Expansion of Lubke Quarry

Environmental Impact Statement

June 2007

blueprint PLANNING & DEVELOPMENT

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STATEMENT

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This report relates to:	The proposed expansion of the existing Lubke Quarry located at 'Cromer', Hume Highway, Holbrook, NSW
This report addresses the:	*EIS Guideline: Extractive Industries – Quarries, DUAP 1996*
Declaration:	This Statement has been prepared in accordance with clauses 72 and 73 of the *Environmental Planning and Assessment Regulation 2000.* This Statement contains all available information that is relevant to the environmental assessment of the development to which the Statement relates. The information contained in this Statement is neither false nor misleading. ..... James W Laycock Date:

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Document Control

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EXECUTIVE SUMMARY

The proposal

The proposal is for the expansion of the existing Lubke Quarry located at 'Cromer', Hume Highway, Holbrook. The quarry is situated approximately five kilometres north-east of Holbrook and one kilometre to the south-east of the highway.

The proposal is anticipated to produce 200,000 tonnes of quarry material per annum for a 20 year period, with the peak extraction period to occur over the next five years (2007-2012) for the proposed Hume Highway Duplication Works between Table Top and Tarcutta.

In general terms the quarry expansion would be the north-east of its current location and progress into the side of Lubke Hill.

The existing haul road and access point with the Hume Hwy would be unchanged.

Proposal Justification

The proposal is considered justified on the basis that environmental impacts projected to be generated by the proposal can be controlled and managed to industry and environmental regulator accepted levels.

Environmental Impact Assessment

Traffic, noise, dust, blasting overpressure, and water quality impacts are anticipated to be generated by the proposal. Various measures, safeguards, and systems have been recommended to nullify or reduce these to acceptable levels. Among these include upgrading the existing haul road and implementing noise, dust and water quality control measures, and implementing and abiding by associated best practice management guidelines when carrying out operations.

Conclusions and Recommendations

This report concludes that the environmental impacts generated by the proposal, whether considered individually or cumulatively in the short-term or long-term in the context of the site and broader area, are not significant and are acceptable provided recommended impact mitigation actions and strategies are implemented and maintained throughout the life of the proposal.

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GLOSSARY

AHD	Australian Height Datum
ASHDP	Accelerated Southern Hume Duplication Package
DA	Development Application to the Greater Hume Shire Council
DECC	Department of Environment and Climate Change
DWE	Department of Water and Energy
ECRTN	Environmental Criteria for Road Traffic Noise
ESD	Ecologically Sustainable Development
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	Environment Protection Authority
EPL	Environment Protection License
HHDWP	Hume Highway Duplication Works Project
INP	Industrial noise Policy
LEP	Holbrook Local Environmental Plan 1970
RTA	Roads and Traffic Authority

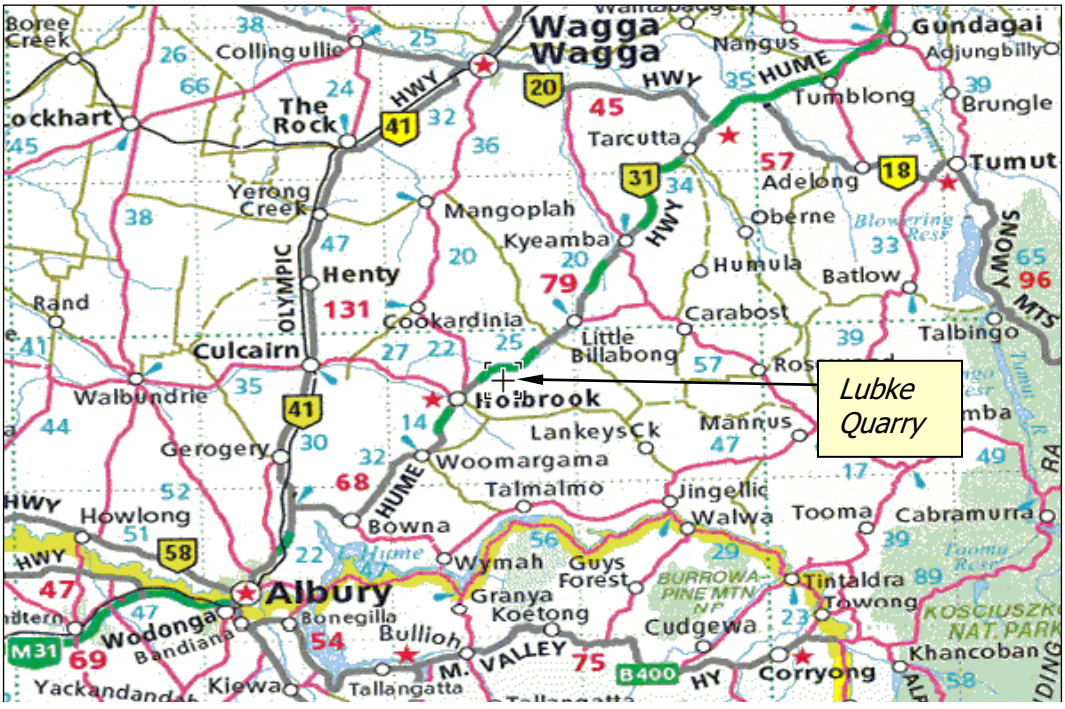
1.0 INTRODUCTION

1.1 Introduction

This Environmental Impact Statement (EIS) accompanies a development application (DA) to the Greater Hume Shire Council (Council) for the expansion of the existing 'Lubke Quarry' located on the farming property known as 'Cromer' situated approximately five kilometres (km) to the north-east of Holbrook with access from the Hume Highway. The land on which the quarry is located is owned by Mr Paul Lubke and comprises Lot 1 DP 585233 with an area of 124.36 hectares (ha).

Lubke Quarry is located in the south-eastern part of 'Cromer' located approximately one km from the Hume Hwy. A plan showing the regional location of the quarry is provided in **Figure 1.1**. More detailed plans are provided below in this EIS.

Figure 1.1: Regional Location Map



Source: http://www.street-directory.com.au

Lubke Quarry began operations some 30 years ago in the mid-1980s and, on average, approximately 3,400 tonnes of material per annum have been extracted. Some blasting operations have occurred during this time. The quarry has been used by the former Holbrook Shire Council and the former Department of Main Roads – now the Roads and Traffic Authority (RTA).

Extracted materials from the quarry would principally be used in costruction works to duplicate the existing two-lane carriageway of the Hume Highway from Table Top to Tarcutta as a part of the Hume Highway Duplication Works Project (HHDWP).

1.2 The Accelerated Southern Hume Duplication Package

The proposal has arisen from the Australian and the New South Wales governments signing a Memorandum of Understanding for the Accelerated Southern Hume Duplication Package (ASHDP). The Australian Government has allocated $800 million in accordance with the *AusLink (National Land Transport) Act 2005*. The RTA will project manage the works.

The works are scheduled to duplicate 67 km of the Hume Highway by the end of 2009, leaving only 20 km of highway as single carriageway. Bypasses of Tarcutta, Holbrook and Woomargama are to be completed by 2012.

The RTA believes the duplication of the Hume Hwy will significantly improve road safety for all motorists and improve transport efficiency for communities and industries along this major freight route (RTA 2007a).

A map showing the works proposed as a part of the ASHDP is provided in **Figure 1.2** below.

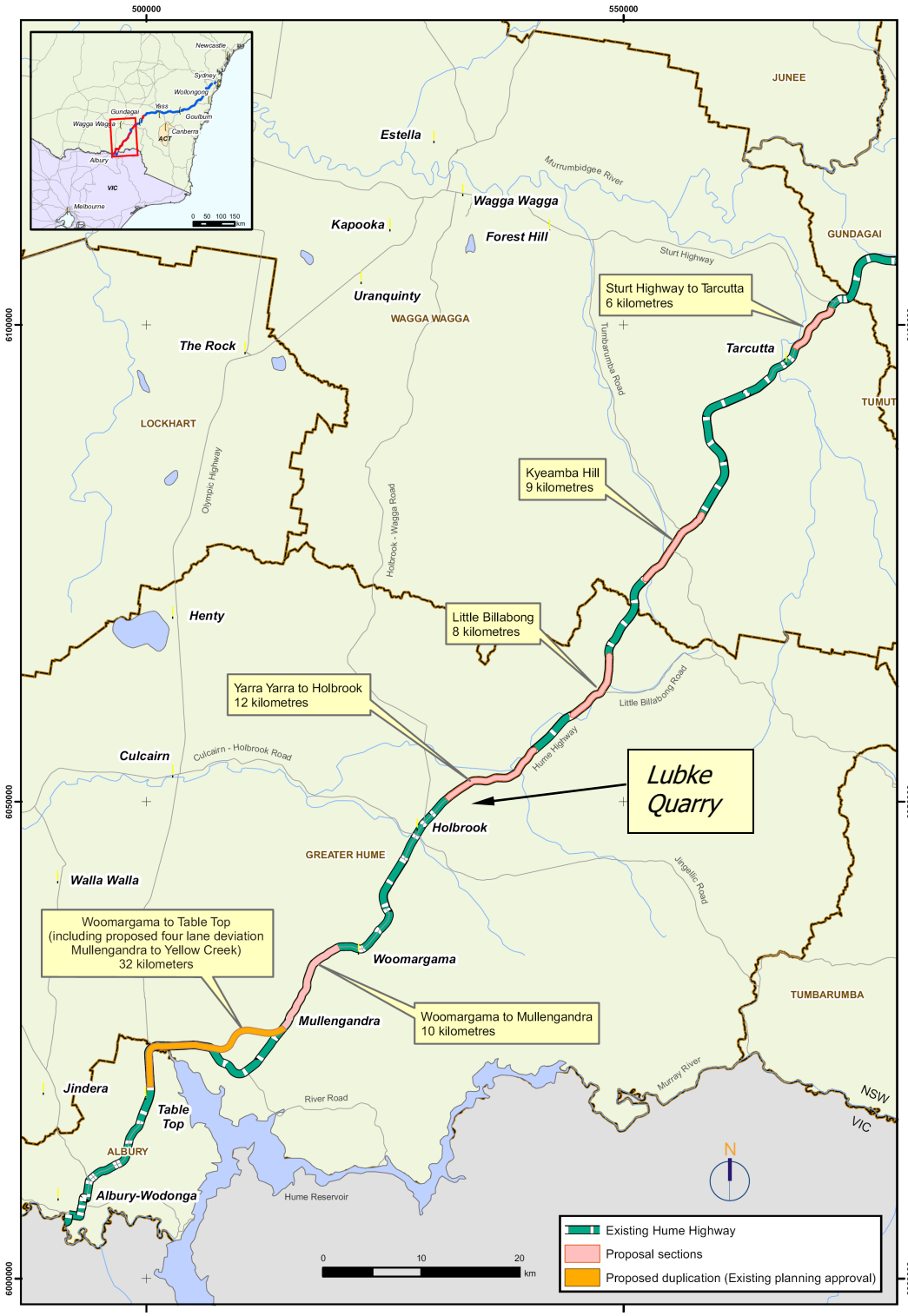
The proposed works will be completed between 2007-2012 and comprise the following:

- Sturt Highway to Tarcutta, Kyeamba Hill, Little Billabong, Yarra Yarra to Holbrook, and Woomargama to Mullengandra (2007-2009); and
- the bypassing of the townships of Woomargama, Holbrook and Tarcutta (2009-2012).

The RTA (2007) have detailed the various benefits expected of the proposed works as follows:

- construction of divided two lane carriageways to improve safety and transport efficiency;
- safer access for adjoining properties and school buses to the Hume Hwy;
- improved stormwater flow and drainage;
- extensive revegetation and landscaping with suitable native species; and
- improved road line-marking and signage.

Figure 1.2: Proposed works comprising the Southern Hume Duplication Package



Source: RTA 2007a

1.3 Project Outline

The proposal is anticipated to produce 200,000 tonnes of quarry material per annum for a 20 year period, with the peak extraction period to occur over the next five years (2007-2012) coinciding with construction of the proposed HHDWP. No expansion beyond what is proposed is anticipated.

In general terms, the existing quarry would be expanded towards the north from its current position into the side of 'Cromer Hill'. Initially a 'bench' would be cut into the hill to provide a stable site for relevant plant and equipment and to carry out associated operations and, thereafter, as extraction progresses, a further series of benches will be cut to win more material and to relocate plant and equipment for improved quarry efficiencies.

The main activities to be undertaken during the expanded quarry's life include:

- re-establishment and restoration of existing sedimentation and erosion control measures associated with the existing quarry;
- site establishment of the expanded quarry, including – clearing of vegetation, stockpiling of topsoil/overburden, haul road upgrading, and off-set native vegetation replanting;
- blasting, extraction and processing of material, stockpiling of material, and truck haulage;
- progressive rehabilitation of the quarry work area.

1.4 History of Lubke Quarry

1.4.1 Exiting Approvals

The existing quarry is approved under current Development Consent No. 10/85 issued by the former Holbrook Shire Council on 17 December 1985. The consent notice contains one condition requiring that operations be carried out in accordance with the EIS prepared for the proposal, which proposed that approximately 25,000 tonnes of material per annum would be extracted. Plans of the approved quarry show an extraction area of approximately 6 ha. The current operating area is approximately 2.5 ha, although some recent works have been carried out to establish a sediment control dam under the current approval which has enlarged the quarry work area.

A development application was lodged with the Greater Hume Shire Council in April 2007 for a weigh-bridge and was approved in May 2007. The approved works are shown in plans considered by this EIS.

1.4.2 Existing Operations

The existing quarry has extracted approximately 3,400 tonnes of material per annum since 1986 (total to 2006 is approximately 73,000 tonnes). The quarry operates on an intermittent basis and mostly supplies crushed rock to local markets. Processing equipment including crushing and screening plant have not been permanently located at the quarry since 1997. Temporary plant has been used for other times.

Basic sedimentation and erosion control measures are in place. Several topsoil/overburden stockpiles are evident in the southern portions of the existing quarry and recent rock drilling and blasting operations are evident on upper slopes (January 2007). Stormwater runoff from some soil overburden stockpiles drains to the existing intermittent watercourse located in the gully. This will need to be rectified. Several sediment dams are located to the northwest of the quarry with contour controlled drainage lines channelling stormwater runoff from the mid-reaches of the quarry. These dams are appropriately maintained and have adequate capacity for existing operations and catchment runoff.

Parts of the haul road are in average condition and would not be passable by heavy vehicles in wet-weather conditions. The existing haul road access with the Hume Highway is known to comply with RTA requirements, however safe intersection sight distance (SISD) could be improved with the removal or lopping of existing trees.

Current operational safeguards associated with the existing quarry are considered and addressed in this EIS.

1.5 Environmental Assessment

1.5.1 Statutory Requirements

Environmental Planning and Assessment Regulation 2000

For the purposes of clause 4 and schedule 3 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regs), the proposal is identified as "designated development" and defined as "extractive industries". "Extractive industries" is defined below and 'triggers' for this EIS have been highlighted in bold for effect:

> *Extractive industries:*
>
> (1) Extractive industries (being industries that obtain extractive materials by methods including excavating, dredging, tunnelling or quarrying or that store, stockpile or process extractive materials by methods including washing, crushing, sawing or separating):
>
> (a) **that obtain or process for sale, or reuse, more than 30,000 cubic metres of extractive material per year**, or
>
> (b) **that disturb or will disturb a total surface area of more than 2 hectares of land by:**

(i) **clearing or excavating**, or
(ii) **constructing dams, ponds, drains, roads** or conveyors, or
(iii) **storing or depositing overburden, extractive material or tailings**, or

(c) that are located:
(i) in or within 40 metres of a natural waterbody, wetland or an environmentally sensitive area, or
(ii) within 200 metres of a coastline, or
(iii) in an area of contaminated soil or acid sulphate soil, or
(iv) **on land that slopes at more than 18 degrees to the horizontal**, or
(v) if involving blasting, within 1,000 metres of a residential zone or within 500 metres of a dwelling not associated with the development, or
(vi) within 500 metres of the site of another extractive industry that has operated during the last 5 years.

…

Due to the above 'triggers', clauses 72 and 73 of the EP&A Regs requires that this EIS be prepared in accordance with the requirements of the:

- Director-General of the NSW Department of Planning; and
- *EIS Guideline: Extractive Industries – Quarries, DUAP 1996*.

The requirements of the Director-General in relation to this EIS are shown at **Appendix A**.

Environmental Planning and Assessment Act 1979

Pursuant to section 91 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) the proposal is identified as "integrated development" as the proposal requires an Environment Protection Licence (EPL) under section 48 of the *Protection of the Environment Operations Act 1997* (POEO Act). The proposal requires an EPL as the proposal is defined as "extractive industries" at Schedule 1 to the POEO Act as follows:

Extractive industries:

(1) that obtain extractive materials by methods including excavating, dredging, blasting, tunnelling or quarrying or that store, stockpile or process extractive materials, and
(2) that obtain, process or store for sale or re-use an intended quantity of more than 30,000 cubic metres per year of extractive material.

Typically the EPL would relate to the environmental management, control and monitoring of water quality (stormwater runoff suspended solids and pH) and air quality (particulate emissions (dust)).

Regional Environmental Plans

Within the meaning of section 51 of the EP&A Act, no Regional Environmental Plan applies to the site or the proposed development.

State Environmental Planning Policy

Pursuant to the Director-General's requirements (**Appendix A**), or within the meaning of section 39 of the EP&A Act, the following State Environmental Planning Policy applies to the site and/or the proposed development:

- *State Environmental Planning Policy No 44--Koala Habitat Protection* (SEPP44). SEPP44 applies as the site is located within the Municipality of Greater Hume which is listed in Schedule 1 of SEPP44. Refer to **Section 3.7** below for further comment.

- *State Environmental Planning Policy No 33–Hazardous and Offensive Development* (SEPP33). SEPP33 applies as the proposal is identified or defined as:

  - "extractive industry" in the and use definitions in the *Holbrook Local Environmental Plan 1970* –

    "Extractive industry" means an industry or undertaking not being a mine, which depends for its operations on the winning of extractive material from the land upon which it is carried out.

  In terms of *Applying SEPP 33–Hazardous and Offensive Development Application Guidelines 1994* the proposal is defined as being:

  - a "pollution potential to people, property or the environment" by virtue of the proposal requiring an EPL under section 48 of the POEO Act; and

  - "not potentially hazardous" as no hazardous materials will be present. (It is noted that explosives used for blasting are not proposed to be stored onsite and will only present during blasting operations by specialist contractors.) Therefore there would be no "hazard potential to people, property or the environment".

  Further detail is provided below at **Section 3.10**.

- *State Environmental Planning Policy No 55–Remediation of Land.* Further detail is provided below at **Section 10.**

- *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.* Further detail is provided below at:

  - **Section 3.3** in relation to clause 12 – Compatibility of proposed…extractive industry with other land uses;

  - **Sections 3.5**, **3.6** and **3.7** in relation to clause 14 – Natural resource management and environmental management;

  - **Section 2.5** in relation to clause 15 – Resource recovery;

  - **Section 3.12** in relation to clause 16 – Transport; and

- **Sections 2.7** and **3.10** and **Figure 2.7.1** in relation to clause 17 – Rehabilitation.

Local Environmental Plans

Within the meaning of section 70 of the EP&A Act, the site and development is affected by the *Holbrook Local Environmental Plan 1970* (LEP), where the site is identified as being zoned part "Non-urban 1(a)" and part "Non-urban 1(b)". As detailed above in this section, the proposed quarry is defined in the LEP as "extractive industry". An "extractive industry" is a permitted land use, with the prior consent of Council, in each of these zones.

Development Control Plans

Within the meaning of Division 6 of Part 3 of the EP&A Act, the site and development is not affected by any Development Control Plan.

Native Vegetation Act 2003

The proposal is not affected by the *Native Vegetation Act 2003* (NV Act), as section 25(f) of the NV Act exempts the proposed removal of native vegetation as follows:

> *Section 25: Legislative exclusions*
> This Act does not apply to the following types of clearing of native vegetation:
> …
> (f) any clearing that is, or that is part of, designated development within the meaning of the EPA Act and for which development consent has been granted under that Act,
> …

Environment Protection Biodiversity Conservation Act 1999 (Cwth)

Consideration of the proposal under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth)(EPBC Act) is required however the proposal is not affected by this Act. Further information is provided below at **Section 3.7**.

Threatened Species Conservation Act 1995

Similarly, consideration of the proposal under the *Threatened Species Conservation Act 1995* (TSC Act) is required however the proposal is not affected by this Act. Further information is provided below at **Section 3.7**.

