



# Boral Quarries

# Marulan South Quarry

Background Report

March 2006



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Approved by:	Mike Shelly
Position:	Project Manager
Signed:	18hor
	9
Date:	March 2006
Approved by:	David Snashall
Position:	Project Director
Signed:	Thekell
Date:	March 2006
Partner:	
	David Snashall

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**Boral Quarries** 

# Marulan South Quarry Background Report

March 2006

Environmental Resources Management Australia Building C, 33 Saunders Street Pyrmont, NSW 2009 Telephone +61 2 8584 8888 Facsimile +61 2 8584 8800 www.erm.com

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#### 1 PROJECT DESCRIPTION

#### 1.1 BACKGROUND

Boral proposes to establish and operate a quarry at Marulan South to supply local markets and the Sydney metropolitan area with high quality construction materials for use in concrete, road construction and other building projects. The purpose of the proposed quarry is to meet demand following the exhaustion of resources at Boral's Prospect and Penrith Lakes quarries.

Operation of the quarry is expected to commence in 2007/2008 and will initially be relatively small scale. Production is expected to increase over time, commencing at 1-2 million tonnes per annum and growing to 5 million tonnes per annum. The quarry is proposed to operate 24 hours a day 7 days a week.

The purpose of this report is to introduce the proposal and provide an overview of the potential environmental issues associated with the quarry. The report will be submitted to the NSW Department of Planning to accompany a project application under Part 3A of Environmental Planning and Assessment Act, 1977 (*EP&A Act*). This background paper will facilitate the development of the Director General requirements for the completion of an environmental assessment for the proposal. An environmental envelope approach is proposed to be developed for the assessment to allow for maximum flexibility for quarry operations within acceptable environmental parameters.

#### 1.2 SITE LOCATION

Marulan South quarry is proposed be located approximately 10 kilometres southeast of Marulan in the Southern Tablelands of New South Wales, approximately 175 kilometres south west of Sydney.

Road access to the site is via Marulan South Road, which extends from an intersection with the Hume Highway and services the existing limestone mine and a small number of rural properties including poultry farms and lime processing industries. A recently approved fireworks factory would also be accessed off Marulan South Road.

The site is in a region dominated by quarrying, mining and agriculture. The Blue Circle Southern Cement limestone mine is located immediately south of the quarry area. The site is bordered by a steep gorge to the east that extends towards Morton National Park. A small number of rural properties are located to the north and west of the site along Marulan South Road. Boral has recently acquired approximately 650 hectares which includes the identified resource area, the proposed processing plant and dam locations as well as surrounding buffer land. The location of proposed quarry with respect to the local setting is shown in *Figure 1*.

## 1.3 OVERVIEW OF PROPOSED OPERATIONS

The Marulan South quarry has an identified resource area of approximately 250 million tonnes and depending on extraction rates this resource will allow quarrying for 70 years or more. At this stage however, project approval is being sought for an area sufficient for 30 years of quarrying.

The 30 year quarry will be located within the identified resource area. The design of the quarry and the extent of the resource area that will fall within the project application will be determined as a part of the environmental assessment process.

At this stage primary and secondary crushing are proposed to be undertaken in-pit, and it is most likely that conveyors will be used to haul rock to an out of pit processing plant to be located immediately south of the existing railway spur as shown on *Figure 1*. A rail siding will also be constructed immediately south of and parallel to the existing rail spurline.

Quarrying at Marulan South will involve four main stages including:

- topsoil and overburden removal and emplacement (along with associated bund and dam construction);
- blasting and primary and secondary crushing of raw feed in pit;
- tertiary crushing, screening and stockpiling; and
- conveying/transport and distribution.

The relatively thin layer of soil and overburden will be stripped off in progressive stages and hauled to emplacement areas. Suitable overburden will be used to build visual and acoustic bunds and dam walls as required.

After overburden stripping, rock will be drilled and blasted and either trucked to or loaded directly into the primary and secondary crushing plant. From here, the crushed rock will be conveyed to the tertiary plant for final crushing, screening, blending and stockpiling.

