GALES–KINGSCLIFF

PTY LTD

ABN 75 093 540 080

# ENVIRONMENTAL ASSESSMENT

## OF THE

# CUDGEN LAKES SAND EXTRACTION PROJECT

*prepared by*

R.W. CORKERY & CO.

PTY. LIMITED ABN 31 002 033 712

May 2008

# Gales-Kingscliff Pty Ltd

ABN: 75 093 540 080

# Environmental Assessment

# for the

# Cudgen Lakes Sand Extraction Project

**Prepared for:**


Gales-Kingscliff Pty Ltd
20 Ginahgulla Road
BELLEVUE HILL NSW 2023

Telephone: (02) 9327 2481
Facsimile: (02) 9387 8230
Email: segals@galesgroup.com.au


**Prepared by:**


R.W. Corkery & Co Pty. Limited
Geological & Environmental Consultants
ABN: 31 002 033 712

**Brooklyn Office:**
1st Floor, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083

Telephone: (02) 9985 8511
Facsimile: (02) 9985 8208
Email: admin@rwcorkery.com

**Orange Office:**
Suite 15, 256 Anson Street
ORANGE NSW 2800

Telephone: (02) 6362 5411
Facsimile: (02) 6361 3622
Email: mail@rwcorkery.com



May 2008

Ref No. 617/03

**This Copyright is included for the protection of this document**

# Declaration Form

**for the submission of an Environmental Assessment (EA) prepared in accordance with the *Environmental Planning and Assessment Act 1979* (Part 3A – Section 75).**

**(a) EA prepared by:**

| | |
|---|---|
| name: | Robert William Corkery |
| qualifications: | M.Appl.Sc, B.Appl.Sc(Hons) |
| address: | Level 1, 12 Dangar Road<br>BROOKLYN NSW 2083 |

**(b) Planning Approval application by:**

| | |
|---|---|
| applicant name: | Gales-Kingscliff Pty Ltd |
| applicant address: | 20 Ginahgulla Road<br>BELLEVUE HILL NSW 2023 |

**(c) Address/land details**

properties to be developed: Altona Drive, CUDGEN NSW 2487

land description:

***Sand Extraction Area:***

Lot 2 DP 216705, Lot 21 DP 1082482 and part of Altona Drive (current alignment).

***Proposed Pipelines Corridors:***

Lot 26C & 26D DP 10715, Lots 11 & 12 DP 871753, Lots 1 and 3 DP 828298, Lot 21 DP 1082482, Lot 2 DP 216705, Lot 1 DP 1075645, road easements for Crescent Street, Tweed Coast Road, Elrond Drive and Turnock Street and road reserve between Lot 26D DP 10715 and Lot 11 DP 871753.

**Project Outline:** Extraction, processing and transportation of sand products by both hydraulic and mechanical methods; importation, processing and blending of virgin excavated natural materials (VENM) for sand and mortar mixes; importation and placement of VENM for backfill and wetland construction; site rehabilitation and landscaping and ancillary activities to all site components.

**(d) Assessment of Environmental Impact:** The assessment of environmental impacts of this Project includes the matters referred to in Director-General's Requirements provided to the Proponent on 6 January 2006 under Section 75F of the *Environmental Planning and Assessment Act 1979.*

**(e) Declaration:** I, Robert William Corkery, hereby declare that I have overseen the preparation of the contents of this assessment and to the best of my knowledge:

- it has addressed the Director-General's requirements as provided by the Department of Planning on 6 January 2006;
- the assessment contains all available information that is relevant to the environmental assessment of the Project; and
- the information contained in the document is neither false nor misleading.

signature: Robert W Corkery

name: Robert W Corkery

date: 19 May 2008

This page has intentionally been left blank

# CONTENTS

# CONTENTS

**Page** **Page**

# CONTENTS

**Page** **Page**

# CONTENTS

**Page** **Page**

# CONTENTS

**Page** **Page**

# CONTENTS

**Page** **Page**

# CONTENTS

**Page** **Page**

# CONTENTS

**Page** **Page**

# Summary of Key Statistics

## Project Components

- Project Site = 67ha
- Southern Extraction Site = 37ha
- Northern Extraction Site = 9ha
- Northern Pipeline Corridor = 0.8km (20m wide)
- Project Life = 20 years
- Processing Area (External) = 3.7ha
- Processing Area (Internal) = 2.2ha
- Eastern Pipeline Corridor = 1.5km (20m wide)

## Resources

- Northern Extraction Site = 380 000m$^3$
- Southern Extraction Site = 4 700 000m$^3$
- Total In-situ Sand Resource = 5 080 000m$^3$
- Annual VENM Imports = 45 000t

## Proponent's Off-site Sand Usage

- Approximate area of land to be filled off site = 125ha
- Approximate quantity of sand required for fill sites = 2 500 000m$^3$

## Extraction / Production Levels

- Maximum annual extraction = 650 000m$^3$
- Annual fill sand component = 450 000m$^3$
- Annual construction material production = 300 000t

## Traffic Movements at maximum production

*(Note: 1 load generates 2 movements)*

### *Outgoing Products*

– Average
= 100 movements per day - Weekdays
= 60 movements per day - Saturdays

– 85$^{th}$ percentile
= 130 movements per day - Weekdays
= 80 movements per day - Saturdays

### *Incoming VENM*

– Average = 24 movements per week

– 85$^{th}$ percentile = 32 movements per week

### *Other Vehicles*

– Trucks = 2 movements per day

– Light Vehicles = Up to 16 movements per day

### *Average Total Heavy Vehicle Movement*

= 124 movements per day

## Hours of Operation

| Activity | Monday to Friday | Saturday | Sunday |
|---|---|---|---|
| Site Establishment | 7.00am to 6.00pm | 7.00am to 1.00pm | - |
| Sand Extraction (dredging to processing area) and Processing | 6.30am to 10.00pm | 7.00am to 4.00pm | - |
| Sand Extraction (dredging to fill sites)* | 6.30am to 6.30pm | 7.00am to 1.00pm | - |
| Soil Removal and Sand Extraction (excavation) | 7.00am to 6.00pm | 7.00am to 1.00pm | - |
| Product Distribution | 7.00am to 6.00pm | 7.00am to 1.00pm | - |
| VENM Receipts | 7.00am to 6.00pm | 7.00am to 1.00pm | - |
| Site Maintenance | 6.30am to 7.00pm | 6.30am to 4.00pm | 9.00am to 4.00pm |
| *Note: the first and last 30 minutes of each day would involve filling or draining water from the pipelines. | | | |

## Socio-Economic Benefits

### *Direct Benefits*

- Net present value of recoverable resource = $30 million (2007 dollars).
- Five full time on-site jobs providing total approximate salaries of $300 000 each year for duration of Project.
- Employment opportunities for approximately 14 truck drivers and associated salaries.