Rivers and Foreshores Improvement Act 1948

The proposal is not affected by the *Rivers and Foreshores Improvement Act 1948* as the quarry perimeter and work area is not closer than 40m to the nearest high bank of the adjoining intermittent watercourse at any location.

Other Policies

The proposal is also affected by the following general policies:

Water quality

- Managing Urban Stormwater: Soils & Construction (Landcom);
- Guidelines for Fresh and Marine Water Quality (ANZECC);
- various State Groundwater Policy documents (DWE);
- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DECC);

Flora and fauna

- draft Guidelines for Threatened Species Assessment (DECC);
- Threatened Biodiversity Survey and Assessment: Guidelines for Development and Activities (DECC);
- NSW Groundwater Dependent Ecosystem Policy (DWE)

Noise

- NSW Industrial Noise Policy (DECC);
- Environmental Criteria for Road Traffic Noise (DECC);
- Environmental Noise Control Manual (DECC);

Blasting vibration and overpressure

- Technical Basis for Guidelines to Minimise Annoyance due to Blasting and Ground Vibration (ANZECC);

Air Quality

- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DECC);

Heritage

- draft Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation (DECC);
- Assessing Heritage Significance (NSW Heritage Office);
- NSW Heritage Manual (NSW Heritage Office);

Traffic

- Guide to Traffic Generating Development (RTA);
- RTA Road Design Guide (RTA);

- relevant Austroad standards;

Waste

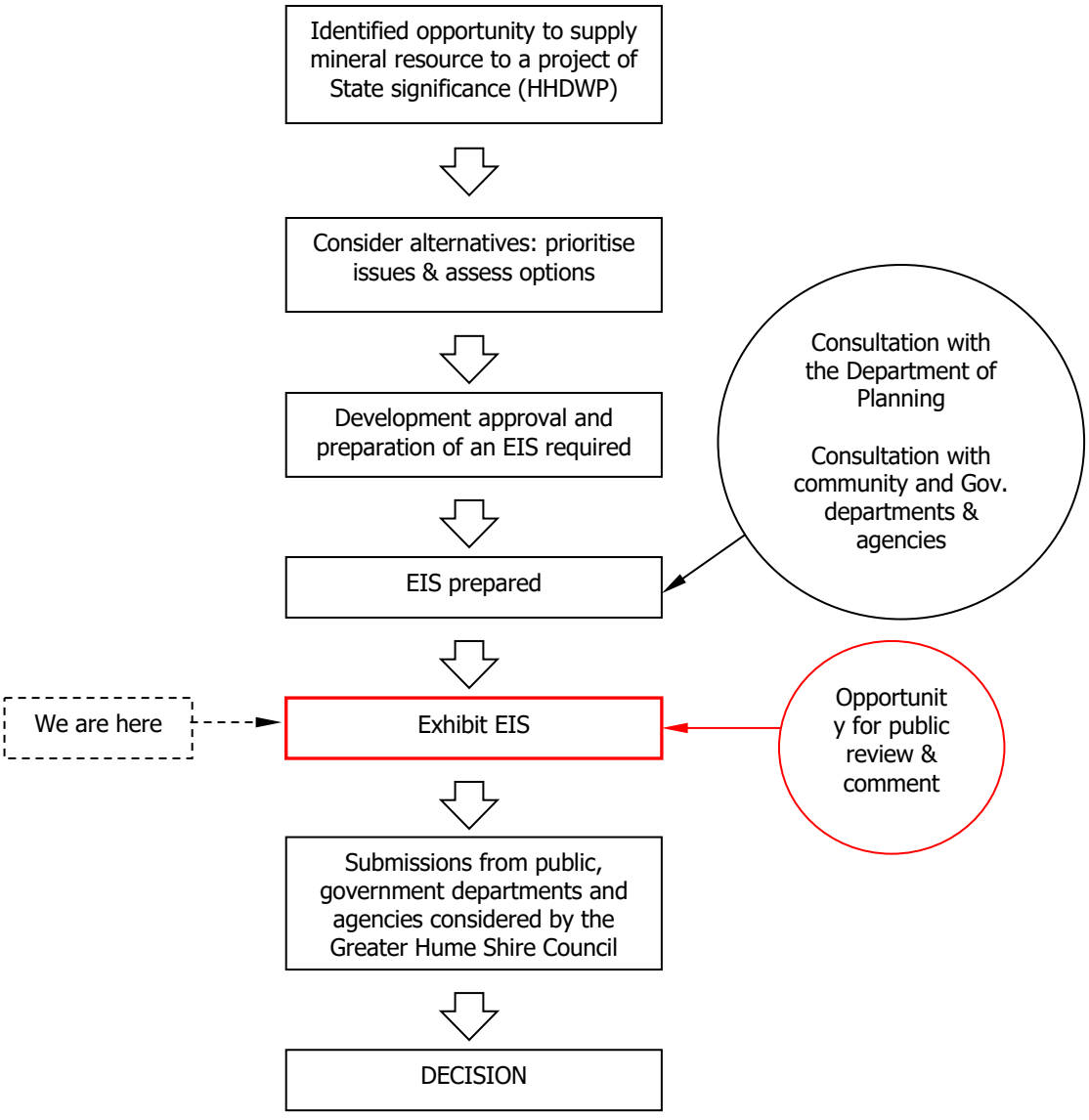
- Environmental Guidelines: Assessment and Classification and Management of Liquid and Non-Liquid Wastes (DECC).

These polices are also discussed below, where relevant.

1.5.2 Environmental Assessment Procedures

The EIS forms one component of the wider environmental impact assessment (EIA) process. This process is shown in **Figure 1.5**.

Figure 1.5: Environmental Impact Assessment Process (Lubke Quarry)



The EIA process is embodied in a legislative and guideline framework, with the following legislation and guidelines most applicable to EISs for extractive industries (quarries):

- EP&A Act;
- EP&A Regs;
- *EIS Guideline: Extractive Industries – Quarries, DUAP 1996*; and
- Department of Planning Director-General's requirements.

The principle purpose of the EIS is to provide information to decision makers on the proposal itself and the potential environmental impacts associated with the proposal. The EIS provides the same information to all parties, including the Council, the community, government departments and non-government agencies.

The EIA process provides the opportunity for public, government, and agency review and comment and forms part of the decision making process. This systematic and integrated review process, resulting in an ultimate decision by the Council, provides a balanced approach to impact assessment.

The EIA process allows any person, during public exhibition of the EIS, to make a written submission in relation to the DA. The Council will consider any public submission, and submissions from government departments and agencies, when considering whether or not to grant consent to the DA. Council's conditions of approval and the approved plans, together with conditions of approval from government departments and agencies where relevant, will form the final consent notice.

The EIS proponent or applicant has the following responsibilities under the EIA process:

- identify the need for the development;
- consider alternatives for the development and a preferred option;
- assess likely environmental impacts of the preferred option and mitigating measures; and
- submit the EIS to the consent authority (in this case the Council) for public exhibition.

The Council has the following responsibilities under the EIA process:

- exhibit the EIS;
- refer the development application and EIS to statutory referral authorities, in this case the Department of Planning, the Department of Environment and Climate Change (formally the Department of Environment and Conservation),

the Department of Water and Energy (formally the Department of Natural Resources) and the Roads and Traffic Authority;

- consider public comments and compile any conditions of the referral authorities and prepare an assessment report recommending one of the following:
  - approval of the DA, with conditions; or
  - refusal of the DA, with reasons.

1.5.3 Scope of the EIS

This EIS has been prepared for Bald Hill Quarry Pty Ltd by Blueprint Planning and a number of specialist sub-consultants. The study team is listed in **Appendix B**.

The EIS has been prepared with the aim of using 'plain English' expression and has been structured to logically flow to facilitate ease of interpretation and the transfer of knowledge of study investigations and findings. It is acknowledged however that scientific language has been used in some instances in order to best articulate subject content. For the EIA process this is regrettably unavoidable given the needed scientific nature of environmental assessment.

The EIS is structured to provide an initial summary of the proposed development and EIS findings. An assessment of the likely implications of proceeding with the development is then provided.

The EIS has been divided into the following structure:

- **Section 1 – Introduction**: provides an introduction to the proposal and the EIS including a basic description of the proposal (provide above).
- **Section 2 – Description of the proposed development**: describes in detail the proposed expanded Lubke Quarry extraction operations.
- **Section 3 – Assessment of environmental impacts and mitigation**: assesses the biophysical and environmental impacts of the proposal including noise and vibration, traffic, and flora and fauna aspects.
- **Section 4 – Project justification**: discusses the need for carrying out the proposal based on an assessment of alternatives and the consequences of not proceeding.

1.5.4 Scope of the Development Application

The DA accompanying this EIS seeks approval of the development. All aspects of the proposed development including extraction quantities and methodology, transportation of the material and infrastructure, as well as the environmental

protection measures outlined in this EIS, form part of – and should be read in conjunction with – the DA. To this end this EIS should satisfy clause 50(1) of the EP&A Regs relating to information required to be submitted with a DA.

1.6 Consultations

Consultation was undertaken during scoping and preparation of the EIS with Local and State government authorities as well as property owners surrounding the site and haul route within a three kilometre radius of the external permitter of the proposed quarry work area. Consultations were also held with the Wandoo Aboriginal Corporation.

Local and State government authorities consulted include:

- Greater Hume Shire Council;
- Department of Planning;
- Department of Environment and Climate Change (including the Environment Protection Authority and the National Parks and Wildlife Service);
- Department of Water and Energy;
- Roads and Traffic Authority; and
- Murray Catchment Management Authority.

Details of written consultations are contained in **Appendix C**.

1.7 Licences and Approvals

Should the proposal proceed, the proponent or applicant will need to obtain an EPL from the DECC.

A separate approval may also need to be obtained from the RTA in relation to the haul road access point with the Hume Hwy/Fwy when the HHDWP is commenced adjacent to 'Cromer'. It is expected that the RTA will detail such arrangements in correspondence to Council detailing their conditions of approval.

2.0 DESCRIPTION OF THE PROPOSAL

2.1 Proposal Outline and Objectives

The proposed development relates to the expansion of the existing Lubke Quarry, principally to supply hard rock quarry products for the HHDWP. The bulk of works will occur during the next five years (2007-2012), with a peak period occurring during the next three years (2007-2010).

The following works are proposed:

- extraction of 200,000 tonnes of hard rock material per annum over 20 years (2007-2027) using drilling, blasting, crushing and screening operations within the "proposed quarry perimeter boundary fence and work area" as shown in **Figure 2.1** below;
- transport quarry product material by truck from the site to the HHDWP area shown in **Figure 1.2** above (2007-2012), and to other local and regional areas for the remainder of the quarry's life (2012-2027);
- progressively rehabilitate the quarry work area with ground stabilisation and revegetation works, and revegetate designated off-set areas. This will be undertaken in accordance with the Concept Rehabilitation and Native Vegetation Off-set Replanting Plan detailed below at **Section 2.7**, and will generally be undertaken as soon as possible to return natural habitat and visual amenity to the site, as well as restrict erosion and sedimentation;
- carry out operations in a manner to minimise visual disturbance and establish procedures to ameliorate effects on the natural environment; and
- following the various stages of extraction detailed below at **Section 2.5**, leave the site is a safe and stable condition.

The principal objectives of the proposed development are to:

- provide quarry products for the HHDWP;
- comply with expectations of the community and the imperatives of the EIA process;
- implement required environmental safeguards and monitoring programs to achieve an environmentally acceptable rock extraction operation; and
- undertake optimal extraction of an identified construction material resource.

The proposed works will integrate with and form a part of the existing operations of Lubke Quarry, as described above at **Section 1.4**.

2.2 Landforms, Geology and Soils

2.2.1 Regional Geology

The following regional landforms, geology and soils description is taken from the *Project Application Report and Preliminary Environmental Assessment* relating to the HHDWP (RTA 2006) and the *Yarra Yarra to Holbrook Environmental Assessment, Hume Highway Duplication* (RTA 2007b).

> The project area is located within the Lachlan Fold Belt geological province of NSW. The geology in the northern part of the project area consists primarily of a metamorphic unit of quartzite, slate, phyllite, greywacke, hornfels and schist which was laid down in the Upper Ordovician. This unit has subsequently been overlain by younger tertiary and quaternary alluvium consisting of gravel, sand, silt and clay. The geology in the middle and southern project areas is comprised of early Palaeozoic granite and Upper Ordovician quartzite overlain by Tertiary alluvium. Tertiary and quaternary alluvium is particularly noticeable along Billabong Creek and also in a large accumulation surrounding the town of Holbrook. Granite outcrops are found at Kyeamba, Holbrook, Woomargama Creek and Mullengandra. Between these outcrops 'folded Ordivician' rocks occur.

Regional soils have also been described as follows (RTA 2006; 2007b):

> There are a variety of soil landscape types present including alluvial, erosional, transferral and residual, which generally represent areas of low relief along creek lines, foot slopes and low hills. Soils tend to be shallow and stony on hill tops and mid slopes are commonly comprised of subsoils derived from the parent rock and overlain by coarse colluvial deposits from upslope. In the valleys and alluvial plains, soils are generally >1.5m deep and are comprised of riverine deposits. Overall, soils in the project area are generally susceptible to localised occurrences of waterlogging; sodicity; acidity; salinity; and flood hazard.
>
> Erosion hazard is generally moderate to high. Gully erosion is evident near stream banks, exacerbated by grazing of livestock, and sheet erosion is common on upper slopes, particularly where cleared. Occurrences of acid soils and salinity in the region are caused by rising groundwater and agricultural practices. Water-logging is particularly evident at discharge areas which are generally found at the break of slopes and may also be associated with areas where normal drainage is restricted.

2.2.2 Site Geology

Lubke Quarry is located on the western slopes of 'Morgans Ridge' – a geological landform comprising massive Silurian granite, with upper slopes of extensive rocky outcrops and lower areas with granite derived soils of increasing depth down-slope. The Morgans Ridge landform rises to approximately 630m above mean sea level and extends for approximately 2 km in a north-south direction. Alluvial plains extend west and north-west with Billabong Creek being the main drainage feature.

Surface run-off drains to Billabong Creek located approximately 1.5 km to the north of the site. Ground water at the site is restricted to cracks and weathered zones in sub-surface granite, or as shallow seepage off bedrock. No permanent soaks or

springs are evident. The site is not flood-prone, affected by salinity, acid sulphate soils, subsidence, or ground instability. The water table is greater than 2m depth.

The nearest registered groundwater bore is located 2.2 kilometres west-northwest of the site and yields 0.13 litres per second.

A bore drilled to a depth of 65m at the site encountered small indications of near surface moisture only and was abandoned, still in solid unweathered granite.

2.2.3 Extraction Resource, Product and Quality

Percussion drilling at the site indicates that the rock resource is largely homogenous and is found throughout the proposed expansion area. Petrographic analysis classifies the rock type as 'micro granite' (fine and medium grain).

A geological survey has confirmed that approximately 5 million tonnes of high-strength rock is available for extraction.

It is anticipated that rock products will be produced to meet a large variety of applications, particularly in relation to road construction. Products currently produced are gravels and road base, as well as graded aggregate and rock.

Material testing of rock samples confirms that the resource meets or exceeds all relevant hard-rock product specifications particularly in relation to RTA construction specifications.

2.3 Extraction Operation, Development and Design

The existing Lubke Quarry comprises an area of approximately 6 ha of disturbed ground, with a current operating area of approximately 2.5 ha. The expanded quarry area is proposed to encompass all of the current disturbed area and be 12 ha in total. This comprises 9% of the area of 'Cromer'. The proposal also includes a temporary stockpile area for the period 2007 to 2012. These areas are proposed to be sited and the quarry is proposed to expand into the side of 'Cromer Hill' as shown in **Figure 2.3** below.

Although the expanded Lubke Quarry is proposed to have a high production output during the initial five year period of operations, apart from core operating plant, relatively little infrastructure is required onsite:

- a 60 tonne weigh bridge and portable site office (including septic system) comprise the only semi-permanent infrastructure; and
- an amenities trailer and separate dry chemical toilet may be located adjacent to the quarry production and stockpiling area.

Other infrastructure is proposed to consist of a small carpark for employees/ contractors, a small transportable site office, haulage road, and soil and water management structures such as diversion banks, sediment retention pits and dams, silt fencing, and a bunded 5,000 litre diesel fuel tank and bunded storage and maintenance area.

In basic and general terms, a standard day's works at the expanded quarry will generally follow the works sequence detailed below:

- Rock is generally loosened by drilling and blasting and then loaded by front-end loader into processing plant and equipment for crushing, screening, and size classification.

- Quarried rock is normally delivered to the processing plant by truck. The feeder or screens separate large boulders from finer rocks that do not require primary crushing, thus reducing the load to the primary crusher. Jaw crushers are usually used for initial size reduction. The crusher product, normally 75 to 300mm in diameter, and the grizzly throughs (undersize material) are discharged onto a belt conveyor and are usually conveyed to secondary plant processing stages.

- The rock from the first stage is conveyed to a vibrating inclined screen called the scalping screen. This unit separates oversized rock from smaller material. The undersized material from the scalping screen is considered to be a product stream and is transported to a storage pile and sold as base material. The material that is too large to pass through the top deck of the scalping screen is processed in the secondary crusher. A cone crusher then typically reduces material to 25 to 100mm diameter. The material (throughs) from the second level of the screen bypasses the secondary crusher because it is sufficiently small for the last crushing step. The output from the secondary crusher and the throughs from the secondary screen are transported by conveyor to the tertiary circuit, which includes a sizing screen and a tertiary crusher.

- Tertiary crushing is usually performed using cone crushers or other types of impactor crushers. Oversize material from the top deck of the sizing screen is fed to the tertiary crusher. The tertiary crusher output, which is typically 5 to 25mm, is returned to the sizing screen. Various product streams with different size gradations are separated in the screening operation. The products are conveyed to open area stockpiles.

- Some rock crushing plants produce manufactured sand (quarry dust). This is a small-sized rock product with a maximum size of 5mm. Crushed stone from the tertiary sizing screen is sized in a vibrating inclined screen (fines screen) with relatively small mesh sizes.

2.4 Hours of Operation and Workforce

The proposal will have the following hours of operation for the following phases of operation:

- *construction,* including – road works, weighbridge, sediment & erosion control earthworks, rock drilling & hydraulic hammer rock breaking, topsoil & overburden removal & stockpiling etc:
  Monday to Saturday (excluding Public Holidays), 7 am to 7 pm for a period of approximately 4 weeks,

- *plant maintenance,* including – crushing plant, earthmoving machinery etc:
  Monday to Saturday (excluding Public Holidays), generally 7 am to 7 pm, however in emergency situations maintenance works may be required at any time,

- *blasting:*
  Monday to Friday (excluding Public Holidays), 10 am to 3 pm, with a frequency of approximately one blast per month,

- *crushing, stockpiling, blending, and pre-coating:*
  Monday to Saturday (excluding Public Holidays), 7 am to 10 pm

- *loading and hauling* product for delivery to customer:
  Monday to Friday (excluding Public Holidays), anytime.

Typically one employee will be onsite; however during crushing operations four employees would typically be present. Non-permanent staff (contractors) would be present during specialist operations only, for example during drilling, blasting or technical maintenance operations.

2.5 Work Plan

2.5.1 Extraction Methodology, Design and Staging

The proposed extraction methodology is shown in **Figure 2.5** below and follows the following sequences using identified plant and equipment:

- removal of vegetation, top soil and overburden and stockpiling of topsoil (using a combination of excavator, front-end loader and off-road dump truck);

- winning of raw feed by drilling and blasting (by contracted hydraulic rotary percussion drill rig and shotfirer);

- load, crush and stockpile quarry products (front-end loader, 3 stage crushing plant, and off-road dump truck) using stockpile sites within the qyuarry or at the temporary site (2007-2012); and

- load quarry product onto haul trucks for delivery (front-end loader and trucks).

Timing of 'stage' progression shown in the extraction methodology plan will be dependant on quarry product demand, however during construction of the HHDWP it is expected that 'stage 1' would last for approximately 4-6 months from the start of HHDWP road construction, stage 2 for approximately 6-12 months afterwards, and 'stage 3' thereafter. Naturally, as extraction works extend further into the hill, higher quantities of resource will become available.

The design of the expanded quarry has been based on a conventional stepped 'bench and berm' layout, with bench height being restricted to 15m with a minimum berm width of approximately 5m.

Quarry pit design at the completion of all extraction phases is shown as 'Stage 4' in **Figure 2.5** above.

2.5.2 Production and Equipment

Extraction of rock would be facilitated using the 'free face' blasting technique with the anticipated quarry layout and design (given topography) requiring approximately 1 blast per month for the life of the HHWDP. Blasting frequency after completion of the HHWDP would be on an 'as needs' basis however is anticipated to be approximately once every 3-6 months. A typical drill and blast program is set out in **Table 2.5** below. Further details are provided at **Section 3.4** below.

