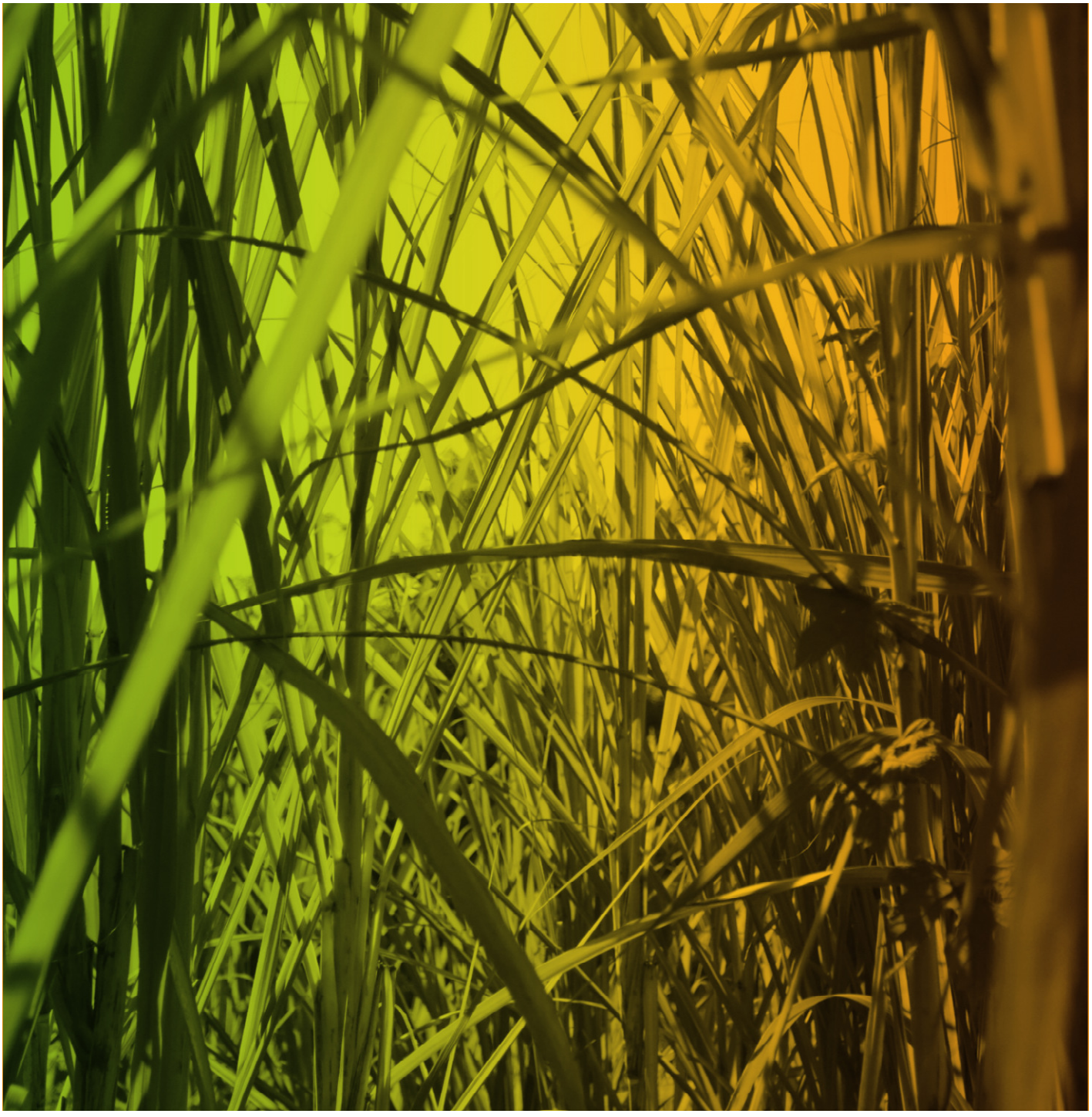
National Ceramic Industries Australia Expansion

Environmental Assessment



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National Ceramic Industries Australia Expansion

Environmental Assessment

Prepared for

National Ceramic Industries Australia

Prepared by

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Quality Information

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Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
1	12 March 2010	Final Draft	Andrew Cook	
2	5 July 2010	Final	James McIntyre	

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Certification

Submission of Environmental Assessment prepared under the *Environmental Planning and Assessment Act 1979* Section 75F

EA prepared by	James McIntyre	Dianne Munro
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Address	AECOM 17 Warabrook Boulevard Warabrook NSW 2304	AECOM 17 Warabrook Boulevard Warabrook NSW 2304
in respect of	Proposed Facility Expansion	
Project application	MP09_0006	
Applicant name	National Ceramic Industries Australia Pty Ltd.	
Applicant address	PO Box 765 Maitland 2320	
Land to be developed lot no., DP/MPS, vol/fol etc Proposed project	The proposed facility Expansion is to be carried out at Lot 101 DP 1062820. The project involves the expansion of the existing ceramic tile manufacturing facility owned by National Ceramic Industries Australia.	
Environmental Assessment	An Environmental Assessment is attached.	
Certification	I certify that I have prepared the contents of this Environmental Assessment and to the best of my knowledge it is true in all material particulars and does not, by its presentation or omission of information, materially mislead.	
	Signature	Signature
	Name: James McIntyre	Andrew Cook
	5 July 2010	5 July 2010

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Glossary of Terms

Term	Definition or Meaning
AHD	Australian Height Datum
Approved Facility	Includes the approved development as approved in the 2002 EIS (Stages One – Four)
AQIA	Air Quality Impact Assessment
AS	Australian Standard
ASSMP	Acid Sulfate Soils Management Plan
CEMP	Construction Environmental Management Plan
CIL	Ceramics Industries Limited
CIL	Ceramic Industries Limited
CO_2-e	Carbon Dioxide Equivalent
DA	Development Consent
dBA	Decibel
DECCW	Department of Environment, Climate Change and Water
DG	Dangerous Goods
DOP	NSW Government Department of Department of Planning
DP	Deposited Plan
DWE	Department of Environment and Water
EA	Environmental Assessment
EARs	Environmental Assessment Requirements
EASR	Environmental Assessment Scoping Report
ECRNT	Environmental Criteria for Road Traffic Noise
2002 EIS	Ceramic Tile Manufacturing Facility at Rutherford NSA (Parsons Brinckerhoff, 2002)
EIS	Environmental Impact Statement
ESAP	Energy Saving Action Plan
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
Existing Facility	Includes the operating development as approved in the 2002 EIS that has been implemented to date (Stages 1-2)
Expansion	Expansion of the approved facility as described in Section 4 of this EA (Stages 5-8)
Facility	The Approved Facility and the Project
GHG	Greenhouse Gas
GLC	Ground Level Concentration

Term	Definition or Meaning
HF	Hydrogen Fluoride
IDC	Industrial Development Code
IGAE	Intergovernmental Agreement on the Environment
INP	Industrial Noise Policy
LA90	Measured background level
LAeq	Equivalent continuous noise level
LEP	Local Environmental Plan
LGA	Local Government Area
LGV	Laser Guided Vehicle
LMP	Landscape Management Plan
MCC	Maitland City Council
MCWDCP	Maitland City Wide Development Plan
MLALC	Mindaribba Local Aboriginal Land Council
MSG	Maitland Stink Group
NATA	National Association of Testing Authorities
NCIA	National Ceramic Industries Australia Pty Ltd - the proponent applying for project Approval
NES	National Environmental Significance
NGA	National Greenhouse Accounts
Nox	Oxides of nitrogen
NP&W Act	National Parks and Wildlife Act 1974
NV Act	Native Vegetation Act 2003
PHA	Preliminary Hazard Analysis
PM_{10}	Particulate Matter - less than 10 microns
POEO Act	Protection of the Environment Operations Act 1997
PPM	Parts per Million
Project	Expansion of the facilities and infrastructure as described in Section 4 of this EA and the operation of four ceramic tile production lines (Stages Five – Eight)
REP	Regional Environmental Plan
RSPCA	Royal Society for the Prevention of Cruelty To Animals
RTA	Roads and Traffic Authority
SEPP	State Environment Planning Policy
SO_2	Sulphur dioxide
Stage 1-4	The four tile production lines of the approved facility
Stage 5-8	The four tile production lines of the Project.
TIA	Traffic Impact Assessment
TP	Total Particulate

Term	Definition or Meaning
tpa	Tonnes Per Annum
TSC Act	Threatened Species Conservation Act 1995
TSP	Total suspended particulates
VIA	Visual Impact Assessment

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Acknowledgements and Notes on the Text

The study team wishes to thank members of the community and industry who greatly contributed to the preparation of the Environmental Assessment as well as the organisations and government bodies who generously provided their assistance.

Would/Will

As a determination on the project will only be made after the Environmental Assessment (EA) has been on public display and submissions considered the future conditional tense is used throughout this EA and Statement of Commitments when describing the project, alternatives and assessing impacts. 'would' is therefore, used throughout the text in preference to 'will'.

If approval is given for the project to proceed under the NSW environmental planning legislation, all 'would' preferences should be interpreted as 'will'.

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1.0 Introduction

NCIA proposes to undertake an expansion to its existing ceramic tile manufacturing facility (the facility) at Rutherford, NSW. The project includes the construction and operation of a second factory building with four additional production lines on a parcel of land adjacent to the approved facility and its associated infrastructure. NCIA also propose to relinquish their existing Development Consent (No. 449-12-2002-i) for the facility and operate all eight production lines (Stages One – Eight) under a new Project Approval. NCIA would relinquish their existing Development Consent upon being granted Project Approval for the project as defined in **Section 4.0** of this EA.

This EA has been prepared consistent with the Directory General's EARs issued 25 February 2009 (see **Appendix A**) and supports NCIA's application for Project Approval under Part 3A of the EP&A Act.

1.1 Background

The existing facility operated by NCIA was granted DA 449-12-2002-i (consent) under Part 4 of the EP&A Act on 2 July 2003 and operates generally in accordance with the supporting EIS (2002 EIS).

Consent was granted subject to a number of conditions including those related to the staging of the development. In accordance with the development described in the EIS and related conditions of development consent, the Facility was to be constructed in two phases, with building fit-out to occurring in four stages.

The consent stipulated a staged development, which was a result of concerns relating to air emissions from the project. As such, a stringent feed-forward/feed-back mechanism was incorporated into the development consent requiring monitoring and reporting of emissions to confirm environmental performance at each stage, and use of this data to predict air emissions performance for the subsequent stage of the operation prior to its commencement.

To date, Stage One – Two of the facility are operational with the current maximum production of the facility being approximately 6.4 million m^2 of ceramic tiles per annum. Stages Three – Four of the facility are approved but not yet operational. When Stages One – Four are operational the facility will have a production rate of 12.8 million m^2 of tiles per annum. The project, known as Stages Five – Eight, would involve increasing the approved capacity to approximately 25.6 million m^2 of tiles produced per annum.

NCIA is seeking approval to expand the existing facility, including construction and operation of a second factory building with four additional production lines on an adjacent parcel of land to the east of the existing facility.

The project would be designed and constructed, by way of leaving space and providing easy connection, to enable the future integration of electricity co-generation facilities. The operation of any co-generation facilities have been not assessed in this EA and would be subject to a future modification.

1.2 Project Context

Prior to the development of the existing facility at Rutherford NSW, the majority of domestic ceramic tile consumption was of tiles imported from China, South East Asia, Italy, Spain and Brazil.

Since 2004-05, NCIA has been successful in meeting a significant proportion the current domestic tile demand from its facility in Rutherford. It is anticipated that this demand will continue to increase in the foreseeable future, therefore NCIA is proposing an expansion of their current facility. The project would also introduce improved technologies into the tile making process, providing efficiencies in energy, production costs and production rates.

1.3 Location

Stages Five - Eight is to be located adjacent to the existing operation, located on Lot 101 DP 1062820 Racecourse Rd, Rutherford, within the local government area of Maitland. The land is owned by NCIA.

The existing facility is located within the Rutherford Industrial Estate where land use is predominantly industrial. The northern and western boundaries are bordered by industrial developments. The location of the existing facility and the location of the project are provided in **Figure 1** and **Figure 2**.

Adjacent to the south and east of the project site is the former Westside golf course. This land is the site for a potential 450 lot residential subdivision. The Development Application for this proposed subdivision is yet to be considered by the Maitland City Council.

The existing location in the Rutherford Industrial Estate continues to be seen as the optimal location for the existing facilities and for the expansion (Stages Five – Eight) of these facilities as described in this EA. Site selection is discussed further in **Section 3.2.1**. The site of the facility is optimally located in an industrially zoned area and the location of Stages One – Four and Five – Eight would allow significant business synergies and efficiencies.

1.4 The Proponent

NCIA is the proponent and is 70% owned by CIL with the remainder being owned by Australian investors (27.5%) and an Italian investor (2.5%). NCIA has been operating since commissioning in 2004 and has experienced significant growth initiating the need to expand the existing facility.

CIL is a major producer of ceramic tiles and sanitary ware in South Africa and was publicly listed on the Johannesburg Stock Exchange in 1991.

During its 2006 financial year, the Ceramic Industries Group (including CIL and NCIA) maintained its position as the largest Southern African manufacturer and supplier of ceramic tiles and vitreous china sanitary ware. The Ceramic Industries Group now manufactures 55% of all tiles and sanitary ware purchased in South Africa and is uniquely positioned in its market. The Group offers a complete range of products to merchants and wholesalers in South Africa and most Southern African countries.

Contact details for the Proponent are:

Leonardo Pereira
Managing Director
National Ceramic Industries Australia
PO Box 765
Maitland NSW 2320

Ceramics Industries Limited vision is to be the preferred low cost global manufacturer and supplier of ceramic tiles and sanitary ware by 2010.

1.5 Existing Operations

The existing facility was granted consent in July 2003 for four production lines (Stages One – Four) and commenced operations in 2004. The initial operations consisted of one ceramic tile manufacturing line (Stage One) with an average annual production of 3.2 million m^2 of tiles (equal to one quarter of the maximum approved annual production of 12.8 million m^2 of tiles).

In 2007 the second phase of the construction of the factory building was completed. This phase completed the infrastructure required to house the approved four production lines (Stages One – Four). During mid-2008, construction of the second production line (Stage Two) was complete. Stage Two operations commenced in August 2009 enabling an average annual production of 6.4 million m^2 (equal to one half of the maximum approved annual production of 12.8 million m^2 of tiles).

1.5.1 Approved Operations

Approved operations are for four production lines (Stages One – Four) with a maximum annual production rate of 12.8 million m^2.

The manufacture of ceramic tiles in the existing production facilities (and that of the approved and not yet constructed Stage Three – Four) is a process of mixing and preparing raw materials in specified proportions, pressing the prepared mix into the desired shape, and then drying prior to decorating and glazing. The tile is then fired in the facilities kiln prior to sorting, packaging and dispatch.

A detailed description of each stage of the process is provided in **Table 1**.

