

Summary

INTRODUCTION

This *Environmental Assessment* has been prepared to support an application by Rocla Materials Pty Ltd (“Rocla”) for project approval from the Minister for Planning to extend its existing sand extraction and processing operations at the Calga Sand Quarry on the Somersby Plateau of NSW to the south onto Lots 1 and 2, DP 805358 (“the Southern Extension” or “the Project”). **Figure A** identifies the site of the existing and proposed extended Calga Sand Quarry. The Project would involve:

- (i) the continued operation of the currently approved Calga Sand Quarry (Stage 3), albeit modified slightly to accommodate the inclusion of the Southern Extension;
- (ii) the development and operation of the Southern Extension; and
- (iii) the progressive increase in sand production to 1 000 000 tonnes per annum (tpa).

The area which is the subject of the application for project approval (the “Project Site”) is located approximately 1km northwest of the Calga Interchange of the F3 Freeway on the Somersby Plateau, approximately 11km west of Gosford.

The Project is classified as a Major Project in accordance with the *State Environmental Planning Policy (Major Development) 2005* and, consequently, the Minister for Planning is the approval authority. As a Major Project, it will be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979* and an *Environmental Assessment* report is required to be prepared.



This summary introduces the Proponent, provides relevant background to the Project, presents an overview of the Project, outlines issue identification and prioritisation undertaken, identifies key issues and summarises the predicted Project-related impacts on the environment.

The Proponent

The Proponent for the Project is Rocla Materials Pty Ltd, the current owner and operator of the existing Calga Sand Quarry. Rocla Materials Pty Ltd is part of the Amatek Group which in turn is wholly owned by Fletcher Building, a company incorporated in New Zealand.

Background to the Proposal

The extraction and processing of sand at the Calga Sand Quarry has been undertaken



since 1991, initially under Development Consent No. 10604 (Stages 1 and 2) and since October 2005 under Development Consent DA 94-4-2004 (Stage 3). During this time, the Calga Sand Quarry has supplied fine sand products to markets in Sydney and the Central Coast. Production levels have fluctuated during this period of operation. However, in recent years sales have averaged approximately 200 000tpa.

The construction sand market in Sydney is approximately 7 million tpa (Mtpa), about 55% of which is fine-grained sand (predominantly <0.6mm) with the remainder classed as coarse grained (0.6mm to 4.75mm). The central coast sand market is approximately 700 000tpa. The two largest sources of construction sand currently supplying the Sydney market are the Kurnell Peninsula (up to 1.5Mtpa) and Penrith Lakes (up to 0.6Mtpa). Of these, the production of fine sand from Penrith Lakes is expected to cease during 2009 (although it is noted that coarse sand from Penrith Lakes will continue to be produced until about 2014), with production from the Kurnell Peninsula likely to cease within 10 years. A Department of Planning sponsored study has forecast that without the extension of existing, or development of new fine sand resource areas, there is likely to be a deficit of fine sand products for the Sydney market by 2011.

Approval of the Project would increase the total fine sand resource available to the Sydney (and Central Coast) market by approximately 13.8Mt. Importantly, access to this additional resource would allow the Calga Sand Quarry to gradually increase annual production from current levels to 1 000 000tpa, thereby easing the supply pressure on Sydney markets created by the reduction and ceasing of supply from the Kurnell Peninsula and Penrith Lakes.

Planning Context

Planning on the Central Coast Plateau Area, within which the Project Site lies, is

controlled principally by Sydney Regional Environmental Plan No 8 – Central Coast Plateau Areas (SREP 8). To remove conflict between SREP 8 and Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2) (SREP 9 (2)) over the designated preferential use of land on the Central Coast Plateau Areas, SREP 8 was amended by Gosford/Wyong Local Environmental Plan 2001 – Central Coast Plateau Areas (Gosford/Wyong LEP 2001). The Project Site is located within an area identified as “*location of extractive industry*” by Gosford/Wyong LEP 2001.

The Project would also be constructed and operated with reference to relevant clauses of *State Environmental Planning Policies 33, 44* and *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

PROJECT DESCRIPTION

Project Objectives

Rocla’s principal objectives in proposing the development and operation of the Southern Extension centre upon the following.

- Consolidating access to the sand resources that will ensure the continued provision of a range of construction materials to the Sydney and Central Coast construction markets at a reasonable price.
- Increasing the level of production from the Calga Sand Quarry from the existing approved level of 400 000tpa to 1 000 000tpa.
- Continuing the use of externally sourced excavated and other materials to produce a range of blended construction materials.
- Providing for ongoing progressive rehabilitation of the Project Site.



- Maintaining local employment levels.
- Maximising the recovery of natural sand resources on site

The Project Site

The “Project Site” covers both the approved Calga Sand Quarry operation on Lot 2, DP229889, and the proposed Southern Extension on Lots 1 and 2, DP805358. All three lots are within the Parish of Narara, County of Northumberland and Gosford City Local Government Area. All three lots are owned by the Proponent.

Access from the Project Site to the adjoining Peats Ridge Road would cross the Peats Ridge Road reserve, which is currently controlled by the NSW Roads and Traffic Authority but is under the care and management of Gosford City Council.

Project Site Layout and Activities

The proposed layout of the Project Site is presented in **Figure B**, and includes the following component activities.

- The Stage 3 extraction areas where sand extraction will continue generally in a manner consistent with the existing consent.
- Two new extraction stages, namely Stages 4 and 5. Stage 4 would be a direct southerly extension of the existing Calga Sand Quarry and Stage 5 would be developed as a separate extraction area.
- Four proposed sand processing areas comprising two sequential locations for the existing 400 000tpa plant (Sites A and B) and two sequential locations for the proposed 600 000tpa plant (Sites C and D). Both processing plants would ultimately be combined or replaced by a single processing plant capable of producing 1 000 000tpa at a long-term location on the floor of a completed section of Stage 4 (Site D).
- Access to the Project Site would continue via the existing site entrance (referred to as the Northern Entrance) and a new site access off Peats Ridge Road. During the early stages of extraction within Stage 4, a new site entrance (the “Southern Entrance”) and access road would be constructed from Peats Ridge Road to create a specific access route for activities within Stages 4 and 5.
- The Project Site administration area (including workshops and fuel storage) would be relocated as the Project progresses from its current location (Site A) to Site B then C to accommodate the sequence of extraction.