### *Indirect Benefits (Implementation of Structure Plan)*

- Generation of approximately 8 587 full time equivalent jobs during construction.
- Generation of 3 390 ongoing full time equivalent jobs.
- Total expenditure in the economy (including output multipliers) in the order of $2 072 million.

# Foreword

*Every effort has been made in the preparation of the Environmental Assessment to correctly display all residence locations, place names, property boundaries, lot numbers and other information and utilise the most up-to-date base maps and aerial photographs.*

*It should be noted, however, that since Kingscliff is one of the most rapidly developing areas in the state, a range of developments, court cases and other factors has resulted, and continues to result in the available base maps and aerial photographs not fully reflecting the current details, and other minor changes to the information.*

*In any case, it is considered that, for the purposes of the Environmental Assessment, the information provided allows the adequate assessment of the Project in accordance with all relevant requirements.*

This page has intentionally been left blank

# Executive Summary

## INTRODUCTION

This *Environmental Assessment* has been prepared by R.W. Corkery & Co. Pty. Limited to accompany an application for project approval by Gales-Kingscliff Pty Ltd ("the Proponent") to develop and operate the Cudgen Lakes Sand Extraction Project ("the Project").

The application area incorporates the land that would be subject to sand extraction and processing operations (the "Project Site") and two proposed pipeline corridors (the "northern pipeline corridor" and "eastern pipeline corridor") nominated for hydraulic transportation of sand.

The Project Site and pipeline corridors are located in northeastern NSW, 8km south of the New South Wales/Queensland border (see **Figure A**). The Project Site is located on land owned by the Proponent and covers an area of approximately 67 hectares (ha), of which approximately 50ha would be disturbed during the life of the Project.

The Project is classified as a Major Project in accordance with the *State Environmental Planning Policy (Major Projects) 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 submitted to support the major projects application.

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

Figure A

## THE PROPONENT

The Proponent for the Cudgen Lakes Sand Extraction Project is Gales-Kingscliff Pty Ltd, a private company that owns a substantial landholding in the Kingscliff / Chinderah / Cudgen area together with an associated Company, Gales Holdings Pty Ltd.

## PROJECT OBJECTIVES

The Proponent's principal objectives in developing the Cudgen Lakes Sand Extraction Project are to provide:

- the necessary sand resources to raise the level of a number of its landholdings in the local area and allowing their development in accordance with its proposed Structure Plan and hence the

generation of significant employment and economic activity;

- a source of construction materials to the regional construction industry; and
- a licenced facility capable of accepting, treating, storing and/or processing virgin excavated natural material (VENM).

Furthermore, the Proponent wishes to create sporting fields, a recreational lake and wetlands, surrounding parkland and walkways consistent with the planned recreational and environmental land uses of the area.

## PLANNING CONTEXT

The Project Site is identified by the *Far North Coast Regional Strategy* as containing a regionally significant extractive resource which requires protection (such as from urban encroachment) by a Local Environmental Plan. Under the *Tweed Local Environmental Plan 2000*, the Project Site is located within an area zoned 1(b2) "Agricultural Protection" which records "extractive industries" as permissible with development consent.

The Project would also be constructed and operated with reference to relevant clauses of *State Environmental Planning Policies 14, 33, 44* and *71* and *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

## BACKGROUND

The Project Site has a history of failed agricultural enterprises including grazing, tropical grass and legume seed nursery and cane farming. For a variety of reasons, including soil and drainage problems, these ventures were all ultimately non-viable. The Project Site has, however, been long recognised as a potential source of construction quality sand.

Between 1987 and 1997, three development applications were submitted over part or all of the Project Site. The most recent application by Torrac Investments Pty Ltd was approved (DA 96/518) for the hydraulic extraction and transportation of 400 000m$^3$ of sand. DA 96/518 provides for extraction from a 12.6ha area within the southwestern corner of the Project Site to a depth of 8.5m over a 6 month period. The sand is to be transported to Lots 1 and 2 DP 828298 adjoining Cudgen, which are approved to be raised through filling under DA S93/76 (see **Figure B**).

The Proponent purchased the subject land approved for sand extraction and the land approved for filling and subdivision in July 2000. Preparatory activities, in accordance with DA 96/518, were commenced in October 2003.

Environment Protection Licence (EPL) 12385 was granted in November 2005 for the approved operation. Further preparatory works, including excavation/dredging of the initial dredge pond (approximately 0.5ha and 5m deep), were then undertaken in April and May 2006. These preparatory activities have provided the opportunity to monitor a range of environmental factors including water quality, groundwater levels and noise levels and determine whether acid sulfate soils and sediments are present.

As the Project would essentially replace the need for the existing approval, Development Consent DA 96/518 would be surrendered in the event that project approval is granted for the Project.

## PROJECT DESCRIPTION

### *Overview*

The Project would involve the removal by both hydraulic and mechanical methods of approximately 5 million m$^3$ of sand over a period of 15 to 20 years.

Sand would either be used as fill sand to raise the level of nominated fill sites or processed for sale to the construction industry. Additionally, the facility would be licenced to accept VENM, which would either be reprocessed or used to backfill the extraction sites.

It is noted that all references to sand resources or sand pumped hydraulically to fill sites are expressed in cubic metres ($m^3$) whereas sand products or incoming VENM are expressed in tonnes (t) given they are despatched or arrive in trucks which are weighed to record tonnage.

The Project Site would be progressively rehabilitated to form a final landform including lake and parklands amenable to a range of recreational activities such as equestrian pursuits, cycling and walking.

### *Project Site Layout*

The Project Site would include:

- a 9ha extraction site north of Altona Drive ("northern extraction site");
- a 37ha extraction site south of Altona Drive ("southern extraction site"); and
- a processing area north of Altona Drive covering an area of 3.7ha (see **Figure B**).

