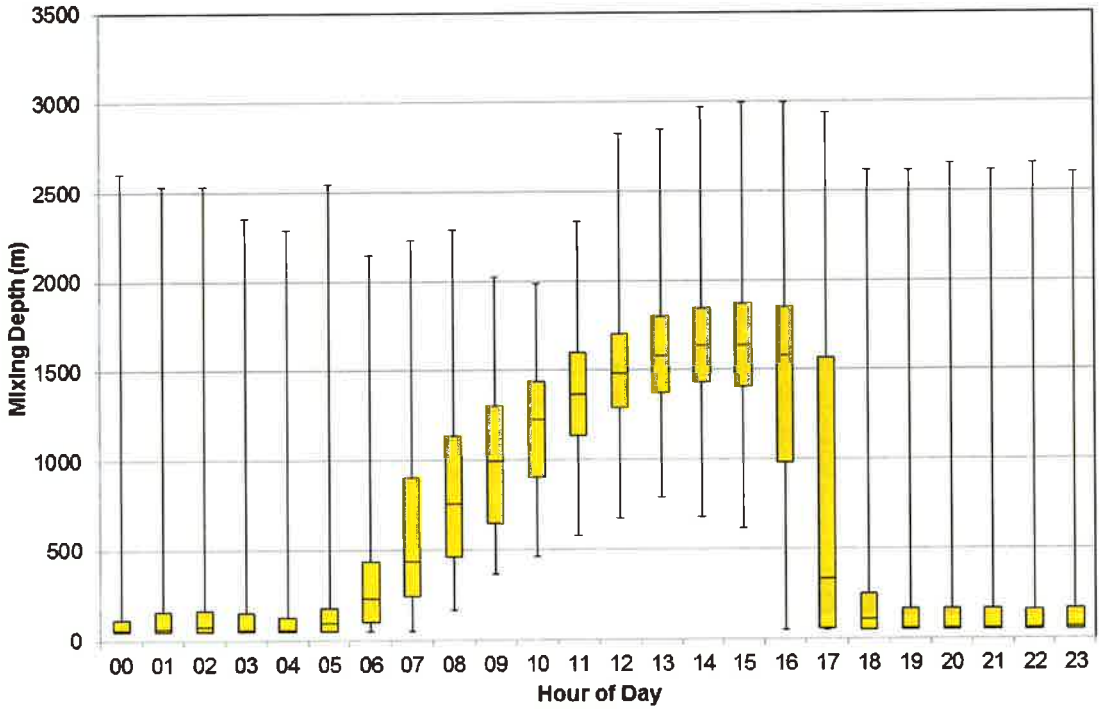


Figure 11 CALMET Predicted Diurnal Variation in Atmospheric Mixing Depth – Quarry Site



Note: Boxes indicate 25th, Median and 75th percentile of CALMET-predicted mixing height data while upper and lower whiskers indicate maximum and minimum values.

5. EXISTING AIR QUALITY ENVIRONMENT

The quantification of cumulative air pollution concentrations and the assessment of compliance with ambient air quality limits necessitate the characterisation of baseline air quality. Given that particulate matter emissions represent the primary pollutant to be generated by the Quarry, it is pertinent that existing sources and ambient air pollutant concentrations of these pollutants are considered.

5.1 EXISTING LOCAL SOURCES OF ATMOSPHERIC EMISSIONS

The National Pollutant Inventory (NPI) and NSW EPA environment protection licence (EPL) databases have been reviewed for significant existing sources of air pollutants in the surrounding region.

The NPI database lists three reporting air emission sources in the Kempsey local government area; two fuel storage operations (2.8km and 4.5km north of the Quarry Site) and the Nestle Beverages facility at Smithtown (15km northeast of the Quarry Site). The NSW EPA EPL database lists a number of minor sources in the surrounding 5km to the Quarry Site, including the Kempsey Shire Council landfill (3.9km to the east) and sewage treatment plant (2.7km to the north).

It is not considered likely that any of the above identified industrial sources would cause significant direct cumulative impacts with emissions from the Quarry Site. Rather, these emissions would contribute to the regional air pollution levels.

In addition to the above operations, it is considered that the following sources contribute to particulate matter emissions in the vicinity of the Quarry Site:

- Dust entrainment due to vehicle movements along unsealed and sealed public roads;
- Diesel emission from vehicle movements along unsealed and sealed public roads;
- Wind generated dust from exposed areas within the surrounding region;
- Dust and diesel emissions from agricultural activities in the Kempsey area;
- Seasonal emissions from household wood burning fires;
- Episodic emissions from vegetation (e.g. bush and grass) fires; and
- Sea salts contained in sea breezes.

More remote sources which contribute episodically to suspended particulates in the region include dust storms and bushfires. Whereas dust storms predominately contribute primary particulates from mechanical attrition, bushfires are a source of fine particulates including both primary particulates and secondary particulates formed by atmospheric gas to particle conversion processes.

5.2 PM_{10} MONITORING DATA

Ambient air quality monitoring is not required to be conducted at the Quarry Site, nor are there any publicly available monitoring data sources for the surrounding region at the time of reporting with which to quantify existing air quality levels.

However, during the Environmental Assessment stage of the Pacific Highway upgrade between Sapphire and Woolgoolga, the NSW Roads and Traffic Authority (RTA) commissioned the establishment of a real-time air quality monitoring station at Korora, approximately 55 km north-northeast of the Quarry Site. This air quality monitoring station was configured to record a range of meteorological and air quality parameters, including PM_{10}.

The results of this monitoring were published in Working Paper 8 of the Environmental Assessment for the Sapphire and Woolgoolga (RTA, 2007) and have been referenced in this assessment.

The monitoring station was situated approximately 20 m from the Pacific Highway, 1 km west of the Pacific Ocean and 5 km north-northeast of the central business district of Coffs Harbour. The monitoring station was sited along a section of the Pacific Highway marked with a 100km/hr speed limit. Monitoring was conducted for the period between 14 October 2005 and 31 January 2006.

The following points are made regarding the Korora RTA monitoring dataset:

- Monitoring was conducted during the Christmas-New Year period, with traffic rates along the Pacific Highway higher than at other times of the year;
- Monitoring was conducted during summer, where a higher frequency of sea-breeze occurs. Consequently, the influence of sea salt aerosols on recorded particulate matter concentrations would be above average.

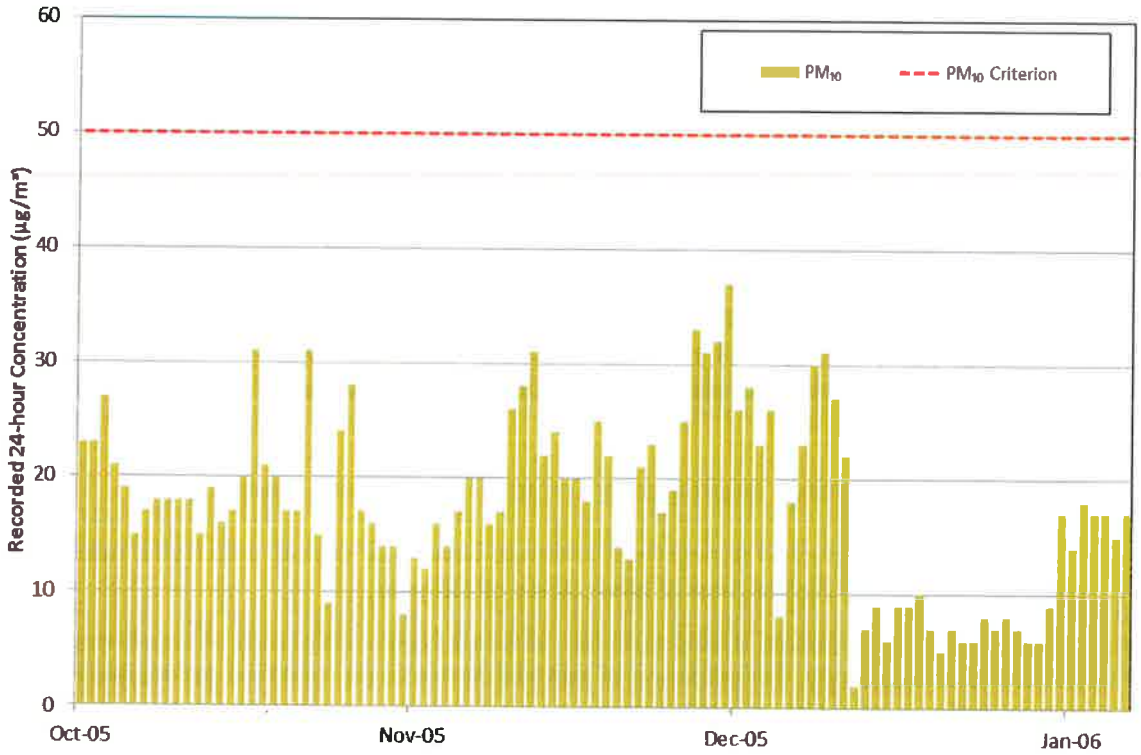
Furthermore, the Working Paper 8 (RTA, 2007) states the following:

> *Due to the proximity of the monitoring site to the Pacific Highway, the concentrations of air quality parameters measured include traffic emissions. Therefore, the concentrations detected are likely to be higher than the background levels for the local area and will give a conservative indication of the air quality experienced on the NSW north coast.*

Consequently, it is considered that the adoption of the Korora RTA monitoring dataset will provide a conservative estimate of baseline air quality in area surrounding the Quarry Site. In the absence of a more recent, local air quality monitoring dataset, it is considered that the use of the Korora RTA monitoring dataset is appropriate for this assessment.

The daily varying (24-hour average) PM_{10} concentrations recorded at Korora are illustrated in **Figure 12**. It can be seen that the recorded 24-hour average PM_{10} concentrations fluctuate throughout the presented period.

Figure 12 Time-series of 24-hour Average PM_{10} Concentrations recorded at Korora – October 2005 to January 2006



A range of statistics for the Korora RTA monitoring dataset is presented within **Table 4**.

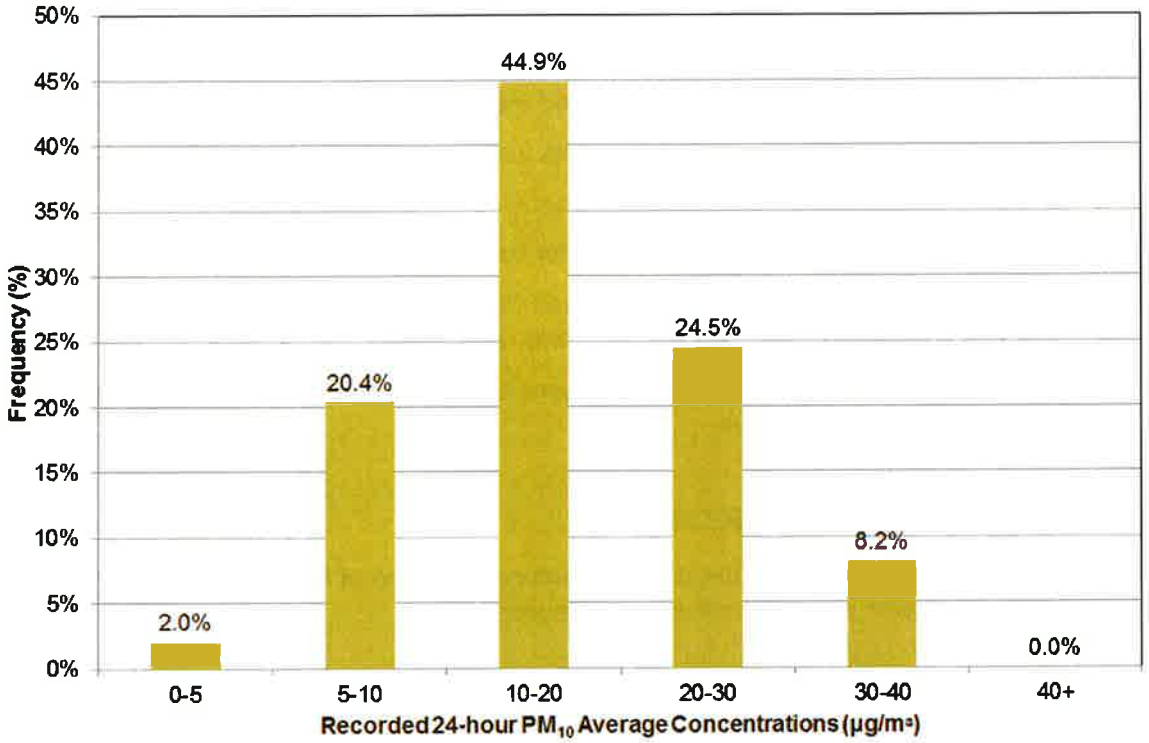
Table 4
Korora RTA PM_{10} Monitoring Dataset Statistics – October 2005 to January 2006

Monitoring Statistic	PM_{10}
Number of Measurements	98
Minimum	2µg/m³
Maximum	37µg/m³
Average	18µg/m³
25th Percentile	13µg/m³
50th Percentile	17µg/m³
75th Percentile	23µg/m³
Inter-quartile Range	10µg/m³

NOTE: NSW EPA Criterion – 24-hour Average 50µg/m³; Annual Average - 30µg/m³

The frequency distribution of 24-hour average PM_{10} concentrations recorded by the Korora RTA monitoring station is presented in **Figure 13**. This figure highlights that 24-hour average PM_{10} concentrations are typically less than 30µg/m³ throughout the Korora RTA dataset.

Figure 13 Distribution of 24-hour Average PM_{10} Concentrations – Korora – October 2005 to January 2006



In order to assess the cumulative 24-hour average PM_{10} impacts of Quarry emissions with ambient background PM_{10} concentrations, the maximum 24-hour average concentration will be combined with the maximum 24-hour average prediction at each receptor location to derive the 100th percentile concentration in accordance with Section 5.1.1 of the Approved Methods (DEC, 2005). This approach is considered conservative for assessing maximum impacts. Maximum 24-hour average PM_{10} background concentration of 37µg/m^3 will be applied.

The annual average PM_{10} concentration to be adopted as background is 18µg/m^3.

6. EMISSION ESTIMATION

Fugitive dust sources associated with the operation the Quarry were principally quantified through the application of Australian National Pollutant Inventory (NPI) emission estimation techniques, in particular the NPI Emission Estimation Technique Manual for Mining (NPI EETMM, 2012) and United States Environmental Protection Agency (US-EPA) AP-42 emission factors. For this assessment, emissions were estimated for the PM_{10} size fraction only.

6.1 SOURCES OF OPERATIONAL EMISSIONS

Air emissions associated with the Quarry will primarily comprise fugitive particulate matter releases. Potential sources of emission were identified as follows:

- Clearing of vegetation, topsoil and overburden by bulldozer;

- Drill and blast activities
- Loading of blasted rock material to haul trucks for transportation to mobile crush/screen plants;
- Unloading of material and loading to hopper at mobile crush/screen plants;
- Crush/screen plant operation and crushed material stockpile loading;
- Loading of crushed material to haul trucks for transportation to product storage area;
- Unloading from trucks and stockpiling operations at product storage area;
- Loading product material to road trucks for transportation to market;
- Wheel Generated emissions from unpaved (transportation of extracted rock and crushed rock) and paved (site access road) roads; and
- Wind erosion of exposed surfaces at topsoil and overburden emplacement, open pit and active stockpiling areas.

6.2 EMISSION SCENARIOS

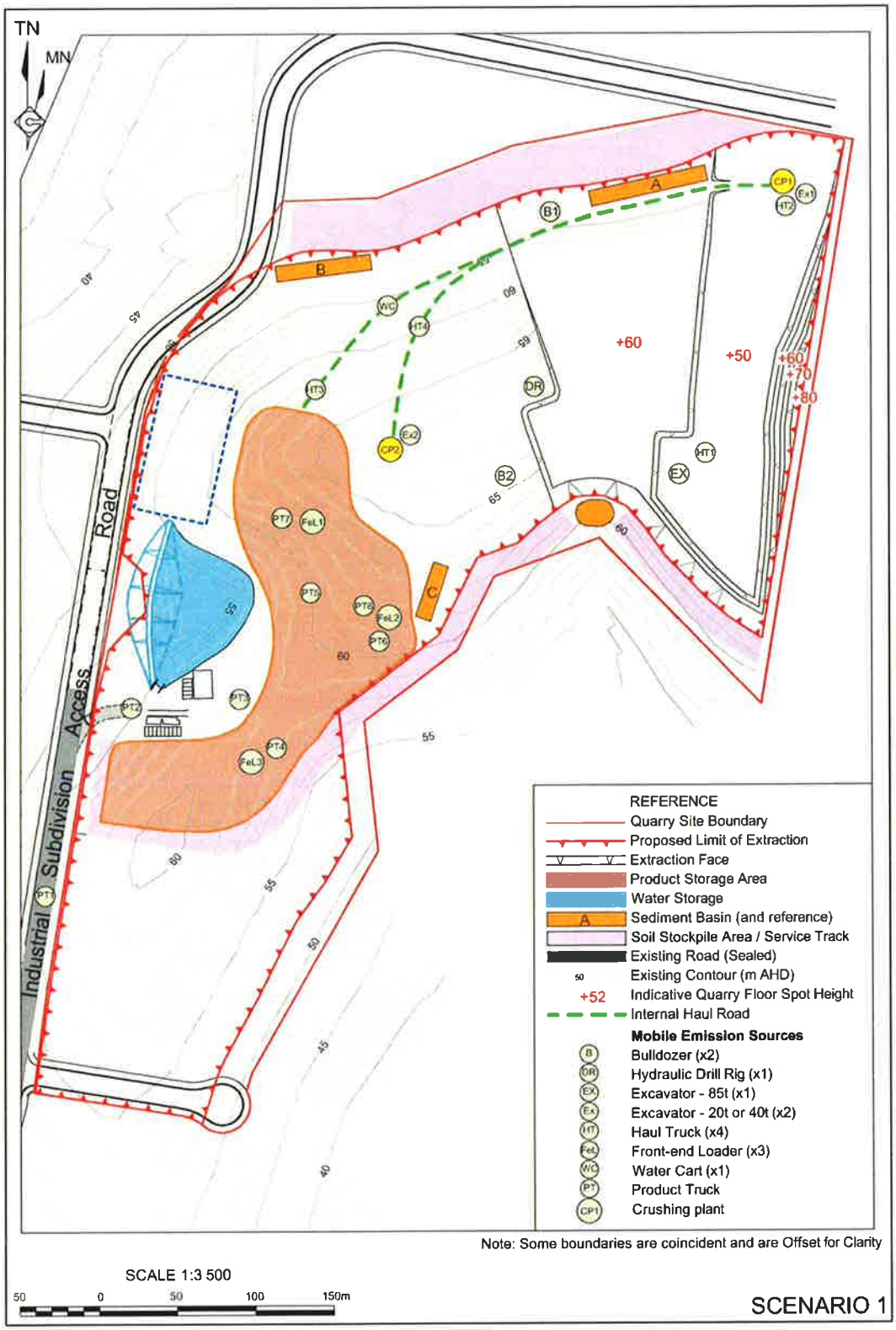
To review emissions generated by the proposed future extension of the existing quarrying operations, two emission scenarios have been developed:

- Scenario 1 – future operations with deepening of existing quarry pit; and
- Scenario 2 – future operations with westward progression of existing quarry pit.

Indicative operational scenario layouts for Scenario 1 and 2 are illustrated in **Figure 14** and **Figure 15** respectively.

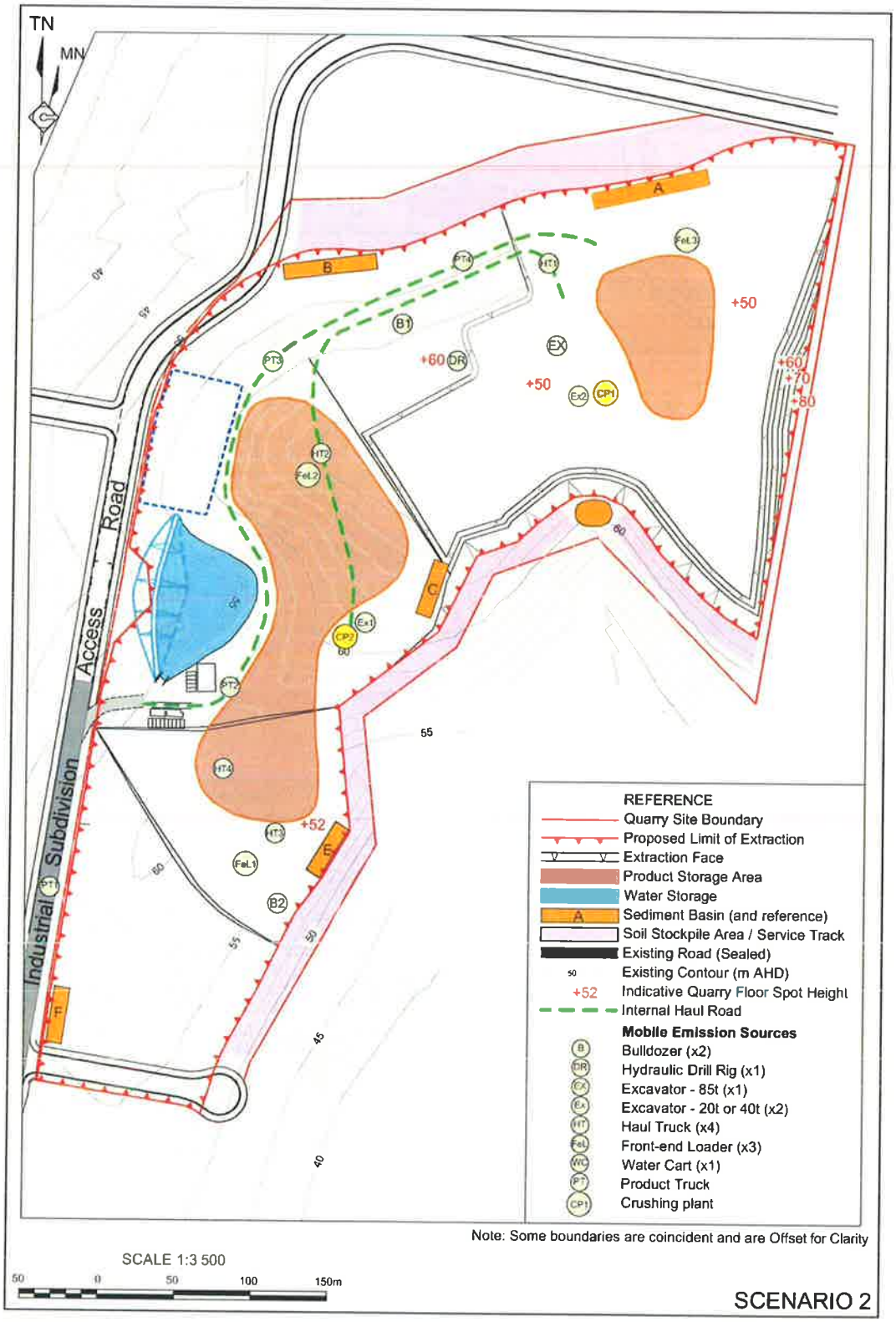
Details on the assumptions made for each scenario are listed within **Appendix 2**.

Figure 14 Indicative Site Layout – Scenario 1



Source: RWC (2014)

Figure 15 Indicative Site Layout – Scenario 2



Source: RWC (2014)

6.3 EMISSION REDUCTION FACTORS

Based on information provided by RWC and the Applicant, the following control measures have been implemented in the emission calculation process:

- Unpaved roads – 75% reduction for water application (NPI, 2012);
- Crushing and Screening Plant – controlled emission factor (crushing and screening, US-EPA, 2004) and 50% reduction (post crusher transfer, NPI 2012); and
- Wind erosion from stockpiles and exposed areas - 50% reduction for watering (NPI, 2012).

6.4 PARTICULATE MATTER EMISSIONS

A summary of Quarry-related PM_{10} emissions by source type is presented in **Table 5** and **Table 6** for Scenario 1 and 2 respectively. A comparison of emissions by source type and scenario is illustrated in **Figure 16**. Control measures proposed for implementation, as documented in **Section 6.3**, have been taken into account in the emission estimates.

These tables and figures highlight that, for both existing and proposed operations, the most significant source of emissions associated with the Quarry is the movement of vehicles along unpaved roads.

It is noted that emission from unpaved roads reduces from Scenario 1 to Scenario 2. This is a function of stockpiling of some product material in the eastern area of the quarry pit (as illustrated in **Figure 15**) near crushing plant CP1, reducing the distance of haulage related to that crusher. Annual emissions of wind erosion increase from Scenario 1 to Scenario 2 due to the increase in quarry pit footprint. Emissions from other processes remain unchanged between the two scenarios.

Further details regarding emission estimation factors and assumptions are provided in **Appendix 2**.

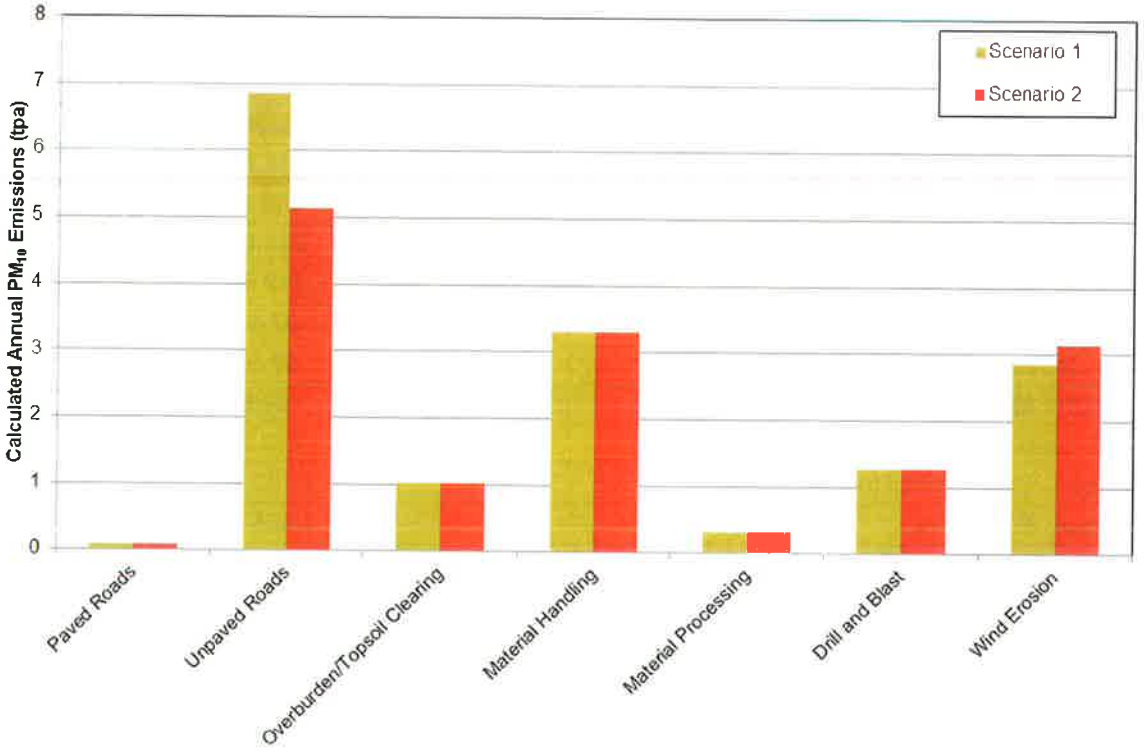
Table 5
Calculated Annual PM_{10} Emissions – Scenario 1

Emissions Source	Calculated Annual PM_{10} Emissions (kg/annum) by Source
Bulldozers (Overburden/Topsoil)	1,023.8
Haulage - EX to CP1	1,455.2
Truck Loading at EX	439.3
Truck Unloading at CP1	219.6
CP1 Hopper Loading	219.6
CP1 - Crushing	67.5
CP1 - Screening	92.5
Post CP1 Material Transfer	109.8
Truck Loading at CP1	219.6
Haulage - CP1 to Road Junction	1,455.2
Haulage - Road Junction to CP2	545.7
Truck Unloading at CP2	219.6
CP2 Hopper Loading	219.6
CP2 - Crushing	67.5
CP2 - Screening	92.5
Post CP2 Material Transfer	109.8
Truck Loading at CP2	219.6
Haulage - Road Junction to Product	2,182.7
Truck Unloading at Product Stockpiles	439.3
Product Handling	439.3
Truck Loading at Product	439.3
Haulage - Product to Exit	1,227.3
Product Transportation - Paved	88.4
Drill	1,190.4
Blast	76.1
Wind Erosion - Exposed surfaces and stockpiles	2,847.5
Total	**15,706.9**

Table 6
Calculated Annual PM_{10} Emissions - Scenario 2

Emissions Source	**Calculated Annual PM_{10} Emissions (kg/annum) by Source**
Bulldozers (Overburden/Topsoil)	1,023.8
Haulage - EX to CP1/East Product	545.7
Truck Loading at EX	439.3
Truck Unloading at CP1	219.6
CP1 Hopper Loading	219.6
CP1 - Crushing	67.5
CP1 - Screening	92.5
Post CP1 Material Transfer	109.8
Truck Loading at CP1	219.6
Haulage - East Product to Exit	2,182.7
Haulage - EX to CP2	1,455.2
Truck Unloading at CP2	219.6
CP2 Hopper Loading	219.6
CP2 - Crushing	67.5
CP2 - Screening	92.5
Post CP2 Material Transfer	109.8
Truck Loading at CP2	219.6
Haulage - CP2 to West Product	545.69
Truck Unloading at Product Stockpiles	439.3
Product Handling	439.3
Truck Loading at Product	439.3
Haulage - West Product to Exit	409.1
Product Transportation - Paved	88.4
Drill	1,190.4
Blast	76.1
Wind Erosion - Exposed surfaces and stockpiles	3,145.0
Total	**14,276.7**

Figure 16 Comparison of Calculated Annual PM_{10} Emissions by Source and Scenario



7. ASSESSMENT OF AIR QUALITY IMPACTS

7.1 DISPERSION MODEL SELECTION AND APPLICATION

As discussed in **Section 4**, the CALPUFF (Version 6.2) modelling system was selected for application within this assessment. Model configuration was conducted in accordance with the *Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia* (TRC Environmental, 2011).