Table 2.5: Typical Drilling and Blasting Program

Approximate quantity of raw rock generated per blast	15,000-20,000 tonnes
No. of drill holes	40
Hole depth	16m
Hole diameter	89mm
Hole Pattern	3.2m x 4.0m
Stemming	2m
Sub drill	1m
Frequency of blasting	1 per month
Maximum instantaneous charge	113 kg
Bench height	15m

When fully developed the quarry rock face will be sufficiently wide to provide for alternate sites for preparatory drilling for continuous rock supply.

No explosives will be stored on site. Licensed contractors will be utilised to convey, load, prime, and detonate all explosives. Lubke Quarry would abide by a self-

imposed blasting notification regime where the owners/occupants of all adjoining dwellings within a 2 km radius would be notified 24 hours in advance of any blasting occurrence. Further detail is provided below at **Section 3.4**.

The processing of raw rock primarily comprises crushing and screening. All crushing equipment would be mobile to facilitate relocation in accordance with site layout and production requirement needs. A front-end loader will be permanently on site to feed raw rock material into crushing plant and to load quarry products into haul trucks for transport off-site.

Quarry equipment required to achieve anticipated production rates for the first five years of operations include:

- 3-stage crushing plant;
- articulated front-end loader;
- excavator; and
- haul trucks.

Over the life of the proposal, the 'type', 'make' and 'model' of plant may vary according to plant upgrade, manufacturer design improvements, or equipment provided by contractors, however initial plant and equipment used during the HHDWP will consist of:

- primary jaw crusher: 42 x 30 STRB (Cedarapids);
- secondary cone crusher (MVP 280);
- VSI mobile crusher or tertiary impact crusher (Canica 90);
- screen units and stockpile conveyors;
- 30t hydraulic excavator (Komatsu PC300);
- front-end loader (Komatsu WA 500/Komatsu WA 470/Hyundai HL770);
- 35t off-highway dump truck (Cat 769B/Komatsu HD325);
- tipper truck (Kenworth 97T900);
- diesel genset; and
- hydraulic rotary percussion drill.

A 60 tonne weighbridge and a transportable site office are the subject of separate development applications which have been approved for installation as part of the existing quarry operations. The site office will have reticulated electricity and 'land line' telephone communications, with VHF radio and mobile phone for on-site communications with the quarry work area. Drinking water will be supplied via a rainwater tank at the site office. Water for dust suppression of the haul road, quarry work area and crushing plant will be provided by existing on-site dam storage and sediment dams.

On-site maintenance of all plant and equipment will be carried out by contractors. Re-fuelling will be carried out by permanent staff or contractors. A 5,000 litre diesel above-ground fuel tank and 110% spill bund area will be provided in the quarry work area. Construction and access will comply with relevant Australian and Occupational Health and Safety standards.

2.6 Transportation and Access

The existing Lubke Quarry haul road and access point with the Hume Highway is shown in **Figure 2.3** above. The haul road is approximately 1.2 km long and of gravel construction.

The haul road is proposed to be changed in location by constructing a new part of the haul road along an internal boundary fence to separate quarry traffic from household and farm traffic. These works are expected to be carried out under the existing quarry approval and be in place when expanded quarry operations are ready to commence. The access point with the Hume Highway will remain unchanged, notwithstanding the proposed HHDWP which will create a new two-lane carriageway inside the current boundary of 'Cromer' requiring that the haul road access point be relocated southeast from its present position. A plan showing the location of the new carriageway is shown later in this EIS. As mentioned above it is presumed the RTA will address this issue in their referral conditions to the Council as a part of the EIS public exhibition process.

The haul road in general will be upgraded to accommodate expected heavy vehicle truck movements of 25 outbound laden truck movements per working day during the five year construction phase of the HHDWP. Haul trucks are expected to be of 33 tonne or 22 cubic metre capacities. Further details are provided below at **Section 3.12**. Haul road upgrade works will consist of road reconstruction and drainage works in accordance with civil engineering best practice guidelines in accordance with expected use and frequency.

2.7 Extraction Site Rehabilitation

Extraction site rehabilitation has the objective to produce an area which is stable, self-sustaining, conforms with the character of the local and regional environment, and is safe. The final land use proposed for the quarry work area site is to return the disturbed area to grassed or rocky outcrop conditions similar to that which currently characterises the unworked areas in the vicinity of, or in, the existing quarry.

The rehabilitation of areas disturbed by extraction or operational works will be progressive. This approach has a number of advantages, including:

- quicker return of visual amenity to areas disturbed by extraction;
- regeneration potential of striped topsoil is maintained, promoting regrowth through nutrient replacement;
- natural erosion and sedimentation controls of vegetation and ground litter are quickly re-established and will aid water quality control; and
- habitat is returned sooner, reducing disturbance effects on native fauna.

All rehabilitated areas will be closed to heavy vehicle and equipment access and will be stock-proof. Gates will be installed for light-commercial vehicle access for maintenance purposes i.e. planting and weed control.

2.7.1 Rehabilitation Concept

The rehabilitation concept is to reinstate the land form, environment, and biodiversity to pre-quarry expansion conditions as best as possible. Similarly it is also intended that water quality to receiving environments be improved over and above pre-quarry expansion conditions.

It is intended that the rehabilitated landform emulates the existing landform as best as possible notwithstanding the open-cut nature of the quarry and the mass of earth resource thus extracted. For this reason several native vegetation 'off-set' replanting areas are proposed to be set aside on the 'Cromer' property immediately adjacent to the expanded quarry work area. These areas have been chosen in locations responsive to biodiversity values, specifically with reference to relevant vegetation communities and fauna habitat preferences. Further detail is provided below at **Section 2.7.4**.

The rehabilitation concept is shown below in **Figure 2.7.1**. Whilst this figure details the 'graphical' part of the plan, this EIS has taken the additional step of preparing the 'written' part up-front and not deferred consideration of related issues till later in the EIA process i.e. consent authority conditions. In this respect reference is made below to **Section 3.7** where relevant details are provided and discussed.

The rehabilitation concept has been designed and formulated to be financially viable with linkages to quarry revenue throughout the life of the quarry to facilitate the 'progressive' requirement for rehabilitation. The principle linkage of course is through quarry ownership and management being the same as the ownership and management of 'Cromer', the encompassing property. The landowner has contributed to the design of the concept plan this facilitating custodianship related principles for the future stewardship of implementation items.

Prior to the commencement of extraction operations, existing grassland and woodland would be cleared. The trees that are on the area to be excavated would be felled and stockpiled for later use as habitat in conjunction with unearthed stone and rock (for reptile habitat improvement works). Further information is provided below at **Section 3.7** (and in **Appendix F**). Topsoil would then be stripped to prescribed depths and stockpiled for later use and respreading onto re-contoured rehabilitation areas. Seed would be collected from existing native vegetation in surrounding areas or from recognised commercial seed supply companies.

Following the completion of excavation, disturbed areas would be re-contoured prior to applying topsoil. These activities would be closely co-ordinated with erosion and sediment control works. Well proven bushland regeneration techniques would be used in accordance with the rehabilitation works program detailed in **Appendix F**.

2.7.2 Site Drainage

The site is located on the side of Cromer Hills with a south to south-westerly aspect in between the 321m and 430m AHD contours. The site has drainage influences from the adjoining Morgans Ridge complex of topography, principally via an

intermittent drainage line which traverses east, south-east and then south of the quarry work area as it falls away draining to lower alluvial slopes. Further detail is provided below at **Section 3.6**.

2.7.3 Erosion and Water Quality Control

The proposed expansion of the quarry has the potential to create soil erosion as well as adversely affect water quality in downstream receiving waters; including through stormwater runoff suspended solids, pH, salinity, and nutrients. During extraction operations, all possible efforts should be made to reduce the potential for soil erosion and reduced water quality in stormwater runoff.

Erosion and sedimentation controls should be based on water quality objectives as detailed in *Australian and New Zealand guidelines for fresh and marine water quality* (ANZECC/ARMCANZ 2000) or the 'ANZECC guidelines', and the standards set out in *Managing Urban Stormwater: Soils and Construction* (Landcom 2004), or other suitable standards. The concept erosion and sedimentation control plan is shown below in **Figure 2.7.2**.

Primarily, sediment and erosion strategies have been designed to minimise the potential for erosion and sedimentation. Strategies include staged clearing and re-vegetation of work areas to minimise the area of exposed erodible surfaces as well as using contour benching on outer work area edges to capture runoff from disturbed ground. Stormwater should be retained within the fill extraction work area within constructed sedimentation drainage infrastructure, including silt traps and dams. Where possible 'clean' runoff should be separated from 'dirty' runoff and disposed of or reused accordingly. Efficient 'water-balancing' of the stormwater management system is a key design principle. Sediment-laden water should be allowed to settle before being discharged, or be reused for dust suppression. More detailed strategies are provided below.

2.7.3.1 Structural Protection Strategies

Before extraction works begin, the following soil and water quality protection strategies should be implemented:

- the outline of the final fill extraction area should be defined on-site by accurate survey and perimeter fencing installed;
- diversion drains should be installed outside these areas to ensure that surface stormwater runoff from undisturbed areas is separated from all operational areas;
- a silt-fence should be placed around those parts of the site where water discharge is possible. This fence should be complemented by pick-up drains that direct any runoff to a sediment trap or dam;

- the silt-fence and the pick-up drains around the total operational area should be complemented by a similar fence and drain placed around each working area, until restoration of that area has been achieved;

- the sediment traps or dam/s should be located to enable all waters discharged from the operational area to pass through. This should include all disturbed and excavation areas, top soil and mulch stockpiles, as well as all roadways on the site; and

- the appropriate capacity of all drainage systems and the highest order sediment dam should be designed in accordance with a 1-in-20 year average return interval (ARI) or 20ARI rainfall event given catchment properties.

The Concept Erosion and Sedimentation Control Plan has been designed and laid out in consideration of these requirements.

2.7.3.2 Operational Protection Strategies

A range of operational procedures should be undertaken to minimise erosion and impacts on water quality, including:

- minimise the size of areas that are cleared for extraction or work area at any one time;

- other areas should be left intact, while extraction is completed within each work area;

- silt-trap fencing and a pick-up drain should be constructed around each work area or topsoil stockpile prior to operations commencing;

- any stockpile that is likely to be left for longer than three weeks should be seeded with temporary grass cover;

- sediment detention basins (traps and dams) should be cleared of sediment if the volume of the basin is reduced by 40%;

- all drainage and erosion control elements should be inspected on a fortnightly basis or following rainfall events;

- each work area should be excavated to finished levels prior to work commencing on a new area; and

- each work area is to be rehabilitated within seven days of the operations ceasing and final levels being achieved.

The Concept Erosion and Sedimentation Control Plan has been designed and laid out in consideration of these requirements.

2.7.4 Revegetation Strategy

The native vegetation off-set replanting areas mentioned above at **Section 2.7.1** are located to the north and south-east of the quarry permitter, and, for the purposes of this EIS, are known as the 'North-east Off-set Revegetation Area' and the 'Southern Off-set Revegetation Area'. A detailed schedule of the proposed replanting program affecting these areas, including the quarry work area is provided at **Appendix F**.

The principal objective of the strategy is to provide off-sets for the removal of native vegetation as a part of the expanded quarry. The flora and fauna survey detailed below at **Section 3.7** identified that the quarry site includes rising country and rocky knolls that support two vegetation communities:

- approximately below the 360 metre Australian Height Datum (AHD) contour – the *Western Slopes Grassy Woodlands (White Box-Yellow Box- Blakely's Red Gum Woodlands)*; and

- approximately above the 360m AHD contour – the *Western Slopes Dry Sclerophyll Forest: Rocky Scarps and Ranges Complex*.

The native vegetation off-set replanting program derives from these vegetation communities and proposes a works and maintenance program commensurate with related biodiversity values and re-vegetation objectives. Further detail is provided below at **Section 3.7 (**and **Appendix F**).

The concept rehabilitation and native vegetation off-set replanting plan is shown above at **Figure 2.7.1**. Further comment is provided below at **Section 3.7**.

2.7.5 Haul Road Rehabilitation

The haul road between the quarry site and the Hume Highway will be rehabilitated during the final phase of site rehabilitation. It is expected that the haul road access point with the Hume Highway will remain and be used for farm access to 'Cromer' as is currently the case. The main works associated with the road rehabilitation will be the levelling of the road and drainage infrastructure and sowing all areas to pasture for agricultural production however the road will remain for farm access purposes. To this affect the drainage arrangement for quarry runoff to be diverted to higher order sedimentation dams to the west via the road table drain.

2.8 Energy Requirements

The primary energy requirement for the expanded quarry will be diesel fuel for mechanical plant and equipment. Secondary energy requirements will be reticulated electricity powering lighting for occupational health and safety reasons and commercial explosives for the blasting of rock.

Based on the plant and equipment detailed above at **Section 2.5.2** below and assuming the maximum extraction of 200,000 tonnes of material per year, the use of diesel fuel is estimated at approximately 200,000 litres per year during the HHDWP and approximately 25-50,000 litres per year thereafter for the remaining life of the quarry.

3.0 ASSESSMENT OF ENVIRONMENTAL IMPACTS AND MITIGATION

3.1 Regional Setting

Holbrook is located 68 km to the northeast of Albury and 114 km southwest of Gundagai via the Hume Highway and has a population of 2,435 (2001).

Areas surrounding Holbrook are 'rural' in character comprising predominantly agricultural grazing lands. Some cropping of alluvial plains land is carried out, and centre-pivot irrigation operations are evident along the immediate environs of Billabong Creek several kilometres to the north of the site.

There are no operational quarries within 2 km of Lubke Quarry, however it is understood that a quarry may be seeking approval to establish approximately 300m to the southeast of Lubke Quarry on adjoining land. Further discussion of the EIA process regarding the establishment of any quarry in proximity to an existing quarry is provided at **Section 3.14** below. A disused quarry also exists approximately 3.5 km to the east. It is understood that 'existing use rights' associated with this quarry have expired.

3.2 Local Setting

Lubke Quarry is located five kilometres to the north-northeast of the Holbrook township. The nearest boundary of land zoned 'residential' in Holbrook to the nearest boundary of the proposed expanded Lubke Quarry work area is approximately 5,250m.

The nearest dwellings to Lubke Quarry not in the same ownership as 'Cromer' are shown in **Figure 3.4** below. An explanation of measurement methodology is provided in the Figure. Communications with the Greater Hume Shire Council have revealed that there are no current building approvals for un-constructed dwellings within 3 km of the nearest boundary of Lubke Quarry (May 2007).

The nearest public open space or public land is the 'Lubke Rest Area" situated in the Hume Highway road reserve, located approximately 600m to the north-west at the nearest point to the proposed expanded Lubke Quarry work area. This area is

situated directly opposite the existing and proposed haul road access point with the highway.

The nearest Crown land (not including the Hume Highway road reserve) is a 'Travelling Stock Route' (TSR) located approximately 1.5 km to the southwest.

There are no known tourist attractions or facilities within 2 km of the site. The nearest such facility is the 'Holbrook Submarine' in the northern area of the Holbrook township some 6 km to the south-west.

In general, the local environmental setting can be characterised as rural with little dust generation activities present except that generated by the existing Lubke Quarry or arising from local agricultural operations. Similarly noise generation occurs from existing operations of the Lubke Quarry including intermittent blasting. The only permanent noise source in the local area generates from traffic using the Hume Highway or from aircraft in 'take-off' climbing configuration in the vicinity of the Holbrook Airport located 4.5 km to the west.

3.3 Land Use and Planning

3.3.1 Land Use

Lubke Quarry is located within the agricultural grazing property of 'Cromer' and is otherwise known as Lot 1 DP 585233. The history of Lubke Quarry is described above at **Section 1.4**.

'Cromer' is used for the agricultural grazing of cattle. Adjoining land consists of similar land uses however with some cropping of flatter more cultivatable land and slopes. The Hume Highway borders 'Cromer' to the northwest of the Lubke Quarry.

3.3.2 Land Use Planning

As mentioned above at **Section 1.5.1**, 'Cromer' is zoned part 'Non-urban 1(a)' and part 'Non-urban 1(b)' under the LEP. The part of 'Cromer' zoned 'Non-urban 1(b)' is that land within 400 metres of the Hume Highway, and 'Non-urban 1(a)' comprises remaining land.

The nearest land zoned for a sensitive land use such as "residential" or "environment protection" is land located on the outer fringe of Holbrook associated with the township urban area. This land is zoned "Non-urban (d) – Rural Small Holdings" under the LEP i.e. a 'rural living' type zoning. The nearest such land is located over four kilometres to the south-west of the nearest property boundary of 'Cromer'.

In Colum III of the Table of permitted land uses in the LEP, the development of land for the purposes of "extractive industry" is permitted in both land use zones with the

consent of Council and Clause 8 of the LEP is considered relevant to the proposal as follows:

> Where application is made to the Council for consent or approval:-
> (a) to carry out development within view of any waterway or adjacent to any main road, railway, public reserve, the Council shall take into consideration the probable aesthetic appearance of the development when used for the proposed purpose and viewed from such waterway, main road, railway or public reserve.
> (b) To carry out development for the purpose of an extractive industry or mine, the Council shall take into consideration the advisability of imposing conditions to secure the reinstatement of the land, the removal of waste material or refuse and the securing of public safety and amenity of the neighbourhood.
> …

In the EIA process the Council needs to consider each of the above issues. For reference, issues arising from clause 8(a) are addressed in this EIS at **Section 3.11** and in relation to clause 8(b) at **sections 2.7** and **3.10**.

The above provisions in the LEP are considered rudimentary (owing to the 1970 issue date of the LEP) however this EIS addresses more mainstream assessment issues, specifically environmental assessment issues arising from section 79C(1) of the EP&A Act and related EIA provisions relating to the assessment of "designated development".

It is known that the Council is currently preparing a new Local Environmental Plan to replace the LEP however this plan has not been released for public exhibition at the time of preparing this EIS. A 'Draft Strategic Land Use Plan for Holbrook' has however been prepared and is currently on exhibition at the time of writing this EIS (May 2007). This plan is the prelude to the introduction of a new LEP for the Greater Hume LGA. A review of the draft plan confirms that no new residential type development is proposed in the area in between Holbrook and Lubke Quarry (GHSC 2007).

In terms of SEPP33, arising from the proposed expanded quarry operations and the extraction and processing methods, it is considered that the proposal is unlikely to be a "pollution potential to people, property or the environment" notwithstanding that an EPL is required under section 48 of the POEO Act. The proposal is also unlikely to be "potentially hazardous" as no hazardous materials will be present. Therefore it is considered that no further consideration under SEPP33 is required.

In terms of SEPP55, for similar reasons and because no known or likely land contamination exists, no further consideration is required. Discussion regarding waste management and disposal is provided below at **Section 3.10**.

3.3.3 Impacts on Land Use

Given the analysis in the above two sections, in general, it is anticipated that the proposal will not impact on surrounding land uses in a significant way. Further information regarding anticipated noise and vibration impact on the nearest dwellings

to the expanded quarry work area are addressed in **Section 3.4** below. Likewise information regarding anticipated dust generation is provided at **Section 3.5** below.

3.4 Noise, Blasting Vibration and Overpressure

In order to best implement the investigation and environmental reporting obligations of this EIS in relation to noise, blasting vibration and overpressure a specialist report has been prepared and is provided at **Appendix D**. The following sections summarise the investigative procedures and findings of this report.

3.4.1 Acoustic Environment

In order to quantify the existing acoustic environment of the area surrounding Lubke Quarry, particularly at nearby dwellings, ambient noise monitoring was carried out. Noise measurements were recorded by installing environmental noise loggers at three nearby dwellings from 2 to 10 February 2007:

- 'Rockley Falls' (representative of south-western area with reduced influences of highway traffic noise);
- 'Rankin Park'/'Milton' (representative of north-western area with reduced influences of highway traffic noise); and
- 'Wongalee' (representative of north-eastern area given that 'Wonga Park' is not permanently occupied).

The location of these sites and their distances from the proposed quarry and the haul road are shown in **Figure 3.4** below. The 2 km radius represents the maximum investigation distance recommended by the *EIS Guideline: Extractive Industries – Quarries, DUAP 1996*.

The noise loggers were set to record the assessment background noise level (L_{A90}) and the existing ambient noise level (L_{Aeq}). The assessment background noise level was determined by the tenth percentile method for 'day', 'evening' and 'night' periods. From this a rating background noise level was derived using median values.

