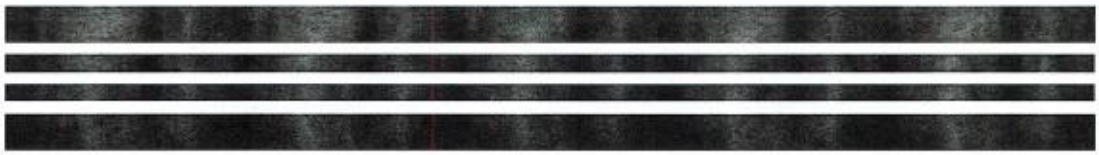


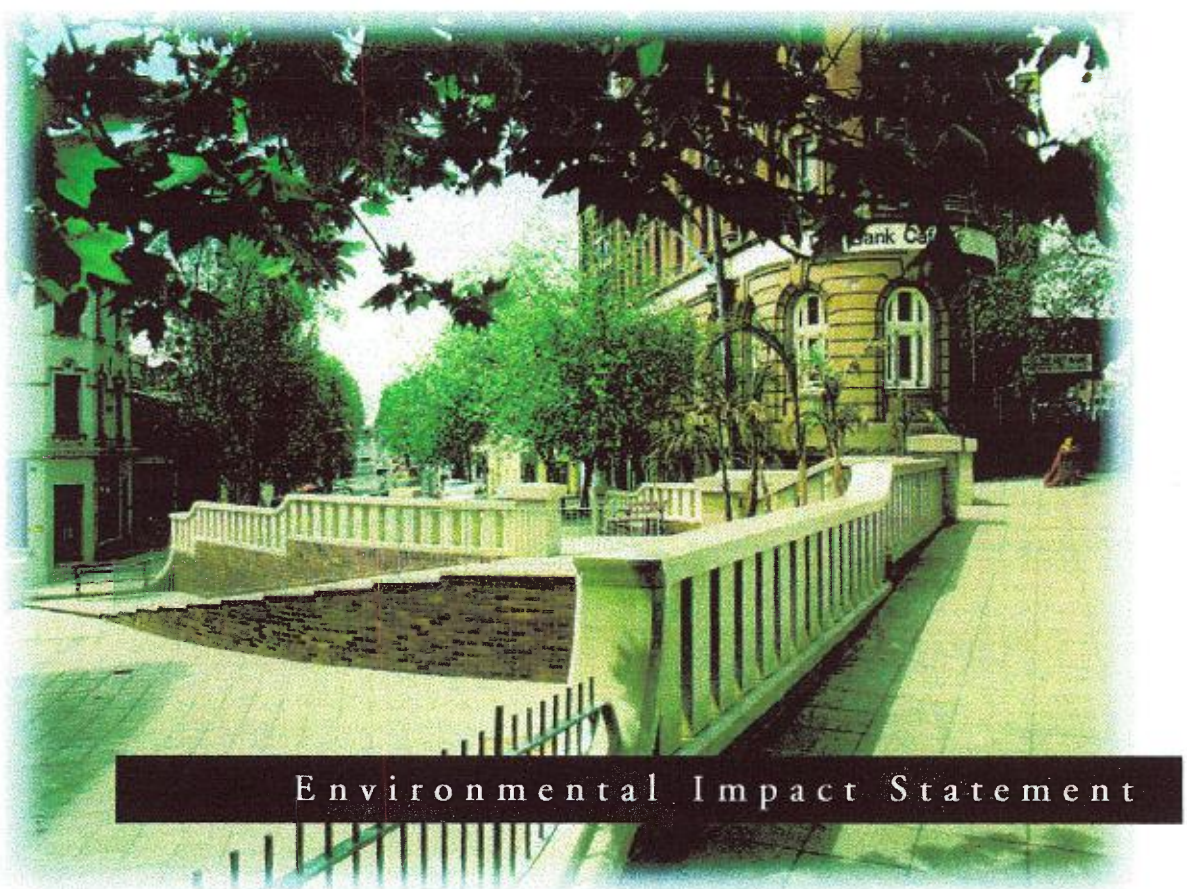
EIS 1155

AB019841

Somersby sandstone quarry : environmental impact statement

GOSFORD QUARRIES

Somersby Sandstone Quarry



Environmental Impact Statement

DECEMBER
1998

EDAW

GOSFORD QUARRIES

Somersby Sandstone Quarry

Environmental Impact Statement

DECEMBER 1998

EDAW (AUST) PTY LTD
211 PACIFIC HIGHWAY
ST LEONARDS NSW 2065
TEL (02) 9906 6899
FAX (02) 9906 4380

This environmental impact statement (EIS) for the extension of existing dimension sandstone quarrying at Somersby has been prepared in accordance with the Environmental Planning and Assessment Act 1979 (NSW), Section 78A(8).

EIS prepared by

Name, qualifications and address of person who prepared the EIS	P Rand, B. App. Sc. EDAW Aust Pty Ltd 211 Pacific Highway St Leonards NSW 2065

DEVELOPMENT APPLICATION

Applicant's name	Gosford Quarries Properties Pty Ltd
Applicant's address	300 Johnston St Annandale NSW 2038
Land to be developed	Land shown in Figure 2.1 of EIS
Property description	Land shown in Figure 2.1 of EIS.
Proposed development	Continued use and extension of existing dimension sandstone quarry

ENVIRONMENTAL IMPACT STATEMENT

The environmental impact statement is provided in this document.

CERTIFICATE

I certify that I have prepared the contents of this Statement and to the best of my knowledge:

in accordance with Clauses 54A and 55 of the Environmental Planning and Assessment Regulation 1994.

It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.

Signature.....

Name P Rand

Date.....22/12/93.....

SUMMARY

The purpose of this environmental impact statement is to support a development application for the continued use and extension of sandstone quarrying operations at Gosford Quarries Somersby site. Dimension sandstone quarrying commenced on the site in 1966. The proposed quarry extension covers an area of 1.6ha.

Prior to the preparation of this EIS, there has been ongoing consultation and correspondence between Gosford City Council, Gosford Quarries and its consultants. This has included consultation about the relevant statutory processes applying to this project. The EIS has been prepared in response to the most recent advice from Gosford City Council and the requirements of the Director of the Department of Urban Affairs and Planning.

The justification for the continued operation and expansion of the quarry is contained in the *Planning Report on Sydney Regional Environmental Plan No 9 – Extractive Industry (No 2)*. This confirms the regional significance of the Somersby site for the supply of dimension sandstone. The sandstone extracted from the site is both limited in supply and highly sought after for specialised building restoration works and also for export.

A review of the *EIS Guideline – Extractive Industry* reveals that there are limited alternatives to the continued operation of dimension sandstone quarrying on the site. In particular, the well established nature of the existing operation and the limited availability of suitable alternative sites makes this proposal the most sustainable.

The failure to gain consent for this project would have a range of consequences. These would include increased consumer costs due to reduced supply and also substantial revenue and employment losses.

In accordance with the Director's requirements, consultation has been undertaken with a range of relevant agencies. The results of these consultations are outlined in the EIS.

PROJECT DESCRIPTION

The proposal involves the extraction of dimension sandstone and associated site rehabilitation. Covering a relatively small area, the quarry extension is expected to yield 4,000 cubic metres of material over a twenty year period.

Environmental Impacts and Mitiagation Measures

A brief description of the project's environmental impacts and mitigation measures are given below.

Land use and planning

Under the provisions of *State Regional Environmental Plan (SREP)No 9 – Extractive Industry (No 2)*, quarrying operations are a permissible use with the consent of Council. The application of this State policy and SREP No 20 are outlined in the EIS. The site is surrounded by non-residential uses such as Old Sydney Town and Brisbane Waters National Park to the north and Davidson Recreation area to the south. Both the Sydney-Newcastle Freeway and the Pacific Highway provide a buffer between the quarry site and the nearest other land uses.

Water

The existing and proposed water management system has been designed to collect and settle surface water from quarried areas of the site. Other erosion and sedimentation control measures, including site contouring and re-vegetation, are also described in the EIS.

Visual quality

The proposed quarry extension would not be visible from nearby roads or viewing points due to the intervening topography and surrounding vegetation.

Socio-economics

The existing and proposed quarry operations support an important local industry which provides employment for 80 people. The site operations also support specialised training in stone masonry.

Noise

The assessment of the noise impacts of the quarry involved the measurement of background noise, the modelling of predicted noise levels and the assessment against acceptable noise levels. The predicted noise levels for the site were well below the acceptable level.

Air quality

Dust and particulate matter are the main sources of air emissions generated by the extraction and transportation of sandstone material. The results of air quality dispersion modelling confirmed that the nearest residence to the site would not be adversely affected by the quarry operations.

Flora and fauna

Approximately 1.6ha of bushland would be disturbed as a result of the proposed extension. This would however, ultimately be rehabilitated. Habitat exists within the extension area for a number of species listed under the Threatened Species Conservation Act 1995. Eight Part Tests of significance are included in the EIS.

Aboriginal heritage

There is only one aboriginal heritage site which would be affected by the proposed quarry extension. This heritage item would be removed, in accordance with National Parks and Wildlife Service requirements, prior to the commencement of quarrying.

Traffic

The proposed quarry extension would not result in any increase in traffic entering or leaving the site. It would only generate up to two truck movements within the site on any one day.

Environmental Management and Rehabilitation

The environmental management and rehabilitation plan outline is given in the final section of the EIS. It addresses a range of environmental management measures including re-vegetation, erosion control and operational impacts. These measures would aim to achieve long term restoration of the site's native ecosystem.

DIRECTORS REQUIREMENTS

The following summary outlines the Director's requirements with reference to the relevant section/s of the EIS in which these requirements are addressed. The Directors Requirements are included as an Appendix to the EIS.

Key Issues

Applicability with SREP No 20 (1.8 and 3.1.2)

Applicability of SREP No 9 (3.1.1)

Potential impact on water courses (4)

Potential impact on flora and fauna (8)

Effectiveness of existing environmental protection measures (throughout)

Cumulative effect, both locally and regionally (throughout)

Consultation *(1.8)*

Use of EIS Guideline - Extractive Industry (throughout)

Consultation with Gosford City Council (1.2, 1.8)

Clause 51 of EP&A Regulation 1994

Summary of EIS (forward to EIS)

Statement of objectives (1.4)

Analysis of feasible alternatives (1.5, 1.6, 1.7)

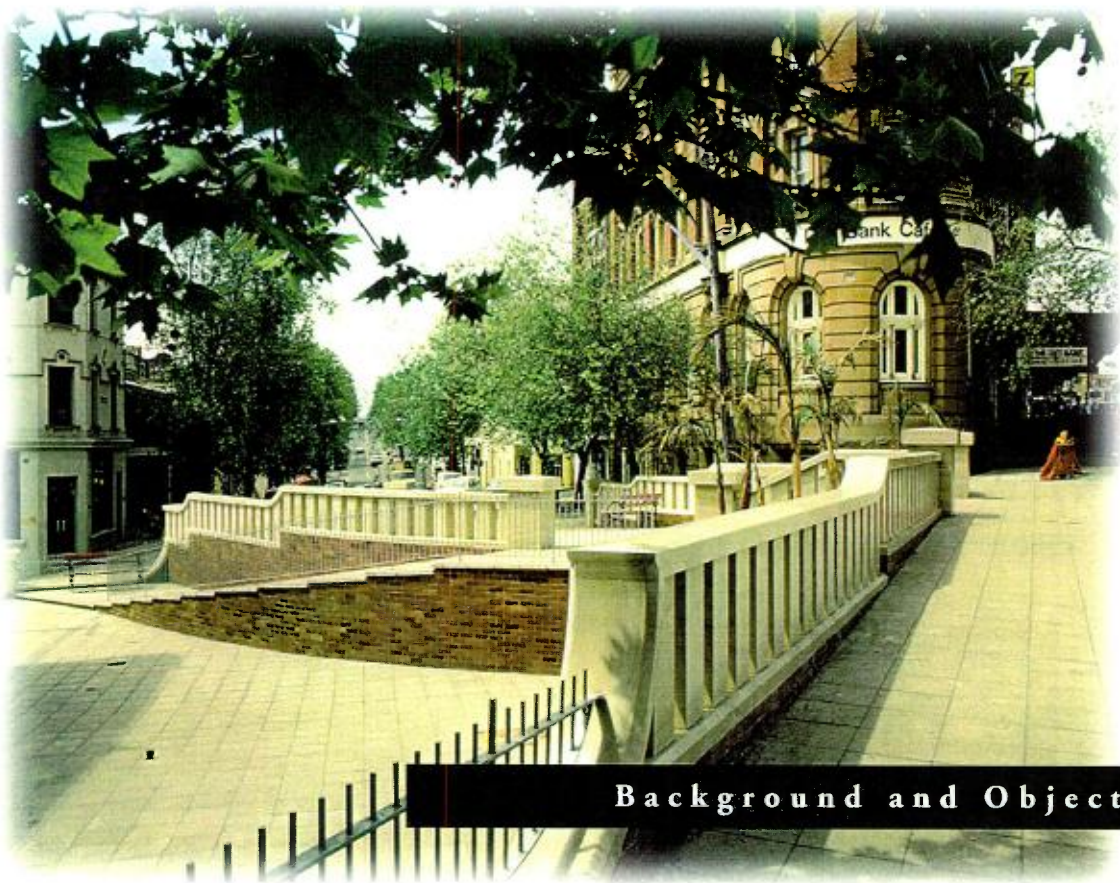
Analysis of developing activity including:

- description of development (2)
- description of environment likely to be affected (3-11)

- soil contamination (not applicable)
- flora and fauna (9)
- air, noise, water pollution (4,7,8)
- health of people in neighbourhood (3.2)
- hazards (not relevant)
- traffic (11)
- local climate (8.2)
- social and economic (6)
- visual (5)
- soil erosion (4)
- cultural and heritage significance (10)
- reasons for justifying the development (1.5)
- compilation of mitigation measures (throughout)
- list of approvals (currently seeking confirmation, no EPA approvals required))
- ESD principles (1.5)

The EIS was also based on a thorough review and response to the EIS Guideline – Extractive Industry Quarries.

Contents



Background and Objectives

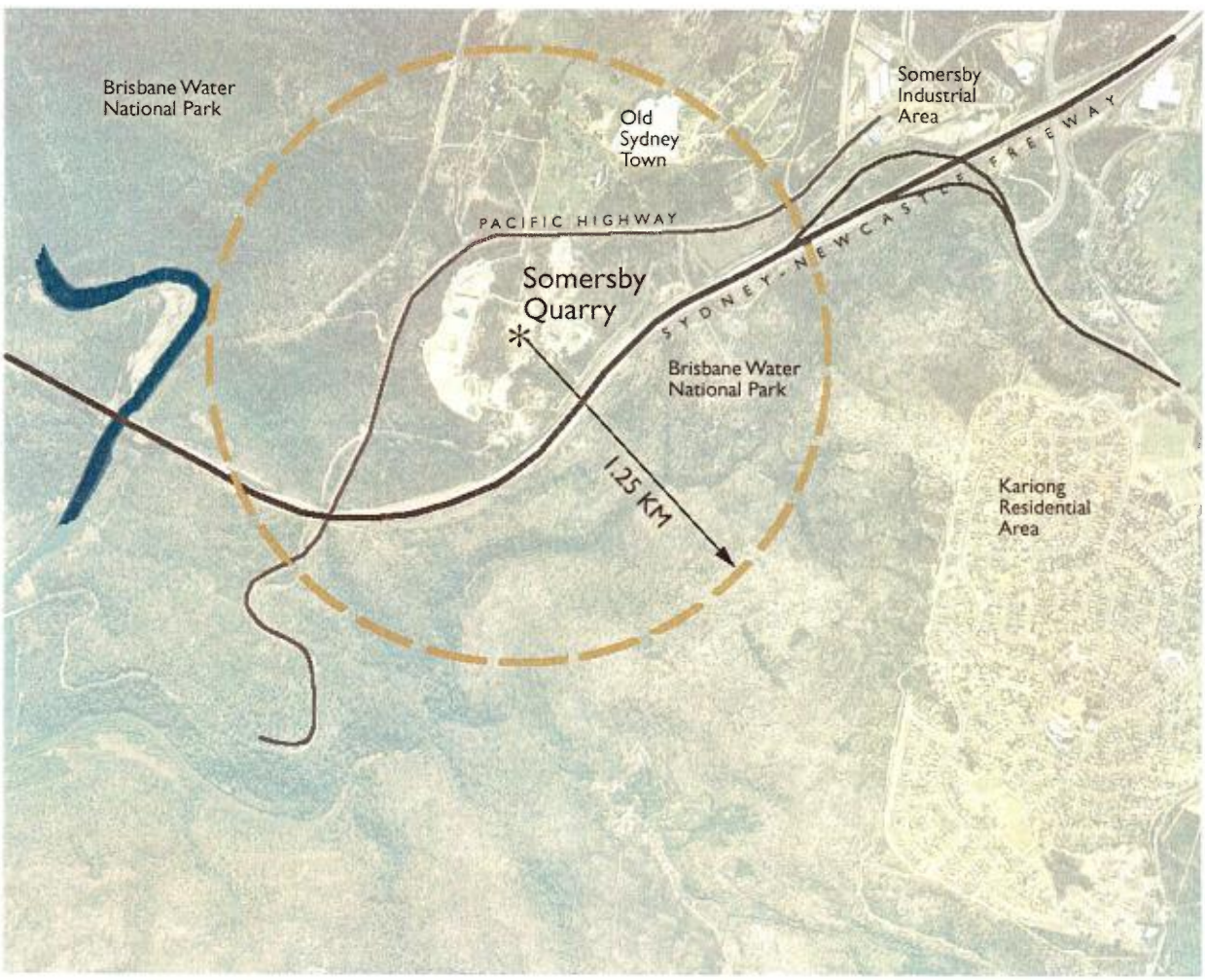
1

1 BACKGROUND AND OBJECTIVES

1.1 BACKGROUND

This Environmental Impact Statement has been prepared for Gosford Quarries Properties Pty Ltd (Gosford Quarries) for the purpose of obtaining development approval for the continuation and extension of its existing dimension sandstone quarry operations at Somersby.

The Somersby quarry site is located near the Sydney-Newcastle Freeway, approximately 6km to the west of the township of Gosford (Figure 1.1).



Aerial Photography Source: Copyright Surveyor General's Department, Panorama Avenue Bathurst 2795

FIGURE 1.1
SOMERSBY QUARRY LOCATION

1.2 CURRENT OPERATIONS AND DEVELOPMENT APPROVAL PROCESS

Somersby quarry is a main source of dimension sandstone blocks for Gosford Quarries. Dimension quarrying began on the site in 1962 and has been operating continuously since 1966.

The proposed development involves a minor extension of the existing quarry as described in Section 2 of the EIS.

Following the gazettal of State Environmental Planning Policy No 37 in 1993, Gosford Quarries has been engaged in ongoing consultation and correspondence with Gosford Council regarding the appropriate development consent procedures applying to continued operations. The process of clarifying the relevant statutory requirements for Somersby quarry and other Gosford Quarry sites has been protracted and complicated.

A summary of events leading up to a requirement for a development application and Environmental Impact Statement for Somersby quarry follows:

- a development application was submitted to Gosford City Council under the provisions of SEPP No 37. This was supported by a statement of environmental effects;
- concerns were raised by Gosford City Council regarding the application of SEPP No 37;
- clarification was sought from the Department of Urban Affairs and Planning;
- Gosford City Council advised that the quarry site is included in Schedule 1 of the State Regional Environmental Plan No 9 and that a new development application and Environmental Impact Statement is required to be submitted (January 1996);
- legal advice obtained by Gosford Quarries and provided to Gosford Council confirms that the development application could be determined (February 1996);
- Gosford City Council confirms that it will proceed with determination of the development application (March 1996);
- Gosford City Council requests additional information on archaeology and ecology to support the development application (April 1996);
- Gosford City Council advises that no objections were received in response to advertising the development application (May 1996);
- the proponent's consultants provide Gosford City Council with reports on archaeology and ecology (August 1996);
- the proponent's consultant requests Gosford City Council to consider the development application under State Regional Environmental Plan No 9 and argues that the proposed development is not designated (March 1997);

- Gosford City Council refuses the development application on the basis that SEPP No 37 did not apply. Council suggested that the applicant submit a new development application together with an Environmental Impact Statement (July 1997);
- the requirements of the Director of the Department of Urban Affairs and Planning are sought (10 November 1997);
- the Director's requirements are issued (30 December 1997); and
- Gosford City Council confirms its requirements for the EIS (February 1998).

1.3 THE PROPONENT

Established in 1992, Gosford Quarries is Australia's leading supplier of dimension sandstone. The company employs approximately 80 people and has been instrumental in reviving the art of stonemasonry in Australia over the last 25 years.

Many training programs implemented by Gosford Quarries have resulted in apprentices continually being awarded Apprentice of the Year Awards within their field. Three apprentices have gone on to represent Australia in the World Skill Olympics, of which one returned with a silver medal.

Renowned for its expertise in restoration work, the company has played major roles in maintaining the external fabric of many of Sydney's heritage buildings including:

- Supreme Court - Elizabeth Street, Sydney;
- St Phillip's Church - Clarence Street, Sydney;
- Department of Lands Building - Bridge Street, Sydney;
- Department of Education Building - Bridge Street, Sydney;
- Queen Victoria Building - George Street, Sydney;
- Sydney Town Hall - George Street, Sydney;
- Commonwealth Bank - Pitt Street, Sydney;
- Sydney GPO - George & Pitt Streets, Sydney;
- The Great Synagogue;
- Newcastle Town Hall;
- Newcastle PO;
- Newcastle Customs House;
- Capital Theatre; and
- St Mary's Cathedral.

In August 1998 Gosford Quarries was awarded the sub-contract to build two 30 metre spires on the towers of St Mary's Cathedral which will become a focal point during the marathon at the Sydney 2000 Olympics.

The last five years have seen the company expand its operations into the export area where it now has networks operating in Germany, China, Hong Kong, New Zealand, Indonesia and England.

The company has a stable workforce and is a significant employer of youth giving them a solid grounding into the traditional art of stone masonry. Gosford Quarries has supported many community and cultural events, donating substantial quantities of stone for sculpture symposiums at Wondabyne and Mt Penang and landscape material for local employment programs.

1.4 OBJECTIVES

The objective of this Environmental Impact Statement is to support a development application for the continued and extended operation of sandstone quarrying in accordance with the project description given in Section 2. The current developments located in SL 73/7 have been the subject of previous development consents:

- DA 12516, January 1990;
- DA 10659, January 1989;
- DA 8460, September 1987; and
- DC 5755-110, February 1975.

The specific objective of the quarry expansion is to allow extraction of the limited high quality sandstone from the site. Although the proposed quarry extension would only yield a total of 4000 cubic metres of sandstone, it would extend the life of the quarry for another 20 years.

The objective of the Environmental Impact Statement is to provide a comprehensive assessment and documentation of environmental impacts and mitigation measures for both the current and proposed quarrying operations. This would assist Gosford City Council to issue development approval. It would also provide the basis of any ongoing monitoring of environmental impacts by Gosford City Council and any other relevant authorities

The proponent's objective is to continue to operate a viable quarry to supply high quality sandstone to meet the demands of the local and international market. Given the difficulties in securing evidence of consent for existing

sandstone extension, the proponent is keen to ensure that development consent is issued, in order to provide proof of compliance with its statutory obligations.