CALPUFF is a transport and dispersion model that advects "puffs" of material emitted from modelled sources, simulating dispersion and transformation processes along the transport pathway. Temporal and spatial variations in the meteorological fields selected are explicitly incorporated in the resulting distribution of puffs throughout a simulation period. The primary output files from CALPUFF contain either hourly concentration or hourly deposition fluxes evaluated at selected receptor locations and at grid intercepts across the modelling domain. CALPOST is then used to process these files, producing tabulations that summarise results of the simulation (Scire et al., 2006).

In order to gain an understanding of likely compliance with NSW EPA assessment criteria, daily-varying 24-hour and annual average PM_{10} concentrations were predicted at the four receptor locations listed in **Table 1**.

Simulations were undertaken for the 12 month period between 1 January 2013 and 31 December 2013.

7.2 METEOROLOGICAL AND EMISSIONS DATA

Meteorological data for the CALPUFF modelling was generated by CALMET using input of hourly varying meteorological observations and prognostic model output. Details regarding the CALMET modelling undertaken for the Quarry are presented in **Section 4.1**.

The methodology and results of the emissions inventory developed for the study are presented in **Section 6** and **Appendix 2**. Emissions were simulated to be released between 7am and 5pm to coincide with Quarry operating hours. As blasting operations are periodic (16 per year), short-term in nature (less than one hour per release) and would generally occur when all other emissions sources are not active, emissions from blasting were not included in the modelling process. Wind erosion emissions were varied by wind speed, with higher emissions occurring during periods of higher wind speed.

7.3 MODEL RESULTS

Dispersion simulations were undertaken and results analysed for PM_{10} concentrations from the Quarry. Tabulated results of PM_{10} concentrations at the four neighbouring receptors are presented and discussed in **Section 8**.

Cumulative impacts have been assessed by pairing the maximum 24-hour average or annual average Quarry-only PM_{10} increment concentration with the maximum 24-hour average and annual average PM_{10} concentration from the Korora RTA dataset ($37\mu g/m^3$ and $18\mu g/m^3$ respectively). This 100^{th}-percentile assessment approach for cumulative concentrations is in accordance with the NSW EPA Approved Methods for Modelling.

8. DISPERSION MODELLING RESULTS

8.1 24-HOUR AVERAGE PM_{10} CONCENTRATIONS

Table 7 presents the predicted incremental and cumulative 24-hour average ground level concentrations of PM_{10} at the selected receptor locations as a result of the proposed future operations at the Quarry Site during each assessed modelling scenario.

Table 7
Maximum Predicted 24-hour Average PM_{10} Concentrations

Receptor	Maximum 24-hour Average PM_{10} Concentration ($\mu g/m^3$)	
	Quarry-only Increment	Cumulative (Quarry Increment + Maximum Background) Concentration
Scenario 1		
R9	5.7	42.7
R8	6.6	43.6
R6A	5.8	42.8
R6B	5.0	42.0
Scenario 2		
R9	6.7	43.7
R8	5.6	42.6
R6A	4.4	41.4
R6B	4.6	41.6

NOTE: NSW EPA 24-hour Maximum PM_{10} Criterion - $50\mu g/m^3$

It can be seen from the results presented in **Table 7** that maximum cumulative 24-hour PM_{10} concentrations associated with the proposed extension of the Quarry are predicted to be below the NSW EPA assessment criterion at all surrounding receptors for the two emission scenarios assessed.

Additionally, analysis of the frequency of occurrence of 24-hour average PM_{10} concentrations from the Quarry was conducted. Frequency histograms of 24-hour average PM_{10} concentrations for Scenario 1 and 2 are presented in **Figure 17** and **Figure 18** respectively. These figures highlight that the 24-hour average PM_{10} concentrations predicted at each of the four surrounding receptor locations are typically much lower than the maximum predicted incremental concentrations presented in **Table 7** for both Scenario 1 and 2.

Figure 17 Frequency of Predicted 24-hour Average PM_{10} Concentrations by Receptor – Scenario 1

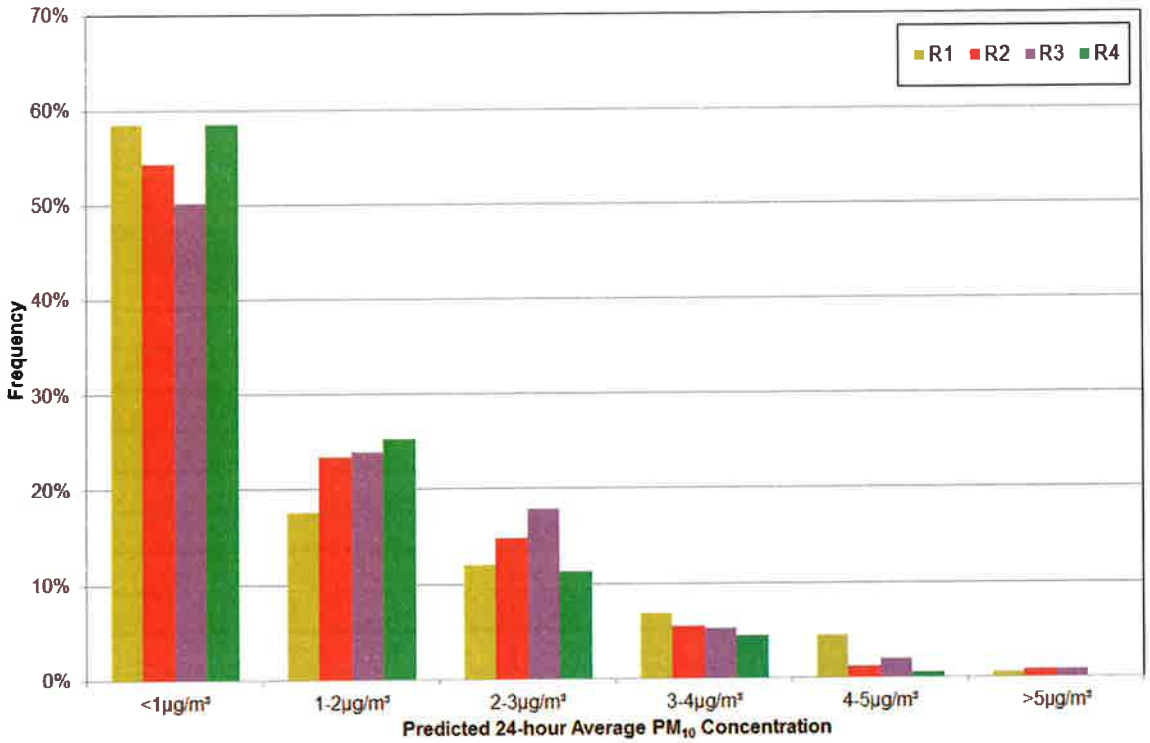
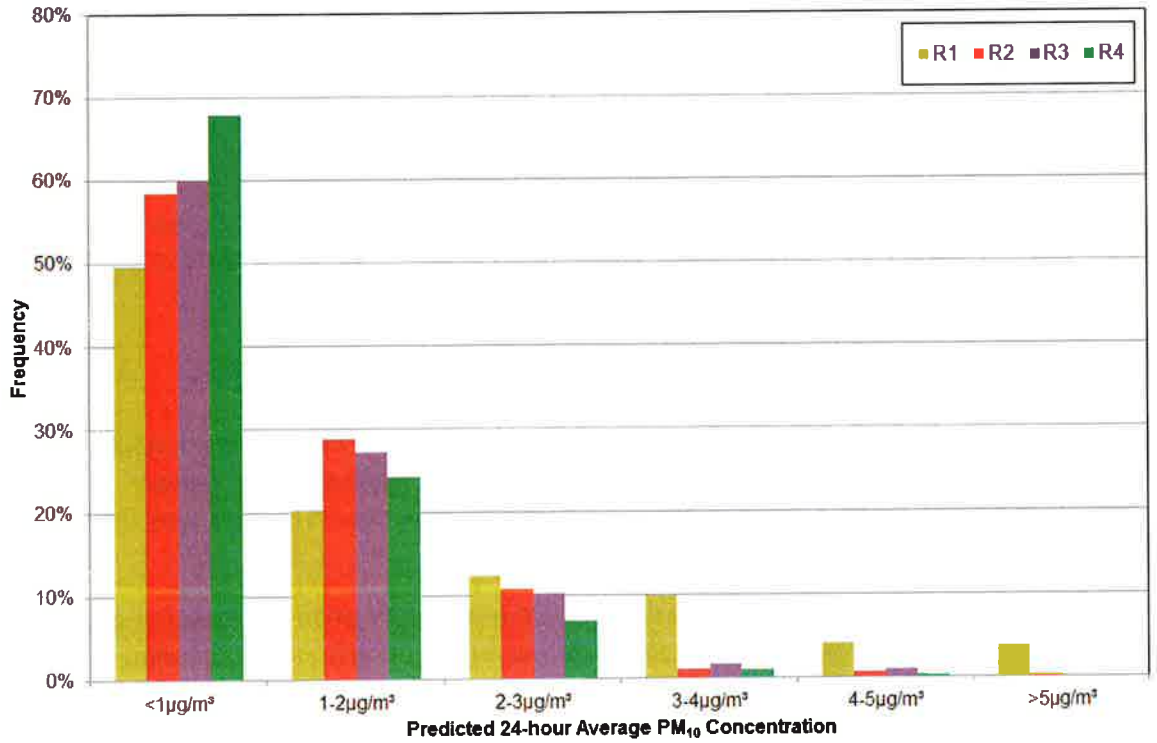


Figure 18 Frequency of Predicted 24-hour Average PM_{10} Concentrations by Receptor – Scenario 2



8.2 ANNUAL AVERAGE PM_{10} CONCENTRATIONS

Table 8 presents the predicted incremental and cumulative annual average ground level concentrations of PM_{10} at the selected receptor locations as a result of the proposed future operations at the Quarry Site during each assessed modelling scenario.

Table 8
Predicted Annual Average PM_{10} Concentrations

Receptor	Annual Average PM_{10} Concentration ($\mu g/m^3$)	
	Quarry-only Increment	Cumulative (Quarry Increment + Maximum Background) Concentration
Scenario 1		
R9	1.1	19.1
R8	1.1	19.1
R6A	1.2	19.2
R6B	1.0	19.0
Scenario 2		
R9	1.5	19.5
R8	0.9	18.9
R6A	0.9	18.9
R6B	0.8	18.8

NOTE: NSW EPA Annual Average PM_{10} Criterion - $30\mu g/m^3$

It can be seen from the results presented in **Table 7** that cumulative annual average PM_{10} concentrations associated with the proposed extension of the Quarry are predicted to be below the NSW EPA assessment criterion at all surrounding receptors for the two emission scenarios assessed.

9. GREENHOUSE GAS ASSESSMENT

The proposed operations at the Quarry Site have the potential to generate greenhouse gas emissions. This section of the report documents the quantification of greenhouse gas (GHG) emissions from a range of sources associated with operations.

9.1 TYPES OF GREENHOUSE GAS EMISSION FACTORS

Direct and indirect GHG emissions are defined by the Department of Environment (DoE, then Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education) within the National Greenhouse Gas Accounting Factors 2013 workbook (NGAF 2013 – DIICCSRTE, 2013), as the following:

Direct emissions *are produced from sources within the boundary of an organisation and as a result of that organisation's activities. These emissions mainly arise from the following activities:*

- *generation of energy, heat, steam and electricity, including carbon dioxide and products of incomplete combustion (methane and nitrous oxide);*

- *manufacturing processes which produce emissions (for example, cement, aluminium and ammonia production);*
- *transportation of materials, products, waste and people (for example, use of vehicles owned and operated by the reporting organisation);*
- *fugitive emissions: intentional or unintentional GHG releases (such as methane emissions from coal mines, natural gas leaks from joints and seals); and*
- *on-site waste management, such as emissions from landfill sites.*

Indirect emissions *are emissions generated in the wider economy as a consequence of an organisation's activities (particularly from its demand for goods and services), but which are physically produced by the activities of another organisation. Examples of indirect emission sources include:*

- *consumption of purchased electricity;*
- *upstream emissions generated in the extraction and production of fossil fuels;*
- *downstream emissions from transport of an organisation's product to customers; and*
- *emissions from contracted/outsourced activities.*

On the basis of the above definitions, the NGAF 2013 workbook prescribes a range of emission factors to estimate associated GHG emissions. These emissions factors are activity-specific, with the scope of the activity determining the emission factor used. Specifically, the scope that emissions are reported under is determined by whether the activity is within the organisational boundary (direct—Scope 1) or outside it (indirect—Scope 2). The NGAF 2013 workbook defines the scope of emissions through the following:

- ***Direct (or point-source) emission factors*** *give the kilograms of carbon dioxide equivalent (CO_2-e) emitted per unit of activity at the point of emission release (i.e. fuel use, energy use, manufacturing process activity, mining activity, on-site waste disposal, etc.). These factors are used to calculate* ***Scope 1 emissions****.*
- ***Indirect emission factors*** *are used to calculate Scope 2 emissions from the generation of the electricity purchased and consumed by an organisation as kilograms of CO_2-e per unit of electricity consumed.* ***Scope 2 emissions*** *are physically produced by the burning of fuels (coal, natural gas, etc.) at the power station.*

Emission factors for calculating direct emissions are expressed within the NGAF 2013 workbook in the form of a quantity of a given GHG emitted per unit of energy, fuel or a similar measure. Within the NGAF 2013 workbook, emission factors are provided as applicable for each of the following greenhouse gases:

- carbon dioxide (CO_2)
- methane (CH_4)
- nitrous oxide (N_2O)
- synthetic gases
  - Hydrofluorocarbons (HFCs), Sulfur Hexafluoride (SF_6), Carbon tetrafluoride (CF_4), Hexafluoroethane (C_2F_6)

All emission factors are standardised by being expressed as a CO_2 equivalent (CO_2-e). This is achieved by multiplying the individual gas emission factor by the respective gas global warming potential (GWP). The GWPs of relevance to this assessment are:

- **Methane (CH_4)**: GWP of 21 (21 times more effective as a greenhouse gas than CO_2); and
- **Nitrous Oxide (N_2O)**: GWP of 310 (310 times more effective as a greenhouse gas than CO_2).

9.2 QUARRY GREENHOUSE GAS EMISSION SOURCES

Review of existing and future Quarry operations highlights that there are limited sources of GHG emissions. The key source of emissions is the consumption of diesel fuel by both mobile quarrying equipment and for the purpose of electricity generation. The Applicant reported a monthly diesel consumption rate of approximately 42,000L.

GHG emissions would also be generated by the detonation of explosives during blasting operations. Based on assumptions made for blasting at the Quarry Site (see **Appendix 2**) and a powder factor of 0.8kg/m^3 of material blasted (Dyno Nobel, 2010), an annual explosives use of 153.6t per annum was calculated.

Other minor sources of GHG emissions may be associated with the Quarry, including those generated by waste disposal. These emissions are anticipated to be relatively negligible in comparison with the emission sources listed above and have therefore not been considered further in this assessment.

The Quarry Site work shop and office areas have only recently been connected to mains power, while the remainder of plant and equipment will remain diesel powered. Consequently, the consumption of purchased electricity by the Quarry is considered negligible.

9.3 ANNUAL GREENHOUSE GAS EMISSIONS

9.3.1 Diesel Combustion

1.1.1 Diesel Fuel Combustion

Emissions from diesel fuel consumption have been calculated based on equations provided in NGAF 2013 workbook.

The following equation is used to calculate fuel-related emissions for solid, liquid and gaseous fuels.

$$GHG\ Emissions_{fuel} = (Fuel\ Quantity \times Energy\ Content) \times (Emission\ Factor) / 1000$$

where,

GHG Emissions$_{fuel}$ is the emissions attributed to a particular GHG (CO_2, CH_4 or N_2O), in tonnes of carbon dioxide equivalent (t CO_2-e), due to the combustion of a particular fuel;

Fuel Quantity is the quantity of fuel combusted in one year, (kL/yr);

Energy Content is the energy content of the fuel combusted, (GJ/kL); and

Emission Factor is the GHG emission factor (kg CO_2-e/GJ) for the relevant GHG (CO_2, CH_4 or N_2O), emitted due to fuel combustion.

Table 9 shows the energy content and GHG emission factor for diesel fuel.

Table 9
Diesel Fuel Energy Content and GHG Emission Factors

Types of fuel combusted (Stationary and Non-Stationary)	Energy Content Factor (GJ/kL)	Emission Factor for GHG Assessed from Fuel Combustion (kg CO_2-e/GJ)		
		CO_2	CH_4	N_2O
Diesel	38.6	69.2	0.1	0.2

9.3.2 Explosives

Explosives detonation will be required during routine mining operations. Based on a blast powder factor of 0.8kg/m^3 material blasted, blast volume of 12,000m^3 and assuming 16 blasts per year, the annual explosives detonated is estimated at 384t. For this assessment it is conservatively assumed that all explosives detonated are Heavy Ammonium Nitrate with Fuel Oil (ANFO).

The NGAF 2013 workbook does not include GHG emission estimation factors for the use of explosives, however a historical version of this document, published in January 2008, provides emission factors for the use of ANFO, Heavy ANFO and Emulsion explosives types. Therefore, an estimate of the CO_2-e emissions resulting from blasting activities at the Quarry has been derived using the factor for Heavy ANFO listed in Table 4 of the NGA Factors 2008.

9.4 CALCULATED GREENHOUSE GAS EMISSIONS AND ENVIRONMENTAL IMPACT

9.4.1 Calculated Annual GHG Emissions

Table 10 provides the calculated annual greenhouse gas emissions (as CO_2-e) for each source detailed above, based on peak operations of the Quarry.

Table 10
Predicted Annual Greenhouse Gas Emissions for the Quarry

Emission Source	Total (t CO_2-e)
Diesel- onsite usage	1359.6
Explosives	27.7
TOTAL	**1387.3**

9.4.2 Impacts of Emissions on Environment

The extent of the warming produced by a given rise in GHG concentrations depends on 'feedback' processes in the climate system, which can either amplify or dampen a change (CSIRO, 2011, p.15). According to the CSIRO (2011) the net effect of all climate feedbacks, given global GHG emissions, is to amplify the warming caused by increasing CO_2 and other GHGs of human origin. The best estimate of annual average warming by 2030 (above 1990 temperatures) is given as being around 1.0°C across Australia, with warming of 0.7°C to 0.9°C in coastal areas and 1°C to1.2°C inland (CSIRO, 2011, p. 35). In regard to rainfall, the CSIRO notes that drying is likely in southern areas of Australia, especially in winter, and in southern and eastern areas in spring, due to a contraction in the rainfall belt towards the higher latitudes of the southern hemisphere. More extreme intense rainfall events are predicted for most locations, with the drying and increased evaporation resulting in a decline in soil moisture over parts of Australia. An increase in fire-weather risk is given as being likely with warmer and drier conditions (CSIRO, 2011).

Potential environmental effects in Australia associated with climate change due to global GHG emissions, are documented to include loss of biodiversity, water security issues in parts of Australia, increased drought and fire incidents, and risks of sea level rise and coastal flooding (IPCC, 2007).

Given the complexity of climate feedback processes, the non-linear relationship between GHG emissions and climate changes, and uncertainties in climate change projections, the specific impact of GHG emissions from the Quarry on the climate system, and as a consequence the broader environment, cannot be quantified with any certainty. The relative significance of GHG emissions from the Quarry may however be qualitatively evaluated by considering the magnitude of such emissions compared to total GHG emissions released within NSW and Australia.

The most recently published annual GHG emissions for NSW and Australia have been sourced from the State and Territory Greenhouse Gas Inventories 2011-2012 (DoE, 2014). According to this Inventory, annual GHG emissions for NSW and Australia in 2011-2012 totalled 165.6 Mt and 554.9 Mt CO_2-e/yr respectively.

Quarry-generated direct GHG emissions represent 0.0008% and 0.0003% of annual NSW and Australian GHG emissions.

10. CONCLUSIONS

ENVIRON was commissioned by RWC to undertake an Air Quality Impact Assessment for the proposed extension to the existing Farrawell's Quarry on behalf of the Applicant.

Model predictions of 24-hour average and annual average PM_{10} concentrations made at the four neighbouring receptors indicate that for the two operational emission scenarios assessed, the potential impacts generated by the Quarry were low. Furthermore, the likelihood of exceedance of the applicable NSW EPA assessment criteria taking background air quality into consideration is low. On the basis of the modelling conducted, it is considered unlikely that the proposed future operations at the Quarry will adversely impact upon the local air quality environment.

In addition to air quality impacts, GHG emissions were calculated for direct emissions from the combustion of diesel fuel and detonation of explosives.

The GHG assessment's key findings are as follows:

- Annual Quarry GHG emissions were estimated to be 141t of CO_2–e/year;
- Emissions generated by the Quarry represent 0.0008% of annual NSW GHG emissions and 0.0003% of annual Australian GHG emissions.

11. REFERENCES

The following documents and resources have been used in the production of this report:

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US-EPA (2011). AP42 Emission Factor Database, Chapter 13.2.1 Paved Roads, United States Environmental Protection Agency.

12. GLOSSARY OF ACRONYMS AND SYMBOLS

ANFO	Ammonium Nitrate with Fuel Oil
Approved Methods for Modelling	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW
AHD	Australian Height Datum
BoM	Bureau of Meteorology
CH_4	Methane
CO_2-e	Carbon Dioxide equivalent
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DIICCSRTE	Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education
DoE	Department of Environment
ENVIRON	ENVIRON Australia Pty Ltd
EPA	Environmental Protection Authority
GHG	Greenhouse Gas
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
µg	Microgram (g x 10-6)
µm	Micrometre or micron (metre x 10-6)
m^3	Cubic metre
NPI	National Pollutant Inventory
N2O	Nitrous Oxide
OEH	NSW Office of Environment and Heritage
PFCs	Perfluorocarbons
PM_{10}	Particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns in aerodynamic diameter
RWC	R.W. Corkery & Co Pty Limited
TAPM	"The Air Pollution Model"
The Applicant	Pacific Blue Metal Pty Ltd
The Quarry	Farrawell's Quarry
TSP	Total Suspended Particulate
US-EPA	United States Environmental Protection Agency
VKT	Vehicle Kilometres Travelled

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APPENDIX 1 – Wind Roses

Figure A1.1 Annual Wind Roses - Kempsey Airport BoM – 2009 to 2013

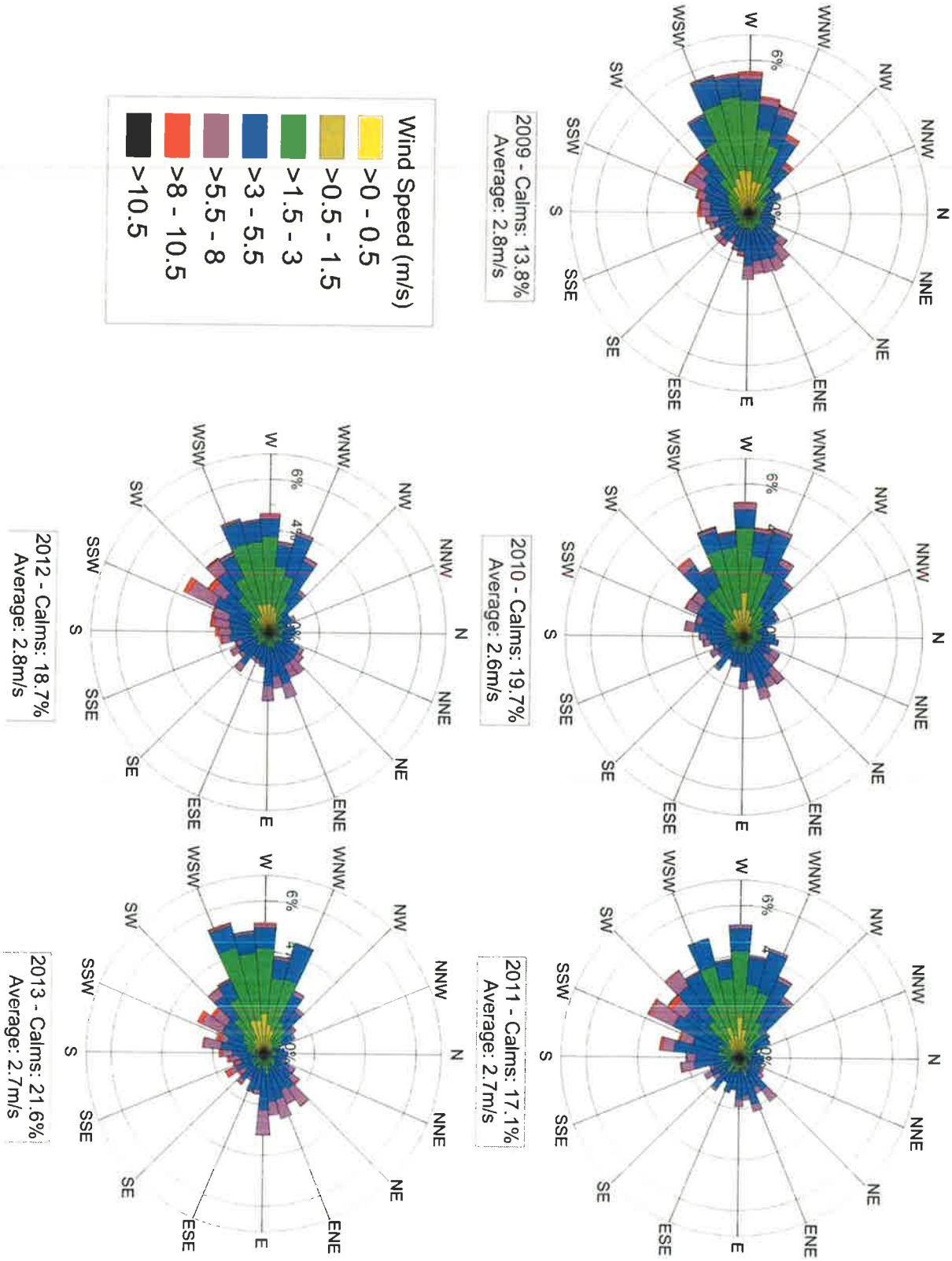


Figure A1.2 Comparison of Recorded Wind Speed - Kempsey Airport BoM – 2009 to 2013