Some of the fines (fine rock) produced by crushing will be combined with sand from Boral's Penrose Quarry and possibly other sources to produce a marketable manufactured sand. A proportion of overburden is expected to be sold for fill or blending.



Aggregates will be stockpiled on site and reclaimed by one of a number of methods for loading into rail wagons. Trains will follow the private spur line to the Medway Junction and onto the Main Southern Railway.

Siting of the proposed Marulan South Quarry on the existing rail spur will facilitate the transport of majority of product by rail, minimising the use of road haulage. Boral operates two rail terminals in Sydney and is currently investigating the potential for a third terminal at one of its sites in or around Sydney.

Marulan South Road is a designated heavy vehicle haulage route with B-Double Capacity and would be used if there was road traffic associated with the operation of the quarry. Boral is currently assessing the transport modes (rail and road) and the extent to which they would be used. Rail is expected to be the primary transport mode although there may be some transport by road. Boral is also investigating the possibility of backloading trucks that are already travelling to the limestone mine with sand from the nearby Penrose operations and other sites for blending with other quarry products.

# 1.4 GEOLOGY AND RESOURCE ASSESSMENT

The Marulan region is underlain by Palaeozoic rocks that can be split into three broad units as listed below from oldest to youngest:

- basement sediments of Ordovician age, which form north-south belts;
- a sequence of volcanics and sediments (the Towrang Beds and De Drack formation) to the south west of Marulan; and
- an overlying sequence of sediments and volcanics forming the Cookbundoon Syncline that extends north-south as a broad unit centred on Goulburn, to the west of Marulan. A belt of volcanics, the Bindook Complex, forms a parallel belt through the Marulan area.

Granitoid bodies have intruded the units described above and are widely distributed. These are related to the thin sheets of basalt, north of Goulburn, covering parts of the Cookbundoon Syncline. These Granitoid bodies are the resource targeted for extraction by Boral at the Marulan South site.

Rock types vary within the stratigraphic zones but limestone is a common component of the strata, and outcrops immediately to the south of the proposed quarry site. The identified resource area contains significant resources of granodiorite. Granodiorite is an intrusive igneous rock, pale to medium grey in colour with medium-sized grains. It is similar in composition to granite (although it contains a higher proportion of mafic minerals), and is commonly associated with granitic batholiths. Approximately 250 million tonnes of this resource have been identified, 150 million of which is within the application footprint.

#### 1.5 WORKFORCE

The quarry will employ up to 30 full-time employees on site with further jobs created in transport and support industries.

#### **1.6** CAPITAL COST

Boral has estimated that approximately \$150 million will be required to develop the Marulan South Quarry.

#### 2.1 GENERAL

The following discussion assesses the proposed development against the relevant planning controls that affect the site. The proposal is not considered to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* or to trigger any other Commonwealth environmental legislation. Therefore, this assessment concentrates on the state planning controls.

There are a number of NSW planning controls which affect the subject development proposal for the site, including:

- Environmental Planning and Assessment Act, 1979;
- Environmental Planning and Assessment Regulation 2000;
- State Environmental Planning Policy (SEPP) Major Projects;
- SEPP No. 33 Hazardous and Offensive Development;
- State Environmental Planning Policy No. 11 Traffic Generating Development; and
- Mulwaree Shire Local Environmental Plan (LEP) 1995 as amended

#### 2.2 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

The proposed development will be assessed in accordance with the *Environmental Planning and Assessment Act, 1979 (EP&A Act)* and the Environmental Planning and Assessment Regulation, 2000.

The *EP&A Act* has recently been amended to include Part 3A which provides a streamlined assessment and approval process for development that is defined as a Major Project. The new Part 3A applies to development that previously was classified as State Significant Development. The proposed development is identified as being a 'Major Project' in Clause 75(b), Part 3A of the EP&A Act which states that:

- *"(1) This Part applies to the carrying out of development that is declared under this section to be a project to which this Part applies:* 
  - (1)(a) by a State Environmental Planning Policy, "

The proposal is defined as a Major Project in State Environmental Planning Policy Major Projects 2005 and project approval is being applied for the initial 30 year quarry proposal.