Two pipeline corridors would extend north and east from the southern extraction site and are referred to as the "northern pipeline corridor" and the "eastern pipeline corridor". The proposed northern pipeline corridor would be located within the western side of the Tweed Coast Road reserve whilst the eastern pipeline corridor would be located within the road reserve for a proposed subdivision road within land owned by the Proponent.

### *Site Establishment and Construction*

Site establishment and construction would involve preparatory works for both the sand processing operation and dredging operation. For the purposes of the *Environmental Assessment*, it has been assumed that both would occur concurrently.

Site establishment and construction would occur over a period of approximately 3 months during which three site entrances, internal roads, fencing, bunding and buildings would be constructed and fixed plant installed. The dredge, pipelines to the processing area, booster pumps and other equipment would also be installed during the site establishment and construction period.

Additionally, the initial western excavation pond would be created during this period to provide sand to raise the height of the processing area and an initial storage area for potentially acid generating VENM.

### *Sand Extraction*

Extraction within the northern and southern extraction sites may occur concurrently and would involve: stripping of topsoil; formation of bunds; and extraction of the sand resource (both loamy sand and fine grained sand).

Within the northern extraction site, an excavator and trucks would be used to recover approximately 380 000$m^3$ of sand to a depth of approximately 5m.

Within the southern extraction site, extraction would occur over 10 stages, generally progressing from west to east. Extraction would occur to the depth of the resource, typically 20m below current ground level.

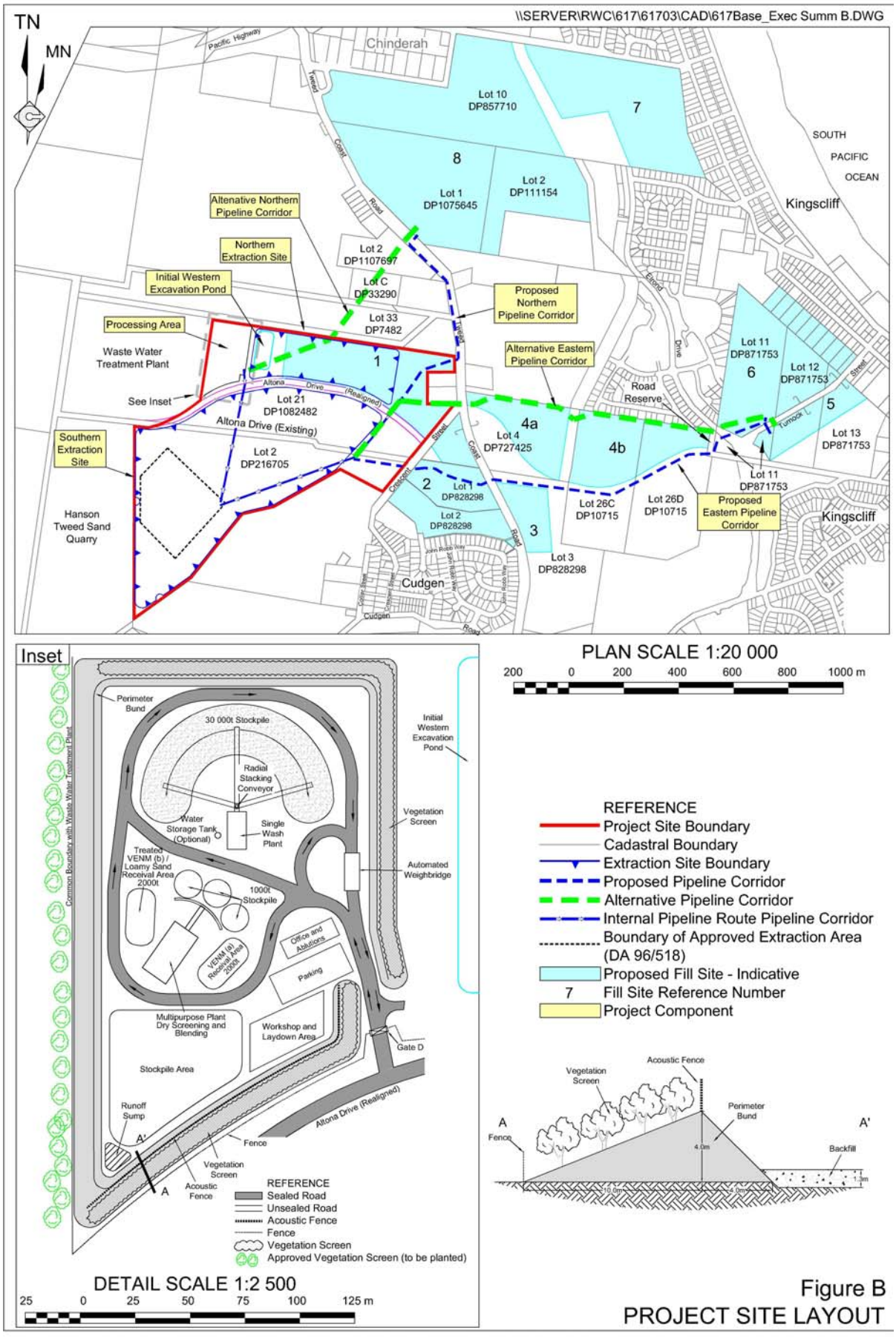



Figure B
PROJECT SITE LAYOUT

The upper loamy sand material would be extracted using an excavator and the remaining fine grained sand material extracted using a cutter-suction dredge. Approximately 4 700 000m$^3$ of sand would be recovered from the southern extraction site.

Up to 200 000m$^3$ of sand would be extracted each year from the northern extraction site and up to 450 000m$^3$ from the southern extraction site during the initial 2 years of operation.

Following the first 2 years of operation, at which time extraction within the northern extraction site is likely to be completed, up to 650 000m$^3$ of sand would be extracted per year from the southern extraction site. The total extraction rate in any one year, however, would not exceed 650 000m$^3$.

### *VENM Receipt and Handling*

Both non-acid generating VENM, VENM(a), and potentially acid generating VENM, VENM(b), would be received at the Project Site via road trucks, appropriate details recorded and the material classification verified.

VENM(a) would either: be processed to produce saleable products or used to backfill the northern extraction pond or finalised edges of the southern extraction pond.