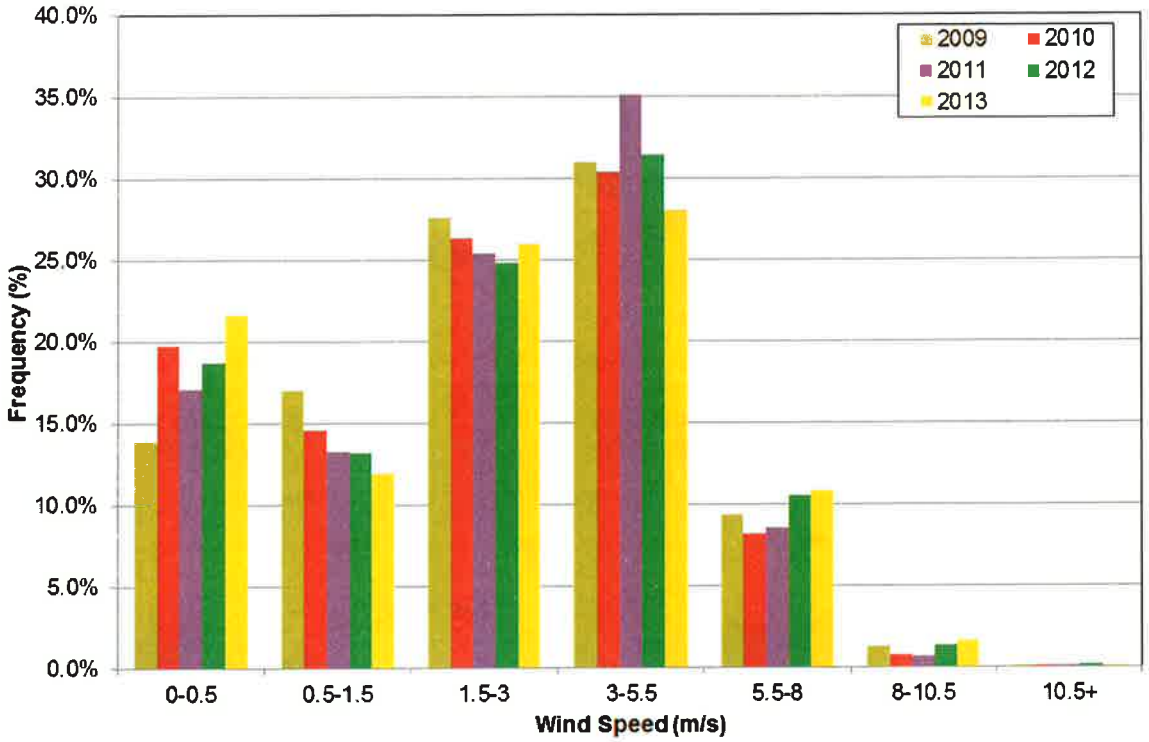


Figure A1.3 Comparison of Recorded Wind Direction - Kempsey Airport BoM – 2009 to 2013

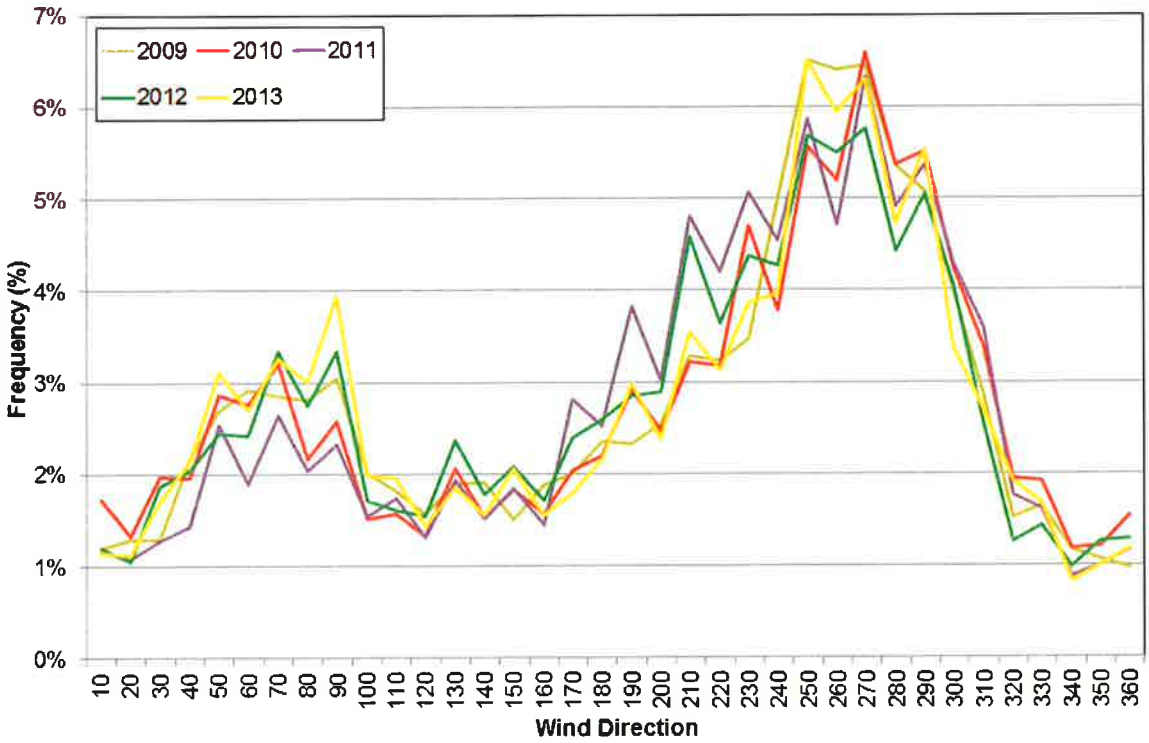


Figure A1.4 CALMET Seasonal Wind Roses – Quarry Site - 2013

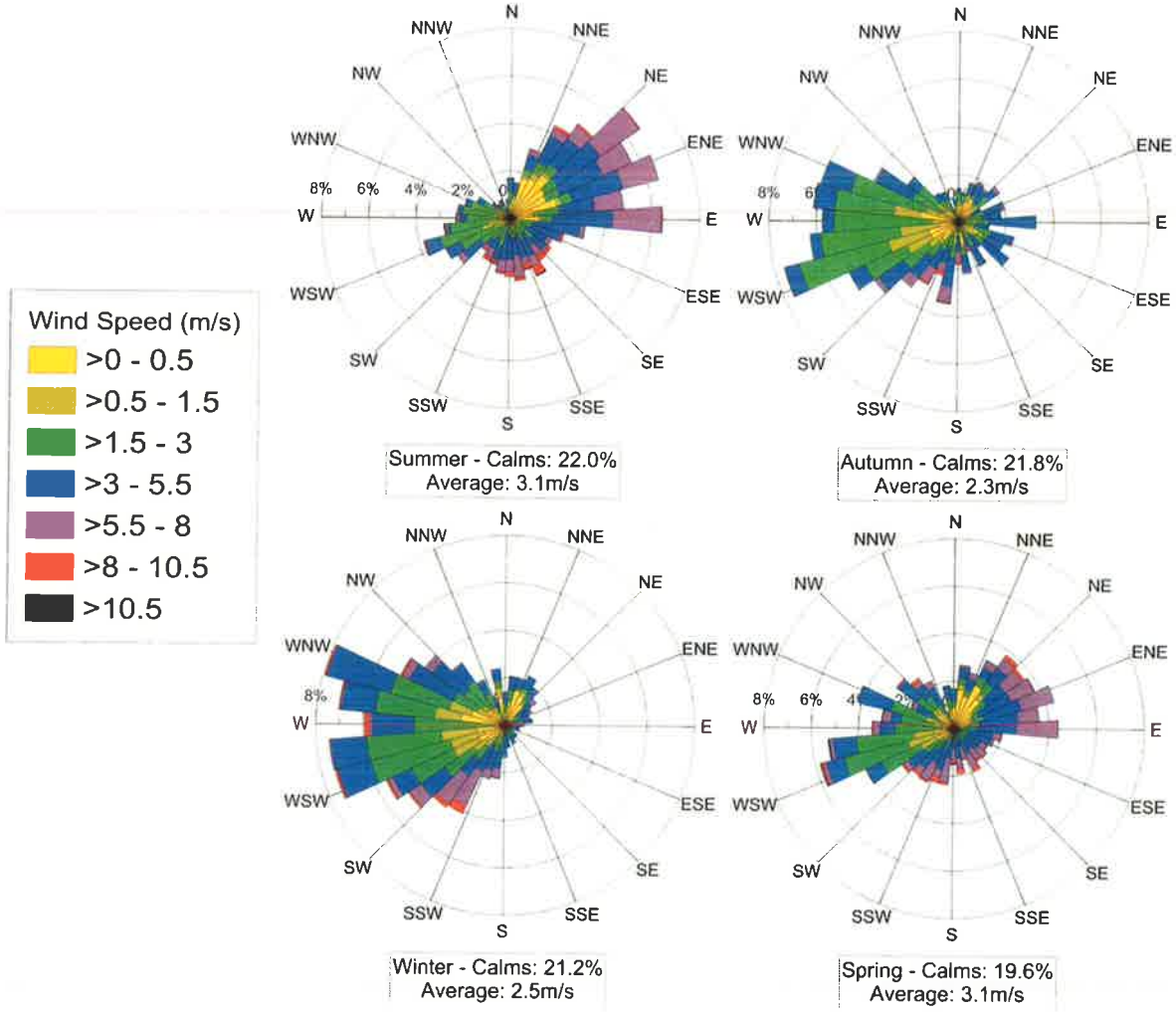
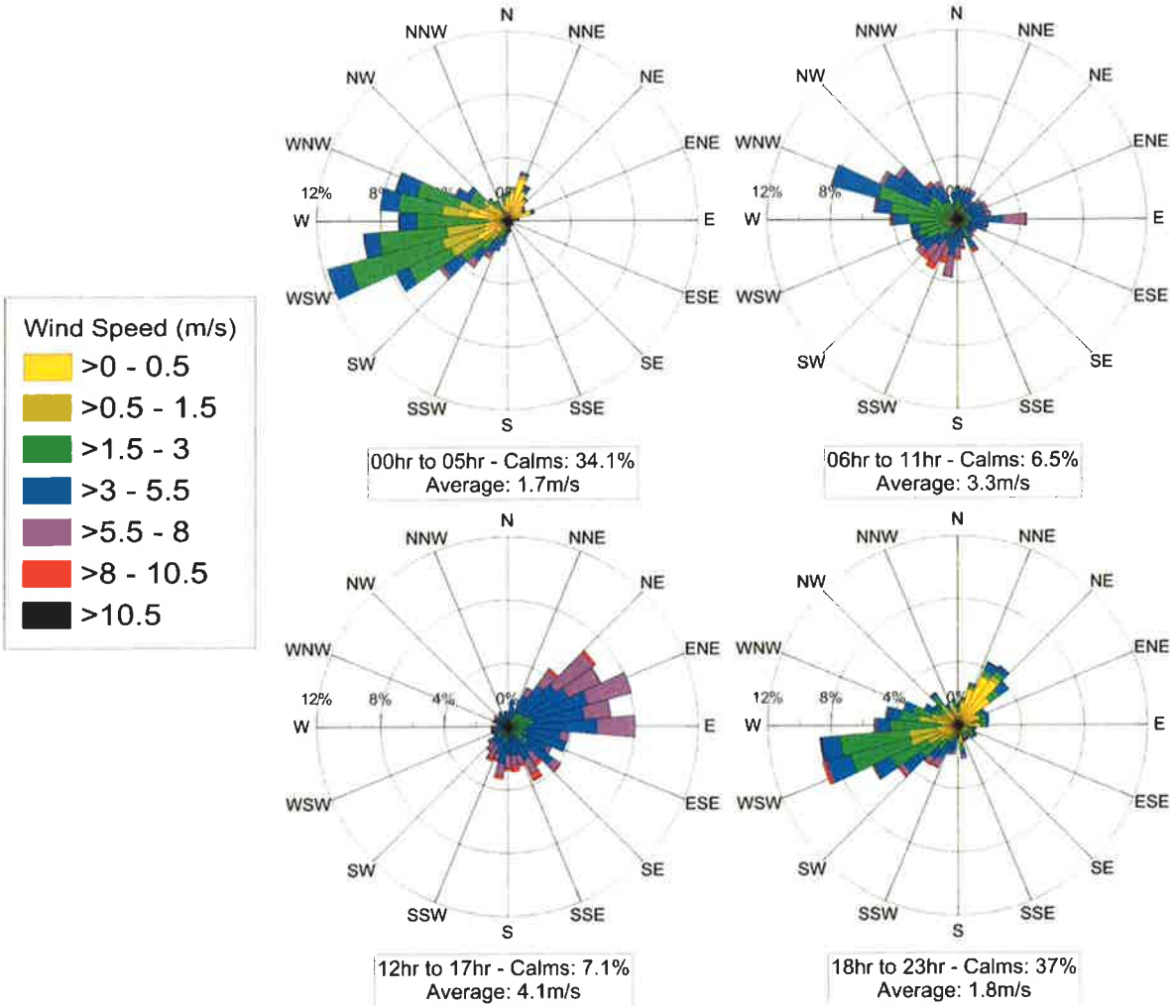


Figure A1.5 CALMET Diurnal Wind Roses – Quarry Site - 2013



APPENDIX 2 – Emission Inventory

Introduction

Air emission sources associated with the various phases of the Quarry were identified and quantified through the application of accepted published emission estimation factors, collated from a combination of United States Environmental Protection Agency (US-EPA) AP-42 Air Pollutant Emission Factors and NPI emission estimation manuals, including the following:

- US-EPA AP-42 AP42 FIRE Emission Factor Database – Stone Quarrying Factors (2004)
- NPI Emission Estimation Technique Manual for Mining (NPI, 2012);
- AP-42 Chapter 13.2.2 – Unpaved Roads (US-EPA 2006);
- AP-42 Chapter 13.2.1 – Paved Roads (US-EPA 2011); and
- AP-42 Chapter 11.9 - Western Surface Coal Mining (US-EPA 1998).

Particulate releases were quantified for PM_{10} only, using ratios for that particle size fraction available within the literature (principally the US-EPA AP-42 and Countess Environmental, 2006), as documented in subsequent sections.

Sources of Particulate Matter Emissions

Air emissions associated with the Quarry will primarily comprise of fugitive particulate matter releases. Key sources of emission were identified as follows:

- Clearing of vegetation, topsoil and overburden by bulldozer;
- Drill and blast activities
- Loading of blasted rock material to haul trucks for transportation to mobile crush/screen plants;
- Unloading of material and loading to hopper at mobile crush/screen plants;
- Crush/screen plant operation and crushed material stockpile loading;
- Loading of crushed material to haul trucks for transportation to product storage area;
- Unloading from trucks and stockpiling operations at product storage area;
- Loading product material to road trucks for transportation to market;
- Wheel Generated emissions from unpaved (transportation of extracted rock and crushed rock) and paved (site access road) roads; and
- Wind erosion of exposed surfaces at topsoil and overburden emplacement, open pit and active stockpiling areas.

Particulate Matter Emission Factors Applied

The emission factor equations applied within the assessment are documented in this subsection. **Table A2.1** lists the uncontrolled emission factors that were applied for the two emission scenarios, references the source of the listed factors and whether the factor is derived from a specific equation or a published default emission factor.

Table A2.1
Emission Estimation Factors Applied for All Scenarios

Emission Source	PM_{10} Emission Factor	Emission Factor Unit	Source of Factor
Drilling	0.31	kg/hole	US-EPA AP42 Western Surface Coal Mining - Default Factor
Blasting	4.76	kg/blast	US-EPA AP42 Western Surface Coal Mining - Blasting Equation
Bulldozer on overburden/topsoil	0.34	kg/hour	NPI 2012 – Bulldozer on material other than coal
Excavator in pit; overburden loading/unloading; clay fines unloading	0.0007	kg/tonne	US-EPA AP42 AP-42 13.2.4 - Materials Handling Equation
Crusher	0.0003	kg/tonne	USEPA AP-42 11.19.2 - Tertiary Crushing Factor (controlled)
Screening	0.0004	kg/tonne	USEPA AP-42 11.19.2 - Screening Factor (controlled)
Unpaved haulage of raw material / processed material	1.16	kg/Vehicle KM Travelled	US-EPA AP42 Unpaved Roads
Unpaved haulage of product material	0.54	kg/Vehicle KM Travelled	US-EPA AP42 Unpaved Roads
Paved haulage of product material	0.01	kg/Vehicle KM Travelled	US-EPA AP42 Paved Road Equation
Wind Erosion – Active stockpiling, quarrying areas, exposed surfaces	425.0	kg/ha/year	US-EPA AP42 - Western Surface Coal Mining - Default Factor - Wind erosion of exposed areas factor

Details relating to the emission equations referenced in **Table A2.1** are presented in the following sections.

Unpaved Roads Equation

The emissions factors for unpaved roads, as documented within AP42 Chapter 13.2.2 - "Unpaved Roads" (USEPA 2006), was applied as follows:

$$E = k\ (s/12)^a (W^*1.1023/3)^b$$

Where:
E = Emissions Factor (lb/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tonnes)

The following constants are applicable:

Constant	PM_{10}
k (lb/VMT)	1.5
a	0.9
b	0.45

The metric conversion from lb/VMT to g/VKT is as follows:

$$1 \text{ lb/VMT} = 0.2819 \text{ kg/VKT}$$

Load in onsite haul trucks was assumed to be 40t, with an average vehicle mass of 54t (34t empty, 72t loaded). Load in offsite transportation trucks was assumed to be 33t, with an average vehicle mass of 37t (20t empty, 53t loaded). Material parameters are listed in **Table A2.2**.

Paved Roads Equation

The emissions factors for paved roads, as documented within AP42 Chapter 13.2.2 -"Paved Roads" (US-EPA 2011), was applied as follows:

$$E = k\,(sL)^{0.91}(W)^{1.02}$$

Where:
E = Emissions Factor (g/VKT)
sL = road surface silt loading (g/m^2)
W = mean vehicle weight (tonnes)
k = constant of 1.5 for PM_{10}

Material parameters are listed in **Table A2.2**.

Blasting Equation

The emissions factors for blasting were taken from AP-42 Chapter 11.9 – "Western Surface Coal Mining" (USEPA 1998).

Units	TSP	PM_{10}
kg/blast	$0.00022(A)^{1.5}$	TSP x 0.52

Where: A= horizontal area (m^2) with blasting depth ≤ 21.

RWC advised that each blast would fragment between 20,000t and 30,000t of raw material. Based on an assumed bench height of 10m and a rock density of $2.5t/m^3$, the area per blast was assumed to be $1,200m^2$. The number of drill holes per blast applied was 240, based on a drill hole pattern of $5m^2$. It was calculated that 16 blasts per year would occur based on annual fragmented tonnage of 500,000t.

Quarry Related Input Data

Material property inputs used in the emission equations presented in **Table A2.1** are detailed in **Table A2.2**. It is noted that minimal details relating to the material properties were available at the time of reporting. To compensate, values were adopted from the literature.

Table A2.2
Material Property Inputs for Emission Estimation Factors Applied for All Scenarios

Material Properties	Units	Value	Source of Information
Silt Content of Unpaved Roads - onsite	%	8.3	US-EPA AP42 (2006) mean value for "haul road to/from pit" for "Stone Quarrying and Processing"
Silt Content of Unpaved Roads - product storage to exit	%	4.3	US-EPA AP42 (2006) mean value for "Service Road"
Silt Content of Overburden	%	6.9	US-EPA AP42 (1998) mean value for "overburden"
Silt Loading of Paved Roads	g/m^2	0.6	Default baseline loading for roads with traffic <500 vehicles per day - US-EPA AP42 (2011)

Key operational details by process used in the emission calculations are listed in **Table A2.3**.

Table A2.3
Emission Estimation Activity Rates Applied for All Scenarios

Process	Unit	Scenario 1	Scenario 2
Raw material extraction	Amount of Rock (tonnes)	500,000	
Processing – CP1		250,000	
Processing – CP2		250,000	
Haulage – EX to CP1	Distance (km)	0.2	0.15
Haulage – CP1 to Road Junction		0.2	-
Haulage – Road Junction to CP2		0.15	-
Haulage – Road Junction to Product Storage		0.3	-
Haulage – Product Storage to Paved Exit		0.3	-
Haulage – East Product to Paved Exit		-	0.6
Haulage – EX to CP2		-	0.4
Haulage – CP2 to West Product		-	0.15
Haulage – West Product to Paved Exit		-	0.2
Haulage - Paved Exit Road		0.3	0.3
Wind Erosion	Area (ha)	13.4	14.8

Appendix 6

Noise and Vibration Impact Assessment by Spectrum Acoustics Pty Ltd

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SPECTRUM ACOUSTICS
NOISE AND VIBRATION CONSULTANTS

Project No: 14896

Noise and Vibration Impact Assessment
Farrawell's Quarry Extension
South Kempsey, NSW

Prepared for:

Pacific Blue Metal Pty Ltd
c/- R. W. Corkery & Co.
P.O. Box 239
Brooklyn NSW, 2083

Author:

Ross Hodge
B.Sc.(Hons)

Principal / Director

Review:

Neil Pennington
B.Sc., B. Math.(Hons), MAAS, MASA

Principal / Director

July 2014

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CONTENTS

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1.0 - INTRODUCTION

This report provides the results and findings of a noise and vibration impact assessment of the proposed modification of the existing Farrawell's Quarry (quarry), located approximately 5 km south of Kempsey on the Mid North Coast of NSW.

This assessment has been undertaken to form part of an Environmental Impact Statement (EIS) to support a Development Application to Kempsey Shire Council.

2.0 - BACKGROUND TO THE PROPOSAL

The principal objective in modifying the quarry is to further utilise the available resource adjacent to and beneath the approved quarry to produce high quality road construction materials for use as select fill and road-base/sub-base materials. The proposed quarry works are located within Lot 2 DP 1194582 located off the Pacific Highway south of Kempsey (see **Figure 1**).

Figure 1 – Site Location

The quarry would produce up to 500,000 tonnes of road construction materials annually with a project life in the order of 15 to 20 years.

The key elements of the proposal for which development consent is being sought are as follows;

- Extend extraction activities beyond the existing approved limit of extraction (covering 8ha) to the proposed limit of extraction (covering 15.8ha),
- Extend the depth of extraction within the existing approved extraction area by up to 8m, and
- Create a final landform conducive to the development of an Industrial Subdivision.

Extraction methods to be used are as per those already approved for the existing quarry under DA T6-07-146 (revision 06), as described below.

Where practical, the exposed rock would be extracted by a bulldozer or excavator until refusal. The ripped rock would be pushed by bulldozer into a stockpile from where it would either be loaded into an off-road haul truck for transportation to the active processing area or loaded directly into the mobile crushing and screening plant which will be strategically placed near the rip rock surge pile.

When ripping is no longer feasible, drilling and blasting would be undertaken. Each blast would involve the fragmentation of between 20 000 tonnes and 30 000 tonnes of rock. Blasted rock would either be loaded from the blasted rock pile into off-road haul trucks for transportation to the active processing area or loaded directly into the mobile crushing and screening plant located near the blasted rock pile.

Product material would typically be transported off site using truck and dog vehicles with up to a maximum of 33t capacity. A number of the small capacity trucks with a 12t to 18t payload would also transport products from the quarry for local users.

It is envisaged that unladen trucks accessing the quarry site would exit the Pacific Highway at the Pacific Highway / Macleay Valley Way interchange before proceeding up the Industrial Subdivision Access Road to the quarry entrance. Trucks leaving the site would follow the same route back onto the Pacific Highway.

Trucks delivering products to local markets within and around Kempsey would pass over the Pacific Highway / Macleay Valley Way interchange and proceed northwards on Macleay Valley Way into Kempsey. Trucks returning to the quarry would use the same route.

All extraction and processing activities would continue to be undertaken between the following hours;

- Monday to Friday – 7:00am to 5:00pm,
- Saturdays – 7:00am to 1:00pm, and
- No work is proposed on Sundays or public holidays.

Maintenance activities would be undertaken at any time, i.e. 24 hours per day/seven days per week to ensure all plant and equipment is maintained in a proper and efficient manner, with the provision that maintenance-related noise is not audible at any surrounding residence outside the hours of operation nominated above.

The quarry site is relatively isolated and the closest residential receivers are shown in **Appendix I**.

Details of the plant and equipment proposed for the quarry are shown in **Table 1**.

TABLE 1
QUARRY PLANT and EQUIPMENT

Equipment	No.	Usage	Frequency of Use
Bulldozer – (Cat D9 to D10 or similar)	2	Stripping topsoil, pushing subsoil, ripping weathered rock and stockpiling.	Continuous
Hydraulic Drill Rig	1	Drilling blast holes.	Weekly
Excavator (85t)	1	Loading ripped and blasted rock into haul trucks.	Continuous
Excavator (20t to 40t)	2	Loading processing plants.	Continuous
Haul Truck (40t)	4	Transporting ripped and blasted rock to the processing area.	Continuous
Front-end Loader – (Cat 980 or similar)	3	Loading product trucks & stockpiling.	Continuous
Water Cart	1	Watering of haul roads.	As required
Crusher and Screens	2	Sizing of quarried material	Continuous

3.0 - DESCRIPTION OF TERMS

This section of the report aims to convey an understanding of several commonly used acoustical terms to the lay reader. Various terms are explained in clear language and the effects of certain atmospheric phenomena on noise propagation are discussed. Noise level percentiles are explained with the aid of a diagram of a hypothetical noise signal.

The descriptions in this section are not formal definitions of the terms. Formal definitions may be found in AS1633-1985 "Acoustics – Glossary of terms and related symbols".

3.1 General Terms

Sound Power Level

The amount of acoustic energy (per second) emitted by a noise source. Usually written as "Lw" or "SWL", the Sound Power Level is expressed in decibels (dB) and cannot be directly measured. Lw is usually calculated from a measured sound pressure level.

Sound pressure Level

The "Noise Level", in decibels (dB), heard by our ears and/or measured with a sound level meter. Written as "SPL", the sound pressure level generally decreases with increasing distance from a source. Noise levels are often written as dB(A) rather than dB. The "A-weighting" is a correction applied to the measured noise signal to approximate the response of the human ear.

Neutral Atmospheric Conditions

An atmosphere that is at a temperature of approximately 23°C from ground level to an altitude of 200m or more. There are no fluctuations in density or water vapour content and no wind. Such conditions rarely occur, as temperature will usually vary with altitude and there is always movement in various directions in different layers of the atmosphere.

Prevailing Atmospheric Conditions

Atmospheric conditions (with regards to potential effects on noise propagation) which are characteristic of the study area. These will typically include seasonal wind directions and velocities.

3.2 Noise Level Percentiles

A noise level percentile (Ln) is the noise level (SPL) in decibels which is exceeded for "n" % of a given monitoring period. Several important Ln percentiles will be explained by considering the hypothetical time signal in **Figure 2**.

The signal in Figure 2 has a duration of 2.5 minutes (i.e. 150 seconds) with noises occurring as follows:

- The person holding the instrument is standing beside a road and hears crickets in nearby grass at a level of around 60 dB (A);
- At about the 30 second mark a motorcycle passes on the road, followed by a car;

- At 60 seconds a truck passes;
- After the truck passes it sounds its air horn at the 73 second mark;
- The crickets are frightened into silence and the truck fades into the distance;
- All is quiet until 105 seconds when the crickets slowly start to make noise, reaching full pitch by 120 seconds;
- The measurement stops at 150 seconds, just when an approaching car starts to become audible.

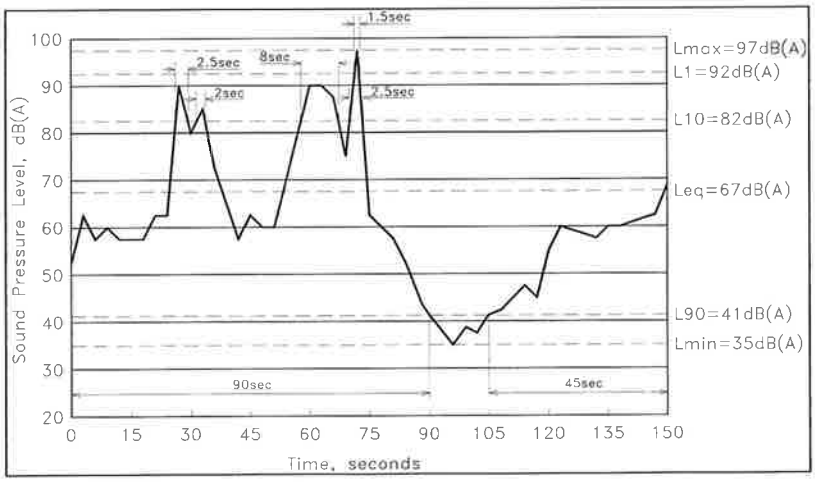


FIGURE 2. - Hypothetical time-trace of 150-second sound signal.

