Section 3
Issue Identification and Prioritisation

This section describes how the environmental issues assessed in the Environmental Assessment were identified and prioritised. In summary:

i) a comprehensive list of all relevant environmental issues was assembled through a review of the operational experience gained to date at the Calga Sand Quarry, consultation with the local community and local and State government agencies, completion of preliminary environmental studies and a review of relevant legislation, planning documents and environmental guidelines;

ii) a review of the Project design and local environment was undertaken to identify risk sources and potential environmental impacts for each environmental issue;

iii) an analysis of risk for each potential environmental impact was then completed with a risk rating assigned to each impact based on likelihood and consequence of occurrence; and

iv) through a review of the allocated risk ratings and the frequency with which each issue was identified, the relative priority of each issue was determined, with this priority used to provide an order of assessment and breadth of coverage within Section 4.

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3.1 INTRODUCTION

In order to undertake a comprehensive *Environmental Assessment* of the proposed Southern Extension of the Calga Sand Quarry, appropriate emphasis needs to be placed on those issues likely to be of greatest significance to the local environment, neighbouring land owners and the wider community. In order to ensure this has occurred, a program of community and government consultation, preliminary environmental studies and literature review was undertaken to identify relevant environmental issues and potential impacts. The issues considered of greatest significance to the assessment of the recently approved Stage 3 of the Calga Sand Quarry along with the operational experience gained to date at the Calga Sand Quarry have also been considered. This was followed by an analysis of the environmental risk posed by each potential impact (without mitigation) in order to prioritise the assessment of the identified environmental issues within the *Environmental Assessment*. Reference should be made to Section 7 where the environmental risks are re-evaluated with the adoption of the mitigation measures proposed by Rocla.

3.2 ISSUE IDENTIFICATION

3.2.1 Introduction

Identification of environmental issues relevant to the development and operation of the proposed Southern Extension involved a combination of consultation and background investigations and research. This included:

- consultation with surrounding land owners (Section 3.2.2.1);
- consultation with State and local government agencies (Section 3.2.2.2);
- review of issues effecting the existing Calga Sand Quarry operation (Section 3.2.3);
- reference to relevant NSW government policies and guidelines (Section 3.2.4); and
- preliminary environmental studies (Section 3.2.5).

3.2.2 Consultation

3.2.2.1 Consultation with Surrounding Land Owners

Between 9 October 2006 and 3 November 2006, the quarry manager of the Calga Sand Quarry and Rocla's Manager of quarry operations, visited land owners and residents of properties between Cooks Road to the north and the F3 Freeway to the south. In total, 17 residences were visited. During each consultation, a copy of the *Preliminary Environmental Assessment* for the Proposed Southern Extension was offered, an overview of the Project provided and an invitation made to the land owner or resident to comment on the existing Calga Sand Quarry and/or the proposed Southern Extension (either verbally or in writing).

During each visit, which varied in time between 30 minutes and 2.5 hours, a consultation record was filled out where details of the land owner/resident land use and history in the local area was recorded, along with comments made on the existing operation and concerns over the proposed extension.

The Proponent's representatives also recorded whether further feedback was likely (in written form) and what further information would be supplied to the land owner/resident.

Once all consultation was completed, and additional written feedback received, the details of land ownership/residence, issues of concern and request for further information were compiled in a database. **Table 3.1** provides a summary of the issues raised by those consulted.

Table 3.1
Issues Raised by Local Community

Land Owner/Resident	Property Reference[1]	Issues Raised[2]								
		Surface Water Resources/Water Use	Dust, Particulate Matter & Air Quality	Traffic	Noise Impacts/Monitoring	Socio-economic/Property Values	Rehabilitation & final Landform/Use	Groundwater Resources	Visual Amenity	Flora & Fauna
T. Thompson	104 Jones Rd	✓✓	✓		✓		✓	✓✓	✓	
R. Townsend	32 Polins Rd	✓					✓			✓
D. O'Bryan	30 Jones Rd			✓	✓					
J. Simmonds[#]	31 Jones Rd									
J. Gazzana[#]	185 Peats Ridge Rd									
B. Lawler[#]	69 Cooks Rd									
J. Glover	69 Jones Rd		✓	✓	✓					
S. & P. Cauchi	3 Jones Rd	✓	✓		✓			✓		
T. & G. Barnard[1]	Darkinjung Rd		✓	✓	✓	✓		✓		✓
M. Lambert	59 Jones Rd									✓
J. King[#]	5 Bandaroo Rd									
M. Pontifex	120 Ironbark Rd	✓	✓✓		✓		✓	✓		
G. Auburn	356 Peats Ridge Rd				✓			✓		
D. Soulis[#]	61 Jones Rd									
C. Goding	208 Peats Ridge Rd							✓		
G. & D. Marler[#]	45 Cooks Rd									
K. Eaton & W. White	24 Jones Rd	✓	✓	✓	✓	✓				
Total		**6**	**7**	**4**	**8**	**2**	**3**	**7**	**1**	**3**

Note 1: Comments received in writing # No Issues Raised
Note 2: Multiple ticks indicate multiple issues raised

On 3 December 2006, the owners of the Australia Wildlife Walkabout Park emailed a document expanding upon the concerns they raised when consulted on 9 October 2006.

A request was made for representatives of Rocla and R.W. Corkery & Co. Pty. Limited to visit the Australia Wildlife Walkabout Park and further discuss their primary issues of concern and the approach to the proposed assessment of these. On 14 February 2007, four representatives of the Proponent and two representatives of R.W. Corkery & Co. Pty Limited visited the Park, reviewed information contained within the Preliminary Environmental Assessment and provided additional detail on the Project. Ms Barnard of Australia Wildlife Walkabout Park reiterated her primary concerns over the Project, namely:

i) changes to landscape and impacts on amenity value of her property and residence;

ii) impacts on viability of Australia Wildlife Walkabout Park business;

It was explained to Ms Barnard that the issues she raised were already being considered with comprehensive assessments to be included in the *Environmental Assessment* for the Project.

3.2.2.2 Consultation with Calga Village Residents

Representatives of Rocla and R.W. Corkery & Co. Pty Limited met with a number of the owners and residents of Calga Village on 20 August 2009 to discuss the proposed Southern Extension Project and issues of potential concern.

The principal concerns expressed by Calga Village residents related to the increase in heavy vehicle traffic the Project would cause on the 200m section of the Pacific Highway and F3 southbound on-ramp. The heavy vehicle related issues raised included following.

- Concerns relating to truck noise, use of exhaust brakes, vibration of homes caused by trucks decelerating and accelerating through the village and repetitive gear changes.
- Potential for vehicle roll-overs at the intersection of Peats Ridge Road and the Pacific Highway.
- Truck speeds on the southbound on-ramp.
- The comparatively short acceleration lane from the southbound on-ramp.
- The structural integrity of the section of road used by trucks to join the F3.
- Potential for noise barriers to screen residents next to the southbound on-ramp.
- Avoidance of trucks queuing in the village prior to 5.00am.
- "Encouragement" of trucks with bigger mufflers.

All residents acknowledged that many of the trucks that currently travel south on Peats Ridge Road to join the F3 originate from other quarries on the Somersby Plateau and from various agricultural enterprises including poultry farms and bottled water suppliers.

Other issues raised by Calga Village residents included the following:

- Use of reversing beepers on the quarry site.
- Groundwater impacts (six residences have bores or wells).
- Dust fallout affecting tank water supplies (all residences have tanks).
- Dust generated by trucks.
- Limitation of site activities on windy days.
- The high proportion of silica in dust from the quarry.
- Evaporation from dams on the quarry site.

3.2.2.3 Community Consultative Committee

In addition to the specific consultation conducted with the land owners and residents surrounding the Project Site, it is noted biannual Community Consultative Committee meetings are held for the approved Calga Sand Quarry operation. At these meetings, community representatives are provided with updates on the progress of planning and environmental assessments of the proposed Southern Extension. The meetings have provided a means for both the resident representatives and Rocla to discuss matters of interest with respect to both the existing and proposed operation.

3.2.2.4 Consultation with Government Agencies

Following the preparation of a Preliminary Environmental Assessment, the following government agencies and organisations were consulted by the Proponent and/or its specialist consultants.

- Department of Planning*.
- Department of Water and Energy* (now the Department of Environment, Climate Change and Water – NSW Office of Water).
- Gosford City Council*.
- Department of Primary Industries – Mineral Resources* (now the Industry and Investment NSW – Mineral Resources).
- Department of Primary Industries (now the Industry and Investment NSW – Agriculture).
- Department of Environment and Climate Change* (now the Department of Environment, Climate Change and Water – Environment Protection and Regulation Group).
- NSW Roads and Traffic Authority.

Representatives of those government agencies identified with an asterisk (*) attended a Planning Focus Meeting convened by the Department of Planning on 6 September 2006. An initial indication of the issues considered to be of primary concern and therefore requiring

priority in the *Environmental Assessment* were followed up by written recommendation to the Department of Planning for incorporation into the Director-General's Requirements (DGRs) for the Project. The DGRs were originally provided to the Proponent on 15 December 2006 with an updated copy provided on 4 March 2009. The key issues of within the DGRs were identified as follows.

- **Surface and Groundwater**

  Including a detailed assessment of the surface and groundwater impacts, a site water balance, and a detailed description of the proposed water management system, including any sediment control and/or water supply dams. As part of the mitigation measures for the Project, a surface and groundwater contingency strategy which details the measures proposed to minimise impacts on supply of water (quality and quantity) to the environment and local land owners in the area must be included.