Environmental noise levels can vary considerably with time; therefore it is not adequate to use a single number to fully describe the acoustic environment. The preferred, and now generally accepted, method of recording and presenting noise measurements is based upon a statistical approach. For example, the L_{A10} noise level is the level exceeded for 10% of the time, and is approximately the 'average maximum noise level'. The L_{A90} level is the level that is exceeded for 90% of the time, and is considered to be approximately the 'average of the minimum noise level' recorded. This level is often referred to as the 'background' noise level. The L_{Aeq} level represents the 'average noise energy' during the measurement period. This level is often referred to as the 'ambient' noise level.

The following tables show the results from the noise loggers. These figures are taken to represent the acoustic environment of the area surrounding Lubke Quarry. Full statistical noise measurement results are shown in graphical form in Appendix B of the specialist report at **Appendix D** of this EIS.

It is noted that this EIS adopts the *NSW Industrial Noise Policy* (EPA 2000) definitions of "day", "evening", and "night" as follows:

- Day – the period from 7 am to 6 pm (Monday to Saturday) and 8 am to 6 pm (Sundays and Public Holidays);
- Evening – the period from 6 pm to 10 pm; and
- Night – the period from 10 pm to 7 am (Monday to Saturday) and 10 pm to 8 am (Sundays and Public Holidays).

Table 3.4.1: Existing Ambient Noise Levels – 'Wongalee' [db(A)]

Date	Time of Day	Assessment Background Noise Levels (L_{A90})	Existing Ambient Noise Levels (L_{Aeq})
2/02/07	Day	35	45
2/02/07	Evening	36	52
2-3/02/07	Night	32	54
3/02/07	Day	34	46
3/02/07	Evening	33	50
3-4/02/07	Night	30	49
4/02/07	Day	34	46
4/02/07	Evening	36	53
4-5/02/07	Night	31	51
5/02/07	Day	35	46
5/02/07	Evening	38	52
5-6/02/07	Night	32	53
6/02/07	Day	33	47
6/02/07	Evening	41	52
6-7/02/07	Night	33	55
7/02/07	Day	36	48
7/02/07	Evening	40	53
7-8/02/07	Night	35	55
8/02/07	Day	34	47
8/02/07	Evening	36	51
8-9/02/07	Night	34	51
9/02/07	Day	34	47
9/02/07	Evening	39	53
9-10/02/07	Night	32	52
10/02/07	Day	36	49

Note: All noise levels are rounded to the nearest whole decibel.

Table 3.4.2: Summary of Existing Ambient Noise Levels – 'Wongalee' [db(A)]

Time of Day	Rating Background Noise Levels (L_{A90})	Log Average Existing Ambient Noise Levels (L_{Aeq})
Day	**34**	**47**
Evening	**36**	**52**
Night	**32**	**53**

Table 3.4.3: Existing Ambient Noise Levels – 'Rankin Park'/'Milton' [db(A)]

Date	Time of Day	Assessment Background Noise Levels (L_{A90})	Existing Ambient Noise Levels (L_{Aeq})
2/02/07	Day	28	39
2/02/07	Evening	28	37
2-3/02/07	Night	32	44
3/02/07	Day	28	48
3/02/07	Evening	28	37
3-4/02/07	Night	27	37
4/02/07	Day	29	44
4/02/07	Evening	28	33
4-5/02/07	Night	28	40
5/02/07	Day	29	47
5/02/07	Evening	31	41
5-6/02/07	Night	30	44
6/02/07	Day	28	45
6/02/07	Evening	33	42
6-7/02/07	Night	30	41
7/02/07	Day	29	46
7/02/07	Evening	30	42
7-8/02/07	Night	30	41
8/02/07	Day	28	40
8/02/07	Evening	29	53
8-9/02/07	Night	32	49
9/02/07	Day	28	44
9/02/07	Evening	29	35
9-10/02/07	Night	29	39
10/02/07	Day	30	45

Note: All noise levels are rounded to the nearest whole decibel.

Table 3.4.4: Summary of Existing Ambient Noise Levels – 'Rankin Park'/'Milton' [db(A)]

Time of Day	Rating Background Noise Levels (L_{A90})	Log Average Existing Ambient Noise Levels (L_{Aeq})
Day	**28**	**45**
Evening	**29**	**45**
Night	**30**	**43**

Table 3.4.5: Existing Ambient Noise Levels – 'Rockley Falls' [db(A)]

Date	Time of Day	Assessment Background Noise Levels (L_{A90})	Existing Ambient Noise Levels (L_{Aeq})
2/02/07	Day	31	53
2/02/07	Evening	30	46
2-3/02/07	Night	31	51
3/02/07	Day	31	54
3/02/07	Evening	29	46
3-4/02/07	Night	29	52
4/02/07	Day	31	53
4/02/07	Evening	34	49
4-5/02/07	Night	30	53
5/02/07	Day	32	57
5/02/07	Evening	36	49
5-6/02/07	Night	30	52
6/02/07	Day	28	56
6/02/07	Evening	28	53
6-7/02/07	Night	31	53
7/02/07	Day	31	59
7/02/07	Evening	41	58
7-8/02/07	Night	32	53
8/02/07	Day	30	50
8/02/07	Evening	33	63
8-9/02/07	Night	32	64
9/02/07	Day	32	51
9/02/07	Evening	37	48
9-10/02/07	Night	31	53
10/02/07	Day	36	52

Note: All noise levels are rounded to the nearest whole decibel.

Table 3.4.6: Summary of Existing Ambient Noise Levels – 'Rockley Falls' [db(A)]

Time of Day	Rating Background Noise Levels (L_{A90})	Log Average Existing Ambient Noise Levels (L_{Aeq})
Day	**31**	**53**
Evening	**33**	**51**
Night	**31**	**53**

As part of the environmental assessment process for construction of the HHDWP the RTA commissioned the *Yarra Yarra to Holbrook Environmental Assessment, Hume Highway Duplication* (RTA 2007). The assessment contained a noise study (Appendix 8) relating to ambient noise at sensitive receivers along the proposed road construction route. One location was at the dwelling known as 'Jerapoohl' located approximately 1,560m to the west of Lubke Quarry. Noise level results arising are shown in **Figure 3.4.7** below.

Table 3.4.7: Summary of Existing Ambient Noise Levels – 'Jerapoohl' [db(A)]

Property	Distance from road	L_{eq}		L_{10}		L_{90}		Max L_{max}	
		Day	Night	Day	Night	Day	Night	Day	Night
'Jerapoohl'	130m	59	61	62	65	46	48	88	80

As indicated in the assessment (RTA 2007b, Appendix 8, p. 7), existing noise levels at night at 'Jerapoohl' exceed the night-time noise assessment criterion by 6 dB(A). This circumstance has a relationship to current traffic noise generated from the Hume Highway (RTA 2007b).

3.4.2 Noise Assessment Criteria

The following polices make up relevant noise assessment criteria in NSW:

- *NSW Industrial Noise Policy, EPA, 2000* (INP);
- *Environmental Criteria for Road Traffic Noise, EPA, 1999* (ECRTN);
- *Environmental Noise Control Manual: Construction Site Noise Guidelines, DEC, 1985* (ENCM); and
- *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration, Australian and New Zealand Environment Council, 1990.*

In order to assess the potential impacts of noise associated with the extraction and haulage of material from the expanded Lubke Quarry area, relevant noise assessment criteria must be established. This is undertaken below.

3.4.2.1 Industrial Noise Policy

The INP assessment procedure for industrial noise sources has two components:

- controlling intrusive noise impacts; and
- maintaining noise level amenity.

In assessing noise impacts of industrial noise sources all components must be taken into account for residential receivers, but, in most cases, only one will become the limiting criterion. The project-specific noise goals reflect the most stringent noise level requirement, and is derived from intrusive and amenity criteria and is used to set a benchmark against which noise impacts and the need for noise mitigation are assessed.

Intrusive noise impacts

The INP states that (p. 14):

> *The intrusiveness of an industrial noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the L_{Aeq} descriptor) measured over a 15 minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB.*

Thus, when considering the environmental consequence of noise from a specific source, any increase above the background sound pressure level, which exceeds 5 dB, may be offensive.

The perception of noise and its level of offensiveness depends greatly on the broader situation within which it occurs. Noise that might intrude into a resting or sleeping place may be found offensive whereas the same noise occurring in a market place or noisy working area may pass unnoticed. The concept of 'background +5 dB' derives from this consideration.

The INP also states that where the existing background noise level at the receptor is less than 30 dB(A), as may occur in a quiet rural area, then 30 dB(A) should be assumed to be the existing background noise level.

Where the noise source contains characteristics such as prominent tonal components, impulsiveness, intermittency, irregularity or dominant low-frequency, content adjustments to the measured level are applied to allow for the increase in annoyance values.

Protecting noise amenity

The INP also provides that (p. 15):

> *To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.1.*

Table 2.1 of the INP (p. 16) is provided as follows in **Table 3.4.8** below.

Table 3.4.8: Recommended Noise Levels from Industrial Noise Sources [dB(A)]

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended (L_{Aeq}) Noise Level	
			Acceptable	Extreme
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
Residence	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
Residence	Urban	Day	60	65
		Evening	50	55
		Night	45	50
Residence	Urban/Industrial Interface – for existing situations only	Day	65	70
		Evening	55	60
		Night	50	55
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Hence the acceptable noise level (L_{Aeq}) for rural areas for day time is **50** dB(A); for evening time is **45** dB(A); and, for night time is **40** dB(A). Modifications can be made to the acceptable noise level (L_{Aeq}) to account for existing levels of industrial noise. This is compiled in **Table 3.4.9** below (INP, p. 17).

Table 3.4.9: Modifications to the Acceptable Noise Level to account for the existing level of industrial noise [dB(A)]

Total existing (L_{Aeq}) noise level from industrial sources	Maximum (L_{Aeq}) noise level from new sources alone
Acceptable noise level +2	Existing noise level -10
Acceptable noise level +1	Acceptable noise level -8
Acceptable noise level	Acceptable noise level -8
Acceptable noise level -1	Acceptable noise level -6
Acceptable noise level -2	Acceptable noise level -4
Acceptable noise level -3	Acceptable noise level -3
Acceptable noise level -4	Acceptable noise level -2
Acceptable noise level -5	Acceptable noise level -2
Acceptable noise level -6	Acceptable noise level -1
Acceptable noise level -6	Acceptable noise level

Modifying Factor Adjustments

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same sound pressure level. A correction should be applied to both the intrusive and

the amenity measurement before a comparison is made with the criteria. An abbreviated version of the correction factors is shown in **Table 3.4.10** below.

Table 3.4.10: Modifying Factor Corrections [dB(A)]

Factor	Assessment/ measurement	When to apply	Correction	Comments
Tonal noise	One-third octave band or narrow band analysis	Level of one third octave band exceeds the level of the adjacent bands by 5 dB or more (above 400 Hz)	+5 dB	Narrow band frequency analysis may be required to precisely detect occurrence
Low frequency noise	Measurement of C-weighted and A-weighted level	Measure/assess C and A-weighted levels over same time period. Correction to be applied if the difference between the two is 15 dB or more	+5 dB	C-weighted is designed to be more responsive to low frequency noise
Impulsive noise	Time weighting fast and impulse	If the difference in the A weighted maximum levels between 'fast' and 'impulse' are greater than 2 dB	Apply the difference in measured levels as the correction up to a maximum of 5 dB	Impulse time weighting is characterised by a short rise time (35msec) compared to 125msec for 'fast'.
Intermittent noise	Subjectively assessed	Level varies by more than 5 dB	+ 5 dB	Adjustment to be applied for night time only

Sleep Disturbance

The INP recognises that short-term high-level noise which occurs at night may comply with noise criteria (as given above) and yet be undesirable because of the 'sleep disturbance' or 'waking arousal' effect generated.

Sleep arousal is a function of both the noise level and the duration of the noise. Not all people are affected to the same degree by noise, and, at different times, a person will be more or less affected by the same noise. Even in cases where a person is not awoken by noise, that person's sleep may be affected. The effects of noise on sleep therefore cannot be predicted with any degree of accuracy. Noise control however should be applied with the general intent to protect people from sleep disturbance.

To achieve this, the noise level that is exceeded for 1% of any one-minute period ($L_{A1,\ 1\ minute}$) of any specific noise source should not exceed the background level ($L_{A90,\ 15\ minute}$) when the source noise is not present, by more than 15 dB when measured outside of the nearest bedroom window.

3.4.2.2 Environmental Criteria for Road Traffic Noise

The ECRTN provides criteria for development which has the potential to generate additional traffic on public roads. The relevant traffic noise criteria ($L_{Aeq,\ 1\ hour}$) is 55 dB(A) for day time (7 am to 10 pm) and 50 dB(A) for night time (10 pm to 7 am). In all cases, additional traffic should not lead to an increase in existing noise levels of more than 2 dB.

3.4.2.3 Construction Site Noise Guidelines

The Environmental Noise Control Manual: Construction Site Noise Guidelines (1985)(ENCM) provides:

> *Where there is likelihood of annoyance due to noise from construction sites, conditions such as the following may be specified in a development consent or building application…This applies particularly to non-scheduled premises such as commercial buildings where a long construction time is not likely…Variation should be made according to local conditions.*
>
> *Level Restrictions:*
>
> - *Construction period of 4 weeks and under: The L_{10} level measured over a period of not less that 15 minutes when the construction site is in operation must not exceed the background level by more than 20 dB(A).*
> - *Construction period greater than 4 weeks and not exceeding 26 weeks: The L10 level measured over a period of not less that 15 minutes when the construction site is in operation must not exceed the background level by more than 10 dB(A).*
>
> *Time Restrictions:*
>
> - *Monday to Friday, 7 am to 6 pm, Saturday, 7 am to 1 pm if inaudible on residential premises, otherwise 8 am to 1 pm.*
> - *No construction work to take place on Sundays or Public Holidays*
>
> *Silencing:*
>
> - *All possible steps should be taken to silence construction site equipment.*

3.4.2.4 Blasting Noise and Vibration Criteria

The Australian and New Zealand Environment Conservation Council has provided the following guidelines in 'Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration' (1990):

- *The recommended maximum level for air blasts is 115 dB Linear Peak;*

- *The level of 115 dB Linear Peak may be exceeded on up to 5% of the total number of blasts over a period of 12 months. However, the levels should not exceed 120 dB Linear Peak at any time;*
- *The recommended maximum peak particle velocity (ppv) for ground vibration is 5 mm/s. It is recommended that a level of 2 mm/s be considered as a long term regulatory goal;*
- *The peak particle velocity magnitude of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. However, the magnitude should not exceed 10 mm/s at any time;*
- *Blasting should only generally be permitted during the period between 09:00 hours and 17:00 hours Monday to Saturday;*
- *Blasting should generally take place no more than once per day.*

The ENCM provides the following guideline criteria for the control of blasting impact on any nearby dwellings:

> *Blasting operations should, in most cases, be confined to the periods Monday to Saturday, 9 am to 3 pm. Blasting outside of those times should be approved only where blasting during the preferred times is clearly impracticable, and should be limited in number. Blasting at night should be avoided unless it is absolutely necessary.*

The limiting criterion for the control of blasting impact on any nearby dwellings is shown in **Table 3.4.11** below. Similar criteria are provided in *Australian Standard 2187.2 (2006): Explosives - Storage and use - Use of explosives*.

Table 3.4.11: Criteria for the control of blasting impact at dwellings

Time of Blasting	Blast Overpressure Level [dB(linear)]		Ground Vibration Peak Particle Velocity (mm/s)	
	95%	100%	95%	100%
Monday to Saturday, 6 am to 9 am	105	120	2	10
Monday to Saturday, 9 am to 3 pm	115	120	5	10
Monday to Saturday, 3 pm to 8 pm	105	120	2	10
Any day, 8 pm to 6 am	95	120	1	10
Sundays and Public Holidays, 6 am to 8 pm only	95	120	1	10

3.4.3 Noise Emissions

As detailed above at **Section 2**, activities associated with the proposed expansion of Lubke Quarry principally include: site preparation, extraction, and rehabilitation. Extraction and rehabilitation operations may occur at the same time. Plant and equipment that would be used during these operations were also detailed at **Section 2.5.2** above. Indicative noise levels from this plant and equipment are shown in **Figure 3.4.12** below. It is noted that limited data was available for a hydraulic

rotary percussion drill and so data for an air track drill was used instead. This approach represents a worst-case-scenario.

Table 3.4.12: Noise levels of quarry plant and equipment

Source	Sound Power Levels [dB(A)] Octave Band Centre Frequency (Hz)								Sound Power Level dB(A)	Sound Pressure Level ($L_{Aeq, 15\ minutes}$) at 7m [dB(A)]
	63	125	250	500	1k	2k	4k	8k		
Primary jaw crusher	121	117	114	117	116	113	108	101	120	95
Secondary cone crusher	120	113	113	115	114	113	110	102	119	94
VSI mobile crusher	119	107	104	102	100	102	99	94	108	83
Screener	113	102	95	97	97	98	99	93	105	80
Komatsu PC300 excavator	102	110	101	100	100	96	91	86	104	79
Hyundai HL770 loader	105	107	107	96	94	92	85	77	102	77
Komatsu WA 500 loader	107	113	106	98	101	96	90	83	105	80
Kenworth 97T900 tipper truck	103	107	107	102	102	99	92	85	106	81
Diesel genset (side exhaust)	123	109	108	110	109	107	103	96	114	89
Air track drill	111	111	106	108	113	117	116	108	122	97

In relation to the potential for sleep disturbance the noise level that is exceeded for 1% of any one minute period ($L_{A1, 1\ minute}$) was measured. The highest noise levels arising are shown in **Figure 3.4.13** below.

Table 3.4.13: Upper percentile noise levels of quarry equipment [dB(A)]

Source	Sound Pressure Level at 7m ($L_{A1, 1\ minute}$)
Primary jaw crusher	97
Secondary cone crusher	96
Komatsu PC300 excavator	88
VSI Mobile crusher	85
Kenworth 97T900 tipper truck	83
Komatsu WA 500 loader	81

3.4.4 Noise Prediction Methodology

The potential noise impacts arising from the expanded Lubke Quarry have been assessed with respect to anticipated extraction operations and the transport of material via the identified haul road.

The noise prediction methodology used for this noise impact assessment are summarised as follows:

- identify noise generation sources, and determine typical maximum noise levels;
- determine the location/s of nearest affected dwellings (or other sensitive receivers) within 2 km radius;
- calculate distances and characterise topographical conditions in between noise sources and affected dwellings; and
- carry out noise modelling in accordance with relevant noise policies.

For the purposes of this EIS, the relevant noise modelling policy that has been used is *ISO 9613-2 (1996): Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation*. This standard allows for modelling for downwind propagation conditions, including:

- wind direction within an angle of ± 45° of the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver; and
- wind speed between approximately 1 m/s and 5 m/s measured at a height of 3 to 11m above natural ground level.

As discussed below at **Section 3.5**, prevailing winds are from the south-west and so a worst-case-scenario is assumed for each affected dwelling. As detailed above at **Section 2.7** and shown in **Figure 2.5**, the extraction methodology is to start work in the south-western area of the quarry and carry out operations in a north-easterly direction, with the reduced level of stages progressively rising in 15m vertical increments.

Arising from **Section 3.4.1** above, the following noise goals have been established. It is noted that the shown goals are for the noise levels solely from the facilities in question and do not include extraneous noise from other sources, for example noise from construction operations associated with the HHDWP in the vicinity of the site or arising from concurrent agricultural operations.

Intrusive Noise Goals

For intrusive noise, the goal is 5 dB(A) plus the background noise level (L_{A90}). These are shown in the tables below.

Table 3.4.14: Intrusive noise goals – 'Wongalee'

Time of Day	Rating Background Noise Level (L_{A90})	Intrusive Noise Level Goal (L_{Aeq})
Day	34	**39**
Evening	36	**41**
Night	32	**37**

Table 3.4.15: Intrusive noise goals – 'Rankin Park'/'Milton'

Time of Day	Rating Background Noise Levels (L_{A90})	Intrusive Noise Level Goal (L_{Aeq})*
Day	28	**35**
Evening	29	**35**
Night	30	**35**

*Note: Based on the minimum 30 dB background +5 dB.

Table 3.4.16: Intrusive noise goals – 'Rockley Falls'

Time of Day	Rating Background Noise Levels (L_{A90})	Intrusive Noise Level Goal (L_{Aeq})
Day	31	**36**
Evening	33	**38**
Night	31	**36**

Noise amenity goals

For the 'amenity' noise goal the value is dependent upon the existing ambient noise level (L_{Aeq}) from other industrial noise sources. (As there are no other industrial sources in the immediate area the 'rural' amenity criteria applies.) These values are shown below.