1.5 JUSTIFICATION

The Planning Report on Sydney Regional Environmental Plan No 9 - Extractive Industry (No2) provides a sound justification for the continued operation of sandstone quarrying on this and other sites which have been identified as being of regional significance.

The sandstone extracted from Somersby Quarry and the other seven sites listed in Schedule 1 of SREP No 9 represents a high quality material which is in strong demand. In particular, this sandstone has been used in the restoration of significant heritage buildings. Figure 1.2 provides examples of recent projects which featured the use of dimension sandstone supplied by Gosford Quarries.

In recent years, and in response to local fluctuations in the demand for sandstone, Gosford Quarries is increasing supplying sandstone for the export market. This sandstone has been used in the facade of a major new commercial building in central London. Other emerging export markets include USA and Korea.

Not only is Gosford Quarry sandstone used for heritage buildings, there is an increasing demand for its use in modern buildings and art works. Gosford Quarries has provided sandstone for the Wondabyne and Mt Penang Sculpture Symposium.

In response to the Director's requirements the quarrying operations can also be justified in terms of ecologically sustainable development in relation to the following:

Conservation of biological diversity
Although the quarrying operations result in disturbance of the biophysical environment (top soil and vegetation), the proposed rehabilitation measures, described in Section 12 aim to conserve the biological diversity of the site.

Precautionary principle
As this principle is relevant to "serious or irreversible damage" it would not appear to have a strong application to this particular development which has been operating for over 30 years. The proposed extension of the quarry is very small when compared with the coverage of previous quarrying. Parts of

the site which have already been filled and revegetated provide evidence that impacts of quarrying are reversible. The rehabilitation measures identified throughout the EIS specifically aim to mitigate environmental damage in relation to noise, air quality, water quality and biological resources. The co-operation between the proponent and the relevant government authorities will be important in achieving successful rehabilitation of the site.

Inter-generational equity

In terms of the natural environment, future generations are expected to benefit from the long term rehabilitation of the quarry site into the bushland environment. These benefits could include a continuous bushland buffer to the freeway or the Somersby industrial area or extended public open space or recreational area.

Improved valuation and pricing

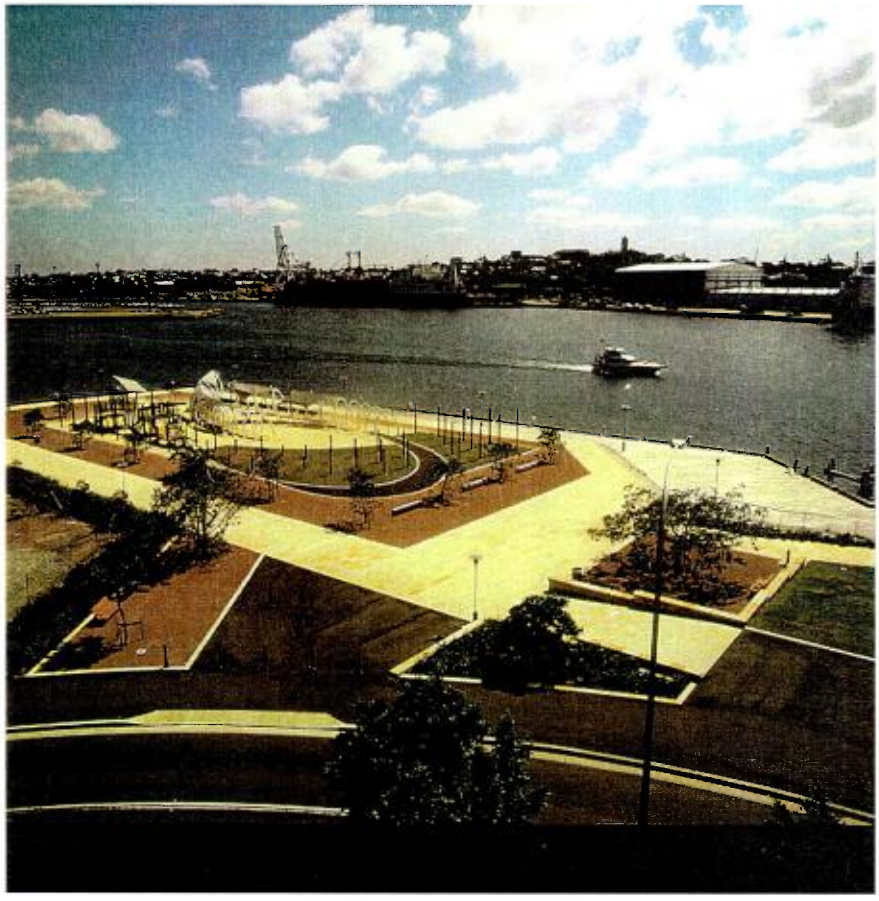
Given the nature of the quarry, the minor extension and the low level of community concern about the project, it was not considered appropriate to carry out a valuation of physical impacts.

1.6 ALTERNATIVES

Alternatives to the proposed development are limited due to the extent and duration of existing operations. By extending the existing quarry by a small area, the proponent avoids the major impacts associated with a new quarry development. It also takes advantage of existing infrastructure such as roads, processing operations and administration facilities.

In response to the requirements of the EIS Guideline - Extractive Industry, alternative operations are limited in relation to the following:

- sandstone quarrying methods - the proposed methods are both simple and proven and the crane and cutting equipment is already located on site;
- quarry design, site layout access roads - these have been predetermined by existing operations. It would be both impractical and uneconomic to consider alternatives to the current conditions which already support the proposed quarry extension;
- other resource locations - the proposed quarry extension areas have been identified as a result of test drilling. There are no other areas of the site that are suitable for quarrying bulk sandstone blocks; and
- alternative rehabilitation and end use options - the proposed rehabilitation measures are designed to reinstate the general shape and vegetation of the landscape. Given that the quarrying operations are estimated to continue for another 20 years, it may be appropriate or necessary to consider



Pyrmont Point Park

Sydney GPO Restoration

FIGURE 1.2
Examples of Recent Projects
Featuring Gosford Quarries Sandstone

alternative rehabilitation or end use options at a later date.

Given that quality dimension sandstone must occur as a large deposit, free of faults, there are very few other suitable sites for sandstone extraction in New South Wales. This is the reason for protecting existing sites under SREP9 No 2.

1.7 CONSEQUENCES OF NOT CARRYING OUT THE DEVELOPMENT

The failure to obtain development approval to continue sandstone quarrying operations would have a number of serious impacts. It would reduce an already limited supply of sandstone from sites which are within reasonable proximity to the Sydney metropolitan area. This reduction in supply could potentially increase the price of sandstone which would have implications for both the construction and landscaping industries.

The operations of Gosford Quarries would be seriously affected if it could not continue quarrying operations on the site. The indirect effects would include cost cutting measures such as reduction in staff numbers and a reduction in purchases from the local area.

The reduced supply of sandstone associated with the development not being carried out could also have an impact on the growing export potential of the resource. This could result from reduced supply and reduced financial capacity to secure international markets for the product.

1.8 CONSULTATION

In accordance with the requirements of the Director of the Department of Urban Affairs and Planning and the Gosford City Council, the following organisations were consulted during the preparation of this Environmental Impact Statement. A number of these organisations were also previously consulted during the preparation of the statement of environmental effects.

The results of the consultation are summarised below.

Hawkesbury Nepean Catchment Trust (HNCT)
The Hawkesbury Nepean Catchment Trust was established in 1993 in response to community concerns about the health of this river system. The requirements of this organisation are:

- maintenance of existing water quality;
- site flows not to be increased;
- notification of type and extent of vegetation clearing; and
- rehabilitation measures.

A representative of the Hawkesbury Nepean Catchment Trust indicated that it may request that Gosford Council require:

- an environmental management plan for site operations
- environmental impact prediction verification to confirm that the predicated impacts and the implementation and performance of mitigation measures

Department of Mineral Resources

The Department of Mineral Resources confirmed that it is the principal government authority responsible for assessing the State's resources of construction materials and for advising the State and local government on their planning and management.

Standard requirements were issued relating to geological and resource information required by the Department of Mineral Resources. These include the need for information on:

- amount of material available and the methods used to determine this
- characteristics of the material to be produced
- assessment of quality of the material
- annual production
- alternative sources
- transport routes
- waste products and description of stockpiles
- noise, vibration, dust and visual impacts
- justification

Environment Protection Authority

Discussions were held with Environment Protection Authority personnel about the noise and air quality aspects of the EIS. The EPA recommended that dust deposition estimates and modelling be undertaken to address the issues of dust emissions. Given the lack of information on dust emissions for sandstone quarrying, the EPA suggested the adoption of information on coal mining. It was also suggested by the EPA that a conservative approach be adopted as dust particles from sandstone quarrying are expected to be larger than coal dust.

Reference was made by Environmental Protection Authority personnel to the Environmental Noise Control Manual, when undertaking noise impact assessment. It was recommended that specific reference be made to chapters 19, 20 and 21 of this manual.

Department of Land and Water Conservation

The following matters were identified for consideration in the EIS:

- removal and rehabilitation of vegetation
- erosion and sedimentation control measures
- effects on adjacent crown land
- need for DLWC owner's consent for the development application
- groundwater impacts
- proximity of river (40 m limitation)

National Parks and Wildlife Service

A review was undertaken by National Parks and Wildlife Service of the archaeological survey of the site. This review endorsed the recommendations of the report and the need for full consultation with the Darkinjung Local Aboriginal Land Council.

Roads and Traffic Authority

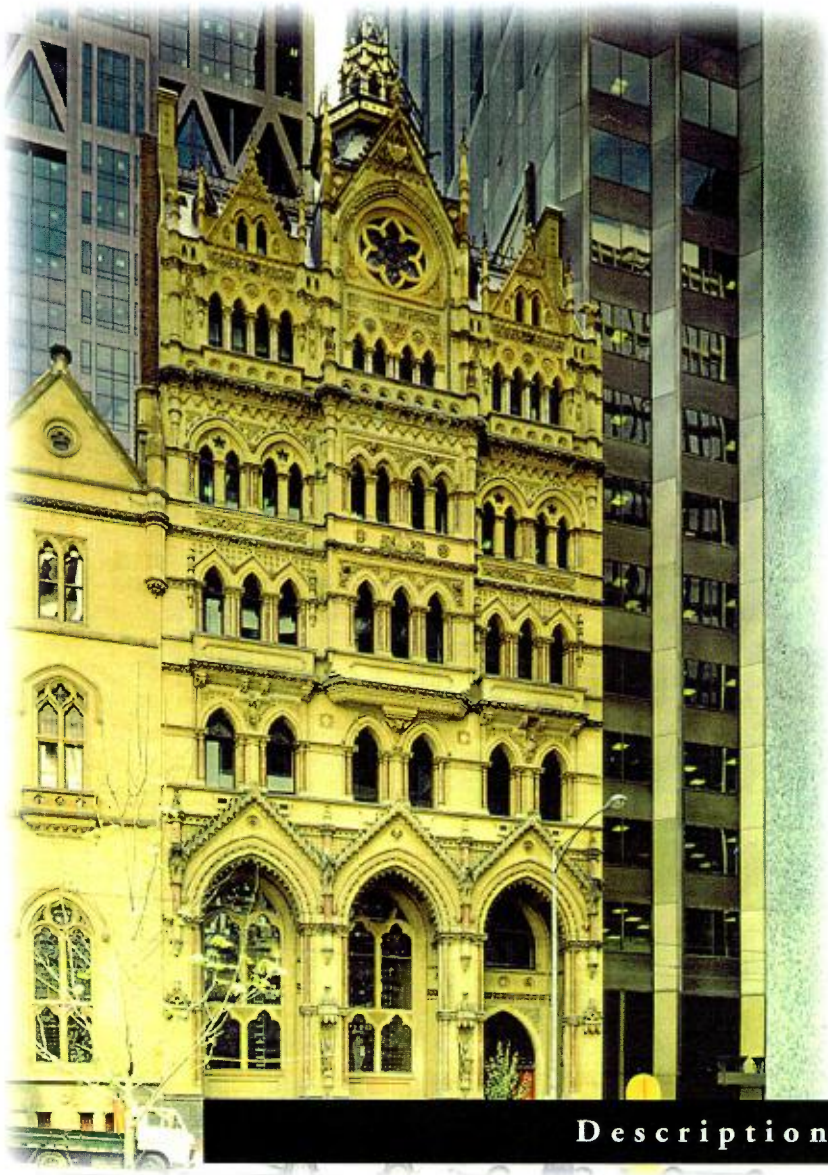
The Roads and Traffic Authority at Newcastle was familiar with the existing operations. Its requirements included information on existing traffic volumes, any likely change in volumes and assessment of impacts on the old state highway.

NSW Agriculture

This department expressed concern that the proposal did not impact on agriculture and that appropriate rehabilitation of the quarried areas of the site is carried out.

Local Aboriginal Land Council

The Darkingung Local Aboriginal Land Council (DLALC) was consulted prior to conducting the aboriginal achaeological survey of the site. During later discussions with representatives of the land council, agreement was reached on the recommendations given in the archeaologist's report. These recommendations are outlined in Section 10 of this EIS.



Description of Proposal

2

2 DESCRIPTION OF PROPOSAL

2.1 PROPERTY DESCRIPTION

Figure 2.1 shows the site of the existing quarry operations and the proposed quarry extension which is located within the area defined by Permissive Occupancy 66/91. This Development Application and Environmental Impact Statement addresses the proposed quarry extension areas. For the purpose of providing a context to this application, this section of the EIS also provides a description of existing quarry operations.

Access to the quarry site is gained from Quarry Road which generally runs a parallel course along the northern side of the Sydney-Newcastle freeway. The northern boundary of the site is adjacent to Pacific Highway.

The property is currently leased, for the purpose of sandstone quarrying and processing, from the Department and Land and Water Conservation.

The site of the subject development application covers an area of 16.11ha. Quarry operations are confined to the central part of the site, covering 30-40 per cent of the site area. The adjoining property, to the west of Permissive Occupancy 66/91, is covered by a separate lease and is not included in this development application. Section 3 of this EIS provides further information on adjoining land use.

Figure 2.1 provides details of the site including lease boundaries, property description, existing operations, rehabilitation areas and the proposed quarry extension area.

The natural topography provides a moderate slope downhill from the north-west towards the general alignment of the Sydney-Newcastle freeway. In parts of the site where quarrying has occurred, the ground level has not been lowered significantly. As part of the rehabilitation process, the overall shape of the natural topography has been maintained following the completion of quarrying operations.

2.2 EXISTING APPROVED FEATURES AND APPROVED ACTIVITIES

The Somersby quarry is one of five sandstone quarries being operated by Gosford Quarries in the Central Coast area. The character of the operations is low volume and highly labour intensive.

Figure 2.2 shows the existing site infrastructure, including the main buildings, quarry areas, sandstone storage areas, car parking and processing build-

ings. A description of existing site infrastructure and physical features is given below.

2.2.1 Buildings

The two storey office/administration building is located near the entrance to the operations area on special lease 73/7. This building houses administrative personnel and facilities which services the company's entire operations, including three other quarrying sites on the central coast.

The largest building on the site is the processing building. It is made up of two simple structures with green colourbond roof and external walls. The main activity that occurs in these buildings is the cutting and processing of stone to meet the specific market requirements. The market requirements are diverse and include orders for sawn paving, building blocks and stone masonry for historic building restoration. The type of equipment housed in these buildings includes frame saws and diamond circular saws. Stonemasons, who carve and shape standstone also work in this building.

2.2.2 Roads and parking

An unsealed road provides direct access to the site, from Quarry Road. Vehicular parking areas provide for employee vehicles, visitors, delivery vehicles and trucks carrying processed sandstone from the site.

2.2.3 Storage areas

The main outdoor storage area is located on the eastern side of the processing building. Sandstone blocks which have been cut to size are stored on palettes, ready for transport to supply outlets or direct to building sites. Figure 2.2 shows a view of the outdoor storage area and part of the main processing building.

2.2.4 Quarrying and rehabilitation

Currently there are two defined areas of the site in which sandstone extraction has previously occurred or is approaching completion.

2.2.5 Filled areas

There are three separate areas of the site which have been previously quarried and filled, or are in the process of being filled with quarry overburden. This fill material consists of clean sandstone rubble which was not suitable for

processing into sandstone blocks or other marketable products.

2.2.6 Sediment control ponds

Figure 2.1 shows the location of the main sediment control ponds on the site. Located on the lower side of the site, these pond are designed to collect surface runoff and sediment from quarrying operations. Further information on the function and design of the sediment control ponds is given in Section 4 of the EIS. As the site is not connected to town water supply, water is pumped from the sediment ponds to provide water needed for the stone milling process.

2.2.7 Completed quarry areas

There are two main areas of the site in which quarrying has been completed. These are located to the west of the processing building and in the northern-central part of the site.

2.2.8 Bushland

Figure 2.1 shows that a large proportion of the site is native bushland. With the exception of the 1.4 ha site area proposed for the extension of quarrying operations, the existing bushland will not be disturbed by any future quarrying operations. Section 9 provides further information on the biological resources on the site. The extent of the site's natural bushland serves an important visual and surface water management function.

2.3 NATURE AND EXTENT OF QUARRY OPERATIONS

The nature and extent of quarry operations are described below.

2.3.1 Sandstone extraction process

The sandstone extraction process involves the following steps:

- test drilling to establish the presence of a commercial deposit;
- levelling of the site to remove and store top soil;
- cutting wheel either track or rail-mounted cutting to a depth of 1.4m;
- large blocks of sandstone are split away from the main deposit by the application of steel wedges;
- these blocks are then split into smaller blocks by drilling a series of holes with a pneumatic hammer;
- steel plugs and feathers are then inserted into the holes and pressure is applied to split off smaller blocks of about 7 tonne;

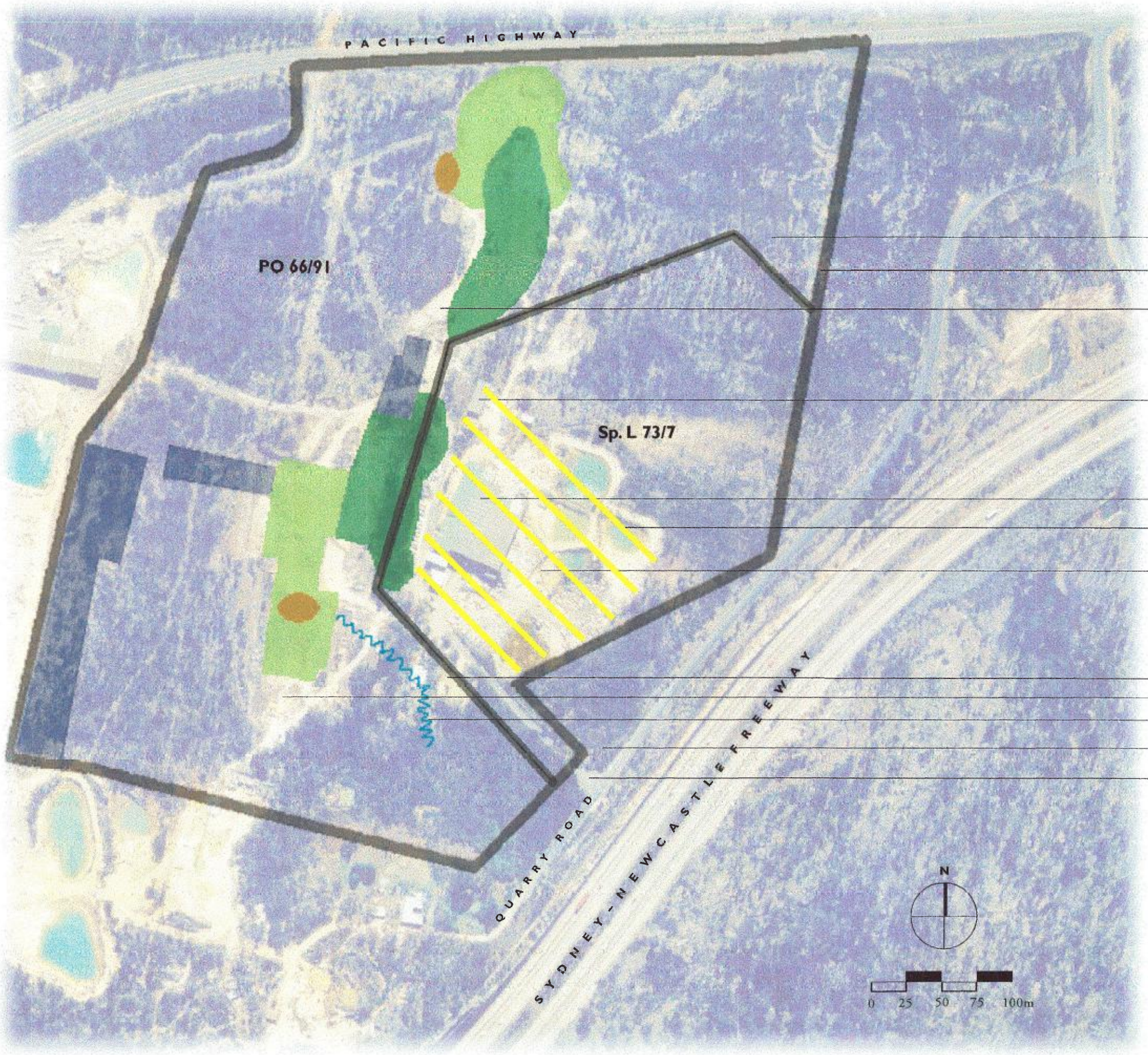


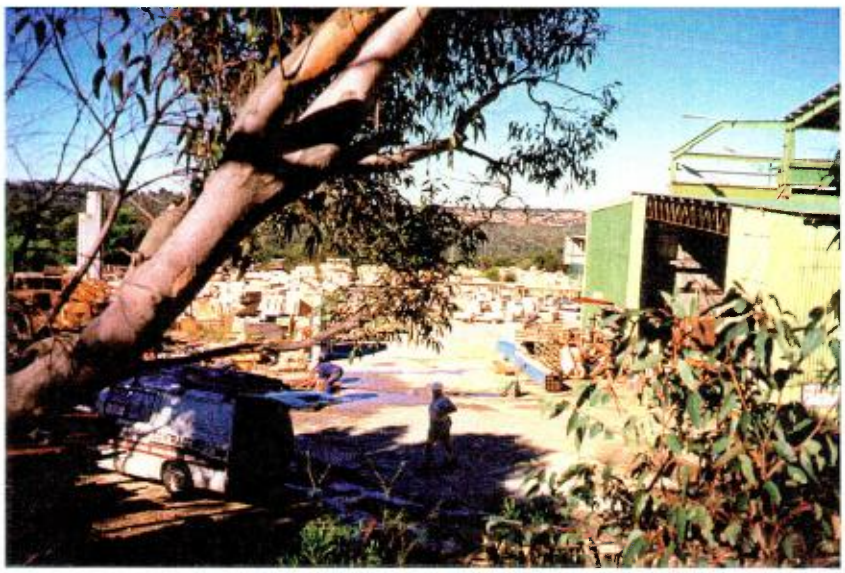
FIGURE 2.1 –
Existing and Proposed
Quarry Operations

Aerial Photography Source: Copyright Surveyor General's Department, Panorama Avenue Bathurst 2795