Table 1: Summary of Approved Operations

Existing Operation	Description
Batching	Raw materials that make up the composite (the basis material for tile manufacture) is stored in bunkers at the northern end of the building. There are nine bunkers storing three different clays, feldspar and all clay scrap that has not been through the kiln. The raw material components that make up the composite are loaded into continuous weigh feeding hoppers using a bucket wheel loader. The material is proportioned continuously by the weigh feeders and transported by conveyor belts to a small buffer silo above the mill, which ensures that the mill is fed consistently.
Mill Feeding	A continuous weigh feeder, feeds the composite from the buffer silo into the mill where water and deflocculant are added. The deflocculant ensures that the composite does not bind by reversing the polarity of clay particles. Alubit balls are used as the grinding media.
Slip Preparation	The composite is ground in the mill to a residue not exceeding three percent retained on a 54-micron screen. The composite exits the mill as a slip and is gravity fed via screens into storage tanks. The composite slip in these tanks is kept in suspension using stirrers. The slip is transported from the tanks via high pressure ceramic pumps through fine nozzles into the spray drier.
Powder Spray-Drying and Clay Storage	The spray drier removes most of the water, leaving a granulated composite with approximately 6 % residual water. At the exit of the spray drier all remaining lumps of clay are screened. Any material removed by the screens is returned to the clay mill for further processing. The granulated composite is then transported by conveyor belts to silos where it is stored for at least 12 hours to allow for the clay-water interaction to take place. The granulated composite is then fed on demand from the silos via a screen to the surge bins above the presses. Any material caught by the screens is returned to the surge bins for further processing. These surge bins directly feed the presses.
Pressing and Drying	The granulated composite is fed into moulds and then pressed into a wet green tile by the hydraulic press. The green tile is fed from the press into a tile drier, which increases the strength of the tile prior to glazing.
Wet Glaze Preparation	Glaze preparation, which includes engobes, printing pastes and glazes, occurs in the glaze preparation plant. This plant is the only glaze batch processing plant in the existing facility. The glazes are milled in batch mills and stored in tanks in a liquid form. The mill is a cylindrical drum that contains alubit balls. Any additional stains or material to achieve the desired effect is added to the mill at this stage.
Wet Glazing	The decorative part of the process takes place in the glazing lines. The average tile would have approximately eight applications of engobe, glaze and printing paste. Engobe, which can be compared to an undercoat in painting applications, is applied to the green tile using an “airpower” applicator, which is a pump attached to spraying nozzles. As the tile passes under the applicator, engobe is applied to the tile at the specified density and viscosity. Matte glaze is applied at the specified density and viscosity using double disc cabins, which would rotate at a high speed and spread the glaze over the tile. Printing paste is printed on the tile in the arranged order using a multiple head printing machine, which is similar to a newspaper printing machine.
Firing	The glazed dry green tiles are fed through a pre-kiln from the glazing line via a small compensator, which removes the moisture from the applied glaze. The tiles are then fed through the pre-kiln and kiln via ceramic rollers designed to handle high temperatures up to 1,300 degrees centigrade. After cooling, the tile is ready for sorting and packaging.

Existing Operation	Description
Sorting, Packaging, Handling and Storage	As the tile exits the kiln it is scanned for grading, boxed and palletised accordingly. Once the tiles are boxed and palletised, the pallets are transported to a shrink-wrap machine by a laser-guided vehicle (forklift). Following the application of shrink-wrapping the tiles are stored in the warehouse and subsequently loaded onto trucks for transport to the relevant merchant.

1.5.2 Stormwater \ Surface Water Management

Approximately 5.8 hectares (ha) of the project site is impervious and occupied by building and hardstand. As part of the approved facility, a stormwater management strategy was developed to minimise the impacts on flow regime from the site (PB, 2002b). This strategy consists of four wet detention basins connected by grass swales to reduce peak stormwater flows and improve water quality. One basin exists on the western side of the existing facility and three exist on the eastern side (**Figure 2**).

The stormwater management system on site has been designed to mimic the pre-development peak runoff characteristics of the existing site footprint. The pre-developed state therefore provides a baseline which the new development would also need to maintain.

1.5.3 Air Emissions Controls

The existing development uses fabric filter baghouses from Italian manufacturer, 'Eurofilter'. A baghouse that collects particulate matter form the tile manufacturing process is connected to each of the kilns and spray dryers. The baghouses attached to the kilns also incorporate the addition of fine grade lime to the exhaust stream. The lime acts to neutralise the fluoride that is present in the kiln exhaust.

In addition to the baghouses additional air emission controls include indoor storage of all raw materials and dust extractors in the clay preparation area and selection lines.

1.5.4 NCIA Environmental Monitoring Program

The air quality programs monitor ambient PM_{10} and Hydrogen Fluoride (HF) concentrations, meteorological conditions and fluoride vegetation impact monitoring. The existing environmental monitoring program is required as conditions of the existing consent and Environment Protection Licence (EPL). The approach to the various ambient air monitoring programs is briefly summarised below.

PM_{10} Monitoring: Two sampling locations have been established for the monitoring of ambient PM_{10} concentrations at the NCIA property boundary, generally along the dominant southeast-northwest wind axis. The monitors are sited in accordance with the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (DECCW 2007), referencing AS/NZS 3580.9.6 (2003) *Methods for Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – PM_{10} High Volume Sampler with Size Selective Inlet - Gravimetric Method* for the monitoring of PM_{10} matter. Discrete 24-hour samples are collected every 6 days according to the NSW EPA schedule. Analysis of PM_{10} is performed by a National Association of Testing Authorities (NATA) certified laboratory.

HF Monitoring: Two fluoride monitoring units (manual, double filter paper samplers) are sited at each of the two locations identified for monitoring of PM_{10} and operated in accordance with AS3580.13.2 (1991). At each location, one monitor operates continuously over a 7-day period to provide weekly fluoride concentration averages. The remaining unit at each site operates for discrete 24-hour periods according to the NSW EPA 6-day cycle to provide 24-hour averages for sampler operation days. Samples are be analysed by a NATA accredited laboratory for particulate and gaseous fluoride.

Meteorological Monitoring: The existing weather station is located on site in accordance with AM-1 (NSW EPA, 2001) for the continuous measurement of wind speed (10 m), wind direction (10 m) and temperature (5 m) in accordance with approved methods defined by NSW EPA (2001). A tipping bucket rain gauge is used to measure the daily rainfall rates. Data acquisition software program associated with the weather station facilitates the calculation of sigma theta (10 m).

Fluoride Vegetation Impact Monitoring: Annual visual assessment of vegetation for fluoride impacts in the area surrounding the NCIA premises have been performed by Dr David Doley (University of Queensland) in accordance with the Department of Environment and Climate Change and Water (DECCW) approved methodology. Annual surveys have been undertaken during the summer-autumn months. Sites selected for periodic assessment will be consistent, as practically possible, with specimens chosen in the completed background survey. Quarterly visual assessments of vegetation have also been undertaken by AECOM. Monitoring of fluoride content in vegetation would be performed as part of the quarterly and annual visual surveys. Foliage samples are collected from various locations and vegetation types for subsequent analysis.

1.6 Environmental Assessment Process

The EP&A *Act* and the *EP&A Regulation 2000* provide a framework for environmental planning in NSW.

Prior to a decision to proceed with a project that may have an impact on the environment, a detailed assessment of the likely impacts of the project must be undertaken. The project has been declared by the Minister of Planning as a 'major project' under the provisions of the *EP&A Act* and *State Environmental Planning Policy (Major Development) 2005* (SEPP 2005), and is therefore subject to the provisions of Part 3A of the *EP&A Act* with the Minister being the approval authority.

The project meets the criteria of a 'major development' under Group 2 of Schedule 1 of SEPP 2005. Group 2 of Schedule 1 includes development classified as:

> *"9 Metal, mineral or extractive material processing, being:*
>
> *Development that has a capital investment value of more than $30 million or employs 100 or more people for any of the following purposes:*
>
> *b) brickworks, ceramic works, silicon or glassworks or tile manufacture"*

The project is expected to have a capital investment of approximately $65 million and is for the purposes of ceramic works. Therefore, as the project is of a kind described in Schedule 1 of SEPP 2005, it satisfies the relevant criteria to be determined under Part 3A of the *EP&A Act*.

A project approval under section 75J of the *EP&A Act* is therefore being sought for the project.

1.7 EA Purpose & Structure

In accordance with Part 3A of the *EP&A Act*, this EA has been prepared pursuant to the Director-General's EARs.

The EA applies to the project boundary as shown on **Figure 2** and supports the application for Project Approval.

The purpose of this report is to assess the environmental effects of the project and to describe the measures that NCIA would take to minimise the impact of identified potential adverse environmental effects in order that the Minister for Planning can make an informed decision with regard to the project.

To inform relevant government agencies and the Maitland City Council of the environmental issues associated with the project, such that the level and detail of environmental assessment required is understood, this EA has been structured to provide information on broad areas as follows:

- **Section 1** – provides a detailed background to the project, including information about the applicant and existing operations;
- **Section 2** – provides location and context of the current operations at the project;
- **Section 3** – describes the need for the project and alternatives considered;
- **Section 4** – provides a detailed description of the project including infrastructure requirements and associated activities during construction and operation of project;
- **Section 5** – describes the legislative context applicable to the project;
- **Section 6** – describes the consultation process undertaken as part of the approvals process;
- **Section 7** – provides a summary of the environmental issues and their prioritisation;
- **Section 8** – provides an assessment of air quality impacts;
- **Section 9** – describes the greenhouse gas impact of the project and the identified energy efficiency opportunities identified;

- **Section 10** – provides an assessment of the predicted noise impacts related to the project;
- **Section 11** – describes the predicated traffic and parking impact of the project;
- **Section 12** – provides and summary of the conceptual stormwater management system, predicted impacts to water quality and water harvesting and recycling activities;
- **Section 13** – provides and assessment of the potential visual impacts of the project;
- **Section 14** - other environmental issues are discussed such as ecology, hazard and risk and archaeology;
- **Section 15** – Lists the Statement of Commitments;
- **Section 16** – presents a residual risk analysis of the project following the implementation of the actions listed in the Statement of Commitments;
- **Section 17** – describes project Justification & Conclusion;
- **Section 18** – Lists the EA project Team; and
- **Section 19** – Lists the References used in this EA.

2.0 Site Context

2.1 Site Location and Description

The Stages Five - Eight is to be located adjacent to the existing NCIA facility in Racecourse Rd, Rutherford, within the local government area of Maitland. Rutherford is located approximately 41km north west of Newcastle. The main arterial road linking Rutherford to Newcastle is the New England Highway. The project's access is directly from Racecourse Road which intersects with the New England Highway. The project's access road off Racecourse Road travels along the western boundary of the site (**Figure 2**).

The site is located within the Rutherford Industrial Estate where the surrounding land use is predominantly industrial, however the former Westside golf course (location of the proposed but not approved Heritage Green residential subdivision) is located to the south and east. The total site area, including that of the existing facility and project is 16.83 hectares, is relatively flat with a slight fall of less than one percent to the south. Surface elevations of the site range from RL 21 metres Australian Height Datum (AHD) at the north of the Site to RL 16 m AHD in the south east corner.

The site is largely devoid of vegetation. The minimal vegetation that did exist was cleared in accordance with the 2003 consent (DA No. 449-12-2002-i). The site currently houses the existing facility (Stage One and Stage Two) which are predominately located with the existing factory building. The existing manufacturing facilities are housed in the existing factory building which is approximately 488 m long and 80 m wide. The height of the building varies with the majority at heights of 6 metres to 8 metres at the eave and 11.5 metres at the ridge. The highest part of the building is 24.5 metres at the eave and 28 metres at the ridge.

Internal roads exist along the western boundary (used for product dispatch and general site access) and along a portion of the northern boundary (used for raw material delivery). The stormwater facilities are located centrally to the east of the existing factory building, along the western edge of the existing factory building and on the south eastern boundary (prior to leaving the site). The site is securely fenced off with a secured entrance off Racecourse Road.

The location of the site can be seen in **Figure 1** and **Figure 2**.

2.1.1 Land Ownership and Legal Description

NCIA is the owner of the site, both the land where the existing facility is located and the adjacent vacant area that is the proposed location for the project.

The site is formally described as Lot 101 DP 1062820.

2.2 Site History

Previous land use at the site was discussed in detail in the 2002 EIS. The EIS indicated that the site was held by a grazier and livestock dealer between 1893 and 1973. In 1973 the ownership of the land passed to Cambridge Credit Corporation. In 1981 ownership of the land transferred to the Maitland City Council which sold the land to NCIA in 2002.

To date NCIA has invested in excess of $53 million in their existing ceramic tile manufacturing facility. The vacant land adjacent to the existing facility where the project would be constructed has remained undeveloped since NCIA acquired the land.

2.3 Regional Overview

The site is located within an existing industrial estate located at Rutherford, NSW. Rutherford is located in the Lower Hunter Region, NSW. The Lower Hunter is located approximately 160 km north of Sydney and is the sixth largest urban area in Australia. The Region covers the area from Wyee in the south, Yengo National Park in the west, Nelsons Bay in the east, and extends north past Maitland by approximately 40 km. The region is home to the state of NSW's second largest city, Newcastle. According to the Lower Hunter Regional Strategy (DOP 2006) the region is:

> *"….. characterised by large areas of rural, agricultural and forested land. Based on a major river and costal estuary, the region contains areas of high quality agricultural land, important drinking water aquifers and internationally and nationally significant environmental assets. The regions rural and semi-rural landscapes account for around 80 per cent of the Region's land and are further defined by key industries of mining, wine production and tourism."*

The Region encompasses five LGAs. These are:

- Newcastle;
- Lake Macquarie;
- Port Stephens;
- Maitland; and
- Cessnock.

Rutherford is located within the Maitland LGA.

Rutherford is located approximately 4 km further east along the New England Highway from the township of Maitland. The township of Maitland was first settled by Europeans in approximately 1810 and is the focus of economic activities of the LGA including agriculture, tourism, mining, manufacturing, and transport and construction industries.

The regional location of the site is indicated in **Figure 1**.

2.4 Surrounding Land Uses

Table 2 summarises the surrounding land uses to the project site in Rutherford, NSW.

Table 2: Surrounding Land Uses to the Project Site

Direction	Surrounding Land Use and Ownership
North	Directly north of the site is an electricity substation owned by Energy Australia. The substation is adjacent to the southern edge of Racecourse Road. Also directly north the RSPCA operates a facility which is setback from Racecourse Road. The surrounding industries to the north of the project site include Hunter Valley Granite and Marble, Landmark and SRH Milk Haulage and Hazchem. The New England Highway is approximately 880 metres to the north from the site. A vacant and newly developed industrial estate is located adjacent and to the north of the New England Highway. A new residential subdivision is being constructed to the east of Anambah Road which runs north of the Highway. The Rutherford Aero Club is located approximately 1.5 km north west of the site. The Hunter River is located approximately 2.6 km north east of the site.
East	The land immediately to the east of the site is zoned 6(b) Private Recreation along with the entire former Westside golf course site. Beyond the former golf course are the residences of Rutherford, with those closest residents being on Kenvil Close, Marlborough Street, Mountvale Street and Regiment Road. Beyond the residences of Rutherford are those located in Telarah and Maitland. Industries north east of the site which are accessed from racecourse Road include National Wide Hire, Hunter Powder Paint, Tolsaf Cranes and Jurox. The North Coast Railway Line, which branches off the Main Northern Railway Line, is located approximately 3 km to the east of the site and runs in a north-south direction.