VENM(b) which is suitable for processing would be placed adjacent to the southern extraction pond for treatment. VENM(b) not suitable for processing would either be used to backfill the northern extraction pond or interned at the base of finalised sections of the southern extraction pond.

### *Processing and Blending Operations*

The upper loamy sand material and VENM(b) suitable for processing would be treated using alkaline amendments, such as agricultural lime, prior to being transferred to the processing area for screening and/or blending to produce various construction materials, such as mortar sand.

Fine grained sand material would either be trucked or pumped to the processing area and washed to remove oversize and undersize materials, producing construction grade sand. Alternatively, this material would be pumped to a nominated fill site without processing for use as fill material.

All undersize materials separated during processing operations or returned from the fill sites would be placed towards the base of either the northern or southern extraction pond.

Up to 300 000t of processed products would be produced annually although production is likely to commence at a level of approximately 150 000t per annum and progressively ramp up to 300 000t.

### *Hydraulic Transportation*

Sand to be used as a filling material to raise the level of various parcels of land in the Kingscliff, Chinderah and Cudgen areas would be pumped hydraulically, ie. using water as a transport medium, to the fill sites from the southern extraction site as a sand / water slurry. Water draining from the sand at the fill sites would be pumped back to the southern extraction pond.

The Proponent intends to use up to two enclosed staging pumps beyond the dredge to convey the sand to the fill sites, one located within the Project Site and one within each pipeline corridor. Pumping would only occur along one corridor at a time. Up to 450 000m$^3$ of sand could be pumped annually to the fill sites.

### *Road Transportation*

Based on maximum annual sales of 300 000tpa the average number of product truck movements on any weekday or

Saturday would, based on conservative estimates, be approximately 100 and 60 respectively (50 and 30 loads).

As sales would vary from day to day, the 85th percentile number of product truck movements on the local roads on a busy weekday or Saturday would be 130 and 80 respectively (65 and 40 loads).

Based on the importation and receival of up to 45 000tpa of VENM, it is estimated that the incoming VENM would generate approximately 24 truck movements (12 loads) per day. The 85th percentile volume has been estimated at 32 truck movements (16 loads) per day.

In total, it is assumed, once the Project is fully operational, the despatch of products and importation of VENM would generate an average of 124 truck movements (62 loads) per day.

All VENM delivered to the Project Site and processed materials despatched from the Project Site would be transported via Altona Drive, Crescent Street and Tweed Coast Road. Access to the Project Site would be provided via three entrances off Altona Drive, one to the processing area and northern extraction site and two to the southern extraction site.

### *Hours of Operation*

The proposed hours of operation are presented in **Table A**.

Maintenance may also be undertaken on a Sunday between 9:00am and 4:00pm.

### *Rehabilitation and Final Landform*

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

**Table A**
**Proposed Hours of Operation**

| Activity | Monday to Friday | Saturday |
|---|---|---|
| Site Establishment | 7.00am to 6.00pm | 7.00am to 1.00pm |
| Sand Extraction (dredging to processing area) and Processing | 6.30am to 10.00pm | 7.00am to 4.00pm |
| Sand Extraction (dredging to fill sites)* | 6.30am to 6.30pm | 7.00am to 1.00pm |
| Soil Removal and Sand Extraction (excavation) | 7.00am to 6.00pm | 7.00am to 1.00pm |
| Product Distribution | 7.00am to 6.00pm | 7.00am to 1.00pm |
| VENM Receipts | 7.00am to 6.00pm | 7.00am to 1.00pm |
| Site Maintenance | 6.30am to 7.00pm | 6.30am to 4.00pm |
| *Note: the first and last 30 minutes of each day would involve filling or draining water from the pipelines. | | |

An important component of the rehabilitation of the Project Site would be the progressive backfilling of the northern extraction site to ultimately form land suitable for sporting fields and recreational facilities. Selected finalised sections of the shore of the southern extraction pond would also be backfilled and native vegetation introduced to create wetland areas and parklands.

The construction of recreational facilities such as walking and equestrian / cycling tracks would occur following completion of sand extraction activities. The final lake (southern extraction pond) would have a depth of up to 20m and cover an area of approximately 37ha.

## 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 and a review of relevant legislation and guidelines. This was followed by an analysis of the unmitigated environmental risk associated with each issued identified in order to prioritise the assessment of the identified environmental issues within the *Environmental Assessment*.

### Consultation

Consultation with the local community involved:

- individual discussions with the landowners / residents of properties surrounding the Project Site;
- group discussions with local groups and organisations; and
- circulation of a community information sheet, brochures and questionnaires.

Tweed Shire Council and a number of State government agencies have also been consulted throughout the process, through an initial planning focus meeting and provision of updates and overviews.

### Issue Prioritisation

Based on the environmental issues raised throughout the consultation process, a review of the Project design and local environmental features was undertaken to identify risk sources and potential environmental impacts for each environmental issue. An analysis of unmitigated risk for each potential environmental impact was then 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.