L1 Noise Level

Near the top of Figure 2, there is a dashed line at 92dB(A). A small spike of 1.5 sec duration extends above this line at around 73 seconds. As 1.5 sec is 1% of the signal duration (150 seconds) we say that the L1 noise level of this sample is 92dB(A). The L1 percentile is often called the *average peak noise level* and is used by the Office of Environment and Heritage (OEH) as a measure of potential disturbance to sleep.

L10 Noise Level

The dashed line at 82 dB(A) is exceeded for four periods of duration 2.5 sec, 2 sec, 8 sec and 2.5 sec, respectively. The total of these is 15 sec, which is 10% of the total sample period. Therefore, the L10 noise level of this sample is 82 dB(A). The L10 percentile is called the *average maximum noise level* and has been widely used as an indicator of annoyance caused by noise.

L90 Noise Level

In similar fashion to L1 and L10, Figure 2 shows that the noise level of 41 dB(A) is exceeded for 135 seconds (90 + 45 =135). As this is 90% of the total sample period, the L90 noise level of this sample is 41dB(A). The L90 percentile is called the *background noise level.*

Leq Noise Level

Equivalent continuous noise level. As the name suggests, the Leq of a fluctuating signal is the continuous noise level which, if occurring for the duration of the signal, would deliver equivalent acoustic energy to the actual signal. Leq can be thought of as a kind of 'average' noise level. Recent research suggests that Leq is the best indicator of annoyance caused by industrial noise and the *NSW Industrial Noise Policy* (INP) takes this into consideration.

Lmax and Lmin Noise Levels

These are the maximum and minimum SPL values occurring during the sample. Reference to Figure 2 shows these values to be 97dB(A) and 35dB(A), respectively.

4.0 - THE EXISTING ENVIRONMENT AND NOISE CRITERIA

4.1 Meteorology

The atmospheric conditions most relevant to day time noise assessments are gentle winds and relative humidity. Following are the most significant meteorological aspects with respect to noise propagation:

- Extremes of relative humidity (RH) are rarely experienced. For modelling purposes, a value of 70% RH was adopted;

- Wind direction and speed data were obtained from wind roses for the Kempsey airport for 2011 (see **Appendix II**). The data were analysed for its vector components. The INP states that wind is considered a feature of an area where source-receiver winds (at 10m height) of 3m/s or below occur for 30% of the time in any assessment period in any season. The statistical analysis of the data showed that the vector components occurred for greater than 30% of the time from east in summer and from the west in autumn and winter. A wind speed of 3m/s (at 10m above ground level) from the east and also from the west was modelled to determine the noise impact under each of these 'prevailing' wind conditions.

4.2 Noise

To quantify the ambient acoustic environment of the area unattended noise logging was undertaken at two locations near the quarry site in in July/August 2013.

The noise logging locations are shown in **Appendix III**.

Noise levels were measured at each location for a period of at least seven days. Noise levels were measured at 15 minute statistical intervals using Svan 949 sound and vibration analysers used as environmental noise loggers. The measurements were done in accordance with relevant EPA guidelines and AS 1055-1997 "Acoustics – Description and Measurement of Environmental Noise". The noise loggers used comply with the requirements of AS 1259.2-1990 "Acoustics – Sound Level Meters", and have current NATA calibration certification.

Each logger was programmed to continuously register environmental noise levels over the 15 minute intervals, with internal software calculating and storing Ln percentile noise levels for each sampling period. Calibration of the logger was performed as part of the instrument's initialisation procedures, with calibration results being within the allowable ± 0.5 dB(A) range.

Measured noise levels at each location are summarised below in **Tables 2** and **3**.

Tabulated results show overall Leq and L90 levels for the day, evening and night time periods using procedures specified in the INP. Graphs showing full data sets are shown in **Appendix III**.

TABLE 2
MEASURED AMBIENT NOISE LEVELS – LOGGER 1

Date	Leq(day)	Leq(eve)	Leq(night)	L90(day)	L90(eve)	L90(night)
30/7/13	61.9	61.2	60.5	51.1	46.6	39.3
31/7/13	60.7	59.8	59.1	49.2	41.7	36.6
1/8/13	60.9	61.1	60.5	49.9	48.3	40.9
2/8/13	60.5	59.7	58.5	48.2	45.1	36.2
3/8/13	58.7	57.2	53.9	47.0	37.9	25.4
4/8/13	59.4	60.9	57.4	45.2	46.0	28.7
5/8/13	60.5	61.4	61.1	47.5	48.3	39.0
LAeq	**60**	**60**	**59**			
L90				**48**	**46**	**37**

TABLE 3 MEASURED AMBIENT NOISE LEVELS – LOGGER 2						
Date	**Leq(day)**	**Leq(eve)**	**Leq(night)**	**L90(day)**	**L90(eve)**	**L90(night)**
30/7/13	56.4	56.1	55.2	49.2	46.0	38.7
31/7/13	55.5	54.9	54.1	48.6	41.1	36.0
1/8/13	55.7	56.1	55.4	48.9	47.3	39.8
2/8/13	55.0	54.5	53.1	47.0	44.5	36.8
3/8/13	53.2	53.0	49.6	45.4	39.3	24.5
4/8/13	54.1	56.1	53.0	44.6	45.1	29.8
5/8/13	55.3	56.1	56.0	46.6	47.4	37.3
LAeq	**55**	**55**	**54**			
L90				**47**	**45**	**37**

As the quarry will only operate during the day time (per definitions in the INP) only that time period is further considered here.

Both sets of data are very similar and, therefore, to ensure consideration of the worst case the lower of the measured background noise levels (Logger 2) will be used for this assessment.

In setting noise goals for a particular project, the INP considers both Amenity and Intrusiveness criteria. The former is set to limit continuing increase in noise from industry, whilst the latter is set to minimise the intrusive impact of a particular noise source.

Given the site is not subject to any significant existing industrial noise, the intrusiveness criteria are those applicable to setting the project specific noise goals. That is, the Rating Background Level (RBL) for the time period, plus 5 dB(A). The RBL (L90) is defined as the overall single figure background level representing each assessment period (in this case day only).

Table 4 specifies the applicable base noise objectives for the site being assessed.

TABLE 4 BASE NOISE LEVEL OBJECTIVES		
Period	Intrusiveness Criterion* L_{eq} (15 min) dB(A)	Amenity Criterion** L_{eq} (Period) dB(A)
Day	**52**	= Acceptable level = 55

* Rating Background Level (RBL) + 5dB. RBL is the median value of each ABL (Assessment Background Level) over the entire monitoring period. The ABL is a single figure representing the "L_{90} of the $L_{90's}$" for each separate day of the monitoring period.
** Suburban zone amenity criterion per Tables 2.1 and 2.2 of INP.

The project specific noise goals (PSNG) for the site are the more stringent of the intrusiveness or amenity criteria, as follows,

Day	**52 dB(A) L_{eq} (15 min)**

4.3 Sleep Disturbance

As the project will not operate prior to 7 am, it is not necessary to assess the potential for sleep disturbance impacts.

4.4 Vehicle Noise

In NSW, noise from vehicle movements associated with an industrial source is assessed in terms of the INP if the vehicles are not on a public road. If the vehicles are on a public road, the NSW Road Noise Policy (RNP) applies.

As vehicles transporting quarry products will travel on private roads (on site) and on public roads, noise from the proposal must be assessed against the project specific noise goals of the INP and also the criteria in the RNP.

4.5 Public Road Traffic

The RNP recommends various criteria for different road developments and uses.

The number of heavy vehicle movements generated by the quarry per day, and the direction of travel of those vehicles, will vary depending on the end user of the quarry product.

Traffic generated by the current proposal will travel along the access road through the proposed industrial subdivision and from there to the Pacific Highway.

Some of the heavy vehicles may then travel along the Macleay Valley Way before eventually disseminating into the local road system. Other vehicles will transport quarry material to Pacific Highway upgrade works and will travel on the highway to those sites.

Potential noise impacts in the vicinity of the quarry are, therefore, assessed against the criteria for traffic noise on a freeway/arterial/sub-arterial road and a local road as per definitions in the RNP.

An extract of Table 3 from the RNP relating to land use developments with the potential to create traffic on these roads is shown in **Table 5**.

TABLE 5 BASE TRAFFIC NOISE OBJECTIVE		
Situation	Recommended Criteria	
	Day - (7am - 10pm)	Night (10pm – 7am)
3. Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments	60 Leq(15hr) External	55 Leq (9 hr) External
6. Existing residences affected by additional traffic on existing local roads generated by land use developments	55 Leq(1hr) External	50 Leq (1 hr) External

4.6 Blasting Criteria

4.6.1 Annoyance Criteria

Noise and vibration levels from blasting are assessable against criteria proposed by the Australian and New Zealand Environment and Conservation Council (ANZECC) in their publication *"Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration – September 1990"*. These criteria are summarised as follows:

- The recommended maximum overpressure level for blasting is 115 dB;
- The level of 115 dB may be exceeded for up to 5% of the total number of blasts over a 12-month period, but should not exceed 120 dB at any time;
- The recommended maximum vibration velocity for blasting is 5 mm/s Peak Vector Sum (PVS);
- The PVS level of 5 mm/s may be exceeded for up to 5% of the total number of blasts over a 12-month period, but should not exceed 10 mm/s at any time;
- Blasting should generally only be permitted during the hours of 9 am to 5 pm Monday to Saturday, and should not take place on Sundays and Public Holidays; and
- Blasting should generally take place no more than once per day.

4.6.2 Building Damage Criteria

Building damage assessment criteria are nominated in AS 2187.2-1993 *"Explosives – Storage, Transport and Use. Part 2: Use of Explosives"* and summarised in **Table 6**.

TABLE 6 BLASTING CRITERIA TO LIMIT DAMAGE TO BUILDINGS (AS 2187)		
Building Type	Vibration Level (mm/s)	Airblast Level (dB re 20 μPa)
Sensitive (and Heritage)	5	133
Residential	10	133
Commercial/Industrial	25	133

The annoyance (ANZECC) criteria are more stringent than the building damage criteria and will be taken as the governing criteria for the quarry.

5.0 – METHODOLOGY

5.1 Overview of Quarrying Operations

As described previously, the extended quarry would extract approximately 500 000t of road construction material by open cut methods. Quarrying would be undertaken by ripping (using dozers and excavators) and by drill and blast methods. The extracted material would be crushed and screened at either a mobile plant, located on the quarry floor, or at the active processing area.

Products would be stockpiled separately within the extraction area or within the stockpile area adjacent to the office and amenities and managed using an FEL and 40 tonne dump truck.

5.2 Noise Sources

The sound power level spectra of each of the modelled operational noise sources are shown in **Table 7**. Spectral data are presented as unweighted (linear) decibel levels and the total is A-weighted.

TABLE 7 Lw's AND FREQUENCY SPECTRA OF MAJOR NOISE SOURCES										
	Frequency (Hz)									
Item	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k
Cat D9 Dozer Leq	119	95	117	123	114	116	113	113	107	100
Cat 980 FEL	112	115	118	114	111	108	106	103	99	95
30t Excavator	107	104	112	114	106	106	103	99	96	92
85t Excavator	112	106	100	107	103	103	101	99	96	93
Water Cart	108	111	113	105	100	99	103	104	96	90
40t Haul Truck	112	106	109	105	108	108	108	105	99	92
Drill Rig	116	132	125	123	107	106	107	108	110	110
Crusher	114	108	125	120	111	111	109	106	102	95
Road Truck	108	97	103	105	106	102	100	95	90	77

The noise levels shown are for the maximum short term Lw for the various noise sources. Over a typical 15 minute period, however, the noise emissions from many of the sources would vary over time and also in relation to individual receivers. That is, mobile equipment moves around and also works at various operating levels throughout any 15 minute period.

The 15 minute Leq noise level for a Cat D9 dozer, for example, was taken from the Spectrum Acoustics technical database. The measured level represents a full 15 minute cycle of a dozer working on a stockpile pushing and reversing in second gear. The measured Leq noise level, as used in the ENM model, is shown in **Table 8**. This is 5dB lower than the maximum Leq sound power level shown in Table 7.

Similarly, the 15 minute Leq for a Cat 980 Front End Loader (FEL) shown in Table 8 (and used in the modelling) was taken from measurements of an FEL working in and around a stockpile, loading a hopper for a full 15 minute period.

Other mobile equipment, such as the water cart, for example, has a maximum sound power level of 108 dB(A), but as the vehicle is in constant movement around the site the 15 minute Leq sound power level used in the modelling represents a point noise source for a water cart at the modelled location, and producing maximum sound power, for 2 minutes out of a 15 minute assessment period.

Similarly, the four haul trucks will move about throughout any 15 minute period. For the modelling the haul trucks were considered to be four separate point noise sources producing maximum sound power, for 2 minutes out of a 15 minute assessment period. The modelled Lw of the water cart would be 99 dB(A) Leq (15 min).

At full production there will be up to of 500 truck movements per day with a maximum rate of 80 per hour, or 20 in a 15 minute assessment period. To assess a worst case, eight point noise sources representing road trucks were modelled at various locations along the quarry access road and stockpile areas. Each "truck" was considered to be producing the noise level in Table 8 at its modelled location for two minutes out of a 15 minute assessment period.

To consider the worst case the excavator, drill rig and crusher were all considered to be producing the maximum sound power level for the entire 15 minute assessment period.

All the measured and calculated Lw's used in the modelling are as shown in **Table 8**.

TABLE 8
MODELLED Lw's AND FREQUENCY SPECTRA OF MAJOR NOISE SOURCES
(as Leq 15 mins)

Item	Frequency (Hz)									
	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k
Cat D9 Dozer	114	95	112	118	109	111	108	108	102	95
Cat 980 FEL	107	110	113	109	106	103	101	98	94	90
30t Excavator	107	104	112	114	106	106	103	99	96	92
85t Excavator	112	106	100	107	103	103	101	99	96	93
Water Cart	99	102	104	96	91	90	94	95	87	81
40t Haul Truck	103	97	100	96	100	100	100	96	91	83
Drill Rig	119	109	101	108	99	104	106	112	115	112
Crusher	114	108	125	120	111	111	109	106	102	95
Road Truck	96	85	91	93	94	90	88	83	78	65

Assessment of operational noise was conducted using RTA Technologies Environmental Noise Model (ENM) v3.06. Each of the noise sources shown in Table 8 was considered to be in a typical operating location and operating at the indicated sound levels for a 15 minute period. Noise modelling was carried out for two separate scenarios as detailed below.

Operational noise source locations for each scenario are shown in **Figures 4** and **5**.

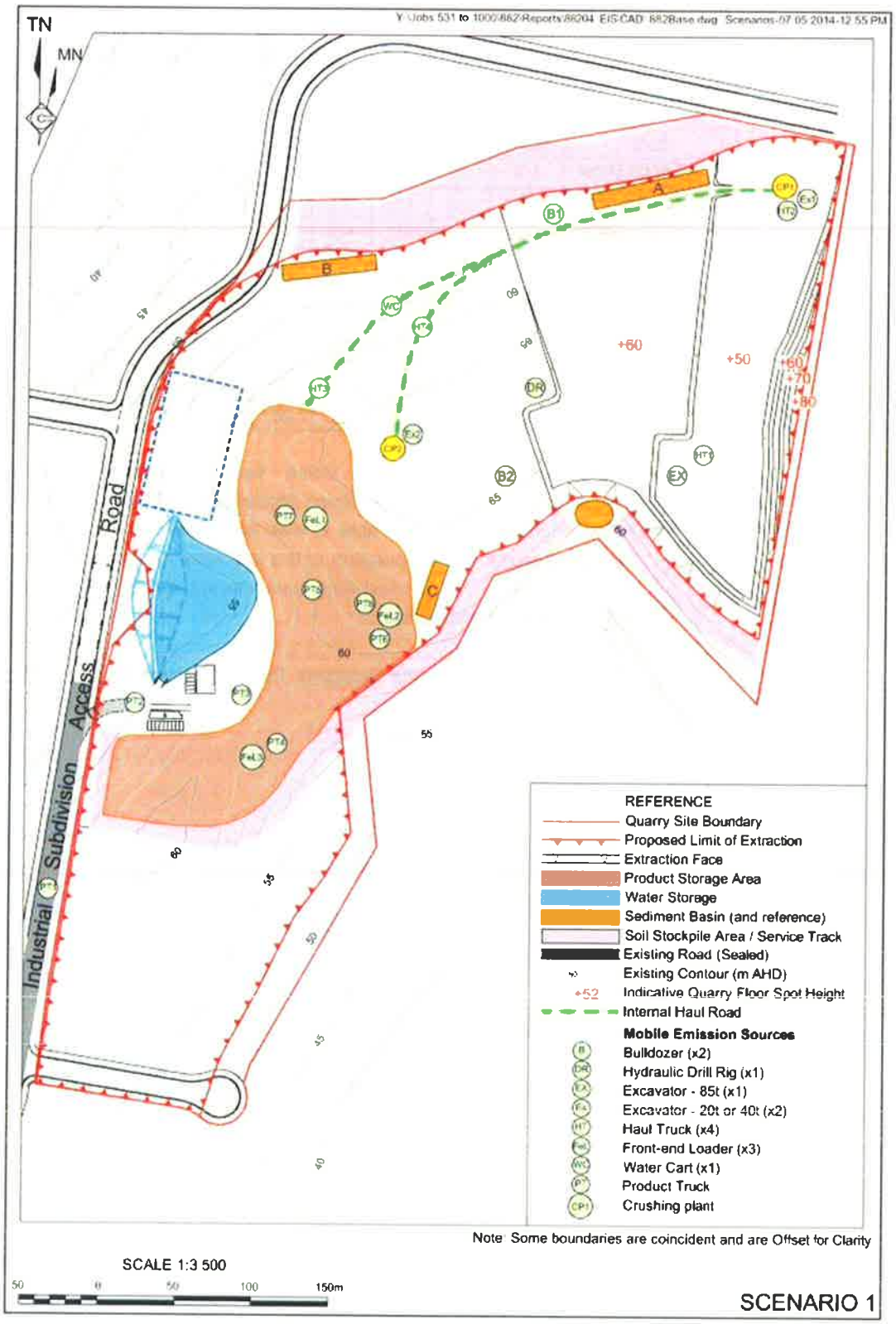


Figure 4 – Scenario 1

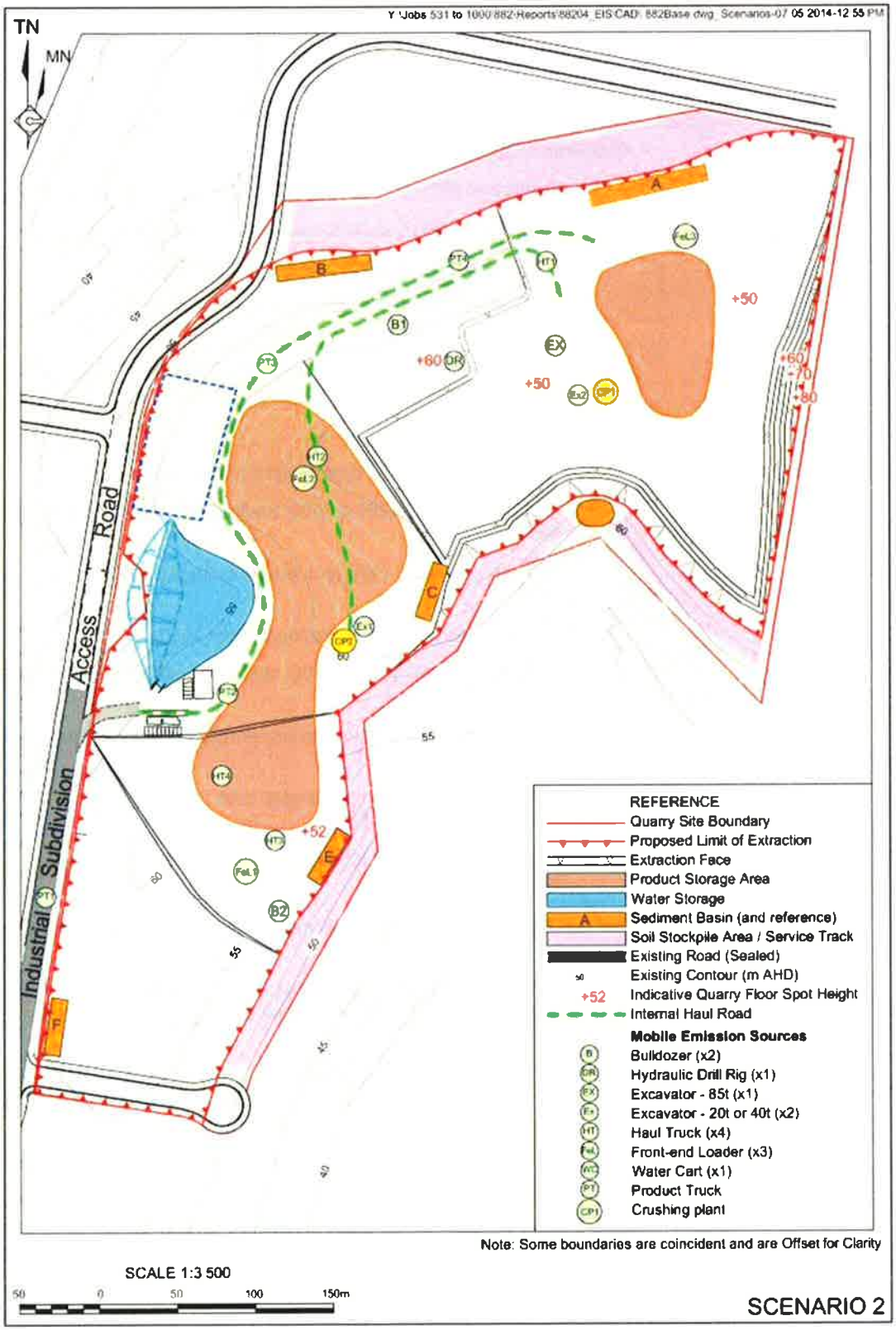


Figure 5 – Scenario 2

Noise modelling was undertaken for the following operational scenarios;

SCENARIO 1: Annual Production – 500 000 tonnes

Extraction Operations

- Bulldozer (B1) (Cat D10) clearing vegetation at 63m AHD.
- Bulldozer (B2) (Cat D10) stripping topsoil at 65m AHD.
- Drill Rig (DR) drilling in preparation for blast at 68m AHD.
- Excavator (EX) (85t) loading ripped and blasted rock into haul trucks at 50m AHD.
- Haul truck (HT1) (40t) being loaded for transfer of material to be processed at 50m AHD.

Processing Operations

- Crusher Plant (CP1) operating at 50m AHD.
- Excavator (Ex1) (20t or 40t) loading material into the CP1 at 50m AHD.
- Haul truck (HT2) (40t) unloading material at the CP1 at 50m AHD.
- Crusher Plant (CP2) operating at 66m AHD.
- Excavator (Ex2) (20t or 40t) loading material into the CP2 at 66m AHD.
- Haul truck (HT4) (40t) returning empty from unloading material at CP2 at 60m AHD.
- Water Cart (WC) undertaking dust suppression on internal haul road at 56m AHD.
- Haul truck (HT3) transporting product to Product Storage Area at 62m AHD.

Product Loading and Despatch (assuming up to 8 movements in a 15 minute period)

- Front-end Loaders (FeL1, FeL2 and FeL3) (Cat 980) loading trucks at Product Storage Area at 62m, 62m, and 59m AHD respectively.
- Three Product Trucks (PT4, PT6 and PT7) being loaded within the Product Storage Area at 59m, 62m and 62m AHD respectively.
- One Product Truck (PT8) sitting idle waiting to be loaded at 62m AHD.
- Two Product Trucks (PT1 and PT3) accessing the Quarry unladen via the Industrial Subdivision Access Road at 55m and 59m AHD.
- Two Product Trucks (PT2 and PT5) exiting the Quarry laden via the Industrial Subdivision Access Road.

SCENARIO 2: Annual Production – 500 000 tonnes

Extraction Operations

- Bulldozer (B1) (Cat D10) clearing vegetation at 58m AHD.
- Bulldozer (B2) (Cat D10) stripping topsoil at 52m AHD.
- Drill Rig (DR) drilling in preparation for blast at 60m AHD.
- Excavator (EX) (85t) loading ripped and blasted rock into haul trucks at 50m AHD.
- Haul truck (HT1) (40t) transporting material to be processed at CP2 at 50m AHD.
- Haul truck (HT2) (40t) returning empty from unloading material at CP2 at 60m AHD.

Processing Operations

- Crusher Plant (CP1) operating at 50m AHD.
- Excavator (Ex2) (20t or 40t) loading material into the CP1 at 50m AHD.
- Crusher Plant (CP2) operating at 60m AHD.
- Excavator (Ex1) (20t or 40t) loading material into the CP2 at 60m AHD.
- Two Haul trucks (HT3 and HT4) transporting product to Product Storage Area at 52m AHD.

Product Loading and Despatch (assuming up to 16 movements in a 15 minute period)

- Front-end Loaders (FeL1, FeL2 and FeL3) (Cat 980) loading trucks at Product Storage Area at 50m, 65m, and 52m AHD respectively.
- Two Product Trucks (PT1 and PT3) accessing the Quarry unladen via the Industrial Subdivision Access Road at 55m and 59m AHD.
- Two Product Trucks (PT2 and PT4) exiting the Quarry laden via the Industrial Subdivision Access Road.

The modelling was undertaken for the atmospheric conditions described below in each year:

Calm – 20°C, 70% R.H., no wind (neutral atmospheric),

East Wind - 20°C, 70% R.H., 3m/s wind from the east (90°), and

West Wind - 10°C, 70% R.H., 3m/s wind from the west (270°).

5.3 Public Road Traffic

Heavy vehicles will be used to transport product material from the site. In relation to noise from heavy vehicles, there are many methods available for calculating the cumulative noise impact arising from intermittent signals of various shapes.

The methodology employed in this section was sourced from the commonly accepted US Environmental Protection Agency document No. 550/9-74-004 "Information on Levels of Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974". The document refers to 'triangular' and 'trapezoidal' time signals, which are illustrated in **Figure 6**.

A triangular time signal rises from the background level to a peak noise level and then immediately begins to subside. A trapezoidal time signal rises from the background level to a maximum level and sustains that level for a period of time before subsiding.

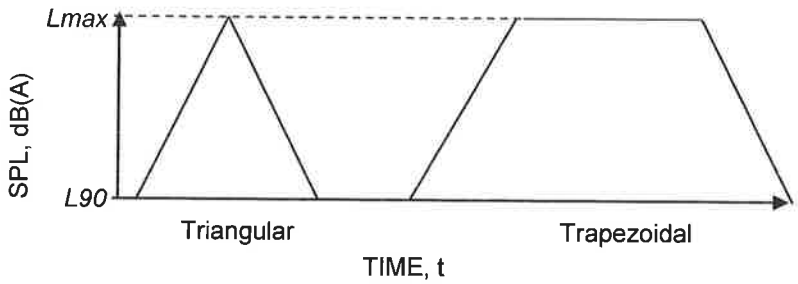


Figure 6 – Triangular and Trapezoidal Time Signals

A triangular time signal is a good approximation to the SPL signal of a car or truck as it passes an observation point. The value of Leq,T for a series of identical triangular time patterns having a maximum level of Lmax is given by **Equation 1.**

$$L_{eq},T = L_b + 10\log\left[1+\frac{ND}{T}\left(\frac{10^{(L\,\max - Lb)/10}-1}{2.3}-\frac{(L_{\max}-L_b)}{10}\right)\right] \quad \textbf{(1)}$$

where,

L_{max} = maximum vehicle noise at residence, dB(A)
L_b = existing Leq noise level, dB(A)
T = assessment period (minutes)
D = duration of noise from each vehicle (minutes)
N = number of vehicle trips during assessment period

As detailed earlier in this report, vehicles on the quarry site or access road are considered site noise whilst those on public roads are assessed separately. For the assessment of vehicles on public roads,

the sound pressure levels of a number of trucks (both laden and unladen) transporting quarry products were sourced from the Spectrum Acoustics technical database.

Received noise was calculated on the basis of half of the vehicles being in the near lane of traffic and half in the far lane, with the total being the log addition of the two levels.