Direction	Surrounding Land Use and Ownership
South	The former Westside golf course is located on the southern boundary of the site (zoned 6(b)). The Main Northern Railway line is located approximately 0.5 km south of the site beyond the golf course, running in an east-west direction. Land to the south of the Main Northern Railway Line is generally zoned for rural purposes, with some rural residential development along Wollombi Road. Stony Creek, a tributary of Fishery Creek, is approximately 150 metres south of the site and flows in an easterly direction. Wentworth Swamps are approximately 3.5 km south of the site.
West	Industrial developments that front Gardiner Street (west of NCIA) are located on the western boundary of the site. These include Atlantic Foods, Treloar Fluid Solutions, Royal Equipment, Pipe Lining and Coating, and Industrial Maintenance and Fabrications. Rockface Block on Shipley Drive and Budget Kitchens on Kyle Street are north west of the project site. Land to the west of this industrial development on Gardiner Street (approximately 0.75 km) is zoned 1(b) Secondary Rural Land. An unnamed tributary of Stony Creek flows in a south-easterly direction approximately 0.5 km west of the site.

2.5 Land Use Zoning

The site is zoned 4(a) General Industrial under the *Maitland Local Environmental Plan 1993* (LEP). The land to the north and west is also zoned for General Industrial. Land immediately to the south and to the east is zoned 6(b) Private Recreation. Further afield to the south and west is land zoned 1(b) Secondary Rural Land. Further to the east beyond the former Westside golf course is land zoned for residential purposes (2a). **Figure 3** shows the land use zoning for the area.

2.6 Heritage Green Residential Development

Following the consent being approved for the existing facility (Stages One – Four) and the commencement of Stage One operations, the former Westside golf course, which borders NCIA to the south and east, was rezoned under the LEP. The rezoning was gazetted on 10 June 2005. That rezoning established the Open Space Zone – 6(b) Private Recreation, over the whole site and introduced an enabling clause (Clause 52) into the LEP that, in addition to the existing golf course, permitted the development of up to 450 dwellings as well as commercial or retail development forming part of a major tourist facility, being a golf course (see **Section 14.4.2**).

The rezoning was predicated on a master plan for the site which was submitted to Maitland City Council (MCC) in support of the rezoning. The master plan showed the arrangement of the golf course, the dwellings, and the tourist recreation facility.

In November 2007 development consent for the Heritage Green site was approved by the MCC for:

- Development of the golf course;
- A three lot subdivision (community titled); and
- The main entry road off Racecourse Road.

Documents submitted in support of this application included the site master plan and an SEE dated September 2006.

The residential development, tourist hotel, club house and retirement village elements of the proposed Heritage Green development did not form part of the development consent.

The Heritage Green site is currently undeveloped, and it is understood that the approved facilities as described in the 2006 SEE, have not progressed and the former Westside golf course is presently disused. Subsequently, development applications in 2008 and 2009 have been submitted to the MCC for development of residential housing with no golf course or tourist facility. Neither of these applications has been approved to date. The current Heritage Green development application for 450 houses (only) is not approved nor has it been considered by the Maitland City Council.

The 2006 SEE identifies noise and air quality impacts from the Rutherford Industrial Estate occurring across sections of the Heritage Green site. The potential impacts from the industrial estate on the proposed Heritage Green site have been previously identified in the approved Heritage Green development applications.

In relation to noise, the 2006 SEE indicated that there are portions of the Heritage Green site impacted by industrial noise. The report indicated that noise from the surrounding industries has the potential to cause noise goal non-compliance during the day, evening and night periods. The report discusses the use of appropriate site layout, distance attenuation (buffer distances) and building design criteria to reduce noise impacts from the existing industrial land uses.

In relation to air quality the 2006 SEE recommends that prior to any residential allotments being located within 150 metres of the north western boundary of the Heritage Green site (NCIA boundary), consideration should be given to particulate matter levels. It also recommends a buffer of 50-100 metres along the northern Heritage Green boundary.

2.7 Existing Consent and Relationship with this EA

The facility currently operates under DA 449-12-2002-i and operates generally in accordance with the supporting Environmental Impact Statement (EIS) (2002 EIS). The existing consent is provided as part of **Appendix A**.

The consent includes the operating conditions and requirements for the existing facility (Stages One – Four). These include:

- The staging of the development;
- Environmental Performance Requirements;
  - Air Quality Performance;
    - Odour;
    - Dust;
    - Discharge limits;
    - Load limits;
    - Stack Discharge Design Requirements; and
    - Meteorological Station.
  - Noise impacts;
  - Water quality impacts;
  - Traffic and Transport Impacts;
  - Waste Management Impacts;
  - Hazard and Risk impacts;
  - Soil Management; and
  - Landscaping and Visual Impacts.
- Environmental Monitoring and Auditing Requirements;
  - Air Quality Monitoring;
  - Discharge Concentration Monitoring;
  - Performance Monitoring;
  - Fluoride Monitoring;
  - Meteorological monitoring;
  - Noise Monitoring; and
  - Auditing.

NCIA currently operates its business under the conditions and requirements summarised above, from its consent. However it is acknowledged that a number of the existing conditions would need to be modified as a result of the project and this is discussed throughout the impact assessment section of this EA. These include the staging of the development, landscaping requirements and the environmental monitoring program.

With consideration to the above exceptions, it is expected that the new Project Approval would be consistent with the existing consent which allows Stages One - Four. It is anticipated that NCIA would not be worse off or be required to operate under more stringent operating conditions than are currently required. NCIA would relinquish

their existing Development Consent upon being granted Project Approval for the project as defined in **Section 4.0** of this EA.

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3.0 Project Need and Alternatives

3.1 Project Need

The project is primarily to increase annual production in order to meet the forecast increase in demand of ceramic tiles, both domestically and internationally. This section provides an overview of the ceramic tile market and provides discussion on alternatives which have been considered during the planning of the project.

3.1.1 Purpose

The purpose of the project is to increase ceramic tile manufacturing output by 12.8 million m^2 per annum. Total manufacturing output would increase from the approved maximum of 12.8 million m^2 per annum to 25.6 million m^2 per annum.

This project would implement the current generation of ceramic tile manufacturing technology (Continua) that brings the benefits of reduced environmental impact while delivering the capability of producing a more robust finished product. The Continua system (see **Section 4.2**) would enable the production of a more diverse (size and style) range of ceramic tiles. This would enable NCIA to increase their production with the aim of satisfying a larger proportion of the Australian domestic tile demand, but may also provide future export opportunities.

The project seeks to both solidify and expand their existing capital investment at Rutherford. The project would also see the continued contribution of NCIA to the local economy, through both direct and indirect employment during the construction and operational phases.

3.1.2 Australian Ceramic Tile Demand Trends

Domestic ceramic tile imports during 2008 were approximately 32.6 million m^2 valued at approximately AU$280 million (Halliday 2008). **Table 3** shows the ceramic tile imports for 2003-2008 from the top 14 nations of origin.

Table 3: Ceramic Tile Imports by Top 14 Nations (all figures m^2)

Country of Origin	2003	2004	2005	2006	2007	2008
China	5,322,743	8,148,168	10,333,534	11,953,829	14,382,446	14,972,197
Malaysia	3,773,395	3,613,880	3,188,443	3,423,222	3,855,963	4,243,967
Thailand	2,578,843	3,128,258	2,702,812	3,039,592	3,268,003	3,409,860
Italy	6,679,047	5,793,521	3,900,058	3,295,596	2,987,992	2,592,138
Indonesia	5,211,553	5,328,547	3,489,733	3,012,648	2,605,016	2,174,836
Spain	4,647,230	4,189,709	2,924,751	2,334,640	2,202,615	1,679,165
United Arab Emirates	1,346,305	1,384,753	936,405	790,970	1,110,249	781,315
Vietnam	543,654	980,095	840,036	799,944	941,032	766,498
Turkey	1,112,092	1,016,584	770,834	608,312	545,192	438,616
Sri Lanka	372,757	456,865	396,985	411,390	486,406	408,954
Brazil	1,319,596	1,226,016	853,715	616,078	404,437	189,284
Germany	38,769	31,995	81,572	46,114	75,969	166,462
France	150,877	98,413	58,871	39,825	31,338	135,108
Portugal	125,633	122,829	123,222	111,058	231,442	128,639

Source: Halliday 2008

One obvious trend from 2003 to 2008 that can be seen from the data above is the growing dominance of the Asian market, in particular China. During this period, traditional sources of tile imports, such as Italy and Spain, became substantially less predominant. This swing in the location of tile imports is representative of the shift in domestic demand towards lower-cost tiles, such as those produced in China and South-East Asia, and away from higher-cost European tiles.

Table 4 shows the total ceramic tile imports to Australia for 2003-2008.

Table 4: Total Ceramic Tile Imports to Australia

Year	Imports (m^2)
2003	34,831,653
2004	36,818,162
2005	31,838,614
2006	31,329,728
2007	34,016,303
2008	32,697,582

Source: Halliday 2008

Table 4 shows that ceramic tile imports to Australia peaked in 2004 before dropping back to around 32.7 million m^2 in 2008. This data indicates that an annual market floor for domestic ceramic tile consumption of 31 million m^2 may be reasonably assumed.

Since the commencement of operations in 2004 NCIA has produced approximately 3.2 million m^2 per annum and from August 2009 have been capable of producing up to 6.4 million m^2 per annum. It appears that demand for ceramic tiles in Australia is headed back to 2004 levels and could be in the vicinity of 36 million m^2 in 2010. With the predicted increase in demand and shift from imports to Australian made, NCIA anticipates with the project they would be well positioned to meet this increase in demand through increased production of an Australian made product.

3.1.3 International Ceramic Tile Demand Trends

It is estimated that the world market demand for ceramic tiles is forecast to reach approximately 9.5 billion m^2 by 2010 (http://www.azom.com). This is consistent with the prediction made in the 2002 EIS based on market research undertaken by NCIA. Asia-Pacific (excluding Japan), is projected to emerge as the fastest growing region for ceramic tile demand by 2010. Asia-Pacific had an estimated market share of 62.5% of production in 2007, dominating the global ceramic tiles market.

The 2002 EIS identified the USA as a potential export market, due to Australian products and standards being readily accepted in the USA. The USA is one of the world's fastest growing markets. In 2006 approximately 312 million m^2 of ceramic tiles were consumed in the USA. However the USA ceramic tile market plunged by 19.5% to approximately 250 million m^2 in 2007. This was due to the reversing of the housing boom and a decline in overall floor covering sales (Sutton 2007).

Overall demand for decorative tiles in the USA is forecast to increase to approximately 372 million m^2 in 2011 (Ceramic Industry, April 2008). Foreign trade plays an important role in the ceramic tile industry in the USA with in excess of 80 % of all tiles sold from imported sources. The major suppliers of ceramic tiles to the USA are China, Italy, Brazil, Spain, Turkey, Thailand, Colombia, Indonesia and Mexico.

NCIA views the expanding USA tile market as a viable export opportunity. Approval to expand its existing tile manufacturing facilities in Rutherford with a proven superior technology would facilitate further exploration of this export opportunity. Currently, NCIA sells the majority of their production domestically with a small proportion being exported to New Zealand.

3.2 Alternatives Considered

This section describes the site selection process, the alternative site locations considered and the alternative technologies considered.

3.2.1 Alternative Site Locations Considered

No alternative sites were considered for the project of the manufacturing facility as the existing site has proven to effectively meet the needs of the business. The existing site was chosen because:

- The site was appropriately zoned;
- Additional land was available onsite;
- Synergies \ efficiencies with existing operation;
- Proximity to product markets in NSW, Victoria and Queensland;
- Proximity to raw material sources throughout NSW;
- Availability and cost of gas, electricity, telecommunications, water and sewer infrastructure;
- Access to an available and skilled workforce with strong work ethics;
- Access to ancillary services;
- Links to major transport facilities including freeways and port facilities;
- Support of government agencies;
- Economic viability; and
- Land area, ownership and required earthworks.

3.2.2 Alternative Process Technology Considerations

The existing facility (including those production lines approved but not yet constructed) was based on contemporary ceramic tile manufacturing technology when NCIA's facility commenced production in 2004 (see **Section 1.5**). As described in the 2002 EIS and summarised in **Section 1.5.1**, the existing process involves pressing the granulated composite into moulds to form the shape of the tile. Once the tile is dried it undergoes the decorative process in the wet glazing lines prior to being fired in a kiln.

Since 2004, innovation in the ceramic tile industry has led to advances in tile manufacturing technology which NCIA intends to implement as part of the project. This technology is called 'Continua' from Sacmi, one of the leading manufacturers of ceramic tile manufacturing plant and equipment from Italy. 'Continua' technology would allow NCIA to produce a wider range of ceramic tile products, introducing a higher level of innovation and quality.

A description of this manufacturing process is provided in **Section 4.0**.

The Continua technology represents advancement in ceramic tile manufacture compared to the existing technology and is considered the new standard within the ceramics industry. Improvements on traditional press filling systems (i.e. Stages One – Four) have increased output speed and production efficiencies. As the energy requirements of the latest generation kilns is lower than that used in the existing facility production costs are predicted to be lower.

The assessment of alternative technologies focused on the size and elements associated with 'Continua' options and additions to standard plant configuration.

3.2.3 Do Nothing

Not proceeding with project would result in a limitation to the future production of ceramic tiles at NCIA. This would result in:

- Loss of potential employment for an additional 70 people;
- Loss of tile production to the regional and State economy;
- A continued reliance on ceramic tile imports for supplying the domestic market; and
- Loss of investment dollars and flow effects on indirect employment and business activity.

The expanded operation of NCIA would provide immediate benefits to the community through the continuation and expansion of employment as well as providing revenue to NSW. If the development does not proceed, these opportunities would be lost.

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4.0 Project Description

This section provides a description of the project for which NCIA is seeking Project Approval. It includes a discussion on construction and operation, key operational components, site layout, building design and layout, waste and an overview of the Continua system and process.

A summary of the key aspects of the project are shown in **Table 5** and discussed further below.

Table 5: Key Project Aspects

Component	Detail
Production Capacity	• 25.6 million m^2 per annum (Stages One – Eight)
Hours of Operation	• 24 hours, 7 days per week, approximately 340 days per year
Employment	• 70 additional employees (140 in total)
Transport	• 44 additional trucking movements (88 in total per day) • 70 additional staff vehicle movements per day*
Project Duration	• Approximately 50 years
*see note at bottom of **Table 32**	

4.1 Introduction

NCIA is planning to implement the 'Continua' ceramic tile manufacturing system. As discussed below, the Continua system has advantages over the current process, particularly relating to the tile quality, the range of products which may be produced and production cost advantages. The process involves grinding and mixing of predominantly clay white granite and rhyolite, followed by a process of drying the mixture, adding dry glaze, roller pressing, additional dry glazing and decorating, additional pressing, cutting to size and firing, prior to packaging and dispatch.