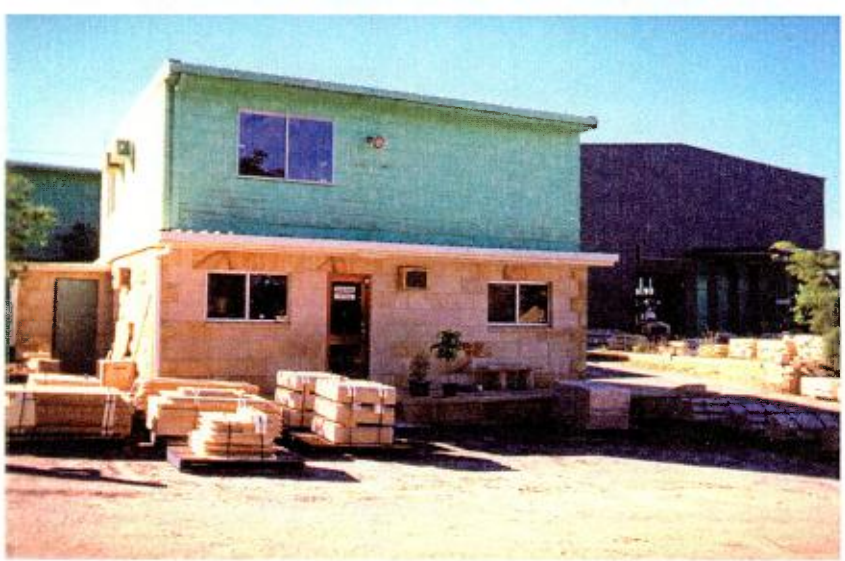
Natural bushland
Boundary of Somersby Quarry
Natural rock shelf
Store
Administration and milling operations
Sediment ponds
Outdoor storage
Sediment pond
Natural outcrop
Grass spillway
Sediment trap
Site Access

COLOUR KEY

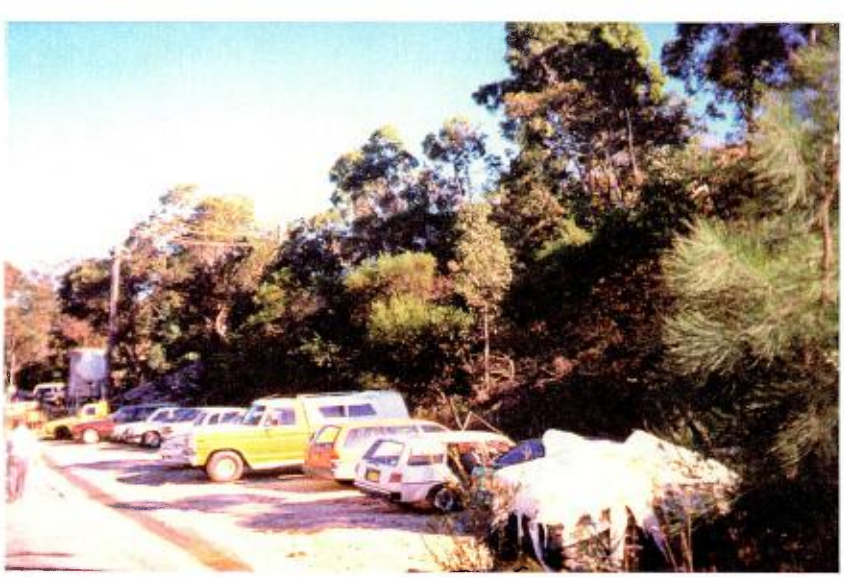
- Rehabilitation in progress
- Revegetation complete
- Topsoil stockpile
- Proposed quarry extension areas
- Activities approved under previous DAs



Outdoor storage and processing building



Administration



Car parking

FIGURE 2.2
EXISTING INFRASTRUCTURE

- the blocks (measuring 2.3 x 0.9 x 1.4 m) are lifted from the quarry by electrically operated derrick cranes for storage on-site, prior to processing.

Figure 2.3 shows the equipment used in the cutting of sandstone.

The extent of sandstone extracted from the site between 1986 and 1994 is shown in Table 2.1. It shows the peak production period between 1986 and 1991 and the rapid reduction in extraction rates since this period.

Financial year	Volume (cubic metres)
1986/87	1 558
1987/88	3 057
1988/89	3 280
1989/90	1 916
1990/91	1 331
1992	nil
1993	109
1994	342
1995	221
1996	210
1997	210

TABLE 2.1
RECENT HISTORY OF SANDSTONE EXTRACTION
Source: Gosford Quarries Royalty Returns

2.3.2 Processing

Currently, milling and processing of sandstone is one of the main functions carried out on the site. These activities have development approval and are excluded from this Development Application. Sandstone extraction from Gosford Quarries' other local quarry sites is transported to the Somersby site for milling and processing prior to final dispatch. Figure 2.4 shows the equipment used in the processing of sandstone.

2.3.3 Hours of operation

The hours of operation for quarrying and processing operations are between 7.30 am and 4.15 pm (Monday to Friday) and 7 am to 12 noon (Saturdays). Currently, extraction of sandstone occurs during a total average period of one month in a year. The proposed quarry extension would result in sandstone extraction occurring for a total of one to two months per year. This low level of activity demonstrates the small scale of the proposed quarry extension.

2.3.4 Workforce

The site operations currently provide employment for 45 people. This includes personnel involved in administration, stone masonry and machinery operations.

2.4 FUTURE OPERATIONS

2.4.1 Extended quarrying operations

Figure 2.1 shows the areas of the site which are proposed for the extension of the existing quarry. These areas have been determined following test drilling throughout the site.

Based on the history of market demand, quarry output of up to 400 cubic metres per annum is predicted. When compared with the figures shown in Table 2.1, this is about 12 per cent of the output of the quarry during the peak extraction period of 1988/89.

The extraction and rehabilitation processes will remain the same for the proposed quarry extension as applies to the current quarrying operations.

2.4.2 Processing

Given the expected low annual extraction rates for this quarry, the main function of the site will be to provide processing and administrative facilities to support the preponents' operations on the Central Coast. These activities have approval under a current development consent.

FIGURE 2.3
Sandstone cutting equipment

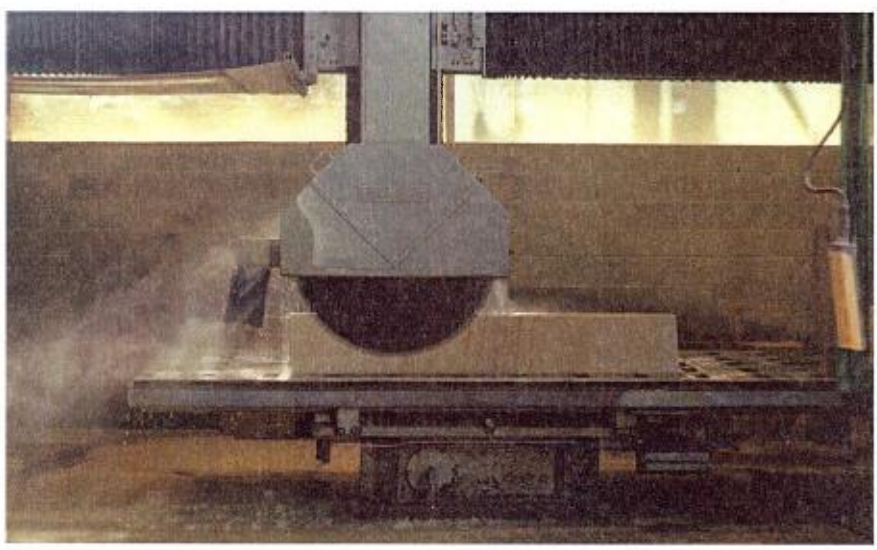
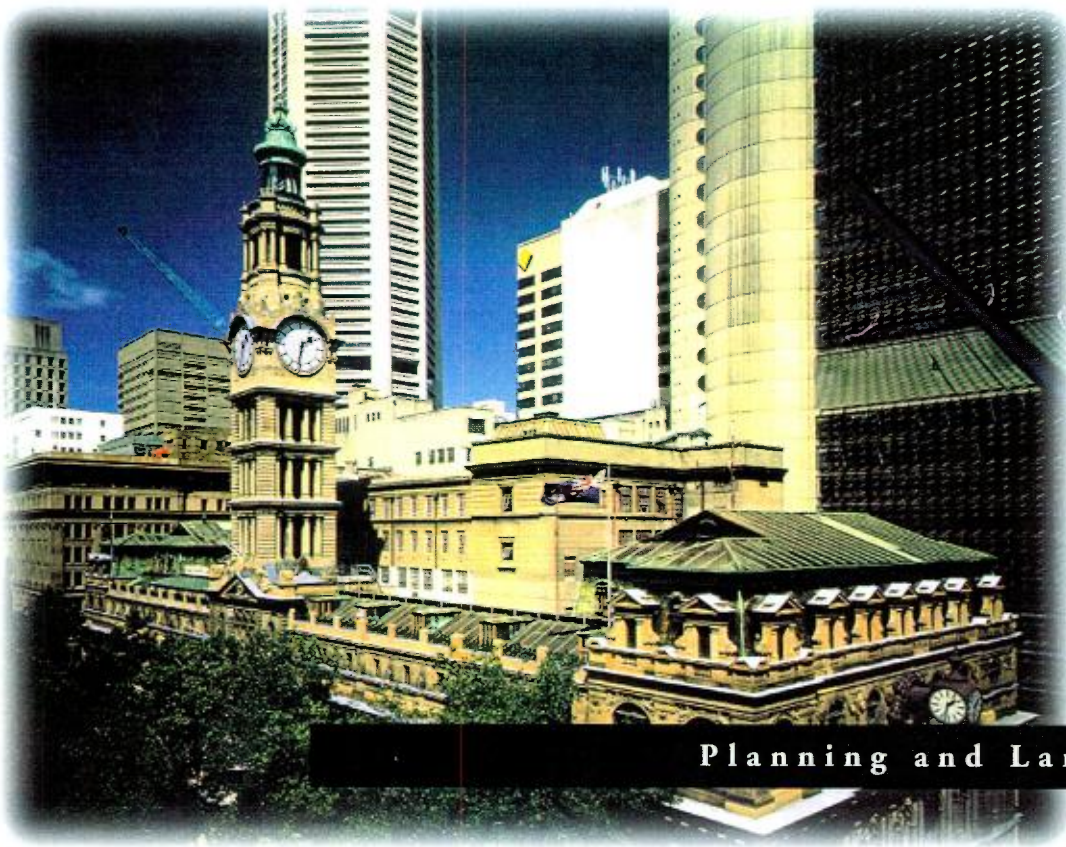


FIGURE 2.4
Sandstone processing equipment



Planning and Land Use

3

3 PLANNING AND LAND USE

This section of the EIS describes the state, regional and local planning controls which apply to the site. It also describes the land uses in the vicinity of the site.

3.1 PLANNING CONTROLS

3.1.1 Sydney Regional Environmental Plan No 9 – Extractive Industry (No 2)

The site of the quarry is covered by the provisions of State Regional Environmental Planning Policy No 9- Extractive Industry (No 2) which includes the Somersby Quarry site in Division 9 of Schedule 1 of the plan. Sites are listed in Schedule 1 if they contain existing extractive operations and potential resource areas of regional significance. As SREP No 9 takes precedence over the local environmental plan, extractive industries are a permissible use, with Council consent, under the provisions of Clause 7 of SREP No 9.

Sandstone quarries meet the following definition of extractive industries which is given in Clause 5 of the SREP:

(a) the winning of extractive material

(b) an undertaking, not being a mine, which depends for its operations on the winning of extractive material from the land on which it is carried on, and includes any washing, crushing, grinding, milling or separating into different sizes of that extractive material on that land.

The key objectives of this plan are to:

- facilitate the development of extractive resources close to metropolitan Sydney by identifying land which contains extractive material of regional significance;
- permit development of extractive industries on certain lands by overriding local environmental planning instruments that might prohibit such developments;
- ensure that extractive industries are carried out in an environmentally acceptable manner;
- prohibit extractive industry on land which is environmentally sensitive;
- ensure that consideration is given to the impacts of encroaching urban development on the ability of the resource to realise its full potential.

The Department of Urban Affairs and Planning has produced a Planning Report which provides background material on the amendments to SREP No 9. These amendments were made following a comprehensive review of

the plan undertaken by the Department of Urban Affairs and Planning in 1990. This report also provides an explanation of some of the key elements of the amended plan.

The Planning Report refers to the requirements for rehabilitation plans to be prepared and considered by Councils prior to the granting of development consent. Section 12 of this EIS provides an environmental management and rehabilitation plan for the site.

3.1.2 State Regional Environmental Plan No 20 – Hawkesbury Nepean River (Amendment No 2 – 1997)

The site is located within Mangrove Creek catchment and is covered by the provisions of Sydney Regional Environmental Plan No 20. The aim of the plan is to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context.

The plan includes a range of specific planning policies and recommended strategies which aim to preserve the use of the river for contact recreation and to maintain the integrity of the aquatic ecosystems. The water quality policy refers to the need for an erosion and sedimentation control plan where development involves the disturbance of soil. The water quantity policy includes a strategy to ensure that the amount of stormwater runoff from a development does not significantly increase as a result of development. These issues are addressed in Section 4 of this EIS which outlines erosion and sedimentation controls for the site.

3.1.3 Local Planning controls

Under the provisions of Interim Development Order No 122 of Gosford City Council, the nominated zoning of the site is 7 (a) Conservation and Scenic Protection. Although the provisions of this zone do not permit extractive industry, these controls are overridden by State Regional Planning Policy No 9 which make quarrying a permissible use on this site, with Council consent.

The zoning provisions covering the land surrounding the quarry site are also contained in Interim Development Order No 122. Under this plan, the National Park areas to the north of the site and to the south of the Sydney-Newcastle freeway are zoned 7 (a) Conservation and Scenic Protection. The site of Old Sydney Town is zoned 7 (c3) Scenic Protection – Tourist Accom-

modation which permits a range of land uses including educational establishments, clubs, nurseries, forestry, tourist uses and recreational establishments.

The Somersby Industrial area, which is located on the western side of the Sydney-Newcastle freeway and to the north of the site, is zone 4 (a1) Industrial under the local planning controls.

3.2 Surrounding Land Use

Figure 3.1 provides a general description of the land use within the vicinity of the Somersby quarry site. The location of the site between the Pacific Highway and the Sydney- Newcastle Freeway provides a substantial barrier between the quarry operations and other surrounding developments.

Adjoining the Somersby quarry, to the west, is a site known as the Central Coast quarry. This quarry is also owned by Gosford Quarries, as a result of it purchasing another quarry operator in 1994. This quarry has been the subject of a previous development approval. At this stage, it appears unlikely that there will be any substantial expansion of the Central Coast quarry in the near future.

The activities of Old Sydney Town occur on a large site on the northern side of the Pacific Highway and to the north of the quarry site. Old Sydney Town is a well known tourist and education facility which also incorporates the Gosford Reptile Park. Apart from the effect of noise on a residence within the Old Sydney Town site, the quarry operations do not have any discernible impact on the amenity of this tourist/educational facility.

Brisbane Water National Park has the most expansive coverage of any land use within the vicinity of the site. The quarry site is separated from the National Park by the alignment of the Pacific Highway and the Sydney-Newcastle Freeway. Brisbane Water National Park, which covers more than 12,000 ha of rugged sandstone country, stretches to the north, west and south of the quarry site.

Apart from it extensive land coverage and Hawkesbury sandstone rock type, the National Park has many other significant features. It provides habitat for swamp wallabies, koalas, echidnas, platypus, brush tail and ring-tailed possums. The floral variety in the park includes open woodland with a heath-like under-storey, remnants of tropical rainforest and stands of mangroves in the mudflats area. The park also includes important items of Aboriginal heritage such as rock engravings, ochre drawings and axe grinding groove. The park has numerous visitor facilities including walking tracks, lookouts and picnic areas.

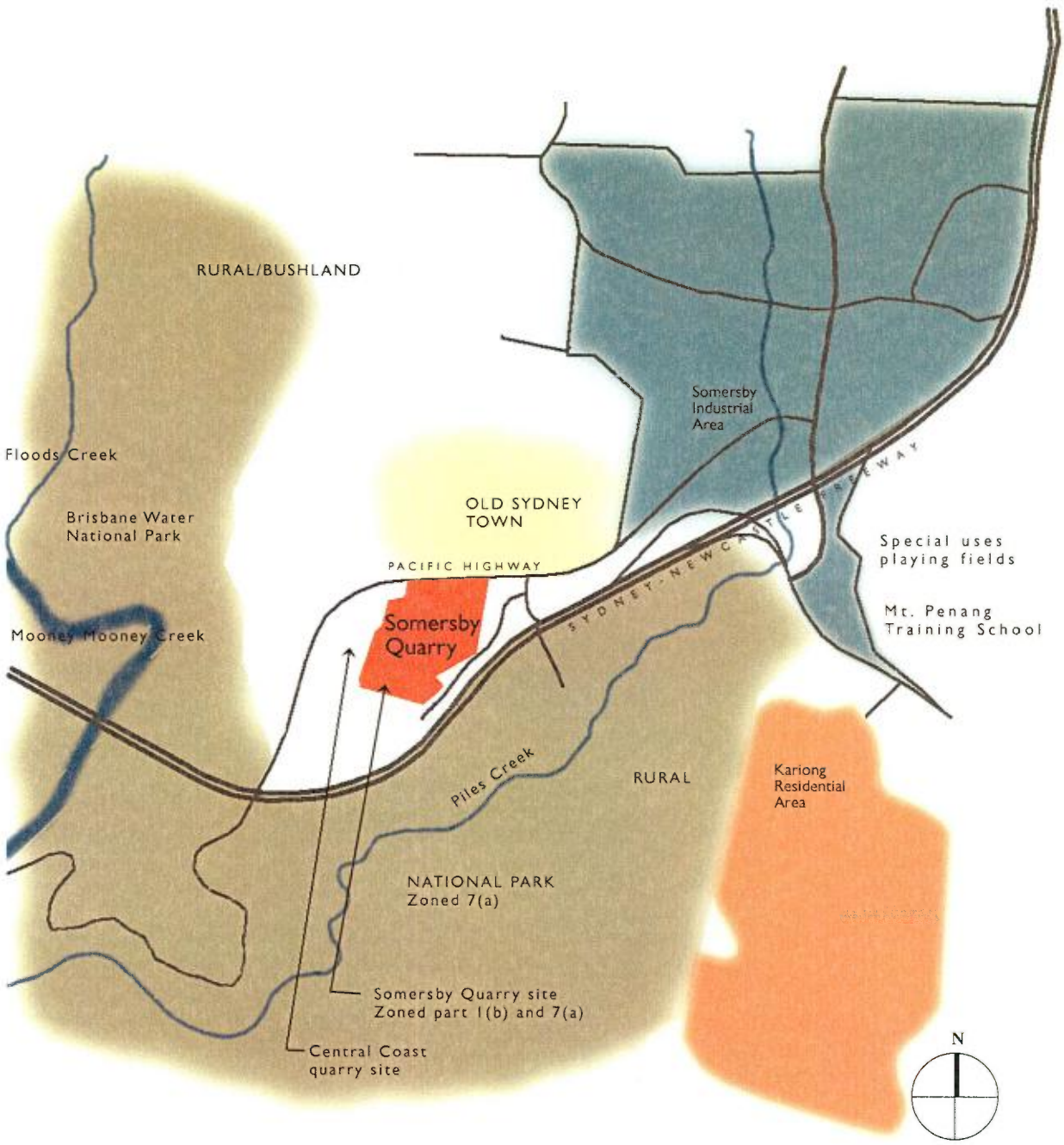
The impact of the quarry operation on Brisbane Waters National Park is mitigated by a number of factors. In particular, the freeway and the highway provide an important buffer between the quarry site and the National Park. Within the site of the quarry, the extent of bushland surrounding the quarry extraction areas provides an important visual screen from any view points located to the south of the quarry site. The nature of the topography generally prevents the site from being viewed from the national park to the north and west of the site.

The potential impacts of quarrying operations on the water quality of local streams leading into the National Park is considered in Section 4 of this EIS. Apart from the proposed quarry extension covering a very small area, the current and proposed sediment ponds and the maintenance of the quarry's bushland surrounds will ensure that the quarry extension would not have any adverse impact on the local streams. The extensive clearing of vegetation associated with the expansion of the Somersby Industrial has greater potential for water quality impacts than the quarry operations.

The Somersby Industrial area is located on the western side of the freeway and to the east of Old Sydney town. It covers a considerable land area and is highly visible from the Sydney-Newcastle Freeway. The industrial area supports a range of activities which include manufacturing of concrete products, earth moving equipment/storage and manufacturing of agricultural products. At the time that EIS was being prepared, further clearing of sites was being undertaken for new industrial developments.

The operation of a quarry near an industrial area is seen as a compatible use. The traffic, noise and dust generated by the quarry is assessed in other sections of the EIS as having minimal impact on the amenity of the surrounding area. Gosford City Council has recognised the highly visible nature of the Somersby industrial area in its *Landscape Guidelines* (Andrews Neal, 1990). As discussed in Section 5 of this EIS, the visual impact of some buildings in the industrial area is more pronounced than the main building on the quarry site.

There are no residential areas located within close proximity to the site. Given the 2.5 km distance between the site and the nearest residential area at Kariong, the existing quarry and the proposed extension would not adversely impact on the amenity of this area.



Somersby Quarry

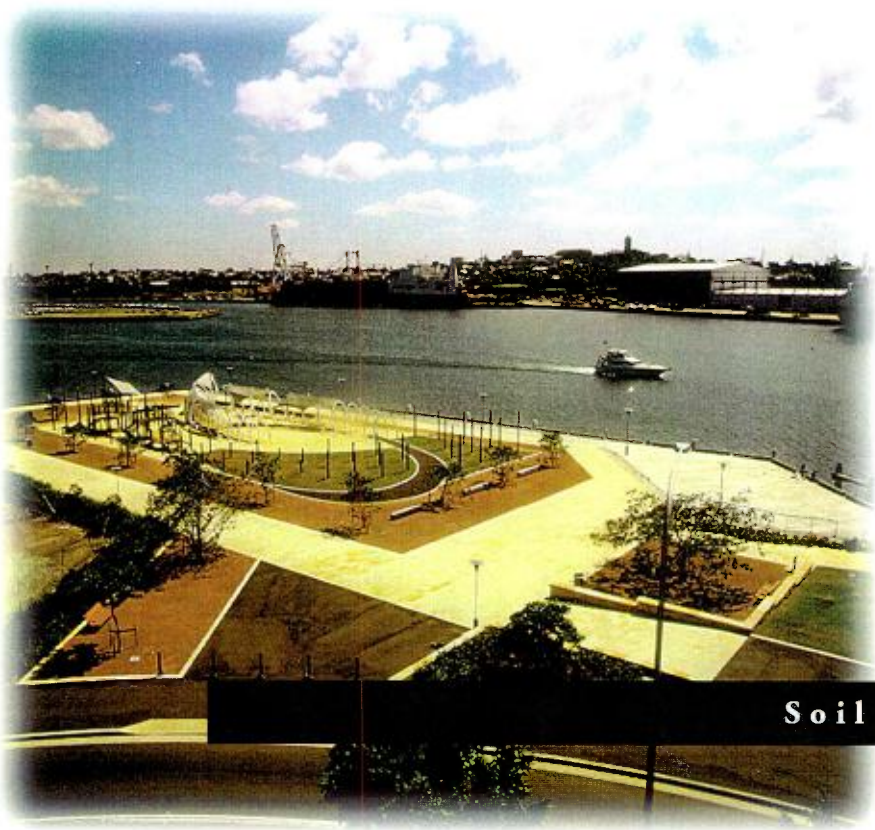
Old Sydney Town

Bushland or Rural

Residential

Industrial

FIGURE 3.1
SURROUNDING LAND USE



Soil and Water

4

4 SOIL AND WATER

This section of the EIS addresses soil and water management issues associated with the existing and proposed quarry operations on the site. It describes the surface and ground-water regime and current and proposed measures to mitigate impacts, particularly in relation to down-stream water quality.