- **Flora and Fauna**

  Including impacts on critical habitats (including riparian habitat), threatened species, populations or ecological communities, groundwater dependent ecosystems, native vegetation, and the adjacent National Park estate. As part of the mitigation measures for the Project, a comprehensive offset strategy which details the measure proposed to ensure that there is no net loss of flora and fauna values in the area in the medium to long term must be included.

- **Rehabilitation, Final Landform and Final Void Management**

  Including a detailed description of how the site would be progressively rehabilitated, revegetated, and integrated into the surrounding landscape, a justification for the proposed final landform and use in relation to any strategic land use objectives (including the draft Central Coast Regional Strategy and Popran National Park Plan of Management), a detailed description of final void management, the measures that would be put in place to ensure sufficient measures are available to implement the proposed rehabilitation measures, and the ongoing management of the site following the cessation of quarrying activities.

- **Noise**

  Including operational and off-site road noise impacts.

- **Air Quality**

- **Heritage**

  Both Aboriginal and non-Aboriginal.

- **Traffic and Transport**

  Including details of traffic volumes generated by the Project, and an assessment of the capacity and safety of the proposed transport route.

- **Hazard and Risk**

  Including public safety and site security.

- **Visual**
- **Social and Economic**

A full copy of the DGRs, along with a tabulated summary of all government agency requirements is presented as **Appendix 2**. **Table 3.2** presents a summary of the frequency with which particular environmental issues were identified by the government agencies consulted.

Table 3.2
NSW Government Agency Issue Identification

Government Agency	Issue[1]													
	Air Quality	Noise	Flora/Fauna	Groundwater Resources	Surface Water Resources (including ESCP)	Aboriginal Heritage	Rehabilitation & Final Land Use	Competing Land Use (including Planning Issues / Permissibility)	Resource Assessment	Land Capability/Agricultural Suitability	Traffic	Socio-economic Impacts	Consultation	Bushfire Hazard
DECC (formerly DEC)	✓	✓	✓	✓	✓	✓		✓						
DWE (formerly DNR)				✓✓										
DPI (MR)									✓					
DPI (Ag)	✓		✓✓	✓	✓		✓	✓		✓				
DPI (Fisheries)				✓✓	✓									
GCC	✓✓✓	✓✓	✓✓	✓✓	✓	✓	✓✓				✓✓	✓✓	✓✓	✓
RTA		✓									✓✓			
Total	5	4	5	8	5	2	3	3	1	1	4	2	2	1

Following the issuing of the DGRs, further consultation was undertaken with each government agency. A summary of the consultation is provided as follows.

Department of Planning

Between May and September 2007, discussions between the Proponent and the Department of Planning were held to establish the Department's expectations for a biodiversity offset strategy for the Project. The discussion culminated in the convening of a meeting at the Calga Sand Quarry on 22 August 2007, attended by representatives of the Department, Rocla, R.W. Corkery & Co. Pty. Limited and Cumberland Ecology Pty Ltd (ecological consultants to the Proponent)[1]. Included in the outcomes of the meeting was confirmation that a minimum 2:1 offset ratio should be targeted, with appropriate consideration given to threatened and/or significant flora and fauna values of both the land to be disturbed and that to be conserved as part of the offset strategy.

[1] DECC was invited to this meeting, however, declined the invitation to attend.

Department of Environment and Climate Change

Following the receipt of draft DGRs from the Department of Planning, Messrs Hamish Rutherford and Stephen Lewer were consulted (1 November 2006 and 6 August 2007 respectively) regarding the requirements of DECC in relation to what would be considered an adequate biodiversity offset strategy. Reference was made to the importance of addressing Step 4 of the *Draft Guidelines for Threatened Species Assessment* issued by Department of Environment and Conservation and Department of Primary Industries in July 2005 (DEC/DPI, 2005). When consulted in August 2007, DECC was invited to attend the site meeting held to discuss the proposed offset strategy of the Proponent. Unfortunately, no DECC personnel was available on the dates proposed and when the possibility of an additional meeting, DECC indicated they would wait until the *Environmental Assessment* was formally submitted before making further comment on the suitability/adequacy of the offset strategy (and other assessments).

Following the submission of the *Environmental Assessment* for adequacy assessment, DECC provided a submission to the Department of Planning expressing the opinion that the ecological and Aboriginal heritage field surveys, in particular survey and assessment of the off-site biodiversity offset area, were inadequate. The comments of DECC were considered and a proposal to address the deemed inadequacies of the ecological field survey (and subsequent assessment of impact on threatened species and the adequacy of the biodiversity offset strategy) forwarded to Mr Peter Jamieson (Head Regional Operations Unit Coastal North-east Branch) of DECC on 5 March 2009. A response in relation to the proposed approach to addressing the deemed inadequacies was subsequently received on 3 April 2009. This response effectively endorsed the proposed approach to undertaking targeted surveys for threatened flora and frog species (within the proposed offset area) during spring.

Department of Water and Energy

Licensing of water resources was identified very early on as an issue requiring careful consideration for the Project. Initially, the DWE was consulted (by email on 12 September 2006) regarding the applicability of the Kulnura Mangrove Mountain Groundwater Sources Water Sharing Plan (WSP), requirement to obtain an appropriate Water Access Licence (WAL) allocation and the potential to transfer WALs between groundwater management areas of the WSP. In summary, the DWE advised that:

- given the WSP has been gazetted, licensing of water falls under the *Water Management Act 2000*;
- the Proponent would be required to licence any water accessed by the quarry, ie. through seepage or removal within the extracted sand; and
- the transfer of WALs between groundwater management areas within the area covered by the WSP was permitted assuming the groundwater management area to be transferred to was not already over allocated under the WSP.

As an embargo on the issuing of new licences is currently in place for the Kulnura Mangrove Mountain Groundwater Sources WSP, obtaining a WAL licence was identified as a potential constraint for the Proponent. The question of what volume of water is considered to have been

'taken' from the aquifer and therefore require licensing was therefore raised with various officers of DWE between September and November 2007. The Proponent identified that a large proportion of the groundwater which seeps into the quarry would ultimately be returned to the groundwater as base flows to Cabbage Tree Creek (a beneficial use for downstream Groundwater Dependent Ecosystems) and therefore should be exempt from licensing. Initial responses from DWE indicated this was a potentially valid position suggesting that as long as the water was returned to a 'beneficial use', the argument of the Proponent would be considered (pers. comm. H. De Silva [11 September 2007] and A. Phillipa [7 November 2007]). However, a formal response received on 20 September 2007 clarified the policy position of the DWE, which was contrary to these responses, ie. there is no allowance made under the *Water Management Act 2000*, for the offsetting of intercepted groundwater via return to the aquifer. On the basis of the above, the Proponent has agreed to terms to purchase a WAL to account for the initial in-flows to the extraction area predicted by groundwater modelling. Further monitoring and model calibration would be undertaken to determine if the allocation is sufficient for the life of the quarry, with additional WALs obtained, as required.

Following the submission of the *Environmental Assessment* for adequacy assessment, DWE provided a submission to the Department of Planning indicating that various aspects of the groundwater and surface water assessments contained within the *Environmental Assessment* were inadequate. The deemed inadequacies were reviewed by the Proponent and further clarification sought from DWE as to the nature of the additional information required, given that for each deemed inadequacy, coverage of this issue could be demonstrated in the *Environmental Assessment* or accompanying *Specialist Consultant Studies Compendium*. A request for clarification was sent via email on 16 March 2009, 8 April 2009 and again on 19 June 2009 (this last correspondence was copied to the Department of Planning), with each deemed inadequacy identified and coverage within the *Environmental Assessment* or accompanying *Specialist Consultant Studies Compendium* identified. The request was also made during a telephone call to the DWE on 14 April 2009, with a further message left on 15 June 2009. To date, no feedback has been received from the DWE and it is therefore assumed that the information provided to the DWE via email satisfactorily addresses the deemed inadequacies.

Roads and Traffic Authority

On 15 May 2008, a representative of the Proponent and the Proponent's traffic consultant met with representatives of the RTA (and Gosford City Council) to discuss the proposed intersection treatment for a new access point from Peats Ridge Road onto the Lot 1, DP 805358 ie. the "Southern Entrance". At this meeting, the RTA representative did not identify any safety (or other) concerns regarding the proposed treatment, and the intersection treatment presented at this meeting was included in the *Environmental Assessment* submitted for adequacy assessment in December 2008. (It is noted that the RTA indicated the issue of traffic congestion related to additional truck movements on the F3 Freeway during the morning peak hour period needed to be considered).

Subsequent to the submission of the *Environmental Assessment* for adequacy assessment, the RTA revised its position and noted there were now serious safety concerns with the proposed intersection treatment, specifically the interaction of vehicles exiting Lot 1, DP 805358 of the proposed Southern Extension with vehicles entering Peats Ridge Road from Jones Road. In response to this revised position, the Proponent's traffic consultant (Transport and Urban Planning) provided further justification for the proposed intersection treatment (on

27 February 2009), however, in a letter to the Department of Planning on 4 May 2009, the RTA maintained its concerns over the safety of the proposed intersection treatment. The recommended Road Safety Audit was subsequently completed and forwarded to the RTA who on 11 June 2009 withdrew its concerns over the proposed intersection treatment.