The design of the proposed Southern Extension reflects Rocla’s objective to maximise the recovery of the friable sandstone resource whilst developing it in such a manner that reflects the environmental and community constraints affecting the area of the proposed extension. As a consequence, Stages 4 and 5 have been designed to:

- avoid direct disturbance to two tributaries of Cabbage Tree Creek;
- to avoid and provide a buffer to identified sites of Aboriginal heritage significance; and
- to minimise disturbance to identified threatened flora species and threatened fauna species habitat.

The Project Site would be progressively rehabilitated, with Stage 4 incorporated into the final landform approved for the existing Calga Sand Quarry. It is proposed that Stage 5 would be rehabilitated to provide for a long-term land use of nature conservation and water storage. **Figure D** provides an illustration of the proposed final landform.





Project Site Sand Resource

The sand resource within the Project Site comprises the friable units of the Hawkesbury Sandstone. Based on the design of Stages 3, 4 and 5, the sand resource of the Project Site is estimated to be approximately 10.3 million cubic metres (m³) which would yield approximately 16.7 million tonnes of sand products.

The total sand products from the proposed Calga Sand Quarry is anticipated to be increased over the life of the Project as small quantities of raw materials such as soil (not topsoil), aggregates and excavated sandstone would be imported, reprocessed and incorporated within various blended sand products.

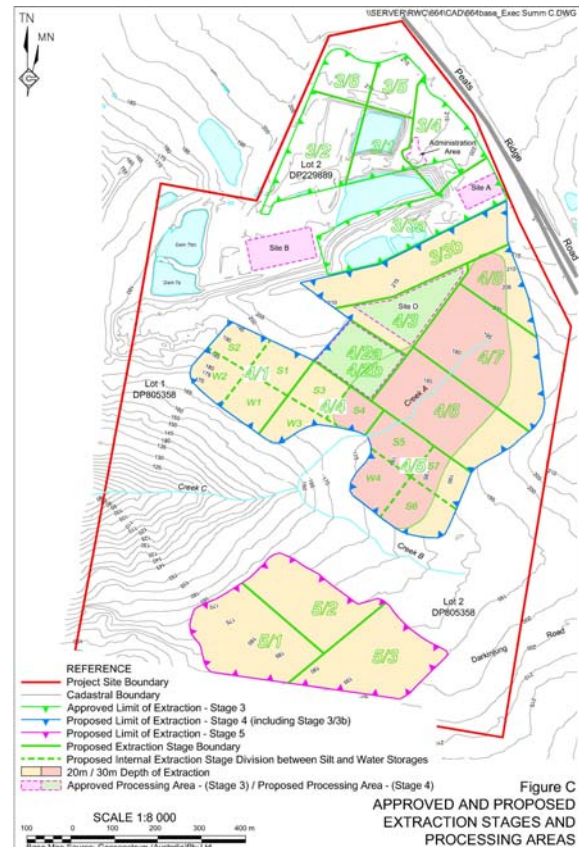
Extraction Operations

The proposed Southern Extension, incorporating Stage 3/3b, 4 and 5, would add approximately 48.0ha to the currently approved extraction area. For the purposes of describing the activities already approved and those proposed, Stages 3, 4 and 5 have been subdivided internally into sequential extraction stages (Stages 3/1 to 3/6, Stages 4/1 to 4/8 and 5/1 to 5/3) (Figure C).

The existing and proposed activities and procedures involve the following sequence of activities.

1. Identification/marketing of the nominated sand extraction area

Prior to the commencement of any activities in each extraction stage, the internal stage boundaries would be identified and defined, either through the construction of an access road or with a series of highly visible markers positioned at regular intervals around the nominated area



2. Installation of the required surface water and erosion and sediment controls

Surface water and/or sediment and erosion controls would be installed/constructed either prior to or immediately following vegetation and soil removal activities.

3. Vegetation removal

Vegetation covering areas required for the ensuing 6 to 12 months operations would be either chainsaw felled or cleared using the bulldozer, small tree limbs/trunks would be set aside for future use in rehabilitation and habitat improvement on the Project Site.

The larger vegetation would be either cut into manageable log lengths or mulched/chipped for future use within the Project Site or elsewhere.

Understorey vegetation such as grasses, low shrubs and forbs would be removed with the Project Site soil resources.



4. Soil removal

The soil in each extraction stage would be stripped following the clearing of the vegetation. In those areas where natural soils remain on, Rocla would remove approximately 0.15m of topsoil and up to 0.5m of subsoil.

Where practical, Rocla would remove soil material and directly transfer it to completed sections of the final landform as part of site rehabilitation. This practice would avoid double handling and maximise natural regeneration. All removed topsoil and subsoil not required immediately for rehabilitation activities would be stockpiled in windrows with a height not exceeding 2m.

5. Overburden removal and management

Below the soil layer, limited volumes of overburden, generally thin lenses of clay or shale, may be present above or within the sandstone. This material would be ripped, using the tynes of a bulldozer and excavated using an excavator. The removed overburden would be either:

- used in the construction of an acoustic bund around the extraction stage;
- used to construct silt cells or the walls of water storages on the floor of the extraction area;
- transferred directly for the capping of completed silt cells;
- transferred directly to completed sections of the extraction area for final landform construction; or
- stockpiled for future use in the construction and capping of silt cells or the construction of the final landform.

6. Acoustic bund construction

In order to minimise the noise levels received at residences surrounding the Project Site, the overburden and /or initial sandstone removed from the extraction stage would be placed around the perimeter of each extraction stage to create a 5m high bund wall. Clean water diversion banks would be constructed upstream of each acoustic bund wall, which would be covered with soil and vegetated to prevent erosion and reduce the visual impact of these structures.