4.1 SURFACE WATER

The site of the quarry is located at the top of the eastern slope of a hill which forms a part of the Piles Creek catchment. The general surface water drainage pattern on the site is shown in Figure 4.1. The natural drainage pattern directs surface water towards the east.

There are currently four sediment ponds along the eastern edge of the cleared site and six smaller ponds along the eastern edge of the site access road. These smaller ponds are generally cleaned out every three to four months. The six smaller ponds drain into one of the large ponds, which only needs to be cleaned out annually.

The ponds have been designed to hold water from a major storm event. During major storms in 1998, there was no overflow from the large ponds.

The following land conditions on the site control both the movement and management of surface water:

- undisturbed bushland which covers a large proportion the site. Surface drainage is allowed to flow naturally through these areas. The maintenance of undisturbed areas of bushland assists in the overall management of surface water by slowing runoff and reducing the erosion potential of runoff. The vegetation and groundcover also stabilises the topsoil and greatly reduces the production of entrained sediment;
- rehabilitation areas - this covers areas where quarrying operations are completed and have been contoured or planted;
- operations areas – these include sandstone extraction areas with vertical walls which have been cut into the side of the hill. It also includes stockpiles of topsoil and fragmented sandstone which is stored for later use as fill in the rehabilitation process. Given the proximity of the quarry face to the top of the hill, diversion channels have not been located on the upper slopes to divert 'clean' water away from re-vegetated areas. Rainwater falling directly on quarry pits is channelled into sedimentation ponds. This water is recycled for use in processing operations.

4.2 GROUNDWATER

Groundwater issues revolve around maintaining the quality and level of the existing water table. These are potentially affected by:

- quality - there are small amounts of domestic wastewater being introduced into the subsurface from washbasins in the lower store facility. This is discharged into a septic tank on site, which also services four toilets. The milling operations buildings all sewer to a holding tank which is pumped out and removed by road tanker.
- levels - the proposed quarry will be elevated slightly from the existing ground levels at the base of the cut. Water ponded at the base of the cut would be channelled to an existing sedimentation pond on site.

As quarrying operations progress within the site, cores are taken to determine the quality of rock. These cores are taken to a depth of about 15m, which is significantly lower than the proposed new quarry face. None of the cores which has been taken in the immediate vicinity of the new quarry face has reached the water table. Thus the base of the new cut will be above the water table and will not affect the water table.

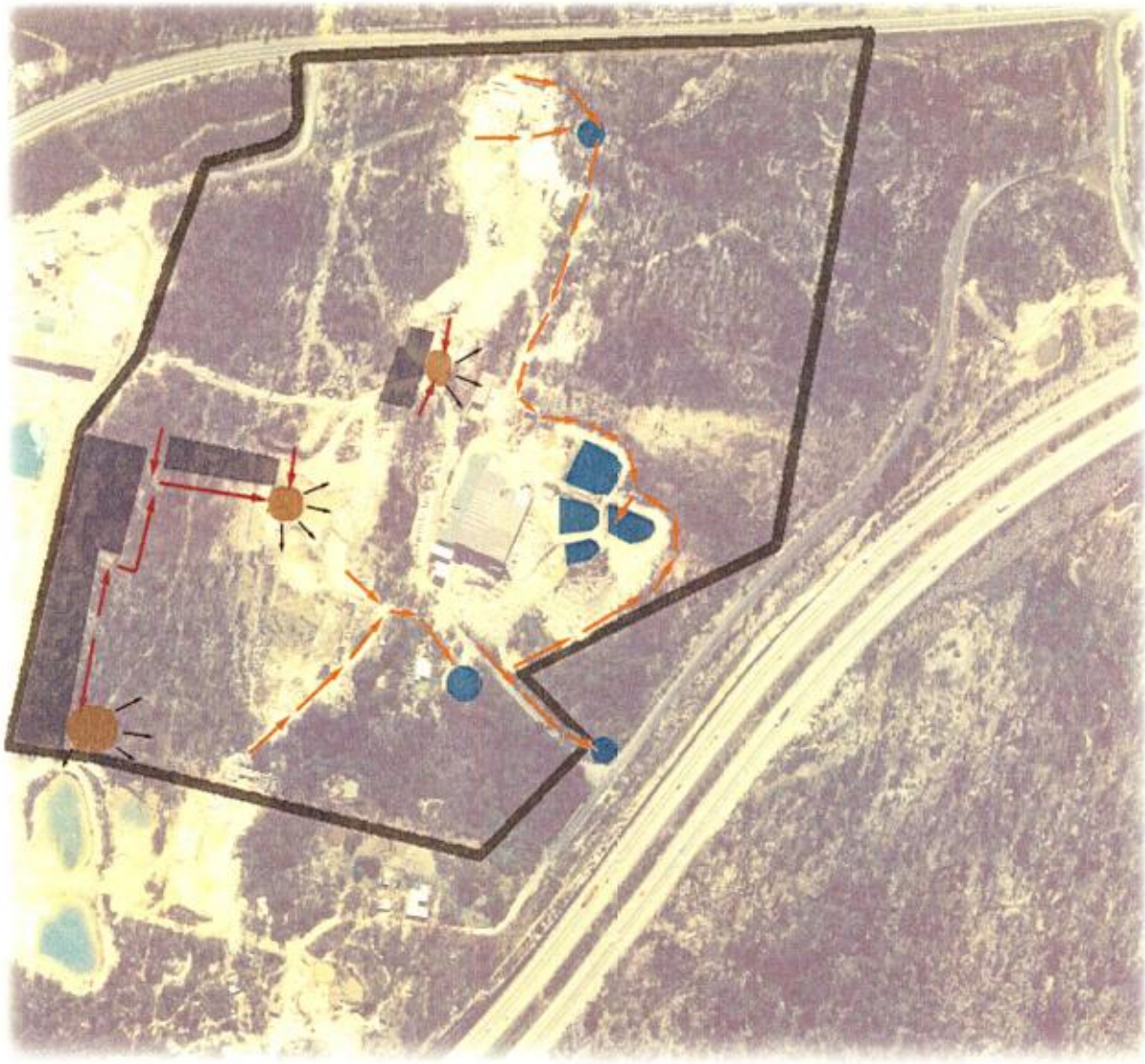
The type of sandstone sought for this low volume and high quality quarrying is a monolithic sandstone which is generally free of fissures. It is these discontinuities in rock which allow the passing of groundwater. Since any rock with these discontinuities would be avoided by the quarrying operations, it becomes even more unlikely that the groundwater would be affected.

In the event that the base of the quarry does become ponded, it will be because of the collection of surface water, not groundwater. If it needs to be de-watered, the ponded surface water will be discharged into one of the existing water storage ponds on site.

4.3 SEDIMENT CONTROL PONDS

Figure 4.1 shows the location and operation of existing sedimentation and settlement ponds on the site. These ponds collect surface water from a series of open drainage channels which are linked to the quarry operations areas. After the sediment has settled in the ponds, the clean water is recycled for use in milling operations.

The sediment collected in these ponds is composed of sand derived from sandstone. The ponds are regularly cleared of this sand which is collected, sold and used as backfill.



Aerial Photography Source: Copyright Surveyor General's Department, Panorama Avenue Bathurst 2795

FIGURE 4.1
Existing/Proposed Water Management System

Proposed Sediment Basin

Proposed Catch Drain

Existing Sediment Basin

Existing Catch Drain

Proposed Quarry Extension

In addition to the external areas, water used in the milling operation is currently collected in a sump in the floor and pumped into a sediment pond. This sediment pond is connected to a clean water storage pond by an overflow weir. Clean water is returned from this pond for reuse in the milling operations. This system is designed to ensure that sediment-laden water is not discharged from the site and into the local creeks. This system has been regularly inspected by officers of the Department of Land & Water Conservation who have confirmed that it is operating effectively.

Even though the site is connected to town water, the collection and reuse of surface water is critical for the economic viability of milling operations. No water is pumped out of the adjacent water courses.

The surface water management system is designed to ensure that only clean water is discharged from the site. Water collected in sedimentation ponds is continuously recycled in milling operations. Given the enclosed nature of the surface water management system, the proposed extension to quarrying operations would not result in any sediment-laden surface water being discharged into Mooney Mooney Creek or its tributaries.

4.4 EROSION AND SEDIMENTATION MANAGEMENT

The control of erosion and sedimentation is one of the environmental management issues associated with the quarrying operations on the site. The risk of erosion and sedimentation occurs when areas of vegetation are cleared, removing the plant and root matrix which holds the topsoil in place. During a rainfall event, topsoil is washed away.

In order to control the migration of sediment from the Somersby Quarry site, the following measures are currently adopted on-site for erosion and sedimentation control. The proposed extension to existing quarrying operations would continue to incorporate these measures:

- maintenance of a natural bushland buffer around topsoil and fill stockpiles;
- stabilisation of long term soil stockpiles with indigenous planting;
- regular removal of sediment from settlement ponds;
- maintenance of drainage channels;
- filling, contouring and replanting of previously quarried areas; and
- use of silt traps and fences for some exposed surfaces.

Section 12 provides further information on the environmental management and rehabilitation of the site.

Visual Quality

5

5 VISUAL QUALITY

This section of the EIS describes the existing visual character of the site activities and assesses the impact of the proposed quarry extension.

5.1 Local Landscape Features

Brisbane Waters National Park and Girrakool National Park are the most significant local natural areas located to the north and south of the quarry site. Both parks are characterised by undulating to steep topography, dissected creeks and expansive bushland. A scenic view of Mooney Mooney Creek and the surrounding landscape can be seen from the freeway and the Pacific Highway, to the south-east of the site. The existing quarry operations and the proposed extension could not be viewed from Brisbane Waters National Park due to the intervening bushland and topography.

The main quarry building, previously approved by Gosford City Council, can been seen at a distance from the access road into Girrakool National Park. It is unlikely that these buildings would be seen from any other part of the park due to screening provided by vegetation and topography.

5.2 Visibility from Adjoining Properties

Figure 5.1 shows views of the quarry site from the Girrakool National Park access road and also from the Somersby industrial area. These photographs show that the only visible features of the quarry operation are the main processing building and the advertising signage. The photograph shows that these views can only been seen at a reasonable distance from the site. Due to the quarry's location and the eastern facing slope of the hill, the buildings or extraction areas cannot be seen from areas to the west and south-west of the site.

The Pacific Highway and the Sydney-Newcastle freeway are strong visual features of the landscape and they also provide separation between Somersby quarry and the adjoining Central Coast quarry, from the surrounding landscape. The quarry extraction areas cannot be seen from nearby properties due to the position within the landscape and the extent of surrounding bushland vegetation.

The main building which has previously been approved by Gosford Council, is only partially viewed from the Somersby industrial area, from the north-east. From this vantage point, the foreground views are marked by major roadways and a number of large warehouse or industrial style buildings.

5.3 Visual Impact Associated with Clearing Vegetation

Figure 2.1 shows the extent of clearing and rehabilitation areas. The proposed quarry extension is estimated to result in the clearing of 1.4ha of vegetation over a twenty year period. This amounts to annual vegetation clearing of about 700m^2. Due to the topography and extent of surrounding vegetation, the proposed areas of clearing could only be viewed from within the site.

During the time in which quarrying takes place in the proposed quarry extension area, the previously quarried parts of the site are expected to be fully re-vegetated. This would mean that by the end of quarry operations, most of the site would have been returned to its native bushland appearance.

5.4 Impact and Mitigation Measures

Figure 5.2 describes the visibility and visual impact of the quarry operations. The proposed quarry extension areas would not be visible from nearby roads or vantage points.

Although the main processing building is visible from the freeway, it is not the subject of this Development Application. The green coloured cladding of the building, along with the surrounding landscape screening has generally subdued the impact of this structure from the surrounding vantage points. When compared with the appearance of the industrial buildings to the north of the site, this building is of relatively low visual impact.

There is no visual impact associated with the access road to the quarry as this is screened by surrounding vegetation and its position on the lower slope, being overshadowed by the Sydney-Newcastle freeway.

The only lighting on the site is associated with the main sign facing the freeway. The security lighting is only activated occasionally in response to heat or movement.

View from access road to Brisbane Waters National Park.

View from the north

FIGURE 5.1
VIEWS OF THE QUARRY SITE

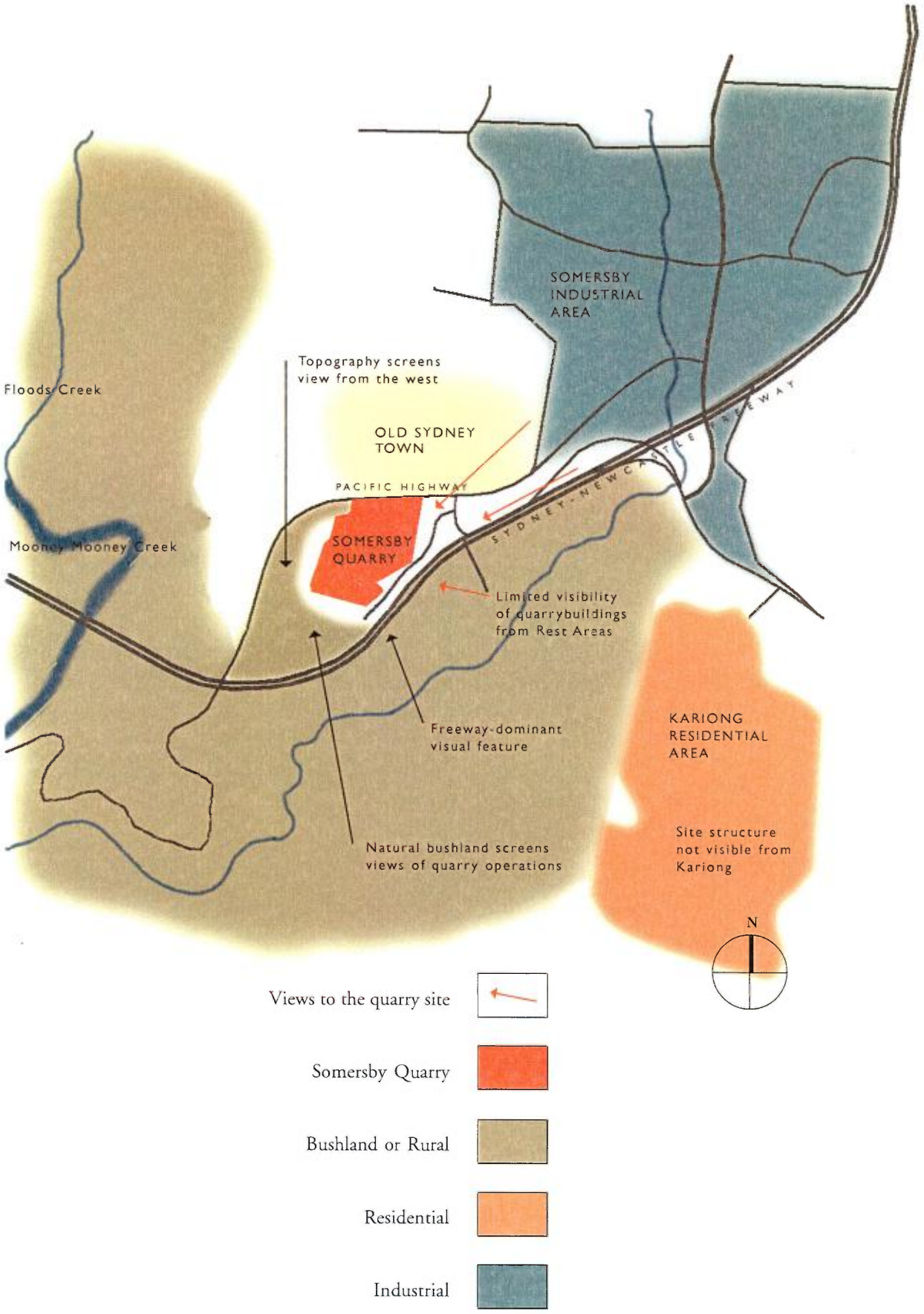
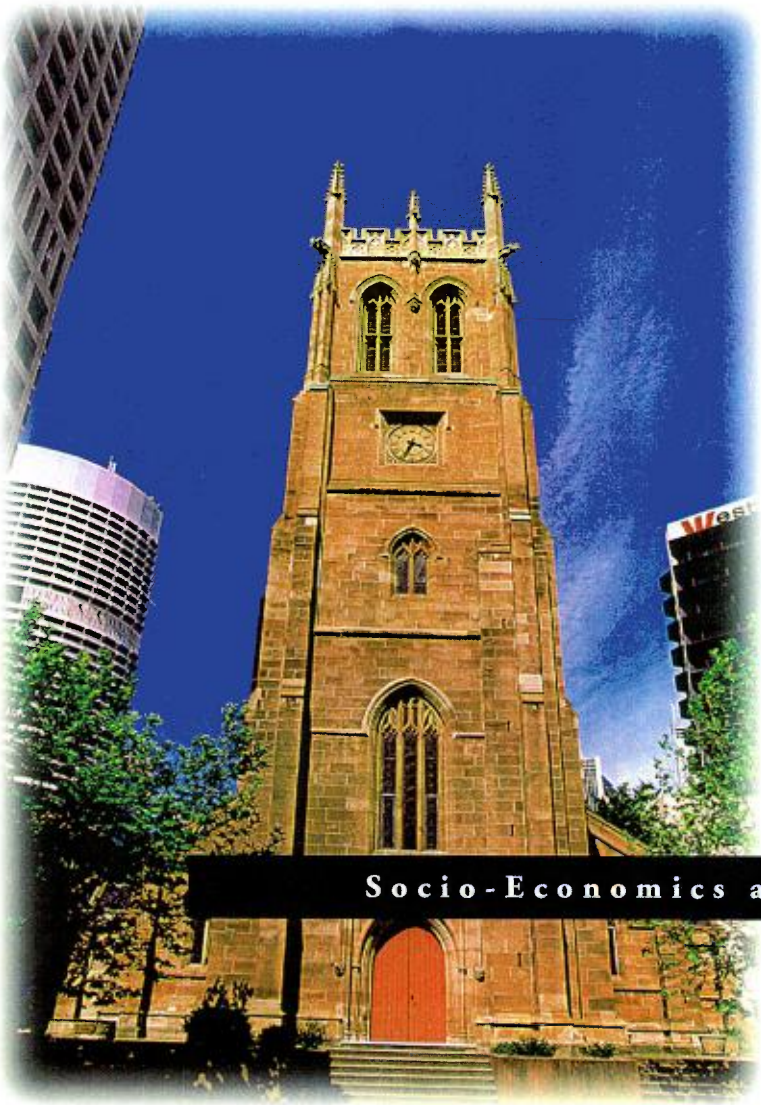


FIGURE 5.2
VISUAL IMPACT



Socio-Economics and Community

6

6 SOCIO-ECONOMICS AND COMMUNITY

This section of the EIS addresses the socio-economic issues related to the continued milling operations and expansion of quarrying at the Somersby site.

6.1 EMPLOYMENT

Gosford Quarries' main office is located at the Somersby site. The company employs a total of 78 staff who work at one of the 9 quarry sites or the sales and distribution offices located in Sydney. There are 45 employees currently working on the Somersby site.

As a company employing more than 50 people, Gosford Quarries provides an important source of local employment. Regional statistics for the Gosford Local Government Area show that of the 6,017 local businesses, only 114 or less than 2 percent of these have more than 50 employees (ABS, 1998). Given the level of community concern about the lack of local employment opportunities, it is important that an established business like Gosford Quarries continues to operate.

An age breakdown of Gosford Quarries employees is given in Table 6.1.

Age	No. of Employees	Percentage of Total
Up to 25 years	10	13
25 to 45 years	41	52
Older than 45 years	27	35

TABLE 6.1
EMPLOYEES BY AGE

This table shows that the largest proportion of Gosford Quarries' employees are in the 25 to 45 year age group. This is also the same age groups in which more than 42% of the unemployed labour force in the Gosford Statistical local area occurs (ABS, 1997). These facts further support the importance of Gosford Quarries as a local employer.

A diverse range of occupations and skills are supported by Gosford Quarries. These include:

- stonemasons;
- management;
- sales;
- administration;
- drivers; and
- labourers.

Of particular relevance is the company's trainee programme for stonemasons. Gosford Quarries is only one of three employers in Australia to provide traineeships for stonemasons, in conjunction with technical training provided at South Western Sydney Institute of TAFE at Miller. Stone masonry is a highly specialised field which is of growing importance in the restoration of heritage buildings.

The continuation of quarrying and other operations on the Somersby site is integral to Gosford Quarries' overall operations. Although the annual quantities of sandstone to be extracted from the proposed quarry extension are very small, the high quality of the sandstone is important in meeting specific market demands. The proposed quarry extension would help to maintain the current employment base provided by the company's operations.

6.2 Social Impacts

The impacts of the quarry extension on the amenity of the local area are assessed in other sections of the EIS which deal with air quality, noise and visual impacts. The presence of sandstone quarrying operations on the site for more than 30 years has meant that site activities are well known to the local community. The proposed quarry extension would facilitate the continuation of quarrying on the site and would ensure ongoing viability of site operations.

In terms of predicted air and noise impacts, the proposed plant expansion is below the specified objectives which are based on accepted standards.

6.3 Economic Issues

Gosford Quarries is the largest single sandstone quarry operator in Australia. There are many indirect economic benefits associated with the continuation of quarrying on the Somersby site. These include:

- rates and taxes contribution;
- maintained supply to a limited market;
- opportunities to further export potential;
- support of related industries such as transport, machinery servicing, office supplies;
- long term rehabilitation;
- viability of specialised TAFE training for stone masons;

- viability of integrated quarrying and processing operations.

The direct and indirect economic benefits of the proposed quarry extension are enhanced by the pre-existing infrastructure. Unlike most new developments, the cost of the quarry extension is minimised as a result of the existing infrastructure such as roads, power, water management and processing facilities.

Noise

7

7 NOISE

This section of the EIS assesses the noise impacts associated with the proposed quarry extension. The assessment of impact is based on guidelines provided by the NSW Environment Protection Authority (EPA).

7.1 APPROACH AND OBJECTIVES

The objective of the noise assessment was to determine the level of environmental impact of quarrying operations on the surrounding area. The assessment of noise impacts, including establishment of objectives, is in accordance with Environment Protection Authority (EPA) guidelines as set out in *Environmental Noise Control Manual* (ENCM). The following tasks were undertaken as part of the noise assessment:

- identification of noise issues relevant to the quarry;
- establishment of background noise levels at the nearest affected residence;
- determination of noise objectives for the quarry operation;
- preparation of a noise impact assessment involving quantitative assessment to determine the environmental impact by comparing measured and predicted impacts with pre-determined environmental objectives, and
- recommendation of safeguards which can be incorporated into quarry operations to reduce environmental impact.