Table 3.4.17: Summary of existing noise levels – all locations

Time of Day	Amenity Noise Level Goal (L_{Aeq})
Day	**50**
Evening	**45**
Night	**40**

Project specific noise goals

The project specific noise goals (worst-case-scenario) are as shown for all relevant locations in the table below.

Table 3.4.18: Project specific noise goals

Period	Intrusive Criterion	Amenity Criterion
Day	**35 dB ($L_{Aeq, 15\ minutes}$)** (30 + 5)	50 dB ($L_{Aeq, day}$)
Evening	**35 dB ($L_{Aeq, 15\ minutes}$)** (30 + 5)	45 dB ($L_{Aeq, evening}$)
Night	**35 dB ($L_{Aeq, 15\ minutes}$)** (30 + 5)	40 dB ($L_{Aeq, night}$)

Note: The goals in bold apply.

Sleep disturbance goal

The sleep disturbance goal (worst-case-scenario) for short-term noise ($L_{A1,\ 1\ minute}$) is 45 dB(A) when measured at a distance of one metre outside of any neighbouring dwelling bedroom window.

Construction noise goal

The day-time construction goal (worst-case-scenario) for short-term noise (i.e. 4 week construction period) is 50 dB(A) (i.e. 30 dB(A) plus 20 dB) when measured at a distance of 30m outside of any neighbouring dwelling facade.

Blasting overpressure goal

The site specific blasting overpressure goal for air blasts is 115 dB linear peak maximum. This is when measured at a distance of 3m from any window of any dwelling.

Vibration goal

A site specific peak particle velocity vibration goal (worst-case-scenario) of 2 mm/s is required when measured at the foundations of any dwelling.

3.4.5 Noise Impact Assessment

The proposed expansion of Lubke Quarry has the potential to impact on the acoustic amenity of surrounding dwellings, principally the operation of plant and equipment at the quarry site. Arising from **Section 3.4.4** above, the predicted plant and equipment noise levels are shown in **Table 3.4.19** below. These noise levels are assumed for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear, calm, early mornings. However during strong temperature inversions and high wind conditions, in unfavourable directions, the predicted noise levels could increase by 6 dB.

Table 3.4.19: Predicted plant and equipment noise levels at nearest dwellings

Name of property containing dwelling	Direction from quarry	Distance (metres)	Predicted sound pressure level ($L_{Aeq,\ 15\ minutes}$)
'Beenly'	West	1,430	40
'Jerapoohl'	West	1,530	39
'Rockley Falls'	Southwest	1,610	39
'Wonga Park'	Northeast	1,360	26*
'Wongalee'	Northeast	1,850	22*
'Rankin Park'/'Milton'	Northwest	2,340	33
'Quambatook'	South	2,390	33

Notes:
- All level are rounded to the nearest whole decibel.
- * In the northeast direction a 'barrier effect' of 15 dB is assumed due to topography.
- All Predictions have a 95% uncertainly of +2/-5 dB.

Upgrade construction works for the haul road and expanded quarry area site preparation works

The impacts of noise associated with upgrade works for the haul road and for site preparation have been assessed in accordance with relevant policies detailed above.

Assuming rock drilling and hydraulic hammer rock breaking is required for these works, the sound power level will not exceed 112 dB(A), and the associated noise level at the nearest affected dwelling is predicted to be 47 dB(A). In all probability these works will not be required along the haul road route, and so these figures assume a worst-case-scenario.

Extraction activity works

The noise levels shown in **tables 3.4.2**, **3.4.4** and **3.4.6** indicate that the industrial noise goal ($L_{Aeq,\ day}$) will be met at the majority of neighbouring dwellings. However this goal could be exceeded at the three closest dwellings to the west and southwest of the site. This takes into account all plant in operation simultaneously and so is a worst-case-scenario situation.

Rock drilling for blasting could also exceed the noise goals, however as this only occurs one day per month on average no significant noise impact is predicted.

In strong temperature inversions or significant high winds in unfavourable directions, (i.e. over 3 km/hr and in the south or southwest directions) the noise criteria could be temporarily exceeded for west, south or southwest properties at a distance of up to 3,000 meters.

Blasting operations (vibration)

Based on the proposed maximum instantaneous charge weight of 114 kg, the peak particle velocity vibration goal of 2 mm/s for 95% of blasts will be met at a distance of approximately 650m from the blast position. As the nearest dwelling to the proposed quarry perimeter is 1,390m ('Wonga Park' to the north-east), the proposed blasting operations comply with relevant blasting vibration guidelines.

Blasting operations (overpressure)

Based on the charge weight identified above, the overpressure goal of 115 dB for 95% of blasts will be met at direct line-of-sight distances of 2,300m from the blast position. The 120 dB limit will be met at distances of approximately 1,200m.

Residences to the north-east are likely to be shielded by natural topography comprising 'Lubke Hill'. No residences are likely to be exposed to overpressure levels exceeding the 120 dB limit. Dwellings located at 'Beenly', 'Jerapoohl' and 'Rockley Falls' are likely to exceed the overpressure goal of 115 dB for 95% blasts. Mitigation measures arising are detailed below at **Section 3.4.6**.

Haul road traffic

The UK Department of Transport and Welsh Office's *Calculation of Road Traffic Noise* (1988)(CRTN) has been used to assess noise impacts from haul road traffic. This modelling approach is listed in the NSW "Environmental Criteria for Road Traffic Noise" as an approved prediction method. The CRTN calculation procedure however is untested for small traffic flows so a calculation based on the sound exposure level for one truck has also been carried out.

As detailed above at **Section 2.6**, a maximum of 80 truck movements per day (day time only) and 6 per hour (i.e. 80/12 hours) and 3 trucks per hour in each direction is assumed. Further detail is provided in **Section 3.12** below. For three truck movements per hour CRTN gives a noise level ($L_{Aeq, 1 hour}$) prediction of 55 dB(A) at 15m (this assumes a vehicle speed of 50 km/hr and a small (2%) uphill gradient). Based on a measured truck sound exposure level (L_{AE}) at 15m of 85 dB(A), the hourly level ($L_{Aeq, 1 hour}$) is 53 dB(A) which complies with relevant guidelines for road traffic noise.

3.4.6 Noise Mitigation Measures

This section only addresses instances where noise, vibration or overpressure controls are likely to be exceeded. There are two such identified instances: the first concerning jaw crushing plant and equipment, and the second concerning blasting overpressure.

Jaw crushing plant and equipment

Operations of the jaw crushing plant and equipment (primary jaw crushing and secondary cone crushing) during daytime may exceed the industrial noise goal ($L_{Aeq, day}$) at the three closest dwellings to the west and southwest of the site. The construction of an acoustic barrier (i.e. an earth mound) close to the jaw crushing equipment, which fully prevents line-of-sight to the three closest dwellings to the west and southwest, will result in a noise reduction of approximately 5 dB. The implementation of this mitigation measure will meet the noise goals under moderate wind and ground based temperature inversions (worst-case-scenario climatic conditions).

Operations of the jaw crushing equipment and diesel genset at night-time may also impact on dwellings within 2,500m to the west and southwest. Therefore it is recommended that this equipment is not used at night-time (10 pm to 7 am). An alterative would be to use the jaw crushing equipment and diesel genset within an acoustic barrier designed to provide at least 12 dB attenuation, however this measure should be the subject of a detailed design process and be certified by a registered acoustic engineer prior to being implemented.

Blasting overpressure

Where winds are between 3 to 5 km/hr blowing downwind from the quarry in a quadrant extending south to west (180° to 270° magnetic north) the blasting charge

weight should be restricted to 30 kg (effectively meaning, for operational reasons, that no blasting can occur). Additionally, blasting should be avoided when winds exceed 5 km/hr blowing downwind from the quarry in the south or south-west quadrant (180° to 225° magnetic north). No blasting should take place at night-time (10 pm to 7 am).

Residents of dwellings within 2,000m of the quarry should be informed in advance of any proposed blasting occurrence (industry experience suggests a minimum 24 hours notice where the blast is proposed to occur on a weekday, and 48 notice where the last is proposed to occur on a Saturday – no blasting should be permitted on Sundays or Public Holidays).

3.5 Climate and Air Quality

3.5.1 Existing Climatic Conditions

Existing climatic conditions were characterised from the Bureau of Meteorology as follows:

- rainfall data from Holbrook for the period 1884–2006 (Bureau of Meteorology Station No. 072022);
- rainfall data from Hume Reservoir for the period 1922–2004 (Bureau of Meteorology Station No. 072023);
- temperature data from Hume Reservoir for the period 1970–2004 (Bureau of Meteorology Station No. 072023); and
- wind direction and speed data from the Albury Airport and the Wagga Wagga Airport (Bureau of Meteorology Station No's. 072146 and 072150)

The Holbrook/Albury area has a temperate climate with warm summers and cold winters. The average monthly minimum temperatures at Hume Reservoir range from below zero degrees Celsius (°C) in winter months to approximately 7°C in summer. The average monthly maximum temperatures range from approximately 20°C in winter to 45°C in summer. The average hottest month is February and the average coldest is July. These months also have the highest and lowest temperature ranges respectively.

The average annual rainfall at Holbrook is approximately 690mm. The Holbrook area is characterised by generally high winter and low summer rainfall. Average monthly rainfall ranges from approximately 50 to 80mm in the winter months to generally less than 50mm in summer. Typically approximately 60% of the average annual rainfall falls in the 6 month period between May and October. Rainfall data for Holbrook indicates that although the total rainfall over the summer months is less than that for the winter months, rainfall in the summer months tends to be more intense. Since 2000 the area has experienced extended drought conditions, with the three years to May 2007 showing serious to severe rainfall deficiencies based on rainfall averages.

No wind direction and speed data was specifically available for Holbrook and so data from the Albury and Wagga Wagga airports has been extrapolated with morning (9 am) and afternoon (3 pm) observations available. Relevant 'wind roses' are shown at **Appendix E**. Albury is approximately 68 km to the south-west of Lubke Quarry and Wagga Wagga is approximately 72 km to the north. It is known that wind direction and speed is highly susceptible to local topographical conditions, and so this data should be seen to be indicative only. More exacting local circumstances have been described elsewhere in this EIS relevant to that environmental issue.

In general, average annual winds in the morning are calm and non-directional (64% of the time in Albury and 24% of the time in Wagga Wagga), with Wagga Wagga experiencing winds from the east 30% of the time approximately equally divided into 0-10 km/hr and 10-20 km/hr wind speeds.

Average annual winds in the afternoon show strong correlations for west and south-westerly winds in the two centres, with Albury experiencing these winds approximately 15% of the time approximately divided equally into 0-10 km/hr, 10-20 km/hr, and 20-30 km/hr wind speeds. Wagga Wagga has slightly stronger winds with higher wind speeds evident across these brackets.

No observation data for fog was available for Holbrook however Albury experiences on average 23 occurrences per year. Fog is known to occur in the Holbrook area for approximately the same number of occurrences. The occurrences of fog have relevance for traffic safety as discussed later.

3.5.2 Existing Air Quality

No air quality monitoring is available or has been undertaken in the vicinity of Lubke Quarry. Air quality monitoring was not undertaken as a part of this EIS given observations of existing air quality in the local and regional area and given existing operations of the Lubke Quarry.

Air quality in the local area however is likely to be influenced by the following:

- dust and vehicle emissions from the existing operations of Lubke Quarry (average annual extraction of 3,400 tonnes of material for 21 years);
- emissions from vehicles using the Hume Highway; and
- dust and vehicle emissions from agricultural operations on 'Cromer' and surrounding land.

3.5.3 Air Quality Assessment Criteria

Air quality impacts associated with the expansion of Lubke Quarry are expected to arise from the generation of airborne dust during extraction and processing

operations. Exhaust emission impacts from plant and equipment and vehicles will also occur however these are expected to be minor.

The *Protection of the Environment Operations Act 1997* at section 128 and the *Protection of the Environment Operations (Clean Air) Regulation 2002* at clause 27 and schedule 4 list 50 milligrams of solid particles (total) per cubic metre (mg/m^3) as the prescribed standard of concentration for the emission of air impurities in relation to any activity carried out, or plant operated, at a 'scheduled premises' identified as 'Group 6'.

Thus, in the context of the proposal, by statutory regulation not more than 50 mg/m^3 of airborne dust is permitted to be generated by the proposal. This is detailed below in **Table 3.5.1**.

Table 3.5.1: Dust concentration goals

Assessment criteria for solid particles		
Pollutant	Criteria	Averaging period
Solid particles (total)	50 mg/m^3	1 hour

In relation to the deposition of dust it is current policy that the above airborne dust generation criteria be the sole standard of measurement.

3.5.4 Emissions and Impacts

The generation of dust is expected to occur during extraction and processing operations, with the potential for impacts to the immediate area surrounding the quarry when easterly winds occur which given average climatic conditions would be rare. The most significant sources of dust generation are expected to arise from:

- site establishment operations for the expanded quarry work area (use of dozer, front-end loader, and trucks);
- blasting events (use of drill rig and explosives);
- crushing and processing operations (use of crushing and processing plant and equipment);
- front-end loaders loading trucks; and
- general movement of vehicles and haul road traffic.

In general dust is also expected to be generated from the quarry work area during dry and windy conditions.

Dust generation during crushing and processing operations are anticipated to produce the most dust. Factors affecting such emissions include rock properties, raw material feed size and distribution, moisture content, throughput rate, crusher type, size reduction ratio, and fines content (US EPA 1995).

Dust emissions from haul trucks 'off-site' are expected to be minor given that load bays will be covered, however collected chassis dust is expected to be deposited off-site when either the vehicle stops or experiences a significant jolt.

For the purposes of calculating dust emissions during a standard day's work at the expanded quarry, the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA 2005) recommends use of the emission release parameters shown in **Table 3.5.2** (extrapolated from US EPA 1995).

Table 3.5.2: Dust emission release parameters (total particulate matter)

Operational activity	Emission factor*
Site establishment operations	20 kg/hr
Blasting events	Not available (unreliable data given complexity of each occurrence)
Crushing and processing operations	Not available (unreliable data given complexity of each occurrence), although "screening" is provided at 0.0125 kg/Mg of material throughput
Front-end loaders loading trucks	0.01 kg/tonne
General movement of vehicles in the immediate quarry work area (max. 10 km/hr assumed)	0.085 kg/VKT#
Haul road traffic (max. 50 km/hr assumed)	0.425 kg/VKT#
Wind blown dust	0.4 kg/ha/hr

Notes:
* Source: *AP-42 – Compilation of Air Pollutant Emission Factors, Edn. 5, US EPA, 1995* (Tables 11.9-2, 11.19.2-1 & 13.2.3-1).
# VKT (vehicle kilometre travelled)

The figures listed in **Table 3.5.2** are conservative estimates for the following reasons:

- drought climatic conditions are assumed during all operational stages, therefore soil/quarry product 'moisture content' is assumed to be low for all calculation variables;
- soil, quarry product, and road base 'silt content' is assumed to be high; and
- 'vehicle speeds' are assumed to be high.

Therefore 'per hour' dust generation is anticipated to be 13.4 kg/hr during the first five years of expanded quarry operations (during the life of the HHDWP) using the following assumptions:

- the expanded quarry work area has been fully cleared with 90% of possible disturbed ground exposed – 10 ha (allows for 10% progressive rehabilitation);
- 'stage 3' of the quarry work plan has been enacted;
- 'material throughput' is 1.25 times greater than the rate at which the material is transported offsite;

- haul truck distance travelled on haul road of 96 km per day comprising a haul road of 1.2 km length and 80 truck movements with an maximum payload per truck of 33 tonnes;

- front-end loader distance travelled in the quarry work area of 5 km per day; and

- no water-spraying of processing plant and equipment, stockpiles or haul road.

It is noted that the estimate of 13.4 kg/hr does not include the 'site establishment' figure of 20 kg/hr as no processing plant and equipment would be operating at the same time.

The above worst-case-scenario analysis in anticipated to make up for the lack of dust generation data from dust generation associated with the primary and secondary crushing plant, and is considered a reasonable basis of assessment. This analysis is presented in **Table 3.5.3** below.

Table 3.5.3: Summary of anticipated dust generation

Operational activity	Dust generation (kg/hr)
Crushing and processing operations	2.58
Front-end loaders loading trucks	1.65
General movement of vehicles in the immediate quarry work area (max. 10 km/hr assumed)	0.05
Haul road traffic (max. 50 km/hr assumed)	5.1
Wind blown dust from quarry work area in general	4.0
	13.4

3.5.5 Dust Controls and Safeguards

Particulate matter emissions

Arising from **Table 3.5.3** above and from industry experience in general, control of dust on the haul road is the single most important opportunity to limit particulate matter emission. The next most important opportunity is to manage the quarry work area in general and the processing plant and equipment.

Options to control haul road dust include:

- limit truck speed; and/or

- improve road surface by sealing or gravel re-sheeting and grading at periodic intervals; and/or

- treat road surface with water or chemical dust suppressants as and when required.

Typically the above options are implemented in terms of cost, efficiency, and applicability, however a combination of all measures is recommended.

Other recommended measures include:

- implement dust emission control measures which may include: watering dry surfaces; covering loads on outbound haul trucks; seed long-term stockpiles; and, removing mud and dirt tracked on to road surfaces;
- monitor and record the effectiveness of measures implemented to control dust emissions;
- progressively rehabilitate disturbed areas as soon as earthworks are complete or where earthworks on disturbed areas are dormant for greater than 8 weeks;
- limit haul road vehicle speed limits to a maximum of 40 km/hr;
- limit vehicle and machinery access to designated work areas;
- install a 'rumble grid' (cattle grid) near the weighbridge which drains the secondary sediment dam to facilitate the removal of mud and dust from vehicles;
- install water micro-sprays using recycled water from the primary sediment dam to wet the various stages of materials production at the processing plant and equipment;
- undertake progressive rehabilitation of the quarry work area;
- develop a dust management plan which allows for the investigation and mitigation of adverse impacts which may be experienced at nearby residences possibly arising from cumulative impacts associated with construction of the HHWDP.

Vehicle, plant and equipment exhaust emissions

All construction vehicles, plant and equipment should be maintained and operated in accordance with Australian Design Rules and manufacturer's specifications.

3.6 Soils, Drainage and Water Quality

3.6.1 Soils

Lubke Quarry is situated mid-slope at Lubke Hill at the north-western extremity of the Cromer Hills, which comprise Ordovician age granite, gneissic granite and gneiss, and is included in the Wagra soil landscape (DWE 2007).

Resource limitations of the Wagra soil landscape include: moderate to high erodability; soil structural decline; low wet bearing strength; hard-setting surface;

high permeability and localised stoniness; sodicity/dispersion; low permeability; water repellence; and. acidification hazard and aluminium toxicity potential (DWE 2007).

Soil depth in the undisturbed part of the proposed expanded quarry area is known to range in depth from 0 to 4-5m.

3.6.2 Topography and Drainage

The site specific topography and drainage of the Lubke Quarry site is dominated by the south-westerly aspect of the site. Currently stormwater drainage from the existing quarry work area is directed along the haul road table drain to a series of sediment dams located approximately 500m to the north. No drainage from the current quarry work area is directed to the intermittent watercourse located in the gully to the south via natural overland flow. The watercourse is highly eroded and consists of alluvial quaternary sediments in its lower reaches.

Erosion and sediment control is a clear issue for the design, construction and maintenance of the proposed expanded quarry work area.

3.6.3 Drainage and Sedimentation Control Works

The erosion and sedimentation control plan should the primary resource document for all related works. The underpinning principle of the plan should be the separation of 'clean' and 'dirty' stormwater runoff systems and to ensure that 'dirty' runoff is treated before discharge off-site to downstream receiving water environments. The Concept Erosion and Sedimentation Control Plan is shown above at **Figure 2.7.2**.

As shown in the plan, several civil engineering design measures are proposed to separate clean stormwater runoff from dirty runoff, including: fencing the quarry work area perimeter; and, piping non-quarry runoff away from primary treatment runoff. Relevant design details are shown in detail plans 'E' and 'G'. Several design measures are also shown to control soil erosion and sedimentation including: the construction of the primary sediment dam; earth bunds; silt fencing; sediment pits/traps; and, site grading.

The primary sediment dam will be constructed to provide for the maximum catchment of 12 ha given a 20ARI rainfall event, and be generally constructed in accordance with detail plan 'C' shown in the plan.

The accepted standards for the discharge of stormwater are shown in **Table 3.6** below.

Table 3.6: Standards for stormwater discharge

Pollutant	Concentration limit
Total suspended solids	50 mg/L
pH	6.5–8.5 pH

3.6.4 Water Quality Management

The current water quality management regime of Lubke Quarry is acceptable given the extent of and location of operations, however run-off southeast of the overburden/topsoil stockpiles is allowed to drain to the gully untreated. The proposed management regime of the expanded Lubke Quarry will rectify this water quality control issue.