7. Extraction of friable sandstone

Friable sandstone would be ripped using the tynes of a bulldozer, pushed into a stockpiles and loaded into haul trucks for transportation to either the mortar sand plant or wash plant(s) or loaded directly into the hopper of a mobile mortar sand plant.

Extraction activities in each stage would not commence until the construction of the acoustic bund wall for that stage is completed.

Wherever possible, the ripping, excavation and loading of trucks would be undertaken behind the benches formed during each stage. This would provide the activities with the maximum acoustic shielding, thereby limiting the potential noise levels received by receivers to the east and southeast of the proposed Southern Extension.

8. Delivery of sandstone to the processing area(s)

The sandstone material would continue to be loaded into haul trucks by front-end loader or excavator and transported to one of the processing areas. The transportation route would vary depending on the prevailing stage of extraction and active



processing area, although each internal haulage route would remain similar in distance.

Processing Operations

Rocla would continue to process the friable sandstone and imported materials using the following methods.

- Washing using a wash plant(s) to produce a concrete sand.
- Dry screening using a mortar sand plant which, combined with a proportion of washed sand produces a mortar sand product.

Up to 90% of the raw sand and imported blending materials would be washed. Therefore, in order to produce the proposed 1 000 000t of sand products per year, Rocla would operate two wash plants, or a single larger wash plant, capable of producing up to 1 000 000tpa. The wash plant(s) would incorporate:

- a primary jaw crusher to reduce the size of the raw feed;
- a vibrating screen to remove the remaining oversize material;
- a final screen deck where the finer material (silt is washed from the sand);
- a set of cyclones for dewatering the washed sand; and
- radial stackers for stockpiling the washed sand.

The remaining sand would be screened only through the mortar sand plant where the raw feed passes over a vibrating screen to remove the oversize material and stacked via a mobile conveyor belt.

Water Use and Management

The two primary uses of water at the Calga Sand Quarry would continue to be the suppression of dust and sand washing.

1. Dust Suppression

Based on the continued use of at least one 12 000L capacity water cart, applying water at a rate of 2L/m² per application, it is estimated that up to 43ML of water would be required for dust suppression as production reaches 1 000 000tpa.

2. Sand Washing

The sand washing process requires between 4 000L and 5 000L of water for every tonne of sand produced. A small proportion of the process water would be retained in the sand products (~55L/t) and oversize material (~21L/t). The majority of the water, containing the silt washed from the sand, would be discharged to silt cells which would be constructed on the floor of the completed extraction stages. This water, after being allowed to clarify, would be reused through the sand washing plant with each silt cell eventually consolidated, capped and revegetated.

Along with the water retained in the sand products and oversize material, water would be lost from the washing circuit through evaporation (~6L/t), seepage to groundwater (~3L/t) and retention within the consolidated silt (~254L/t).

Considering the in-situ moisture content of the extracted sand, it is estimated that for every tonne of sand produced, 208L of water is required to be added to the circuit, ie. up to 208ML of water would be required per year at maximum production. This volume of water would be sourced primarily from rainfall and runoff captured within the Project Site, with supplementary water obtained from groundwater in-flow to the extraction areas.

Silt Management

Before the silt-laden water can be re-used through the wash plant, the silt must be removed from the water. This would continue to be achieved by discharging the silt-laden water to storage structures where



the suspended silt is allowed to settle. The clarified water is then pumped back to the wash plant for reuse. Following removal of the water, the settled 'residual' silt is allowed to dry and consolidate before being capped with oversize material or overburden and soil as part of the final landform creation.

Rocla would continue to construct a series of small silt cells within the completed stages of the extraction area. These would be constructed with a small dividing bund constructed between active cells, with silt discharged to a consolidation cell (at higher elevation). The silt would be discharged into the more elevated consolidation compartment, with water eventually overflowing into a holding compartment from where it would be pumped back to the wash plant or other water storage. Cell capacity would vary according to the size of the extraction area and the proposed final landform.

Once the capacity of each silt cell is reached, the residual silt would be left to dry and consolidate within the cell. The silt cell would then be capped with successive layers of oversize and overburden. Once capped, the surface of the silt cell would be available for the construction of another silt cell or rehabilitation.

Product Transportation

The transportation of all sand products produced at the Calga Sand Quarry would continue to be by road, via Peats Ridge Road and the F3 Freeway.

Rocla has proposed a three-phased approach to Project Site and internal access and traffic management. The three phases are as follows.

Phase 1: Maintenance of a single Project Site entrance off Peats Ridge Road (the existing "Northern Entrance"), with all

product trucks travelling between either Site A or B and the Northern Entrance.

Phase 2: A new entrance to Stage 4 (the "Southern Entrance") would be constructed with all traffic entering the Project Site via this entrance, accessing Sites B, C or D, and exiting via a modified "Northern Exit".

Phase 3: Once Stage 3 is completed, Lot 2, DP229889 may be sold. If this is to occur, the Southern Entrance to be modified to allow for entry and exit of all traffic from this point.

Trucks entering and leaving the quarry would typically be single body tippers with trailers or semi-trailers, usually of 25t to 30t capacity, with larger capacity B-double trucks occasionally used. Based on maximum annual sales of 1 000 000tpa the average number of product truck movements on any weekday or Saturday would be approximately 240 and 90 respectively (120 and 45 loads).

Hours of Operation

Extraction and processing would be undertaken between 6:00am and 10:00pm Monday to Friday and 6:00am and 6:00pm on Saturdays. Product transportation would be undertaken between 5:00am and 10:00pm Monday to Saturday.

Project Life

To account for fluctuating demand and sales over time, project life of 30 years is anticipated.

Rehabilitation and Final Landform

The Proponent would adopt a progressive approach to final landform creation and rehabilitation to ensure that, wherever possible, disturbed areas are either temporarily and / or permanently stabilised to limit erosion and adverse visual impacts.