7.2 NOISE SOURCES AND RECEIVERS

The main sources of noise associated with sandstone quarry operations are:

- circular cutter;
- extraction equipment, including jackhammer;
- crane; and
- truck transport.

The receiver most likely to be affected by noise generated from the proposed extension of the Somersby site is the Old Sydney Town farm house, located approximately 1km north of the existing quarry. Background noise assessments were taken from this location.

There are no other residential properties in the immediate vicinity of the quarry, and the next closest properties are on the opposite side of the F3 Freeway at Kariong.

7.3 BACKGROUND NOISE

7.3.1 Noise Measurement Methodology

Environmental noise logger were installed at the nearest residence, for the purposes of measuring background noise.

The logger was set to record A-weighted LA_{10}, LA_{90} and LA_{eq} noise levels every 15 minutes for a period of 7 days. LA_{10} and LA_{90} are statistical noise levels which represent the noise level exceeded for 10% and 90% of the time respectively during a monitoring period. The LA_{eq} noise level is the continuous equivalent noise level which contains the same amount of energy as the fluctuating levels of noise.

The noise logger was calibrated before and after the monitoring period and drift was determined to be less than +/- 0.5 dB(A).

7.3.2 Noise Measurement Results

Ambient noise levels were measured at the farm house location between 15 and 23 June 1998. A summary of the measured results as lowest repeatable noise levels are given in Table 7.1.

Date	LA90		LA10		LAeq	
(1998)	Day	Night	Day	Night	Day	Night
15-16/5	36	34.5	44	41.5	41.5	38.5
16-17/5	43	39.5	47.5	48	47.5	44.5
17-18/5	37.5	36	44	43	45.5	40.5
18-19/5	37	38	45.5	49	42.5	47.5
19-20/5	38.5	39	46.5	46	46.5	43
20-21/5	37.5	33	43.5	42.5	40.5	39
21-22/5	38.5	36	45	41	44	39
22-23/5	44	35.5	49	42	47.5	40
Average	*39*	*36*	*46*	*44*	*44*	*42*

TABLE 7.1
AMBIENT NOISE LEVELS - FARMHOUSE (dB(A))

The ambient noise monitoring results presented in Table 7.1 show that the average background noise levels recorded at the Old Sydney Town farm house were between 37 dB(A) and 44 dB(A) during the day, and 33 dB(A) and 39.5 dB(A) at night.

The main sources of noise contributing to the overall levels at the nearest residence in Table 7.1 were identified, by the acoustic consultant, as noise from road traffic on the Pacific Highway and F3 Freeway. Other sources of

noise include activities at Old Sydney Town such as cannon and musket firing, farm animals, birds, insects and wind-generated noise.

The weather conditions experienced during the monitoring period were mainly fine with light to moderate winds for the majority of the time. These conditions are considered suitable for undertaking ambient noise measurements.

7.4 Predicted Equipment Noise Levels

The major items of noise-generating machinery and equipment to be located in the proposed quarry extension area are listed in Table 7.2. The indicative sound pressure levels (SPL) associated with the equipment operating at full capacity are also given. The SPL data were obtained from comparable items of plant equipment that are currently operating at the Piles Creek and Somersby quarries.

Equipment	**Sound Pressure Level Spectrum**								
Frequency (Hz)	31.5	63	125	250	500	1K	2K	4K	8K
Quarrying Equipment									
Rock Drill	70.9	81.5	87.4	83.1	82.5	83.9	90.8	98.4	97.5
Circular Cutter	86	89.2	83.2	81.9	88.7	79.7	81.8	72.1	61.3
Crane	105.3	112.2	106.6	109.4	103.9	104.3	100.9	96.6	88.3
Atlas Copco Screw Compressor	64.6	70.7	74.2	70.8	66.7	63.9	58.8	56.	55.4
Processing Equipment									
Forklift	77.7	82.4	83.7	84.3	83.5	83.1	83.4	79.9	80.9
Blocksaw	751	83.9	80.2	80	83.4	84.2	92.1	89	81.6

TABLE 7.2
Equipment and Associated Sound Pressure Levels at 7m

7.5 Noise Objectives

The NSW Environmental Protection Authority Noise Control Manual provides guidelines for setting noise objectives for various categories of development. It also recommends outdoor background noise levels for various types of receivers. Table 7.3 provides a summary of these guidelines.

Zoning of Noise Receiver Area	Predominant Land-Use of Receiver Area	L_{90} Background Noise Level (dB(A))		
		Acceptable Limit		*Extreme Limit*
Rural	Residential, church, hospital, school	*Day*	45	35
		Night	50	40

TABLE 7.3
RECOMMENDED OUTDOOR BACKGROUND NOISE LEVELS

**From Monday to Saturday, daytime is defined as 07:00 to 22:00 and night time is 22:00 to 07:00. On Sundays and Public holidays daytime is 08:00 to 22:00 and night time is 22:00 to 08:00.*

To determine the overall noise objective for the project a relationship is required to be established between existing ambient noise levels and the recommended levels. The *Environmental Noise Control Manual* recommends the noise levels given in Table 7.4 when planning for a new noise source. These levels were adopted for the proposed quarry extension. The ENCM specifies that when planning for a new noise source the recommended planning noise levels listed in Table 20-1 of the ENCM must be considered.

The average day-time background noise level determined at the Old Sydney Town farm house is 6 dB (A) below the acceptable level listed in Table 7.1. The night-time levels are 1 dB(A) above the accepted level. The recommended maximum planning noise level for the quarry, based on table 7.4, is set at 5 dB(A) above the day-time background level, and 10 dB(A) below the background level at night time. Therefore, the noise level objectives for the quarry at the farm house are:

44 dB(A) day-time

26 dB(A) night-time

7.6 NOISE IMPACT ASSESSMENT

The methodology used to assess noise impacts from the proposed extension of Somersby quarry firstly requires the establishment of the PWLs for equipment that will operate at the quarry. This information is incorporated into the Environmental Noise Model (ENM) to determine predicted noise levels at the nearest residential receiver.

For the purpose of noise modelling, single octave PWL noise data were used.

The modelling places the items of plant equipment in locations within the quarry at which they are likely to operate and attenuates the noise over distance to meet the nearest receiver. A cross-section of topography and groundcover information for the area between the source and receiver was put into the model. Worst case meteorological conditions were simulated in the model.

For the purpose of assessing worst case impacts, the modelling exercise assumes all plant equipment identified in Section 7.2 is operating simultaneously and at maximum capacity. Based on the results of the noise modelling, the predicted noise level for the nearest residence was found to be LA10 noise level, 35.9 dB(A).

The full results of noise modelling are included in the detailed noise report prepared by Sinclair Knight Merz. The noise from the quarry would not have any noticeable impact on residences located on the eastern side of Sydney-Newcastle Freeway due to the extended separation distance between the noise levels generated by the freeway.

The predicted noise level of 35.9 dB(A) is less than the pre-determined daytime noise level objective of 44 dB(A). Given that the noise modelling was based on worst-case conditions, noise from the proposed quarry would not

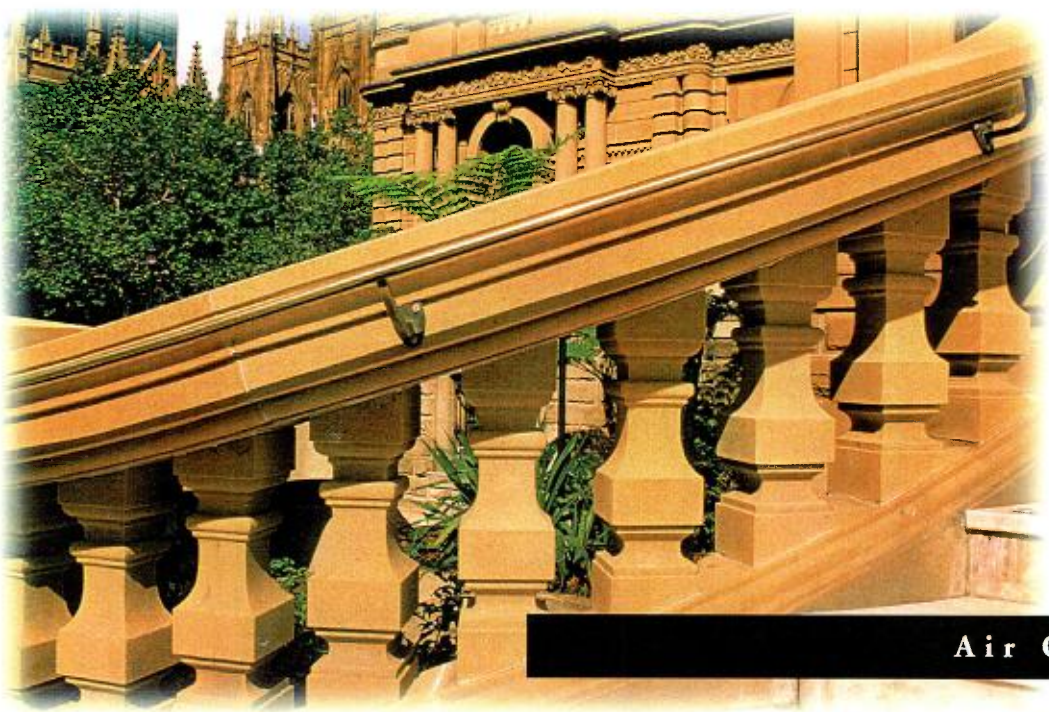
Existing Background Noise Level at the most sensitive point in an affected residential area	**Recommended Maximum Noise Level, for planning approval purposes, at the most sensitive point as a result of a proposed new noise source**
Background is above relevant acceptable level	Preferably, set maximum planning level 10 dB(A) of more below acceptable level At least, set maximum planning level 10 dB(A) below existing background level
Background is at acceptable level	Set maximum planning level 10 dB(A) below acceptable level
Background is below acceptable level by:	Set maximum planning level
1dB(A)	9 dB(A) below acceptable level
2dB(A)	5 dB(A) below acceptable level
3dB(A)	3 dB(A) below acceptable level
4dB(A)	2 dB(A) below acceptable level
5dB(A)	2 dB(A) below acceptable level
6dB(A)	5 dB(A) above background level

TABLE 7.4
Recommended Planning Levels
Source: Environmental Noise Control Manual

have a significant impact on the nearest residence during the day-time.

The results of the modelling show that the noise impacts from the quarry would be within EPA objective levels at the nearest residence during the day time. The noise impacts of proposed quarry operation are therefore not significant.

Although noise from the proposed quarry extension has been shown to be within EPA objectives levels for the day-time periods during which the quarry will operate, it is appropriate that all plant equipment be maintained in a proper and efficient manner to ensure that minimal noise is generated from quarry operations.



Air Quality

8

8 AIR QUALITY

This section of the EIS addresses the impact of quarrying operations on the air quality of the surrounding area.

8.1 OBJECTIVES AND APPROVAL

The overall objective was to determine the potential air quality impacts of dust generated by the extraction and transporting of sandstone.

The tasks involved in assessing air quality impacts included:

- a description of the climate and dispersion meteorology of the area;
- identification of air quality issues;
- an outline of air quality objectives for the proposed extension;
- air dispersion modelling to predict ground-level dust concentration and deposition levels likely to result from the proposed operations; and
- assessment of the potential air quality impacts with respect to dust, at the nearest sensitive receptor adjacent to the proposed extension site.

8.2 CLIMATE AND DISPERSION METEOROLOGY

8.2.1 Overview

A detailed description of the climate and dispersion meteorology is contained in the air quality report prepared by Sinclair Knight Merz. A brief description of the climate and meteorology is given below.

The NSW Bureau of Meteorology operates a research station at Narara, approximately 5km north west of the study area. The data recorded at the Narara station and at the Mangrove Mountain Station were received as part of the air quality study.

8.2.2 Temperature

Figure 8.1 shows monthly average temperatures at Narara Station. These temperatures are expected to be indicative of conditions experienced in the vicinity of the quarry site.

8.2.3 Humidity

The relative humidity readings experienced within the study area may vary slightly from those recorded at the Narara Station (Figure 8.2), however, the trends will generally remain the same. Figure 8.2 shows the seasonal variations with the relative humidity reading being highest during the cooler months.

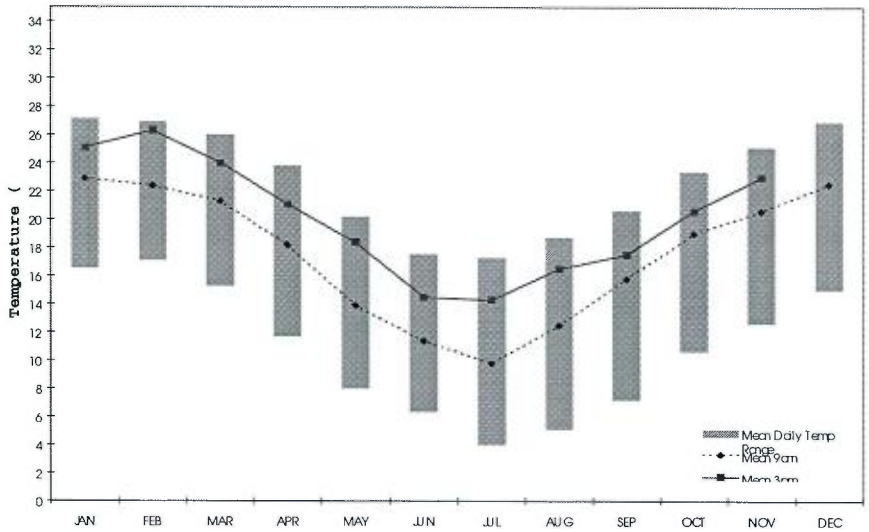


FIGURE 8.1
MONTHLY AVERAGES OF TEMPERATURE (NARARA)

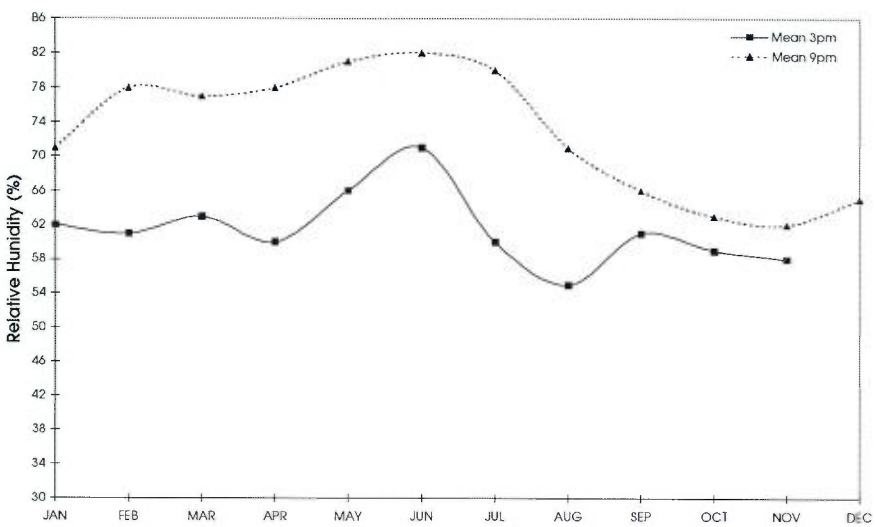


FIGURE 8.2
MONTHLY AVERAGES OF RELATIVE HUMIDITY (NARARA)

8.2.4 Rainfall

The mean monthly rainfall pattern demonstrates a distinct seasonal variation, with most rain occurring during the summer and autumn months (Figure 8.3). This pattern of rainfall experienced within the study area is not expected to differ greatly to that experienced at Narara, exhibiting fairly consistent rainfall all year round with a distinct summer and autumn maxima.

8.2.5 Wind

The general wind flow patterns within the study area have been derived from wind speed and directional data obtained from the research station at Mangrove Mountain. Wind rose data are given in the detailed air quality report.

The annual wind pattern shows a predominance of north to north-westerly winds throughout the year, with south to south-westerly winds also occurring. There is a marked seasonal variation in wind patterns with easterly winds dominating during summer months and north-westerly winds dominating during the winter months. Winds from the south-east and north-east are also common during the summer, while north-west and south-westerly winds are also common in the winter months. The autumn and spring wind patterns show north-west winds to be common during these months.

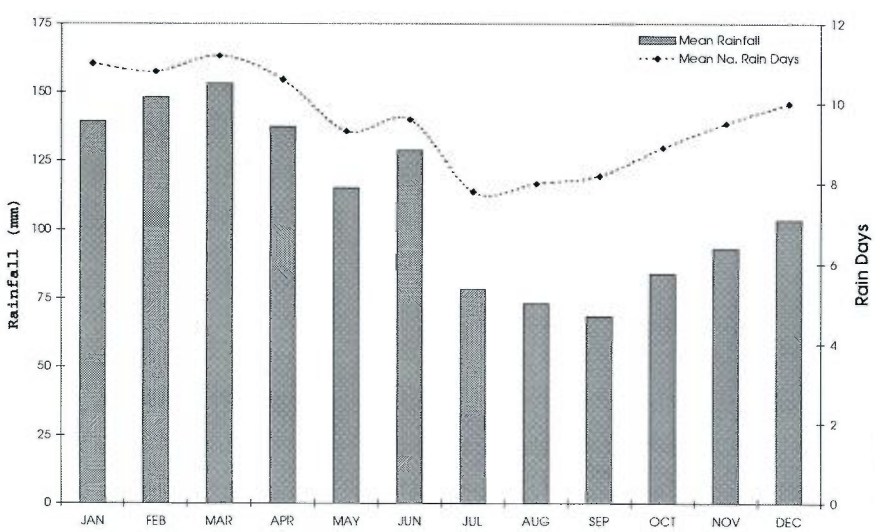


FIGURE 8.3
MONTHLY AVERAGES OF RAINFALL (NARARA)

8.3 Existing Air Quality and Objectives

8.3.1 Source of Emissions

The existing air quality at Somersby is typical of a rural area. The main local sources of air pollution in the vicinity of the site are:

- vehicle emissions from the Sydney-Newcastle Freeway and the Pacific Highway; and
- minor dust emissions from surrounding quarrying activities.

Existing levels of atmospheric pollutants, including dust, have not been monitored in the area surrounding the proposed quarry extension.

8.3.2 Air Quality Objectives

The effects of atmospheric pollutants, including dust, on the environment are generally assessed by comparing measured dust deposition rates and concentrations with air quality objectives. Air quality objectives for dust impacts are available for assessment of both short-term (24 hour) and long-term (annual) impacts.

The NSW Environment Protection Authority (EPA) has generally adopted air quality goals for dust as determined by the National Health and Medical Research Council of Australia (NHMRC) and the United States Environmental Protection Agency (USEPA). The National Environment Protection Council of Australia (NEPC) is currently determining a revised set of air quality standards for adoption at a national level as part of the National Environment Protection Measures (NEPM). The following short and long-term air quality objectives have been derived from a range of sources. In the absence of specific objectives for sandstone quarrying, the objectives set for open cut mining have been adopted.

8.3.3 Short-term Objectives

In assessing the acceptability of mining projects, the NSW EPA has previously adopted the US EPA 24-hour air quality standard for PM_{10} (particles with a diameter of less than 10 µm) of 150 $\mu g/m^3$. The NSW Government has recently adopted the draft NEPM PM_{10} 24-hour goal of 50 $\mu g/m^3$ as an interim goal which is not to be exceeded on more than 5 days per year.

There are no short term air quality objectives for dust deposition, as dust deposition is considered a long term measure of air quality.

8.3.4 Long-term Objectives

The EPA refers to NHMRC annual average objective for total suspended particulates (TSP) of 90 $\mu g/m^3$. This concentration is recommended as the maximum permissible level that should be permitted for TSP. TSP refers to all particles with a diameter of less than 50μm.

The EPA also refers to the US EPA goal for PM_{10} particles which is an annual mean concentration of 50 $\mu g/m^3$. The size range of dust generally emitted from open cut mining operations is such that approximately 50 % of the TSP particles are in the PM_{10} range and therefore, the two goals referred to above are approximately the same. This may, however, vary for sandstone quarrying where it expected that there will be a larger percentage of particles outside the PM_{10} range.

The EPA has historically considered that residential areas would begin to experience dust related nuisance impacts when annual average dust deposition levels, assumed to be comprised of insoluble solids, exceed 4 g/m^2/month. At 10 g/m^2/month dust deposition would be considered unacceptable (SPCC 1983). More recently the EPA has refined these criteria as shown in Table 8.1 (Dean *et al.* 1990).

The dust deposition objectives given in Table 8.1 aim to protect against nuisance impacts in the general community. In the absence of known dust deposition data for the area, it was assumed that the existing annual average dust deposition levels are less than 2g/m^2/month. Based on this assumption and the information given in Table 8.1, an increase of up to 2g/m^2/month would be acceptable for the area in the vicinity of the proposed quarry extension

Existing dust level (g/m^2/month)	Maximum acceptable dust level increase above existing level (g/m^2/month)	
	Residential / Suburban	*Other*
2	2	2
3	1	2
4	0	1

TABLE 8.1
GENERAL OBJECTIVES FOR DUST DEPOSITION

8.4 AIR QUALITY IMPACT ASSESSMENT

8.4.1 Air Quality Issues

The main atmospheric pollutants associated with the proposed quarry extension are dust and particulate matter (PM). Oxides of carbon, nitrogen and sulphur would also be emitted in vehicular emissions and from stationary fuel burning equipment, however these emissions are expected to be of a minor nature. The transient nature of exhaust emissions is not expected to increase ambient concentrations above EPA recommended health standards.

The air quality impact assessment investigated the contribution of the proposed quarry on ambient PM (dust) concentration and deposition levels. In particular, the potential impacts of dust emissions from the quarry on the nearest residential dwellings were assessed. The nearest dwelling to the proposed mine site is the Old Sydney Town Farm House, located approximately 1 km north of the site.

8.4.2 Dust Emissions

Dust or particulate matter (PM) emissions are likely to be generated during both the removal and transport of the sandstone. The main sources of particulate emissions include:

- drilling;
- sawing of sandstone; and
- vehicular movements along roads within the quarry.

The air quality impact assessment presented in the following section details the potential dust impacts arising from quarrying operations in the pit, and transfer of material out of the quarry area. The potential dust emissions arising during processing operations, including sculpting and cutting, have not been included in the modelling scenarios. These activities occur in enclosed structures and have been the subject of an earlier development approval.

8.4.3 Air Quality Safeguards

A range of air quality safeguards are incorporated into the existing operations and these minimise the loss of product in the form of dust emissions. These safeguards would also apply to the proposed quarry extension.

The main components of these dust control measures are summarised below:

- the size of the surface area of land exposed at any one time would be minimised as far as possible, to reduce the potential generation of wind blown dust;
- during dry and windy weather, disturbed areas, including unsealed roads and access routes, would be watered regularly to reduce dust emissions;
- water spray dust suppression would be used at the primary cutting area during the cutting of sandstone; and
- control measures to minimise the generation of dust during transport of material from the site would also be applied.