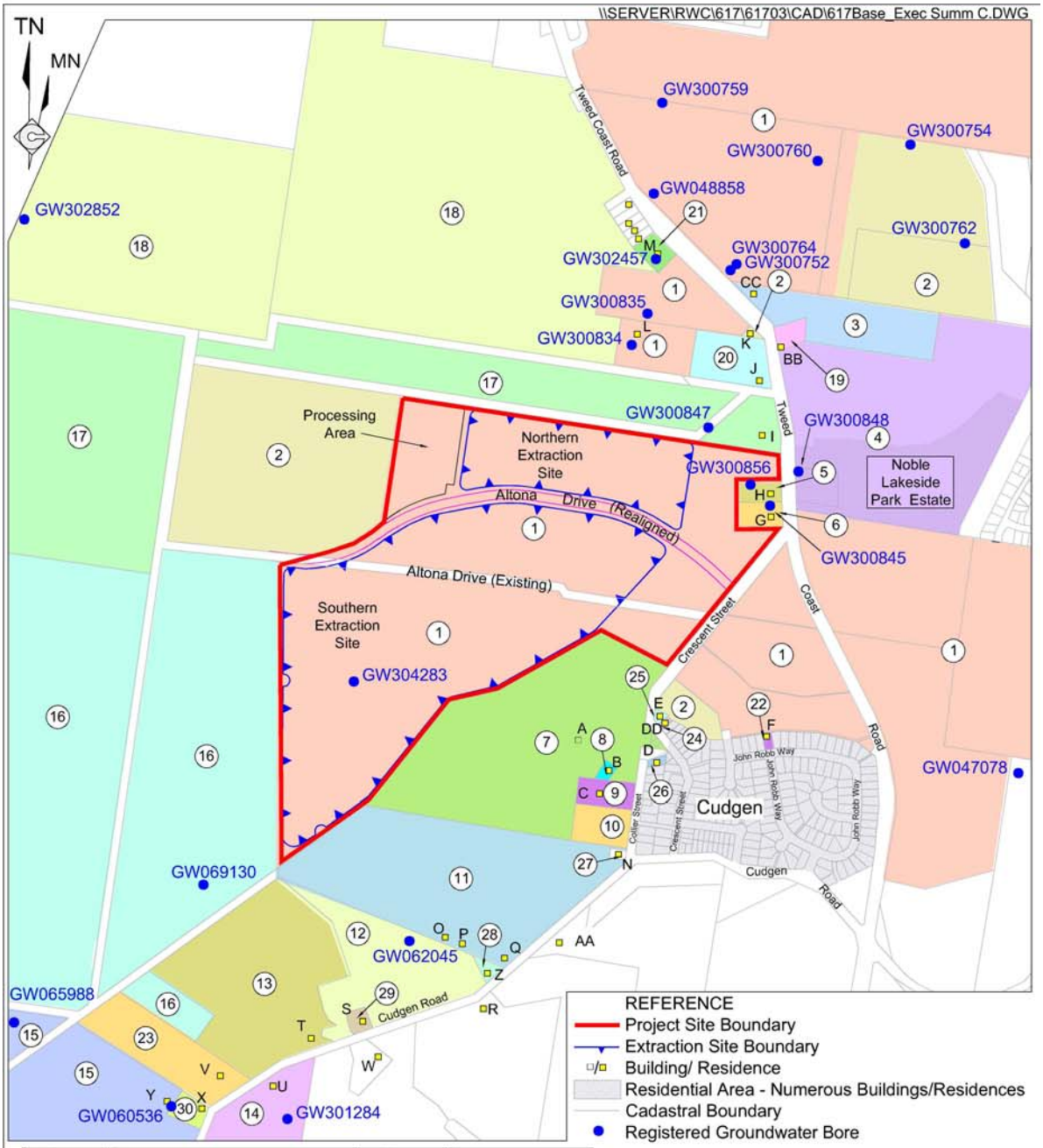
1. Groundwater.
2. Flooding.
3. Acid sulfate soil.
4. Flora.
5. Fauna.
6. Aquatic ecology.
7. Transportation.
8. Noise.
9. Air quality.
10. Aboriginal heritage.
11. Socio-economic.
12. Visibility

## EXISTING ENVIRONMENT, PROPOSED SAFEGUARDS AND IMPACTS

The components and features of the existing environment within and surrounding the Project Site have been studied in detail and the Project designed to avoid or minimise potential impacts. **Figure C** displays the surrounding landownership and residence locations and registered groundwater bores while a brief overview of the main components of the surrounding environment, the proposed safeguards and the assessed level of impact are set out as follows.

### Groundwater

Groundwater resources within the area surrounding the Project Site are principally associated with two aquifers, namely the Quaternary sands of the Tweed River floodplain and the Tertiary basalts of the Cudgen Plateau.




| Reference | Owner | Reference | Owner |
|---|---|---|---|
| 1 | Gales - Kingscliff Pty Ltd | 17 | C. Cooper |
| 2 | Tweed Shire Council | 18 | J. Brinsmead |
| 3 | P. Phillips | 19 | B. Rudman |
| 4 | Baglon Pty Ltd | 20 | M. & J. O'keeffe |
| 5 | K. Martin | 21# | J. Brinsmead |
| 6 | L. & P. Hermann | 22 | T. & L. Rascionato |
| 7 | R. Julius | 23 | S. Elworthy |
| 8 | R. & B. Julius | 24 | S. & A. Lawton |
| 9* | NSW Dept. of Education & Training | 25 | V. Long |
| 10 | Tweed Shire Council | 26 | D. & J. Clark |
| 11 | C. Pritchard & W. Julius | 27 | R. & C. Prichard |
| 12 | H. & R. Taylor | 28 | P. & H. Hardy |
| 13 | S. Thomson | 29 | Country Energy |
| 14 | S. & G. Melville | 30 | D. Green |
| 15 | I. Kettle & M. Stephens | | |
| 16 | Hanson Construction Materials | | |

* Cudgen Public School
\# Chinderah Golf Club

SCALE 1:15 000

250 0 250 500 750 m

Land Ownership Source: Dept. of Lands (2005)

Figure C
SURROUNDING LAND OWNERSHIP, RESIDENCES AND REGISTERED GROUNDWATER BORES

The Quaternary sand aquifer extends northwards from the base of the Cudgen Plateau located beyond the southern boundary of the Project Site to the Tweed River. Monitoring within the Project Site indicates that the elevation of the water table within the aquifer varies between -0.25m AHD to 0.75m AHD, with an average elevation of approximately 0.25m AHD or approximately 0.75m below natural ground level.

The extent of the Tertiary basalt aquifer is defined by the Cudgen Plateau which covers an area of approximately 8.4km$^2$ directly south of the Project Site.

Australasian Groundwater & Environmental Consultants Pty Ltd developed a numerical and analytical model to assess the potential impacts on local groundwater levels within these aquifers.

The elevation of the groundwater table in the vicinity of the northern extraction site would likely be affected up to a distance of approximately 100m from the extraction pond. Specifically, it is calculated that, at a distance of 60m from the extraction pond, the drawdown would be approximately 0.1m, well within the natural range of groundwater fluctuation.

The groundwater table drawdown within the Quaternary sand aquifer in the vicinity of the southern extraction site would likely extend to a maximum distance of approximately 500m to the north of the Project Site and at Year 7 a groundwater table drawdown of between 0.5m and 1.0m would extend approximately 500m to the south of the Project Site on the Cudgen Plateau. Following the cessation of extraction operations, groundwater levels would recover to pre-extraction levels within 12 months.