Techniques that would continue to be used for the rehabilitation of the quarry perimeter, benches, acoustic bund walls, silt cells and floor would continue to ensure final land use objectives are met.

Figure D presents the proposed final landform of the Calga Sand Quarry.

As illustrated on **Figure D**, the final landform for Stages 3 and 4 would be free-draining to the southwest, with water diverted via four primary channels to retained dams 7a, 7b/c, 21 and 22. The final landform of Stage 5 would be water holding with rainfall and runoff from the profiled 1:3 (V:H) slopes flowing into a retained dam at the southwestern corner of the rehabilitated extraction area (Dam 20).

With the exception of the northern and northeastern quarry faces of Stage 3, the retained quarry faces would be profiled to create a slope of approximately 1:3 (V:H). This slope would be achieved through a combination of laying back the perimeter of the extraction areas and backfilling with material contained within the acoustic bund wall and other stockpiles.

As is currently planned for the approved Stage 3 final landform, the final landform of Stage 4 would be amenable to some form of intensive agriculture, eg. poultry sheds/poultry enterprises, hydroponic/horticultural enterprises and/or nurseries, sporting fields or even a commercial centre (subject to rezoning). Given its much smaller size, relative isolation from Stage 4 and proximity to Popran National Park, it is proposed the primary final land use for Stage 5 would be nature conservation.

Biodiversity Offset Strategy

Rocla recognises that even with the proposed modifications to the extraction area design, the proposed Southern Extension would require the clearing of approximately 34.8ha of remnant native vegetation. To compensate for this disturbance, Rocla proposes to establish a

biodiversity offset of approximately 83.8ha (see **Figure E**). Approximately half the offset area would be provided by vegetation unaffected by the project within the Project Site itself and will be set aside for permanent conservation purposes. It is proposed to supplement this vegetation (totalling 39.1ha, of which 31.7ha is native vegetation) with 44.7ha of native vegetation on the neighbouring “Glenworth Valley” property.

ISSUE IDENTIFICATION AND PRIORITISATION

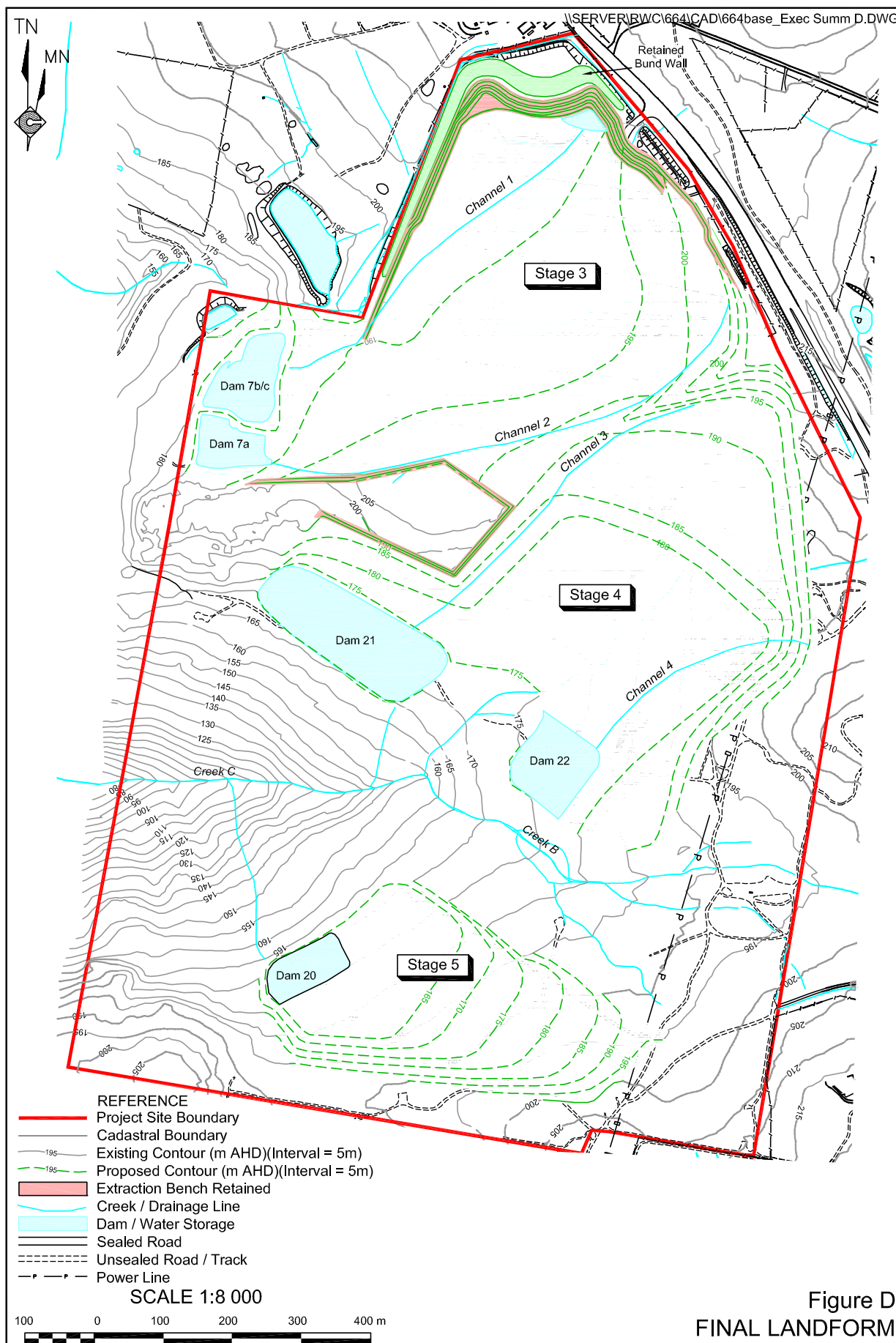
In order to undertake a comprehensive *Environmental Assessment* of the Project, appropriate emphasis has been placed on those issues likely to be of greatest significance to the local environment, neighbouring landowners and the wider community.