The project (Stages Five – Eight) would produce approximately 12.8 million m^2 of tiles per annum. The project would increase total production at NCIA to approximately 25.6 million m^2 of tiles per annum.

The project is described below in relation to the construction and operational phases and is shown on **Figure 4.** The project involves the:

- Construction and operation of a second factory building adjacent to the current building to accommodate four production lines (Stages Five – Eight);
- Development and use of associated infrastructure and services such as utility connection, stormwater management and internal roads; and
- Relinquishment of NCIA's existing Development Consent (No. 449-12-2002-i) and operation of all eight production lines (Stages One – Eight) under a new Project Approval.

To enable these elements of the project, the environmental assessments that form part of the EA have considered the cumulative impact of the approved facility (Stages One – Four) and that of the proposed expansion (Stages Five – Eight). That is, the cumulative impact of Stages One – Eight has been assessed.

4.2 Construction

4.2.1 Staging of Works

The construction of Stages Five – Eight is anticipated to commence in 2011. Construction of Stages Five – Eight would take approximately 8 months commencing with the civil works, the factory building, and then the internal factory fit out.

The new factory building would be constructed in two phases (refer **Figure 4)** with factory fit out of Stages Five – Eight being market driven and dependant. The first phase of the factory's construction would include all necessary earthworks and site drainage requirements and internal capacity for two production lines (Stages Five – Six). The second phase would involve expanding the factory building to house the additional production lines (Stages Seven – Eight).

The progressive fit out driven by market demand would correspond to the construction of Stages Five – Eight inside the new factory building. The construction of each stage, following the completion of phase one of the factory building, would be driven by market demand.

Given the cumulative nature of the air quality assessment in this EA (**Section 8**), the strong backlog of air quality data as it relates to the existing facility and realistic understanding of the operational performance of the project (Stages Five – Eight), it is not expected that a stringent feed-forward/ feedback mechanism would be applied to the project as was the case with the existing facility. A Project Approval that enables implementation and holistic operation of Stages Five – Eight is anticipated.

4.2.2 Construction Methods

The construction of Stages Five – Eight would generally involve the following process:

- Establishment of construction offices and temporary parking;
- Stripping of soils and vegetation within the construction footprint;
- Bulk earthworks;
- Laying of concrete foundations;
- Construction of steel frame and colorbond cladding;
- Installation of roofing including translucent panels for natural lighting;
- Incorporation of plant equipment within the building including storage areas, mills, driers and kilns; and
- Construction of internal roadways, stormwater detention basins and landscaping.

The majority of construction materials would be pre-fabricated offsite, delivered to site and assembled onsite, reducing the amount of construction activities required on site.

Onsite construction machinery would indicatively include dozers, excavators, padfoot rollers, concrete trucks, drilling rigs, water cart, cranes, backhoes and other ancillary equipment.

4.2.3 Construction Hours

Construction would be undertaken from 7.00 am to 5.00 pm Monday to Saturday. No construction would be undertaken on Sundays or public holidays unless prior approval is received from DOP.

4.2.4 Peak Construction Workforce

It is anticipated the peak construction workforce would be approximately 50 during the peak time. Where possible, labour would be sourced locally.

4.2.5 Construction Traffic

During peak construction times, it has been assumed that construction staff would generate approximately 100 traffic movements per day (50 trips in and 50 trips out). Parking would be provided on site or along Racecourse Road. Based on previous experience at the NCIA site it has been assumed that construction traffic would generate approximately 60 truck movements per day (30 inbound and 30 outbound per day) for the delivery of various materials.

4.3 Key Operational Project Components

The project would generally require the construction of:

- A separate factory building to incorporate Stages Five – Eight;
- Storage bunkers for raw materials;
- Storage silos for dry clay glazes;
- Installation of four production lines and associated components;
- Emission stacks;
- Pollution control (baghouses);
- Internal roadways and additional car parking; and
- Stormwater detention basins and integration works.

The general location for the proposed factory building for Stages Five – Eight and the location of existing infrastructure are provided in **Figure 4**. The factory that would be constructed to accommodate Stages Five – Eight would be similar in scale and size of the existing facility. Raw materials would be stored on the northern end of the project, with the manufacturing process progressing north to south along the production line prior to dispatch.

The area separating the two buildings would be used largely for stormwater management. Key components of the project are described further below.

4.3.1 Operation Hours

The project would operate over a 24–hour period, approximately 340 days per year. An annual shut down period, which accounts for the remainder of the year, is required to allow for maintenance.

4.3.2 Staff

The project (Stages Five – Eight) would employ approximately 70 employees, resulting in a total workforce of approximately 140 employees at NCIA.

4.3.3 Transportation of Materials

All transport to the project would be via road consistent with the existing approved operation. Access to the project is via Racecourse Road, which intersects with the New England Highway to the north.

Vehicles used for raw material delivery and product dispatch are generally B-doubles and semi-trailers. Raw material delivery vehicles would travel along the northern perimeter road and would enter the raw material storage area of the new factory building on the eastern side and exit on the western side prior to returning along the northern perimeter road, through the existing weighbridge and finally to Racecourse Road.

Product dispatch would occur from the southern end of the existing factory building, at the end of the process line (as is the case with the existing operations). Tiles would be packaged in shrink wrapped pallets and taken by laser guided vehicles (LGV) to the storage area in the existing factory building before being placed on trucks via the loading dock. The loading dock is an open area, with a retaining wall which allows the level loading of trucks. Dispatch traffic would travel north-south along the existing two way internal road adjacent to the western boundary to exit the site.

4.3.4 Stormwater Management

The existing site stormwater management system would require alteration to allow for the increased stormwater as a result of the project. Two of the four existing detention basins would be directly impacted by the proposed layout and would need to be removed. Therefore the new site mitigation measures have been developed to:

- Compensate for the loss of detention provided for the existing facility; and
- Maintain the status quo of the flow regime from the site as a result of the project.

Constraints to be considered in developing the stormwater design for the site include:

- The site is relatively flat with longitudinal grades of 1%. As a result provision of an underground pipe network stormwater system is constrained by minimum grades and associated potential issues with sedimentation and blockage;
- Use of infiltration devices onsite are not feasible due to the presence of clay soils; and
- The construction of the additional factory building considerably constrains the area available for the provision of detention basins.

In response to these constraints, the concept stormwater management strategy aims (to the extent possible) to employ similar methodology to the existing development, namely:

- Use of detention basins with the dual function of reducing peak stormwater flows and improving water quality; and
- Use of grass swales to collect runoff from beside roadways and to provide connection between the detention basins to reduce runoff velocities, provide some infiltration of water, and for water quality improvement.

In addition to the above, large rainwater tanks are proposed to provide additional stormwater detention. These tanks are required due to the lack of available room for a large detention basin at the downstream (southern) extent of the project, and also provide the additional benefit of allowing for onsite stormwater harvesting and reuse (see **Section 12**). The volume of the detention basins and rainwater tanks were designed to maintain the status quo of the flow regime from the site as a result of the project (see **Section 12** for more detail). The locations of the detention basins and rainwater tanks are conceptually shown on **Figure 4**.

Stormwater would flow from the site using the existing underground stormwater pipes connected to the southeast detention basin, beneath two golf fairways at the proposed Heritage Green site and directly into to an existing artificial wetland within the adjacent golf course.

4.4 Site and Building Layout

The conceptual site layout including the existing facility is provided in **Figure 4**. The new factory building would be of similar scale and structure and would be constructed to the east of the existing building. The new building would be constructed in a north-south orientation with raw material storage and production at the northern end and packaging \ dispatch at the southern end. LGVs would generally transport the packaged tiles from the new factory building to the storage area of the existing building prior to dispatch.

The new factory building would house the following equipment and manufacturing plant:

- Separate raw material and dry glaze storage areas;
- Continuous weigh feeder hoppers, bucket wheel loaders and overhead gantries;
- Mills, continuous hydraulic presses, driers, kilns and selection packing lines;
- Die storage and workshop, electrical storage and control room and laboratory;
- Compressors and standby generators; and
- Three diesel forklifts and one front end loader.

Indicative locations of this equipment and manufacturing plant are shown in **Figure 5**.

The manufacturing plant would be housed within a new industrial building approximately 420 m long and 120 m wide in the southern end, 55 m wide through the middle and 105 m wide at the northern end.

The highest part of the new factory building would be 26 m with a 5 degree slope to the ridge and would accommodate the mill and spray drier towards the northern end of the building. Other sections, accommodating the raw materials storage and press areas, would be up to 16 m high. The majority of the building would be 6 – 8 m high. The conceptual building elevations and cross sections are shown in **Figure 6** and **Figure 7.**

Most of the new factory building would be clad with corrosion resistant Colorbond coated steel sheeting. Translucent sheeting would be used at selected locations to provide natural lighting in the new building and would comprise approximately 5 % of the wall and roof surface area. Translucent sheeting would also be used on some selected areas of the walls away from the noisier machinery such as the clay mill and tile presses.

The lower section of each wall, generally up to a height of 1 m but higher where required, would be constructed of concrete panels to provide a resistant surface where accidental damage is most likely to occur. Similar concrete wall sections to a height of around 6 m would be constructed in the northern end of the building to form the walls of the raw material storage bunkers. These bunkers would be designed to take the impact of the front-end loaders used to load from the bunkers.

The walls of the new building would be designed to withstand design wind loadings for the location and expansion joints would be provided at required locations along the walls and roof. The building would be a Class 8 building as defined by the *Building Code of Australia* (ABCB, 2009).

Roller shutters would be located along the western and eastern walls of the building at the northern end to allow for raw material delivery truck access. These shutters would generally be 7 m high by up to 7 m wide. Additional roller shutters would be located along the eastern and western walls to allow access to the various sections of plant along the new building's length. These roller shutter doors would nominally be 5.5 m wide and be located adjacent to the Clay Preparation area, the Presses and the Wet Glazing Line. A nominally 7 m wide roller shutter door would be located to the south of the new building on the western side to allow finished product to be transported by the LGVs to the storage area in the existing factory building.

4.5 Continua System Overview

NCIA is proposing to implement the 'Continua' tile manufacturing technology from Italian plant manufacture's Sacmi. Unlike traditional press feed systems, Continua combines technology that allows modification of both tile aesthetics and size. The Continua system incorporates a powder compaction system that provides both surface and full-body decoration. The key production benefits include:

- Increased production rate;
- Increased versatility in tile dimensions;
- Through-body tile effects;
- Fixing of aesthetic styles and decoration;
- Reuse of exact effects and styles; and
- Increased variety of aesthetic effects styles and decorations.

Other key plant features include automatic waste control (the process waste is automatically fed back into the system for reutilisation) and the possibility of hosting cutting-edge decorating systems.

4.6 Processing

The manufacture of ceramic tiles using 'Continua' involves numerous steps. An indicative process flow diagram is provided in **Figure 8**. Due to technology and process improvements, the manufacturing process using the Continua system for the project would be different to the approved manufacturing process used in Stages One – Four.

A brief description detailing the various steps in the proposed tile manufacture process is provided below. The process described below would be replicated along each production line for Stages Five – Eight.

4.6.1 Raw Materials

Raw materials that are used in the tile manufacturing process are predominantly clays, rhyolite and white granite. These are naturally occurring products, which are typically sourced from quarries located in NSW. Clay is the main component of the tiles, providing strength and body and contributes to the final properties of the tile.

A number of dry clay glazes would also be used during the process, depending on the current demand for tile design and style. These glazes are typically imported from Italy or Spain (**Section 4.9.1**).

4.6.2 Batching and Mill Feeding

The raw materials used in the initial phase of manufacture would be stored in a series of bunkers located at the northern end of the plant. The materials are collected from the storage bunkers using a bucket wheel loader, which are then placed into continuous weigh feeding hoppers.

The continuous weigh feeding hoppers ensure that the clay mill has a constant and consistent supply of raw materials. At the mill, water and deflocculant are added to the milled material which is also known as composite. Deflocculant is used to ensure that the composite does not combine during the milling process.

The wet clay milling process described here for Stages Five – Eight is identical to Stages One – Four.

4.6.3 Slip Preparation and Drying

Slip is the product of the wet clay milling process described above. Slip preparation involves adding water (40% volume) and deflocculant to the composite to produce the composite solution, or slip. The slip is then gravity fed into a series of storage tanks. The slip is kept in suspension using stirrers within the tanks. From the tanks the slip is pumped out and sprayed through fine ceramic nozzles into the spray drier.

The granulated composite that remains after the spray drying process contains approximately 6% water. Water vapour and fine particulates would be emitted from an emissions stack off the spray drier. Particulate emissions would be controlled by fabric filter baghouses. From the spray drier, all remaining lumps of clay are removed by screens and are returned to the clay mill for further processing. The granulated composite is then transferred via a conveyor belt to storage silos. The granulated composite is left within the silos for approximately 12 hours, which allows for interaction between water and clay to take place.

The slip preparation and drying process described above for Stages Five – Eight is identical to Stages One – Four.

4.6.4 Description of the Continua Line

The forming process based on 'Continua' technology is different from traditional methods and consists of a sequence of five specific stages on the line:

- Belt feeding of powder;
- Pre-compaction into a continuous strip;
- Cutting in a predetermined format;
- Dry and/or wet decoration; and
- Pressing of large format and cutting of unfired slab into sub-multiples (if required).

The storage silos feed onto a conveyer belt and the 'Continua' system begins where a dry glaze is applied. This material then passes through a roller press that compacts the dry glaze into the unfired granulated composite. Following the roller press, additional dry glazing and tile decorating (printing) can occur as required. The continuous length of material is then cut into large sheets and is re-pressed. The sheets are then trimmed if necessary and cut to the required tile size. The tiles may undergo a final application of wet glaze as the style of tile requires and then are dried in a tile drier. Each is described further below.

Belt feeding of powder

Belt feeding of the spray-dried powders is performed using specific automatic distribution and batching systems capable of producing both through-bodied products and double or multiple loading products. The product production process is performed continuously, which improves the consistency of powder distribution. The layers of basic powder can be further decorated on the surface through the application of micronised powders and flakes and subtle coloured veins of fusible glazes or granules, either across the entire tile or according to a screen-printed design. The powders are deposited on a belt.

Pre-compaction and cutting of the strip

Continuous pre-compaction enables a specific pressure to be applied to the powders in order to 'freeze' or 'fix' the aesthetic results created in the various powder loading operations. The process is performed continuously, thus generating a strip of infinite length which is cut crosswise as it moves and the edges trimmed to produce a specific size.

Dry and/or wet decoration and final pressing

The strip may be decorated on the surface, using wet applications by extra-large decorating machines as required and is then placed on the press mould without the lower punch descending, and is pressed by upper die forming at the standard ceramic tile pressure of approximately 400 kilograms per square centimetre (kg/cm^2). When the material reaches the press it has already been de-aerated in the previous pre-compaction operation, thus facilitating the actual forming stage. The indicative standard sizes are 120 x 120 cm and 120 x 60 cm (fired).