It is predicted that existing groundwater users to the north of the Project Site would not be significantly affected. Groundwater drawdown at the closest non-project related bore would be less than 0.5m, which is within natural fluctuation levels.

It is acknowledged that groundwater users to the immediate south, principally R. Julius, may be affected to some degree with possible lower yields from bores or spears and reduced water levels in dams excavated below the water table.

An agreement has been reached with R. Julius to monitor water levels and water usage rates within the dams on the property that would potentially be affected. Monitoring of water levels and water usage has been occurring since December 2006. In the event that groundwater supplies are adversely affected as result of the Project, the Proponent has committed to compensating R. Julius, through the provision of an alternative water supply or through another agreed form.

### Flooding

The Project Site is located on the southern flank of the Chinderah-Kingscliff-Cudgen Floodplain and is subject to both local catchment floods and major overbank floods in the Tweed River.
Despite the high degree of flood liability, the Project Site has a relatively benign flooding regime. Flow velocities during floods are generally very low with the site considered more a flood storage area rather than a floodway.

During an extreme local catchment flood during June 2005, the peak flood levels in the vicinity of the Project Site had an elevation of approximately 1.57m AHD. It is therefore unlikely that a local catchment flood would inundate the processing area

(1.6m to 1.8m AHD) or extraction ponds (bunding spillways at 1.5m AHD) during the life of the Project.

During a local catchment flood, access would still be available to the Project Site, although the road may be overtopped by 10cm of water in a 1 in 100 year ARI event prior to the realignment of Altona Drive.

Tweed River overbank flooding occurs in the vicinity of the Project Site on average less than once every 20 years. Therefore, it is likely that the Project Site would be flooded from the Tweed River at least once, and possibly twice or more, during the life of the Project. Once the Tweed River overtops its banks, floodwaters are likely to rise steadily to an elevation of approximately 3.3m AHD during a 100 year ARI event resulting in flood depths of up to 2.5m across the Project Site.

During a Tweed River overbank flood, road access to the Project Site via Altona Drive would not be possible as the road would be overtopped in excess of 1.0m of water.
Despite the substantial flood depths during a Tweed River overbank flood, the rate of rise would be relatively slow, and there would be time to remove vulnerable equipment and safely evacuate personnel. The warning time for potential overbank flooding would be at least 6 hours and possibly 12 hours.

During a Tweed River overbank flood, both the processing area and the extraction ponds would be inundated by more than 1.5m of water. It is noted that the blocking of the access gap within the bund surrounding the processing area may reduce the level and duration of flooding within the processing area, however, this would not be relied upon as a safety measure.

In order to ensure that personnel within the Project Site respond appropriately to a warning of an imminent Tweed River overbank flood, a Flood Evacuation Plan would be prepared prior to commencement of on site activities, and staff would be trained in its implementation. This would ensure that lives are not put at risk, and that economic damages from flooding are minimised.

Additionally, spillways would be located within the eastern-most and western-most parts of the bunds surrounding the extraction ponds, allowing the depth of water in the pond to equalise with water levels outside the bunded areas. This would minimise any scour of the bunds as they are progressively overtopped.

When floodwaters within the Project Site start to recede as Tweed River level drops, gaps would be cut to natural ground level within the spillways to allow floodwaters trapped behind the bund to spill down an unobstructed flow path to the main drain adjoining and to the south of Altona Drive.

Floodwaters passing through the extraction ponds would generally do so with low velocities, resulting in some minor deposition of fine sediments within the Project Site. There would be no mobilisation of extraction pond sediments and the mixing of the floodwaters with the extraction pond waters should result in the pH of the extraction pond waters moving closer to neutral.

No further provision regarding erosion control and surface water quality protection are deemed necessary.

### Acid Sulfate Soils and Sediments, Soil Contamination and Agricultural Suitability

An assessment of acid sulfate soils and sediments, potential soil contamination and agricultural suitability was undertaken by HMC Environmental Consulting Pty Ltd (HMC).

### *Acid Sulfate Soil and Sediments*

According to the Cudgen 1:25 000 Department of Natural Resources acid sulfate soil planning map, the Project Site is located within a Class 3 area which may be affected by acid sulfate soils.

A number of acid sulfate soil surveys have been undertaken across the site with further investigations by HMC involving the coring and analysis of an additional 8 boreholes.

Preliminary screening of soil samples indicate Potential Acid Sulfate Soil was identified in all boreholes in the upper soil and sediment profile (<6m depth) although there is very little existing acidity in the soil and sediments.

In contrast with the upper 6m of soil and sediments, in all boreholes below 6m depth, the buffering capacity within the soil and sediments exceeds the acid generating capacity and therefore would neutralise any acid generation which might occur due to the oxidation of sulfidic sediments.

Monitoring of a short-term initial dredging operation on the Project Site under an existing approval (DA 96/518) confirmed that there is significant acid neutralising capacity within the soil and sediments. Furthermore, water quality within the dredge pond and surrounding groundwater bores remained within applicable criteria and standards.

Based on the results from these and previous investigations, and the demonstrated long-term successful operation of the adjoining sand extraction operation, the proposed management strategies for the Project would provide sufficient protection to ensure any exposure of sulfidic sediments is minimised and ensure any acid generation is either avoided or neutralised via the targeted application of alkaline amendments.

An Acid Sulfate Soils and Sediments Management Plan would be developed for the Project.

### *Soil Contamination*

A review of the site history for the Project Site was undertaken to determine potential for contamination from prior land use. As the land has been previously used for sugar cane cultivation, several residual agri-chemicals were identified as being contaminants of concern.

An inspection of the Project Site by HMC did not indicate any areas of discoloured soil, polluted water or affected plant growth and animal population or significant odours.

In addition to the visual inspection, soil samples were analysed for contaminants of concern from six locations south of the existing Altona Drive and three to the north. Each location involved sampling to upper 150mm of the soil profile within a 20m x 20m grid. Laboratory results for all contaminants of concern were below the Health Investigation Levels for Residential "A" exposure outlined in the *National Environment Protection (Assessment of Site Contamination) Measure 1999*.

Based on these results the Project Site can reasonably be considered, for the purpose of the proposed development, to be uncontaminated. HMC has concluded that there is little environmental or health hazard associated with the proposed use of the subject property for sand extraction.