8.4.4 Air Dispersion Modelling Methodology

The EPA was consulted prior to undertaking the air quality assessment and indicated that air dispersion modelling should be undertaken to quantify potential dust impacts from the proposed quarry extension.

Air quality impacts surrounding the proposed Somersby quarry extension were assessed using the Industrial Source Complex (ISC Version 3) computer dispersion models. These models, developed by the US EPA, are capable of predicting dust impacts from open cut mines and quarries, and are used by the NSW EPA when assessing dust impacts from mining operations.

The general method of assessment incorporated particulate emission release parameters with meteorological conditions, as inputs into the ISC long-term and short-term models. Ground-level dust concentration and deposition rates were then computed for the area surrounding the site.

The meteorological data used for modelling are generic meteorological data predicting worst-case impacts at various distances from the proposed quarry site.

Emission release parameters for various process components were obtained from the US EPA source, *AP- 42 - Compilation of Air Pollutant Emission Factors.*

The receptors were arranged in a 3 km by 3 km grid around the proposed quarry extension, with a receptor grid spacing of 100m. Discrete receptors were also placed at the nearest residential dwelling surrounding the site.

The highest ground-level dust concentration and deposition predicted at the nearest sensitive receptor during the modelling runs were retained within the computer model. The results of dispersion modelling indicate the theoretical maximum ground-level concentration and deposition values predicted at the nearest sensitive receptor.

Table 8.2 provides a summary of the expected dust emissions from each source at the site of the proposed quarry extension.

Description	Emissions (t/yr)
Wind Blown Dust	26
Drilling / Sawing	1.6
Haul Road	0.5
Total	*28.1*

TABLE 8.2
ESTIMATED DUST EMISSIONS (TONNES/YEAR)

8.4.5 Dispersion Modelling Results

Based on a sandstone extraction of 1000m^3 per year, the maximum ground level 24-hour concentration of total suspended particulates predicted at the nearest residence is approximately 20 µg/m^3. The corresponding maximum ground-level concentration of particulates (with a diameter less than 10mm) is likely to be less than 10 µg/m^3. This is below the NSW government interim goal of 50 µg/m^3.

The maximum annual average TSP concentration predicted at the nearest sensitive receptor is approximately µmg/m^3, which is below the NHMRC goal of 90 µg/m^3. The maximum annual average PM_{10} concentration predicted at the nearest sensitive receptor is less than 3µg/m^3, which is below the US EPA goal of 50 µg/m^3.

The maximum increase in dust deposition rates predicted at the nearest residential receptors surrounding the proposed quarry extension is approximately 0.3 g/m^2/month, and does not exceed the allowable increase of 2 g/m^2/month.

The air quality report contains further information on the modelling limitations.

8.5 ASSESSED IMPACTS

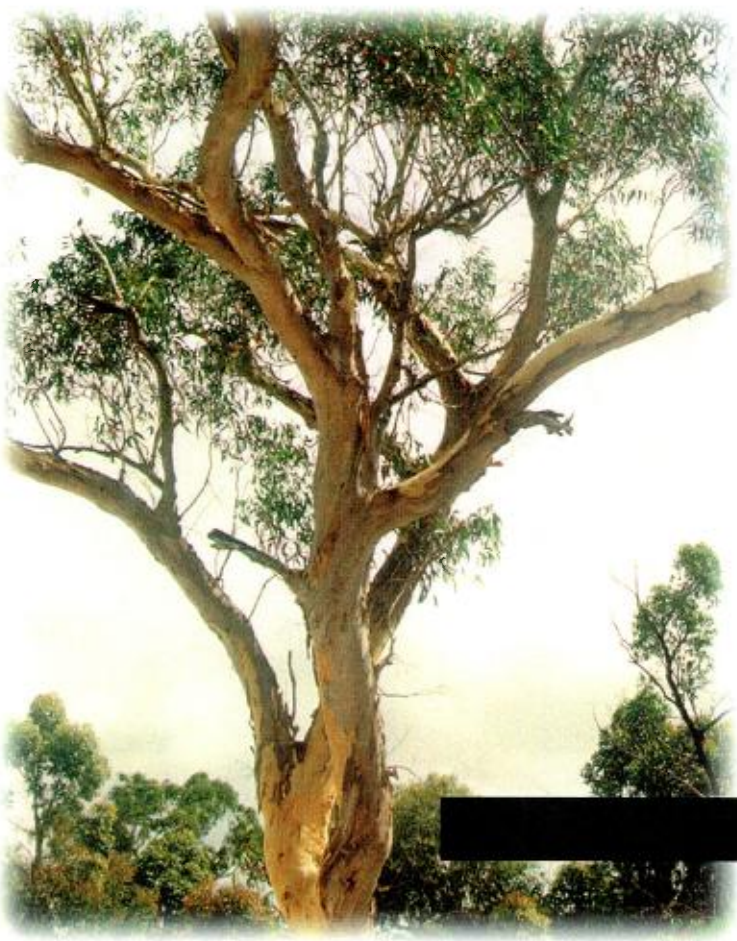
Based on the quarry extension plan information, the air dispersion modelling results indicate that the nearest residence, located approximately 1 km to the north of the site, would not suffer adverse air quality impacts as a result of the proposed quarry extension.

This is based on the following predicted results at the nearest residence:

- maximum 24-hour and annual average PM_{10} concentrations are not likely to exceed the NSW Government Interim 24 goal of 50 mg/m^3, and the

US EPA annual average goal of 50 mg/m^3.

- the maximum annual average concentration of TSP are not likely to exceed the NHMRC annual average goal of 90 mg/m^3 for TSP.
- the maximum increase in monthly dust deposition rates extensions are not likely to exceed the pre-determined allowable increase of 2 g/m^2/month.



Flora and Fauna

9

9 FLORA AND FAUNA

9.1 BACKGROUND

A detailed botanical survey of the extension areas was carried out by Robert Payne Ecological Surveys and Management in 1996, along with some survey for amphibians. A supplementary fauna survey was carried out, also by Robert Payne Ecological Surveys and Management in August 1998 to provide a more comprehensive characterisation of the fauna on the site.

9.2 FLORA

The vegetation habitat or plant association for all extension areas is described as being a Low Closed Heathland with occasional small trees. The description for the plant association is :

Structure

Closed to open cover (depending on the presence of rock platforms) of shrubs to 2 metres high with a dense lower cover of monocotyledons and occasional trees up to 4 metres high.

Main Species Present

Trees - *Eucalyptus haemastoma, Eucalyptus capitellata, Eucalyptus punctata* and *Angophora hispida.*

Shrubs - *Banksia ericifolia, Banksia oblongifolia, Hakea teretifolia, Acacia oxycedrus, Acacia suaveolens, Grevillea buxifolius, Grevillea sericea* and *Leptospermum polygalifolium.*

Monocotyledons - *Lepyrodia scariosa, Leptocarpus tenax, Hypolaena fastigata, Empodisma minus* and *Xanthorrhoea resinifera.*

Herbs - *Gonocarpus teucrioides* and *Goodenia paniculata.*

Remarks

Equivalent to Community 8 of Benson and Fallding (1981).

There were no plant species recorded that are listed on Schedules 1 and 2 of the Threatened Species Conservation Act 1995 but there are two plant species present which are classified as ROTAP species (Briggs and Leigh,

1988). Those species are:

• *Darwinia glaucophylla* was found to be present at the central extension area and at the upper extension area. The central extension area has isolated pockets of the rare plant but at the Central Coast Quarry the population is patchy, although widespread where it is associated with seepage zones and large rock outcrops. *Darwinia glaucophylla* is coded 2RCa, which indicates the species is rare, but not currently threatened or endangered. This species is only reserved in Brisbane Water National Park.

• *Gonocarpus salsolioides* was found at the central extension area. Only one plant was recorded growing in wet conditions amongst sedge vegetation. *Gonocarpus salsolioides* is coded 3RCa which classifies the species as being rare but is represented in Brisbane Water National Park, Royal National Park and Sydney Harbour National Park.

In addition, at the central extension area, *Persoonia isophylla* is present. *Persoonia isophylla* is not listed as either threatened, rare or endangered on the ROTAP list, but is regarded as a 'species of special conservation significance' to the region. There were no additional such species recorded during the survey of these quarries.

9.3 Fauna

9.3.1 Fauna Survey Methods

The census for fauna was undertaken in the following manner.

Small Bats - Bats were censused along the only access road through the quarry area. At this location an Anabat II ultrasonic bat detector with delay device was setup for a period one (1) hour to detect echo location calls of small bats. Calls were analysed by computer techniques. Three nights were allocated for this section of the survey.

Nocturnal Animals - On each evening a traverse was undertaken along the access track and amongst the vegetation using a hand-held spotlight. The vegetation is only low and therefore only warranted the use of a hand-held spotlight. Three nights were allocated for this section of the survey.

Birds - The set point quadrat method was used to detect bird species. On

three mornings, quadrat censuses were carried out, where the observer sits quietly for a period of 30 minutes and all the bird species are recorded from calls and observations.

Small Mammals - Small mammals were censused using 'Elliot' box type small mammal traps and baited using peanut butter, honey and rolled oats. As the site is only small, two lines of traps, with each line comprising ten traps, were set out. One line occupied the mid slope and one line occupied the upper slope or ridge. Traps were set out for a period of three nights providing 60 trap nights of survey.

Amphibians - On seven evenings 30 minutes was spent listening and searching for the presence of frogs along the access track in the drains and through the heathland. In particular a search was made for holes of the Giant Burrowing Frog.

Reptiles - Reptiles were not censused because the temperature conditions were considered suboptimal. Any reptiles recorded would be done so by opportunistic observations. However, a search was made for termite mounds which would be considered habitat for the Heath Monitor, *Varanus rosenbergi.* Searches were also made for suitable rock outcrops with small boulders and tree hollows in close proximity, which could be considered suitable for the Broad-headed Snake *Hoplocephalus bungaroides.*

9.3.2 Fauna Survey Results

The results of the survey are presented hereunder for each separate fauna component.

Small Bats - Bats were only recorded on one night (22.8.98) despite three nights survey. Six species were recorded, two of which are listed on Schedule 2 of the Threatened Species Conservation Act, 1995. The Greater Broad-nosed Bat, *Scoteanax rueppellii*, was recorded with a definite call whilst the Common Bent-wing Bat, *Miniopterus schreibersii*, was recorded with a possible call.

Nocturnal Animals - There were only two nocturnal animals recorded being the Swamp Wallaby, *Wallabia bicolor* and the Southern Boobook, *Ninox novaeseelandiae.* The Southern Boobook was seen perched in a Scribbly Gum and the Swamp Wallaby was seen on three nights amongst the heathland. There were no nocturnal animal species recorded listed under Sched-

ules 1 and 2 of the Threatened Species Conservation Act, 1995.

Birds - Only a small number of birds were recorded which reflects the small area of the site and the presence of a single habitat. There were no bird species recorded listed on the Threatened Species Conservation Act, 1995.

Small Mammals - The small mammal capture rate was 60% which is considered excellent and was probably due to the drizzly weather conditions. Four species of small mammals were captured with one species unconfirmed. The Bush Rat,*Rattus fuscipes* and the Swamp Rat, *Rattus lutreolus* were considered common as was the Brown Antechinus *Antechinus stuartii.* One capture of the Eastern Chestnut Mouse, *Pseudomys gracilicaudatus* was probable although not confirmed. The animal escaped from the trap before hair samples could be taken for more positive identification. The Eastern Chestnut Mouse is listed on Schedule 2 of the Threatened Species Conservation Act, 1995. This was recorded outside the proposed extension areas in an area of hanging swamp.

Amphibians - On the three rainy nights the Common Eastern Froglet, *Ranidella signifera* the Dusky Toadlet, *Uperoleia fusca* and the Bleating Tree Frog, *Litoria dentata* were recorded. These species were found to be common along the access track drains and within muddy soaks. However, on a warm overcast day following rain, the Red-crowned Toadlet, *Pseudophryne australis* was heard calling amongst the heathland vegetation beneath rocks. The species was subsequently confirmed. The Red-crowned Toadlet is listed on schedule 2 of the Threatened Species Conservation Act, 1995. Clear skies then initiated calls of the Brown-striped Frog, *Limnodynastes peroni* and Peron's Tree Frog, *Litoria peroni.* There were no ground holes found of the Giant Burrowing Frog.

Reptiles: There were no reptiles recorded during this survey, and as a result of the site inspection, no habitat was considered present for the Heath Monitor or the Broad-headed Snake except if the species traversed the site.

9.3 DISCUSSION

Habitat exists for the Eastern Chestnut Mouse in the study area and the probable recording of the species is consistent with the findings of the Australian Museum (Anon, 1997) and previously by Recher and Posamentior, who recorded the species in the hanging swamp habitat directly opposite the quarry site in the Somersby Industrial Estate. The Eastern Chestnut Mouse is also probably further represented in Brisbane Water National Park at a

number of sites where this habitat is replicated. It should be noted however, that the habitat for the Eastern Chestnut Mouse in the Somersby Quarry will not be affected by future quarry extensions.

The habitat of the Red-crowned Toadlet is widespread through the area on Hawkesbury Sandstone, but probably uncommon in the region. It is restricted to specific locations on this geological unit, which are the higher ridgetops combined with soaks and seepage zones. Other finds of the species have been recorded nearby in Kowarra Road and Girrakool. Soaks and seepage zones within the proposed extension areas are minimal, with core habitat likely to occur in the wetter adjacent bushland areas.

Both threatened bat species would feed over the site and it is possible the Greater Broad-nosed Bat would roost within the overall quarry boundary because of the presence of trees with hollows. There are however very few trees with hollows in the quarry extension areas. The Common Bent-wing Bat could also roost at the quarry but is unlikely to roost in the quarry extension areas. Both species were previously recorded by the Australian Museum for the Somersby Industrial Estate. The Greater Broad-nosed Bat appears to be very rare in the region as only few recordings have been recorded which are at Wyong, Chittaway and Somersby.

There are species which also might occur but on a very occasional basis. The Powerful Owl has been present in the Brisbane Water National Park area for the past two years (pers. obs.) and it is not beyond the realms of possibility that this species could traverse the site flying from one feeding area to another. However, the species would nt be expected to inhabit the site.

The Koala has also been sighted at Kariong. Although there are Grey Gums present, which are a known food tree, the specimens are poor, small and few in number. No scats were found and the area would not constitute koala habitat although it is possible the Koala could traverse the site.

Management of the threatened species will be required as part of the ongoing management of the quarry. While little or no further habitat for Threatened Species will be lost, a priority of the rehabilitation of existing quarry areas and the proposed extension areas will be to maximise potential habitat value for Threatened Species. Examples of habitat enhancement may include placement of sandstone drains at strategic locations, which can fill with leaf litter and provide habitat for the Red Crowned Toadlet. Consideration may also be given to the construction of small ponds as breeding habitat for the Giant Burrowing Frog.

9.4 EIGHT PART ASSESSMENT TESTS

Under Section 5A of the Environmental Planning and Assessment Act 1979, eight factors must be addressed to determine whether a proposed development will have a significant impact on threatened species or habitats, populations or ecological communities or their habitats. Eight part tests are carried out below for the Eastern Chestnut Mouse, the Greater Broad-nosed Bat, the Common Bent-wing Bat, the Red-crowned Toadlet and the Giant Burrowing Frog.

The Common Bent-wing Bat: *Miniopterus schreibersii*

The Common Bent-wing Bat *Miniopterus schreibersii* is a small insectivorous bat which hunts insects over a range of vegetation types in the region. They have been recorded previously in the area of interest. They generally roost in caves and intercises associated with rocky cliffs in the escarpment areas around the coast and ranges but do feed over moist vegetation types. The species also breed in maternal caves and congregate as colonies. The species was recorded during the survey feeding amongst the vegetation.

(a) In the case of a threatened species, whether the lifecycle of the species is likely to be disrupted such that a local population of the species is likely to be placed at risk of extinction.

The proposal will not change significantly the extent of feeding habitat and will not affect roosting habitat for the Common Bent-wing Bat. From our current knowledge the species feeds over variable vegetation types and therefore a small decrease in the extent of their feeding grounds may be expected as a result of this proposal. The population of the Common Bent-wing Bat is not expected to be disrupted by this proposal such that the population is placed at risk.

(b) In the case of an endangered population, whether the lifecycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

The Common Bent-wing Bat is not an example of an endangered population.

(c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.

The area of feeding habitat for the Common Bent-wing Bat amounts to approximately 1.6ha of the vegetation on the site. In relation to the regional

distribution of its feeding habitat, say in Brisbane Water National Park (> 2,000ha), the disturbance and removal of feeding habitat will only be a small modification. There will be no modification of roosting and breeding habitat.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal will cause further isolation from currently interconnecting or proximate areas. The area adjoins, more or less, Brisbane Water National Park. The quarry site is already fragmented but does have remaining small patches of vegetation. Three small sections of this vegetation will be fragmented.

(e) Whether critical habitat will be affected.

Critical habitat for the Common Bent-wing Bat would include known maternal denning and roosting sites in caves. No critical habitat exists at the quarry site.

(f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

The Common Bent-wing Bat is considered to be adequately represented in conservation reserve in the Sydney Basin bioregion because of its association with Hawkesbury Sandstone geology. It is found in Brisbane Water National Park.

(g) Whether the development or activity proposed is a Class of Development or Activity that is recognised as a threatening process.

The activity would not be classified as a threatening process because it does not involve removing large areas of feeding habitat and removing maternal and roosting caves.

(h) Whether any threatened species, population or ecological community is at the limit of its known distribution.

The Common Bent-wing Bat is not at its southern limit of distribution because it occurs as far south as Victoria and South Australia.

The Great Broad-nosed Bat: *Scoteanax rueppellii*

The Great Broad-nosed Bat *Scoteanax rueppellii* is a large insectivorous bat which hunts insects over a restricted vegetation type in the bioregion. They have been recorded previously in the area associated with wetland or Swamp Mahogany Forest and on the Somersby Plateau (Peter Quote Australian Museum Reference). They generally roost in tree hollows. There are numerous trees with hollows present at the site but only two trees with hollows were noted in the proposed future quarry areas.

(a) In the case of a threatened species, whether the lifecycle of the species is likely to be disrupted such that a local population of the species is likely to be placed at risk of extinction.

The proposal will not change significantly the extent of feeding habitat but will affect potential roosting habitat for the Greater Broad-nosed Bat to a minor degree. From the observations the species was feeding over the low forest and therefore the partial loss of their feeding grounds may be expected as a result of this proposal. It is unknown if the bats roost at the quarry site but at least two trees with hollows will be lost as a result of the proposal.

(b) In the case of an endangered population, whether the lifecycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

The Greater Broad-nosed Bat is not an example of an endangered population.

(c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.

The area of feeding habitat for the Greater Broad-nosed Bat to be lost by the proposal amounts to approximately 1.6Pha of the vegetation. In relation to the regional distribution of its known feeding habitat areas; Yucca Road Wyong, Enterprise Drive Chittaway and the Somersby Industrial Area, these areas amount to no more than thirty hectares and the loss of this habitat will cause a moderate modification. However, our research indicates that the extent of feeding habitat for these species is really unknown and may be far greater than what is known but the important factor to consider is that potential roosting at the quarry site has been able to be minimised. The roosting habitat is more important to consider because it is considered to be critical habitat.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal will cause further isolation from currently interconnecting or proximate areas. The area adjoins, more or less, Brisbane Water National Park. The quarry site is already fragmented from the quarry but does have remaining small patches of vegetation. Three small sections of this vegetation will be fragmented.

(e) Whether critical habitat will be affected.

Critical habitat for the Greater Broad-nosed Bat would include known denning sites. It is obvious that potential critical habitat does exist at the site and denning habitat is unlikely to be significantly affected by this proposal.

(f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

The Greater Broad-nosed Bat is not considered to be adequately represented in conservation reserves in the Sydney Basin as it is only known from a few coastal areas in the bioregion.

(g) Whether the development or activity proposed is a Class of Development or Activity that is recognised as a threatening process.

The activity would not be classified as a threatening process because it does not involve removing large areas of feeding or denning habitat.

(h) Whether any threatened species, population or ecological community is at the limit of its known distribution.

The Greater Broad-nosed Bat is at its southern limit of distribution at Somersby although there have been older previous records from Sydney.

Red-crowned Toadlet: *Pseudophryne australis*

Red-crowned Toadlet, in this region, is confined to Hawkesbury Sandstone. Habitat attributes include high elevated ridge areas that are moist or have hanging swamps, naturally occurring drains or even artificial gutters. Leaf litter within these attributes can be important for the species survival.

(a) In the case of a threatened species whether the lifecycle of the species is likely to be disrupted such that a viable local population or the specie is likely to be placed at risk of extinction.

The proposal is likely to disrupt the lifecycle of part of the population of the Red-crowned Toadlet because part of the habitat where the population occurs will be removed during the quarry operation. The disruption, however, will not place the population at risk of extinction because the population is expected to occur also on the adjoining vegetated lands along the Old Pacific Highway.

(b) In the case of an endangered population, whether the lifecycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

The Red-crowned Toadlet is not an example of an endangered population.

(c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community whether a significant area of known habitat is to be modified or removed.

The area of habitat of the quarry, where the Red-crowned Toadlet will be lost is approximately 1.6ha. There is at least 100-200ha of Red-crowned Toadlet habitat in the region (this is based on say 400 ridgetops at 0.5ha in area) and therefore the modification is not considered significant. The area of the main population on the quarry site, however, will be disturbed with the proposal.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal, even though it is of small scale, is likely to cause the main population to become further isolated because the degree of fragmentation will increase. It is expected that the population will not inhabit the extension areas until rehabilitation is in progress, however it extends through adjacent bushland areas and will remain viable. At a larger scale (*ie.* adjoining Brisbane Water National Park) the population will become further isolated from other proximate areas of habitat as a result of the proposal.

(e) Whether critical habitat will be affected.

Critical habitat for the Red-crowned Toadlet has not been defined by the New South Wales National Parks and Wildlife Service but the area of the proposal would be considered critical habitat for the Red-crowned Toadlet.

(f) Whether a threatened species, population or ecological community or their habitats are adequately represented in conservation reserves in the region.

The Red-crowned Toadlet is represented in Brisbane Water and Bouddi National Parks. It is also probably represented in Popran National Park and parts of Yengo National Park. However, at this stage it is not reasonable to say that it is adequately conserved because its habitat is the highly elevated moist ridgetops which are small in size. In total the reserved area may only be 400ha.

(g) Whether the action proposed is a Class of Action that is recognised as a threatening process.

The proposal could be considered to be a threatening process because it removes habitat. However, the area is considered to be of small scale and is unlikely to cause extinction of the population at Somersby.

(h) Whether any threatened species or ecological community is at the limit of its known distribution.

The Red-crowned Toadlet is not at its limit of distribution at Somersby.

Giant Burrowing Frog: *Heleioporus australiacus*

The Giant Burrowing Frog occurs in similar habitats to the Red-crowned Toadlet. Its attributes include ridgetops and valley slopes where moisture is more available. Creeks, ponds and dams are essential for the breeding purposes. In this region it is a species restricted to Hawkesbury Sandstone and is considered to be a ridgetop specialist. The species has not been recorded on the site, however it is considered that habitat occurs.

(a) In the case of a threatened species whether the lifecycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk.