Based on the criteria shown in **Table 5**, the traffic noise assessment has been undertaken to calculate the minimum distance a receiver must be from the edge of the near lane of traffic to achieve compliance with the noise criteria for a freeway/arterial road. For a local road the approach was to determine the maximum number of vehicle movements per hour to maintain compliance with the criterion.

5.4 Blast Impact Assessment Procedure

Each proposed blast would be designed to remove between approximately 20 000 and 30 000 tonnes of material. This would equate to about two production blasts per month. A number of smaller, development, blasts may also occur to restructure areas for rehabilitation or prepare areas for production blasts.

Typical hydraulic blast hole rigs would be utilised drilling holes of approximately 150mm diameter, charging the holes with explosive and firing shots using non-electric detonators with appropriate delays to control airblast overpressure and ground vibration.

The following sections provide standard equations for predicting blast overpressure and ground vibration levels, sourced from the United States Bureau of Mines.

5.4.1 Blast Overpressure

Unweighted airblast overpressure levels (OP) are predicted from **Equation 2** below.

$$OP = 165 - 24(\log_{10}(D) - 0.3 \log_{10}(Q)), dB \quad (2)$$

where D is distance from the blast to the assessment point (m) and
Q is the weight of explosive per delay (kg).

Analysis of 12 months blast data for a coal mine in the Hunter Valley has shown Equation 2 to underestimate overpressure levels by up to 3 dB for small blasts (MIC < 800kg) and overestimate by 1 dB for larger blasts.

As the range of MIC values to be used at the current site will be less than 100 kg no correction has been applied to Equation 2.

5.4.2 Blast Vibration

The basic equations for calculation of peak particle vibration (PPV) levels from blasting are as follows:

$$PPV = 1140\left(\frac{D}{Q^{0.5}}\right)^{-1.6} \text{, mm/s} \quad \text{(for average ground type)} \qquad \textbf{(3)}$$

$$PPV = 500\left(\frac{D}{Q^{0.5}}\right)^{-1.6} \text{, mm/s} \quad \text{(for hard rock)} \qquad \textbf{(4)}$$

where D and Q are defined as in Equation 2.

A coefficient value of 1000 has been used in Equation 4 to approximate typical ground conditions in the blast vibration calculations.

6.0 - RESULTS

6.1 Operational Noise

Noise levels were modelled using ENM for each of the operational and atmospheric scenarios described in **Section 5.2**.

The ENM noise model was utilised in point calculation mode to determine the actual predicted noise level at the six closest receivers to the quarry (see Appendix I). The results of the point calculations for the modelled neutral atmospheric (calm), east, and west winds are shown in **Tables 9** to **11**.

TABLE 9
ENM POINT CALCULATION RESULTS (dB(A) Leq (15 min))
MODELLED NEUTRAL ATMOSPHERIC CONDITIONS

Location	Scenario 1	Scenario 2	Criterion
A	37.8	44.0	52
B	36.6	42.0	52
C	39.9	44.2	52
D	36.2	40.5	52
E	34.9	40.2	52
F	32.8	39.4	52

TABLE 10 ENM POINT CALCULATION RESULTS (dB(A) Leq (15 min)) MODELLED EAST WIND			
Location	Scenario 1	Scenario 2	Criterion
A	49.2	50.1	52
B	49.8	47.7	52
C	48.2	47.8	52
D	42.2	42.7	52
E	41.1	41.8	52
F	39.4	40.7	52

TABLE 11 ENM POINT CALCULATION RESULTS (dB(A) Leq (15 min)) MODELLED WEST WIND			
Location	Scenario 1	Scenario 2	Criterion
A	40.0	40.7	52
B	41.1	39.1	52
C	40.6	41.1	52
D	38.8	39.2	52
E	38.3	39.2	52
F	36.9	38.5	52

The results in Tables 9 to 11 show that, under the assessed conditions, there will be no exceedance of the day time noise criterion as a result of the modelled noise emissions from the quarry.

The results show that noise received noise levels will be significantly lower than the criterion at all receivers under the modelled neutral atmospheric and west wind conditions.

The worst case received noise will be at Receivers A, B and C under the modelled east wind.

6.2 Public Road Traffic

At full production there will be up to 500 heavy vehicle movements per day. As the main end user at full production is envisaged to be Pacific Highway upgrade works, the majority of this traffic will travel on the Pacific Highway for most of the transport route.

A scenario of 500 truck movements over a 10 hour day time period has been assessed with results of the intermittent traffic calculation shown in **Table 12**. Vehicles were assumed to be travelling on the highway at an average speed of 90k.p.h.

TABLE 12 ROAD TRAFFIC NOISE - HIGHWAY	
	Day
Typical Operating Sound Power, @ 90 kph dB(A)	110
Distance Loss to Receiver (15m)	32
Received Maximum Noise dB(A)	78
Traffic Volume, (vehicles/10hrs)	500
Time each vehicle audible at 90 kph (mins)	0.07
Background Noise Level dB(A)	48
Calculated Traffic Noise, dB(A)(Leq 15 hr)	60
Criterion dB(A) (Leq 15 hr)	60

Table 12 shows that traffic noise levels will be below the day time criterion for a freeway/arterial road at the façade of all receivers greater than 15m from the centre of traffic on the Pacific Highway. There are no receivers in this zone.

Some quarry products will be delivered to local markets in the Kempsey area. The number of trucks travelling on local roads will be dependent on several factors. The approach taken, therefore, was to determine the maximum number of truck movements in an hour that is possible on local roads before the appropriate criterion is exceeded.

The results of the intermittent traffic calculation are shown in **Table 13**. Vehicles were assumed to be travelling on local roads at an average speed of 60k.p.h. with potential impacts determined to a theoretical reception point 12m from the centre of traffic.

TABLE 13 ROAD TRAFFIC NOISE – LOCAL ROAD	
	Day
Typical Operating Sound Power, @ 60 kph dB(A)	106
Distance Loss to Receiver (12m)	30
Received Maximum Noise dB(A)	76
Traffic Volume, (vehicles/hr)	14
Time each vehicle audible at 60 kph (mins)	0.04
Background Noise Level dB(A)	48
Calculated Traffic Noise, dB(A)(Leq 1hr)	55
Criterion dB(A) (Leq 1hr)	55

Table 13 shows that, for a residential façade 12 from the centre of traffic on a local road, there may be up to 14 truck movements in an hour, during the day, before the adopted noise criterion is exceeded.

The results in Tables 12 and 13 are based on measured noise levels taken from the Spectrum Acoustics technical database. The measurements are of trucks travelling on public and private roads and include a mixture of road configurations including where vehicles were travelling up and down hill and slowing to turn, then accelerating away, etc.

As such, the results are the theoretical calculated noise levels considered applicable to the majority of conditions and scenarios that may be encountered on the transport route. In reality road conditions may vary from those modelled due to specific localised circumstances. Examples may include long straight stretches of road, or sections of particularly steep gradient. Road conditions may also vary over time due to deterioration or maintenance.

The calculations also assume a full line of sight of the road (through approximately 135°) and do not allow for the shielding effects of intervening structures or topography (such as where the road is in cut).

As a result, the received noise levels may differ slightly from those shown in the tables. This variation may be to a level either higher or lower than that shown.

6.3 Blast Impact Predictions

The nearest residence to blasting will be approximately 500m to the west of the closest sections of the pit. Substituting various representative distances and an MIC of 100kg, to approximate a worst case, into equations 2 and 4 gives the following resultant overpressure and vibration impacts at surrounding areas as shown in **Table 14**.

TABLE 14
PREDICTED BLAST NOISE AND VIBRATION LEVELS

Distance	PPV (mm/s)	OP dB Linear
500m	0.95	114
750m	0.50	110
1000m	0.31	107
1500m	0.16	103

The results in **Table 14** show that received noise and vibration levels from typical blasting operations will not exceed the relevant criteria at the nearest receiver. As all other receivers are more distant from the quarry, further assessment of impacts at these receivers is not considered warranted.

7.0 – CONCLUSION

7.1 Operational Noise

The results of the modelling of quarry operational noise have shown that, for the assessed scenarios, there will be no exceedance of the adopted day time noise criterion at any residential receivers.

7.2 Public Road Traffic

The results of the road traffic noise assessment have shown that, under the worst case traffic movement numbers from the quarry, the relevant day time traffic noise criterion will be achieved at distances greater than 15m from the centre of traffic on an arterial road or freeway.

The assessment has also shown that, for a theoretical receptor at 12m from the centre of traffic on a local road, compliance with the relevant day time noise criterion will be achieved provided there are no more than 14 heavy vehicle movements in a hour.

7.3 Blast Impact Predictions

Predicted received noise and vibration levels as a result of blasting at the quarry were shown to be below the relevant criteria at all residential receivers.

8.0 - REFERENCES

Office of Environment and Heritage (OEH), 1999. Environmental Criteria for Road Traffic Noise, Sydney

Office of Environment and Heritage (OEH), 2000. NSW Industrial Noise Policy, Sydney.

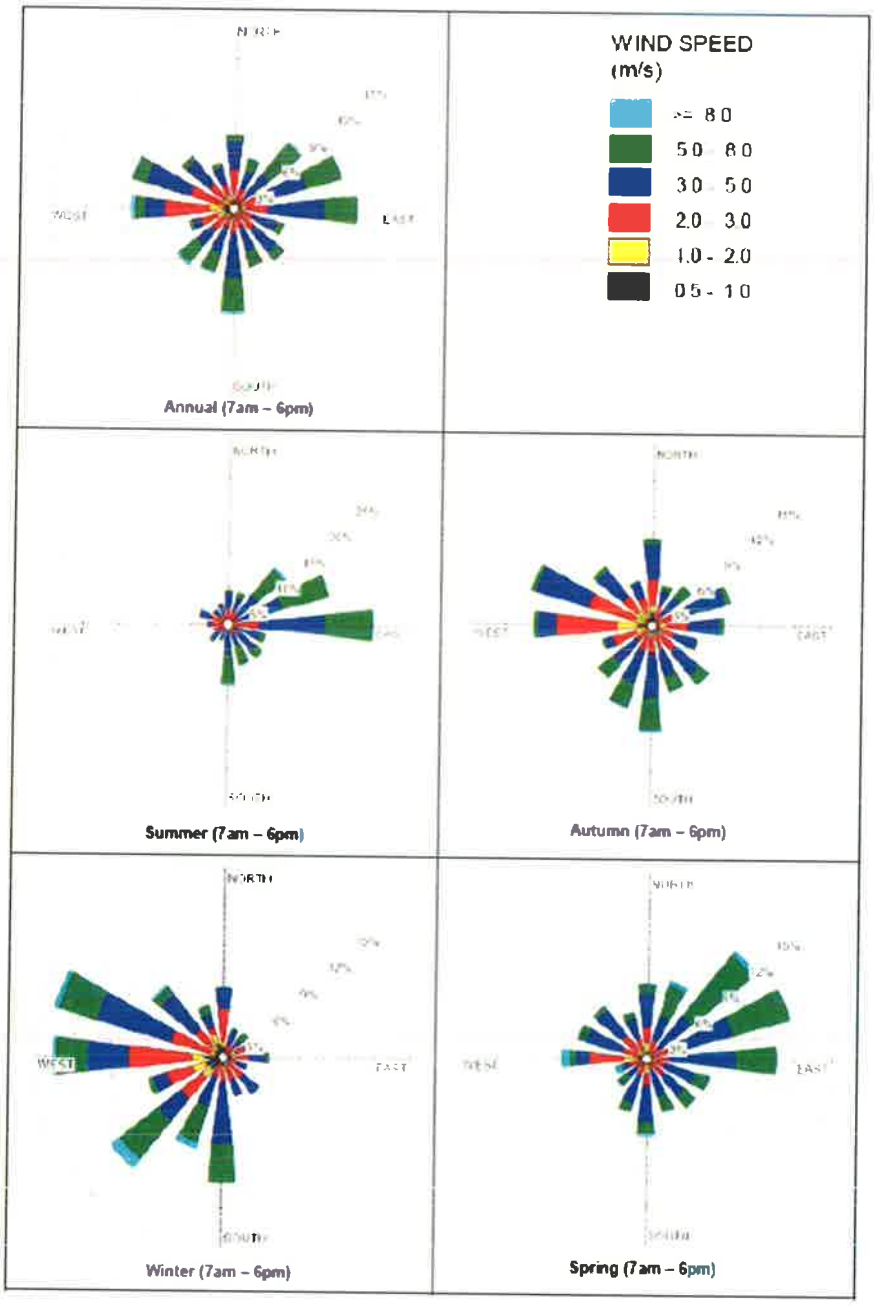
Appendix I

Residential Receiver Locations

Residential Receiver Locations

Appendix II

Wind Roses

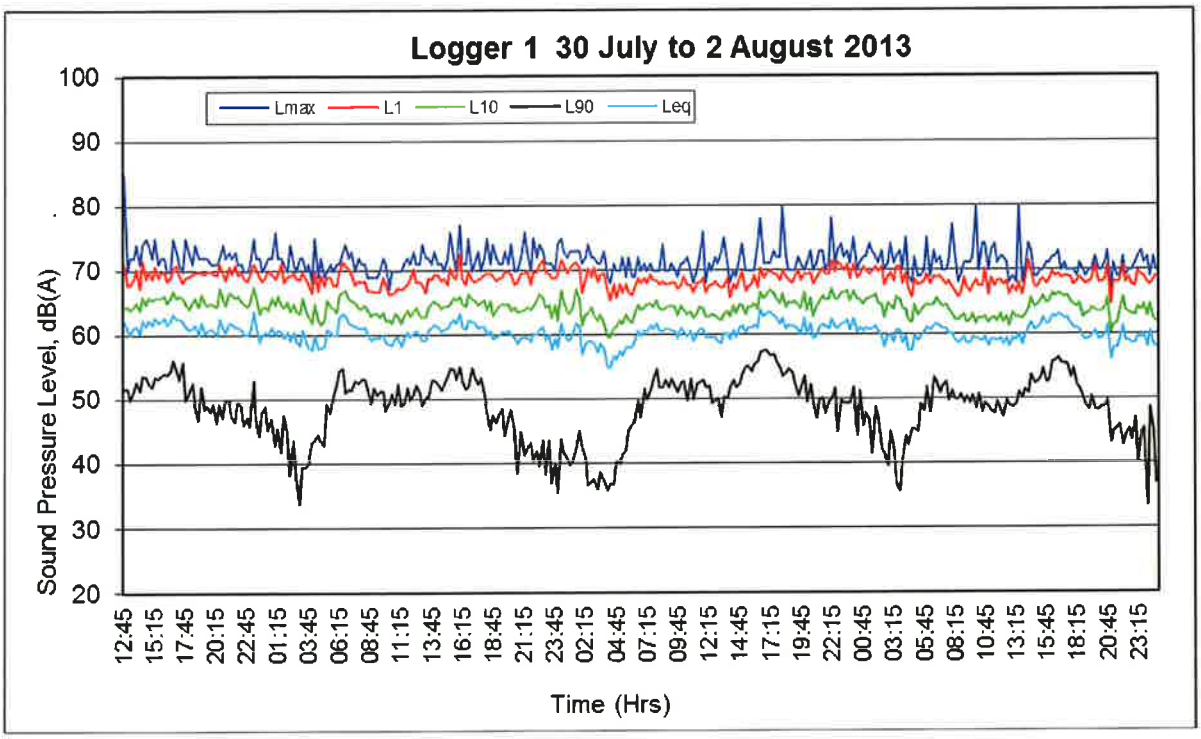


2011 Annual and Seasonal Wind Roses – Kempsey Airport

Appendix III

Noise Logger Locations and Charts

Noise Logging Locations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L10
L90
Leq
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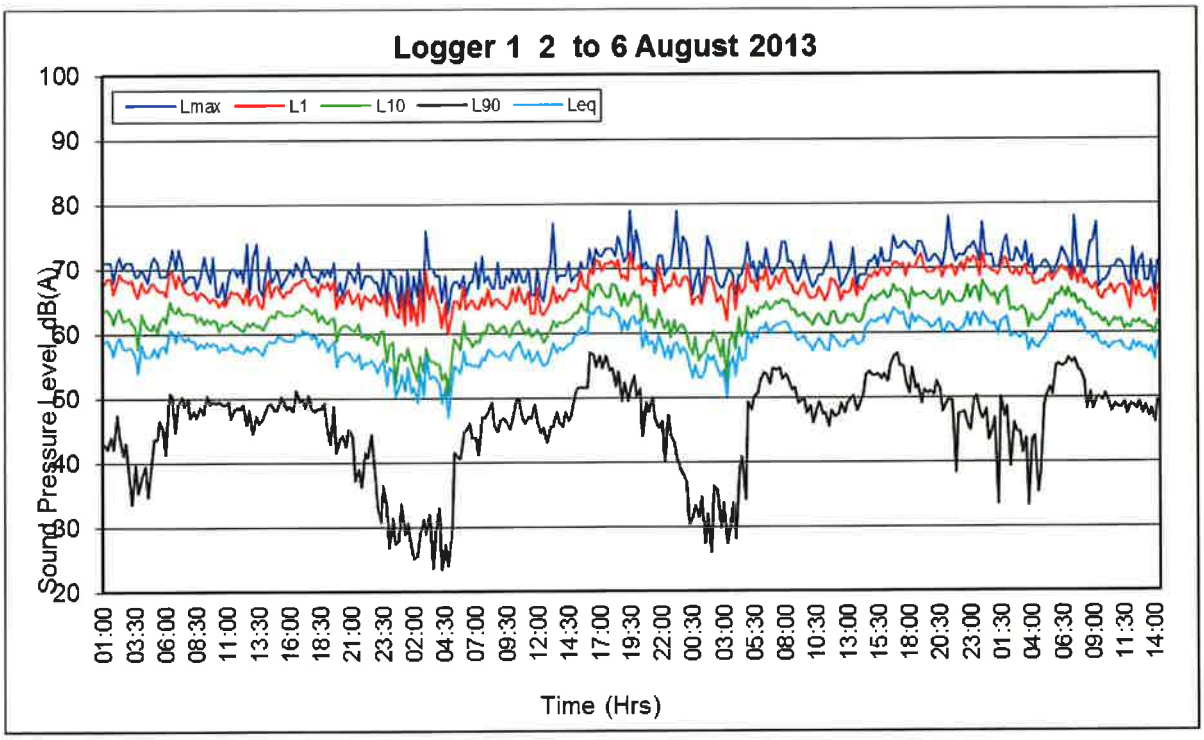
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Sound Pressure Level, dB(A)
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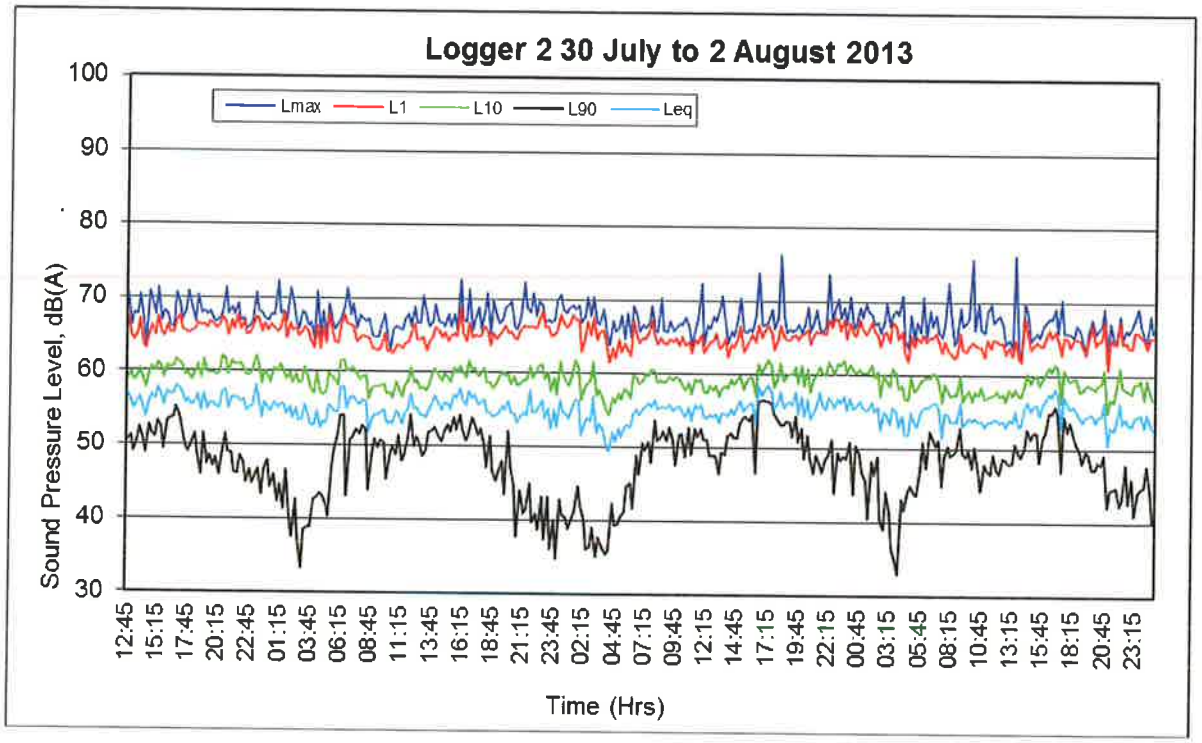
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Sound Pressure Level, dB(A)
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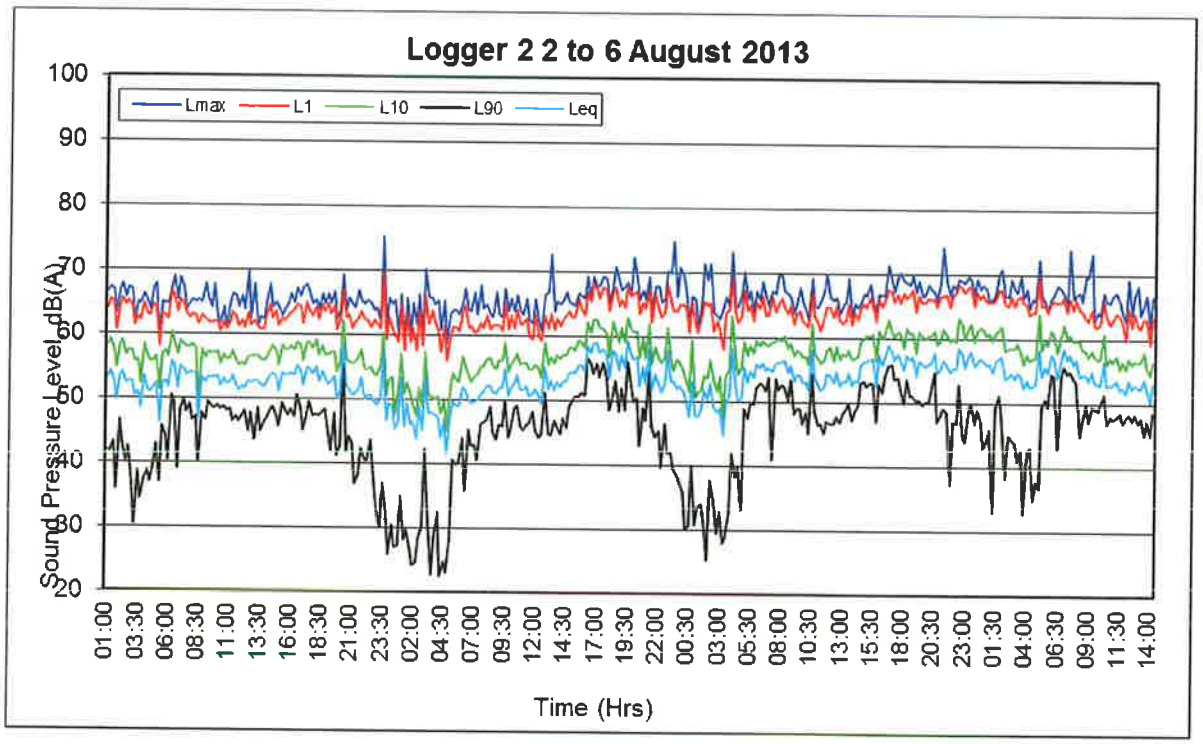
Logger 2 2 to 6 August 2013
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L1
L10
L90
Leq
Sound Pressure Level, dB(A)
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Appendix 7

Aboriginal Heritage Assessment by Archaeological Surveys and Reports Pty Ltd

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The archaeological re-assessment of Site #30-3-0111 Farrawell's Quarry, South Kempsey, NSW

John Appleton

ARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

JUNE 2014

ASR No. 558/14

For

R.W. Corkery & Co. Pty limited

On behalf of

PACIFIC BLUE METAL PTY LTD

ASR

This report has been compiled in 'Plain English', but presented in a format suitable for developing policies for the management of the cultural resources, and as a basis for scientific reference in future research studies.

Project No. 558/14

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Client: R.W. Corkery & Co. Pty Limited Pty
PO Box 239
Brooklyn 2803
02 9985 8511

- on behalf of:

Pacific Blue Metals Pty Ltd

All inquiries in regard to this report should be addressed to:

R.W. Corkery
02 9985 8511

Or to:

John Appleton
Archaeological Surveys & Reports Pty Ltd
16 Curtis Avenue
Armidale 2350
Tel. 02 6772 6512
Mobile: 0428 651 789
Email. japples@northnet.com.au

EXECUTIVE SUMMARY

This assessment was performed for R.W. Corkery & Co. Pty Limited (RWC) which has been engaged by Pacific Blue Metal Pty Ltd (PBM) to prepare an Environmental Impact Statement for proposed extensions to its existing operations at Farrawell's Quarry, south of Kempsey, Mid-north Coast, New South Wales.

RWC engaged Archaeological Surveys & Reports Pty Ltd (ASR) to undertake an inspection of the quarry site to relocate a site previously recorded in 1988 (AHIMS Ref. #30-3-0111: a copy of the Site Recording Form [SRF] is included as Appendix i) to identify any artefacts present, for the purpose of applying for an Aboriginal Heritage Impact Permit (AHIP) to salvage the artefacts. Salvage of the site is necessary to remove the current constraint the site presents to extending quarrying operations at the location of the site.

PBM proposes to extend extraction activities beyond the approved limit of extraction (covering 8ha) to the proposed limit of extraction (covering 15.8ha). To meet this objective PBM proposes to extend the depth of extraction within the existing approved extraction area by up to 8m. In doing so PBM will ultimately create a landform conducive to the long term Industrial Subdivision and extend the operational life of the quarry to 15 to 20 years.

Despite a thorough search of an area cleared of groundcover at the hub of the site no artefacts were found. ASR concludes that there are no artefacts at this location; or if there is that realistically they are not recoverable.

As a result of examining the location of Site #30-3-0111 ASR concludes that there are no artefacts to salvage, and that there is therefore no reason to apply for an Aboriginal Heritage Impact Permit to salvage artefactual material. Unfortunately there is no procedure by which the site can be "removed" from the AHIMS Site Register and in the absence of salvage the site record cannot be notated that the site has been "destroyed". As a consequence ASR recommends that the proposed quarry extensions should be allowed to proceed as there are no constraints of either an Indigenous cultural or archaeological scientific nature to the proposed works.

While no artefacts were found the proponents are advised that it is their responsibility to ensure that if any artefactual material becomes exposed and visible during the proposed works that they have a Duty of Care to avoid damage to both Aboriginal sites and the artefactual material they contain. To cause damage to a site or its contents without authorisation from OEH may lead to prosecution, and if found guilty, the offender may be fined and may be imprisoned. This may equally apply to the property owners, to their employees or to any sub-contractors they might engage.

1. If Aboriginal cultural objects are uncovered due to quarrying activities, all works must halt in the immediate area to prevent any further impacts to the object(s). A suitably qualified archaeologist and Aboriginal community representatives must be contacted to determine the significance of the object(s). The site is to be registered in the AHIMS (managed by NSW OE&H) and the management outcome for the site included in the information provided to the AHIMS. It is recommended that the Aboriginal community representatives are consulted in developing and implementing management strategies for all sites, with all information required for informed consent being given to the representatives for this purpose.

2. If human remains are located during the project, all works must halt in the immediate area to prevent any further impacts to the remains. The NSW Police, the Aboriginal community and NSW OE&H are to be notified. If the remains are found to be of Aboriginal origin and the police consider the site not an investigation site for criminal activities, OE&H should be contacted and notified of the situation and works are not to resume in the designated area until approval in writing is provided by NSW OE&H. In the event that a criminal investigation ensues, works are not to resume in the designated area until approval in writing (*has been received*) from NSW Police and NSW OE&H.