Optional cutting of unfired material into submultiples

The pieces obtained can optionally be cut into submultiples at the press exit. The flexibility in terms of sizes is an additional advantage of the Continua system. It is possible to produce slabs of varying length and up to a maximum width of 140 cm (fired dimensions).

The most common traditional ceramic tile sizes that can be produced on the Continua line are 120 cm, 100 cm, 90 cm, 80 cm, 60 cm, 50 cm, 40 cm and 30 cm with further scope for non-typical rectangular sizes.

4.6.5 Glazing and Decorating

Dry glazing powders would be applied prior to being roller pressed into the composite and again prior to being cut and dried as described above.

The forming of finished products at the press using dry glazes substantially reduces or eliminates the need for the traditional glaze preparation, the glazing line and the glazing sludge purification processes.

Storage of dry clay glazes would take place in a number of storage silos that would be located in the northern section of the new factory, prior to the beginning of the production line conveyors. Seven dry glaze colours are required to manufacture the full range of tiles which require the installation of up to twenty four storage silos.

Wet glaze application in Stages Five – Eight would be significantly reduced when compared to Stages One – Four. Many tile varieties would not require wet glaze application in Stages Five – Eight because of the use of dry glazes. Wet glaze preparation would be undertaken as a batch process within the glaze preparation plant. Batches are prepared based on the particular glaze or effect that is required. The wet glazes would be stored as a liquid and left to stand for 24 hours to allow for cooling and bubble removal.

Wet glazes would be applied to the tile on the glazing line after the tiles are cut to size and dried in the tile dryer. Wet glazes are applied using an airpower applicator, which is a pump attached to rotating spraying nozzles that ensure a consistent finish over the tile. Wet glazes would be used to further enhance or decorate tiles in ways not possible during the dry glazing process.

4.6.6 Firing

Tiles are fed through a pre-kiln which removes the moisture from the tile and any applied wet glaze. The tiles then pass through the kiln at 1,300 degrees centigrade. Once the tiles have cooled they are available for packaging and dispatch. As can be seen in **Figure 5** each production line includes its own kiln.

Each kiln would generate gaseous emissions from the combustion of natural gas. These emissions would be released via one scrubbed stack per kiln.

4.6.7 Packaging and Dispatch

Tiles are scanned for grading in line with NCIA's quality control procedures. Tiles are then boxed, placed on pallets and shrink wrapped in plastic through an automated process. Once on the pallets, the tiles would be transported to the existing factory building by LGVs where they would be stored in the existing storage area, awaiting dispatch.

4.6.8 Productivity

The maximum speed of the pre-compacting belt is approximately 6 m per minute which allows the press to be fed with very dense, complex products that could not be achieved at the same speed with conventional loading systems.

It is anticipated that Stages Five – Eight would produce approximately 12.8 million m^2 per annum. This would result in the entire NCIA facility having a maximum production 25.6 million m^2 per annum.

4.6.9 Product Types

The Continua system enables the development of unique ceramic tile products of high aesthetic quality. The possibility of multilayer loading allows for a lower consumption of more expensive materials (high-quality raw materials and pigments) for specific types of ceramic tile.

The system's feeding and decoration systems allow for the use of all types of semi-finished products (spray dried products, micronised products, granulates, flakes, grits, etc.) required for the production of glazed (e.g. glossy, rustic, textured, varied colour, metallic, etc.) and unglazed ceramic tiles with through-bodied, double or multiple loading decorations.

With glazed ceramic tiles, dry decoration prior to pressing makes it possible to create products with an extremely natural appearance due to the integration of the bases, the semi-finished products, the decorations and possibly the texture of the final mould.

In addition it is also possible to develop products with geometric patterns (stripes, squares, diamonds, spots, etc.) that can either be used as they are or as substrates for subsequent screen printing decorations. Additionally, the process of depositing layers of powder on a belt opens up new potential for the production of composite ceramic materials.

Finally, it is possible to make ceramic slabs reinforced with metallic fibres suitable for use on ventilated facades or to include low-density materials in the ceramic body to improve thermal and acoustic insulation. These possibilities may result in novel uses of ceramic tiles in the building sector.

4.7 Co-Generation Plants

NCIA proposes to design and construct the project to enable the future integration of electricity co-generation plants across their production lines (both existing and proposed).

The co-generation plants do not form part of the current application but would be subject to a separate application at some stage in the future. The co-generation plants are likely to be located at the clay preparation spray drier area. It is envisaged that the co-generation plants would capture waste exhaust and heat from the boiler that runs the turbine and this would be used to operate the spray driers.

Co-generation is the simultaneous production of electricity and heat using a single fuel source. The heat which is produced from the electricity generating process is captured and utilised to produce high and low level steam. The steam can then be used as a heat source for numerous industrial applications. This process is most common in European countries, but has been increasingly adopted in industrial applications in Australia. The advantages of co-generation are that it harnesses heat that would otherwise be wasted and substantially reduces carbon dioxide (CO_2) emissions whilst achieving greater thermal efficiencies.

4.8 Waste

Waste from the project would be generated during the construction phase and during the operation of the expanded facility. Operational waste would include 'green tiles', broken fired tiles, baghouse waste, consumables, packaging waste and general domestic waste generated within the office and lunchroom.

4.8.1 Construction Waste

Construction waste generated by the project would include steel and timber off cuts, packaging (plastic, cardboard and timber pallets) and general building wastes. Construction waste would be collected for disposal by a licensed contractor. Based on previous experience, it is estimated that approximately 400 m^3 of waste may be generated during the construction stage.

4.8.2 'Green' Tiles

As with existing operations, any raw material waste from un-fired, 'green' tiles would be reused in the manufacturing process. In addition, dust collected from fabric filters would be mixed with water to form slurry, which would be reused in the manufacturing process.

4.8.3 Fired Tiles

Based on existing broken tile rate, it is estimated that approximately 1% of fired tiles would not be eligible for sale, either as broken tiles or not passing NCIA's strict quality assurance process.

At the maximum production rate of 200 tonnes per kiln per day, four kilns operational (i.e. Stages Five – Eight) and 340 operational days per year it is estimated that Stages Five – Eight would produce approximately 272,000 tpa. Given this production rate, the annual volume of fired tiles going to waste would be approximately 2,720 tonnes.

The broken and unacceptable tiles would be disposed of to a licensed landfill and where possible, broken tiles would be sold for reuse in mosaics as is currently undertaken.

4.8.4 Baghouse Waste (Lime)

During the tile firing process in the kiln, some HF is liberated from the clay matrix. Kiln exhaust gases are passed through an emission control system designed to scrub the gaseous HF. This is achieved via controlled injection of 'lime into a baghouse. Gaseous HF is absorbed into the lime. Residual particulate matter entrained within the gas stream is removed by baghouse filters. The treated kiln exhaust gases are then discharged to the atmosphere.

Regular pneumatic pulses dislodge particulate matter accumulated on the filters within the baghouse, and this waste material is collected within 1 m^3 bulk bags.

The quantity of waste lime generated by NCIA is determined by the lime addition rate into the baghouses attached to each kiln stack. For the existing facility, the optimal lime addition rate to efficiently control fluoride emissions has been determined to be approximately 120 grams per minute per kiln. This equates to approximately 59 tonnes per kiln per annum.

It can be reasonably assumed that the production of baghouse waste in the expanded facility would be equivalent to that produced in the existing facility. That is, for Stages Five – Eight approximately 236 tonnes of baghouse waste would be produced per annum once operational.

It is planned that this waste stream be reused early in the production cycle at the milling stage.

4.8.5 General Waste and Consumables

Packaging waste, general office waste and lunch room waste would be disposed of to a licensed landfill or collected by a recycling contractor as appropriate. Incoming packaging waste such as pallets would be reused where possible.

Wastes generated from consumables would comprise an extremely minor part of the total waste stream from the project. Waste consumables, including oil and grease, would be disposed of to a licensed disposal or recycling facility by a licensed commercial contractor.

4.9 Resources and Infrastructure

4.9.1 Raw Materials

Clay is key raw material used in the ceramic tile manufacturing process. The other two important raw materials are white granite and rhyolite. These raw materials are typically sourced from quarries located in NSW.

Clay provides a body to the tile of sufficient strength to work within the green (unfired) stage and also contributes to the final properties of the tile. White granite and rhyolite enhances the strength of the tile and reduces water absorption and often also acts to whiten the body of the tile.

Table 6 outlines the estimated volumes of raw materials required for the operation of the project and where NCIA anticipates sourcing these materials.

Table 6: Raw materials for the project

Raw Material	Approximate Quantity*			Source
	Approved (Stages One – Four)	Proposed (Stages Five – Eight)	Total (Stages One – Eight)	
Clay	400	400	800	• Cowra, NSW • Toronto, NSW • Ulan, NSW
White Granite	260	260	520	• Oberon, NSW • Allandale, NSW
Rhyolite	140	140	280	• Lue, NSW

** Tonnes per day*

In addition to the above, a number of dry clay glazes and to a much lesser degree wet glazes would be used during the manufacturing process. Frit is a component of the glaze, which varies depending on the level of gloss required in the tile. Frit is made up of oxides and minerals such as kaolin, feldspar, quartz, nepheline and zirconium. Frit would be imported from Italy and Spain. Naturally occurring oxides not available in Australia, used to stain the tiles, would also be imported from Italy and Spain. Other components of the glaze materials would be derived from Australian sources. Glaze materials would account for approximately 2% of the raw materials used.

Sodium tripolyphosphate would be used as a deflocculant in the milling process for the project (as is used in the approved operations). Deflocculant would comprise a very small amount of tile composition (approximately 0.1%) and would be derived from either China or Australia.

4.9.2 Natural Gas

The predominant use of natural gas at NCIA is as a fuel for the operation of the kilns and spray dryers.

The gas supply network infrastructure is owned by Jemena. The existing below ground gas main runs along the western boundary of the project. This main is a 150 mm diameter secondary gas main, with a maximum operating pressure of 1,050 kilopascals. It is a welded steel pipeline laid within an easement. The existing gas main is a 'dead end' line branching off the main gas line from Hexham.

Based on actual natural gas consumption by NCIA since operations commenced in 2004, natural gas consumption would be approximately 1.2 million gigajoules for the approved facility (Stages One – Four).

Natural gas consumption for the project would be equivalent to the requirements of the approved facility (Stages One Four). However, the implementation of the Continua system and new kilns are likely to result in an increase in energy efficiency. It has been estimated that the new facility may consume approximately 10% less natural gas than the approved facility. This would result in natural gas consumption for Stages Five – Eight being 1.08 million gigajoules.

NCIA's current natural gas supplier is AGL. Correspondence with AGL has been undertaken and AGL has confirmed that the natural gas supply infrastructure is capable of the delivery rate required by the project and that natural gas supplies are sufficient to meet NCIA's proposed future demand.

4.9.3 Electricity

The site is located adjacent to an Energy Australia zone substation on Racecourse Road, which currently feeds the Rutherford Industrial Estate and NCIA. The electricity line along the western boundary of the site runs to a different Energy Australia substation in the Rutherford Industrial Estate which could be used to supply electricity to the project as an alternative if there was a problem at the zone substation.

Based on actual electricity consumption since NCIA operation commenced in 2004, electricity consumption would be approximately 40,600 megawatt hours per annum for the approved facility (Stages One – Four).

Electricity consumption for the project (Stages Five – Eight) would be expected to be equivalent to the requirements of the approved facility (Stages One – Four). However, the implementation of the Continua system is likely to result in an increase in energy efficiency. It has been estimated that the new facility would consume approximately 10% less electricity than the approved facility. This would result in electricity consumption for Stages Five – Eight being 36,720 megawatt hours per annum.

TRU Energy has been contacted and written confirmation has been received that electricity requirements for Stages Five – Eight is acceptable and achievable.

4.9.4 Water

Water is supplied to the project site by the Hunter Water Corporation supply network.

Based on actual water consumption since NCIA's operation commenced in 2004, water consumption for the approved facility (Stages One – Four) would be approximately 1,772 kilolitres per week (approximately 253 kilolitres per day). This water is used for the tile manufacturing process and wash down requirements. Water is also required for staff amenities, landscaping and fire fighting.

The project (Stages Five – Eight) would be expected to use an equivalent volume of potable water as the approved facility (Stages One – Four).

The cumulative impact for Stages One - Eight on total potable water consumption would be expected to be approximately 3,544 kilolitres per week. Consultation with the Hunter Water Corporation has commenced regarding the project's additional water requirements.

The 2007-2008 Annual Environmental Management Report (AEMR) indicates that during the reporting period NCIA commenced investigating alternative water supply, as stated in the Operational Environmental Management Plan (OEM). The AEMR reported that initial investigations have focussed on the potential suitability for use of the stormwater captured in the water retention basins onsite. AECOM was commissioned to carry out water quality monitoring of the stormwater contained in the water retention basins. This investigation is ongoing, the results of which can be utilised to assess the suitability of the stormwater for use in plant processes.

Additionally, NCIA is proposing to implement rainwater harvesting infrastructure to reduce reliance on potable water as part of the project. It is envisaged that rainwater tanks would be implemented around the proposed factory building generally shown in **Figure 4**. These rain water tanks would be insufficient to meet the full process water needs of the project, however they would at a minimum supplement NCIA's potable water requirements in relation to the irrigation of existing and proposed site revegetation and landscaping and also provides the potential for reuse for staff amenities.

4.9.5 Sewage System

The existing facility is connected to the Hunter Water Corporation sewage system on Burlington Place, to the north east of the project. The facilities that are connected to the sewer are related to the staff amenities and include wash basins and toilets for NCIA staff. No process water or trade waste would be discharged to the sewer.

4.9.6 Public Infrastructure

Section 94 Contributions Plans are a mechanism within the planning process to assist in spreading the costs of services and infrastructure to users. MCC has one Section 94 Contribution Plan that applies to the entire Local Government Area. The *Maitland Section 94 Contributions Plan* came into effect on 4 May 2006 and applies to all land within the Maitland LGA. Contributions are levied on a citywide basis for development that may generate a demand for new district or city wide public services and amenities, or the augmentation of existing facilities.

In accordance with this Plan, contributions under Section 94 would be sought for the following types of development:

- Subdivision of land (urban, rural and rural residential);
- Medium density housing;
- Expansion or redevelopment of existing residential development; and
- Infill development that includes either subdivision or additional housing stock (e.g. dual occupancies).

This project does not fall within the nominated development types that would require a Section 94 contribution to the MCC. However, Section 1.5.2 of the Contributions Plan states:

> *"There may be other types of development not specified in this Plan that generates a need for new or augmented public services and amenities. In such instances, the applicant may be requested to prepare a needs analysis for the development to determine the development contribution to be levied.*
>
> *Alternatively Council may seek to negotiate with the developer to enter into a planning agreement or to provide a mutually agreeable facility(s) in lieu of a contribution to meet the additional needs as a result of the development."*

This EA demonstrates that this project does not generate the need for new of augmented public services or amenities. As such it is not anticipated that Section 94 contributions to the MCC would be required.