Under Part 3A Clause 75(R), environmental planning instruments other than State environmental planning policies do not apply to a 'Major Project'. A discussion of the State Environmental Planning Policies applicable to the proposed development follow.

# 2.3 STATE ENVIRONMENTAL PLANNING POLICIES (SEPPS)

State Environmental Planning Policies (SEPPs) relevant to the proposed development have been considered in the following sub-sections.

# 2.3.1 State Environmental Planning Policy (Major Projects) 2005

The Major Projects SEPP identifies development to which the development assessment and approval process of Part 3A of the EP&A Act applies. The policy establishes the Minister for Planning as the consent authority for any development classified as a 'Major Project'. Clause 6(1) of the SEPP identifies projects under Part 3A as development that, in the opinion of the Minister, is development of a kind listed in either Schedule 1, 2 or 3 of the policy. Schedule 1 includes *extractive industries* as a 'Major Project' under Part 3A in Clause 7(1)(a) and (b) as follows:

# "Extractive Industries

- (1) Development for the purposes of extractive industry that:
  - a. extracts more than 200 000 tonnes of extractive materials per year, or
  - b. extracts from a total resource (the subject of the development application) of more than 5 million tonnes"

The proposed Marulan South Quarry is anticipated to produce approximately 150 million tonnes of the total resource with an extraction rate of up to 5 mtpa. Consequently, subject to the Minister's agreement, the application may be assessed under Part 3A.

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

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) provides definitions for 'hazardous industry', 'hazardous storage establishment', 'offensive industry' and 'offensive storage establishment'. The definitions enable decisions to approve or refuse a development to be based on the merit of the proposal.

SEPP 33 may apply to the proposed development and will be considered during the assessment process. The consent authority must consider the specifics of the proposal, the location and the intensity of the proposed activity to determine whether the proposed development may be classified as "potentially hazardous" or "potentially offensive" as defined in the policy.

# 2.3.3 State Environmental Planning Policy No. 11 – Traffic Generating Developments

State Environmental Planning Policy No. 11 – Traffic Generating Developments requires development proposals considered as trafficgenerating developments to be referred to the Roads and Traffic Authority. Traffic-generating developments are identified in Schedule 1 and 2 of.

Extractive industries are listed in Schedule 1 and the proposal is therefore classified as a traffic-generating development. The application will be required to be referred to the Roads and Traffic Authority. A traffic impact assessment will be prepared as part of the Environmental Assessment.

# 2.4 MULWAREE SHIRE LOCAL ENVIRONMENTAL PLAN (LEP) 1995 – AS AMENDED

Whilst not relevant to the assessment of a major project under Part 3A, the provisions of the local planning instruments are noted below. The majority of the site is zoned 1(a) *General* Rural zone under the Mulwaree Shire Local Environmental Plan 1995 which allows extractive industries to be permissible with consent. The relevant aims and objectives of the 1(a) zone include the following:

"to promote the proper management and utilisation of resources by;

- (a) promoting, enhancing and conserving:
  - (iv) valuable deposits of mineral, coal, petroleum, and extractive materials by controlling the location of development for other purposes in order to ensure the efficient extraction of those deposits;"

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*i.* The now abandoned Marulan South village has retained the 2(v) Village Zoning and a small part of the identified resource area could be within this zone which prohibits extractive industry.

The village was initially built to service the existing limestone mine and has subsequently been abandoned and the majority of premises demolished. Community and civic buildings such as the Marulan South Country Club have been retained but are only irregularly used by Boral and Blue Circle Southern Cement. The village zoning is therefore redundant.

Under Clause 75(J)(3)(b) of the *EP&A Act*, the Minister can approve applications for development that are not wholly prohibited. Should any of the proposed 30 year quarry be located within the old village, the Minister can approve the development, notwithstanding the zoning of a small section.