Within the vicinity of the site the proposal is likely to disturb the habitat of the Giant Burrowing Frog. However, no ground holes could be located but the area is potential habitat for the species. Other sites known for the Giant Burrowing Frog occur in adjoining Brisbane Water National Park and as a result of this known data the proposal is not likely to place a viable local population at risk.

(b) In the case of an endangered population, whether the lifecycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

The Giant Burrowing Frog is not an example of an endangered population.

(c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community whether a significant area of known habitat is to be modified or removed.

The area of habitat in the vicinity of the quarry, where the Giant Burrowing Frog is expected to occur, is approximately 1.6ha. There is at least 500ha of Giant Burrowing Frog habitat in the region (this is based on its habitat in Brisbane Water National Park) and therefore the modification, which is minor, is not considered significant. Only a small area of the habitat will be disturbed with the proposal.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal, even though it is of small scale, is unlikely to cause any population to become isolated from another population. At a larger scale (*ie.* between ridgetops) the population will become isolated to a minor degree from other proximate areas of habitat as a result of the proposal. The Giant Burrowing Frog is capable of greater movement than the Red-crowned Toadlet, for example, and would be able to traverse the disturbed areas.

(e) Whether critical habitat will be affected.

Critical habitat for the Red-crowned Toadlet has not been defined by the New South Wales National Parks and Wildlife Service but the area of the proposal would be considered only partly critical habitat for the Giant Burrowing Frog. Essential critical habitat would include breeding ponds and stream which are not found in the areas to be disturbed.

(f) Whether a threatened species, population or ecological community or their habitats are adequately represented in conservation reserves in the region.

The Giant Burrowing Frog is represented in Brisbane Water and Bouddi National Parks. It is also probably represented in Popran National Park and part of Yengo National Park. However, at this stage it is not reasonable to say that it is adequately conserved because insufficient data is known of its distribution.

(g) Whether the action proposed is a Class of Action that is recognised as a threatening process.

The proposal could be considered to be a threatening process because it removes habitat. However, the area is considered to be of small scale and is unlikely to cause extinction of any population at Somersby.

(b) Whether any threatened species or ecological community is at the limit of its known distribution.

The Giant Burrowing Frog is not at its limit of distribution at Somersby.

Heath Monitor: *Varanus rosenbergi*

The Heath Monitor occurs in heathland sedgeland habitat throughout the Hawkesbury Sandstone. Its attributes include ridgetops and valley slopes where moisture is more available and heathlands and sedgelands are able to develop. Sometimes ant termite mounds are used for its breeding purposes and trees with hollows are used for refuges. In this region it is a species not specifically restricted to Hawkesbury Sandstone. It may occur in the area of interest as there is a previous sighting by John Weigall at Kariong.

(a) In the case of a threatened species whether the lifecycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk.

Within the vicinity of the site the proposal is unlikely to disturb the breeding habitat of the Heath Monitor. It is assumed that the main habitat areas are located throughout Brisbane Water, Bouddi, Popran and Yengo National Parks. Its habitat in the vicinity of the proposal would only be regarded as transitory and would not place any local population at risk of extinction.

(b) In the case of an endangered population, whether the lifecycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

The Heath Monitor is not an example of an endangered population.

(c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community whether a significant area of known habitat is to be modified or removed.

The area of habitat in the vicinity of the quarry, where the Heath Monitor is expected to occur, is approximately 1.6ha. There is at least 1000ha of Heath Monitor habitat in the region (this is based on its habitat in Brisbane Water National Park and the other parks mentioned) and therefore the modification, which is minor, is not considered significant. Very little area of the habitat will be disturbed with the proposal.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal, even though it is of small scale, is unlikely to cause any population to become isolated from another population. At a larger scale (*ie.* between ridgetops) the population will not become isolated from other proximate areas of habitat as a result of the proposal because the Heath Monitor is capable of moving between such areas.

(e) Whether critical habitat will be affected.

The area of interest would not be considered critical habitat for the Heath Monitor.

(f) Whether a threatened species, population or ecological community or their habitats are adequately represented in conservation reserves in the region.

The Heath Monitor is represented in Brisbane Water, Popran National Park and Bouddi National Parks. It is also probably represented in parts of Yengo National Park. However, at this stage it is not reasonable to say that it is adequately conserved because insufficient data is known of its distribution and records for the region are uncommon.

(g) Whether the action proposed is a Class of Action that is recognised as a threatening process.

The proposal would not be recognised as a threatening process for the Heath Monitor.

(h) Whether any threatened species or ecological community is at the limit of its known distribution.

The Heath Monitor is not at its limit of distribution at Somersby.

The Eastern Chestnut Mouse: *Pseudomys gracilicaudatus*

The Eastern Chestnut Mouse is a small mammal which is found in acid unconsolidated sands amongst heathland and reedland vegetation. It occurs in habitat where low nutrient sandy substrates are found (Higgs & Fox, 1993). The Eastern Chestnut Mouse was tentatively recorded during the survey. The Eastern Chestnut Mouse has a southern limit of distribution at Gosford but only isolated locations are known in this region.

(a) In the case of a threatened species, whether the lifecycle of the species is likely to be disrupted such that a local population of the species is likely to be placed at risk of extinction.

The proposal is likely to disrupt the lifecycle of part of the population of the Red-crowned Toadlet because part of the habitat where the population occurs will be removed during the quarry operation. The disruption, however, will not place the population at risk of extinction because the population is expected to occur also on the adjoining vegetated lands along the Old Pacific Highway.

(b) In the case of an endangered population, whether the lifecycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

The Eastern Chestnut Mouse is not an example of an endangered population.

(c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.

The area of habitat for any Eastern Chestnut Mouse population is unknown because the number of records on the New South Wales National Parks and Wildlife Service wildlife atlas records are low. Habitat may amount to 70ha in the bioregion *ie.* from the Hunter River to Gosford. Known sites are Cockle Bay Nature Reserve, Brisbane Water National Park, Kariong and Port Stephens. In comparison to any disturbance of known habitat in the bioregion the modification would be low.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal will cause minor further isolation from currently interconnecting or proximate areas of habitat because light clearing will take place. The clearing will be for the nutrient facility on the eastern side together with an area for access purposes. However, in view of the clearing, some areas will need to be regenerated following construction to at least reinstate some habitat. The regeneration will be detailed in the ameliorative measures.

(e) Whether critical habitat will be affected.

Critical habitat for the Eastern Chestnut Mouse would include known habitat areas. Critical habitat area at this site is unknown but potential critical habitat area that will be disturbed amounts to approximately 1.6ha.

(f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

The Eastern Chestnut Mouse is not considered to be adequately represented in conservation reserves in the Sydney Basin bioregion, although it is found in Brisbane Water National Park and Cockle Bay Nature Reserve. The area of conservation is estimated to be a few hectares.

(g) Whether the development or activity proposed is a Class of Development or Activity that is recognised as a threatening process.

The activity would be classified as a threatening process because such a process will involve removing areas of habitat.

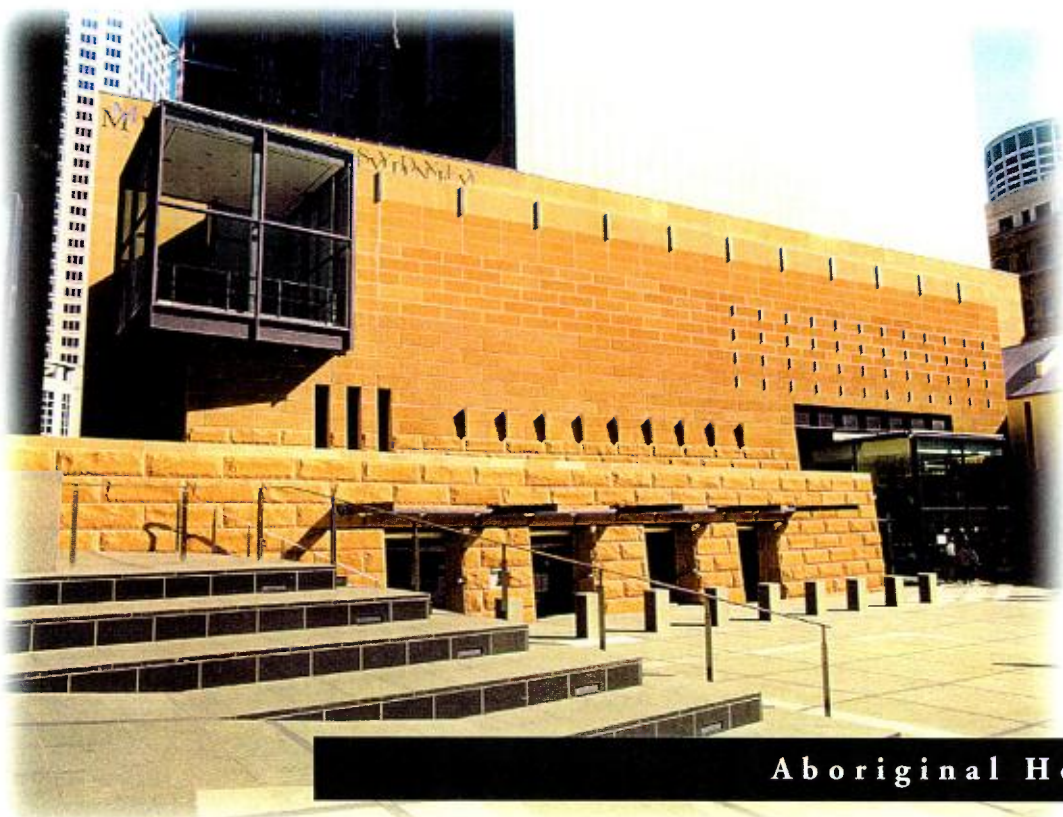
(h) Whether any threatened species, population or ecological community is at the limit of its known distribution.

The Eastern Chestnut Mouse population is at its southern limit of distribution at Gosford.

Summary

The proposal will impact the habitat of some threatened species as shown above. The proposal can be considered short term if the disturbed quarry areas can be regenerated and habitat for these species reinstated. This avenue should be further investigated and planned with the proposed future quarry operations.

Before commencing future quarries the existing disturbed quarries should show some signs of practical regeneration by spreading topsoil from the future quarry areas. Landforms should also be created to simulate hanging swamps and allow them to develop. Permanent ponds and drainage lines should also be created.



Aboriginal Heritage

10

10 ABORIGINAL HERITAGE

The result of the Aboriginal archaeological survey of the site is given in this section of the EIS. It also contains recommendations relating to identified sites.

10.1 PURPOSE OF INVESTIGATIONS

Investigations into the Aboriginal heritage of the site were carried out by Jo McDonald Cultural Heritage Management Pty Ltd in 1996. These investigations responded to the requirements issued by Gosford City Council following submission of the earlier statement of environmental effects. The specific aims of the investigation were to:

- identify Aboriginal sites which may be impacted by proposed quarry extensions;
- liaise with the Darkingung Local Aboriginal Land Council; and
- make recommendations for any site which may be affected.

10.2 REGIONAL AND LOCAL CONTEXT

The archaeological survey for pre-historic sites (Jo McDonald Cultural Heritage Management, 1996) refers to the previous archaeological studies and site investigations of the local area. It refers specifically to recent test excavations of an area of potential archaeological deposit (PAD) (Silcox, 1996) at a sand quarry near Somersby. These text excavations revealed a low density concentration of stone artefacts. Excavation was carried out at two of these locations resulting in the collection of ten stone artefacts. Reference was also made to work undertaken in Wyong and Gosford Shires by Vinnecombe (1980).

Prior to conducting the survey, a search of the National Parks and Wildlife Service Site Register was undertaken for areas within 2 km of the Somersby site. Most of the sites located on the Register have already been impacted by construction of the Sydney-Newcastle freeway or the gas pipeline. The surveys conducted for the freeway and pipeline corridor resulted in the recording of 42 per cent of the known sites. One site (NPWS#45-3-426) located on the Somersby site had been destroyed by previous quarrying, with a consent to destroy being granted by NPWS.

Based on information in the National Parks and Wildlife Service Site Register, the most commonly occurring sites in the local area are rock engravings and axe-grinding grooves.

Given that the geology of the study area is Hawkesbury sandstone formation, the most predominant site types likely to be found are:

- engraving sites;
- grinding grooves;
- shelter sites containing archaeological deposits and/or art.

10.3 ABORIGINAL CONSULTATION

The Somersby site falls within the boundaries of the Darkingung Local Aboriginal Land Council (DLALC). Prior to conducting the survey, contact was made with DLALC's site officer, Mr Kevin Duncan. The archaeological consultant organised for Mr Duncan and the Chairperson, Mr Andrew Sim to participate in the survey. Due to unforseen circumstances, neither representative was able to attend on the day of the survey.

During the survey, the site archaeologists visited the Wyong offices of DLALC and had discussions with Mr Graham Smith (DLALC co-ordinator) about the study area. Maps and aerial photographs were used to show the extent of existing and proposed quarrying operations. At this meeting, DLALC agreed to prepare a response to the archaeological report.

Subsequently, Mr Duncan visited Somersby Quarry and was shown the engraving site by Mr Col Parry of Gosford Quarries. Discussions with DLALC representatives indicated that they were in agreement with the report's recommendations.

10.4 SURVEY

10.4.1 Survey procedure

The survey was undertaken in June 1996 by archaeologists Jo McDonald and Stephanie Garling. Mr Col Parry of Gosford Quarries accompanied the archaeologists during the initial inspection of the proposed extension area. All sandstone outcrops were inspected for possible engraving or grinding grooves. Sandstone overhangs, suitable for shelter, were not observed on this site. Visibility on the site was generally good, except in areas of undisturbed bushland. Locating rock platforms was relatively simple and aided by the use of aerial photographs.

One of the key tasks of the survey was to re-locate those known sites recorded in the National Parks and Wildlife Service Site Register. Given the

uncertainties inherent in many of the early recordings and inaccuracies in grid location information, it was often difficult to locate these sites, especially when the physical environment had been altered. The survey determined that no known sites would be affected by the proposed extension to the quarry.

10.4.2 Survey results

The following sites were located during the survey:

Engraving site (coded SQ 1). This is located on a sandstone platform, in an area which has been core drilled and identified for quarry extension. The site consists of a single macropod engraving in the centre of a large sandstone platform. The macropod motif is quite weathered and its head is difficult to discern. It has two legs in profile, one ear and its tail and back leg are depicted at 180 degree angle.

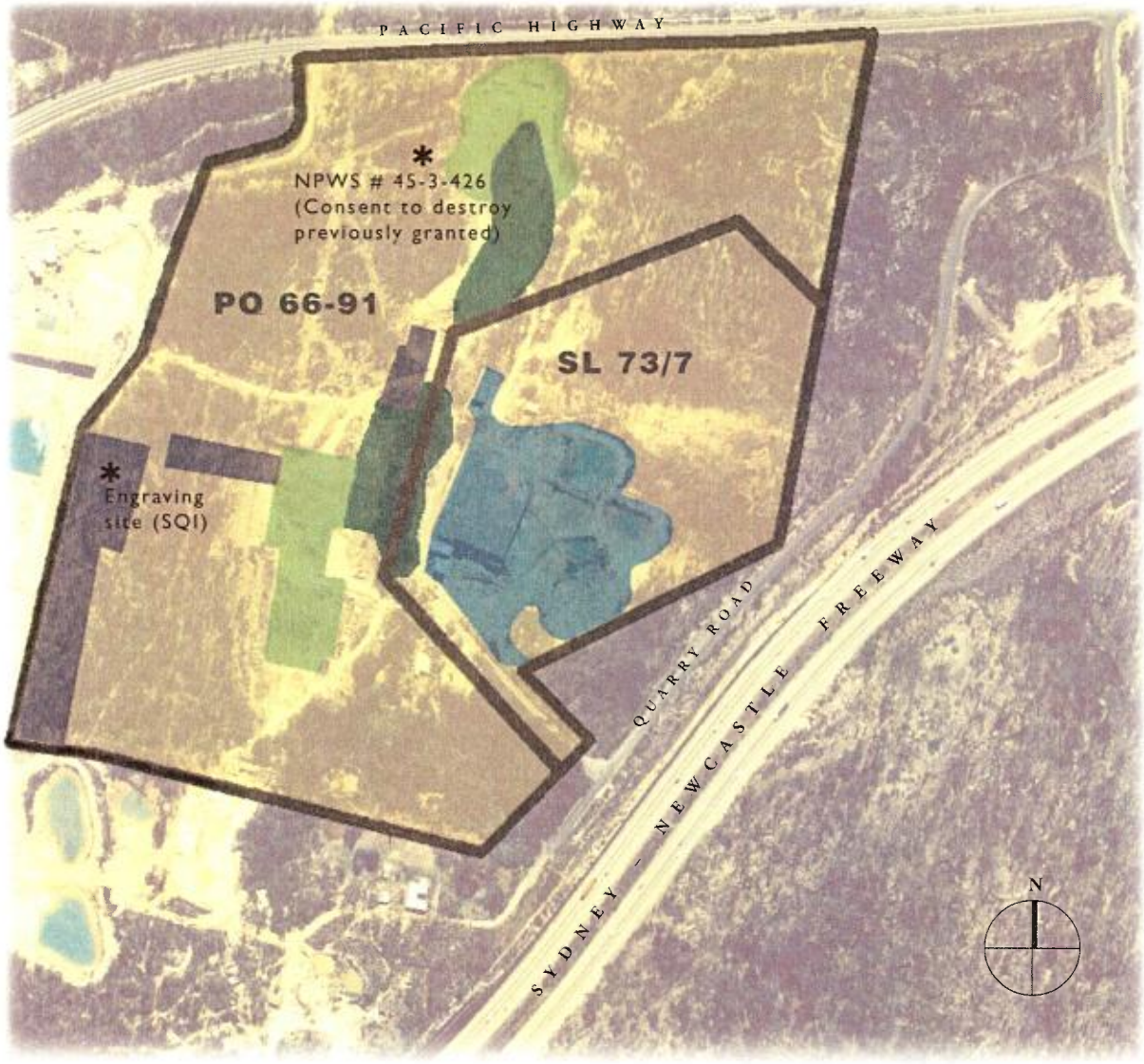
Grinding groove site (NPWS # 45-3-1455). This site is located outside the proposed quarry extension areas. It was relatively simple to identify based on available descriptions given in the National Parks and Wildlife Service Site Register. Only two of the grooves are not covered by soil, with the other six grooves being partially obscured by sediment and vegetation cover.

10.4.3 Assessment of significance

The assessment of significance of these sites is based on consideration of the following:

- scientific significance - this involves the placement of a site in its broader regional framework as well as assessing its individual merits. The overriding aim of cultural heritage management is to preserve a representative sample of the archaeological resource;
- cultural significance - this concerns the importance of the site or feature to the relevant cultural group, in this case the Aboriginal community;
- public significance - this relates to the use of a site for educative purposes. Grinding groove sites and engraving sites are generally considered to be of high public significance because they are easily visible and can be easily understood by the general public.

The two Aboriginal heritage sites identified on the Somersby quarry site are well represented in this part of the Sydney region. Engraving and grinding grooving sites are the most common types on the Somersby plateau. Given that Consent to Destroy site NPWS #45-3-426 has already been granted, the significance of this site is not further addressed.



Aerial Photography Source: Copyright Surveyor General's Department, Panorama Avenue Bathurst 2795

Aboriginal Heritage Site

Rehabilitation in Progress

Revegetation Complete

Proposed Quarry Extension Areas

Natural Bushland

Quarry Operations Area

FIGURE 10.1
ABORIGINAL HERITAGE SITES

The engraving site (SQ 1) occurs in an area where engraving sites are particularly common. Research in the Guringai language area has also indicated that sites with a single macropod motif are quite common in the area (McDonald 1994:223).

Given that the site is small in terms of an assemblage site, it is assessed as having low to moderate scientific significance. Also, there is little information that this site can add to the research questions relating to rock art in the local or regional area. However, the site may be considered to have significance by the local Aboriginal community. It is also assessed as having high public significance.

10.5 Impacts and Mitigation Measures

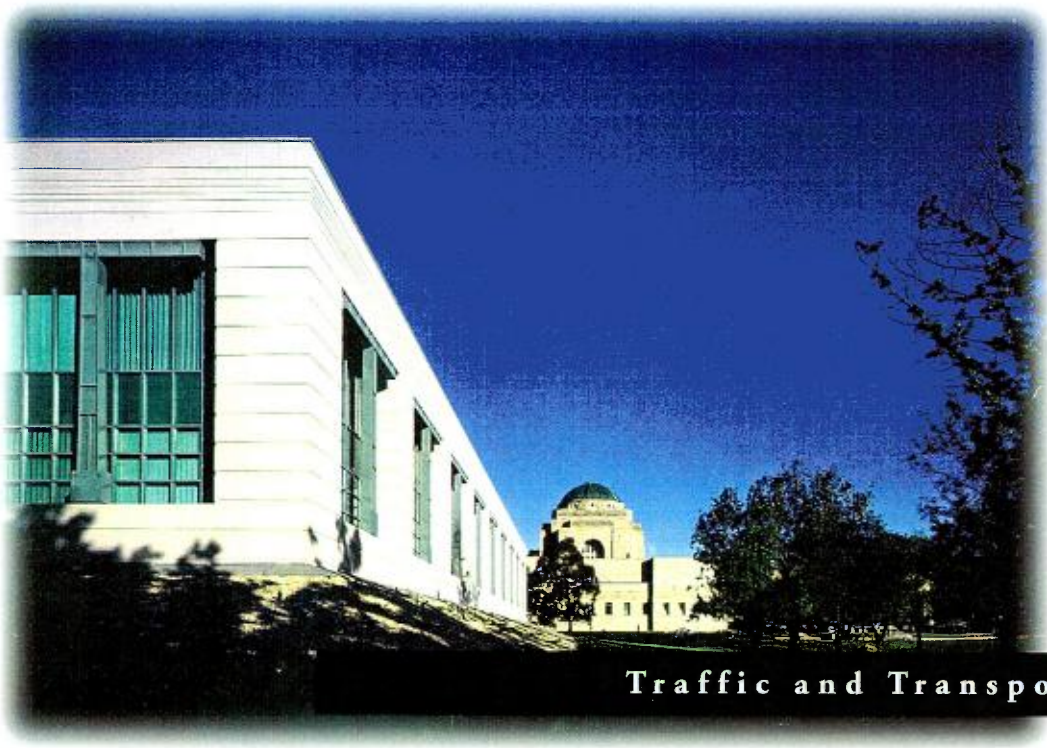
The engraving site (SQ 1) is located within an area proposed for quarrying extension. The site is defined by the limits of the rock platform upon which the engraved motif is located. Proposed quarrying would impact on the rock platform on which the motif is located, thus destroying the site. It is anticipated that the motif itself would also be destroyed by quarrying, although it will be close to the edge of the buffer area.

Gosford Quarries has advised that protecting the site will not be a feasible management option because the engraving is in the middle of an area to be quarried. It is therefore proposed that the motif on a block of sandstone be removed as one of the conditions of a Consent to Destroy. Gosford Quarries has the equipment to remove a block of sandstone, leaving the motif intact.

Before the sandstone block is removed, a Consent to Destroy must be sought for site SQ 1. This consent is also contingent on conditions requiring detailed recording, including night recording and latex peel, prior to destruction.