Section 94A contributions as defined in the *EP&A Regulation 2000* (the Regulation) and the *Section 94A Development Contributions* (MCC) Factsheet indicate that development contributions are payments made by developers to enable Council to provide public facilities and services required as a consequence of new development. The MCC factsheet states that developments in excess of $200,000 are liable for the maximum 1% levy on the total cost of the development (as stipulated in Clause 25K of the Regulation).

The EA discloses that the project has an estimated total cost of approximately $65 million. It is considered that a development levy of $650,000 would not be fair and reasonable in this instance for the following reasons:

- The EA provides a detailed traffic analysis (see **Section 11** of the EA) that shows the increase in traffic due to the project will not unduly impact on the local road network, and importantly the roundabout controlled intersection of the New England Highway and Racecourse Road does not require any upgrades or modifications. The EA shows that the local road network would continue to function adequately once the project is operational without expenditure by MCC;
- The EA provides a detailed stormwater \ surface water analysis (see **Section 12** of the EA) that demonstrates the proposed modified onsite stormwater management system is effective in attenuating the developed site peak discharge. The modelling shows that the proposed stormwater management strategy on average keeps the peak site stormwater discharge at or below the sites pre-development levels. As a result it is not expected that the MCC would incur expenses to upgrade or modify council owned stormwater management infrastructure;

- The proposal is for an expansion of an existing industrial development which will create approximately 70 additional employment positions. This type and scale of development will not place significant demand on local infrastructure; and
- Utility services such as natural gas, electricity and water are provided to NCIA by service providers outside of the MCC. It is not expected that as a result of the project that any upgrades to the infrastructure supplying utilities to NCIA would need to be upgraded. It is expected that the existing infrastructure has sufficient excess capacity to supply the project without additional expenditure on infrastructure upgrades.

For these reasons, it is not expected that as a result of the project MCC would incur any significant additional costs, nor would the local community be disadvantaged or be required to carry the cost of infrastructure upgrades. As a result it is considered that a 1% levy would be excessive.

5.0 Statutory Planning

5.1 Local Matters

5.1.1 Maitland Local Environmental Plan 1993

The project is wholly located with Lot 101 DP 1062820 Racecourse Rd, Rutherford, within the local government area of Maitland, New South Wales. The project is subject to the provisions of the LEP 1993.

Zoning

Under the provisions of the LEP 1993 the project site is wholly located within the 4(a) General Industrial zone. The objectives of the 4(a) General Industrial zone are:

(a) *To set aside certain land for the purpose of general industry within convenient distance of the urban centres of the City.*

(b) *To allow commercial and retail development for:*

- *use ancillary to the main use of land within the zone,*
- *the display and sale of bulky goods, and*
- *the day-to-day needs of occupants and employees of the surrounding industrial area.*

(c) *To ensure that industrial development creates areas which are pleasant to work in and safe and efficient in terms of transportation, land utilisation and service distribution.*

The project is generally consistent with the relevant objectives of Zone 4(a).

Permissibility

Clause 23 of the LEP 1993 details that any development other than those listed in Item 5 (development which is prohibited) is permissible with development consent within the General Industrial Zone. The project is not a prohibited development, and therefore would be permissible under this zone.

5.1.2 Maitland City Wide Development Control Plan

Maitland City Council has adopted a single comprehensive set of development principles for the Maitland area, entitled the Maitland City Wide Development Control Plan (MCWDCP). This document is structured into a series of chapters containing guidelines for particular areas or topics. Those chapters of relevance to the project are detailed below.

Industrial Development Code

The Industrial Development Code (IDC) emphasises the need for applicants to fully describe the details of proposed developments, particularly as they relate to potential pollution hazards, and the measures proposed to control such risks. The IDC also addresses physical performance standards for industrial development including design and appearance, landscaping, parking and access, setbacks, storage areas, advertising, drainage and security. The stated objectives of the IDC are:

- *To encourage growth in the industrial sector, provided that new industrial development does not present unacceptable risks to residential areas or other land by way of pollution, hazard or otherwise;*
- *To encourage applicants to act in their own interests by submitting fully substantiated and documented projects, including hazard analysis where appropriate;*
- *To encourage a process which minimises problems with development projects, through appropriate consultation prior to applications being submitted;*
- *To provide general guidelines for applications for designated development as to matters to be addressed in Environmental Impact Statements;*
- *To assist applicants by minimising duplication of documentation required under laws (pollution control, occupational health and safety, etc.);*
- *To encourage visual and operational compatibility between industrial development and residential areas; and*
- *To encourage improvements to the character and appearance of industrial estates.*

The project is generally consistent with the objectives of the IDC and the physical performance standards of the IDC, with the exception of clause 3.3 (i) which relates to car parking requirements that are based on gross floor area. Car parking for the project is further discussed in **Section 11.**

Maitland Development Control Plan No. 21 Guidelines for Outdoor Advertising (DCP 21)

DCP 21 aims to ensure that outdoor advertising signs are of good quality, well maintained and are complementary in scale and form with surrounding environment and streetscape. DCP 21 includes guidelines for outdoor advertising signage and outlines a licensing strategy, fee structure and enforcement provisions.

No outdoor advertising associated with the project is planned. Therefore the provisions of DCP 21 do not apply.

Car Parking Requirements

The Car Parking chapter of the MCWDCP provides guidance on all aspects of parking generation relating to development. The objectives of this Development Control Plan are:

- *To ensure adequate provision of off-street parking to maintain the existing levels of service and safety on the road network;*
- *To detail requirements for the provision of parking and loading/unloading facilities in association with development in the City of Maitland;*
- *To provide a consistent and equitable basis for the assessment of parking provisions;*
- *To facilitate design of parking areas, loading bays and access driveways which function efficiently;*
- *To ensure that parking areas are visually attractive and constructed, designed and situated so as to encourage their safe use; and*
- *To acknowledge the traditional lack of parking spaces within areas of historical or architectural significance (Central Maitland, Morpeth) and balance this with the need to facilitate development in order to maintain vitality and vibrancy in such centres.*

The MCEDCP indicates that parking should be provided at the rate of 1 space per 2 employees or 1 space per 75 m^2 of ground floor area whichever is greater.

A car parking provision rate of 1 space per 75m^2 for industrial developments, as specified in the Maitland Citywide Development Control Plan is inappropriate for this development. Floor space of Stages One - Four is approximately 38,000m^2 and approximately 32,500m^2 for Stages Five – Eight. This equates to a total floor space of 70,500m^2 which, at a rate of 1 space per 75m^2, would result in a ludicrous parking provision of 940 spaces.

Based on the limited staffing requirements in relation to the ground floor area, and the precedent set by the approved development, parking provision provided at the rate of 1 space per 2 employees is considered appropriate. Based upon achieving the total staff numbers onsite of 140 it can be seen that a parking provision of 70 spaces should be provided onsite.

The car parking for the project has been assessed generally in accordance with these objectives and requirements of the MCWDCP and is discussed in **Section 11.**

5.2 Regional Matters

As of 1 July 2009, Regional Environmental Plans (referred to generally as REPs) are no longer part of the hierarchy of environmental planning instruments in NSW. This process is described through *State Environmental Planning Policy (Repeal of REP Provisions) 2009* (also see *Department of Planning Circular PS 09-014*). As a result the existing REP described below is deemed to be a SEPP under the new Division 2 Part 3 of the *EP&A Act*.

5.2.1 Lower Hunter Regional Strategy, 2006

The Lower Hunter Regional Strategy was released in 2006. The aims of the strategy are to:

- *Ensure that sufficient employment lands are available to cater for 66,000 new jobs;*
- *Plan for additional 160,000 residents and 115,000 new dwellings;*
- *Establish important green corridors, to protect and even enhance the Region's strong environmental and biodiversity assets; and*
- *Reinforce the role of the Newcastle City Centre as the Regional City.*

The strategy states that the economic challenges for the region are to:

- *Maximise the economic opportunities associated with the Region's competitive advantages, in particular its economic infrastructure and specialised centres;*
- *Ensure sufficient employment lands in appropriate locations, including within centres and as traditional industrial land, to provide sufficient capacity to accommodate growth in existing and emerging industries and businesses;*
- *Maintain or improve the employment self sufficiency of the region; and*
- *Ensure activity within the Lower Hunter complements rather than competes with the economies and communities of adjoining regions.*

The project would assist the region generate direct and indirect employment opportunities and improve employment self sufficiency. The project would be situated in an existing defined industrial estate where growth in existing and emerging industries should be encouraged. The project would have a negligible effect on the biodiversity of the region.

The Lower Hunter Regional Strategy's aims and stated economic challenges would be supported by the project.

5.3 State Matters

5.3.1 Environmental Planning and Assessment Act 1979

The *EP&A Act 1979* and the *EP&A Regulation 2000* provide the framework for environmental planning in NSW and include provisions to ensure that projects which have the potential to impact the environment are subject to detailed assessment and provide opportunity for public involvement.

The project has been declared by the Minister as a major project under the provisions of the *EP&A Act* and clause 9 of Schedule 1 of SEPP 2005, and is therefore subject to the provisions of Part 3A of the *EP&A Act*.

The SEPP 2005 identifies development eligible for assessment under Part 3A of the *EP&A Act* as discussed in **Section 5.3.2**.

Approvals That Do Not Apply

Under section 75U of the *EP&A Act* if the project is granted approval under Part 3A of the Act, the following authorisations, which may otherwise have been relevant, would not be required to carry out the project (refer to **Table 7**).

Table 7: Relevant Authorisations That Do Not Apply

Act	Authorisations Not Required
Coastal Protection Act 1979	Concurrence under Part 3 of Act of the Minister administering that part of the Act.
Fisheries Management Act 1994	Permit for works or structures within a waterway.
Heritage Act 1977	Disturbance to an item listed on State Heritage Register or Interim Heritage Order; Excavation permit.
National Parks & Wildlife Act 1974	s87 preliminary research permit; s90 consent to destroy relics.
Water Management Act 2000	Water use approval, water management work approval or activity approval.
Native Vegetation Act 2003	Consent for the clearing of native vegetation.
Rivers and Foreshores Improvements Act 1948	A permit under Part 3A of the Act: Permit required for excavation.
Threatened Species Conservation Act 1995	Licence to harm or pick threatened species, populations or ecological communities or habitat.

Approvals Legislation to be Applied Consistently

Under section 75V of the *EP&A Act*, if the project is granted approval under Part 3A of the *EP&A Act*, the following authorisations, which would be required for the project, must not be refused by the relevant approval authority and must be substantially consistent with the terms of the project approval (refer to **Table 8**).

Table 8: Relevant Approvals Legislation to be Applied Consistently

Act	Approval	Authority
Protection of the Environment Operations 1997	Environment Protection Licence	DECCW
Roads Act 1993	Permit to impact on a public road	Local roads – Maitland City Council

5.3.2 State Environmental Planning Policies

State Environmental Planning Policy 2005 – Major Development

SEPP 2005 identifies the types of development that the assessment and approval process under Part 3A of the *EP&A Act* applies.

Schedule 1 of SEPP 2005 identifies the major development classifications that require assessment and approval under Part 3A of the *EP&A Act*. Group 2 of Schedule 1 includes development classified as:

> *"9 Metal, mineral or extractive material processing, being:*
>
> *Development that has a capital investment value of more than $30 million or employs 100 or more people for any of the following purposes: ....*
>
> *b) brickworks, ceramic works, silicon or glassworks or tile manufacture."*

The project is expected to have a capital investment value of approximately $65 million and is for the purposes of ceramic works. Therefore, as the project is of a kind described in Schedule 1 of SEPP 2005 and Part 3A applies to the project.

The project has been declared by the Minister of Planning as a major project under the provisions of the *EP&A Act* and clause 9 of Schedule 1 of SEPP 2005, and is therefore subject to the provisions of Part 3A of the *EP&A Act*.

Table 9 outlines the timeline and process NCIA have followed to comply with Part 3A of the *EP&A Act*.

Table 9: EA Process Requirements Followed

Date	Action
27 June 2008	An Environmental Assessment Scoping Report (EASR) and project application form were submitted to DOP for consideration to prepare the Director General EARs for the project
25 July 2008	EA declared major project by Minister of Planning (see **Appendix A**)
22 December 2008	A revised EASR and project application form were submitted to DOP for consideration to prepare the EARs for the project. This was done due to a redefinition of the scope of the project
25 February 2009	DOP issued EARs for Project (**Section 6.1**)
27 November 2009	The EASR revised as per the request of DOP when the co-generation facilities were removed from the scope of the project (**Section 6.2**)
12 March 2010	Preparation and submission of EA pursuant to EARs

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (SEPP 2007) aims to facilitate the effective delivery of infrastructure across the State by:

i) *improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and*
   - *providing greater flexibility in the location of infrastructure and service facilities,*
   - *allowing for the efficient development, redevelopment or disposal of surplus government owned land,*
   - *identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development),*
   - *identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and*
   - *providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing."*

Clause 104 of SEPP 2007 relates to traffic generating development and requires that certain development with the potential to generate a substantial level of traffic be referred to the RTA for comment. Development to which the clause applies is set out in Schedule 3 of SEPP 2007.

The project meets the requirements of clause 104 and Schedule 3 of SEPP 2007.

In relation to such traffic generating development, the consent authority is required to take into consideration:

i) *any submission that the RTA provides in response to that notice within 21 days after the notice was given (unless, before the 21 days have passed, the RTA advises that it will not be making a submission), and ...*

ii) *the accessibility of the Site concerned, including:*
   i) *the efficiency of movement of people and freight to and from the site and the extent of multi-purpose trips, and*
   ii) *the potential to minimise the need for travel by car and to maximise movement of freight in containers or bulk freight by rail, and ....*

iii) any potential traffic safety, road congestion or parking implications of the development.

The RTA has been consulted with respect to this project (as detailed in **Section 6**) in accordance with the EARs. A traffic assessment is provided in **Section 11** of the EA with mitigation measures proposed where appropriate.

State Environmental Planning Policy (SEPP) 33 – Hazardous and Offensive Development

State Environmental Planning Policy No.33 – Hazardous and Offensive Development (SEPP 33) applies to industry that has the potential to create an off-site risk or offence to people, property or the environment. SEPP 33 was designed to ensure that sufficient information is provided to consent authorities to determine whether a development is hazardous or offensive. Conditions can then be imposed on the development to reduce or minimise adverse impacts as required.

SEPP 33 defines a 'potentially hazardous industry' as follows:

> *a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:*
>
> *(a) to human health, life or property, or*
>
> *(b) to the biophysical environment,*
>
> *and includes a hazardous industry and a hazardous storage establishment.*

A 'potentially offensive industry' is defined under SEPP 33 as:

> *'development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment.*

The document *Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines* was prepared by the Department of Urban Affairs and Planning in 1994 to provide assistance in implementing SEPP 33. The Guidelines recommend a 'risk screening' method for determining whether a project is hazardous, and provide guidance on assessing potentially offensive development projects.