The implementation of the proposed erosion and sedimentation control plan, with associated underpinning policies, will ensure that the quality of water discharged from the site will be acceptable in terms of addressing stormwater runoff suspended solids and pH parameters.

Regular inspection of erosion and sediment control works and measures are recommended, with maintenance works carried out as and when required.

3.7 Flora and Fauna

In order to best implement the investigation and environmental reporting obligations of this EIS in relation to flora and fauna impacts a specialist report has been prepared and is provided at **Appendix F**. The following sections summarise the investigative procedures and findings of this report. Reference should be made this appendix for more detailed analysis.

3.7.1 Context and method of investigation

Preliminary database searches as well as a literary review were undertaken before conducting field surveys of the proposed Lubke Quarry expansion area. Initial investigations included a 'Protected Matters Search' of the NSW Department of Environment and Heritage Database (2006) for information on threatened species and endangered ecological communities listed under the *Environment Protection Biodiversity Conservation Act 1999* (Cwlth)(EPBC Act). The NSW Bionet (2006), DECC website (2006) and NSW Wildlife Atlas (2006) were also searched for records of threatened species, populations and ecological communities within the Greater Hume Local Government Area (LGA) and the NSW Upper Slopes CMA sub-region. The BioMetric Operational Manual currently utilised by NSW catchment management authorities as a terrestrial biodiversity assessment tool for Property Vegetation Plans was also reviewed (2007). Aerial photograph (2006) interpretation was also used to

determine the spatial distribution of existing vegetation, including vegetation connectivity. Local landowners were also consulted regarding their knowledge of general flora and fauna issues pertaining to the local area.

For the purposes of this EIS, flora and fauna investigation and assessment was carried out in three geographical contexts – these being at 'local', 'regional', and 'State' levels:

- local – the area within 2 km radius of Lubke Quarry;
- regional – the area defined as the Greater Hume Shire LGA and the 'Upper Slopes Sub-region' (Murray Catchment Management Authority); and
- State – the region identified as the 'South West Slopes Bioregion', which includes lands from the NSW State border to the southwest at Albury to Tumbarumba to the north-east.

It is confirmed that, for the purposes of the *National Parks and Wildlife Act 1974*, the site or surrounding land is not affected by any 'conservation agreement' or 'plan of management', or, for the purposes of the *Wilderness Act 1987*, a 'wilderness area'. In terms of the EPBC Act it is not considered that the site or proposal impacts or affects any matters of national environmental significance, including any:

- World Heritage property;
- Ramsar wetland (wetland agreement signed in Ramsar, Iran in 1971);
- listed threatened species or ecological community;
- listed migratory species; or
- listed marine area.

The specialist report at **Appendix F** details the field survey techniques used for flora and fauna assessment (section 3.2) and survey timeframes and potential limitations (section 3.3).

3.7.2 Flora

The native vegetation profile of the proposed expanded Lubke Quarry area has the general characteristics shown in **Table 3.7.1** below. More detailed descriptions are provided at **Appendix F** (section 4.2 within).

Table 3.7.1: Native Vegetation Profile of the Area

	Vegetation profile	
Landform	Rising country to 360m AHD contour	Rocky knoll country between 360m and 430m AHD contour levels
Vegetation class/type (Murray CMA)	*Western Slopes Grassy Woodlands (White Box-Yellow Box- Blakely's Red Gum Woodland)*	*Western Slopes Dry Sclerophyll Forest: Rocky Scarps and Ranges Complex*
Geology & soils	Alluvium – sand, silt, gravel & clay. Also granite, gneissic granite & gneiss. Sandy granite soils	Various granite formations dominated by fine grained plagioclase granodiorite intergrading with quartz porphyry. Highly eroded bedrock ('Nubbin' rock). Sandy granite soils
Location example	East of Hume Hwy rising to 360m AHD contour level	Proposed quarry expansion area

The vegetation type 'White Box-Yellow Box-Blakely's Red Gum (Box-Gum) Woodland' is listed as an Endangered Ecological Community (EEC) under the TSC Act (also known and listed under the EPBC Act as the 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands' EEC).

In the site and over surrounding area, this EEC is missing the major ecological components of the middle and lower-storey vegetative layers. Existing conditions comprise an over-storey of scattered trees, with a tree density cover of approximately 8% at the site and 4% over surrounding land, over a mostly introduced ground layer of non-native pasture grasses and weeds. In the Greater Hume LGA 90% of this EEC has been cleared.

No species identified in schedules 1 or 2 or the TSC Act, listed in the EPBC Act, or listed as Rare or Threatened (ROTAP species) were found in the Lubke Quarry area.

Arising from the specialist report in **Appendix F**, the ecological integrity of the expanded Lubke Quarry area has been assessed as 'low' for the *Western Slopes Grassy Woodlands (White Box-Yellow Box- Blakely's Red Gum Woodland)* and 'medium' for the *Western Slopes Dry Sclerophyll Forest: Rocky Scarps and Ranges Complex.*

Summary

Arising from identification of the EECs, an 'assessment of significance' under section 5A of the EP&A Act and has been undertaken for the 'White Box-Yellow Box-Blakely's Red Gum (Box-Gum) Woodland' (TSC Act) and the 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands' (EPBC Act). No significant impacts were identified however mitigation strategies for off-set replanting and habitat restoration are recommended. Further detail is provided at **Section 3.7.4** below.

3.7.3 Fauna

A total of 57 native fauna species were recorded at or in the vicinity of the site. Of these, three threatened bird species listed under the TSC Act and one terrestrial migratory bird species listed under the EPBC Act were observed. Whilst not observed or heard calling several other threatened species are expected to frequent the site and have been considered in related assessments. Further details are provided below.

Birds

A total of 33 bird species listed as 'vulnerable' or 'endangered' in NSW and/or nationally have been recorded in the Greater Hume LGA. Of these, three species were observed or heard calling at the site, and a further 17 which were not observed or heard calling are considered likely to be present at the site from time-to-time and have been considered in related assessments.

The three species include the Diamond Firetail, Black-chinned Honeyeater, and the Rainbow Bee-eater. Whilst not listed as 'vulnerable' or 'endangered' a further four species were observed or heard calling that are known to be 'disappearing woodland birds of conservation concern', including the Dusky Woodswallow, Red-capped Robin, Southern Whiteface, and Jacky Winter.

Mammals

The Eastern Grey Kangaroo, Common Brush-tail Possum and Common Wombat were recorded at the site during the survey period.

Anabat surveys revealed the presence of 8 bat species. The threatened Large Bent-wing Bat was tentatively identified; however the quality of the call and overlap with the Forest Bats prevented a positive identification. Considering that this species has been recorded previously within the locality it is considered likely that this species would occur within the subject site.

Whilst no spotlighting was conducted for the threatened nocturnal Squirrel Glider it is considered highly likely to occur in the area because:

- it has been recorded in the 'Billabong Creek' and adjacent 'Box-Gum Woodland' habitat in the Holbrook area;
- suitable Box-Gum Woodland habitat in the form of large, hollow-bearing trees can be found on and near the site; and
- the habitat on the site connects via a vegetated gully to other similar habitat at the base of Morgans Ridge to the east.

Reptiles

A total of 7 reptile species were recorded on the site, none comprising threatened species. No non-recorded threatened reptile species are expected to occur based on lack of suitable habitat, including:

- the absence of appropriate rock (granitorised rhyodacite), Kangaroo Grass and associated ants made it unlikely that the Pink-tailed Worm Lizard was present;
- bioclimatic conditions were outside those preferred by the Little Whip Snake; and
- the lack of termitaria, hollow logs and the size of the remnant made it unlikely that Rosenberg's Goanna was present.

Koala habitat

Koala habitat contains areas of native vegetation where trees of the type listed in schedule 2 of SEPP44 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. The feed tree species which occur in the Greater Hume LGA which are listed in schedule 2 of SEPP44 are White Box, Ribbon Gum and River Red Gum. White Box occurs in the study area, representing more than 15% of the tree species composition, but the Lubke Quarry expansion area contains only one specimen of this species. The nearest known koala habitat is at Mullengandra, some 30 km to the south, and there is a recording at Woomargama National Park, 25 km to the south-east. However these sites are not connected to the study area, therefore it is highly unlikely that koalas would be present in the study area and the study area could not be categorized as related core habitat.

Amphibians

No frog species were observed or heard calling at the site, and the only potential habitat is the intermittent drainage line in the gully to the east, south-east, and south of the site, which is excluded from the quarry work area perimeter. Thus, despite study period climatic conditions, no impacts to amphibians is considered likely to occur.

Summary

Arising from the identification of fauna species of conservation significance and identification of their preferred habitat an 'Assessment of Significance' under section 5A of the EP&A Act and has been undertaken for the species listed in **Table 3.7.3** below. The results of this assessment are discussed further in **Section 3.7.4** below.

Table 3.7.3: List of species for which an 'Assessment of Significance' has been carried out

Birds:	Barking Owl Black-chinned Honeyeater Brown Tree Creeper Bush Stone Curlew Diamond Firetail Gang Gang Cockatoo Glossy Black Cockatoo Grey-crowned Babbler Hooded Robin Painted Honeyeater Pink Robin

	Powerful Owl Regent Honeyeater Speckled Warbler Swift Parrot Turquoise Parrot
Mammals:	Eastern Bent wing bat Eastern Pygmy Possum Squirrel Glider

3.7.4 Impacts and Mitigation Measures

Each 'Assessment of Significance' for the EEC and birds identified above has concluded that the proposed expansion of Lubke Quarry would not cause a significant impact. It is recommended however that mitigation measures be implemented for the Diamond Firetail, in particular enhancement of foraging habitat as a part of quarry rehabilitation measures (which would need to be carried out anyway). This is recommended to occur via the Concept Rehabilitation and Native Vegetation Off-set Replanting Plan, incorporating both the 'graphical' part and the 'written' part – with the graphical part shown at **Figure 2.7.1** above and the written part provided at **Appendix F** (refer Appendix 9 within).

In order to reduce the impact of the proposal on native flora and fauna and their habitats the following mitigation measures are recommended:

- Immediately prior to blasting activities, a loud high-pitched 'warning' siren should be sounded in the quarry area. This should serve to flush birds from the site.

- Progressively implement the Concept Rehabilitation and Native Vegetation Off-set Replanting Plan, incorporating both the graphical part and the written part – with the 'graphical part' shown at **Figure 2.7.1** above and the 'written part' provided at **Appendix F** (refer Appendix 9 within). The plan includes the following sub-recommendations:

  - Provision of permanent and fenced native vegetation off-set replanting areas.

  - Retention of identified hollow-bearing trees in 'Zone 1' by fencing into 'Zone 3.

  - Protection of root zones of identified hollow-bearing trees in 'Zone 1' by providing permanent fencing outside the driplines of tree canopies (this will avoid the breaching of fences when limbs fall and will have the effect of incorporating these trees into 'Zone 3').

  - Provide fencing for protection from grazing which will allow regeneration. (Grazing of off-set areas should be enacted only for fire hazard abatement purposes, when necessary, once per year for up to three weeks or only until the hazard is controlled. The optimum time to reduce this hazard is approximately the end of August (depending on seasonal

conditions and the grass fuel load). By grazing when the introduced grasses are at their optimum growth stage the land manager can control the amount of seed set that occurs, thereby reducing the area taken up by these species and then, with the removal of stock, the native grass species are able to grow, set seed and regenerate.) By fencing out livestock, native trees, shrubs, grasses and forbs can grow and regenerate. Introduced annual pasture grasses tend to grow, flower and set seed earlier in the season than native plants and grasses. This provides an opportunity to target and control annual grasses.

- Noxious and environmental weeds should be controlled through a weed management plan included in an Environmental Management Plan (EMP).
- Gates should be provided in fenced areas for maintenance access purposes.
- Fallen limbs, leaf litter and dead trees should be retained *in situ* for habitat purposes.
- Revegetate in identified areas using indigenous species, particularly understorey species.
- Avoid use of fertilizers near remnant trees.
- Avoid soil disturbance in or near remnants, such as ripping planting lines and access road grading.
- The collection of nominated fallen limbs and twigs from beneath trees in 'Zone 2' and placement into adjoining habitat areas to allow their continuation as potential fauna refuge sites. This coarse woody debris should not be placed in heaps but spread in a fashion which replicates the natural environment.

- Habitat corridor linkages should be strengthened where necessary by enhancement plantings and the placement of rock.
- The retention of surface rock overlying exposed bedrock wherever possible.
- The construction of soil stockpile storage berms for soil extracted from the quarry area in a way which ensures there is no overflow into protected 'off-set' areas.
- Regular feral animal control.
- Nearby domestic cats should be controlled by confinement to homes at night or to caged cat walk areas.

3.8 Aboriginal Cultural Heritage

3.8.1 Methodology for Archaeological Investigation and Results

An archaeological survey was carried out during EIS investigations for establishment of the Lubke Quarry in 1985. These investigations did not reveal any relics or places of Aboriginal cultural heritage significance. Notwithstanding this the proposed expansion of Lubke Quarry extends outside the immediate investigation area that comprised the original survey, and so the local Wandoo Aboriginal Corporation was contacted and carried out a site survey (Aboriginal Heritage Assessment) in November 2006. The survey involved ground inspection carried on out foot using 10m wide transects across slope. The survey area included all the proposed expanded quarry work area. Particular attention was paid to the spur lines and the ridgeline of 'Lubke Hill' within the proposed work area. No relics or places of significance were identified. A letter to this affect is attached at **Appendix C** (noting that no attachment to the letter was received). A copy of a letter from the National Parks and Wildlife Service in 1985 relating to the original quarry approval is also included in this appendix.

The DECC was also contacted in relation to whether or not any Aboriginal objects or places were recorded at or near the site on the Aboriginal Heritage Information Management System (AHIMS). Likewise no Aboriginal objects or places were recorded. A letter to this affect is also provided at **Appendix C**.

An inspection of the haul road route was also carried out but investigations were limited given the existing use of the route as either the existing haul route for the quarry or use as a farm access track. No objects or places were identified.

3.8.2 Significance Assessment and Safeguards

The Aboriginal cultural heritage value of the site is considered to be low, however in the unlikely event that objects or relics of Aboriginal significance are found or unearthed during works for the quarry all related work should cease and contact should be made with the DECC for further advice.

3.9 European Cultural Heritage

3.9.1 Methodology for Heritage Investigation and Results

A search of National, State and Local heritage registers did not reveal any places or built items of European cultural heritage in relation to the proposed quarry work area, 'Cromer' or adjoining property. The nearest such is place or item is located in the Holbrook township some 5 km to the southwest.

3.9.2 Significance Assessment

The European cultural heritage value of the site is considered to be nil, and it is considered very unlikely that any built heritage artefacts would be unearthed during works.

3.10 Hazard, Risk and Waste Management

Work place risk management involves the identification, ranking and reduction or elimination of risks inherent in work activities and operations. Risks relevant to a hard rock quarry typically affect human, plant and equipment, and environmental resources.

In relation to waste management, operations should minimise the amount of waste generated. Operations should also ensure that the storage, handling, and transport of any dangerous goods are carried out in accordance with relevant standards.

3.10.1 Identification of Hazards

The major hazards inherent in the operation of a hard rock quarry include:

- collision/s involving haul trucks;
- toppling of plant and equipment;
- fuel storage leakage/spill;
- fire or explosion from trucks, plant and equipment, or fuel storage;
- overload damage to haul trucks or plant and equipment;
- setting of incorrect blast parameters for blasting operations or faulty equipment;
- environmental damage caused by poor erosion and sediment control systems; and
- spread of bushfire.

Each of the above hazards has differing severity and probability, and all should be low provided the quarry adheres to relevant OH&S legislation. For the purposes of this EIS, relevant design parameters have been incorporated into site layout and design and haul road location and construction design. It is considered the quarry extraction methodology plan and the design of the haul road adequately respond to best practice guidelines given the circumstances of the case.

3.10.2 Waste Management

Waste generated during the life of an expanded hard rock quarry is typical of the following:

- during expansion site establishment i.e. 'natural' waste generated from clearing operations; and
- from normal winning of material, processing and loading operations and from progressive rehabilitation i.e. plant and equipment consumable containers, human waste, miscellaneous rubbish etc.

As discussed elsewhere in this EIS material generated from clearing operations will be reused for later rehabilitation works or used in native vegetation off-set planting areas, and so such natural waste should be minimal.

In terms of normal quarry operations, a dry chemical toilet will be available and general refuse bins with lids will be provided and emptied as and when required. No solid wastes of a toxic nature are anticipated to be produced or stored on site. There may be incidents, however, when plant or equipment failure may cause non-hazardous wastes such as from oils and greases. Should this occur, all non-hazardous waste including materials that have become contaminated will be collected by absorbent material (i.e. "Recoverit") and disposed of at a suitable EPA approved landfill site. Waste oils and greases arising from routine maintenance will be disposed of in accordance with EPA and council guidelines.

Given the nature of the extraction process no solid waste will be produced by the extraction process, however 'crusher fines' with diameter less than 5mm will be generated as a by-product which may exceed reuse possibilities. Should this be the case the material will be appropriately stockpiled, stabilised, and used for quarry bench expansion and haul road maintenance in accordance with the Site Plan and Extraction Methodology Plan.

3.10.3 Safeguards and Mitigation Measures

In relation to hazard and risk, in the event of any environmental incident, including any blasting firing fault, the first priority is the safety of all personnel and the immediate community. Following this, human harm or environmental impact should be contained/minimised or prevented as best as possible, then relevant authorities contacted for advice via appropriate incident management and reporting procedures.

Incident response procedures should include:

- the identification of responsible staff and relevant external authorities;
- procedures for the containment, treatment, and clean-up of spills;
- procedures for environmental monitoring;

- evacuation plan;
- location/s of emergency equipment; and
- audit procedure following an incident.

Environmental monitoring procedures should include:

- risk assessment to identify quarry work areas that are vulnerable to environmental incidents;
- clear reporting procedure and lines of communication and responsibility;
- staff training in environmental rectification works (containment and rehabilitation); and
- routine inspection and auditing regime.

In relation to waste, it is recommended that operations minimise the amount of waste generated. All liquid and non-liquid wastes resulting from activities and processes at the site should be assessed, classified and managed in accordance with the EPA's Environmental Guidelines: *Assessment, Classification and Management of Liquid and Non-liquid Wastes* (EPA 1999).

Operations should also ensure that the storage, handling, and transport of any dangerous goods are carried out in accordance with relevant standards, in particular:

- *AS 2187-1998: Explosives - Storage, transport and use – Storage*;
- *AS 1940-2004: The storage and handling of flammable and combustible liquids*;
- *AS/NZS 1596:2002: The storage and handling of LP Gas*; and
- the *Australian Dangerous Goods Code*.

3.11 Visual Assessment

Visual impact assessment in the context of Lubke Quarry, local and regional topography, and the locations of nearby dwellings and public areas, is generally based on analyses of the following factors:

- the location and number of dwellings whose occupants would be able to see components of the expanded quarry work area, and the distance and duration of their views;
- the location and extent of public areas, including existing public roads whose users would be able to see components of the expanded quarry work area, and the distance and duration of their views;

- the degree of contrast between the different visual components of the expanded quarry work area and the surrounding landscape; and

- the nature, extent, and timing of rehabilitation and landscape mitigation measures.

It is noted that this assessment does not include or take account of any mitigation off-set benefit through existing visual acceptance of the current visual contrast of Lubke Quarry. This is primarily due not in relation to existing dwellings but in relation to the Hume Highway and its use as a major tourist thoroughfare through the locality and region.

3.11.1 Existing Visual Setting

The regional landscape setting of Holbrook is dominated by a semi-cleared rural landscape, with undulating land to the east dominated by the treed Cromer Hills and Morgans Ridge escarpment of hills traversing the locality in a north-south direction; and to the north and west with plains land dominated by the Billabong Creek and Ten Mile Creek flood plains.

The local setting of the site includes the western slopes of Cromer Hills with the quarry located on the south-western slope of 'Lubke Hill'. The rolling hills support scattered woodland trees in open grassland. The creeks lines, and to a lesser extent fence lines and local road reserves, also support tree groups that help to punctuate the landscape. A major feature of the landscape in the locality is the major tree planting belts occurring along the Hume Highway and along some paddock fence lines.

The expanded quarry site when viewed from the western compass quadrant is clearly dominated by the Cromer Hills line of topography, which acts as a backdrop of undisturbed escarpment scenery.