3. All reasonable efforts must be made to avoid impact to Aboriginal cultural heritage values at all stages of the works. If impacts are unavoidable, mitigation measures are to be negotiated with the Aboriginal community and NSW OE&H.

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1. INTRODUCTION

1.1 Background to the project

This assessment was performed for R.W. Corkery & Co. Pty Limited (RWC) which has been engaged by Pacific Blue Metal Pty Ltd (PBM) to prepare an Environmental Impact Statement for proposed extensions to its existing operations at Farrawell's Quarry, south of Kempsey, Mid-north Coast, New South Wales.

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PBM proposes to extend extraction activities beyond the approved limit of extraction (covering 8ha) to the proposed limit of extraction (covering 15.8ha). To meet this objective PBM proposes to extend the depth of extraction within the existing approved extraction area by up to 8m. In doing so PBM will ultimately create a landform conducive to the long term Industrial Subdivision and extend the operational life of the quarry to 15 to 20 years.

1.2 The Aboriginal site location

Firstly for practical purposes it is necessary to convert the 1988 map references on the SRF to the current format. When the site was recorded by archaeologist Brian Egloff in 1988 the largest scale Topographical map available was the 1: 25,000 scale "First Edition" of "Kempsey 9435-1-N", which was drawn up from aerial photography taken in 1981 and based on the *Australian Geodetic Datum 1966 (AGD66)*. The site reference recorded by Egloff using that map was Easting 483880 Northing 483880. Since then the Topographic map has been re-

issued twice and the current issue, "Kempsey 9435-1N" is based on aerial photography in 2009 and on the *Geocentric Datum of Australia 1994* (GDA94). The significance of the change is that Egloff's map references must be converted to GDA94 for it to be relevant to the current Environmental Impact Statement. The conversion requires that the Easting should be increased by 104 (metres) and the Northing by 188 (metres). Thus the converted site reference for site #30-3-0111 is **Easting 483984, Northing 6556818**. This location is shown in **Figure 1** which is the current issue of the Kempsey Topographic map.

Figure 1 is detail from a Topographic map of the general area showing the location of the Project Site; **Figure 2** is an aerial photograph showing the site as it was photographed on 25th February 2014, **Figure 3** is detail from the aerial photograph showing Site #30-3-0111, and **Figure 4** shows the proposed quarry site layout and the landform profiles after the site has been rehabilitated upon completion of the quarrying operations from the proposed extensions.

1.3 Potential impact from the proposed quarrying operations

The potential impact from the proposed operations will be that the location of Site #30-3-0111 will be destroyed.

1.4 Objectives of the site re-assessment

The purpose of the site inspection was to relocate any artefacts that might be present to determine whether it would be necessary for PBM to apply for an Aboriginal Heritage Impact Permit (AHIP) in order that the artefacts could be salvaged.

1.5 Report structure

In accordance with the "National Parks and Wildlife Amendment (Archaeological Investigations) Regulation 2010" and "Guide to investigating, assessing and reporting on Aboriginal Cultural heritage in NSW (Office of Environment & Heritage, 2011), with minor

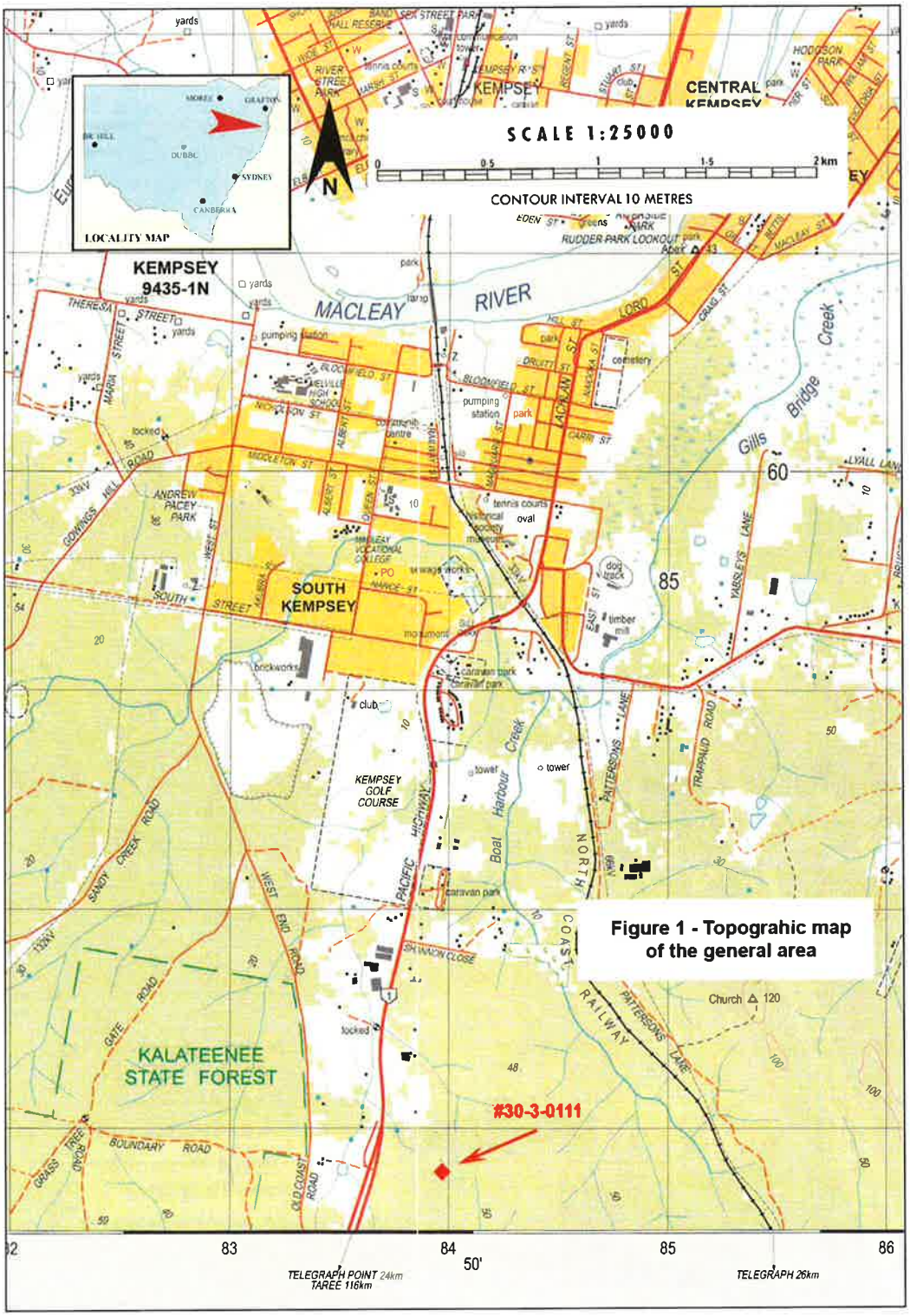

Figure 1 - Topograhic map of the general area

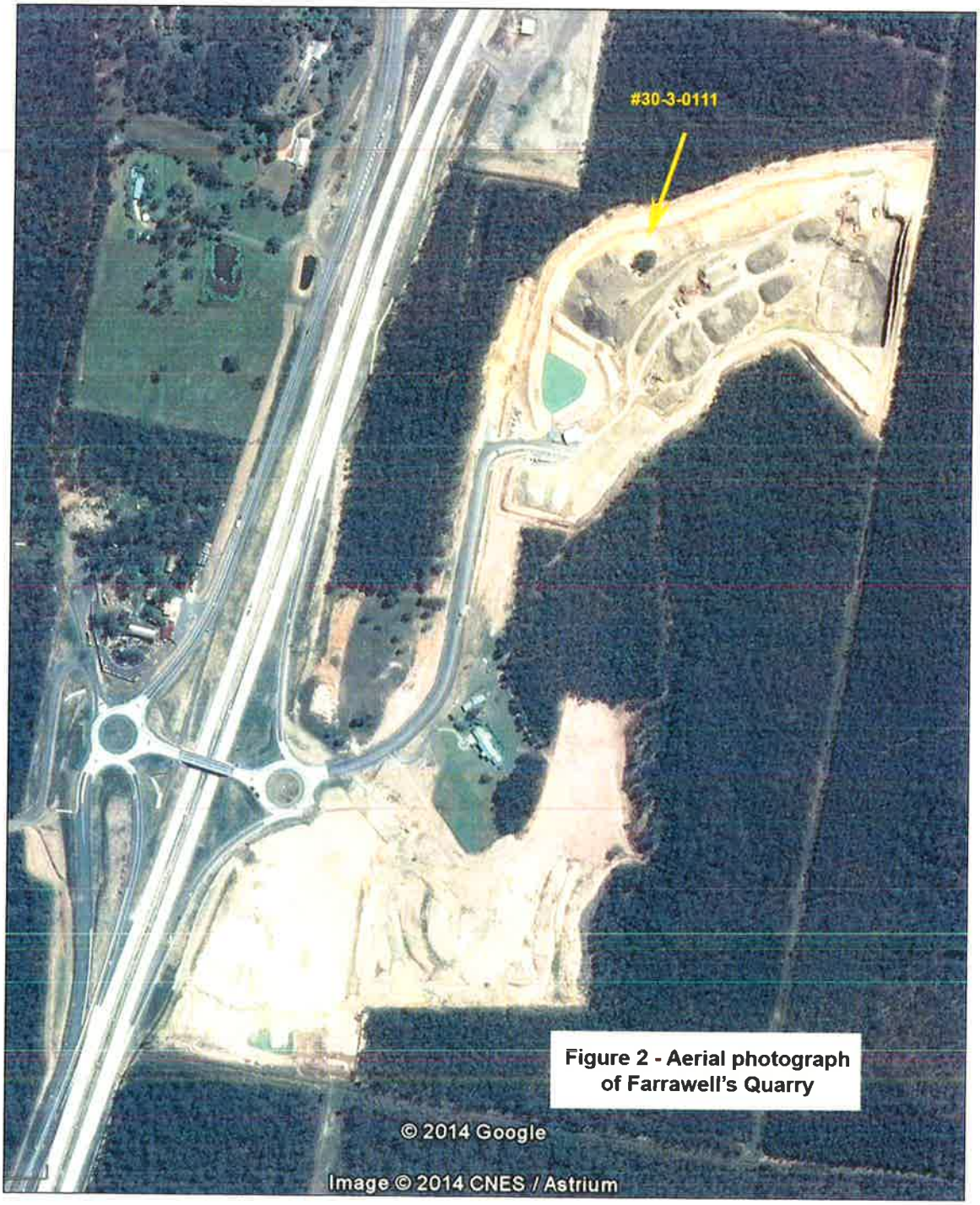

Figure 2 - Aerial photograph of Farrawell's Quarry

Figure 3 - Detail from the aerial photograph

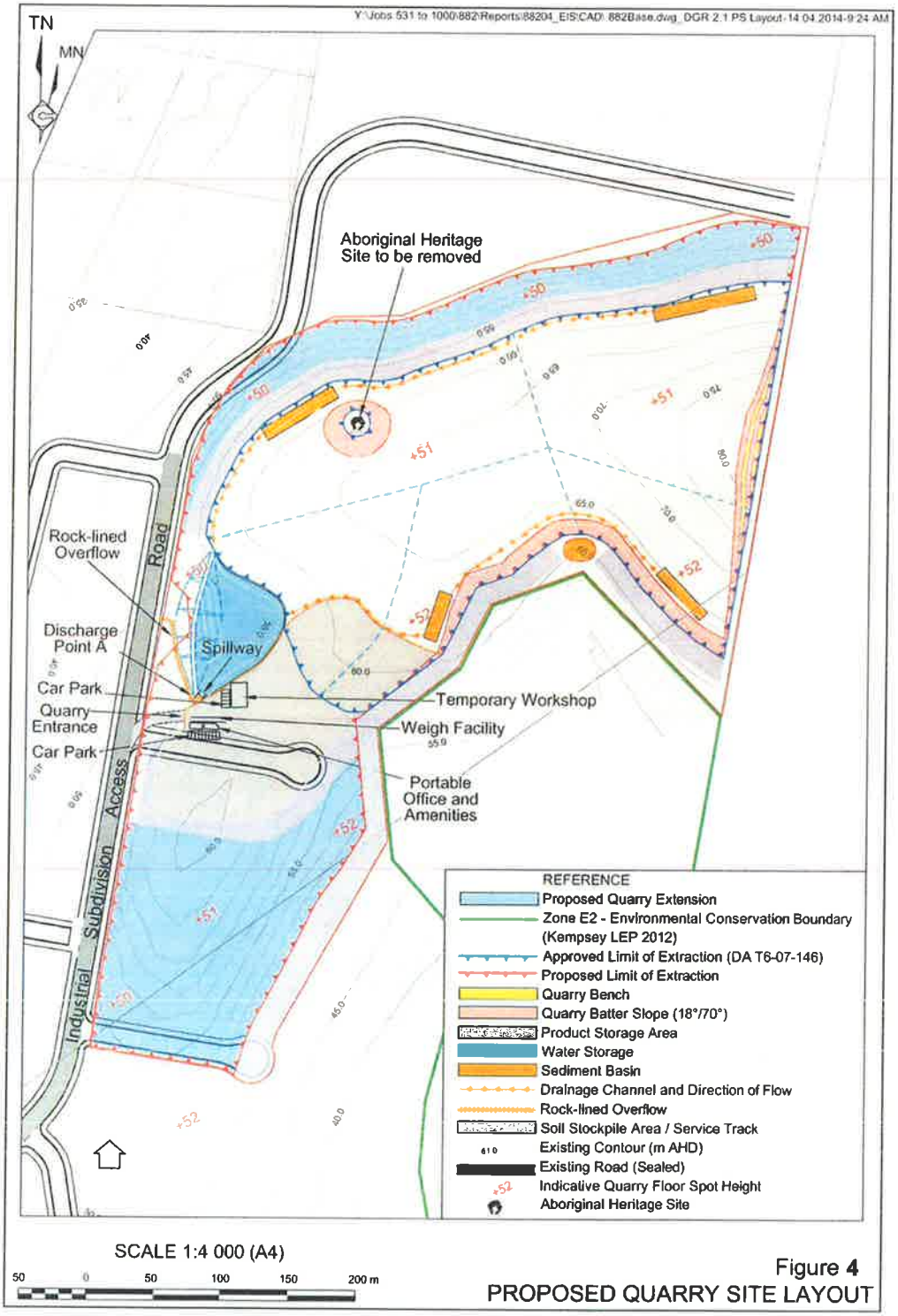

Figure **4**
PROPOSED QUARRY SITE LAYOUT

changes to the suggested structure and contents, the report is presented in the following format:

1.6 Proposed methodology

The proposed methodology for relocating the site and its contents was to:

- Make a detailed study of the brief and supporting documentation to identify the known facts of the project and the results of any preliminary work undertaken by surveyors and other consultants.
- Use the Topographic map to identify the topographic features and environments both in the project site and in the surrounding area.
- Use Metallogenic maps and Geological maps to identify the stone material underlying the top-soils in the survey area.
- Refer to Jeans (1986) and Charman & Murphy (1991) to identify soil types, vegetation types and environment types for the purposes of developing a Predictive Model for Site Location.

- Develop a Predictive Model for Site Location in the project site.
- Visit the site to identify any surface manifestations of the presence of archaeological material, and to identify any locations in which Potential Archaeological Deposits (PADs) might occur.
- Write a report of the results of performing the above and assess the potential for the presence of archaeological material likely to present a constraint to the proposed quarry extensions; and make clear and concise recommendations as to the preferred option for the future management and development of the project site.
- Consult with registered Aboriginal stakeholders with an interest in the Project Site.
- For that purpose distribute a draft copy of the site relocation report to each of the registered Aboriginal stakeholders to give them the opportunity of providing any cultural information directly related to the Project Site.
- Recommend an appropriate management strategy for the avoidance, mitigation of impact, or if necessary the salvage of any archaeological material that will be impacted by the proposed subdivision.
- Advise the proponents as to their obligations under the "National Parks & Wildlife Act 1974" (as amended), "Code of Practice for Archaeological Investigation in NSW 2010" and the penalties that may apply in the event that any unauthorised 'harm' occurs to any sites or cultural objects located within the survey area.

2. CODES OF PRACTICE: NSW OEH REQUIREMENTS FOR ARCHAEOLOGICAL ASSESSMENTS AND INVESTIGATIONS

Recent legislated amendments to the National Parks and Wildlife Act 1974 (as amended), and the introduction of Codes of Practice, and Due Diligence, have established new procedures for how archaeological assessments should be undertaken and reported; and re-defined the procedure to be followed in consulting with Aboriginal stakeholders. These are briefly summarised below.

2.1 "Code of Practice for Archaeological Investigation in NSW 2010"

The purpose of *National Parks and Wildlife Act 1974, Part 6* – "Code of Practice for Archaeological Investigation in NSW" is twofold. The standard procedure is:

- To establish the requirements for undertaking test excavation as part of archaeological investigation without an AHIP (Aboriginal Heritage Impact Permit for Section 90 Consent to destroy by salvage).
- To establish the requirements that must be followed when carrying out archaeological investigation in NSW where an application for an AHIP is likely to be made.
- The Code is applied **when further investigation** (such as subsurface investigation) is necessary, and when the proposed activity will be undertaken to support a **development application** under the *Environmental Planning and Assessment Act 1979*.

For the purposes of relocating the site it was only necessary to obtain a copy of Egloff's original Site Recording Form, and with the use of a Topographic map and Google Pro aerial photographic images prior to visiting the site to ground-proof Egloff's findings.

2.2 "Due Diligence Code of practice for the Protection of Aboriginal Objects in NSW 2010".

The purpose of this code of practice is to assist individuals and organisations to exercise due diligence when carrying out activities that may harm Aboriginal objects and to determine whether they should apply for consent to salvage in the form of an Aboriginal Heritage Impact Permit (**AHIP**).

If Aboriginal objects are present or likely to be present and an activity will harm those objects, then an **AHIP** will be required.

> *"If you have followed this code and at any point have reasonably decided that an AHIP application is not necessary either because Aboriginal objects are not present or, if they are present, harm to those objects can be avoided, you can proceed with caution.*

If, however, while undertaking your activity you find an Aboriginal object you must stop work and notify OE&H and you may need to apply for an AHIP. Some works may not be able to resume until you have been granted an AHIP and you follow the conditions of the AHIP. Further investigation may be required depending on the type of Aboriginal object found.

If human skeletal remains are found during the activity, you must stop work immediately, secure the area to prevent unauthorised access and contact NSW police and OE&H" (DECCW 2010).

2.3 "National Parks and Wildlife Amendment (Archaeological Investigations) Regulation 2010".

The amendments provide detailed procedural instructions for how sites should be recorded and how investigations should be reported in order to provide consistency and transparency in archaeological investigations. The Aboriginal consultation undertaken for this project is in accordance with the new standards, and the report has been structured as per the new directive, only minor changes having been made to the recommended sequence of "chapters" to provide a more logical sequence.

2.4 "Guide to investigating, assessing and reporting on Aboriginal Cultural heritage in NSW (Office of Environment & Heritage, 2011).

A guide to the procedure for investigating, assessing and reporting on Aboriginal Cultural heritage. This procedure was released in April 2011.

3. ABORIGINAL CONSULTATION

On 29th[t] May 2014 letters were sent to the following departments and agencies: Planning and Aboriginal Heritage Section - Northeast (OE&H); National Native Title Tribunal (NNTT); Kempsey Local Aboriginal Land Council (LALC); Kempsey Shire Council; NTSCorp; NSW & ACT Registry; Northern Rivers CMA; and Office of the Registrar, ALRA, requesting that they provide lists of registered Aboriginal stakeholders for the area. A copy of an example of the letter, and the search form for NNTT are included as **Appendix ii**. Northern Rivers CMA has previously advised ASR in other projects that it should not be included as an addressee in providing a list of Aboriginal stakeholders but as the guidelines require that CMAs should be included as an addressee it was included in this project to comply with the guidelines. Also on 30th May 2014 an advertisement was placed in the "*Macleay Argus*", inviting all Aboriginal stakeholders with an interest in the project to register their interest. A copy of the advertisement as it appeared in the newspaper is included as **Appendix iii**.

As a result of the responses from the government departments and agencies and to the advertisement the following registered stakeholders were identified.

STAKEHOLDER	CONTACT	DETAILS
Benelongs Haven Limited	Val Carroll	Kinchela Creek, via Kempsey 2440 Tel. 6567 4856 Fax.6567 4932
Booroongen Djugun Aboriginal Corporation	Garry Morris	Locked Mail Bag 2, Kempsey 2440 Tel. 6562 5556 Fax. 6562 7078 Email. booradmin@midcoast.com.au
DFTV Enterprises	Derrick Vale Sr	5 Mountbatten Close, Rutherford 2320 Mob. 0438 812 197 Email: deckavale@hotmail.com
Dunghutti Elders Council Aboriginal Corporation	Board of Directors	PO Box 179, Kempsey 2440 Tel. 6562 2855 Email: decac1@onestream.com.au
Goori Galbans Aboriginal Corporation	Madeline Donovan	3/4 John Street, Kempsey 2440 Tel. 6562 1867, Fax. 6562 1561

Guri Wa Ngundagar Aboriginal Corporation	Noel Lockwood	PO Box 115, Kempsey 2440 Tel. 6562 8291 Fax. 6562 1620 Email: gwn@tsn.cc
Mirriwinni Gardens Aboriginal Academy	Fay Oliver	Private Mail Bag, Kempsey 2440 Tel. 6567 2011 Fax. 6567 2106
Ngarramang-Kuri Aboriginal Culture and Heritage Group	Abie Wright	21 Bancroft Street, Glendale 2285 M0b. 0466 589 238
Nulla Nulla Boongutti Aboriginal Corporation	Mervyn Cohen or Elizabeth Cohen	Willawarren Post Office via Kempsey 2440 Tel & Fax.. 6567 2137
Pandanus People Inc.	Shirley Doyle	1 Mayta Moran Fig Tree Reserve, South West Rocks Tel. 6566 6893
HSB Heritage Consultants	Patricia Hampton	35 Larool Street. South Tamworth 2340 Mob. 0424 142 216 Email: pamelaann@live.com.au
Kempsey Local Aboriginal Land Council	Jo Kelly	PO Box 540, Kempsey 2440 Tel. 6562 8971: Email klalc ceo@bigpond.com
South Kempsey Aboriginal Men's Group Aboriginal Corporation	Raymond Donovan	76 Middleton Street, South Kempsey 2440 Tel. 6562 8129
South West Rock Aboriginal Corporation	Edward Moran	4 Crystal Place, South West Rocks 2431 Mob. 0401 375 525 Email: Shanny.moran@hotmail.com

Table 1 – List of registered stakeholders.

In its response to the enquiries the Office of the Registrar, ALRA advised that its records did not list any Registered Aboriginal Owners. And the National Native Title Tribunal advised that there were no stakeholders registered in the National Native Title Register, nor were there any Native Title Claims, nor Unregistered Claimant Applications, nor any entries in the Register of Indigenous Land Use Agreements with regard to the Project Site (**Appendix iv**).

There is no requirement in the "Code of Practice for Archaeological Investigation in NSW" for Aboriginal participation in the field inspection when undertaking an archaeological assessment, however the Code of Practice of the Australian Association of Consulting Archaeologists Inc.

(AACA) requires that there should be Aboriginal consultation for all investigations in New South Wales (which includes assessments).

In order to comply with this requirement a draft copy of this report was sent to each of the registered Aboriginal stakeholders by **registered post** on **7th July 2014** requesting that they review the report, and provide any cultural information directly relevant to the Project Site for consideration in the final assessment (**Appendix v**). They were also informed that on the morning of **Wednesday 30th July 2014,** 23 days after the draft report had been sent to them that they could visit the site with the archaeologist in order that they could see for themselves that the site location today is significantly different to the way that Egloff described it in 1988 and that no artefacts are likely to be recoverable if present.

No stakeholders responded or attended the quarry on the 30th July.

Although there had been no response to the draft report, nor had any of the stakeholders attended the site there was still the possibility that there might have been a reason why people who had wanted to visit the site had been unable to because of circumstances: Perhaps the most likely reason being that there had been a funeral for someone from the Kempsey Aboriginal community. It was therefore decided to give every stakeholder another opportunity to visit the site, and that a letter should be sent to each of them informing them that they could visit the site on Friday 8th August 2014. A copy of the letter is included as **Appendix vi**.

No stakeholders responded or attended the quarry on 8th August.

It was concluded that the Aboriginal stakeholders were satisfied with the draft report and had no information to add that should be taken into account in the re-assessment of the site.

4. THE ARCHAEOLOGICAL RECORD

4.1 Site #30-3-0111

The Site Recording Form (SRF) for Site #30-3-0111 (**Appendix i**) contains information that is relevant to understanding the circumstances and context in which Egloff recorded the site. The items of note are as follows (for a description of the different site types refer to **Appendix vii** – Site types):

- Egloff was undertaking the survey, "as part of Kempsey Shire Heritage Study".
- No photographs were taken because it was raining.
- Egloff wrote that "the site was, "most likely not known to local Aborigines" – from which we can assume that his survey was not done with Aboriginal Sites Officers or representatives.
- The site, "lies on access track used to service electricity line"
- The site lies in a cleared paddock in grass and bracken.
- The site "consists only of a scatter of chert and quartz flakes".
- The site occurs on, "decomposing shales".
- The site consists of, "say a dozen ... quartz flakes and two highly weathered chert flakes in an area roughly 25m by 25m".
- The artefacts "were discovered in the ruts of a track".
- "Due to vegetation cover it was impossible to tell the extent and if there was any stratigraphy".
- Egloff did not attach a sketch map or a mud map of the site that would have shown the distribution and location of the objects he described as "flakes".

Each of these observations is addressed in the following text.

4.2 The factors that influence the context of the archaeological record

Sites are usually only found when there are archaeological investigations for development, and so the distribution tends to represent only those areas that have been investigated. Also, artefacts are usually only found where there is good archaeological visibility at the time of the survey. Land use and the extent to which the surface deposits have been altered might also affect whether or not artefacts are observable.

Not all archaeological investigations are of areas, but might be of strips of land for roads, communication cables, powerlines, gas pipelines, etc. And the technological changes that have occurred since 1974 (when the National Parks & Wildlife Act 1974 was enacted) have been seen in more detailed mapping, high resolution aerial photographs, the introduction of 1: 25,000 scale maps, more accurate site recording, and increased skills of archaeological consultants.

It should also be noted that the Aboriginal Heritage Information Management System (AHIMS) Aboriginal Sites Register has been transposed to different computer software programmes at least three times in the last 20 years and many transposition errors have occurred, with the result that many site map references are now erroneous and place the sites in locations many kilometres from where they were actually recorded. A transposition of one digit in a site reference can 'misplace' a site by up to 10,000m.

5. THE ENVIRONMENTAL CONTEXT

Any discussion of the likely presence of Aboriginal cultural remains or of the basis why such remains might be discovered must be within the context of the environment and the resources that would have been available to any Aboriginal occupants of the area.

5.1 The general geology and topography

The Project Site occurs on the northern half of the Hastings Block on the Permo-carboniferous unit known as the "Kempsey Beds". This unit comprises, "lithic sandstone, mudstone, pebbly sandstone and minor conglomerates" (Department of Mineral Resources 1987). It is worth noting that conglomerates include all rock types including quartz and chert. Egloff described the prevailing rock type to be shale, but Milford (1999) defines shale as, "a fine-grained detrital sedimentary rock which is typically laminated, well cleaved and easily split into layers". Shale is therefore not an appropriate description of the rock at this location and as the metallogenic map for this area clearly shows the location to be of "Kempsey Beds", the site location would be better described as comprising "pebbly sandstone and minor conglomerates of the Kempsey Beds".

The site was located on the middle slopes of a north-westerly trending spur that drained towards the northwest into a northerly flowing tributary of Boat Harbour Creek.

The site was located at approximately 62m AHD elevation with a north-westerly aspect.

5.2 Vegetation

As **Figure 1** shows the quarry site occurs in a forested area but the Topographic map was drawn up on aerial photography of 2009; but Egloff described the environment in 1988 as being "cleared paddock". We can therefore assume that between 1988 and 2009 what had been cleared paddock in 1988 was left fallow soon after and that the aerial photograph of 2009 was of 21 year old or younger regrowth or plantation forest.