If a proposed development is found to be 'potentially hazardous', a Preliminary Hazard Analysis (PHA) is required to be prepared in accordance with current circulars or guidelines published by DOP and submitted with any development application.

An assessment of the type and volume of dangerous goods stored onsite indicated that the project is not deemed potentially hazardous (see **Section 14.2**). Therefore the provisions of SEPP 33 do not apply and a PHA is not required.

Although the project is not considered hazardous or offensive (refer **Section 14.2**), the procedures and standards relating to dangerous goods handling would be implemented.

State Environmental Planning Policy (SEPP) 44 – Koala Habitat

The objectives of the SEPP (44) are to:

> *'encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline:*
>
> i. *by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat; and*
> ii. *by encouraging the identification of areas of core koala habitat; and*
> iii. *by encouraging the inclusion of areas of core koala habitat in environment protection'*

The Maitland LGA is listed in Schedule 1 of the SEPP as an area where there is potential for koala habitat, however, none of the tree species listed in Schedule 2 of the SEPP are present on the site.

The site was assessed for the potential of koala habitat as part of the 2002 EIS. The assessment concluded that the site did not provide any potential koala habitat; therefore it is considered that the provisions of SEPP (44) do not apply.

5.3.3 Protection of the Environmental Operations Act 1997

The NSW *Protection of the Environment Operations Act 1997* (POEO Act) prohibits any person from causing pollution of waters, or air, and provides for penalties for air, water and noise pollution offences. Schedule 1 of the *POEO Act* identifies "scheduled activities" which require an EPL from DECCW.

NCIA currently holds EPL 11956 which would be varied as required to incorporate relevant components of the project should Project Approval be granted, consistent with the requirements of Section 75V of the *EP&A Act*.

5.3.4 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) aims to conserve the environmental heritage of the state of NSW. The *Heritage Act* legislates the creation of the NSW Heritage Council who administer the Act. The *Heritage Act* makes provision for a place, building, work, relic, moveable object, precinct, or land to be listed on the State Heritage Register.

Section 75U of the *EP&A Act* applies in that if the project is granted Project Approval, any permits under the *Heritage Act* are not required, however, appropriate assessments under the *Heritage Act* must be undertaken.

The site does not contain any items listed on the NSW State Heritage Register, and as such, the project is unlikely to impact on any listed items.

5.3.5 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) provides for the conservation of threatened species, populations and ecological communities of animals and plants through:

- *conserving biological diversity and promoting ecologically sustainable development;*
- *preventing extinction and promoting the recovery of threatened species, populations and ecological communities;*
- *protecting critical habitat of threatened species, populations and ecological communities;*
- *eliminating or managing certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities; and*
- *encouraging the conservation of threatened species, populations and ecological communities by the adoption of measures involving co-operative management.*

The *TSC Act* provides a framework to ensure that the impact of any action affecting threatened species is assessed. Schedule 1 of the *TSC Act* lists endangered species, populations and ecological communities, Schedule 2 lists vulnerable species and Schedule 3 lists key threatening processes whilst Part 3 of the *TSC Act* defines critical habitat.

While the compliance provisions of the *TSC Act* do not apply to the project, consistent with Section 75U of the *EP&A Act*, impacts upon any threatened species because of the project needs to be assessed.

The impact of the project on threatened species, populations and ecological communities of animals and plants is discussed further in **Section 14.1.** The assessment concludes that, no threatened species are expected to be adversely affected as a result of this project. This finding is consistent with the ecological impact findings of the 2002 EIS.

5.3.6 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NP&W Act) governs the establishment, preservation and management of national parks, historic sites and certain other areas, and the protection of certain fauna, native plants and Aboriginal relics. The objectives of the *NP&W Act* are:

> *(a) the conservation of nature, including, but not limited to, the conservation of:*
>
> *(i) habitat, ecosystems and ecosystem processes, and*
>
> *(ii) biological diversity at the community, species and genetic levels, and*
>
> *(iii) landforms of significance, including geological features and processes, and*
>
> *(iv) landscapes and natural features of significance including wilderness and wild rivers,*
>
> *(b) the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including, but not limited to:*
>
> *(i) places, objects and features of significance to Aboriginal people, and*
>
> *(ii) places of social value to the people of New South Wales, and*
>
> *(iii) places of historic, architectural or scientific significance,*
>
> *(c) fostering public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation,*
>
> *(d) providing for the management of land reserved under this Act in accordance with the management principles applicable for each type of reservation.*

Section 75U of the *EP&A Act* applies in that if the project is granted Project Approval, any permits under the *NP&W Act* are not required, however, appropriate assessments under the *NP&W Act* must be undertaken.

The indigenous heritage study performed as part of the 2002 EIS concluded that the approved facility would not impact upon indigenous heritage. Based on this previous study (and those reference in it), the site contains no known items of indigenous heritage significance. Based on this assessment and determination, it is considered that the project continues to hold no significance in regard to Indigenous heritage.

5.3.7 Native Vegetation Act 2003

The Native Vegetation Act 2003 (NV Act) is aimed at minimising the effects of threatening processes and protecting, conserving and improving the condition of existing native vegetation, particularly at a local and regional level. The *NV Act* establishes the following objectives:

> *(a) to provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State, and*
>
> *(b) to prevent broadscale clearing unless it improves or maintains environmental outcomes, and*
>
> *(c) to protect native vegetation of high conservation value having regard to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation, and*
>
> *(d) to improve the condition of existing native vegetation, particularly where it has high conservation value, and*
>
> *(e) to encourage the revegetation of land, the rehabilitation of land, with appropriate native vegetation, in accordance with the principles of ecologically sustainable development.'*

Section 75U of the *EP&A Act* applies in that if the project is granted Project Approval, any permits under the *NV Act* are not required, however, appropriate assessments under the *NV Act* must be undertaken.

It is unlikely that this project would have a significant effect on threatened flora species. The site is void of any significant vegetation other than a mosaic of exotic grasses. This project would require the removal of grass, and the removal of the one mature *Eucalyptus amplifolia* (Cabbage Gum) from the south east corner of the project (see **Section 14.1**).

5.4 Commonwealth Matters

5.4.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires the approval of the Commonwealth Minister for the Environment, Water, Heritage and the Arts for actions that may have a significant impact on matters of National Environmental Significance (NES). Approval from the Commonwealth is in addition to approvals under NSW legislation.

The *EPBC Act* also provides for the identification, conservation and protection of places of NES and provides for the management of Commonwealth Heritage places.

The *EPBC Act* lists seven matters of NES which must be addressed when assessing the impacts of a proposal which are:

- World Heritage properties;
- National heritage places;
- Ramsar wetlands of international significance;
- Listed threatened species, critical habitats and ecological communities;
- Listed migratory species;
- Commonwealth land, marine areas or reserves; and
- Nuclear actions.

An EPBC Protected Matters search to identify matters of NES and other protected matters was undertaken in respect of the project on 26 February 2010 (refer **Appendix I**). The results are summarised in **Table 10**.

Table 10: EPBC Protected Matters Database Search

Matter	Records within 10 km of Site
World Heritage Properties	No World Heritage Properties
National Heritage Places	No National Heritage Places

Matter	Records within 10 km of Site
Ramsar Wetlands of International Significance	The Hunter Estuary Wetlands (a Ramsar site) is located within the same catchment area as the project. However the wetlands are in excess of 25km from the project and would not be impacted by this project.
Threatened Species, Critical Habitats & Threatened Ecological Communities	17 threatened species were recorded within 10 km of the project site. The ecological assessment undertaken for the Project (refer **Section 14.1**) concluded that no threatened species would be significantly affected by the project One threatened ecological community (White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland) was listed to potentially occur in the area, however it has not been identified on or immediately adjacent to the project site
Migratory species	15 migratory species were identified as potentially occurring within 10 km from the project site. As no permanent water bodies or significant habitat occurs on or immediately adjacent to the project site, the listed migratory species are not likely to be affected by the project
Commonwealth Land Marine Areas	No Commonwealth Marine Areas
Nuclear Action	No Nuclear Actions
Commonwealth Lands	Five areas of Commonwealth Land were identified (see **Appendix I**) however none of these are expected to be impacted by the project
Commonwealth Heritage Places	No Commonwealth Heritage Places
Places on the Register of the National Estate (RNE)	30 Places on the RNE were recorded within 10 km of the project site, however none of these sites would be impacted by the project
Listed Marine Species	13 Listed Marine Species or species habitat were identified as potentially occurring within 10 km from the project site. All of these are listed migratory bird species. The ecological assessment undertaken for the project (refer **Section 14.1**) concluded that no listed marine species would be significantly affected by the project.
Whales and Other Cetaceans	No Whales and Other Cetaceans
Critical Habitats	No Critical Habitats
Commonwealth Reserves	No Commonwealth Reserves

As can be identified in **Table 10** the project is not anticipated to affect matters of NES under the *EPBC Act* and as such an EPBC Referral to the Minister for the Environment, Water, Heritage and the Arts is not required.

The 2002 EIS concluded that there are no World Heritage properties, Commonwealth marine areas, Ramsar wetlands or nuclear actions in or near the project site. The approved facility is not considered to likely produce a significant impact on any matter of NES in accordance with the *EPBC Act*.

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6.0 Stakeholder Engagement

This section includes the consultation undertaken with DOP and other regulatory authorities, businesses and stakeholders and the community.

6.1 Department of Planning

In preparing the EA, the Director-General's EARs have been addressed as required by Clause 75F of the *EP&A Act* which are reproduced in **Table 11**, together with the relevant section of the EA which addresses that matter. A full copy of the Director-General's EARs for the project is provided in **Appendix A**.

Table 11: Environmental Assessment Requirements

Key Matters	Reference in EA
General Requirements	
The Environmental Assessment of the project must include:	
An executive summary;	Page (xvii)
• A detailed description of the project, including the: – Need for the project – Alternatives considered, including justification for the proposed manufacturing facility on economic, social and environmental grounds; – Likely staging of the project; and – Plans of any proposed building works.	Sections 3, 14 and 16
• A risk assessment of the potential environmental impacts of the project identifying the key issues for further assessment;	Section 7
• A detailed assessment of the key issues specified below and any other significant issues identified in the risk assessment (see above), which includes: – A description of the existing environment, using sufficient baseline data; – An assessment of the potential impacts of all stages of the project, including any cumulative impacts, taking into consideration any relevant statutory provisions and technical or policy guidelines (see below); – A description of the measures that would be implemented to avoid, minimise, mitigate, rehabilitate/remediate, monitor and/or offset the potential impacts of the project, including detailed contingency plans for managing any potential significant risks to the environment.	Sections 8 to 15 and Appendix C to H
• A statement of commitments, outlining all the proposed environmental management and monitoring measures;	Section 15
• A conclusion justifying the project on economic, social and environmental grounds taking into consideration whether the project is consistent with the objectives of the *Environmental Planning and Assessment Act 1979;*	Section 16
• A signed statement from the Author of the Environmental Assessment certifying that the information contained in the report is neither false nor misleading.	Page i

Key Matters	Reference in EA
Key Issues	
Noise & Vibration – including construction, operational and traffic noise and particularly the impact of the proposed development to sensitive receptors (both current and proposed).	Section 10 and Appendix E
Air Quality and Odour – air quality impacts for construction and operation of the proposed development, particularly in relation to particulates and impacts to sensitive receptors (both current and proposed). Details of proposed mitigation measures.	Section 8 and Appendix C
Traffic and Parking – including details of access to the site; details of the traffic volumes likely to be generated during construction and operation; an assessment of the predicted impacts of this traffic on the safety and efficiency of the surrounding road network and car parking requirements.	Section 11 and Appendix F
Visual – assess the visual impact of design and siting of the facilities & buildings, lighting and any signage. Proposed landscaping including details of indigenous vegetation planting to off-set any clearing	Section 13 and Appendix H
Soils & Water – including the proposed erosion and sediment controls (during construction); water quality management; the proposed stormwater management system, water supply including consideration of the potential for rainwater harvesting / recycling; and waste water disposal.	Section 12 and Appendix G
Greenhouse Gas and Energy Efficiency – including an assessment of the energy use on site, and demonstrate what measures would be implemented to ensure that the project is energy efficient.	Section 9 and Appendix D
Consultation	
During the preparation of the Environmental Assessment, you should consult with the relevant local, State or commonwealth Government authorities, service providers, community groups or affected land owners. In particular you must consult with the: • Department of Environment and Climate Change; • Department of Water and Energy; • NSW Fire Brigades; • Roads and Traffic Authority; and • Maitland City Council. The consultation process, and the issues raised during this process, must be described in the Environmental Assessment.	Section 6

6.2 Other Relevant Authorities

NCIA has undertaken consultation with key local and State Government agencies as specified in the EARs during the preliminary design phase and preparation of the EA. The purpose of this consultation has been to provide an overview of the project and to seek feedback on issues which have been addressed in the EA.

In this regard a letter of introduction with a formal offer to make a submission to the EA process and a detailed briefing note about the project were delivered via mail on 20 May 2009 to regulatory agencies identified in the EARs to seek input into the preparation of the EA (see **Appendix B**).

Table 12 summarises the responses received together with the relevant section of the EA which addresses the matter.

Table 12: Agency and Stakeholder Issues & Where Addressed in the EA

Agency	Matters for Consideration	Reference in EA
Department of Environment and Climate Change (DECC) *Now DECCW*	Through the consultation undertaken in the preparation of the EARs, DECC indicated that the key issues of concern were: • Air; • Noise; • Water quality; • Threatened species and habitats; • Aboriginal cultural heritage; • Design and layout of facilities; and • Environmental mitigation measures. DECCW responded to the formal request for a submission indicating their comments on the project had been addressed through the EARs.	Section 8 and Appendix C Section 10 and Appendix E Section 12 and Appendix G Section 14.1 Section 14.3 Section 4 Section 15
Department of Water and Energy (DWE) *Water is now part of Department of Environment and Climate Change and Water (DECCW)*	Through the consultation undertaken in the preparation of the EARs, DWE indicated that the key issues of concern were: • *Water Management Act 2000*; • Protection of groundwater; • Assessment of hydraulic connection between surface water and groundwater and the proposed development; • Ensuring no adverse impacts on surface water and groundwater; • DWE's *Guidelines for Controlled Activities (February 2008)*. DWE did not respond to the additional formal request for a submission into the EA process other than through the EARs.	Section 12 and Appendix G Section 15
NSW Fire Brigades	NSW Fire Brigades was provided with the project introduction letter and briefing note with follow up phone calls and emails. NSW Fire Brigades did not have any specific requirements for the EA.	N/A
Roads and Traffic Authority (RTA)	Through the consultation undertaken in the preparation of the EARs, the RTA indicated that the key issues to address in the EA were: • Reference to the Department of Planning guideline *EIS Guideline: Roads and Related Facilities;* • Reference to RTA's *Guide Traffic Generating Development: Section 2 Traffic impact Studies;* and • A traffic study in accordance with the RTA's *Guide Traffic Generating Development*; The RTA also responded to the formal request for a submission into the EA process in a letter dated 10 June 2009. The RTA reiterated its request for a Traffic Impact Study to identify the likely impacts and identify if any subsequent road upgrades were required.	Section 11 and Appendix F

Agency	Matters for Consideration	Reference in EA
Maitland City Council (MCC)	Through the consultation undertaken in the preparation of the EARs, the MCC indicated that the key issues for consideration were: • Air quality; • Noise amenity; • Water quality; • Traffic; and • Potential impacts on future residential development. The MCC did not respond responded to the formal request for a submission into the EA process.	Section 8 and Appendix C Section 10 and Appendix E Section 12 and Appendix G Section 11 and Appendix F Section 13
Maitland Stink Group (MSG)	The MSG was contacted by email on 20 May and 27 May 2009 to confirm correct contact details. Phone contact was made with the MSG and the introduction letter, briefing note and request for submission was sent on the 16 June 2009. A written response was received 3 July 2009 which noted the following key issues for consideration in the EA: • Air Quality complaints from Rutherford Industrial Estate; • Existing odour issues; • Landuse conflicts; • Non-compliance with existing operating conditions; and • Traffic.	Section 8 and Appendix C Section 14.4 Section 10 and Appendix E Section 11 and Appendix F
McCloy Group (proposed Heritage Green developers)	The McCloy Group was consulted via the introduction letter with the formal request to make a submission to the EA process and the detailed briefing note. A response was received from McCloys on the 1 February 2010. The written response quoted the EARs in relation to the noise and air quality assessments needing to assess both current and proposed sensitive receptors.	Section 8 and Appendix C Section 10 and Appendix E

DOP was notified on 20 October 2009, by the way of a letter, of the minor change in the scope of the project (the integrated cogeneration facilities were removed). A response was received (19 November 2009) indicating that EARs were not required to be modified, however the Preliminary Environmental Assessment (PEA) was updated to reflect this change in the project scope following the request of DOP.