3.11.2 Visual Effect of the Proposal

The expansion of the quarry will have two visual effects. Firstly, the removal of grass cover, trees and the exposure of earth will impose a colour contrast in relation to the existing landscape (this assumes a break in the current drought and the return of a natural drab-green colour to the landscape – current conditions would impose little contrast). And, of course, the planned removal of earth mass from the site will alter the form and shape of the south-western face and summit of Lubke Hill.

The scale of the operation is relatively large in relation to the setting of Lubke Hill, however not so large in the context of the Cromer Hills located behind and acting as a backdrop. It is envisaged that half of the seen area of the hill when viewed from the south-west will be affected by quarry operations from 'stage 2' of extraction operations onwards – refer to the Extraction Methodology Plan shown at **Figure 2.5**.

The colour contrast resulting from the exposed earth will be strong creating a high visual effect over its area. This will vary in colour from the existing grass greens of the winter and spring grasses and the gold of the cured summer grass cover.

Landscape line and form modification will also have a high visual effect in the short-term. This is a result of the need to have benches and rock faces and working stockpiles, all of which would create unnatural shapes and lines in the landscape. However in the longer-term this effect will not be great as it can have a high degree of compatibility with adjoining landform as progressive rehabilitation and native vegetation off-set replanting takes place and the scale of operations reduces after the first five year period of works associated with the HHDWP.

3.11.3 Visual Interactions

The expanded quarry work area can be viewed from a number of off-site locations within a 2 km radius. These locations are shown in **Figure 3.11** below, including:

- residential viewing locations (with direct views);
- residential viewing locations (with obscured views); and
- public road viewing locations (views from travelling vehicles), including from the future HHDWP new carriageway location.

The residential viewing locations shown with 'direct views' have been selected by physically standing in any area near the affected dwelling and being able to directly see the proposed expanded quarry work area at ordinary eye level from a standing position. This area includes from any dwelling window, patio, or from within any fenced yard area associated with the dwelling.

The residential viewing locations with 'obscured views' were assessed in the same way however trees or topography in between near or far may be partially blocking direct sight.

Assessment of public road viewing locations has taken account of the proposed alignment of the HHDWP new carriageway location.

Is some instances the quarry would be able to be seen from areas outside a 2 km radius, in particular from the Hume Highway within the first 3 km of Holbrook travelling north-east as driver sight-lines are obliquely oriented to the quarry's location, however a 2 km radius analysis threshold has been set in accordance with the *EIS Guideline: Extractive Industries – Quarries* (DUAP 1996).

3.11.4 Visual Mitigation Strategies

In the first instance, assuming drought conditions cease, the visual impact of the expanded quarry work area to places identified in **Figure 3.11** will largely arise from

colour contrast created by exposure of raw earth and rock faces. The timeframe for maximum effects will be approximately reached within five years of commencing expansion operations (2012).

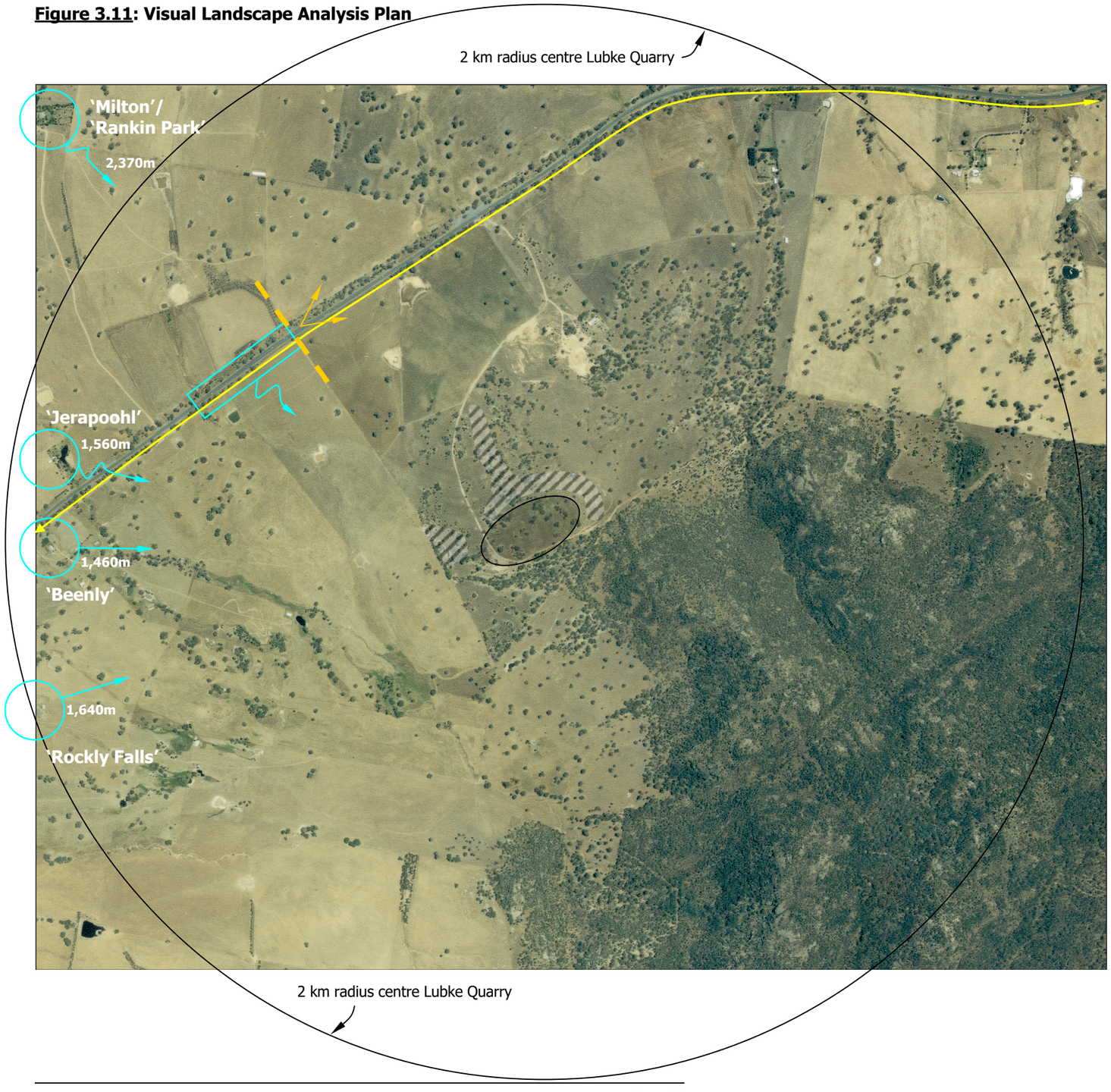
The next most significant visual effect will arise from the change in land form brought about by the mass of earth extracted. Likewise the maximum effect will be approximately reached by 2012.

In terms of mitigation strategies, it is obvious that no amount of restoration work will restore the land mass removed; however emulation of the existing landform through colour contrast is possible and likewise is visual screening through the strategic retention of vegetation and the planting of new vegetation. Implementation of these strategies to limit the visual impact of the proposal is recommended through the Concept Rehabilitation and Native Vegetation Off-Set Replanting Plan detailed in **Figure 2.7.1** above.

It is also noted that the following site layout and design parameters formed the basis of the current expanded quarry work area plan for visual screening purposes:

- retention of existing spur-line vegetation along the quarry's south-western boundary; and
- retention of existing vegetation 40m either side of the intermittent creek located along the southern boundary.

<u>Figure 3.11</u>: Visual Landscape Analysis Plan



KEY:

Residential viewing locations (direct views)

Residential viewing locations (obscured views)

Public road viewing locations (views from travelling vehicles), including from the future HHDWP new carriageway location

Hill crest

Panoramic vista

Future HHDWP carriageway location

'Indicative' expanded Lubke Quarry work area

Visual screening by topography or vegetation

<u>Notes</u>:

Field observation assessment was combined with photographic analysis together with results of Visual Assessment Report from the *Yarra Yarra to Holbrook Environmental Assessment, Hume Highway Duplication* (RTA 2007

Distances of residences from Lubke Quarry calculated from nearest boundary of quarry perimeter (quarry perimeter not shown accurately) to nearest wall of residence rounded down to the nearest 10m

Aerial photo imagery from LPI 2006

3.12 Traffic Impact Assessment

In order to best implement the investigation and traffic engineering reporting obligations of this EIS in relation to traffic impact a specialist report has been prepared and is provided at **Appendix G**. The following sections summarise the investigative procedures and findings of this report.

Details regarding proposed hours of operation of the quarry and other operational parameters have been detailed elsewhere in this EIS.

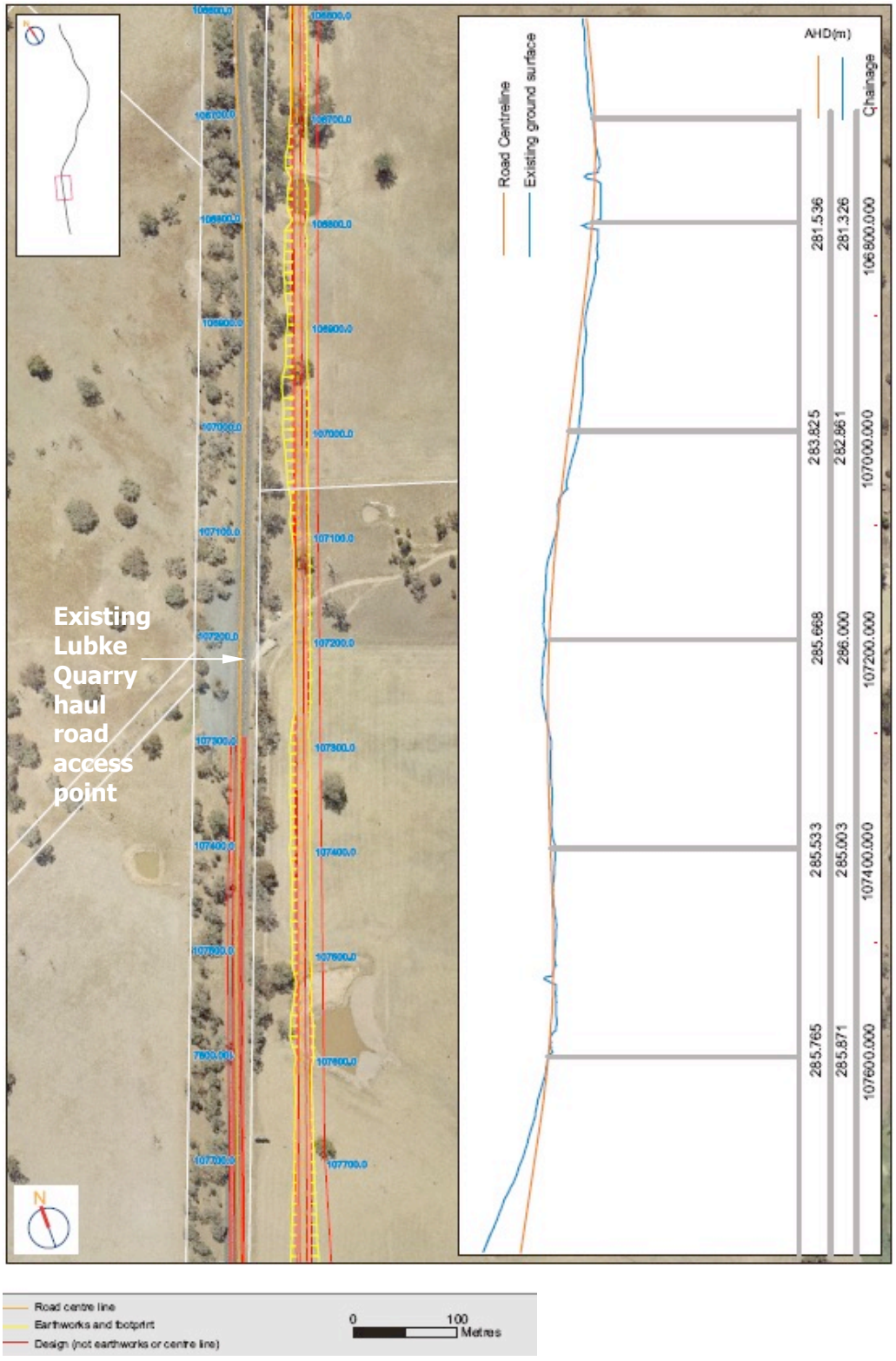
3.12.1 Site Access

The only vehicle access to Lubke Quarry from a public road is via the Hume Highway at the existing access point to 'Cromer' shown in the Site Location Map in **Figure 2.1** above and in the Proposed HHDWP Carriageway Construction affecting 'Cromer' in **Figure 3.12.1** below. The access point is used by haul trucks from the existing Lubke Quarry and by residential and farm vehicles associated with the 'Cromer' homestead and the property in general.

At this access point the Hume Highway carriageway is single-lane in either direction, with the nearest seal constructed 15m from the 'Cromer' access gate. The traffic lanes are 3.6m wide with 2m sealed shoulders. The highway is straight and level in either direction with over 255m safe-intersection-sight-distance available (provided several trees were removed either side of the access point). Geometric design of the accessway complies with the semi-trailer swept path requirements detailed in *Design Vehicles and Turning Path Templates, Austroads, 1995 (AP-34/95)*. A hill exists to the south-west of the access point with dual climbing lanes provided, and the 'Lubke Rest Area' is situated directly opposite the access point. This area is fully sealed.

The location of the extra carriageway lanes to make up the HHDWP will be located inside the current property boundary of 'Cromer'. The concept location of the carriage in the vicinity of the existing access point is shown in **Figure 3.12.1** below.

Figure 3.12.1: HHDWP Carriageway Construction affecting 'Cromer'



Source: *Yarra Yarra to Holbrook Environmental Assessment, Hume Highway Duplication* (RTA 2007, Figure 3.1h 'Yarra Yarra to Holbrook alignment')

3.12.2 Traffic Generation

Existing traffic counts of the Hume Highway sourced from the *Traffic Volumes Data for South West Region* (RTA 2003) are shown in **Table 3.12** as follows:

Table 3.12: Hume Highway traffic counts

Location of traffic count	Vehicles per day (VPD)
Hume Hwy south of Olympic Hwy	16,000
Hume Hwy north of Olympic Hwy	14,128
Hume Hwy south of Holbrook	9,211
Hume Hwy north of Holbrook	9,456

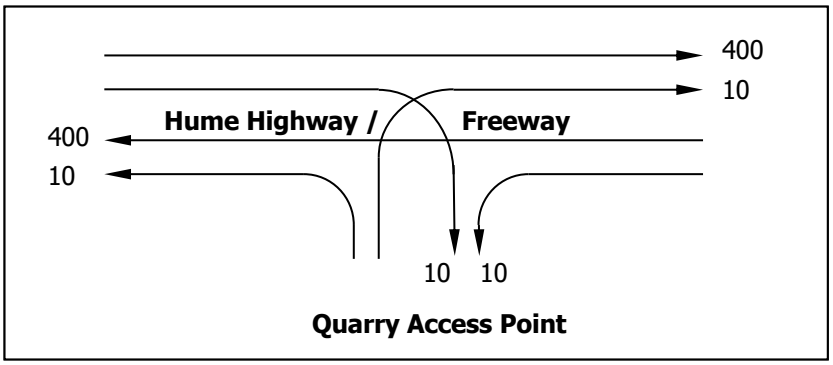
Data regarding hourly variations in traffic have been obtained from the RTA, with the observation that most heavy vehicle movement occurs at night-time. Traffic accident statistics reveal that the local stretch of highway has only has one accident in the period 2002-2005.

As expanded operations of the quarry will generate a maximum extraction of 200,000 tonnes of crushed rock per year over a 20 year period, and as a cubic metre of crushed rock (loose unit mass) weighs approximately 1.5 tonnes, the peak annual outbound volume of material will be approximately 133,333 cubic metres (m^3). Haulage will be done by standard semi-trailer and 'truck and dog' truck configurations having both 3 and 4 axles. For the purposes of these truck configurations it is assumed that the average outbound loaded truck carries 33 tonnes or 22 cubic metres. Allowances for lighter truck loads have been factored into later summary analysis.

Given the above, there will be approximately 6,250 outbound truck movements per year. Therefore, allowing for 250 working days per year, there will be approximately 25 outbound trucks per day. If an average working day for haulage of material is 8 hours, an average of approximately 4 outbound trucks per hour would eventuate (rounded up from 3.125). For the purposes of this EIS a worst-case-scenario of five times the average is assumed, or a peak hourly traffic generation of 20 outbound trucks per hour. This assumption provides for lighter truck loads than maximum capacities of 33 tonnes.

It is further assumed that haul trucks would turn equally to the east and to the west along the Hume Highway/Freeway in the peak hour, and 8% of annual average daily traffic (AADT) or 9,600 VPD occurs in a typical hour during quarry operations. This forecast has been represented in **Figure 3.12** below to show vehicle turning movements at the quarry access point with the Hume Hwy/Fwy at the worst time during a peak working day.

Figure 3.12: Estimated hourly turn counts at the quarry access point to the Hume Highway



It is also an assessment consideration under *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* that a driver's code of conduct relating to the transport of materials on public roads should be prepared and implemented. As the proposed haul road and access point with the Hume Highway and likely destination routes thereafter do not reasonably affect any residential areas or existing dwellings, such a driver's code is not recommended in this EIS however the preparation and implementation of such a code is considered good practice.

3.12.3 Traffic Impact Assessment and Safeguards

Two mitigation strategies are warranted to facilitate traffic safety at the Hume Hwy/Fwy access point to Lubke Quarry: The first relates to existing highway conditions; and, the second relates to the proposed freeway conditions.

The following works are recommended to ensure traffic safety given the current alignment/construction of the Hume Hwy:

- an Auxiliary Right Turn (AUR) should be constructed in accordance with the RTA's *Road Design Guide* for the 100 km/hr speed limit prior to haul trucks transporting material from the expanded quarry;
- existing haul road gates and fencing are to be relocated to ensure that a standard semi-trailer 19m long is able to be clear of the nearest traffic lane and shoulder when turning into the site;
- the entrance way area and at least 50m of haul road should be sealed to minimise dust generation affecting highway traffic;
- no more than the minimum necessary trees are to be removed (estimated at 3 each side) to ensure SISD in accordance with the RTA's *Road Design Guide* for the 100 km/hr speed limit; and

- no haul trucks are to enter or leave the access point during times of fog when clear sight-distance is not available for 225m in either direction – to this end a marker post is to be located, with prior advice and permission from the RTA, 225m in either direction along the Hume Hwy and all truck drivers (permanent employees or contractors) are to be informed of this requirement.

The following additional works are recommended to ensure traffic safety given the future construction of the Hume Fwy:

- all of the above requirements subject to RTA approval (except for tree removal as no tree removal will be required to comply with SISD); and

- the access point and fencing is to be designed and constructed to comply with semi-trailer swept path requirements detailed in *Design Vehicles and Turning Path Templates, Austroads, 1995 (AP-34/95)*.

3.13 Socio-economic Assessment

3.13.1 Socio-economic Impact Assessment

During consultation with surrounding landowners in January 2007 the main social issues of concern were noise and dust impacts on nearby dwellings, and to a lesser extent visual effects. Issues concerning noise, dust and visual impact have been discussed above at **sections 3.4**, **3.5** and **3.11** respectively. The mitigation measures proposed should minimise related impacts, in particular limiting hours of operation and blasting, and instigating a blasting community notification plan.

In general, the wide community consultation already undertaken by the RTA in relation to the HHWDP, in particular land acquisition negotiations with affected landowners seems to have created a strong community awareness and understanding of the construction works proposed and likely impacts arising. This process seems to have created an expectation in the community that some impacts will occur during the 2007-2012 HHDWP construction phase period, and also that there will be positive socio-economic benefits generated from construction staff and contractors participating in local commerce whilst the works are being carried out.

As the proposed quarry expansion is expected to employ only limited full or part-time staff the proposal is not anticipated to have any effect on local employment patterns.

The proposed expansion of Lubke Quarry is considered unlikely to have a significant socio-economic impact on the local area.

3.14 Cumulative Impacts

There are no operational quarries within a 2 km radius of Lubke Quarry; however it is understood that a quarry may be seeking approval to establish approximately 300m to the southeast of Lubke Quarry on adjoining land. A disused quarry exists approximately 3.5 km to the east, however it is understood that 'existing use rights' associated with this quarry have expired – in any case this quarry is not currently operational.

There are also no industries or industrial land uses within 5 km of Lubke Quarry – the nearest such use which has an EPL is Hyne Timber which is located in the Holbrook urban area (particulate matter emissions arising from wood and timber milling). The cumulative impacts of particulate matter generated from this site are not considered significant in the context of Lubke Quarry, principally Lubke Quarry is 'downwind' given prevailing winds and over 2 km away.