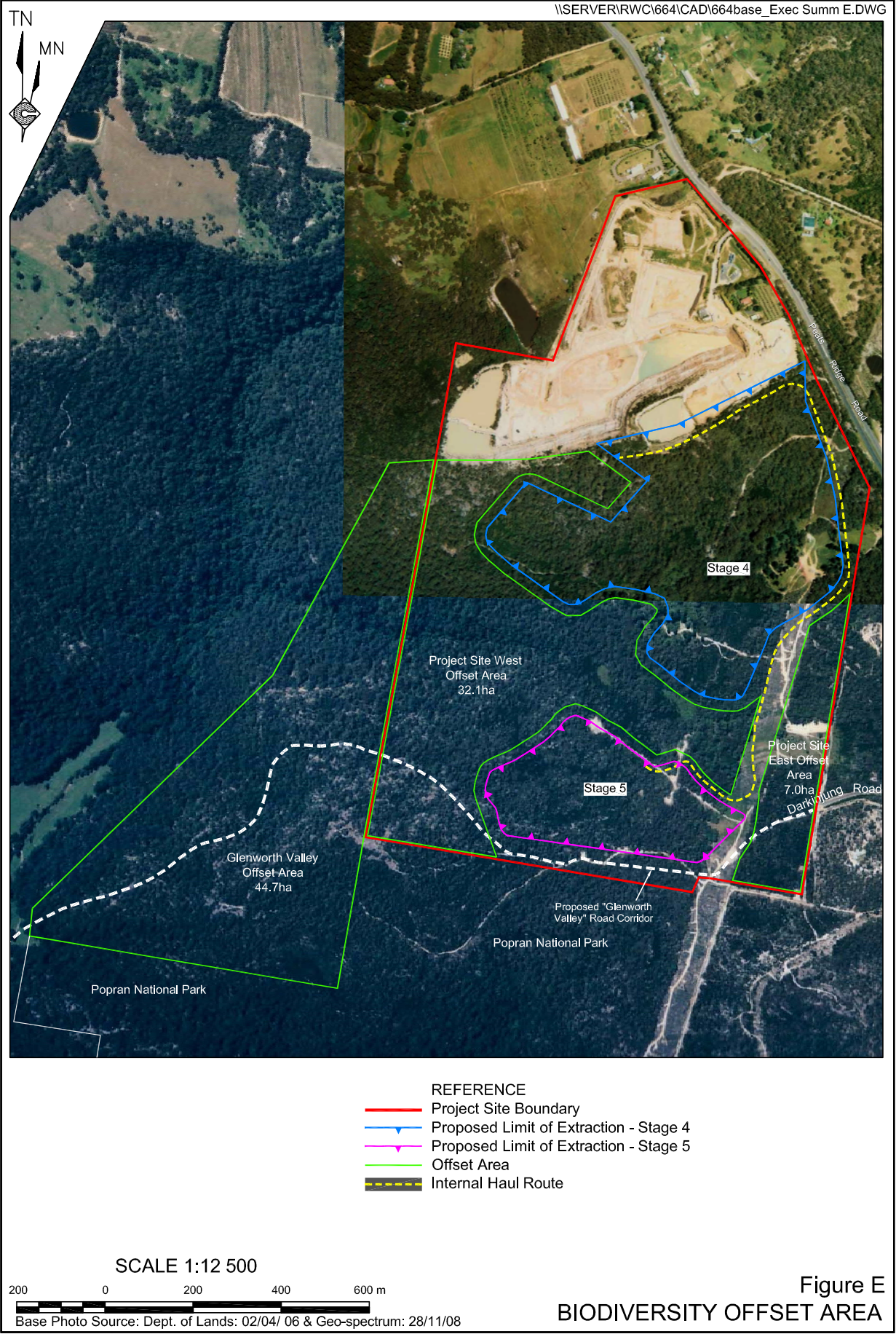
These issues (and their potential impacts) were identified through a program of community and government consultation, consideration of the existing environmental impacts of the approved Calga Sand Quarry, preliminary environmental studies and a review of relevant legislation and guidelines. This was followed by an analysis of the unmitigated environmental risk associated with each issue identified in order to prioritise the assessment of the identified environmental issues within the *Environmental Assessment*.

Consultation

Consultation with the local community involved face to face meetings and discussions with the landowners / residents of properties surrounding the Project Site. Several land owners and residences were visited on more than one occasion. A record of discussions held with each the landowner / resident was kept and used to identify those issues most frequently nominated as of concern.







Gosford City Council and a number of State government agencies have also been consulted during the preparation of the *Environmental Assessment*, through an initial planning focus meeting and provision of updates and overviews.

Issue Identification

Based on the environmental issues raised throughout the consultation process, a review of monitoring data maintained for the existing Calga Sand Quarry, feedback from specialist consultancies commissioned to review the existing environmental setting and constraints and a review of the Project design, all environmental issues were recorded and initially ranked based on the frequency with which these issues were nominated.

Issue Prioritisation

Following the identification of all environmental issues, an analysis of unmitigated risk for each potential environmental impact was completed with a risk rating assigned to each impact, based on likelihood and consequence of occurrence in the absence of any mitigation measures.

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 depth of coverage within the *Environmental Assessment*.

Based on the issues identified and the risk ratings allocated to the potential environmental impacts of these, the following order of priority has been determined.

- | | |
|-------------------------|---------------------|
| 1. Groundwater. | 7. Air Quality. |
| 2. Surface Water | 8. Traffic. |
| 3. Flora and Fauna. | 9. Bushfire. |
| 4. Aboriginal Heritage. | 10. Soils. |
| 5. Visual Amenity. | 11. Social setting. |
| 6. Noise. | |

EXISTING ENVIRONMENT, PROPOSED SAFEGUARDS AND IMPACTS

The components and features of the existing environment within and around the Project Site have been studied in detail to understand how the proposed operations within the Project Site and associated transport operations can best be designed to avoid or minimise impacts on the surrounding environment. A brief overview of the main components of the surrounding environment and the assessed level of impact is set out below.