Gosford City Council

As the nominated road authority for Peats Ridge Road, a representative of the Proponent and the Proponent's traffic consultant met with representatives of Gosford City Council (and the RTA) to discuss the proposed intersection treatment for a new access point from Peats Ridge Road onto the Lot 1, DP 805358. At this meeting, the Gosford City Council representative did not identify any safety (or other) concerns regarding the proposed treatment, and the intersection treatment presented at this meeting was included in the *Environmental Assessment* submitted for adequacy assessment in December 2008.

Subsequent to the submission of the *Environmental Assessment* for adequacy assessment, Gosford City Council made a submission to the Department of Planning indicating that aspects of the flora and fauna assessment contained within the *Environmental Assessment* were inadequate. The deemed inadequacies are consistent with those raised by the DECC and so consultation was restricted to the DECC, the relevant authority in relation to the management of natural heritage values and threatened species management within NSW.

3.2.3 Review of Issues Relating to the Existing Calga Sand Quarry

During the preparation of an EIS for the existing approved Calga Sand Quarry, both the local community and government agencies expressed concerns over impacts on the groundwater resources of the Somersby Plateau. To date, however, those concerns have not been vindicated by the results of both monthly and continuous monitoring of groundwater levels on and surrounding the Calga Sand Quarry. The monitoring has revealed no evidence of adverse impacts on either groundwater levels or groundwater quality. Notwithstanding this, it is anticipated that over time the level of impact may increase and potentially trigger a Groundwater Contingency Plan prepared for the approved Calga Sand Quarry.

Surface Water Resources

There are two primary issues related to surface water that currently require management at the Calga Sand Quarry.

i) Harvest of surface water: water diverted around Stage 3 of the Calga Sand Quarry currently flows to Dams 7a and 7b/c at the western end of the existing extraction area. Depending on the requirements of the neighbouring land owner, this can be diverted onto this property and/or downstream to Cabbage Tree Creek.

   The management of diverted surface water is likely to be a continuing issue requiring management, should the Project be approved.

ii) Water quality: water discharged from Dam 7a and 7b/c of the approved Calga Sand Quarry must meet DECC nominated criteria.

In recent times, this has been achieved, however, with increased areas of disturbance and therefore disturbed catchment, this is likely to require ongoing management and operational safeguards.

Waste Management

A constraint on production at the approved Calga Sand Quarry is the availability of areas for the construction and management of silt cells.

With the proposed increase in production, as part of the proposed Southern Extension and therefore silt produced through sand washing, the management of silt is likely to require ongoing careful consideration. The prevention of spillage of silt outside the proposed extraction area and/or pollution of discharged surface water would also require ongoing management and operational safeguards.

Noise and Air Quality

While monitoring has confirmed that the approved Calga Sand Quarry can operate within nominated noise and dust deposition criteria, an increase in the area of disturbance and production levels as proposed by the Project requires detailed assessment of possible increases in noise levels and/or air contaminants.

Weed Management

The possible propagation of weed species at the approved Calga Sand Quarry and proposed Southern Extension is an issue requiring consideration as part of the Project.

3.2.4 Review of Planning Issues and Environmental Guidelines

3.2.4.1 Introduction

A number of State and regional planning instruments apply to the Project. These planning instruments were reviewed to identify any environmental aspects requiring consideration in the *Environmental Assessment*. In addition, the DGRs identified a number of guideline documents to be referenced/reviewed during the preparation of the *Environmental Assessment* (see **Table A2-1**).

A brief summary of each relevant planning instrument is provided in Sections 3.2.4.2 to 3.2.4.4. The application and relevance of planning instruments related to specific environmental issues have been assessed in the relevant specialist consultant assessments. Section 3.2.4.5 briefly outlines the approach taken to referencing and reviewing environmental guideline documents.

3.2.4.2 State Planning Issues

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

This SEPP was gazetted on 17 February 2007, in recognition of the importance to New South Wales of mining, petroleum production and extractive industries. The quoted aims of the SEPP are as follows.

"*a. To provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State.*

b. To facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources.

c. To establish appropriate planning controls to encourage ecologically sustainable development through the Environmental Assessment, and sustainable management, of development of mineral, petroleum and extractive material resources."

The SEPP specifies matters requiring consideration in the assessment of any mining, petroleum production and extractive industry development, as defined in NSW legislation. A summary of the matters that a consent authority needs to consider when assessing a new or modified proposal (Part 3 - Clauses 12 to 17 of the SEPP) is as follows.

- **Clause 12**: Compatibility of proposed mine, petroleum production or extractive industry with other land uses.

  Consideration must be given to:

  – the existing uses and approved uses of land in the vicinity of the development;

  – the potential impact on the preferred land uses (as considered by the consent authority) in the vicinity of the development; and

  – any ways in which the development may be incompatible with any of those existing, approved or preferred land uses.

  The respective public benefits of the development and the existing, approved or preferred land uses must be evaluated and compared, along with any measures proposed by Rocla to avoid or minimise the incompatibility.

- **Clause 13:** Compatibility of the Project with mining, petroleum production or extractive industry.

  Consideration must be given to whether the development is likely to have a significant impact on current or future mining, petroleum production or extractive industry and ways in which the development may be incompatible. Measures taken by Rocla to avoid or minimise any incompatibility are to be considered. The public benefits of the development and any existing or approved mining, petroleum production or extractive industry must be evaluated and compared.

- **Clause 14:** Natural resource management and environmental management.

  Consideration must be given to ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure:

  – impacts on significant water resources, including surface and groundwater resources, are avoided or minimised;

  – impacts on threatened species and biodiversity, are avoided or minimised; and

  – greenhouse gas emissions are minimised and an assessment of the greenhouse gas emissions (including downstream emissions) of the development is provided.

- **Clause 15:** Resource recovery.

  This clause requires the efficiency of resource recovery, including the reuse or recycling of material and minimisation of the creation of waste, be considered.

- **Clause 16:** Transportation.

  Consideration must be given to alternative means of product transportation other than by road and that a code of conduct for the transport of materials on public roads is prepared.

- **Clause 17:** Rehabilitation.

  The rehabilitation of the land affected by the development must be considered including:

  – the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated;

  – the appropriate management of waste generated by the development;

  – remediation of any soil contaminated as a result of the development; and

  – the steps to be taken to ensure that the state of the land does not jeopardize public safety, while being rehabilitated or at the completion of rehabilitation.

It is worthy of note that State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 does not apply to the Project as the application for project approval was lodged on 8 September 2006 (see **Appendix 1**), ie. prior to the gazettal of this SEPP on 16 February 2007. This notwithstanding, Section 7 reviews how each of the considerations presented in Clauses 12 to 17 is addressed in this document.

State Environmental Planning Policy (Major Projects) 2005

This SEPP, gazetted on 25 May 2005, identifies projects of significance to NSW, which are to be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*. It applies to all projects satisfying nominated criteria contained within the schedules of the SEPP. Under Schedule 1 of the SEPP, the Project would be classified as a Group 2 development, ie. mining, petroleum production, extractive industries and related industries given the size of the sand

resource is greater than 5 million tonnes and the annual rate of sand removal would exceed 200 000 tonnes per year. The Calga Sand Quarry Southern Extension Project exceeds both of these threshold levels as the extractable resource is approximately 23.9 million tonnes and maximum annual sales would be 1 million tonne per year.

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

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

In accordance with SEPP 33 the hazardous substances and dangerous goods to be held or used on the Project Site are required to be identified and classified in accordance with the risk screening method contained within the document entitled "Applying SEPP 33 2nd edition", (DUAP, 1997). Hazardous materials are defined within DUAP (1997) as substances falling within the classification of the Australian Code for Transportation of Dangerous Goods by Road and Rail (Dangerous Goods Code).

The Project would involve the storage of approximately 30 000L of diesel fuel, Class 3 C1 combustible liquid, and small amounts of other hydrocarbons including lubricating oils and grease, Class 3 C2 combustible liquids. The diesel stored on site would be used principally to fuel the equipment operating around the processing area. This fuel storage would supplement the daily/weekly delivery of fuel by a fuel contractor directly to the mobile earthmoving equipment used for sand removal operations. As the diesel fuel and lubricating oils and greases would not be stored adjacent to any other hazardous materials of the same class, DUAP (1997) does not require these to be considered further.

No assessment or screening thresholds are provided in relation to the transport of Class 3 C1 or C2 combustible liquids. However, experience with determinations for projects transporting similar quantities of Class 3 hazardous materials, via comparable transportation routes suggests transportation of diesel to the Project Site would not be considered potentially hazardous.

Based on the risk screening method of DUAP (1997), neither the storage nor transportation of the hazardous materials to be used on the Project Site would result in the Project being considered potentially hazardous under SEPP 33. As such, there is no requirement to undertake a Preliminary Hazard Analysis for the Project.

State Environmental Planning Policy No. 44 (SEPP 44) – Koala Habitat Protection

The Gosford City Local Government Area (LGA) is identified in Schedule 1 of this policy as an area that could provide habitat for Koalas. The policy requires an investigation be carried out to determine if core or potential Koala habitat is present on the areas of the Project Site likely to be disturbed. Core Koala habitat comprises land with a resident population of Koalas whereas potential Koala habitat comprises land with native vegetation with known Koala feed trees constituting at least 15% of the total number of trees present on a site.

SEPP 44 has been addressed by the ecological consultant to the Project (Cumberland, 2009 - see *Specialist Consultant Studies Compendium* - Part 3).