The most important cumulative impacts to consider concern construction impacts arising from the HHDWP. To this end reference is made to the two most local environmental assessments relating to the HHDWP– the:

- *Project Application Report and Preliminary Environmental Assessment* (RTA 2006); and
- *Yarra Yarra to Holbrook Environmental Assessment, Hume Highway Duplication* (RTA 2007).

The latter EIA was prepared after the Minister for Planning declared the HHDWP to be a project to which Part 3A of the EP&A Act applies, pursuant to section 75B(1), in September 2006 and then declared the project to be a Critical Infrastructure Project, for the purposes of section 75C, in December 2006. At the time of writing this EIS, the EIA is currently on public exhibition, with submissions closing on 2 June 2007. Overall this assessment concludes (section 8.3, p. 168) that:

> The Proposal would assist in meeting the primary objective of Hume Highway Duplication which is achieving dual carriageways for the Hume Highway between its intersection with the Sturt Highway to north of Albury (excluding the single carriageway sections through Tarcutta, Holbrook and Woomargama). The Proposal has important economic and road user benefits which assist the Hume Highway Duplication in meeting the *AusLink National Network* objectives of supporting national economic growth by developing sustainable transport solutions that:
>
> - Increase infrastructure handling capacity and efficiency
> - Improve safety and security
> - Improve transport productivity on nationally strategic and export-oriented freight corridors
> - Improve the reliability of travel on interstate and interregional corridors

- Are consistent with viable, long-term economic and social outcomes, and with the obligation to current and future generations to sustain the environment.

Reducing potential environmental impacts of the Proposal has been a major consideration during design development. The development of management and mitigation measures has been a key feature of the environmental assessment process and firm commitments to implement appropriate management and mitigation measures have been made. These factors coupled with the RTA's commitment to consider the offsetting of residual impacts during consultation with the relevant government agency and stakeholders results in acceptable environmental outcomes for the Proposal.

The Proposal achieves acceptable environmental and social outcomes and delivers substantial economic and road user benefits. The Proposal is therefore considered justified.

Given the extent of environmental work carried out for the above EIA, and its veracity, it is considered reasonable to conclude that unmitigated impacts arising from the HHDWP in company with unmitigated impacts arising from the expansion of Lubke Quarry are not significant. Any further EIA carried out in the area has the responsibility to separately consider its relevant cumulative impacts.

3.15 Summary of Environmental Mitigation, Monitoring and Reporting Recommendations

This EIS has identified a number of constraints associated with the proposed expansion of Lubke Quarry and has formulated a means of ensuring that the impacts are minimised and that all legislative requirements are adhered to. The safeguards proposed are summarised in the key environmental areas listed below.

3.15.1 Noise, Vibration and Overpressure

The operation of the expanded Lubke Quarry has the potential to impact on the acoustic amenity of dwellings to the west and south-west of the site. The following recommendations have been made in order to minimise the potential noise impacts from blasting, extraction, processing, and haul operations:

- the construction of an acoustic barrier (i.e. an earth mound) close to the jaw crushing equipment, which fully prevents line-of-sight to the three closest dwellings to the west and south-west;

- the jaw crushing equipment and diesel genset should not be used at night-time (10 pm to 7 am). An alterative would be to use the jaw crushing equipment and diesel genset within an acoustic barrier designed to provide at least 12 dB attenuation, however this measure should be the subject of a detailed design process and be certified by a registered acoustic engineer before being implemented.;

- Where winds are between 3 to 5 km/hr blowing downwind from the quarry in a quadrant extending south to west (180° to 270° magnetic north) the blasting charge weight should be restricted to 30 kg, or no blasting should take place;
- blasting should be avoided when winds exceed 5 km/hr blowing downwind from the quarry in the south or southwest quadrant (180° to 225° magnetic north);
- no blasting should take place at night-time (10 pm to 7 am); and
- residents of dwellings within 3,000m of the quarry should be informed in advance of any proposed blasting occurrence (industry experience suggests a minimum 24 hours notice where the blast is proposed to occur on a weekday, and 48 hours notice where the last is proposed to occur on a Saturday – no blasting is permitted on Sundays or Public Holidays).

3.15.2 Air Quality

To minimise the potential impacts on air quality resulting from dust generated from operations associated with Lubke Quarry the following recommendations are made:

- limit haul road truck speed to 40 km/hr by erecting speed limit signage at the Hume Hwy/Fwy ingress point, at the weigh-bridge, and at the egress of the quarry;
- maintain the gravel part of the haul road by re-sheeting and grading at periodic intervals;
- use a water-cart or truck for dust suppression as and when required;
- cover loads on outbound haul trucks before trucks leave the quarry work area or stockpile loading site;
- implement dust emission control measures in the quarry work area by: watering dry surfaces; seed grass long-term stockpiles; and, remove mud and dirt tracked on to road surfaces;
- monitor and record the effectiveness of measures implemented to control dust emissions;
- progressively rehabilitate disturbed areas as soon as earthworks are complete or where earthworks on disturbed areas are dormant for greater than 8 weeks;
- limit vehicle and machinery access to designated work areas;

- install a 'rumble grid' (cattle grid) near the weighbridge which drains to the secondary sediment dam to facilitate the removal of dust and mud from vehicles;
- install water micro-sprays using recycled water from the primary sediment dam to wet the various stages of materials production at the processing plant and equipment;
- undertake progressive rehabilitation of the quarry work area;
- develop a dust management plan which allows for the investigation and mitigation of adverse impacts which may be experienced at nearby residences possibly arising from cumulative impacts associated with construction of the HHWDP; and
- all construction vehicles, plant and equipment should be maintained and operated in accordance with Australian Design Rules and manufacture's specifications.

3.15.3 Water Quality

The proposed expansion of Lubke Quarry has the potential to impact on the water quality of downstream receiving water environments. The following recommendations have been made in order to minimise the potential for water quality impact:

- implementation of the proposed erosion and sedimentation control plan by carrying out works in accordance with the plan;
- regular inspection of erosion and sediment control works and measures are recommended with maintenance works carried out as and when required;
- limit haul road truck speed to 40 km/hr by erecting speed limit signage at the Hume Hwy/Fwy ingress point, at the weigh-bridge, and at the egress of the quarry;
- seed long-term stockpiles;
- remove mud and dirt tracked on to road surfaces;
- monitor and record the effectiveness of measures implemented to control water quality;
- progressively rehabilitate disturbed areas as soon as earthworks are complete or where earthworks on disturbed areas are dormant for greater than 8 weeks;
- limit vehicle and machinery access to designated work areas;

- install a 'rumble grid' (cattle grid) near the weighbridge which drains to the secondary sediment dam to facilitate the removal of dust and mud from vehicles;
- undertake progressive rehabilitation of the quarry work area; and
- an impervious bund with a spill capacity of 110% of the usable volume of the above-ground fuel tank is to be constructed around the tank. The bund should be designed and installed in accordance with the requirements of the EPA Environment Protection Manual Technical Bulletin *Bunding and Spill Management* (1994).

3.15.4 Flora and Fauna

The proposed expansion of Lubke Quarry has the potential to impact on flora and fauna identified in **Section 3.7** and in **Appendix F**. The following general and specific recommendations have been made in order to minimise the potential for related impacts:

- Immediately prior to blasting activities, a loud high-pitched 'warning' siren should be sounded in the quarry area. This should serve to flush birds from the area.
- Implement the Concept Rehabilitation and Native Vegetation Off-set Replanting Plan, incorporating both the graphical part and the written part – with the 'graphical part' shown at **Figure 2.7.1** above and the 'written part' provided at **Appendix F** (see Appendix 9 within). The plan includes the following sub-recommendations:
- Habitat corridor linkages should be strengthened where necessary by enhancement plantings and the placement of rock.
- The retention of surface rock overlying exposed bedrock wherever possible.
- The construction of soil stockpile storage berms for soil extracted from the quarry area in a way which ensures there is no overflow into protected 'off-set' areas.
- Regular feral animal control.
- Nearby domestic cats should be controlled by confinement to homes at night or to caged cat walk areas.

3.15.5 Visual

The visual impact of the proposed quarry expansion will depend to a large extent on mitigation strategies but also depend on whether current drought conditions cease so as to provide more colour contrast with the landscape. The following recommendations have been made in order to minimise the potential for visual impact:

- progressively rehabilitate the quarry and carry out replanting in accordance with the Concept Rehabilitation and Native Vegetation Off-Set Replanting Plan;
- install perimeter fencing before expanded operations commence; and
- minimise disturbed ground area by only carrying out operations to the minimum extent necessary to achieve production parameters.

3.15.6 Traffic

The proposed expansion of Lubke Quarry has the potential to impact on traffic safety at the Hume Hwy/Fwy access point. The following recommendations have been made in order to minimise the potential for traffic impact:

Current alignment/construction of the Hume Hwy

- an Auxiliary Right Turn (AUR) should be constructed in accordance with the RTA's *Road Design Guide* for the 100 km/hr speed limit prior to haul trucks transporting material from the expanded quarry;
- existing haul road gates and fencing are to be relocated to ensure that a standard semi-trailer 19m long is able to be clear of the nearest traffic lane and shoulder when turning into the site;
- the entranceway area and at least 50m of haul road should be sealed to minimise dust generation affecting highway traffic;
- no more than the minimum necessary trees are to be removed (estimated at 3 each side) to ensure SISD in accordance with the RTA's *Road Design Guide* for the 100 km/hr speed limit; and
- no haul trucks are to enter or leave the access point during times of fog when clear sight-distance is not available for 225m in either direction – to this end a marker post is to be located, with prior advice and permission from the RTA, 225m in either direction along the Hume Hwy and all truck drivers (permanent employees or contractors) are to be informed of this requirement.

Future construction of the Hume Fwy

- all of the above requirements subject to RTA approval (except for tree removal – no tree removal will be required to comply with SISD); and
- the access point and fencing is to be designed and constructed to comply with semi-trailer swept path requirements detailed in *Design Vehicles and Turning Path Templates, Austroads, 1995 (AP-34/95)*.

3.15.7 Waste and Risk Management

It is recommended that operations minimise the amount of waste generated. All liquid and non-liquid wastes resulting from activities and processes at the site should be assessed, classified and managed in accordance with the EPA's Environmental Guidelines: *Assessment, Classification and Management of Liquid and Non-liquid Wastes* (EPA 1999).

Operations should also ensure that the storage, handling, and transport of any dangerous goods are carried out in accordance with relevant standards, in particular:

- *AS 2187-1998: Explosives - Storage, transport and use – Storage*;
- *AS 1940-2004: The storage and handling of flammable and combustible liquids*;
- *AS/NZS 1596:2002: The storage and handling of LP Gas*; and
- the *Australian Dangerous Goods Code*.

Risk management procedures should be provided for and documented in the EMP.

3.15.8 Environmental Reporting

In accordance with the *EIS Guideline: Extractive Industries – Quarries* (DUAP 1996, pp. 28-29), an EMP should be prepared and implemented where necessary prior to formal operations commencing. The EMP should be prepared in accordance with the *Guideline for Preparation of Environmental Management Plans* (DIPNR 2004).

The EMP should be a document designed to ensure that the commitments in the EIS and conditions of development consent and licence/s are fully implemented. It is a comprehensive technical document which is usually finalised during or following more detailed design of the proposal after approval of the development application. It should take into consideration any existing plan of management for the whole

extractive industry resource, including the existing operations of Lubke Quarry. It should also provide a comprehensive framework for managing or mitigating environmental impacts for the duration of the quarry's operation, and also a framework for auditing the effectiveness of the proposed protection measures and procedures. The structure of the EMP should align with this EIS. A key tenet of the EMP should be that it is financially viable in terms of implementation both in the short-term and the long-term.

4.0 PROJECT JUSTIFICATION

4.1 Introduction

It is a requirement in the preparation of an EIS (DUAP 1996) to examine the necessity for the project (pp. 29-30) and alternative methods, designs and sites (pp. 19-20). In the case of an extractive operation such as the one proposed, location is fixed by the position of an economic quantity of suitable material. Thus, the examination of alternative sites is limited.

The subsequent sections examine the presence of other sources of similar material and also the consequences of not undertaking the development.

4.2 Project Alternatives

A number of alternatives to the project have been considered, including:

- the "no expansion of quarry" option;
- alternative design and method; and
- alternative methods of extraction.

4.2.1 The "No Expansion of Quarry" Option

The consequences of adopting a "no expansion of quarry" option would mean that the existing Lubke Quarry would be limited by its existing development consent to supply approximately only 25,000 tonnes of material per annum to the HHDWP during its five year construction period. The adoption of this option would not mean that the HHDWP would not go ahead but rather that the economic supply of materials to the HHDWP would increase in value as quarry materials would need to be transported to the HHDWP construction area from wider afar and so their monetary purchase cost through transportation would be higher.

Primarily, the close proximity of Lubke Quarry to the HHDWP is a valuable circumstance in terms of saving haul truck diesel fuel and truck 'wear and tear' cost, and therefore the saving of public monies associated with construction of the HHDWP through the purchase of economically priced quarry material is possible. In effect the savings of construction cost associated with quarry products allows for extra expenditure elsewhere in the HHDWP allowing for greater public and/or environmental benefit depending upon where saved monies are allocated.

4.2.2 Alternative design and method

Several alternative expanded quarry site plans were considered and set aside, including expanding the quarry to the south-east over the cadastral boundary of 'Cromer' and into the adjoining property of 'Rockley Falls' to access additional quarry resources. This was set aside due to the high environmental impact of conducting operations across the existing intermittent drainage line separating the areas, and also resolution of land ownership issues were complex.

A further plan was to carry out more extensive extraction in the western and north-western expanded quarry areas; however visual screening of the expanded quarry would be lessened by the needed removal of a significant stand of native vegetation along the north-western quarry permitter. Removal of these trees would allow for the expanded quarry area to be more visually dominant in the landscape when viewed from the three adjoining dwellings to the west and south-west and also from the Hume Hwy/Fwy tourist route thoroughfare. An existing telecommunications facility (leased and managed by Telstra) would also need to be removed. The consequences of removing this facility were not considered economically viable as the extra rock resource gained did not outweigh relocation costs to adjoining elevated hills which would be suitable for telecommunications broadcast.

No consideration was given to alternative haul road location or access to the Hume Hwy/Fwy as location and access options are limited given the frontage of 'Cromer'.

In relation to alternative methods of extraction, the use of blasting is needed to win material as it is the only economically viable and practicable means of fracturing high-strength rock for processing.

4.3 Assessment with the Principles of Ecologically Sustainable Development

Notwithstanding the principles of ecological sustainable development (ESD) as detailed in *EIS Guideline: Extractive Industries – Quarries* (DUAP 1996, pp. 29-30), it is considered the most current literature on the topic is succinctly articulated in a recent decision of the NSW Land and Environment Court in *Telstra Corporation*

Limited v Hornsby Shire Council [2006] NSWLEC 133. In this case involving a telecommunications facility and the issue of electromagnetic radiation, the Court comments simply that is ESD is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Further, ESD involves the following principles:

- Firstly, sustainable use: The aim of exploiting natural resources in a manner which is sustainable or prudent or rational or wise or appropriate. The concept of sustainability applies not merely to development but to the environment by ensuring that development improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

- Secondly, ESD requires the effective integration of economic and environmental considerations in the decision-making process (i.e. section 6(2) of the *Protection of the Environment Administration Act 1991* (PEA Act) adopted by section 4(1) of the EPA Act). This principle of integration recognises that the ecologically harmful cycle caused by economic development without regard to and at the cost of the environment could only be broken by integrating environmental concerns with economic goals. The principle of integration ensures mutual respect and reciprocity between economic and environmental considerations. The principle recognises the need to ensure not only that environmental considerations are integrated into economic and other development plans, programmes and projects but also that development needs are taken into account in applying environmental objectives. This principle has been refined in recent times to add social development to economic development and environmental protection, or recognising the "triple bottom line".

- Thirdly, there is the precautionary principle. There are numerous formulations of the precautionary principle but the most widely employed formulation adopted in Australia is that stated in section 6(2)(a) of the PEA Act, which provides:

  "…if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

  In the application of the precautionary principle, public and private decisions should be guided by:

  (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

  (ii) an assessment of the risk-weighted consequence of various options."

- Fourthly, there are principles of equity:
  - There is a need for inter-generational equity – the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations (i.e. section 6(2)(b) of the PEA Act).
  - There is also a need for intra-generational equity – considerations of equity within the present generation. It involves people within the present generation having equal rights to benefit from the exploitation of resources and from the enjoyment of a clean and healthy environment.
- Fifthly, there is the principle that conservation of biological diversity and ecologically integrity should be a fundamental consideration (section 6(2)(c) of the PEA Act).
- Sixthly, ESD involves the internalisation of environmental costs into decision-making for economic and other development plans, programmes and projects likely to affect the environment. This is the principle of the internalisation of environmental costs. The principle requires accounting for both the short-term and the long-term external environmental costs. This can be undertaken in a number of ways including:

  (a) environmental factors being included in the valuation of assets and services;

  (b) adopting the 'polluter pays' (or 'user pays') principle, that is to say, those who generate pollution and waste should bear the costs of containment, avoidance or abatement;

  (c) the users of goods and services paying prices based on the full life cycle of the costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and

  (d) environmental goals, having been established, being pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The principle application of the above ESD 'principles' to the EIA process for the expanded Lubke Quarry have included:

- erosion and sediment control;
- flora and fauna impact mitigation; and
- visual impact mitigation.

Mitigation measures have been identified as summarised above in **Section 3**. In particular it is recommended that the Concept Erosion and Sediment Control Plan be implemented; the Concept Rehabilitation and Native Vegetation Off-set Replanting Pan be implemented; and, the quarry work area be designed and laid out in the manner proposed to preserve visual landscape amenity when the quarry area is viewed from adjoining dwellings and public areas.

The ESD principles of 'sustainable use', 'triple bottom line', 'precautionary principle', 'inter and intra-generational equity', 'biological diversity and ecological integrity', and 'internalisation of environmental costs' have been considered in the context of this EIS in both the short-term, the long-term, and cumulatively. The considered justification for quarry expansion is provided below.

4.4 Justification for Quarry Expansion and Consequences of not Proceeding

The proposed expansion of Lubke Quarry will greatly benefit the HHDWP. The identified rock resource has been tested to be of high quality and suitable for all phases of the proposed road construction works. In particular, petrographic analysis of the resource classifies the rock type as 'micro granite' (fine and medium grain), and a geological survey has confirmed that approximately 5 million tonnes of high-strength rock is available for extraction.

The relative close proximity of the extraction site to the construction site (1.2 km at minimum haul distance) means that the overall cost to transport material will be less and the environmental and community impacts associated with haulage operations would be minimised.

The extraction site and haulage route are located in areas which are already highly disturbed and the expanded quarry work area has been designed specifically to retain as much native vegetation as is reasonably possible given the balancing of ESD principles. This has additionally culminated in the retention of existing native vegetation along the north-western quarry perimeter which will assist visually shielding the quarry from south-western and western private and public viewing locations. The expanded site layout has been designed to also ensure that existing telecommunications infrastructure is retained and the existing intermittent drainage line to the south-east is not impacted upon.

Due to the highly disturbed nature of the immediate site area, any environmental, cultural, archaeological or scientific value of the area has been largely lost.

Progressive rehabilitation and erosion and sedimentation controls will greatly reduce the impact on the visual amenity and water quality of the area. Also, the proposed off-set native vegetation replanting program will progressively enhance habitat to better-than-existing-conditions. Environmental monitoring is also proposed to asses the project's environmental performance and further improve its operation. This will occur via implementation of the proposed EMP.

Concerns raised during the consultation process have been considered and addressed. The environmental impacts of the development are expected to be minimal with the exception of noise. The mitigation measures that have been recommended in this EIS will negate or minimise environmental impacts associated with the proposed development.

The collective conclusion of this EIS is that the proposed expansion of Lubke Quarry should proceed, subject to implementation of the mitigation, monitoring, and reporting recommendations listed in **Section 3.15** of this EIS.

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APPENDIX A: Matters to be addressed in the EIS

APPENDIX B: Study Team

This EIS was prepared for Bald Hill Quarry Pty Ltd by Blueprint Planning and a team of specialist sub-consultants. The following personnel contributed to the EIS:

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Garry Gaffney	Traffic
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Ray Walsh; Ken Scannell	Noise, vibration and overpressure

APPENDIX C: Consultation Details

APPENDIX D: Specialist Noise, Vibration and Overpressure Report

APPENDIX E: Wind Roses for Albury and Wagga Wagga Airports

APPENDIX F: Specialist Flora & Fauna Report

APPENDIX G: Specialist Traffic Report