### *Agricultural Suitability*

During 1986, an assessment was undertaken in conjunction with the NSW cane industry to determine the long-term agricultural viability of the Project Site. The assessments concluded that the Project Site is not suitable for intensive agriculture and is subject to a number of constraints including waterlogging and poor uneven fertility.

The Project Site has also been assessed using the Farmland Protection Project guidelines and the NSW Agriculture Land

Classification Guidelines. Under these guidelines, the proposed use of the land is recognised as a rural industry and there is recognition that extractive industries have a place in some agricultural areas.

Based on the poor agricultural suitability of the Project Site, the benefits of the proposed operation outweigh the potential adverse impacts. Furthermore, it is considered that the Project would be compatible with adjoining land uses in the area and the impacts from the Project would be minimal.

## Flora

Flora surveys were undertaken by Idyll Spaces during July, August & November 2003 and May 2005.

Ten vegetation communities were mapped and described within and surrounding the Project Site and pipeline corridors. Exotic grassland was the most extensive community, essentially encompassing the entire Project Site, with smaller areas of swamp forest also identified, principally surrounding the eastern pipeline corridor.

Swamp Sclerophyll Forest on Coastal Floodplain and Swamp Oak Floodplain Forest may occur within two of the identified communities. Both are considered groundwater dependent and are listed as Endangered Ecological Communities under the *Threatened Species Conservation Act 1995 (TSC)*.

No Threatened flora species, Endangered Populations or Critical Habitat listed under the TSC Act or the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC)* were identified during the surveys. Habitat requirements for the Threatened flora species *Drynaria rigidula, Geodorum densiflorum* and *Oldenlandia galioides*, listed as Endangered under the TSC Act, may be met within some of the identified vegetation communities, however, their occurrence is considered unlikely due to habitat modification.

Progressive rehabilitation utilising native vegetation would maximise the final cover of native vegetation and minimise opportunities for erosion and weed invasion. Any noxious weeds identified within the Project Site or pipeline corridors would also be controlled.

With the implementation of the proposed safeguards, it has been assessed that the Project would maintain or improve biodiversity outcomes, and in particular, the Project would not reduce the long-term viability of a local population of any species, population or ecological community, accelerate the extinction of the species, population or ecological community or place it at risk of extinction, or adversely affect critical habitat.

## Fauna

Fauna surveys of the Project Site and pipeline corridors were undertaken by Kendall & Kendall Ecological Services Pty Ltd between 9 and 13 May 2005 and 21 and 26 November 2006.

A total of 75 bird, 14 mammal, three reptile, seven amphibian and one fish species were recorded within the Project Site and proposed northern pipeline corridor. Of these, three bird species are considered Threatened under the TSC Act and one under the EPBC Act. Each of these species was recorded flying over the survey area (as opposed to directly residing within it).

Sixteen species listed under the migratory provisions of the EPBC Act were also recorded.

Within the area surrounding the proposed eastern pipeline corridor, 102 vertebrate species were recorded. Of these species, five are listed as Threatened under the TSC Act and one under the EPBC Act. Twelve species listed under the migratory provisions of the EPBC Act were also recorded.

Based on habitat requirements, a total of 32 Threatened species recorded within the Murwillumbah subregion under the TSC Act are considered either 'likely' or 'possible' to occur within or surrounding the Project Site or pipeline corridors. Nine Threatened species listed under the EPBC Act and recorded within 5km of the Project Site are also considered 'likely' or 'possible' to occur within the Project Site or pipeline corridors.

The Project Site and pipeline corridors contain no tree species listed under Schedule 2 of *State Environmental Planning Policy No. 44* (SEPP) and therefore are not considered to contain potential Koala habitat as defined by SEPP 44.

With the implementation of the proposed safeguards, it has been assessed that the Project would not have significant impact upon any Threatened or migratory species listed under either the TSC Act or EPBC Act occurring or likely to occur on or in the vicinity of the Project Site.

### Aquatic Ecology

With the exception of a number of drainage channels which traverse the site, the Project Site contains limited aquatic habitat. A single main drainage channel is aligned east-west through the southern extraction site with other drainage channels located along the southern and northern borders of the Project Site. There is also a drain which connects the main drain to the southern drain, however, it is of little aquatic value.

The drainage channels are part of a network of straight and narrow drains connected to the Tweed River and are classified as Class 3 waterways.

Assessment of the aquatic habitat by The Ecology Lab Pty Ltd, together with desktop searches of threatened species databases, indicates that there are no threatened species, population or ecological communities or areas of conservation significance that are likely to be affected by the Project.

The only potential for threatened species to be affected would be in the event that acid sulfate soils or VENM(b) are not managed appropriately and acid water is permitted to enter the drainage channels and subsequently the Tweed River.

During operations, water quality within the extraction ponds, any drainage from the extraction sites and groundwater would be monitored to ensure excessive acidity does not occur. Care would also be taken to adequately handle and treat potential acid sulfate soils.

Where permanent crossings are to be constructed across the main drainage channel (eg. access road crossings) they would designed to allow fish free passage.

Based on the proposed operational and design measures, it is concluded that the Project would:

- have no significant impact on existing aquatic habitat or threatened species or population; and
- result in the creation of a coastal freshwater lake providing additional habitat that may potentially be recognised as an endangered ecological community.

### Traffic and Transport

A review of the existing intersection performance at four key intersections surrounding the Project Site by Veitch Lister Consulting Pty Ltd indicated that three of the intersections are currently operating satisfactorily. It was also identified that the Tweed Coast Road / Crescent Street intersection currently does not comply with Austroads standards and requires a channelised right turn lane.

Assessment of these key intersections under future predicted ambient (ie. without the operation of the Project) traffic conditions also indicated that, by 2011, improvements for the left turn out of Crescent Street to Tweed Coast Road will require upgrading.

By 2023, it is also considered that, under ambient traffic conditions, the Tweed Coast Road – Pacific Highway interchange (Chinderah Roundabout) will also require minor works.

As part of the Project, a range of design measures and safeguards would be implemented. Proposed design measures for the Project include the construction of the new Altona Drive / Crescent Street intersection and the realignment of Altona Drive prior to sand extraction within southern extraction site reaching the current alignment.