Groundwater

The groundwater resources in the Central Coast are located within two principal geological units, namely the Hawkesbury Sandstone and the underlying Terrigal Formation. The Hawkesbury Sandstone is the main source of groundwater in the area surrounding the Project Site, with virtually all registered bores obtaining water from this aquifer. The sandstone contains predominantly deep, low yielding semi-confined aquifers. Standing water levels are recorded to be mostly between 10m and 50m below surface, with bore yields ranging from 0.1L/s to 1.0L/s, averaging around 0.4L/s.

An understanding of the groundwater resources beneath the Project Site has been established through the construction and monitoring of a number of piezometers and private bores on and surrounding the Project Site. This monitoring has illustrated that standing water levels (SWLs) on and surrounding the Project Site is directly correlated to rainfall, ie. rainfall quickly seeps into the permeable sandstone and raises the groundwater level, with the water level subsiding following extended dry periods as the water, which flows to the southwest, discharges into local creeks.



Based on rainfall and groundwater monitoring records a recharge proportion of 5% to 15% has been estimated. Given the natural fluctuation of groundwater level beneath the Project Site in response to rainfall, it is difficult to provide a definitive level for the groundwater table. Monitoring indicates that the depth below surface to groundwater fluctuates by approximately 5m, varying between 5m and 25m below surface.

Monitoring of groundwater quality within the sandstone beneath the Project Site has identified that the water is consistently of low salinity but generally acidic with a pH of between 4.1 and 6.3. Other exceedances of the ANZECC (2000) 95% trigger level for freshwater species were also identified for a range of parameters including aluminium, copper, lead, zinc, nitrogen oxides, cadmium, manganese and nickel.

A hydrogeological investigation was undertaken to predict the volume of water that would flow into the extraction areas of the proposed Southern Extension (including the approved Stage 3 quarry), the affect this would have on the standing water level within the local groundwater bores surrounding the Project Site, and the influence of the modified landform on recharge to local groundwater and surface water base flows within the Cabbage Tree Creek catchment. A steady-state groundwater modelling program was used which was calibrated through comparison to the monitored groundwater levels in the bores within and surrounding the Project Site.

The results of this groundwater modelling, and a discussion of residual impacts (*in italics*), are as follows.

1. The groundwater model predicted that the annual in-flow of water to the

extraction areas would be approximately 28ML at the completion of Stage 3, 139ML at the completion of Stage 4 and 161ML at the completion of Stage 5.

These predictions are likely to overestimate the actual inflow volume as the modelling was not developed transiently, ie. the model assumes the entire extraction stage is removed at once which would create an artificially high pressure differentiation and therefore higher flow rates. Under the Water Management Act 2000, a Water Access Licence (WAL) is required to extract groundwater. Rocla is currently finalising the purchase of a WAL for 46ML, which combined with WAL 20WA100255 assigned for industrial usage on Lot 2, DP229889 (6MLpa), provides for twice the allocation required for operations to the completion of Stage 3. Additional allocation is to be obtained following further groundwater investigations that will more accurately identify the volume of groundwater that actually, and is expected to flow into the quarry.

2. Up to seven bores are predicted to incur a standing water level reduction of between 1m and 5m, with one bore (GW102729) predicted to incur a drawdown of approximately 5m. All remaining bores are located beyond the 1m drawdown contour. The drawdown in seven of the eight bores represents a loss in available drawdown of less than 10%, which is not anticipated to noticeably effect bore yields. The predicted drawdown within GW66907 is equivalent to 16% of its available drawdown. However, as the bore would still retain at least 20m of available drawdown, it is not anticipated that bore yield would be adversely affected.



While there are no specific mitigation measures to counteract impacts on groundwater drawdown, Rocla has committed to a comprehensive monitoring program to assess progressive groundwater impacts. In the event that a reduction in bore yield can be attributable to the Project operations, Rocla proposes to 'make good' any significant losses in groundwater availability to local groundwater users.

3. The modelling predicts that the impact of the Project on base flows to the local creek system would be relatively limited. The rate of base flow is predicted to be reduced by approximately 15% before increasing by approximately 10% following quarry closure and rehabilitation (as a consequence of the ponded water stored in Dams 7a, 7b/c, and 20 to 22).

This minor reduction in base flows during the operation of the Project is unlikely to have any significant impact on the hydrology or vegetation of the catchment, as the area affected represents <5% of the total Cabbage Tree Creek catchment.

Overall, the groundwater assessment has established that the groundwater impacts would be localised and that there are opportunities for Rocla to compensate for any losses any surrounding land owner experiences as a result of the Project proceeding.

Surface Water

The Project Site is located within the Cabbage Tree Creek catchment, an ephemeral stream that flows southwest into Kellys Creek and then, a further 500m downstream into the tidal section of Popran Creek. The general topography of the Cabbage Tree Creek catchment is gently sloping in the upper catchment areas near ridgelines, changing to steep sided valleys

with gently sloping valley floors in lower catchment areas.

The drainage of the Stage 3 quarry area has been highly modified with flows from the northeast diverted around the acoustic bund of the extraction area. Drainage over the Southern Extension area flows to the west and is conveyed in a westerly direction by tributaries of Cabbage Tree Creek (located approximately 500m from the western boundary of the Project Site). These unnamed tributaries have been identified as Creeks A, B and C (see **Figure B**). Observation of local flows and vegetation suggests that groundwater discharges into these creeks, presumably along the interface between the more permeable upper layers and the less permeable underlying rock.

Based on the hydrologic modelling, the estimated average pre-Project annual runoff associated with the Creek C catchment (Creeks A, B and C) is estimated to be 395ML/year, with flows in the 10th percentile wet year, ie. the wettest 10% of years, estimated to be approximately 864ML/year and in the 10th percentile dry year, ie. the driest 10% of years, approximately 84ML/year.