# 2.5 OTHER APPROVALS

A development proposal under Part 3A does not require the referral and approval from other relevant authorities prior to the planning approval determination in accordance with Clause 75 (U) of the EP&A Act. However, a licence in accordance with the *Protection of the Environment Operations Act, 1997* will be required for the operation of the quarry.

### 3.1 GENERAL

As part of the preparation of the Environmental Assessment a Stakeholder Engagement Plan has been developed. The principal aims and objectives are to:

- identify all stakeholders;
- develop appropriate techniques and methods to engage all identified stakeholders;
- establish positive relationships with all stakeholders;
- ensure there are no misconceptions about the proposed operation of the Marulan South Quarry;
- provide a framework for responding to questions and issues raised by stakeholders; and
- provide a mechanism for frequent monitoring and evaluation of the effectiveness of stakeholder engagement.

The following sections provide an overview of the stakeholder engagement strategy and the outcomes of the initial consultation process.

#### 3.2 IDENTIFICATION OF STAKEHOLDERS

The following individual and groups have been identified as key stakeholders in the proposed Marulan South Quarry:

- residents living nearby the quarry;
- residents living along Marulan South Road and the railway spur;
- Marulan residents and businesses;
- State regulatory agencies including Department of Planning, Department of Environment and Conservation, the Roads and Traffic Authority, Railcorp, Sydney Catchment Authority and Department of Primary Industries;
- Minister for Planning;
- Goulburn Mulwaree Council;
- State Member of Parliament Katrina Hodgkinson;
- Boral employees;
- Aboriginal groups; and
- the media.

#### 3.3 STAKEHOLDER STRATEGIES AND PROGRESS

A range of stakeholder engagement strategies have been developed to tailor communication methods to selected stakeholder groups.

The following provides a brief discussion of the objectives and methods for communication with each group of stakeholders. *Table 3.1* summarises the preferred communication methods.

Stakeholder	Communication Method
Nearby residents and landowners	• Face to face visits and personnel communication
	throughout the EA process
	Community newsletters
	• General information on web site (updated regularly)
	Public information session(s)
	1800 community issues line
Government/Regulatory Agencies	Planning focus meeting
	• Further briefings as necessary
Goulburn Mulwaree Council	Meetings with staff and Mayor
	Newsletters to council
State MPs	Offer of face to face briefing
	Newsletters to electoral office
BCSC Limestone Mine Employees	<ul> <li>Newsletter and briefing note distribution</li> </ul>
Aboriginal groups	Advertisement for interest
	• Briefings/input into the assessment, survey methodology and recommendations.
	Site surveys
Media	Media statements and briefings as required

# Table 3.1Communication Methods

# 3.3.1 Nearby Residents And Landowners

Personnel communication has been undertaken with near neighbours to introduce the project and establish communication lines. Contact was initially made via telephone with offers for face to face briefings by the project team. To date, eight near neighbours have been contacted with two face to face meetings undertaken. Feedback has generally been positive, with neighbours appreciative of the opportunity to learn about the proposal and provide input into the EA process. This includes provision for noise and dust monitoring equipment to be installed on a number of properties to establish baseline data and provision for site photographs to assist in the visual modelling.

In addition, the nearby neighbours have received a newsletter about the project, and had the opportunity to attend the first information session on Saturday 22<sup>nd</sup> of October. Approximately 20 community members attended at different times through the open session. Issues of interest were dust, noise, traffic and visual amenity. Formal records of attendance were made and notes kept of issues and questions raised by attendees.

Copies of the newsletter have also been provided to the Department of Planning, Council and the local MP. An 1800 phone number and a website have been established to provide further information on the proposal. No phone calls have been registered on the 1800 line and four emails were logged on the website in October.