3.2.4.3 Regional Planning Issues

Sydney Regional Environmental Plan No. 8 – Central Coast Plateau Areas (SREP 8 CCPA)

Planning on the Central Coast Plateau Areas, within which the Project Site is located, is controlled principally by Sydney Regional Environmental Plan No. 8 – Central Coast Plateau Areas (SREP 8). The objectives of the planning instrument is to provide for the environmental protection of the Central Coast plateau and to evaluate competing land uses. Development of extractive industries is permissible with consent in areas nominated on the plans accompanying the instrument provided the following conditions are satisfied.

- Arrangements are made for buffer zones to surround the development as deemed applicable by Council.
- The land would be rehabilitated on cessation of the extractive industry so as to enable its subsequent agricultural or other suitable land use.
- The consent of Council[2] is provided prior to the clearing of land.

SREP 8 was amended by Gosford/Wyong Local Environmental Plan No. 2001 – Central Coast Plateau Areas (Gosford/Wyong LEP 2001) to remove conflict between SREP 8 and Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2-1995) (SREP 9 (2)) over the designated preferential use of land on the Central Coast Plateau Areas. **Figure 3.1** places the Project Site in its regional planning context and illustrates its location within an area identified as: "*location of extractive industry*" by Gosford/Wyong LEP 2001.

Sydney Regional Environment Plan No. 9 (SREP 9) – Extractive Industry (No. 2 – 1995)

The Gosford Local Government Area is identified in Schedule 4 of this plan, as containing extractive material of regional significance in proximity to the population of the Sydney Metropolitan Area. As noted with reference to SREP 8, Gosford/Wyong LEP 2001 has confirmed the designated preferential use of land on which the Project Site is located as "*location of extractive industry*". The objective of SREP 9(2) is to facilitate the development of extractive resources in proximity to the population of the Sydney Metropolitan Area, whilst promoting the development in an environmentally acceptable manner. The plan states that extractive industries are permissible with consent only if:

- effects on both surface water and groundwater are considered;
- a rehabilitation plan is prepared in accordance with Guidelines for Rehabilitation Plans in the Extractive Industry Report;
- noise and vibration would be generally in accordance with guidelines in the State Pollution Control Commission Environmental Noise Manual (1985 edition); and
- rehabilitation measures would be carried out in accordance with Urban Erosion and Sediment Control Handbook (1992)[3].

[2] As the proposed Southern Extension is considered a Major Project under Part 3A of the *Environmental Planning and Assessment Act 1979*, consent is required of the Minister for Planning rather than Council.
[3] These documents have since been superseded or updated.

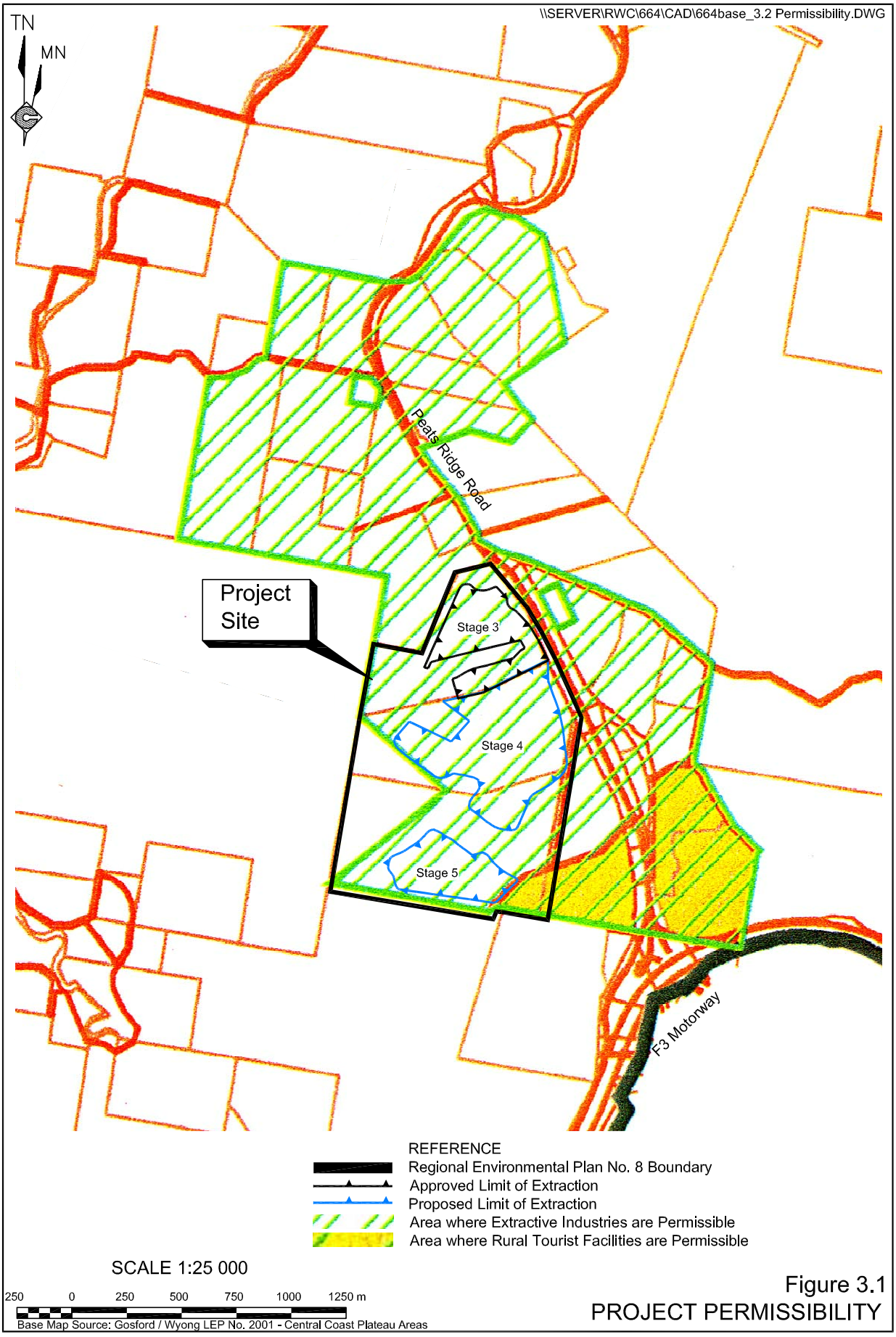

Figure 3.1
PROJECT PERMISSIBILITY

3.2.4.4 Local Planning Issues

Gosford Interim Development Order 122 – (Gosford IDO 122)

The Project Site is zoned as Rural (Highway Protection) 1(b) and Scenic Protection 7(b), however, both SREP 8 and SREP 9(2) take precedence over IDO 122 and therefore the Project is permissible with consent.

The only Development Control Plan (DCP) of relevance to the 2005 amended proposal is DCP No. 111 – Car Parking.

DCP No. 111 – Car Parking (DCP 111)

Extractive industries are not referenced specifically under the schedule of requirements of DCP 111. There is currently sufficient car parking spaces at the Calga Sand Quarry to accommodate the existing workforce and visitors to the Calga Sand Quarry. The relevant standards referenced in DCP 111 would be implemented when the car parking area is required to relocate as Stage 3 of the quarry is further developed.

3.2.4.5 Regional Strategic Plans

Draft Central Coast Regional Strategy (DoP, 2006)

The draft Central Coast Regional Strategy was prepared by the DoP to provide the strategic framework to guide sustainable growth within the Central Coast region over the next 25 years. While focusing on planning for the forecast population increase in the region, the strategy also seeks to:

- prevent development in areas constrained by coastal processes, flooding, wetlands, important primary industry resources and significant scenic and cultural landscapes;
- protect the cultural, Aboriginal and non-Aboriginal heritage values and visual character of the Region's centres and surrounding landscapes;
- provide a framework for important environmental assets, landscape values and natural resources to be identified and protected; and
- require that new development occurs in a sustainable manner.

The key environmental challenges include:

- providing a sustainable long-term water supply;
- providing a balance between future development and important conservation values;
- improving identification, protection and enhancement of natural environments including significant biodiversity corridors, regionally significant vegetation, coastal lakes and estuaries, and landscape values;

- improving understanding of Aboriginal cultural heritage values and incorporating this information within land use planning and natural resource management processes;
- accepting the value of rural lands as food-producing lands and ensuring the long term protection of these assets; and
- managing natural hazards in new developments, namely flooding, coastal erosion and inundation (including the impacts of climate change), land instability, bushfire and acid sulphate soils.

The Project Site is classified as being located on "rural and resource lands" (see **Figure 3.2**), which are recognised by the strategy as providing a significant proportion of the Sydney regions agricultural produce, coal and construction materials. While recognising the value of rural and resource lands to the demand for natural resources of the Central Coast and Sydney regions, the strategy identifies the need for a Regional Conservation Plan that identifies and protects State and regional biodiversity values, including buffers to these areas, and provides certainty for development.

The Project has been designed with consideration given to the primary objectives and environmental challenges identified in the preceding text.

Popran National Park Plan of Management (NPWS, 2000)

Popran National Park, gazetted as a national park in November 1994, covers 3 970ha and protects an important area of native vegetation and wildlife corridor between Brisbane Water National Park to the east and Dharug National Park to the west. The plan of management (POM) is a legal document required under the *National Parks and Wildlife Act 1974* that outlines how the park is required to be managed.

While primarily focused on the management of lands within the Popran National Park, the POM also provides policies for the management of adjacent lands, as this might impact on the national park. All policies contained within the POM were reviewed and the following were considered relevant to the Project.