The hydrologic modelling, which considered a 38 year continuous rainfall dataset, yearly development of the extraction areas, modelled groundwater in-flows and progressive demand for water due to increasing production levels, was developed to determine:

- (a) whether sufficient water would be available to supply the demands of the Project; and
- (b) what impact the proposed development of the extraction areas would have on the hydrology of the catchment within which the Project is located.



The model confirmed that in all but selected 10th percentile dry years, sufficient water would be available to supply the Project's water demands. During the drier years, water may need to be transferred from existing water storages within Stage 3 to those still being developed within Stage 4.

The modelling also predicted that despite the topographic and geomorphic changes resultant from the Project, the volume of water discharged from the Project Site to the Cabbage Tree Creek catchment would not vary significantly from current flows.

Finally, assuming the construction and maintenance of appropriately designed water control structures, the Project would not have any adverse impact on local water quality.

Flora and Fauna

The Project would result in the clearing of approximately 34.8ha of native vegetation (and an additional 10.9ha of previously disturbed land). Impacts on the most sensitive areas of vegetation, eg. those providing important habitat for threatened species, have been avoided to the extent practicable.

The vegetation to be cleared is typical of the vegetation found elsewhere in the Hawkesbury Sandstone environments on the Somersby Plateau. Notably, the Project would not result in the clearance of any areas of "high conservation value", nor either of the two communities considered regionally significant (E54 – Sandstone Hanging Swamps and E2 – the Sandstone Ranges Warm Temperate Rainforest). Notably, the areas of the Project Site to be cleared represent <1% of the known extent

of each of the relevant vegetation communities¹.

The impact of the proposed clearing on the distribution of native vegetation would be partially mitigated by the proposed rehabilitation of the Stage 5 extraction area to native vegetation. The impacts of clearing will be further offset by the establishment of the proposed biodiversity offset strategy which, with the exception of a small area of Gahnia/Banksia Swamp, includes all vegetation communities that would be disturbed. The offset ratio of approximately 2:1 is considered suitable given no endangered ecological communities (EEC's) are to be cleared. In addition, the offset strategy adequately addresses the DECC's 13 principles contained in Appendix II of the document entitled "*principles for the use of Biodiversity Offsets in NSW*", and it provides for no net loss of biodiversity values.

Through a review of previous records of threatened species in the Gosford City LGA, the habitats provided by the Project Site and habitat preferences of threatened species, it was determined that up to 13 threatened species were at a high risk and 22 species at moderate risk of being impacted by the Project. A review of the significance of the anticipated impact on these species, considering the extraction area design modifications, mitigation measures, and proposed biodiversity offset strategy was completed based on:

- the importance of individual species, populations and/or plants and/or subpopulations that are likely to be affected by the Project in maintaining

¹ it was not possible to determine the proportional clearing of the Gahnia/Banksia Swamp due to there not being reliable records of the regional distribution of this community type.



the long-term viability of the species;
and

- the importance of habitat features that are likely to be affected by the Project in maintaining the long-term viability of the species.

The assessment determined that the likely impact of the Project would not be significant.

Aboriginal Heritage

A desktop survey of the archaeological record of the Calga area indicated that up to 10 Aboriginal sites are located within or immediately surrounding the Project Site. Through review of the original reporting cards and several surveys of the site, it was confirmed that only four of these sites are identified as occurring within the Project Site. The field surveys, also identified two additional Aboriginal sites on the Project Site.

Based on consultation with Darkinjung Local Aboriginal Land Council (LALC), it was considered that all the sites on the Project Site held cultural significance to the local Aboriginal community, with one of these sites, a complex of engravings (female and animal) and a stone arrangement, considered to have high scientific significance.

In recognition of the significance of these sites, Rocla modified the boundaries of the proposed extraction areas to ensure none of the sites would be disturbed by the proposed extraction and associated activities. In addition, Rocla has committed to implementing operational controls and safeguards to ensure that access to these sites is restricted and they are protected from accidental damage.

Noise

Unattended and attended noise monitoring was conducted at four locations to the south and east of the Project Site in December 2006 and September 2009 to determine the rating background noise level. These background noise levels were used to establish operational and traffic noise criteria for the Project.

A noise model was developed and the received noise levels at the closest five residences to the Project Site were predicted based on three worst-case operational scenarios.

Initial modelling of each scenario, completed in accordance with the Industrial Noise policy (INP), predicted noise levels at five residences to the north, east and southeast of the Project Site would exceed the noise criteria established for each. Rocla subsequently committed to the construction of a series of 5m high bunds, constructed above the local ground level at the northern, eastern, northeastern and southeastern boundary of each extraction stage prior to the commencement of extraction from that stage. Assuming extraction occurs in another stage below ground level while the acoustic bunds are constructed, the noise modelling predicts compliance with the relevant operational noise criteria at all residences under all conditions. The noise modelling also predicted compliance with sleep disturbance criteria under all conditions.

The noise levels attributable to the additional truck movements traversing the section of Peats Ridge Road from the Project Site to the F3 Freeway was also calculated using the ECRTN methodology. In all cases, the road traffic noise level, which is dominated by existing traffic on Peats Ridge Road and the F3 Freeway, would not increase by more than 2dB(A) and therefore remain compliant with the ECRTN criterion.



Visual Amenity

The southern extension to the Calga Sand Quarry would change the visual landscape through the clearing of approximately 36ha of native, predominantly woodland/forest, vegetation. However, through the continuation of the existing, and implementation of the proposed operational controls, the altered landscape would only be visible from a restricted number of vantage points including:

- Sections of the western side of the Australia Wildlife Walkabout Park;
- the southern end of the “Glenworth Valley” property; and
- vantage points on properties to the west of “Glenworth Valley”.

Notably, the existing Calga Sand Quarry is already visible from these locations, albeit either more distant or more obscured.

Of these vantage points, the potentially most affected would be within the Australia Wildlife Walkabout Park, as the southern extension would encroach to within 80m of the park boundary and 270m from a residence on the property. This increased proximity notwithstanding, the natural visual screening provided by local topography and vegetation would reduce the impact of the extraction activities. It is also important to note that the disturbance associated with the Project would be temporary and progressively rehabilitated through landform profiling and revegetation.