# 3.3.2 Government/Regulatory Agencies

A Planning Focus Meeting was held on 3<sup>rd</sup> November to give agencies specific information about the proposal and provide guidance in terms of impact assessment. Agencies invited to the meeting included:

- Department of Planning;
- Department of Environment and Conservation;
- Roads and Traffic Authority:
- Sydney Catchment Authority;
- Goulburn Mulwaree Council; and
- Department of Primary Industries.

A meeting with key Goulburn Mulwaree Council staff and the Mayor was held on the 13<sup>th</sup> of October. Feedback was generally positive and Council indicated they would like to be kept informed with the progress of the EA. Copies of the community newsletters will also be made available to Councillors and to Council.

# 3.3.3 State Member Of Parliament

A letter has been sent to Katrina Hodgkinson, MP for Burrinjuck including a copy of the newsletter and offering a briefing.

# 3.3.4 Aboriginal Groups

In accordance with the interim DEC guideline for Aboriginal consultation, advertisements for the present assessment were placed in the Goulburn Post newspaper on Wednesday 28 September 2005 and in the Marulan Magazine on Tuesday October 4 2005. In accordance with the guidelines, a survey methodology was agreed with the respondents and surveys were completed in late November with representatives from Pejar Local Aboriginal Land Council and the United Ngunnawal Corporation.

#### 4 ENVIRONMENTAL ISSUES

#### 4.1 OVERVIEW

The Marulan South site has been selected from a number of alternative locations based upon both the quality of the resource and the suitability of the site to minimise potential environmental impacts.

While the proposal is essentially a greenfield development, siting the quarry adjacent to the existing limestone mine, means that the proposal will not introduce a completely new landuse to a rural setting.

The location of the site adjacent to the existing rail spur servicing the limestone mine was a key consideration, as rail transportation is both economically and environmentally more sustainable than road haulage. The majority of the proposed site has been previously cleared for grazing with only limited pockets of remnant vegetation remaining, thereby minimising the potential for biophysical impacts associated with the proposal. Boral has bought a number of rural properties surrounding the identified resource area to provide a buffer and ameliorate potential amenity impacts such as noise and dust.

At this early stage of the environmental assessment process it is difficult to accurately predict the extent of impacts associated with the proposal. An environmental envelope assessment approach is being undertaken in order to set the benchmarks/parameters for the statement of commitments to guide the operation of the quarry. Modelling is being undertaken under worst case scenarios in order to provide maximum flexibility of operations within the acceptable environmental envelope.

While detailed assessment will be undertaken to address all potential impacts, the key issues for consideration are expected to relate to transport and water resources. An outline of key issues and results of the early assessment process where relevant are outlined in the sections below.

#### 4.2 TRANSPORT AND TRAFFIC

Road haulage has been identified as a key issue in the local community. The recent Ardmore Park quarry proposal raised objections from many residents primarily due to the traffic impacts. This application has recently been refused, at least partially on the grounds of transport impact on residents.

Siting of the proposed Marulan South Quarry on the existing rail spur will facilitate the transport of majority of product by rail, minimising the use of road haulage. Boral operates two rail terminals in Sydney and is currently investigating the potential for a third terminal at one of its sites in or around Sydney.

Marulan South Road is a designated heavy vehicle haulage route with B-Double Capacity and would be used if there was road traffic associated with the operation of the quarry. Boral is currently assessing the transport modes (rail and road) and the extent to which they would be used. Rail is expected to be the primary transport mode although there may be some transport by road to local markets. Boral is also investigating the possibility of backloading trucks that are already travelling to the limestone mine with sand from Penrose and other sites for blending with other quarry products.

The use of an existing dedicated route will minimise disruption to the local road network and may reduce the need for any special operating conditions along the route.

Rail and truck traffic issues are currently being investigated, with specific regard to:

- the capacity and capability of Marulan South Road to accommodate additional heavy vehicle movements;
- capacity and operation of the intersection of Marulan South Road and the Hume Highway;
- alternative truck haulage routes; and
- the impact of additional trains on local noise amenity both along the spur line and the Main Southern Line.