Gosford Quarries is expected to be required to clearly identify on maps the presence of all known Aboriginal sites within the Somersby quarry site. The company would also provide notification to employees that it is an offence to damage, deface or destroy sites without prior written permission. This will ensure that inadvertent damage does not affect those sites.

These recommendations have been reviewed and supported by National Parks and Wildlife Service. This is contained in correspondence from the Acting Cultural Heritage Manager, Sydney Zone of the National Parks and Wildlife Service (21 August, 1996).



Traffic and Transportation

11

11 TRAFFIC AND TRANSPORTATION

The traffic generated by existing activities on the site and the proposed quarry extension are discussed in this section of the EIS. It shows that the milling and administrative activities, which are the subject of previous development approvals are the main source of traffic. The proposed quarry extension would not result in any net increase in traffic and thus it was not considered appropriate to carry out a traffic impact study.

11.1 TRAFFIC GENERATION

The traffic generated by existing approved activities on the site includes the following:

- Cars - with 45 employees working on the Somersby site, this generates a maximum of 90 car movements per day. The quarry operations also generate varying numbers of visitors to the site. Based on an average of one visitor vehicle per day, this would generate another 16 car movements per day.
- Trucks - sandstone is delivered by truck from other quarries for cutting, processing and distribution to building sites and product sales outlets. Although the average daily truck movements vary, these currently do not exceed 12 truck movements per day.

The only traffic movements generated directly by quarrying extraction result from transporting of sandstone block from the quarry to the outdoor storage or milling operations area. Given the small quantities of sandstone extracted from the site, these internal truck movements do not exceed two truck movements per day.

11.2 ACCESS AND VEHICULAR MOVEMENTS

The Somersby quarry site has good access to the Sydney Newcastle Freeway and the Pacific Highway. Figure 11.1 shows the route used by north and south-bound traffic to gain ready access to the site. The proximity of the site to the freeway and highway means that truck movements avoid noise-sensitive residential areas.

The local roads linking the freeway and Quarry Road provide access to the Somersby industrial area and the quarry site. These road have been designed to accommodate high volume heavy vehicle traffic generated by movements to the industrial area and to the township of Gosford. Appropriate design standards have been adopted for intersection and sight distance requirements.

Quarry Road provides direct access to the site from the Somersby industrial area. It is a sealed road which terminates at the entrance to the quarry site. The road design and capacity has proven satisfactory to service the quarry over many years.

11.3 MANAGEMENT AND MITIGATION MEASURES

Given the low volume of truck traffic generated by the quarry and the capacity of the roads linking the quarry site to the freeway, it seems unlikely that any management measures could be adopted to reduce the traffic related impacts associated with the existing quarry operations.

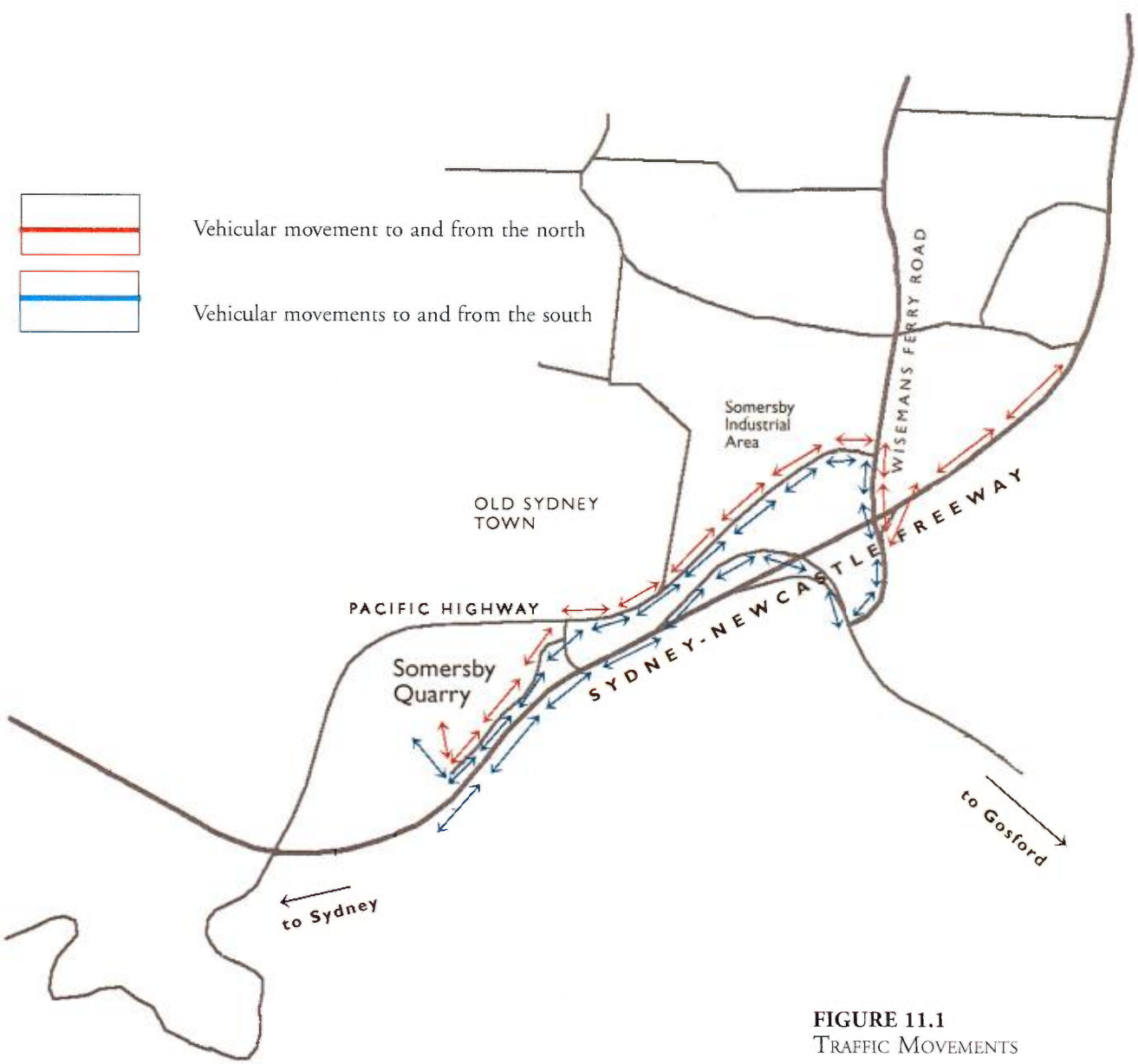
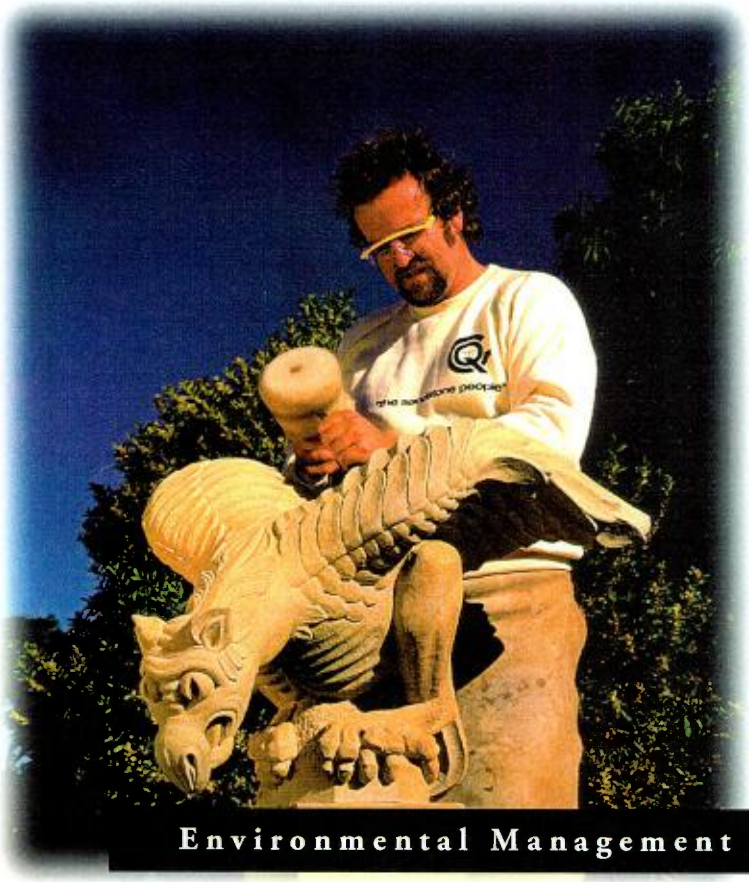


FIGURE 11.1
TRAFFIC MOVEMENTS



Environmental Management and Rehabilitation

12

12 ENVIRONMENTAL MANAGEMENT AND REHABILITATION

This section of the EIS provides an outline of an environmental management and rehabilitation plan for the quarry site. It summaries a range of mitigation measures identified in other chapters of the EIS and covers additional matters identified in the *EIS Guideline – Extractive Industry Quarries.*

12.1 Objectives

Sandstone quarrying is expected to continue for another twenty years on the Somersby site. During this period, the site will undergo progressive rehabilitation. Although it is difficult to determine the final use of the site following the completion of quarrying, the current conservation and scenic protection zoning provides a framework for its end use. Given the existing bushland surrounding the quarry extraction area and proximity of the site to Brisbane Waters National Park, the long term use of the site is expected to be for open space and recreation purposes.

The specific objective of the rehabilitation process is to restore the native ecosystem. The quarry operator would continue to seek the advice of experts in the field of soil development, plant succession and species diversity during the planning and implementation of the rehabilitation process. The rehabilitation process would aim to accelerate the natural revegetation processes. To achieve this, the rehabilitation areas would be protected from disturbances and threats such as bushfires, weed invasion and loss of nutrients through poor drainage design.

12.2 Rehabilitation Process

The first stage in the rehabilitation process involves backfilling of defined quarry areas, with rock overburden and sediment. These defined areas usually measure 60 metres square. Backfilling involves only the use of on-site material. The process can take five years or more.

Once the quarry has been filled, the area is stabilised and contoured to resemble the pre-quarry landform. Topsoil, also stored on the site, is spread over the newly contoured site. The revegetation process involves native seeding and planting of indigenous seedlings.

12.2.1 Progressive rehabilitation

Gosford Quarries has already embarked on a programme of progressive rehabilitation of those areas of the site where quarrying has been completed. Figure 12.1 shows various stages of the site rehabilitation. The process of progressive rehabilitation has been incorporated into the quarry extraction plans.

Figure 12.2 shows the likely progress of site rehabilitation over the remaining twenty year life of the quarry.

12.2.2 Monitoring

The rehabilitation programme will continue to be monitored through the use of photographic records. Gosford Quarries is also committed to ongoing reviews by personnel of the Department of Land & Water Conservation who regularly inspect the site.

12.2.3 Training

The quarry manager is responsible for site rehabilitation and revegetation. On-site training is provided to field personnel on rehabilitation techniques.

12.3 ENVIRONMENTAL MANAGEMENT AND REHABILITATION PLAN OUTLINE

The scope of the environmental management and rehabilitation plan is influence by two important factors:

- extraction rates of 400 cubic metres per year are very small when compared with most quarrying operations and therefore the extent of land disturbance is limited
- quarrying has been carried out on the site for more than twenty years, with former quarry areas at various stages of rehabilitation.

12.3.1 Management Of Site Impacts

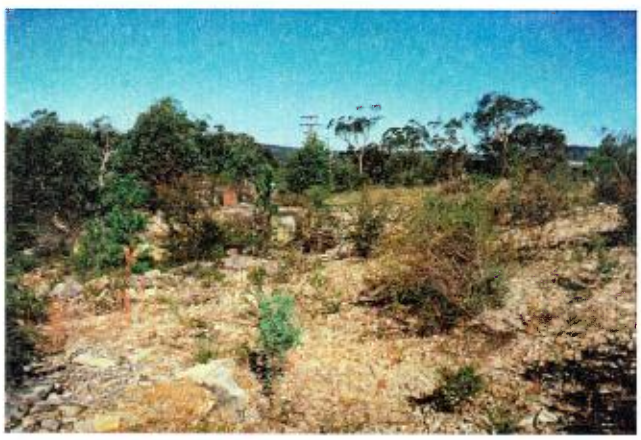
Section 4 of the EIS outlines the existing and proposed erosion and sedimentation controls for the site.

The success of the rehabilitation process to date will assist in the planning of rehabilitation and revegetation for the next 20 years. If necessary, expert biological advice would be sought on the key aspects of the revegetation process including:

- species selection;

Filling with overburden

Contouring



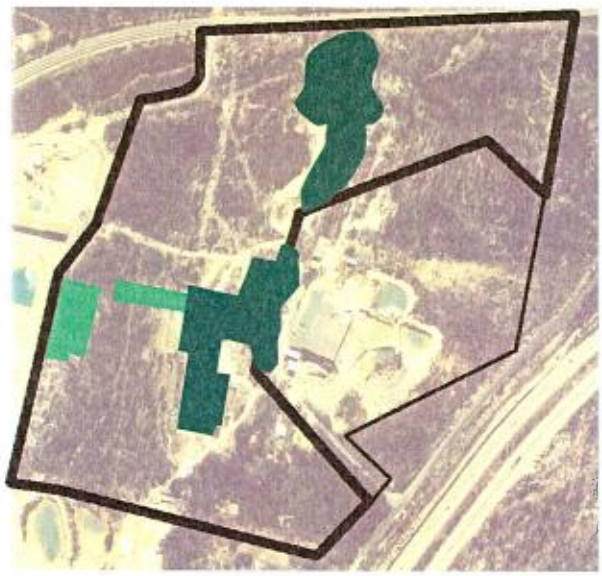
Early phase revegetation

Advanced revegetation

Source: Site photographs, Somersby, 1998

FIGURE 12.1
STAGES IN REHABILITATION

1998



2008

2018

Rehabilitation in Progress

Rehabilitation Complete

FIGURE 12.2
Progress in rehabilitation

- timing of planting;
- soil preparation works;
- seed collection, processing, storage and treatments;
- plant establishment (sowing seed or planting seedlings);
- weed control;
- soil enhancement.

Overall, the rehabilitation process is expected to be successful due to the extent of existing natural bushland surrounding the disturbed parts of the site. This will be particularly helpful in allowing native fauna to recolonise the site.

12.3.2Management Of Operational Impacts

Top soil stock pile

The earliest stage of the quarrying process involves the removal and on-site storage of top soil. Topsoil plays an important role in the re-establishment of native species. The following measures would be adopted for stockpile management:

- store soil stock pile away from drainage lines and vehicle routes;
- use local seeds to grass stockpile;
- install erosion barriers such as fabric curtains or hay bales around stock pile;
- check stockpile regularly for signs of damage or erosion;
- seek professional advice, where necessary.

Where appropriate, cleared vegetation would be used as mulch or as a source of seed for revegetation.

Chemical, explosives and fuels

With the exception of the use of fuel for vehicles, the site is generally free of any chemicals that might represent an environmental risk. There are no chemicals used in the extraction or processing of sandstone.

Water, dust and erosion management

The water management measures currently and proposed to be adopted for the site are described in Section 4. These include formed drainage lines to direct surface runoff from disturbed areas of the site and ponds to collect sediment. A simple system is used for the recycling of water collected in the sedimentation ponds.

Section 8 of the EIS deals with air quality impacts including dust management. In windy conditions, watering of disturbed areas is used to minimise dust dispersion.

Transport management

The main truck transport activities are contained within the operational area of the site, within the vicinity of the main processing building. There are very few truck movements within the sandstone extraction area and these generally follow defined roadways, thus avoiding any disturbance to native vegetation.

Maintenance and site security plans

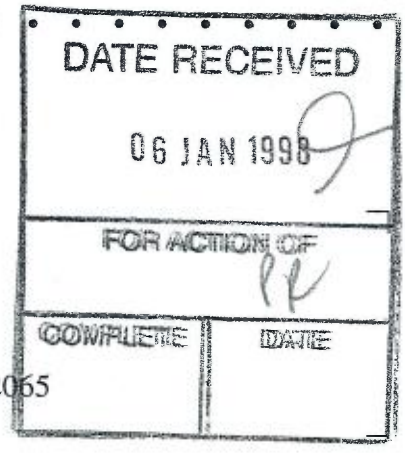
Current site security measures include perimeter fencing and an electronic security system. These measures would be maintained throughout the life of the quarry.

Contingency plans

Gosford Quarries has an Occupational Safety & Health Policy for the site, as required by the Department of Mineral Resources. This outlines emergency responses to fire, storm and other such events. All emergency services have been provided with location plans and details of access routes to the site.

Appendix A
Directors Requirements

New South Wales Government
Department of Urban Affairs and Planning



Mr P Rand
Associate
EDAW
PO Box 91
ST LEONARDS 2065

Contact: R Eather

Our Reference: N97/000397

Your Reference:

Dear Mr Rand,

Gosford Quarries - Somersby Quarry
Lot 173 DP 755246 Quarry Road, Somersby

Thank you for your letter of 10 November 1997 seeking consultation with the Director-General for the preparation of an environmental impact statement (EIS) for the above development.

Under clause 52 of the Environmental Planning and Assessment Act Regulation 1994 (the Regulation), the Director-General requires that the key issues outlined below are specifically addressed in the EIS.

Key Issues

- Applicability of Sydney Regional Environmental Plan No. 20 - Hawkesbury Nepean River (Amendment No. 2 - 1997), in particular clause 11(17), which requires consultation with the Hawkesbury-Nepean Catchment Management Trust;
- Applicability of Sydney Regional Environmental Plan No. 9 - Extractive Industry;
- Visual impacts;
- Potential impact on watercourses including Mooney Mooney Creek and its tributaries;
- Potential impact on flora and fauna, including threatened species;
- Effectiveness of existing environmental protection measures;
- Cumulative effect, both locally and regionally, given the proximity of other similar operations in the area.

Consultation

- Hawkesbury Nepean Catchment Management Trust;
- Department of Mineral Resources;
- Environment Protection Authority;

Governor Macquarie Tower
1 Farrer Place, Sydney 2000
Box 3927 GPO, Sydney 2001

Telephone: (02) 9391 2000
Facsimile: (02) 9391 2111

- Department of Land and Water Conservation;
- National Parks and Wildlife Service.

You should use the Department's EIS Guideline 'Extractive Industries Quarries' in the preparation of the EIS. The Guidelines contains a guide to the type of information most likely to be relevant to the development you propose. Not all the matters it contains may be appropriate for consideration in the EIS for your proposal; equally, the guide is not exhaustive. The Guideline is available from the Department's Information Branch at a cost of $6.00. The Information Branch is located at No. 1 Farrer Place, Sydney, on telephone (02) 9391 2222.

The EIS shall be prepared in accordance with clauses 50 and 51 of the Regulation. Statutory requirements for the form and content of the EIS are outlined in Attachment 1.

You should consult with Gosford City Council and take into account any comments Council may have in the preparation of the EIS. Other issues emerging from consultation with relevant local, State and Commonwealth government authorities, service providers and community groups are to be addressed in the EIS.

Should you require any further information regarding the Director-General's requirements for the EIS, please contact Rosalind Eather on (02) 9391.2356.

Yours sincerely

Neille Osborne

for David Mutton
Acting Manager 30/12/97
Major Assessments and Hazards Branch
As Delegate for the Director-General

DEPARTMENT OF URBAN AFFAIRS AND PLANNING

Attachment No. 1

STATUTORY REQUIREMENTS FOR THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT UNDER PART 4 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

In accordance with the *Environmental Planning and Assessment Act 1979* (the Act), an environmental impact statement (EIS) must meet the following requirements.

Content of EIS

Pursuant to Schedule 2 and clause 51 of the *Environmental Planning and Assessment Regulation 1994* (the Regulation), an EIS must include:

1. A summary of the environmental impact statement.
2. A statement of the objectives of the development or activity.
3. An analysis of any feasible alternatives to the carrying out of the development or activity, having regard to its objectives, including:
   (a) the consequences of not carrying out the development or activity; and
   (b) the reasons justifying the carrying out of the development or activity.
4. An analysis of the development or activity, including:
   (a) a full description of the development or activity; and
   (b) a general description of the environment likely to be affected by the development or activity, together with a detailed description of those aspects of the environment that are likely to be significantly affected; and
   (c) the likely impact on the environment of the development or activity, having regard to:
      (i) the nature and extent of the development or activity; and
      (ii) the nature and extent of any building or work associated with the development or activity; and
      (iii) the way in which any such building or work is to be designed, constructed and operated; and
      (iv) any rehabilitation measures to be undertaken in connection with the development or activity; and
   (d) a full description of the measures proposed to mitigate any adverse effects of the development or activity on the environment.
5. The reasons justifying the carrying out of the development or activity in the manner proposed, having regard to biophysical, economic and social considerations and the principles of ecologically sustainable development.
6. A compilation, (in a single section of the environmental impact statement) of the measures referred to in item 4(d).
7. A list of any approvals that must be obtained under any other Act or law before the development or activity may lawfully be carried out.
8. For the purposes of Schedule 2, the principles of **ecologically sustainable development** are as follows:
   (a) The precautionary principle - namely, that 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.
   (b) Inter-generational equity - namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.
   (c) Conservation of biological diversity and ecological integrity.
   (d) Improved valuation and pricing of environmental resources.

Note

The matters to be included in item (4)(c) might include such of the following as are relevant to the development or activity:

(a) the likelihood of soil contamination arising from the development or activity;

(b) the impact of the development or activity on flora and fauna;
(c) the likelihood of air, noise or water pollution arising from the development or activity;
(d) the impact of the development or activity on the health of people in the neighbourhood of the development or activity;
(e) any hazards arising from the development or activity;
(f) the impact of the development or activity on traffic in the neighbourhood of the development or activity;
(g) the effect of the development or activity on local climate;
(h) the social and economic impact of the development or activity;
(i) the visual impact of the development or activity on the scenic quality of land in the neighbourhood of the development or activity;
(j) the effect of the development or activity on soil erosion and the silting up of rivers or lakes;
(k) the effect of the development or activity on the cultural and heritage significance of the land.

An environmental impact statement referred to in Section 77(3)(d) of the Act shall be prepared in written form and shall be accompanied by a copy of Form 2 of the Regulation signed by the person who has prepared it.

Procedures for public exhibition of the EIS are set down in clauses 55 to 57 of the Regulation.

Attention is also drawn to clause 115 of the Regulation regarding false or misleading statements in EISs.

Note

Should the development application to which the EIS relates not be exhibited within 2 years from the date of issue of the Director-General's requirements, under clause 52(5) of the Regulation the proponent is required to reconsult with the Director-General.

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Appendix B
Study Team

STUDY TEAM

This Environmental Impact Statement was prepared for Gosford Quarries Properties Pty Ltd under the direction of Mr Philip Brown. The following study team includes members of EDAW and key subconsultants

Peter Rand	*Project Manager*
Maureen Wade	*Environmental Planning Consultant*
Brook Hambly	*Research Assistant*
Teri Nye	*Graphic Design*
Matt Davies (Sinclair Knight Merz)	*Noise and Air Quality*
Kim Nicholson (Sinclair Knight Merz)	*Noise and Air Quality*
Rob Lenferna (Sinclair Knight Merz)	*Water Management*
Robert Payne	*Flora and Fauna*
Jo McDonald	*Aboriginal Archaeology*