5.3 Water resources

As described previously Site #30-3-0111 occurs on the mid-slope of a spur and so no run-off would have been retained in the vicinity of the site and unless there had been heavy rain and springs had developed upslope the nearest reliable potable water would have been in wells dug in the marshes around Gills Bridge Creek some two and a half kilometres to the north. The Macleay River would have been heavy with silts after heavy rain and the water undrinkable, but pits or wells dug in the swamps would have produced drinkable water as the swamp silts would filter out any colluvial minerals and impurities.

5.4 Stone resources

As described previously Site #30-3-0111 occurs on "Kempsey Beds" - a unit which in part comprises conglomerates. Conglomerates typically might include pebbles both whole and in fragments of quartz, quartzite, chert, mudstone, jasper, chalcedony, agate, greywacke, granite, sandstone, volcanics and other igneous rock types, etc. Any of these might have been potential source material for knapping into tools or weapons but from the size of the pebbles visible in the stock heaps of the quarry the pebbles in the vicinity of the site were too small to have been knapped (see also Image 16 on page 21).

5.5 Previous impacts

Egloff described the site location as being a cleared paddock. For it to have been cleared the trees of the native woodland that occupied the paddock before it was cleared, would have been felled and the timber bulldozed into heaps and then either burnt or trucked away. The stumps and their roots would then have been dragged out by tractors and trailing chains or pushed out with bulldozers and then burnt or removed. Following that the uneven ground would firstly been raked to clear the felling detritus and then harrowed to level the surface out. All of these disturbances would have smashed many of the conglomerate pebbles and created many fragments.

Egloff also refers to an access track to the electricity lines. Heavy maintenance vehicles would have caused further fragmentation of the pebbles.

As the following images show the ground surface has also been disturbed by rabbits and by termites.

6. THE SITE VISIT

6.1 Locating Site #30-3-0111

In most situations relocating a particular site location precisely can be difficult but in this instance the site had been enclosed by a circle of star pickets with a diameter of 30m, around which a further 2m buffer zone had been left to prevent inadvertent mechanical damage to the site or the star pickets. The entire area within the 34m diameter protected circular area supported a copse of eucalypt regrowth varying from trees with 50cm diameter trunks down to recent saplings. The site thus stood out in the aerial photographs (refer to **Figures 2 and 3**) and was clearly visible from the ground. Once at the site a white stake marked "SCATTER SITE" at the centre of the circular area marked where Egloff considered was the centre of the artefact scatter.

6.2 The search for artefactual material

Having read the SRF for Site #30-3-0111 it was clear that the condition and environment of the site was significantly different from that described by Egloff in 1988. In addition to the regrowth there was now a deep groundcover of fallen branches, grasses, weeds and a 3cm-deep compacted "carpet" of leaf litter and leaf detritus. There were also holes and small heaps of the soil removed by rabbit scratching, and a termite mound.

In order to relocate any of the recorded flakes it was necessary to remove the accumulate leaves and branches from around the central stake. As this would merely expose the ground surface and did not involve excavation an Aboriginal Heritage Impact Permit (AHIP) was not required. Egloff had recorded material on the ground surface and the removal of leaves and branches was simply to re-expose the ground surface.

Firstly, the loose fallen branches were carefully removed by hand from a roughly circular area approximately 3 - 3.5m diameter centred on the white stake, and laid to one side. The loose leaves were then carefully removed by hand and cast to one side. Next the less-loose or more compacted leaves were whisked to the sides using a 75mm wide soft-bristle paint-brush. That left a thin layer of leaf detritus which was carefully whisked away in short light strokes so as to cause the least disturbance to the underlying soils, however once the detritus was removed it

was clear there was no soil, just a compacted angular pebble surface. All loose pebbles were inspected to see whether or not they were artefactual, but no artefacts were found.

Following the thorough inspection of the cleared area it was concluded that there were no artefacts present within the cleared area at the centre of the site.

6.3 Recording the search

All relevant observations as to the vegetation cover, and conditions, were recorded with a Panasonic "Lumix" DMC-TZ7 Digital Camera, to record the character of the site, and to witness conditions.

6.4 Constraints to search effectiveness.

Archaeological visibility was initially a constraint to relocating artefactual material. Prior to removal of the fallen braches, leaves and leaf detritus archaeological visibility was zero, but once they had been removed there was no constraint to archaeological visibility within the cleared area.

The following series of digital images record various aspects of the search for artefactual material at Site #30-3-0111.

Image 1 – Approaching the site from the south west.

Image 2 – Approaching the site from the northwest

Image 3 – Star pickets marking the outer limits of the site, with the centre stake beyond and to the right

Image 4 – The white stake marking the centre of the site.

Image 5 – The fallen dead branches and loose leaf litter has been removed.

Image 6 – The leaf detritus has been removed. Cleared area viewed from the northwest The scale is 3m long.

Image 7 – The cleared surface viewed from the Southwest. Scale is 3m long

Image 8 – Close up showing the exposed conglomerate.

Image 9 – Departing view of the cleared centre area, a termite mound, and a fallen tree.

7 THE RESULTS OF THE SITE VISIT

No artefactual material was found in the area cleared at the centre of the site, which can reasonably assumed to have been placed at the centre of the artefact scatter recorded by Egloff.

8. DISCUSSION

8.1 The shortcomings of the 1988 SRF

Since 1988 there have been a number of changes to the guidelines issued firstly by NPWS and more recently by OEH as to how Aboriginal sites should be recorded and to the standards expected from consultant or professional archaeologists, however, even allowing for the changes the information provided in the SRF falls short of the basic information that might be expected in a Site Recording Form.

Firstly, no photographs were taken. There are no conditions so adverse that a photograph cannot be taken, and however detailed a site description may be it will never provide the depth of information provided by a photograph.

The description of the rock type as "shale" is completely misleading. If it was shale then quartz and chert objects would certainly not be background material; but as the background material is conglomerate both quartz and chert could be expected to be present naturally.

The description of all of the artefacts as flakes suggests that the recorder was not fully conversant with stone artefact identification. It would be almost unique if a site contained only flakes – which are diagnostically the most clearly identifiable artefact type between flakes and flaked pieces and are generally present in smaller numbers than flaked pieces. It would also be extremely rare for every quartz artefact to be a flake, and if they were then the unusualness of the assemblage would have warranted a different description than the site, "consists *only* of a scatter of chert and quartz flakes".

The absence of any dimensions or detailed descriptions for any of the artefacts including such important features such as percentage of cortex, of at least the two chert artefacts is an

important omission. Rain is a nuisance in the field but the full details of perhaps 14 objects could be recorded in less than 10 minutes.

The description of the site as being 25m by 25m implied that it was roughly rectangular but the area enclosed by the star pickets was circular which doesn't seem to follow, and if a buffer zone was added to the 25m x 25m area then it would have been more than 34m diameter.

The absence of a sketch map or "mud map" – even if added at a later time when out of the rain, would have been useful, particularly as there were no photographs.

9. SIGNIFICANCE ASSESSMENT

The NSW OE&H policy to safeguard all sites, Aboriginal places, and archaeological material of significance wherever possible requires that some means of assessing the significance of the sites is necessary. This is not only for the purpose of determining whether the proposed development can proceed as proposed, but also to provide Cultural Resource Managers with the information for future management of the area.

9.1 Cultural significance

The Aboriginal or cultural significance of Aboriginal relics and sites can only be assessed by the Aboriginal community, and in particular, the Elders. It is the responsibility of the archaeologist to ensure that the Elders or elected representatives of the Aboriginal community are advised of the survey results, and are consulted as to their knowledge and opinion of the significance of the area, and to transcribe and present those expressions in report form.

As referred to previously, a copy of the draft of this report was sent to each of the registered Aboriginal stakeholders for review and comment on **7th July 2014** to provide them with the opportunity to provide any information of a cultural nature directly relating to the Project Site, so that it could be considered in the final recommendations of this report.

No responses were received either to the draft report or to two invitations to attend the site. It is therefore concluded that the "site" is of no cultural significance.

9.2 Research potential

In the absence of artefacts there is nothing to assess.

9.3 Educational potential

In the absence of artefacts there is nothing to assess.

9.4 Aesthetic value

In the absence of artefacts there is nothing to assess.

9.5 Uniqueness and/or rarity

In the absence of artefacts there is nothing to assess.

10. IMPACT ASSESSMENT

In the absence of artefacts there is nothing to assess.

11. MANAGEMENT AND MITIGATION MEASURES.

In the absence of artefacts in Site #30-3-0111 there is nothing to manage or mitigate damage to. However, while no artefacts were found the proponents are advised that it is their responsibility to ensure that if any artefactual material becomes exposed and visible during the proposed works that they have a Duty of Care to avoid damage to both Aboriginal sites and the artefactual material they contain. To cause damage to a site or its contents without

authorisation from OEH may lead to prosecution, and if found guilty, the offender may be fined and may be imprisoned. This may equally apply to the property owners, to their employees or to any sub-contractors they might engage.

12. RECOMMENDATIONS

As a result of examining the location of Site #30-3-0111 ASR concluded that there are no artefacts to salvage, and that there is therefore no reason to apply for an Aboriginal Heritage Impact Permit to salvage artefactual material. Unfortunately there is no procedure by which the site can be "removed" from the AHIMS Site Register and in the absence of salvage the site record cannot be notated that the site has been "destroyed".

ASR was aware that some of the registered Aboriginal stakeholders might not agree with the conclusions reached in this report without firstly visiting the site for themselves. A letter was sent to each stakeholder inviting them to review the draft report and to visit the site; however no one took the opportunity to visit the site or to provide any information additional to that contained within this report. It was therefore concluded that there were no constraints on cultural grounds to the proposed quarrying of the recorded site location.

As a consequence of this re-investigation of site #30-3-0111 ASR recommends that the proposed quarry extensions should be allowed to proceed as there are no constraints of either an Indigenous cultural or archaeological scientific nature to the proposed works.

13. CONCLUSION

While this assessment has resulted in no artefactual material being found there remain obligations that the quarry operators should be aware of. As in all earthmoving projects the quarry operators are advised NSW OE&H has made the following recommendations in relation to any earthwork-operations as additional Statements of Commitment or as conditions of approval as appropriate:

1. If Aboriginal cultural objects are uncovered due to quarrying activities, all works must halt in the immediate area to prevent any further impacts to the object(s). A suitably qualified archaeologist and Aboriginal community representatives must be contacted to determine the significance of the object(s). The site is to be registered in the AHIMS (managed by NSW OE&H) and the management outcome for the site included in the information provided to the AHIMS. It is recommended that the Aboriginal community representatives are consulted in developing and implementing management strategies for all sites, with all information required for informed consent being given to the representatives for this purpose.

2. If human remains are located during the project, all works must halt in the immediate area to prevent any further impacts to the remains. The NSW Police, the Aboriginal community and NSW OE&H are to be notified. If the remains are found to be of Aboriginal origin and the police consider the site not an investigation site for criminal activities, OE&H should be contacted and notified of the situation and works are not to resume in the designated area until approval in writing is provided by NSW OE&H. In the event that a criminal investigation ensues, works are not to resume in the designated area until approval in writing (*has been received*) from NSW Police and NSW OE&H.

3. All reasonable efforts must be made to avoid impact to Aboriginal cultural heritage values at all stages of the works. If impacts are unavoidable, mitigation measures are to be negotiated with the Aboriginal community and NSW OE&H.

GENERAL GLOSSARY:

The definitions that follow are for terms used in this and other reports written by the author, and do not necessarily apply to their use in different contexts.

ADZE : A modified flake with at least one steeply-retouched working edge. While all adzes are generally considered to be wood-working tools it is probable that some also served as cores and others as scrapers. Adzes with a uniform butt were frequently hafted to make a chisel-like tool, but the intended use of the adze determined the size of the adze and whether it was hafted (Flenniken and White, 1985).

ARCHAEOLOGICAL DEPOSIT :
Sediments which contain evidence of past Aboriginal use of the place, such as artefacts, hearths, burials etc.

ARTEFACT : Any object that has attributes as a consequence of human activity (Dunnell, 1971). In this report 'artefacts' has been used generally to describe pieces of stone that have been modified to produce flakes, flaked pieces, cores, hammerstones, or axes.

BACKED BLADE :
A stone tool manufactured from a flake on which one margin has been modified by the removal of small flakes to blunt the edge or margin opposite the cutting edge.

BORA GROUND :
A ceremonial site comprising of one or two connected circles composed of compacted or mounded earth, or defined by an arrangement of stones, of 2 to 30m diameter, generally used in male initiation rites.

CAMPSITE : A place at which the density of artefacts and the variety of material indicates that people 'frequently' used the place as a stopping or resting place. Such places are also likely to contain or be close to water resources, food resources, or stone material resources. In this report a campsite is used to describe artefact scatters that are associated with hearths or fireplaces, as distinct from scatters that are not associated with hearths or fireplaces, which are described as Open Scatters.

CHALCEDONY :
A form of silica (partially translucent), which occurs as linings in cavities in rocks. When banded it is known as AGATE (Department of Mines, 1973). Chalcedony is uniformly coloured and agate has curved bands or zones of varying colour (Cook & Kirk, 1991).

CHERT : Another name for sedimentary chalcedony. It occurs most frequently in limestones, or in marine sedimentary rock, or as pebbles in sedimentary rock. In its depositional context it is often concentrated in bedding planes. Chert found in deep-water limestones is formed from radiolaria and diatoms (siliceous planktonic micro-organisms) (Cook & Kirk, 1991).
Chert is a form of amorphous or extremely fine-grained silica, partially hydrous, found in concertions and beds. It is classified as a chemical sedimentary rock although it may be precipitated both organically and inorganically (Department of Mineral Resources, n.d.).

CONGLOMERATE :
Naturally cemented gravel. Conglomerate is a coarse-grained clastic sedimentary rock composed of generally rounded fragments of other rock types larger than 2 mm in diameter, set in a fine-grained matrix of sand, silt, or any of the common natural cementing materials (Department of Mineral Resources, n.d.).

CORE : A piece of stone from which flakes have been removed, that cannot otherwise be described as a retouched or modified artefact.

CORTEX : The naturally altered surface of stone – e.g. the water-worn surface of river pebbles.

DEBITAGE : The small waste material observed in knapping floors. Generally, waste material is described as all those fragments having a maximum dimension of less than 10mm.

FLAKE : A fragment of stone exhibiting features indicating that it has been deliberately removed from a core piece. These features are evident as:

i) Platform: Plane or point at which a blow was delivered to remove the flake.
ii) Bulb of Percussion: Convex surface that occurs on the face or ventral surface of a flake, radiating from the point of impact, produced as a consequence of the force pattern.
iii) Eraillure: see below.

Other terms:

i) Dorsal: The back or outer face of a flake as it would have been prior to removal from a core. Frequently either ridged or exhibiting negative flake scars when removed in secondary flaking, with a natural weathered cortex when removed in primary flaking.
ii) Ventral: The 'chest' or inner face of a flake as it would have been prior to removal from the core. The surface upon which the Bulb of Percussion occurs.
iii) Platform Preparation: The removal of flakes from a surface to produce a level platform. May be evidenced by retouch scars to the platform.
iv) Retouch: The removal of small flakes from an edge or margin of an artefact to modify its shape or resharpen its edge.
v) Proximal: The end of a flake closest to the striking platform.
vi) Distal: The end of a flake furthest from the striking platform.
vii) Margin: The edge of an artefact.
viii) Eraillure: A small circular to elliptical negative flake scar occurring on the surface of the bulb of percussion on flakes of very fine-grained or highly silicified material. It occurs 'naturally' as a consequence of internal forces generated at the time of flake removal.
ix) Split Cone: Occurs when the flake splits down its axis frequently removing part of the striking platform. Generally believed to be produced by faulty knapping technique, but is also probably a consequence of flawed material.
x) Transverse Snap: Occurs when a flake snaps across its axis. Generally believed to be caused by post-depositional impacts such as human or stock treadage, or vehicular traffic.

FLAKED PIECE :

A fragment of stone exhibiting flake scars indicating that it is an artefact, but not displaying diagnostic features, such as a Bulb of Percussion, Striking Platform, or an Eraillure.

GREYWACKE :

A type of sandstone, grey or greenish-grey in colour, tough and well indurated and typically poorly sorted (Clark & Cook, 1986).

A generally poorly sorted, dark sandstone containing feldspar and sand-sized rock fragments of metamorphic or volcanic rocks (Department of Mineral Resources, n.d.).

Usually a dark and coarse-grained rock compared to mudstones and siltstones that are much finer-grained and better sorted.

HOLOCENE PERIOD :

The period from 10,000 years ago to the present.

IGNEOUS ROCK :

Rock formed by the cooling and solidification of magma on or below the earth's surface (Geography Dictionary, 1985).

In situ : In its original place – as deposited.

ISOLATED ARTEFACT :

A solitary stone artefact, at least 50m from its nearest neighbour. This is based on NPWS policy that two artefacts within 50m of each other constitute a site.

KNAPPING FLOOR:

A discrete scatter of artefacts in which at least two artefacts are recognisably of the same material, and derive from the same piece of stone. Also described as a stone tool manufacturing site or floor.

LOCATION : The place at which an artefact is found, or a place identified as having either archaeological or Aboriginal significance.

MEASUREMENT :

I) Flake:
   i) Length: Measured along the percussion axis at right angles to the platform.
   ii) Width: The greatest width measured at right angles to the percussion axis.
   iii) Thickness: The greatest thickness measured at right angles to the percussion axis.

II) Flaked piece:
   i) Length: The longest dimension
   ii) Width: The greatest width measured perpendicular to the length.
   iii) Thickness: The greatest thickness measured perpendicular to the length.

III) Core:
   i) Length: The longest dimension.
   ii) Width: The greatest width measured perpendicular to the length.
   iii) Thickness: The greatest thickness measured perpendicular to the length.

MIDDEN : A refuse heap or stratum of food remains, such as mollusc shells, and other occupational debris (Dortch, 1984 – see also Meehan, 1982).

MUDSTONE : A fine-grained detrital rock, usually quite massive and well consolidated. May be black through grey to off-white, browns, reds and dark blues/greens. Frequently found in association with sandstones (Cook & Kirk, 1991).

Identification is often aided by colour variations in layering. A source for stone material tool manufacturing material found as river pebbles in creek beds, and artefacts often display a water-worn cortex.

NEGATIVE FLAKE SCAR :

A concave surface resulting from the removal of a flake, occurring on the surface of the rock from which a flake has been removed.

PLEISTOCENE PERIOD :

The period from about 10,000 years ago to 2 million years ago.

POTENTIAL ARCHAEOLOGICAL DEPOSIT (PAD):

Synonymous with Potentially Archaeologically Sensitive : Having the potential to contain archaeological material although none is visible.

QUARTZITE :

Quartzites are formed by the regional or contact metamorphism of quartz arenites, siltstones, and flints (cherts). They are composed essentially of quartz, and usually have a fine-grained granoblastic (grains are roughly the same size) texture. Generally massive, but may sometimes show sedimentary structures (Cook & Kirk, 1991).

ROTATION :

The removal of flakes from a core by blows directed at different angles, to different platforms. May be evident on the dorsal surface of a flake as negative flake scars, which do not follow the same direction as the percussion axis of the flake. This may be confused with scars produced during core preparation.

SCAT : The solid waste material produced by an animal – dung, droppings, manure (Triggs, 1985).

SCATTER : Two or more artefacts occurring within 50 metres. Scatter may also be used in the context of 'background scatter', meaning the general distribution of artefacts across the landscape that cannot be recognised as discrete concentrations.

SILCRETE : A near surface or surface siliceous induration (Desen & Peterson, 1992).
A conglomerate consisting of surficial sand and gravel cemented into a hard mass by silica.
A siliceous duricrust (Bates & Jackson, 1980).
Crusts may form as a result of low, infrequent rainfall, on reasonably flat surfaces. These are known as duricrusts – those cemented by silica are known as silcretes (Clark & Cook, 1986), sometimes referred to locally as 'billy' (Gentilli, 1968), or 'grey billy'.
Silcrete on the northern tablelands of NSW forms at the surface contact between sediments of the Sandon Beds and the Armidale Beds with overlying basalt, where groundwater (more rich in silica than surficial water) interacts with surficial water and precipitates new quartz as the matrix to the sediments (N.D.J. Cook, Dept. of Geophysics, UNE, pers. Comm.).
In softer formations of quartz sands, groundwater has apparently been responsible for the formation of concretionary layers of silcrete. Under altered climatic conditions, the less competent beds erode away leaving concretions. Since they are often the size of old-fashioned woolsacks and are greyish and white, they are popularly known as grey billy (slang for billy goat) (Fairbridge, 1968).

SITE : A discrete area or concentration of artefactual material, place of past Aboriginal activity, or place of significance to Aboriginal people.

SCIENCE TERMS (taken from Banks 1995, and others as referenced).

BEDROCK : Outcrop of *in situ* rock material below the soil profile.

BENCH : A strip of relatively level earth or rock breaking the continuity of a slope.

BLOWOUT : A closed depression formed in the land surface by wind eroding sands and depositing them on adjacent land.

CLAYPAN : A depression caused by the aeolian deflation of sediments, or by the presence of a prior lake.

DUNE : A ridge built up by wind action composed of sands, silts, or sand-sized aggregates of clay.

FLOODPLAIN : A large flat area, adjacent to a watercourse, characterised by frequent active erosion and aggradation by channelled and overbank stream flow.

GIBBER : A level surface covered by a thick deposit of gravel or broken siliceous pebbles, occurring in the more arid parts of the continent, thought to have been formed from the break-up of a siliceous (silcrete) surface crust, and termed gibber plains (Whittow, 1984) – see also silcrete.

GILGAI : Surface microrelief associated with soils containing shrink-swell clays. Gilgai consists of mounds and depressions, or irregularly distributed small mounds and subcircular depressions varying in size and spacing. Vertical interval usually <0.3m; horizontal interval usually 3-10m, and surface almost level. Sometimes called 'crab-hole' soils.

GULLY : An open incised channel in the landscape generally greater than 30cm deep and characterised by moderately to very gently inclined floors and steep walls.

HUMMOCK : A small raised feature above the general ground surface.

LANDFORM ELEMENTS :
Crest : Landform element standing above all points in the adjacent terrain.
Flat : Neither a crest or a depression <3% slope.
Upper slope : Adjacent to and below a crest or flat but not a depression.
Midslope : Not adjacent to a crest, a flat or a depression.
Lower slope : Adjacent to and above a flat or a depression but not a crest.

LITHOSOLS : Shallow soils showing minimal profile development and dominated by the presence of weathering rock and rock fragments.

QUARTZOSE: A term applied to sedimentary rocks composed primarily of quartz particles (http://www.landcareresearch.co.nz/publications/factsheets/rare-ecosystems/inland-and-alpine...) accessed 22nd April 2014

RILL : A small channel cut by concentrated runoff through which water flows during and immediately after rain.

RUNOFF : That portion of precipitation not immediately absorbed into or detained upon the soil and which thus becomes surface flow.

SCARP/CLIFF : A steep slope terminating a plateau or any level upland surface.

SCRUB : vegetation structure consisting of shrubs 2-8m tall.

SHEET EROSION : The removal of the upper layers of soil by raindrop splash and/or runoff.

SOIL PROFILE :
"A HORIZON" : The top layer of mineral soil. This may consist of two parts:
A_1 HORIZON: Surface soil and generally referred to as the topsoil.
A_2 HORIZON: similar in texture, but paler in colour, poorer in structure, and less fertile.

" B HORIZON" : The layer below the A Horizon. This consists of 2 parts:
B_1 HORIZON: A transitional horizon dominated by properties characteristic of the underlying B_2 horizon.

B_2 HORIZON: typically contains concentrations of silicate clay and/or iron, and/or aluminium and/or translocated organic material.

"C HORIZON" : The parent rock. Recognised by its lack of pedological development, and by the presence of remnants of geologic organization.

"R HORIZON" : Hard rock that is continuous (Charman & Murphy, 1993; 350-1).

SPUR : A ridge which projects downwards from the crest of a mountain as a water-parting (Whittow, 1984).

SUBSOIL : Sub-surface material comprising the B and C Horizons of soil with distinct profiles; often having brighter colours and higher clay contrasts.

SURFACE CONDITION :
Gravelly : Over 60% of the surface consists of gravel (2-69mm).
Hardsetting : Soil is compact and hard.
Loose : Soil that is not cohesive.
Friable : Easily crumbled or cultivated.
Self-mulching : A loose surface mulch of very small peds forms when the soil dries out.

SWALE : A linear level-floored open depression excavated by wind or formed by the build-up of two adjacent ridges.

SWAMP : Watertable at or above the ground surface for most of the year.

TERRACE : A flat or gently inclined surface bounded by a steeper ascending slope on its inner margin and a steeper descending slope on its outer margin (Whittow, 1984).

TOPSOIL : A part of the soil profile, typically the A_1 horizon, containing material that is usually darker, more fertile and better structured than the underlying layers.

UNDERSTOREY : A layer of vegetation below the main canopy layer.

VEGETATION: Forest types.
Closed forest: Canopy provides complete cover – these areas are often called rainforests.
Tall open (wet eucalypt) forest: Canopy cover is reduced – understorey of trees and shrubs.
Open forest (dry eucalypt) Canopy is lower and more open – understorey of hard-leaved shrubs and grasses.
Woodland: Trees are more widely spaced – understorey is grass rather than shrubs

Hardwood: A group of trees called angiosperms, or flowering plants, also called broadleaved plants. Most common is eucalypt.
Softwood: A group of trees called gymnosperms or conifers. Includes pine trees, spruces and firs, cypress pine. Used as timber.

Forests can be described as: open or closed; tall or short; wet or dry; softwood or hardwood.
Varieties: rainforest; wet eucalypt forest; mixed eucalypt forests; dry eucalypts forests; cypress pine forests.

Old growth forests are forests that have not been disturbed for 200 years (Underwood S & G, 1995)

ZEOLITE: Family of alumina-silicate minerals. Used in industry as catalysts and drying agents.
Occurs as low-grade metamorphic minerals, and also in vesicules in lavas, or in shallow igneous intrusions (Cook & Kirk 1991).
Various natural zeolites have applications in agriculture, aquaculture, water treatment, and pollution control, in soil conditioning and as an odour control agent in stock feeds, pet litters, fertilizers, sewerage treatment and other uses (Mineral Resources 2001).

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APPENDICES

Appendix i – Site Recording Form, #30-3-0111

Appendix ii – Letter to Government Departments and Agencies (example)

Appendix iii – Advertisement inviting Aboriginal stakeholders to register their interest in the project site, "Macleay Argus" 30/5/2014

Appendix iv – Responses to letters to Government Departments and Agencies

Appendix v – Letter sent to stakeholders with the draft report

Appendix vi – Follow-up letter to stakeholders

Appendix vii – Site Types

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Appendix i – Site Recording Form, #30-3-0111

National Parks and Wildlife Service

BOX N189, GROSVENOR STREET POST OFFICE, SYDNEY, NSW 2000. TEL (02) 237 6500

Standard Site Recording Form Revised 5/88

30-3-0111

NPWS Code

1:250,000 map sheet: Hastings

AMG Grid reference (Full reference - please include leading digits): 250K 48380 mE 25K; 250K 6556630 mN 5/6 25K

Scale of map used for grid reference (Please use largest scale available): [X] 25K, 50K (preferred) [ ] 100K [ ] 250K

1:25K, 50K, 100K map name: Kempsey

HEAD OFFICE USE ONLY:

NPWS Site no: 30-3-111

Site types: OPEN CAMPSITE

Accessioned by: [illegible] Date: 10/11/88

Data entered by: [illegible] Date: 10/11/88

Owner/Manager: not known

Address:

Site name: Stumpy Creek Locality/property name: not known

NPWS District: Port Macquarie Region: Northern

Reason for investigation (give R.O. instruction no. where applicable)

As part of Kempsey Shire Heritae Study

Portion no: 10 Other land category:

Parish: Beranghi County: Macquarie

Air photo refs. (for stereo pair)

Photos taken? Yes/No: no (rained)

How many attached?

How to get to the site (refer to permanent features, give best approach to site eg. from above, below, along cliff. (Draw diagram on separate sheet.)

site is approximately 4km south of Kempsey on the east side of the Pacific HIghway. Site is indicated on the attached map (scale 1:25 000)

Other sites in locality? Yes/No: not immediate Site Types include:

Are sites in NPWS Register? Yes/No:

Have artefacts been removed from site? Yes/No/don't know When?