Appropriate intersections would be constructed for the three Project Site access points off Altona Drive. A range of safeguards would also be implemented including a truck driver's code of conduct, prohibition of right turns from Crescent Street to Tweed Coast Road and adherence to speed and weight restrictions.
Based on the proposed design measures and safeguards, it is considered that the Project would have little impact upon the surrounding road network or road users. It has also been assessed that the performance of the key surrounding intersections would remain largely unchanged.

### Noise

Unattended noise logging was conducted at four locations to determine the rating background noise level. The recorded daytime rating background noise level ranged between 41dB(A) and 51dB(A).
A series of attended noise measurements were also undertaken. At locations closer to Tweed Coast Road, background noise was dominated by traffic noise, whilst noise sources at locations more distant from Tweed Coast Road included wind in the trees, barking dogs and distant traffic noise.

Measurements were also taken during the creation of the initial dredge pond for the approved sand extraction operation. The noise levels were so low that they could not be measured at all surrounding locations, however, some activities were occasionally audible.

Assuming the adoption of the identified noise controls, no exceedances of noise criteria are anticipated to occur at surrounding residences during either site establishment or operational activities. The Project would also easily comply with the criteria for road traffic at the closest residences to the proposed transport route.

The cumulative impacts of the Project with the adjoining Hanson Tweed Sand operation were also assessed as likely to comply with the nominated noise criteria.

The Proponent would undertake a program of noise monitoring to:

- confirm that the sound power levels of equipment used remains within the noise emission levels outlined within the noise assessment;
- conduct noise measurements during initial extraction operations to confirm that noise levels at the surrounding assessment locations comply with the nominated noise limits; and

- conduct noise measurements at the surrounding assessment locations on an annual or biennial basis to ensure that noise emissions remain within the noise limits imposed.

## Air Quality

The air quality assessment undertaken by Simmonds and Bristow Pty Ltd indicated that, with the implementation of the proposed safeguards and mitigation measures, total deposited dust, total suspended particulates, annual $PM_{10}$ (suspended particulates <10µm in size) and 24hr $PM_{10}$ levels at all surrounding receptors would remain within accepted criteria during both site establishment and operations.

A greenhouse gas assessment was also undertaken by R.W. Corkery & Co. Pty Limited. Total direct and indirect emissions that would result from the Project were estimated to be 4 026t of $CO_2$ equivalent per year. This amounts to less than 0.001% of the total baseline year for Australian emissions (1990) annually and hence the Project would have negligible impacts upon greenhouse gas emissions.

### Aboriginal Heritage

In August and September 2005, a comprehensive survey was carried out of the entire Project Site by Heritage Surveys together with the Tweed Byron Local Aboriginal Land Council (LALC).

No Aboriginal sites or relics were identified during the survey. Although a number of Aboriginal sites have been found within the local area, the extensive area of surface visibility within the Project Site was adequate to conclude with a high degree of certainty that Aboriginal heritage sites do not exist in this area.

No Aboriginal sites or relics were identified within the proposed pipeline corridors during site surveys. The only class of Aboriginal site considered to have potential to occur within the proposed pipeline corridors were scar trees. These are highly identifiable sites, of which none were found.

Though no Aboriginal sites or relics were identified, the Tweed Byron LALC would be invited to observe site preparation activities within the proposed northern pipeline corridor. Furthermore, if in the process of site establishment, construction or operational works any Aboriginal sites or relics are identified, works at and adjacent to the site or relic would stop and the DECC regional archaeologist and the Tweed Byron LALC would be contacted.

These recommendations have been supported by the Tweed Byron LALC.

### Socio-economic

A socio-economic assessment was undertaken by Darren Gibson Planning focusing upon the potential impacts requiring assessment under Tweed Shire Council's Development Control Plan 45.

The socio-economic assessment found that:

- the provision of fill sand, allowing the implementation of the Proponent's Structure Plan, would result in significant expenditures and ongoing employment;
- the Project would result in the productive utilisation of a regionally significant resource; and
- the Project has been designed to limit potential adverse environmental and amenity impacts.

The net present value of the resource is estimated to be approximately $30 million with the operation expected to directly provide 5 full time jobs with total salaries in the order of $300 000 each year over the Project life.

Additionally, the implementation of the structure plan would generate in the order of 8 587 full time equivalent jobs during construction and permanent ongoing employment for a further 3 390 people. The total expenditure in the economy, including output multipliers, would be in the order of $2 072 million.

### Visibility

The existing visual character of the Project Site and surrounds is a combination of a rural landscape, including grazing and horticultural enterprises, and industrial developments.

Industrial developments include the adjoining Hanson Tweed Sand Quarry, the new Kingscliff Waste Water Treatment Plant on the western boundary of the Project Site, and the Australian Bay Lobster Farm which has been approved for construction immediately to the west of the Hanson Tweed Sand Quarry.

A range of safeguards and mitigation measures would be implemented to reduce the visual impacts of the Project. These measures include the use of visual screens and amenity bunds, progressive rehabilitation and positioning of lighting.

It is considered that the processing area would be the primary area that would be visible and that broken views would be available whilst the vegetation screens are being established.

It is noted that most views of the Project Site from surrounding elevated areas would be against the setting of the new Kingscliff Waste Water Treatment Plant, Hanson Tweed Sand Quarry and Australian Bay Lobster Farm. It is therefore assessed that the nature and scale of buildings associated with the sand extraction operation would be consistent with the scale and character of development in the immediate vicinity of the site.

As the Project progresses, and following completion of rehabilitation activities, it is considered that the visual character of the landscape would improve with the addition of the final lake and fringing wetlands and parklands.

## 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 and broader Tweed and surrounding region.

## 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 fill sand, processing of sand for construction purposes and materials and a facility for the disposal of VENM. The provision of fill materials would allow the Proponent to implement its Structure Plan which would provide significant social and economic benefits to the local and wider community.

Additionally, the final landform and land use would be ecologically valuable and provide social value through the provision of parklands and recreational facilities.

In light of the conclusions incorporated throughout the *Environmental Assessment*, it is assessed that the Project could be constructed 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 fill sand for substantial and worthwhile local projects;
- contribute towards satisfying the demand for construction materials within the region;
- 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 nature conservation and recreation;
- provide social and economic benefit to the local and wider community; and
- address perceived social impacts.

This page has intentionally been left blank