The impacts of the Project on local visual amenity are assessed to be acceptable given the proposed operational controls and progressive rehabilitation of the Project Site.

Air Quality

Monitoring of deposited dust has been undertaken in the vicinity of the Project Site for a number of years, and in association with some limited monitoring of PM₁₀, ie.

that component of airborne dust with a diameter <10µm, at a residence to the south of the Project Site and a review of data held by the DECC, background air quality was established. An air quality dispersion model was developed and four worst-case scenarios were assessed.

The results of the air quality modelling assessment concluded that assuming the implementation of the Project design features, operational safeguards and mitigation measures, the potential impact on air quality at surrounding residences would be minor and would not exceed the recommended air quality goals.

Transportation

Assuming an average annual traffic growth of 2% on Peats Ridge Road, the Project would increase traffic by 6.1%, with an increase in the proportion of heavy vehicles increasing by 2.5%. While the estimated maximum hourly weekday traffic volume on Peats Ridge Road is expected to increase from 168vph in 2006 to around 218vph in 2012 (an increase of 30%), this is considered to represent a relatively low two way traffic volume for a divided two way rural road, especially considering the separate entrance and exit arrangement proposed by Rocla.

It has also been calculated that the Project would result in traffic on the F3 Freeway increasing by less than 1% on an average weekday.

Therefore, while the Project would increase the number of heavy vehicles entering and using Peats Ridge Road, the Pacific Highway and the F3 Freeway, there is unlikely to be any detrimental impact on road safety given:

- there is no treatable pattern or single treatable location where recorded accidents occur on these roads;



- all of the roads to be used are engineered to current standards with the RTA;
- the proposed changes to Calga Sand Quarry vehicle access from Peats Ridge Road would be designed and constructed to RTA standards; and
- a Code of Conduct, stipulating safe driving practices at all times, has been successfully implemented to date for all employees and truck drivers.

Soils

The management of the soil resource on the Project Site has been designed to ensure proper handling and to provide the maximum opportunity for its re-use in the successful rehabilitation of the Project Site. These practices have been developed based on the operating experience gained to date within the Project Site, and have been shown to be successful. As such, the impact associated with topsoil/subsoil removal, storage and re-use is anticipated to be minimal.

Considering the immediate transfer of topsoil and other soil management controls to be implemented, it is assessed that the impact on soil resources within the Project Site would be moderate and temporary.

Socio-Economic Setting

The proposed Southern Extension of the Calga Sand Quarry has, to the extent feasible, been designed to minimise the social and economic cost of the Project on the local community. The Project provides for the removal, processing and despatch of sand products recognised to be in short and diminishing supply within the Sydney/Central Coast market. The Project would be significant in generating local employment opportunities and boosting the local economy of Calga and other

communities on the Somersby Plateau. The final landform would provide for the future use of the Project Site for employment generating facilities which could include, product distribution facilities, intensive agriculture, horticulture or others.

Through the design of the Project and implementation of the operational safeguards and management measures proposed, it has been assessed that the Project would have limited and acceptable impact on the environment on and surrounding the Project Site, eg. noise, air quality, water resources, flora and fauna, heritage, and land use.

In relation to the issue of greatest common concern to the local community, access to water resources, which may influence the viability of several properties or commercial operations in the Calga area, the Proponent has committed to ongoing monitoring and the provision of compensatory supply should it be demonstrated the Project has an adverse impact on the water resources surrounding the Project Site.

Based on the above, the Project is not anticipated to have a significant adverse impact on the community surrounding the Project Site but would deliver a number of benefits locally and regionally.

PROJECT EVALUATION AND JUSTIFICATION

An evaluation of the Project has been undertaken by firstly reassessing the risks posed to the local environment by project-related activities following the implementation of all operational controls, safeguards and / or mitigation measures, and secondly through consideration of the principles of ecologically sustainable development.

The evaluation found that, with the implementation of the proposed controls



and safeguards measures, the residual risk posed by each possible environmental incident or impact was reduced from its original level and, with limited exception, classified as either moderate or low and therefore acceptable.

The Project has also addressed each of the sustainable development principles. It has been concluded that the Project achieves a sustainable outcome for the local and wider environment.

The Project has also been justified in terms of a wide range of biophysical, social and economic issues. These impacts have been justified in terms of the low risk of environmental impacts and the positive economic and social benefits that would result for the local community, Gosford LGA and wider Sydney metropolitan area, primarily through the provision of construction materials likely to be in deficit within the next few years.

CONCLUSIONS

The Project has, to the extent feasible, been designed to address all issues raised by the local community and all levels of government as well as the principles of ecologically sustainable development.

The Project provides for the extraction and transport of fine sand products predicted to be in deficit within the Sydney construction market by 2011/2012. The Project has been designed such that compliance with all nominated environmental criteria has been predicted with the final landform to be created that blends with the surrounding topography.

To compensate for the proposed disturbance to approximately 36ha of native vegetation,

Rocla has developed a biodiversity offset strategy that includes approximately 71ha of native vegetation on the Project Site and adjoining property. The proposed biodiversity offset meets the DECC's 13 principles for the establishment of biodiversity offsets in NSW.

In light of the conclusions incorporated throughout the *Environmental Assessment*, it is assessed that the Project could be developed and operated in a manner that would satisfy all relevant statutory goals and criteria, environmental objectives and reasonable community expectations.

The *Environmental Assessment* supported by the range of specialist consultant studies has established that if the Project proceeds, it would:

- provide necessary fine sand products for the Sydney and Central Coast construction markets;
- reduce risk levels associated with possible environmental incidents and adverse impacts on the environment to an acceptable level;
- have a minimal and manageable impact on the biophysical environment;
- satisfy sustainable development principles;
- provide for continuing and future use of the Project Site for agricultural, commercial or recreational activities as well as nature conservation;
- provide social and economic benefit to the local and wider community; and
- address perceived social impacts.



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