By whom? Deposited where? site most likely not collected

Is site important to local Aborigines? Yes/No/don't know

Give contact(s) name(s) + address(es) most likely not known to local Aborigines

Contacted for this recording? Yes/No

(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report)

NPWS Report Catalogue #

Checklist surface visibility, damage/disturbance/ threat to site

Condition of site: site lies on access track used to service electricity line. Site lies in a cleared paddock in grass and bracken

Recommendations for management & protection (attach separate sheet if necessary):

As site consists only of a scatter of chert and quartz flakes suggest that no specific management is required

Site recorded by: Brian J. Egloff Date: 12 December 1988

Address/Institution: Anutech GPO Box 4 CAnberra ACT 2601

4

SITE POSITION & ENVIRONMENT | OFFICE USE ONLY: NPWS site no: :C -3 -111

1. Land form a. beach/hill slope/ridge top, etc: ridge/hill top
   b. site aspect: westerly c. slope: moderate
   d. mark on diagram provided *or* on your own sketch the position of the site:
   e. Describe briefly: below crest of hillon on the western flank, well sheltere

f. Local rock type: decomposing shales
g. Land use/effect: cleared, most likely cultivated

2. Distance from drinking water: c. 400m Source: Stumpy Creek

3. Resource Zone associated with site (estuarine, riverine, forest etc): forest/creek (possibly swampy)

4. Vegetation: introduced pasture grasses, bracken

5. Edible plants noted: bracken

6. Faunal resources (include shellfish): not known

7. Other exploitable resources (river pebbles, ochre, etc): not known

Site type:

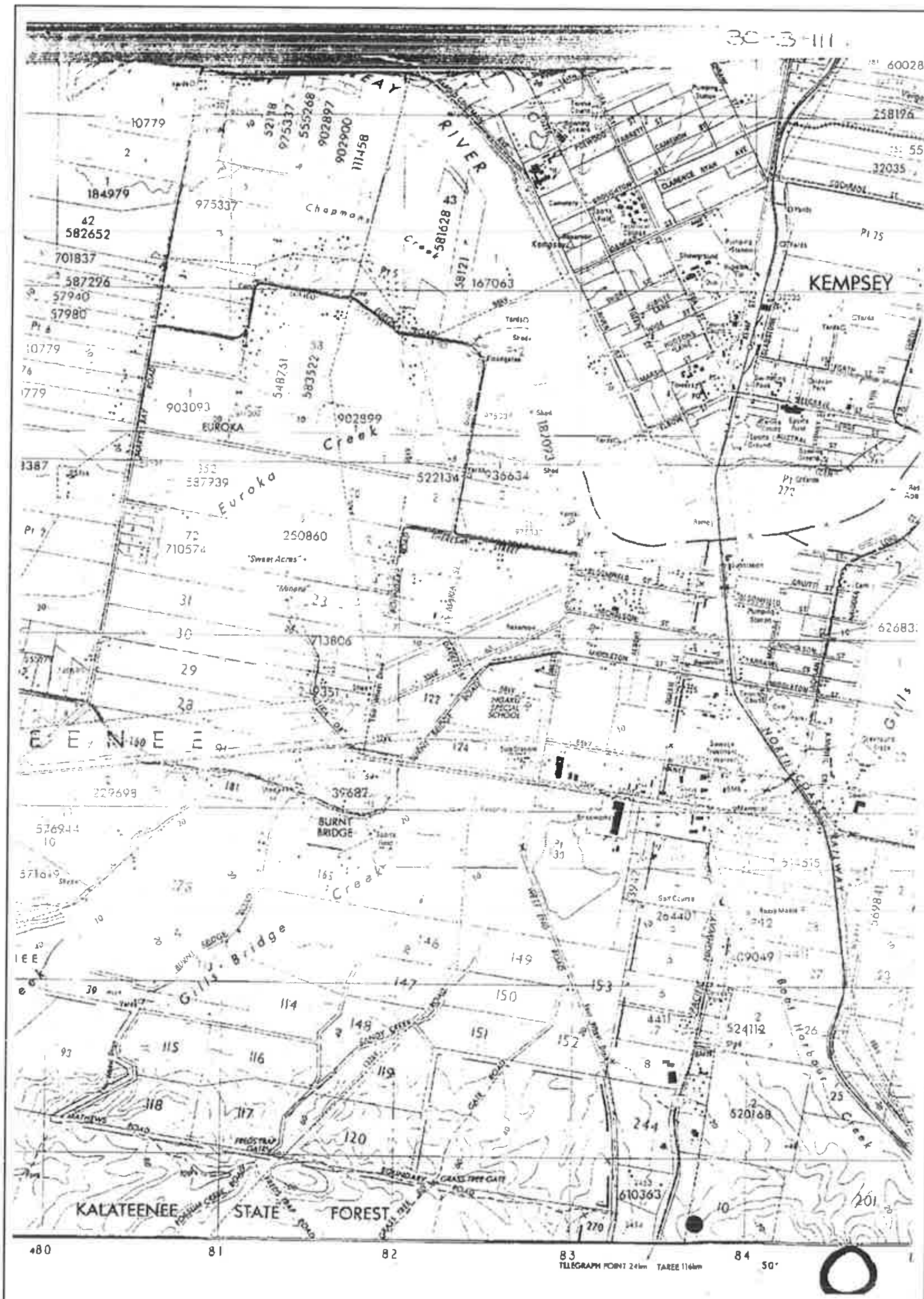
open camp

CHECKLIST TO HELP:
length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock.
DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types.
ART: area of surface decorated, motifs, colours, wet, dry pigment, technique of engraving, no. of figures, sizes, patination.
BURIALS: number & condition of bone, position, age, sex, associated artefacts.
TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth.
QUARRIES: rock type, debris, recognisable artefacts, percentage quarried.
OTHER SITES EG. structures (fish traps, stone arrangements, bora rings, mia mias), mythological sites, rock holes, engraved groove channels, contact sites (missions massacres cemeteries) as appropriate

DESCRIPTION OF SITE & CONTENTS.
Note state of preservation of site & contents. Do NOT dig,disturb,damage site or contents.

site consists of a scattering of say a dozen polycrystaline quartz flakes and two highly weather chert flakes in an area roughly 25m by 25m. Artifacts were discovered in the ruts of a track. Due to vegetation cover it was impossible to tell the extent and if there was any stratigraphy.

Attach sketches etc. eg. plan & section of shelter, show relation between site contents, indicate north, show scale.
Attach annotated photos (stereo where useful) showing scale, particularly for art sites.


KEMPSEY
EUROKA
Euroka
Creek
Chapmans
RIVER
"Sweet Acres"
BURNT
BRIDGE
Gills Bridge
KALATEENEE
STATE
FOREST
480
81
82
83
84
50'

Appendix ii – Letter to Government Departments and Agencies (examples)

Your details	Name:	JOHN APPLETON
	Position:	DIRECTOR
	Company/organisation:	ARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD
	Postal address:	16 CURTIS STREET, ARMIDALE 2350
	Your reference:	FARRAWELLS
	Email address:	japples@northnet.com.au
	Telephone No.:	02 6772 6512
	Fax No.:	02 6772 4567
	Date of request:	2/4/2014
Reason for search request	☐ I am a party to a native title proceeding - please specify Federal Court/Tribunal file number/application name:	
	☒ I need to identify existing native title interests to comply with the NTA or other State/Territory legislation - please provide details: "Code of Practice for Archaeological Investigation in NSW" (OEH 2010) "Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (OEH 2011)	
Details of the area to be searched Please complete the relevant description fields (fields marked with an asterisk must be completed) and provide a clear map of the area including landmarks	Mining Tenure:	
	*State/Territory:	
	*Mining/ exploration details: Tenement number(s) (i.e. EL No or MCN No) or block/sub block description:	
	Other Land Tenure:	
	*State/Territory:	NEW SOUTH WALES
	Land parcels: *Lot number(s)*:	Lots 51 & 55 DP1165099
	*Tenure type (*e.g. agricultural lease*):	FREEHOLD
	Property name:	N/A
	Pastoral Lease number or name:	
	*Local Government Area(s):	KEMPSEY SHIRE COUNCIL
	County:	MACQUARIE
	Parish:	BERANGHI
	Town:	KEMPSEY
	Section:	
	Hundred:	
	Northern Territory Portion:	
	Other details: (additional information may be attached):	

Note: Search requests cannot be processed if insufficient detail is supplied.

Note: Map coordinates that form part of the attachments to a search result will not be sent with results unless specifically requested. Maps and any other formal attachments will be sent.

Archaeological
Surveys
&
Reports
Pty Ltd

John Appleton
AGA, ACIS, ACIM, BA (Hons)

16 Curtis Street, Armidale, NSW 2350
Tel 02 6772 6512 Fax 02 6772 4567 Mob 0428 651 789
Email jappleton@northnet.com.au

ABN 67 075 625 722

Office of the Registrar, ALRA
Tranby Aboriginal College
11-13 Mansfield Street
Glebe 2037

29th May 2014

Re: Archaeological investigation:
To relocate a site previously recorded at Farrawells Quarry, South Kempsey

Dear Sir/Madam

This is to advise that Archaeological Surveys & Reports Pty Ltd has been engaged by R.W. Corkery & Co. Pty Limited, on behalf of the operator, Pacific Blue Metal Pty Limited (PBM), to relocate a site previously recorded at Farrawells Quarry, South Kempsey.

PBM plans to extend its quarry operations to include the listed site location and it will therefore be necessary for it to lodge an Application for an Aboriginal Heritage Impact Permit (AHIP) to salvage the artefactual material.

In accordance with Best Practice we are now seeking information on any Aboriginal groups, stakeholders or traditional knowledge holders with an interest in the management of Indigenous heritage matters in the Kempsey area. Would you please provide contact details for any known Aboriginal groups with a cultural interest in the area. The nominated groups can then be included in the consultation process with regard to Indigenous heritage issues.

Regards

Appendix iii - Advertisement inviting Aboriginal stakeholders to register their interest.

"*Macleay Argus*" 30/5/2014

PUBLIC NOTICE

ARCHAEOLOGICAL ASSESSMENT

Darryl McCarthy Constructions Pty Ltd (DMC) operates the Dowe's Quarry off Mount Lindesay Highway, 8km northeast of Tenterfield, and proposes to lodge a Development Application (DA) with Tenterfield Shire Council to extend ongoing operations. DMC has engaged R.W. Corkery & Co. Pty Limited (RWC) to prepare an Environmental Impact Statement to support the DA requirements.

RWC has engaged Archaeological Surveys & Reports Pty Ltd to undertake an archaeological assessment of the site to identify any Indigenous cultural issues that might present a constraint to the proposed operations.

In accordance with the "Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales" (OE&H 2010); the "Code of Practice for Archaeological Investigation in NSW" (OE&H 2010); the "Aboriginal Cultural Heritage Consultation Requirements for Proponents" (OE&H 2010); and the "Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW" (OE&H 2011) all registered Aboriginal stakeholders with an interest in the Study Area are invited to register their interest in providing any cultural information pertaining to the Study Area.

Please register your interest within 14 days with

John Appleton, Archaeological Surveys & Reports Pty Ltd

Tel. 02 6772 6512 - Mob. 0428 651 789

Email: japples@northnet.com.au

John Appleton

From: melinda.campbell@fairfaxmedia.com.au
Sent: Wednesday, 2 April 2014 10:24 AM
To: japples@northnet.com.au
Subject: PUBLIC NOTICE ARCHAEOLOGICAL ASSES
Attachments: 1360282_616661734.jpg

ADVERTISING PROOF

Ref no: AW1360282 Printed: 02/04/2014 10:23:34 (FP-TAMWORTH)
Attention: JOHN APPLETON
Company: ARCHAEOLOGICAL SURVEYS AND REPORTS P/L

BOOKING DETAILS

Name:	ARCHAEOLOGICAL SURVEYS AND REPORTS P/L
Address:	16 CURTIS ST
City:	ARMIDALE
State:	NSW
Postcode:	2350
Authorised by:	JOHN APPLETON
PO Number:	
Cost:	$231.26
Size:	8 x 2
Class / section:	Public Notices (628)

APPEARANCE DETAILS

09/04/2014	Tenterfield Star	$231.26 inc GST

AUTHORISATION

I have checked all details contained in the advertisement (including phone numbers and spelling) and authorise you to proceed as per the booking details above.

Name:

Signature:

Date:

Comments

Hi John, Please find attached ad for proof. Please advise asap if ok to print. I will also need to organise payment, if possible, via credit card over phone. Regards Melinda

Once authorised, please reply with 'authorised' in the subject field to melinda.campbell@fairfaxmedia.com.au

or fax back to (02) 6766 3181

Should you have any further enquiries please do not hesitate to contact me.
Regards,

1

Appendix iv – Responses to letters to Government Departments and Agencies

National
Native Title
Tribunal

Sydney Office, Operations East
Level 16
Law Courts Building
Queens Square
Sydney NSW 2000
GPO Box 9973
Sydney NSW 2001
Telephone (02) 9227 4000
Facsimile (02) 9227 4030

15 April 2014

John Appleton
Director
Archaeological Surveys & Reports
16 Curtis Street
ARMIDALE NSW 2350

Our Reference: 6142/6143-14SJ
Your Reference: Hardacres & Dowes

Dear Mr Appleton

Native Title Search Results for "Hardacres" & "Nareena"

Thank you for your search requests in relation to the above areas.

As your request was related to areas of land which are freehold it should be noted that under the *Native Title Act 1993* (Cwlth), the valid grant of a freehold estate (other than certain types of Aboriginal and Torres Strait Islander land) on or before 23 December 1996 is known as a 'previous exclusive possession act'. This means that native title has been extinguished over the area.

Native title claimants are not allowed to include land and waters covered by previous exclusive possession acts in their applications; therefore they would normally exclude freehold areas. Although a native title application may be made over freehold land on the basis that freehold was invalidly granted, the chances of this happening are very low.

For more information on native title and freehold tenure, you may also wish to visit our website at http://www.nntt.gov.au/Applications-And-Determinations/Registers/Pages/Register-Searches-for-Native-Title-Claims-Over-Freehold-Land.aspx

Yours sincerely

Sylvia Jagtman

Sylvia Jagtman | SENIOR CASE MANAGEMENT ASSISTANT
National Native Title Tribunal | Sydney Office
Level 16, Federal Law Courts Building, Queens Square, Sydney, New South Wales 2000
Telephone (02) 9227 4013 | Facsimile (02) 9227 4030 | Email sylvia.jagtman@nntt.gov.au
Shaping country, shared future

NSW GOVERNMENT Office of Environment & Heritage

Our reference: DOC14/66858
Contact: Rosalie Neve (02) 6659 8221

Mr John Appleton
Archaeological Surveys & Reports Pty Ltd
16 Curtis Street,
Armidale NSW 2350

Dear Mr Appleton

RE: Archaeological assessment: Dowe's Quarry, Part Lots 38 and 309 DP 751540, and Lot 3 DP42044, Mount Lindesay Highway, Tenterfield

Thank you for your correspondence of 20 March 2014 to the Office of Environment and Heritage (OEH) regarding Aboriginal cultural heritage consultation for the proposed assessment of the abovementioned property which lies in the Tenterfield local government area. I apologise for the delay in responding.

Please find enclosed a list of known Aboriginal parties for the Tenterfield local government area (Attachment A) that OEH considers likely to have an interest in the proposal. Note this is not necessarily an exhaustive list of all interested Aboriginal parties. Receipt of this list does not remove the requirement for a proponent/consultant to advertise the proposal in the local print media and contact other bodies and community groups seeking interested Aboriginal parties, in accordance with the OEH '*Aboriginal cultural heritage consultation requirements for proponents 2010*' (the CRs).

OEH would also like to take this opportunity to remind the proponent and consultant to:

- Ensure the project documents the full consultation process in the Aboriginal Cultural Heritage Assessment Report and to include copies of all correspondence sent to or received from all relevant stakeholders (including Aboriginal stakeholders and the agencies listed in section 4.1.2 of the CRs). Omission of these records in the final report may cause delays in the assessment of the Aboriginal Heritage Impact Permit application or require parts of the consultation process to be repeated if the evidence provided to OEH does not demonstrate that the consultation process has been fair, equitable and transparent.

- Ensure OEH is provided with evidence that reasonable attempts have been made to contact the relevant parties associated with the CRs. If this is not provided then OEH will deem that the consultation process has not complied with the CRs. OEH considers evidence of reasonable efforts to contact relevant parties would include, but not be limited to, multiple forms of communication; faxes (with confirmation slips demonstrating successful transmission), an e-mail log, registered post details, copies of letters and a phone call log.

Locked Bag 914, Coffs Harbour NSW 2450
Federation House Level 7, 24 Moonee Street,
Coffs Harbour NSW 2450
Tel: (02) 6651 5946 Fax: (02) 6651 6187
ABN 30 841 387 271
www.environment.nsw.gov.au

- Note that Appendix A of the CRs contains a map illustrating which Regional Office of OEH should be contacted regarding the AHIP application based on the local government area in which the project is located. Full details of the consultation requirements and the relevant Fact Sheets can be located on the OEH website at: www.environment.nsw.gov.au/licences/consultation.htm.

- Forward to OEH any changes to the contact details of interested Aboriginal parties, or information regarding additional parties, so that OEH can update its records

- Ensure that consultation is fair, equitable and transparent. If the Aboriginal parties express concern or are opposed to parts of or the entire project, OEH expects that evidence will be provided to demonstrate the efforts made to find common ground between the opponents and the proponent

If you require further information or clarification please do not hesitate to contact Rosalie Neve, Aboriginal Heritage Planning Officer, on (02) 6659 8221

Yours sincerely

Dimitri Young 20 May 2014

DIMITRI YOUNG
Senior Team Leader Planning, North East Region
Regional Operations

Enclosure Attachment A

ATTACHMENT A: OEH Known Aboriginal Parties (other than Aboriginal Land Councils for the Tenterfield Local Government Area

1 Kwiembal Elders Indigenous Group
21A Dudley Street
ASHFORD NSW

2. Natalene Mercy
6 Bando Street
GUNNEDAH NSW 2380
0457 617 117

3. Ngoorabul Elders
PO Box 157
GLEN INNES NSW

Appendix v – Letter sent to stakeholders with the draft report

Archaeological
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Pty Ltd

John Appleton
A.C.I.S., A.C.I.M., B.A. (Hons), Dip. Comm. Art

16 Curtis Street, Armidale, NSW 2350
Tel 02 6772 6512 Mob 0428 651 789
Email jappleton@northnet.com.au

ABN 67 075 625 722

CEO/ Chairperson/Registered stakeholder 7th July 2014

Re: Archaeological assessment; Proposed extensions to, Farrawell's Quarry, South Kempsey

Dear Sir/Madam

Please find enclosed a draft copy of the report of the archaeological assessment of Site #30-3-0111 at Farrawell's Quarry, South Kempsey.

If you know of any cultural information that relates directly to the site please advise me so that I can take it into consideration in my conclusion and recommendations in the Final report.

To provide you with the opportunity to see Site #30-3-0111 the quarry operators have agreed to your visiting the site. However because there are safety issues the visit can only be on a particular date and at a particular time. OEH guidelines require that you have 21 days in which to respond to the draft report and as the 21 day period will finish on 28th July, and adding two days for any postal delays the period in which you can respond to the draft report will end on 29th July. The site visit will be at **10.30am on Wednesday 30th July 2014.** If you are interested in viewing the site please be at the quarry Site Office at 10.30am. We will 'sign in' and leave the office for the site at 10.45am. Please do not make your own way to the site for safety reasons but wait until we are already to go together.

To avoid any misunderstanding your attention is drawn to **Section 3.4 "Consultation should not be confused with employment"** of the OEH guidelines, **"Aboriginal cultural heritage consultation requirements for proponents 2010", Part 6 National Parks and Wildlife Act 1974.** You are invited to the site as part of the consultation process. No-one will be paid for the site visit.

If you choose to visit the site on 30th July you will be most welcome, but while there is direct access, it will require you to walk down a 40m long relatively steep slope of loose sand and gravel to get to the site, otherwise the site can be viewed from a distance of about 50m from the top of an earth mound that surrounds the quarry. Please wear sensible footwear as the ground surface is loose and slippery, particularly if there has been rain. There is no wheelchair access.

Please advise me if you will be visiting the site on 30th July so that the quarry manager will have some idea of how many people will be on site.

Your early response will be greatly appreciated.

Regards

Appendix vi – Follow-up letter to stakeholders

Archaeological
Surveys
&
Reports
Pty Ltd

John Appleton
A.C.I.S., A.C.I.M., B.A. (Hons), Dip. Comm. Art.
16 Curtis Street, Armidale, NSW 2350
Tel 02 6772 6512 Mob 0428 651 789
Email japples@northnet.com.au

ABN 67 075 825 722

CEO/ Chairperson/Registered stakeholder 4TH August 2014

Re: Archaeological assessment: Proposed extensions to Farrawell's Quarry, South Kempsey

Dear Sir/Madam

As I have not received any response from you to my draft report of the archaeological assessment to relocate an artefact scatter reported to have been found in 1988 on the Farrawell's Quarry site (Site No. #30-3-0111); nor did you attend the site on 30th July 2014 you are being given a second opportunity to visit the site.

If you are interested in viewing the site be at the Site Office of Farrawell's at **10.30am on Friday 8th August 2014.** This will be your last opportunity to visit the site as the quarry owners will be applying to Council for a Development Permit to develop the site in an expansion of its existing operations.

As advised previously to avoid any misunderstanding your attention is drawn to **Section 3.4 "Consultation should not be confused with employment"** of the OEH guidelines, **"Aboriginal cultural heritage consultation requirements for proponents 2010", Part 6 National Parks and Wildlife Act 1974.** You are invited to the site as part of the consultation process. No-one will be paid for the site visit.

If you choose to visit the site on 8th August you will be most welcome, but while there is direct access, it will require you to walk down a 40m long relatively steep slope of loose

sand and gravel to get to the site, otherwise the site can be viewed from a distance of about 50m from the top of an earth mound that surrounds the quarry. Please wear sensible footwear as the ground surface is loose and slippery, particularly if there has been rain. There is no wheelchair access.

Regards

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Appendix vii – Site Types

Site types associated with Indigenous activities and cultural beliefs

The definitions that follow are for terms used in this report, and do not necessarily apply to their use in different contexts.

Art sites are defined as places where any medium has been applied to a rock surface either as symbols, characters, drawings, paintings, or any other rendition, recognisable as not being a natural discolouration or feature. They also include markings to a rock surface, either by engraving, abrading, or pecking, and which cannot be identified as being a natural feature.

Bora rings are circles of 2-30 metres diameter of compressed earth (from repeated treading or dancing), or stone arrangements, at which men performed initiation ceremonies, and are the most frequently recorded ceremonial sites. Sometimes they occur as two rings joined by a central track in a barbell configuration. They usually occur on level or low-lying country, which is usually the first topographical unit to be cultivated, or utilised for highways and roads, but they may also occur as circular stone arrangements on elevated rock platforms and hilltops. If they are or were present then they are usually either already known and have been recorded, or they have long since been destroyed.

Carved trees are readily recognised by even the untrained observer. The carving is incised either into the outer bark, or more commonly, into the living wood after removal of a section of the bark. The designs frequently consist of 'diamond cross-cuts', but may also consist of stylised animal motifs. Previously unrecorded carved trees are still discovered in relatively remote or inaccessible areas. Carved trees frequently occur near burial sites and/or Bora rings, but in some regions they may have been tribal boundary markers.

Fish traps may occur either in rivers or on seashores. They are recognisable as unnaturally formed stone arrangements that were constructed to trap fish (or eels or turtles) carried into the enclosure in deep water, and which are left stranded within the enclosure as the water level drops. The fish were then caught by nets, hand, or by spear.

Grinding grooves are usually observed on the surfaces of large sedimentary boulders or exposed shelves and outcrops of sedimentary rock along creek banks and beds, or near water. They have been produced by Aborigines using the rock surface to shape and sharpen the edges of stone to produce ground-edged axes, or to sharpen wooden spears (the latter tend to be narrow and deep). Water was used to lubricate the surface of the rock. The grooves frequently occur as linear abraded depressions in the rock, and may each be between 10 and 50 centimetres long, up to 15 centimetres wide, and 2 to 5 centimetres deep. Some sedimentary rock surfaces may exhibit shallow ground depressions of roughly round or elliptical shape, and these are more likely to be associated with seed grinding, root crushing, or other food preparation.

Middens may be identified variously as beach, lagoon, lacustrine, or estuarine, and are most likely to be observed at or above the water line where erosion, topsoil removal, or mining has exposed the shell. The size of the midden can vary enormously, with the smallest comprising a 'one off', "dinner-time camp" (Meehan. 1982), with as few as two or three shells, or a shallow lens of only a few centimetres. The largest middens may extend for many kilometres and may comprise of a number of lenses and layers of shell and ash up to several metres deep. These large middens may be evidence of continuous exploitation of the resource over many thousands of years. Middens of fresh water mussel shell may be found in eroding creek banks or in eroding terraces, particularly near both existing and defunct water holes.

Isolated shell or fragments may occur on any surface and in any situation. A single shell may have been discarded by a bird, but the presence of use-wear would indicate Aboriginal use of the shell as a tool, which was discarded after use. Such occurrence is likely to be where there is no immediate source of stone material suitable for tool manufacture.

Natural Mythological sites are places of significance to Aborigines, either because they are described in mythological stories or songlines, or because they were used in religious ceremonies. They may occur anywhere and while some are more predictable than others – as for example, permanent water holes, waterfalls, rock promontories, etc., others may have no particularly remarkable features. Seldom is there any recognisable artefactual evidence or anything to distinguish it from similar features in the vicinity. These sites must of necessity be identified by Aboriginal people with an association with the place.

Open sites, campsites, knapping floors, scatters, and isolated artefacts, are most likely to occur on eroded and exposed creek banks, particularly where slope wash or stock trails has removed the humic layer, or on eroded ridges and spurs, particularly near the junctions in watercourses.
Open sites are most likely to be present in greatest numbers near a source of either raw stone material, or potential food resources, or in a natural corridor between two differentially preferred environmental zones, or at the contact between two environmental zones containing different resources.
Artefacts in open scatters are likely to be manufactured from the dominant raw material available; i.e. Greywacke on greywacke-sourced soils, quartz on granite-sourced soils, silcrete and chert on relict sedimentary soils.
Artefact assemblages in open scatters are likely to consist predominantly of discard material, i.e., cores, flakes, flaked pieces, and debitage.
Artefacts exhibiting retouch scars and backing are most likely to occur in sites where secondary activity took place peripheral to the central camp site, although this is a generality and can only be observed where there is sufficient surface visibility to identify peripheral sites. Fragments of flakes with retouch or backing may occur on knapping floors indicating breakage occurring during manufacture, or maintenance areas in which damaged tools have been replaced and discarded.
Isolated artefacts are likely to be most frequently observed where the groundcover obscures all but the larger artefacts, such as cores, and large flakes, or where there is little contrast between the texture of artefactual material and the surface upon which it lies. Artefacts of materials contrasting with the matrix may be visible regardless of size; e.g. quartz artefacts may be far more visible than much larger basalt artefacts against a background of dark humic terrace soils.

PADs or Potential Archaeological Deposits are deposits, usually in shelters (but they may also be identified where there are intact deposits in open areas), which although not containing any visible archaeological material, are considered likely to contain archaeological material below the surface. These 'sites' are not recorded as sites on the Aboriginal Site Register, but are identified as places that require subsurface testing to establish whether a site exists or not.

Rock shelters with art or occupation deposits, are most likely to occur where the character of the parent rock is sufficiently massive or consolidated for it to retain a structure that weathers differentially to form shelters and overhangs.

Scarred trees are perhaps the most difficult site type to determine as having been caused by deliberate removal of the bark by humans and not as a consequence of natural events; such as abrasion from falling trees or branches, natural branch attrition, fire damage, or contact from vehicles or stock. They may occur in places wherever there are tree species that produce bark suitable for tool and implement manufacture. While some scars are clearly the consequence of deliberate bark removal by Aborigines (either evidenced by stone axe marks, or identified by Knowledge Holders), some scars were made by settlers, and stockmen, and surveyors who frequently blazed trails and property boundaries by scarring the trees, and by timber men who removed a strip of bark to test the suitability of a tree for logging.

Other site types such as hearths, burials, etc., are less easily predicted, although burials are frequently associated with carved trees, and Bora rings, and hearths with campsites, shelters, and shell middens.