Native and Introduced Plants

- Programs to control the invasion and spread of introduced plants within the park will be developed in consultation with neighbouring landholders.
- Conservation of important vegetation communities on lands adjoining the park will be promoted through input into the Catchment Management Committee and through information to local community groups.

Native and Introduced Animals

- Programs to control introduced animals will be undertaken in conjunction with neighbours, where appropriate.

Figure 3.2
LAND CLASSIFICATION UNDER THE DRAFT CENTRAL COAST REGIONAL STRATEGY

Bushfire Management

- Effective and efficient utilisation of district's fire fighting resources will be promoted through co-operative planning arrangements.
- On-going liaison will be undertaken with park neighbours on co-operative fire management, and Community Fireguard programs promoted.

Management Operations

- Gates and fencing will be erected where necessary to prevent unauthorized access into the park. All management trails will be signposted and gated.

The identified policies were considered in the design of the proposed Southern Extension of the Calga Sand Quarry, particularly the Stage 5 extraction area.

3.2.4.6 Environmental Guidelines

The DGRs require that in assessing the identified key assessment requirements, reference be made to one or more guideline documents. In addition, a number of the government agencies consulted in relation to the Project required reference to other environment guideline documents. **Table A2.2** of **Appendix 2** identifies each of these guidelines and identifies the relevant section of the *Environmental Assessment* or part of the *Specialist Consultant Studies Compendium* where they are considered and/or addressed.

3.2.5 Preliminary Environmental Studies

Following the completion of an exploration program over the area of the proposed Southern Extension (see Section 2.2.3.1), and during the initial project design phase, a number of preliminary environmental studies and/or extensions of existing monitoring programs were commenced to identify the constraints posed by the local environment and what elements of the local environment would require further consideration and assessment should an application for a project be submitted. Studies in the fields listed below were commenced.

- Aboriginal Heritage.
- Water Resources.
- Noise.
- Flora and Fauna.
- Air Quality.
- Traffic.

The preliminary studies and monitoring programs identified the following issues within these fields which could potentially constrain the Project and have therefore been considered issues of priority.

Aboriginal Heritage

Several Aboriginal sites had previously been recorded within the area of the proposed Southern Extension, of which one was identified to fall within the area being considered for extraction. Both the consultant archaeologist of Australian Surveys and Reports Pty Ltd (AS&R) and representatives of the Darkinjung Local Aboriginal Land Council (LALC) consider this site to be of high cultural and scientific significance and therefore the conservation of this site is identified as being of high priority and a potential constraint on the Project. Several other sites were identified within the area of the proposed Southern Extension, however, these fall outside the area being considered for extraction and should not constrain the Project.

Further detail on the field survey and assessment of Aboriginal heritage over the Project Site is provided by AS&R (2009) (see Part 4 of the *Specialist Consultant Studies Compendium* with a summary provided in Section 5.4).

Flora and Fauna

In recognition of the fact that the Southern Extension of the Calga Sand Quarry would require the clearing of a relatively large area of native vegetation, Rocla commissioned Cumberland Ecology Pty Ltd (Cumberland) to coordinate baseline studies of Flora and Fauna. Field surveys conducted between November 2005 and June 2008 allowed a detailed vegetation map of the Project Site to be prepared. Notably, none of the vegetation communities identified were determined to be Endangered Ecological Communities, as listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Small pockets of vegetation on and downstream of the Project Site were, however, mapped as being either completely or partially groundwater dependent with further assessment required to predict impacts on these communities which, in the absence of any mitigating or offset measures may constrain the development.

Based on targeted surveys for flora and fauna of conservation significance, and an assessment of the risk posed to each by the Project, Cumberland determined that no species would be placed at extreme risk, ie. requiring high level planning and remedial action to ensure no detrimental impact on local distribution and population density. A total of 13 species were identified as being potentially at high risk of impact as a consequence of the Project and would require further consideration as part of an assessment of impact. It was considered likely that further mitigating or offset measures would be required for these species, potentially constraining the Project, and therefore management of each species was identified as an issue of high priority.

Further detail on the field survey and assessment of Project Site ecology is provided by Cumberland (2009) (see Part 3 of the *Specialist Consultant Studies Compendium* with a summary provided in Section 5.3).

Water Resources

Following the completion of an exploration program consisting of 13 bore holes south of the existing Calga Sand Quarry, seven bore holes were converted to piezometers to monitor groundwater levels and quality. Four of these have been fitted with automatic water level recorders. Drilled depths were generally between 27m and 30m, with one piezometer (MW13) completed to a depth of 45m.

Preliminary groundwater investigations undertaken by Peter Dundon & Associates Pty Ltd (Dundon) in 2006 confirmed the water is contained in the sandstone layer targeted by Rocla for extraction. Dundon measured the water table between 10m and 25m below ground level with the groundwater level pattern consistent with that observed on the existing quarry site, suggesting hydraulic continuity across the two sites.

Dundon mapped the groundwater level contours as generally mirroring the surface topography, with a slope across the site towards the west, and an average hydraulic gradient of 0.05 (5m per 100m). The top of the ridge occupied by Peats Ridge Road is believed to be both a surface water and groundwater divide and therefore the groundwater flows in a generally westerly direction across the site.

Groundwater recharge occurs by infiltration of rainfall and this flows down-gradient towards Cabbage Tree Creek. Given the elevation of Cabbage Tree Creek to the west of the Project Site is about 130m lower than the lowest water table level measured on the Project Site, Dundon expected natural discharge of the groundwater would occur to Cabbage Tree Creek, probably from springs or seeps in the area between the Project Site and the creek.

Based on the preliminary investigations of Dundon, it is likely that the Project would have some influence on the local groundwater table, as the proposed extraction would intercept water contained within the sandstone. The degree of impact of the Project on the groundwater table and local bores which access water from the sandstone aquifer has therefore been identified as requiring detailed assessment. The Project may also have some impact on the quantity of rainfall infiltrating the groundwater table and discharging to Cabbage Tree Creek downstream. The level of impact of the Project on ecosystems partially or completely dependent on this discharge has also been identified as an issue requiring further assessment as part of this *Environmental Assessment*.

Air Quality

Dust deposition levels have been monitored at locations surrounding the existing Calga Sand Quarry since April 2001 and more recently adjacent to the proposed extraction area of the Southern Extension (since October 2006). While the deposited dust levels have generally met the nominated criteria, the increased scale of the Project would be likely to increase the level of dust deposition and concentration of airborne particulate matter around the Project Site.

The likely increase in these levels and concentrations requires further assessment as part of this *Environmental Assessment* (and then monitoring) to ensure DECCW goals are not exceeded.

Noise

Noise levels have been monitored at locations surrounding the existing Calga Sand Quarry as a condition of DA 94-4-2004. The most recent monitoring confirmed that the quarry was operating within the nominated noise criteria levels, however, given the scale of operations at the Calga Sand Quarry would increase as a result of the Project, and would move closer to additional residences to the south and southeast, further assessment (and then monitoring) of likely noise levels at residences surrounding the Project Site is required to ensure DECCW criteria are not exceeded.

Traffic

Transport and Urban Planning (TUP) undertook an assessment of the existing road network, traffic levels and accident statistics to assess whether the Project may be constrained by the proposed increase in production and therefore traffic generation. TUP concluded:

- the local road network has been constructed to a high standard with appropriate traffic management along the roads and at the principal intersections;
- traffic volumes using Peats Ridge road on weekdays are relatively low and traffic is free flowing with minimal delays; and
- recorded accident levels between 2001 and 2005 do not indicate any significant or treatable accident problem on the road network.

Traffic generation is unlikely to constrain the Project, however, the possible impact on road condition, traffic levels and congestion, and general road safety is an issue requiring assessment as part of this *Environmental Assessment*.

Further detail on the methods employed by TUP in their review of existing conditions is provided by TUP (2008) (see Part 7 of the *Specialist Consultant Studies Compendium* with a summary provided in Section 5.6).

3.2.6 Summary of the Identified Environmental Issues and Impacts

Table 3.3 presents a summary of the environmental issues identified, and the frequency with which each was identified. The frequency of identification provides an initial indication of those environmental aspects perceived to be at greatest risk and hence of greatest priority and **Table 3.3** has been ordered accordingly (from most to least frequently identified).

Following a review of the Project design, the local environment and other factors, a number of potential sources of risk and their corresponding potential environmental impacts were identified for each of the environmental issues presented in **Table 3.3**.

Section 3.3 presents an analysis of risk associated with the identified sources of risk and their potential environmental impacts in accordance with Australian Standards HB 203:2006 and AS/NZS 4360:2004 and through consideration of the likelihood and potential consequence(s) of the environmental impacts. **Table 3.7** presents a summary the identified sources of risk/potential incidents and the subsequent potential environmental impacts.