# 4.3 WATER RESOURCES

With the recent drought conditions throughout much of NSW and extremely low level of water in dams within the Goulburn Mulwaree local government area, water resources are expected to be a key issue for consideration.

Tangarang Creek flows directly to the north of the identified resource area and forms a small tributary of Barbers Creek which subsequently flows to the Shoalhaven River. The intention is for the proposed quarry to be independent as far as possible from external water sources. To this end, two main out of pit dams to the north of the pit are planned as shown in *Figure 1*. Additional inpit sumps will be excavated and operated to supply dust suppression and process water.

Initial calculations show that these dams and in pit storages will be sufficient to supply environmental flows, dust suppression, process and potable water with an adequate drought reserve. Groundwater investigations of the fractured rock groundwater system have included water depth and quality sampling of open boreholes as well as slug testing to interpret groundwater make and interconnectivity. Measurements of levels in bores across the area were recorded, and ranged from 6.1 to 35.45 metres below ground level, with an average of 18.4 metres below ground level.

Investigations to date have shown limited groundwater is available within the quarry site. Most of the sampled groundwater is of reasonably high quality, although the variation in chemistry suggests low interconnection. In summary, it appears that the local groundwater resource has very limited yield, and groundwater is not likely to measurably add to in-pit water supplies, nor is it likely that there are currently large discharges to the environment.

### 4.4 NOISE AND VIBRATION

As with any quarry, there is potential for Marulan South to have noise and vibration impacts on surrounding receptors and a detailed assessment will establish these impacts.

The noise assessment will be undertaken in accordance with the DEC's (formerly the EPA) NSW Industrial Noise Policy (INP) 2000. This will include a baseline noise survey of the existing ambient noise at several residential locations surrounding the quarry. The project specific noise limits will be derived from this survey in accordance with the INP and the EPA's Environmental Noise Control Manual.

The noise impact assessment would encompass attended and unattended noise monitoring to ascertain the existing background and ambient noise at the nearest residential receivers and passive recreational areas such as the National Park. Approximate noise logger locations are indicated on Figure 1.

Cumulative transport noise impacts, such as the additional road and/or rail traffic required, will be calculated for Marulan South Road and the existing rail spur and main southern line. Impact assessment would be primarily based around the predicted net noise increase and absolute noise level.

Blasting impacts will be assessed in accordance with the criteria recommended by the Australian and New Zealand Environment and Conservation Council. These criteria are used by the DEC to assess human annoyance and discomfort as well as potential structural damage.

#### 4.5 AIR QUALITY

Existing air quality and likely changes in future emissions due the proposal and cumulatively from neighbouring operations will be assessed.

The assessment would be based on the NSW DEC's *Guideline on the use of Air Quality Models for Modelling Assessments* using the ISCST3 computer-based dispersion model to predict concentration and deposition rates of particulate matter.

Similarly to noise, it is proposed to model dust emissions based upon a worst case operational scenario to enable flexibility in quarry operations within the determined limits of the worst case scenario.

Total suspended particulate and sub 10 micron high volume air samplers have been installed at representative locations to provide baseline data as shown on Figure 1.

Given that the granodiorite has no large energy requirements to extract and crush, and that rail will be used rather than road for most products, greenhouse emissions are not expected to be an important issue.

#### 4.6 ECOLOGY

State and commonwealth threatened species registers list seventeen plant, five bird and four mammal species within ten kilometres of the site. Field surveys undertaken to date targeted towards detection of these species have found no threatened plants or animals within the identified resource area, processing plant area or dam locations.

The site has been predominantly cleared for grazing and the results of the initial ecological investigations suggest that the proposed quarry will not be significantly impacting on habitat for threatened flora or fauna species.

#### 4.7 VISUAL AMENITY

The proposal is not expected to be highly visible from any nearby sensitive receptors. A visual assessment incorporating 3D simulations is being undertaken to confirm potential impacts. Issues relate principally to the likely impacts of the proposed quarry on the existing rural character of the area and the visibility of operations to the receptors.