Table 3.3
Summary of Identified Environmental Issues

Environmental Issue	Source and Frequency of Identification					
	Government Consultation[1]	Community Consultation[2]	Preliminary Environmental Studies[3]	Legislation, Policies & Guidelines[4]	Review of Calga Sand Quarry Management	Total
Groundwater	8	7	2	5	1	23
Threatened flora and fauna protection	5	3	6	6	-	20
Surface water/erosion & sediment control	5	6	1	3	2	17
Noise	4	8	1	3	1	17
Air pollution - dust/odour/other	5	7	1	1	1	15
Traffic and transport	4	4	1	3	-	12
Rehabilitation & final landform	2	3	-	-	1	6
Aboriginal heritage	2	-	1	1	-	4
European heritage	-	-	-	3	-	3
Socio-economic impacts	1	2	-	-	-	3
Land Use/Planning/permissibility	3	-	-	-	-	3
Waste management	-	-	-	1	1	2
Soil resources/land capability	1	-	-	1	-	2
Land and/or water contamination	1	-	-	-	1	2
Consultation	2	-	-	-	-	2
Visual amenity	-	1	-	-	-	1
Bushfire	1	-	-	-	-	1

Note 1: Summarised from the Director-General's Requirements and attached correspondence to DoP from consulted government agencies (see Appendix 2).
Note 2: Summarised from one-on-one discussions held with surrounding land owners.
Note 3: Based on the identified constraints of preliminary environmental studies conducted by the specialist consultants for the Project.
Note 4: A record of the environmental legislation, planning documents and guidelines required to be referenced in the preparation of the *Environmental Assessment*.

3.3 ANALYSIS OF ENVIRONMENTAL RISK AND ISSUE PRIORITISATION

3.3.1 Analysis of Environmental Risk

Risk is the chance of something happening that will have an impact upon the objectives or the task, which in this case is development and operation of the Project with minimal affect on the local environment. Risk is measured in terms of consequence (severity) and likelihood (probability) of the event happening. For each environmental issue identified in **Table 3.3**, the potential environmental impacts (see **Table 3.7**) have been allocated a risk rating based on the potential consequences and likelihood of occurrence.

The allocation of a consequence rating was based on the definitions contained in **Table 3.4**. It is noted that the assigned consequence rating represents the highest level applicable, ie. if a potential impact is assigned a level of 4 - Major based on impact to the environment and 2 - Minor based on area of impact, the consequence level assigned would be 4 - Major.

Table 3.4
Qualitative Consequence Rating

Level	Descriptor	Description
5	Catastrophic	• Massive and permanent detrimental impacts on the environment. • Very large area of impact. • Massive remediation costs. • Reportable to government agencies. • Large fines and prosecution resulting in potential closure of operation. • Severe injuries or death.
4	Major	• Extensive and/or permanent detrimental impacts on the environment. • Large area of impact. • Very large remediation costs. • Reportable to government agencies. • Possible prosecution and fine. • Serious injuries requiring medical treatment.
3	Moderate	• Substantial temporary or minor long term detrimental impact to the environment. • Moderately large area of impact. • Moderate remediation costs. • Reportable to government agencies. • Further action may be requested by government agency. • Injuries requiring medical treatment.
2	Minor	• Minor detrimental impact on the environment. • Affects a small area. • Minimal remediation costs. • Reportable to internal management only. • No operational constraints posed. • Minor injuries which would require basic first aid treatment.
1	Insignificant	• Negligible and temporary detrimental impact on the environment. • Affects an isolated area. • No remediation costs. • Reportable to internal management only. • No operational constraints posed. • No injuries or health impacts.
Source: modified after HB 203:2006 (Standards Australia, 2006) - Table 4(B)		

The likelihood or probability of each impact occurring was then rated according to the definitions contained in **Table 3.5**.

Table 3.5
Qualitative Likelihood Rating

Level	Descriptor	Description
A	Almost Certain	Is expected to occur in most circumstances.
B	Likely	Will probably occur in most circumstances.
C	Possible	Could occur.
D	Unlikely	Could occur but not expected.
E	Rare	Occurs only in exceptional circumstances.
Source: HB 203:2006 (Standards Australia, 2006) - Table 4(A)		

The risk associated with each environmental impact was assessed without the inclusion of any operational controls or safeguards in place and based on the qualitative assessment of consequence and likelihood, a risk ranking of either; low, medium, high or extreme was assigned to each potential impact based on the matrix of **Table 3.6**.

Table 3.6
Risk Rating

Likelihood	Consequences				
	Insignificant 1	**Minor 2**	**Moderate 3**	**Major 4**	**Catastrophic 5**
A (Almost Certain)	H	H	E	E	E
B (Likely)	M	H	H	E	E
C (Possible)	L	M	H	E	E
D (Unlikely)	L	L	M	H	E
E (Rare)	L	L	M	H	H
Note: Rating modified after HB 203:2006 (Standards Australia, 2006) - Table 4(C)					

The four risk rankings are defined as follows.

Low (L): requiring a basic assessment of proposed controls and residual impacts. Any residual impacts are unlikely to have any major impact on the local environment or stakeholders.

Moderate (M): requiring a medium level assessment of proposed controls and residual impacts. It is unlikely to preclude the development of the Project but may result in impacts deemed unacceptable to some local or government stakeholders.

High (H): requiring in-depth assessment and high level documentation of the proposed controls and mitigation measures. Ultimately, this level of risk may preclude the development of the Project.

Extreme (E): requiring in-depth assessment and high level documentation of the proposed controls and mitigation measures and possible preparation of a specialised management plan. Unless considered to be adequately managed by the controls and/or management plan, this level of risk is likely to preclude the development of the Project.

Table 3.7 presents the identified potential impacts that may be associated with each environmental issue based on the source or risk or potential incident, potential consequences and local receptor/surrounding environment.

Table 3.8 provides an assessment of the unmitigated risk for each potential environmental impact based on the classifications and definitions provided in **Tables 3.4** to **3.6**. Where appropriate, and to provide a more realistic assessment of the risks posed by the various environmental issues, the environmental impacts have been further defined using either a level, range or scale of impact providing for the various circumstances which may apply. **Table 6.1** in Section 6 provides an analysis of risk following the implementation of operational and safeguards measures.

3.3.2 Environmental Issue Prioritisation

The issues identified as requiring assessment within the *Environmental Assessment* have been prioritised based, in decreasing order, of emphasis upon the following.

- The key assessment requirements of the DGRs (see Section 3.2.2.3 and **Appendix 2**).
- Issues identified with a greater frequency of impacts with high or extreme risk ratings (see **Table 3.6**).
- Issues with a high frequency of identification (see **Table 3.1**).

By considering both the number and respective proportion of higher risk impacts or potential incidents and proportion, the issues as requiring assessment within the *Environmental Assessment* have been prioritised. **Table 3.9** presents these issues in decreasing order of priority following consideration of the number and proportion of high and extreme risk impacts and incidents.

Table 3.7
Risk Sources and Potential Environmental Impacts

Environmental Issue	Risk Source (s)	Potential Consequences	Receptor/Surrounding Environment	Potential Environmental Impacts
Groundwater	• Pollution of groundwater due to hydrocarbon spills. • Pollution of groundwater due to other contaminants, eg. overburden etc.	• Decreased groundwater quality.	• Surrounding landholders utilising bores or pumps.	• Reduced groundwater quality causing reduced availability for existing uses.
	• Reduction of groundwater levels due to extraction and associated drawdown.	• Reduction in quantity of water stored in local aquifers. • Decrease in availability of groundwater to adjoining land owners and/or groundwater dependent ecosystems.	• Lower Mangrove and Popran Creeks Groundwater Source of the Kulnura Mangrove Mountain Water Sharing Plan (WSP). • Aquifer of the sandstone aquifer. • Groundwater bores of adjoining land owners. • Groundwater dependent ecosystems.	• Reduced water contained within the affected groundwater source area of the Kulnura Mangrove Mountain WSP. • Reduction in groundwater levels. • Reduced yields of local groundwater bores. • Degradation of groundwater dependent ecosystems.
	• Reduction in contribution to surface water flows.	• Changes to local hydrological regime and surface flows.	• Local streams, springs and perched water table.	• Reduced surface flows to Cabbage Tree Creek catchment. • Degradation of groundwater dependent ecosystems.
Surface Water/Flooding	• Reduction in environmental flows through on-site capture of water.	• Reduced flows to downstream vegetation.	• Downstream flora and fauna.	• Reduced natural surface water flows resulting in stress to native vegetation and degradation of fauna habitats.
	• Discharge of dirty, saline or contaminated water.	• Decreased water quality. • Impacts on local soils and vegetation.	• Local creeks and tributaries. • Project Site soils and vegetation.	• Reduced quality of downstream waters. • Indirect impacts on soil quality and vegetation.
	• Altered flood regimes.	• Altered flood regimes.	• Local communities and ecosystems.	• Changes to local flooding patterns and indirect impacts on native vegetation communities and ecosystems.
Erosion and Sedimentation	• Erosive actions of wind and water. • Elevated concentration of suspended sediments within runoff resulting from erosion of disturbed areas.	• Loss of topsoil. • Increased sedimentation within downstream creeks.	• Project Site soils. • Local creeks and their tributaries.	• Soil erosion. • Increased sediment load in drains and/or waterways.
	• Increase in deposited dust and particulate matter concentration.	• See "*air pollution*" below.	• See "*air pollution*" below.	• See "*air pollution*" below.
Flora and Fauna Protection	• Removal of native vegetation due to land clearing activities.	• Removal of habitat and disturbance to threatened species, populations or communities. • Decreased amenity of local area, in particular the wildlife park commercial venture to the south.	• Vegetation within Project Site and area of influence. • Local land owners and residents, in particular the owner/operator of Australia Wildlife Walkabout Park.	• Loss of, or alteration to, existing habitats. • Direct adverse impact on threatened species, populations and communities. • Decreased amenity of local land owners, residents and business operators.
	• Disturbance to threatened species identified on the Project Site or in the local areas	• Local or regional reduction in distribution. • Possible local extinction.	• Locally identified threatened species, notably, *Darwinia glaucophylla*, *Hibertia procumbens*, *Callistemon linearifolius, Red-crowned Toadlet, Giant Burrowing Frog and Glossy Black-cockatoo*.	• Local or regional reduction in distribution. • Possible local extinction.
	• Disturbance to fauna and fauna habitat as a result of project operations, eg. noise, dust etc.	• Reduction in biodiversity of the Project Site.	• Local communities and ecosystems.	• Reduced biodiversity. • Direct adverse impact(s) on threatened species, populations or communities.
Aboriginal Heritage	• Removal or destruction of Aboriginal sites and/or artefacts due to Project Site extraction and associated activities.	• Loss or damage to Aboriginal artefacts.	• Local Aboriginal community	• Impact on identified sites and/or artefacts of Aboriginal cultural heritage as a result of the proposed extraction and associated activities.
European Heritage	• Removal or destruction of sites of heritage significance due to project activities.	• Loss or damage to heritage sites.	• Identified heritage sites.	• Loss or destruction to/of items of heritage significance.
Noise	• Increased noise levels resulting from operation of mobile equipment, crushing and screening equipment and product transportation.	• Decreased amenity. • Health related issues. • Decreased land values. • Detrimental effects on local fauna	• Surrounding residents, land owners and native fauna.	• Increased noise and levels associated with operational activities causing annoyance, distractions, ie. amenity impacts. • Increased noise levels associated with the Project traffic causing annoyance, distractions, ie. amenity impacts. • Sleep disturbance as a result of maximum noise levels. • Increased noise levels associated with the Project leading to impacts on local fauna assemblage.

Source: Modified after HB203:2006 (Standards Australia, 2006) - Table 3

Table 3.7 (Cont'd)
Risk Sources and Potential Environmental Impacts

Environmental Issue	Risk Source/potential incident(s)	Potential Consequences	Receptor/Surrounding Environment	Potential Environmental Impacts
Air Pollution – Dust, Odour, other	• Dust generation resulting from vehicle movements on unsealed roads. • Wind action on disturbed areas, overburden emplacements and stockpiles.	• Increased deposited and suspended particulates. • Health-related complaints.	• Surrounding residences and buildings. • Surrounding native vegetation, eg. Popran National Park. • Local residents.	• Nuisance/amenity impacts from dust deposited on window sills, cars, surfaces etc. • Adverse health impacts (if PM_{10} or crystalline silica levels are excessive). • Stress of native vegetation, and indirect impacts on fauna habitat.
	• Vehicle emissions.	• Increased greenhouse and other gas emissions.	• Local and global air-shed	• Increased contribution to greenhouse effect.
Traffic and Transport	• Construction of additional entrance off Peats Ridge Road.	• Impacts associated with road construction (noise, dust, ecology, heritage etc.).	• See "*air pollution*", "*flora and fauna protection*" and "*noise*" above, and "*Aboriginal heritage*" below.	• See "*air pollution*", "*flora and fauna protection*" and "*noise*" above, and "*Aboriginal heritage*" below.
	• Increased traffic levels due to movement of workforce and contractors.	• Increased vehicle movements (especially heavy vehicles) on local roads.	• Local road network. • Existing road users.	• Increased traffic congestion. • Elevated risk of accident/incident on local roads. • Road pavement deterioration.
	• Increased heavy vehicle movements for product transportation.			
Visual Amenity	• Changes in visual characteristics of the Project Site.	• Clearing of native vegetation and increased visibility of the quarry activities.	• Surrounding residents and local motorists.	• Decreased visual amenity.
Rehabilitation and Final Landform	• Temporary or permanent changes to the landform of the Project Site.	• Reduced amenity of the Project Site land and influence on activities/lifestyle of adjoining land owners. • Altered final land use not compatible with activities/lifestyle of adjoining land owners.	• Project Site land surrounding land owners and/or residents.	• Reduced amenity of the final landform resultant from vegetation clearing and altered topography. • Final landform and land use that is not compatible with activities/lifestyle of local community.
Soil Resources	• Reduction in soil quality and availability through poor management practices.	• Structural damage to soils through poor soil management practices. • Reduced biological activity of soils.	• Project Site soils.	• Insufficient soil quantities for rehabilitation. • Reduced soil quality.
	• Increased erosion or erosion potential of soils	• See "*erosion and sedimentation*" above.	• See "*erosion and sedimentation*" above.	• See "*erosion and sedimentation*" above.
Waste Management	• Production of contaminating or polluting materials, eg. waste oils, saline water, general rubbish.	• Contamination of downstream surface waters. • Contamination of groundwater. • Contamination of downstream lands. • Reduced visual amenity.	• Project Site land and water resources. • Downstream land and water resources. • Local and regional groundwater.	• Hydrocarbon or other pollutant contamination of surface water. • Hydrocarbon or other pollutant contamination of groundwater. • Reduced amenity of Project Site due to poor rubbish, litter management.
Land Contamination	• Extraction exposing previously contaminated materials.	• Transfer of contaminated materials to non-contaminated areas.	• Areas receiving contaminated material (including surface waters).	• Transfer of contaminated material. • Surface water contamination.
Bushfire	• Initiation of fire on the Project Site and spread to adjoining properties and/or Popran National Park.	• Health and safety impacts to project personnel. • Damage to Project Site equipment. • Damage to adjoining properties and/or native vegetation.	• Project Site personnel and equipment. • Project Site and adjoining land.	• Injury or health impacts on project personnel. • Operational constraint posed by damaged equipment. • Destruction/damage of native vegetation and fauna habitat.
Socio-Economic Impacts	• Alteration of social activities or employment due to employment generation and capital expenditure.	• Reduced unemployment and increased local spending.	• Local community and businesses	• Improved economic activity and related social impacts attributable to reduced unemployment
	• Perceived or real impacts on local amenity of neighbouring properties.	• Reduced property values. • Reduced amenity value of landholdings.	• Surrounding property owners.	• Reduced quality of life (actual or perceived). • Reduced property values.

Source: Modified after HB203:2006 (Standards Australia, 2006) - Table 3

Based on the issues identified and the risk ratings allocated to the potential environmental impacts of these, and a review of the issues considered 'key assessment requirements' of the DGRs, the following order of priority has been determined. This order of priority provides for the order of assessment in Section 5, namely:

1. Groundwater
2. Surface Water/Erosion and Sedimentation
3. Flora and Fauna
4. Aboriginal Heritage
5. Visual Amenity
6. Bushfire
7. Rehabilitation/Final Landform/Land Use
8. Traffic
9. Land Contamination and Waste Management
10. Noise
11. Soil and Land Capability
12. Air Quality
13. Socio-economic Climate

Table 3.8
Analysis of Unmitigated Environmental Risk

Page 1 of 5

Potential Environmental Impacts (see Table 3.5)	Type/Level/Scale of Impact (if applicable)	Consequence of Occurrence if not Mitigated	Likelihood of Occurrence if not Mitigated	Unmitigated Risk Rating
Groundwater				
Groundwater Pollution by leaking/spilt hydrocarbon	Contamination requiring minor recovery works.	2	D	M
	Contamination requiring major recovery works.	4	E	H
Drawdown of groundwater	Reduced water levels within the aquifer of the Lower Mangrove and Popran Creeks Groundwater Source of the Kulnura Mangrove Mountain Water Sharing Plan (WSP) on the Project Site.	2	B	H
	Reduced water levels within the aquifer of the Lower Mangrove and Popran Creeks Groundwater Source of the Kulnura Mangrove Mountain WSP on adjoining properties to the Project Site.	3	C	H
	Reduced water levels within the entire aquifer of the Lower Mangrove and Popran Creeks Groundwater Source of the Kulnura Mangrove Mountain WSP.	4	E	H
Reduction in groundwater bore yields	Reduced yields observed in groundwater bores on Proponent owned land.	1	B	M
	Reduced yields of up to 15% occur within groundwater bores on privately owned (non-project related) land.	2	C	M
	Reduced yields of >15% occur within groundwater bores on privately owned (non-project related) land.	3	C	H