Given the distance (approximately two kilometres) and the surrounding topography, it is not expected that the quarry will be visible from the Bungonia Lookout, which is the main visitor area within the Bungonia State Conservation Area. Long Point walking track approximately 500 metres to the east of the quarry is about level with the elevation of the top of the quarry, and would therefore look into the pit area through a discontinuous tree screen. Tree planting on the east side of the eastern bund would suitably screen the workings so that while parts of the pit and crushing plant may be visible, there would not be a strong visual impact. The main Long Point Lookout is approximately 700 metres east of the quarry and faces east towards the Shoalhaven River and away from the quarry site.

Isolated, elevated properties above Long Point Road are located some kilometres from the pit and may receive distant and filtered views of the quarry. There would be no views of the quarry from the Long Point Road leading to the lookout or Morton National Park on the opposite side of the Barbers Creek valley.

# 4.8 SOCIO-ECONOMICS

There is a substantial economic value in ensuring a supply of construction materials to the Sydney market. The Sydney region has a significant demand for aggregates and sand for concrete production, road sealing, railway works and other construction projects. With the impending closure of several aggregate and sand quarries that supply the Sydney region, it is critical to the ongoing socio-economic strength of Sydney to find and develop new aggregate and sand resources.

The socio-economic assessment will include an evaluation of potential impacts upon the amenity values of the nearby national park and state recreation area. The assessment will draw upon the results of various other technical assessments such as noise, air quality and visual to qualitatively assess the impact of the proposal upon the amenity values of recreational users of the park.

# 4.9 ARCHAEOLOGY

A desktop review of the historical information available has not uncovered any historical heritage sites within the quarry application footprint.

In accordance with the interim DEC guideline for Aboriginal consultation, advertisements for the present assessment were placed in the Goulburn Post newspaper on Wednesday 28 September 2005 and in the Marulan Magazine on Tuesday October 4 2005. In accordance with the guidelines, a survey methodology was agreed with the respondents and surveys were completed in late November with representatives from Pejar Local Aboriginal Land Council and the United Ngunnawal Corporation.

The field survey methodology was designed to target landforms within the overall site boundary likely to contain Aboriginal heritage sites, based upon an analysis of previous heritage studies undertaken in the region, and on the location of previously recorded Aboriginal sites.

Five Aboriginal sites were identified within the quarry resource area during the survey, all of which were isolated artefacts. None of the sites appear to have any further subsurface deposit, and all were in heavily disturbed context. The sites recorded were located in areas that have experienced extensive disturbance in the form of ploughing, farm dam construction and erosion caused by cattle grazing for at least the past 50 years. The context of these sites within the heritage of the region and the level of disturbance they have experienced means that they are assessed as having low archaeological significance.

Further sites were identified during survey in the proposed dam area to the north of the quarry site, along Tangarang Creek. These artefacts were identified eroding from *in situ* soil horizons within the dam's proposed innundation area and assessment is still ongoing.

#### CONCLUSION

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This background paper has been prepared to outline the Marulan South quarry proposal and provide an overview of the potential environmental issues associated with the development. This report will be submitted to the NSW Department of Planning to accompany a project application under Part 3A of *EP&A Act* and will assist in the development of the Director General requirements for the completion of an environmental assessment for the proposal.

An environmental assessment will be undertaken based upon the integrated Director General requirements developed by the Department of Planning in conjunction with a range of other government agencies. The environmental assessment will include a full impact assessment process which will be used to further refine the proposed 30 year quarry footprint within the identified resource area. An environmental envelope approach will be taken for the assessment to allow for maximum flexibility for quarry operations within acceptable environmental parameters.

The EA will be submitted to DOP along with a draft statement of commitments which will be developed concurrently with the EA to guide the operation of the quarry. The draft EA and statement of commitments will undergo a pre-exhibition review by DOP and relevant agencies prior to formal exhibition, assessment and the Minister's determination of the proposal.

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