Table 3.8 (Cont'd)
Analysis of Unmitigated Environmental Risk

Potential Environmental Impacts (see Table 3.5)	Type/Level/Scale of Impact (if applicable)	Consequence of Occurrence if not Mitigated	Likelihood of Occurrence if not Mitigated	Unmitigated Risk Rating
Groundwater (Cont'd)				
Impacts on Groundwater Dependent Ecosystems (GDEs)	Reduced groundwater availability to GDEs on the Project Site.	3	C	H
	Destruction or degradation of Project Site GDE(s) as a consequence of the Project.	4	D	H
	Reduced groundwater availability to GDEs downstream of the Project Site.	4	D	H
	Destruction or degradation of downstream GDE(s) as a consequence of the Project.	4	E	H
Air Quality				
Nuisance - deposited dust	Deposited dust levels attributable to the Project occasionally (for one or two months every year) above DECC guideline, affects only adjacent landholders.	2	C	M
	Deposited dust levels attributable to the Project regularly (exceedances greater than DEC guideline for >5 months per year) affects landholders some distance from the Project Site.	3	C	H
	Deposited dust levels attributable to the Project resulting in impacts to adjoining vegetation.	3	D	M
Health - PM_{10}	PM_{10} levels attributable to the Project occasionally (once every 1 to 2 years) above the Project goal, affects only adjacent landholders.	2	C	M
	PM_{10} levels attributable to the Project occasionally (>5 times per year) above the Project goal, affects landholders some distance from Project Site.	3	C	H
Health – Crystalline Silica	Concentration of respirable crystalline silica resulting in respirable disease in residents surrounding the Project Site.	4	E	H
Greenhouse Gas Emissions	Small increase (<0.05%) in greenhouse gas emissions (compared to 1990 Australia emissions).	1	B	M
	Moderate increase (>0.05%, <0.1%) in greenhouse gas emissions (compared to 1990 Australia emissions).	2	C	M
	Significant increase (>0.1%) in greenhouse gas emissions (compared to 1990 Australia emissions).	3	D	M
Soil Erosion and Sedimentation				
Soil erosion	Erosion of disturbed areas on the Project Site.	2	C	M
	Erosion of rehabilitated areas and/or final landform of the Project Site.	3	C	H
Sediment Load and Turbidity	One-off discharge of dirty water from the Project Site.	2	C	M
	Regular discharge of dirty water from the Project Site.	4	D	H
Surface Water and Drainage				
Reduced natural surface water flows	Reduced environmental flows to Cabbage Tree Creek catchment.	2	D	H
	Reduced groundwater availability to GDEs downstream of the Project Site.	3	C	H
	Reduced available recharge to groundwater.	2	C	M
Reduced quality of downstream waters	Isolated and minor event resulting in temporary degradation of water quality in local creeks and tributaries, eg. minor discharge of 'dirty' water.	3	C	H
	Continuing discharge of contaminated water resulting in ongoing degradation of water quality in local creeks and tributaries, eg. frequent/periodic discharge of dirty water.	4	D	H

Table 3.8 (Cont'd)
Analysis of Unmitigated Environmental Risk

Potential Environmental Impacts (see Table 3.5)	Type/Level/Scale of Impact (if applicable)	Consequence of Occurrence if not Mitigated	Likelihood of Occurrence if not Mitigated	Unmitigated Risk Rating
Surface Water and Drainage (Cont'd)				
	Isolated and major event resulting in temporary but wider spread degradation of water quality, eg. discharge of hydrocarbons to the downstream catchment.	4	D	H
	Repeated major event resulting in long-term and wide spread degradation of water quality, eg. repeated or continued discharge of hydrocarbons to the downstream catchment.	4	E	H
Flora and Fauna				
Loss of, or alteration to, existing habitats.	Disturbance to native vegetation/habitat within nominated area of disturbance.	2	A	H
	Disturbance to native vegetation/habitat outside nominated area of disturbance.	3	E	M
Direct adverse impact on threatened species.	Disturbance to Endangered Ecological Community (ies).	3	E	M
	Disturbance to Threatened species or populations.	3	C	H
Reduced biodiversity	Reduction in local biodiversity	4	D	H
	Reduction in regional biodiversity	4	E	H
Noise				
Increased noise levels associated with Project Site activities causing annoyance, distractions, ie. amenity impacts.	Occasional minor exceedance of noise criteria (1-2dB(A))	1	C	L
	Regular minor exceedance of noise criteria (1-2dB(A))	2	C	M
	Occasional marginal exceedance of noise criteria (3-5dB(A))	2	C	M
	Regular marginal exceedance of noise criteria (3-5dB(A))	3	C	H
	Occasional major exceedance of noise criteria (>5dB(A))	3	D	M
	Regular major exceedance of noise criteria (>5dB(A))	4	D	H
Increased noise levels associated with project related traffic causing annoyance, distractions, ie. amenity impacts.	Occasional minor exceedance of noise criteria (1-2dB(A))	1	C	L
	Regular minor exceedance of noise criteria (1-2dB(A))	1	C	L
	Occasional marginal exceedance of noise criteria (3-5dB(A))	2	C	M
	Regular marginal exceedance of noise criteria (3-5dB(A))	3	C	H
	Occasional major exceedance of noise criteria (>5dB(A))	3	D	M
	Regular major exceedance of noise criteria (>5dB(A))	4	D	H
Maximum noise levels resulting in sleep disturbance.		3	D	M
Increased noise levels associated with the Project leading to impacts on the native fauna assemblage.		3	E	M
Traffic and Transport				
Increased traffic congestion		2	C	M
Road pavement deterioration		2	C	M
Elevated risk of accident/incident on local roads	Minor accident - no injury	1	C	L
	Minor accident - minor injury	3	C	H
	Major accident - moderate injuries requiring hospitalisation	4	D	H
	Severe accident - severe injuries or death injury	5	E	E

Table 3.8 (Cont'd)
Analysis of Unmitigated Environmental Risk

Potential Environmental Impacts (see Table 3.5)	Type/Level/Scale of Impact (if applicable)	Consequence of Occurrence if not Mitigated	Likelihood of Occurrence if not Mitigated	Unmitigated Risk Rating
Rehabilitation & Final Landform				
Reduced amenity of the final landform resultant from vegetation clearing.		2	C	M
Final landform and land use that is not compatible with activities/lifestyle of local community or Popran National Park.		3	C	H
Aboriginal Heritage				
Impact on identified Aboriginal sites and/or artefacts of high cultural or scientific significance as a result of the Project.		4	E	H
Impact on identified Aboriginal sites and/or artefacts of lower cultural or scientific significance as a result of the Project.		3	E	M
Impact on unidentified Aboriginal sites and/or artefacts as a result of the Project.		3 – 4	D – E	M – H
European Heritage				
Loss or destruction of items of European heritage significance.		3	-	
Visual Amenity				
Reduced amenity of altered Project Site landform	Temporary disturbance to landform.	2	B	H
	Marginally identifiable change to landscape following rehabilitation and final landform creation.	3	C	H
	Highly identifiable change to landscape following rehabilitation and final landform creation.	3	D	M
Land Contamination/Waste Management				
Hydrocarbon Contamination of land	Contamination requiring minor recovery works.	2	D	L
	Contamination requiring major recovery works.	4	E	H
Hydrocarbon Contamination of water	Contamination of surface water requiring minor recovery works.	3	D	M
	Contamination of surface water requiring major recovery works.	4	E	H
	Contamination of groundwater requiring recovery works.	3	E	M
Reduced amenity of Project Site due to poor rubbish, litter management		2	C	M
Soil Resources				
Insufficient soil quantities for rehabilitation.		3	D	M
Reduced soil quality	Temporary disturbance to soil	1	B	M
	Degradation of soil quality	2	C	M
Elevated erosion or erosion potential.		3	C	H
Bushfire				
Initiation of fire leading to impacts on the Project Site	Minor disturbance to Project Site lands and equipment resulting in temporary suspension of operations.	3	E	M
	Major damage to Project Site lands and equipment resulting in long-term or complete suspension of operations.	4	E	H
	Impacts on health and safety of project personnel.	4	E	H
Initiation of fire leading to impacts outside the Project Site	Minor disturbance to lands and property external to the Project Site.	3	E	M
	Major disturbance to lands and property external to the Project Site.	4	E	H
	Impacts on health and safety of local land owners, residents and the general public.	5	E	E

Table 3.8 (Cont'd)
Analysis of Unmitigated Environmental Risk

Potential Environmental Impacts (see Table 3.5)	Type/Level/Scale of Impact (if applicable)	Consequence of Occurrence if not Mitigated	Likelihood of Occurrence if not Mitigated	Unmitigated Risk Rating
Socio-Economic Impacts				
Reduced quality of life (actual or perceived)		3	D	M
Reduced property values	Temporary decrease in property values	2	C	M
	Moderate term decrease in property values	3	C	H
	Long term decrease in property values	3	D	H

Consequence of Occurrence: 1 = Insignificant; 2 = Minor; 3 = Moderate; 4 = Major; 5 = Catastrophic
Likelihood of Occurrence: A = Almost Certain; B = Likely; C = Possible; D = Unlikely; E = Rare
Risk Rating: E = Extreme; H = High; M = Moderate; L = Low

Table 3.9
Environmental Issue Prioritisation

	Extreme		High		Combined	
	frequency	%	frequency	%	frequency	%
1. Groundwater	0	0	11	92	**11**	**92**
2. Surface Water/Erosion and Sedimentation	1	9	7	64	**8**	**73**
3. Flora & Fauna	1	17	3	50	**4**	**67**
4. Aboriginal Heritage	0	0	2	66	**2**	**67**
5. Visual Amenity	0	0	2	66	**2**	**67**
6. Bushfire	1	17	3	50	**4**	**67**
7. Rehabilitation/Final Landform/Land Use	0	0	1	50	**1**	**50**
8. Traffic	1	17	2	33	**3**	**50**
9. Land Contamination and Waste Management	0	0	2	40	**2**	**40**
10. Noise	0	0	4	29	**4**	**29**
11. Soil and Land Capability	0	0	1	25	**1**	**25**
12. Air Quality	0	0	2	22	**2**	**22**
13. Socio-economic Climate	0	0	2	50	**2**	**50**

It is noted that the inclusion of "Socio-economic Setting" at N^{o} 13 is not a direct consequence of the environmental risk analysis. Rather, it is included at N^{o} 13 to enable all other issues to be considered prior to the consideration of the socio-economic setting as this issue invariably is inter-related with many of the preceding issues. It is also noted that the issues associated with "Rehabilitation/Final Landform/Land Use" and "Land Contamination and Waste Management" are considered as part of the assessment of other issues such as water resources and soils.

The sources of risk and potential environmental impacts associated with each issue are discussed within relevant subsections within Section 5. All other issues generally allocated a "moderate" or "low" level of priority, have been addressed to the level considered appropriate throughout the *Environmental Assessment*.

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