NCIA was unable to obtain sufficient details regarding the desired co-generation plant to adequately assess the potential environmental impacts. Therefore NCIA has not included the integration of co-generation facilities into the scope of the project. The design and layout of the project would be planned to enable the integration of cogeneration facilities at a later date with appropriate planning approval in place.

6.3 Community Engagement

Community consultation was undertaken via a written invitation to make a formal submission to the EA process which also included a description of the project on (20 May 2009).

The invitation was hand delivered to approximately 100 houses in proximity to the existing facility (see **Figure 9**) including:

- The west side of Marlborough Street;
- Mountvale Street;
- The west side of Regiment Road (South of Marlborough Street, north of Durmount Close);
- The east side of a section of Fairfax Road that overlooks the project (south of Christine Close, north of Liddell Street); and
- The south side of the New England Highway (in the Rutherford Industrial Estate) west of Shipley Drive (former National Textiles housing).

In addition to the consultation undertaken with the adjoining residential community, surrounding industrial neighbours in the Rutherford Industrial Estate were also advised of the project. These industrial neighbours were hand delivered the equivalent information that was provided to relevant agencies and other stakeholders on 23 and 24 June 2009. Businesses in the following locations through the Rutherford Industrial Estate were notified:

- Shipley Drive;
- Kyle Street;
- Gardiner Street;
- Bradmill Avenue;
- Hinkler Avenue; and
- Racecourse Road.

No submissions were received from the residential community or surrounding industrial neighbours.

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7.0 Issue Prioritisation

7.1 Issue Identification

A preliminary assessment of environmental issues associated with the project was undertaken for the EASR prepared in respect of the project. Environmental issues addressed in this EA and identified in the EASR included:

- Air Quality;
- Water Quality;
- Geology and Soils;
- Noise and Vibration;
- Ecology;
- Community Resources;
- Traffic, Transportation and Parking;
- Waste;
- Greenhouse Gas and Energy Efficiency;
- Hazard and Risks;
- Socio-Economic Impacts;
- Heritage and Archaeology;
- Land Use; and
- Visual Impacts.

7.2 Prioritisation of Issues

7.2.1 Approach

The prioritisation of issues for the project was carried out by AECOM in consultation with NCIA. The prioritisation was based on the need to recognise that a higher degree of assessment is required for the issues with the highest potential severity and greatest potential consequences.

Table 13 shows the issues prioritisation matrix used to identify priorities. Each issue was given a ranking between one and three for the severity of effects and the perceived consequences of those effects if left unmanaged. These two numbers were added together to provide a numerical ranking for the issue that was used to categorise each issue into high, medium and low priorities.

Table 13: Issues Prioritisation Matrix

Severity of Effects	Consequence of Unmanaged Effects		
	3 High	2 Medium	1 Low
1 Low	4 (Medium)	3 (Low)	2 (Low)
2 Medium	5 (High)	4 (Medium)	3 (Low)
3 High	6 (High)	5 (High)	4 (Medium)

7.2.2 Assessment

The prioritisation of environmental issues related to the project is shown in **Table 14**. The assessment allowed the prioritisation of issues for assessment and did not consider the application of mitigation measures to manage environmental effects. This process allowed the prioritisation of key issues to be addressed in the EA. Those with a higher level of potential risk were identified for a more detailed level of assessment to support the development of project specific mitigation and management measures.

The allocation of risk is based upon the following considerations:

Severity of Risk

- Low: localised implications; imperceptible or short term cumulative impacts;
- Medium: regional implications; modest or medium term accumulation of impacts; and
- High: inter-regional implications; serious or long term accumulation of impacts.

Consequences of Unmanaged Effects

- Low: minor environmental change; offsets readily available;
- Medium: moderate adverse environmental change; offsets available; and
- High: important adverse environmental change; offsets not readily available.

Table 14: Prioritisation of Environmental Issues

Issue	Severity	Consequence	Priority
Aspect: Air Quality			
Emissions of particulate and HF	2	3	**5 (High)**
Emissions of oxides of nitrogen and sulphur dioxide	2	2	**4 (Medium)**
Aspect: Water			
Effects on surface water	1	2	**3 (Low)**
Effects on groundwater	1	1	**2 (Low)**
Aspect: Geology and Soils			
Impacts during construction and operation	1	1	**2 (Low)**
Aspect: Noise			
Cumulative emissions	2	3	**5 (High)**
Point source emissions	1	2	**3 (Low)**
Aspect: Ecology			
Impact to existing flora and fauna	1	1	**2 (Low)**
Aspect: Community Resources			
Demand upon resources (water, electricity, gas, sewerage)	1	2	**3 (Low)**
Aspect: Transportation			
Transportation impacts during construction	2	2	**4 (Medium)**
Transportation impacts during operation	2	2	**4 (Medium)**
Traffic impacts from construction	2	2	**4 (Medium)**
Traffic impacts from operation	2	2	**4 (Medium)**

Issue	Severity	Consequence	Priority
Aspect: Waste			
Construction and Operation	1	1	**2 (Low)**
Aspect: Greenhouse Gas and Energy Efficiency			
Emission of greenhouse gases	2	2	**4 (Medium)**
Increase in effects of pollution due to climate change	1	1	**2 (Low)**
Aspect: Hazards and Risks			
Potentially hazardous or offensive development	2	2	**4 (Medium)**
Aspect: Socio-Economic Impacts			
Impact to local economy and resources	1	1	**2 (Low)**
Aspect: Heritage and Archaeology			
Impacts to items of archaeological significance	1	2	**3 (Low)**
Aspect: Land Use			
Impact to future land use	2	2	**4 (Medium)**
Aspect: Visual Impacts			
Impact to residents and workers in the vicinity	2	2	**4 (Medium)**

Table 15 identifies the prioritisation of environmental issues, where each is addressed in this EA and therefore the focus of the EA for the project.

Table 15: Prioritisation of Issues

Low	Medium	High
• Water **(Section 12)** • Geology and Soils **(Section 12)** • Ecology **(Section 14.1)** • Heritage and Archaeology **(Section 14.3)** • Community Resources **(Section 1.5)** • Socio-Economic Impacts **(Section 14.6)** • Waste **(Section 4.8)**	• Traffic, Transportation and Parking **(Section 11)** • Greenhouse Gas and Energy Efficiency **(Section 9)** • Hazard and Risks **(Section 14.2)** • Visual Impacts **(Section 13)** • Land Use **(Section 14.4)**	• Air Quality (**Section 8**) • Noise and Vibration **(Section 10)**

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8.0 Air Quality

AECOM was commissioned by NCIA to undertake an Air Quality Impact Assessment (AQIA) to assess the potential effects of air emissions from the project. The purpose of this assessment was to determine the air emissions associated with the construction and operation of the project, the potential impacts on sensitive receptors and identify any required mitigation. The AQIA is reproduced in full in **Appendix C** and summarised below.

8.1 Existing Environment

8.1.1 Background

Air quality in Rutherford is dominated by motor vehicle emissions, and major industry located throughout the Rutherford Industrial Estate. Additional air emission sources include dust emissions from the Hunter Valley approximately 40 to 60 km northwest of the project site.

The air pollutants in the vicinity of the project are summarised in the *Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales* (DEC 2005), with levels of these pollutants on occasion approaching or exceeding the national standards prescribed in the *National Environment Protection Measure for Ambient Air Quality (NEPC, 2003)*.

In order to provide a thorough assessment of cumulative impacts, the modelling included regional background air emission data (where available) from NCIA's PM_{10} and HF ambient air monitoring stations, Hydro Aluminium (located at Kurri Kurri approximately 20 km south of NCIA) and from regulatory monitoring undertaken by DECCW.

8.1.2 Particulate Matter

NCIA is currently required to undertake monitoring of PM_{10} on the northwest and southeast areas of the site in accordance with the conditions of EPL 11956. A summary of the NCIA monitoring results is shown in **Appendix C**. The results show GLCs are below DECCW guidelines for the Annual Average, however, exceedances above the DECCW guidelines were recorded in 2007 and 2008 for the 24 hour average PM_{10}.

8.1.3 Hydrogen Fluoride

NCIA is required to undertake monitoring of HF levels on the NW and SE areas of the site in accordance with the conditions of EPL 11956. A summary of the NCIA monitoring results is shown in **Appendix C**. The monitoring results show that no exceedances of the 90 day, 7 day or maximum 24 hour average DECCW guidelines were recorded.

In addition to data from the NCIA monitoring network, ambient monitoring data of HF were sourced from Hydro Aluminium. Hydro Aluminium is required to undertake ambient HF monitoring at a nearby vineyard (Wyndham Estate), situated approximately 12 km northwest of NCIA. This site was considered to be representative of background concentrations of HF likely to be experienced in the Rutherford area and, as such, was used for the cumulative assessment undertaken for this report.

8.2 Assessment Methodology

8.2.1 Introduction

The scope of work undertaken by AECOM to assess the project included:

- A review of background information relating to site air emissions from the existing site;
- Assessment of the likely air emissions from operation and construction of the project;
- Dispersion modelling using identified air emissions during existing and proposed operating conditions of the project; and
- Assessment of the effects of the project at sensitive receptor locations against relevant statutory guidelines.

Ground level pollutant concentrations predicted from stack emissions of the following air pollutants were assessed:

- HF;
- Oxides of nitrogen (NO_X);

- Total suspended particulates (TSP);
- Particulate matter with an aerodynamic diameter less than 10 µm (PM_{10});
- Sulfur dioxide (SO_2);
- Sulfuric acid; and
- Heavy Metals.

Fugitive and odour emissions were not considered by the modelling, as under normal operation of the project these types of emissions have not occurred to date and are not expected to occur.

8.2.2 Emission Sources

The manufacture of ceramic tiles generates air emissions associated with the combustion of natural gas and release of compounds from within the clay during the firing process. Approved emission sources associated with the existing facility and the project are summarised in **Table 16.**

Table 16: Stack Emission Sources

Source/Activity	Existing * (Stages One-Two)	Approved * (Stages Three – Four)	Proposed * (Stages Five – Eight)
Clay preparation	CP1	CP2	CP3, CP4
Pressing and drying	PD1	PD2	PD3, PD4
Dryers	D1, D2	D3, D4	D5 – D8
Glaze line	GL1234	-	GL5678
Selection line	SL1234	-	SL5678
Sprayer dryers	SD1	SD2	SD3, SD4
Kilns	KP1, KP2	KP3, KP4	KP5 – KP8
Hot air coolers	HAC1, HAC2	HAC3, HAC4	HAC5 – HAC8

* e.g. CP1 refers to 'Clay Prep stack, Line 1', CP2 refers to 'Clay Prep stack, Line 2' etc. (refer Figure 2 of Appendix C)

8.2.3 Construction Air Emissions

Potential emissions to air from construction activities include products of fuel combustion from vehicles and equipment used in construction and transportation activities. Dust emissions may also occur during construction works.

As the works would be undertaken within a limited time frame with appropriate environmental management measures as described in **Section 8.4**, dust emissions from wind erosion and vehicle emissions are expected to be negligible. As the existing facility is currently surrounded by industrial premises and vacant land, any potential dust and exhaust emissions are unlikely to cause off-site nuisance effects. It is not anticipated that the potential residences of the proposed Heritage Green development would be impacted due to the unapproved nature of the development and the timing of the projects construction activities unlikely to correspond with any possible residents at the site. Dispersion modelling was not deemed necessary to quantify the construction impacts of the project.

8.2.4 Dispersion Modelling Methodology

The AUSPLUME prognostic air dispersion model was used in the AQIA. AUSPLUME is an advanced Gaussian plume dispersion model with algorithms based on the Industrial Source Complex – Short Term (ISCST3) model.

The model uses the Gaussian dispersion model equations to simulate the dispersion of a plume from point, area or volume sources. Mechanisms for determining the effect of terrain on plume dispersion are also provided. AUSPLUME operates on an hourly time step, and, therefore, requires hourly wind speed, wind direction and other dispersion parameter data. The dispersion of each pollutant plume is determined for each hour using conventional Gaussian model assumptions. It should be noted that Gaussian models are best used to identify pollutant concentrations at receptor locations close to emissions sources, as they can overestimate concentrations at longer distances

8.2.5 Modelling Scenarios

Two modelling scenarios were examined to determine the likely air quality impacts resulting from the project:

- Scenario 1: Approved operations – assessment of approved facility (stages One – Four). Scenario 1 was examined to allow the establishment of a baseline approved level of impacts; and
- Scenario 2 (the project): Approved and proposed production lines (Stages One – Eight) at agreed emission rates (all existing and future emission sources).

All modelling scenarios outlined above assumed the project was operating continuously (24 hours per day, 365 days per year). The facility is unlikely to operate at this level due to operational restrictions (such as breakdowns and routine maintenance) and as such the scenario represents worst-case conditions for the NCIA's operation, and is likely to overestimate the actual long term impacts.

8.2.6 Emissions Inventory

Source emissions were based on the results of stack emission testing conducted by AECOM between 2007 and 2009. To ensure that the assessment of impacts was conservative, the following values were used:

- All Total Particulate (TP) and PM_{10} emitted at maximum measured emissions rate;
- With the exception of HF all other pollutants emission data is based on maximum stack emission measurements; and
- HF was modelled at the regulatory emission concentrations limit for eight kilns. The reason for the different approaches was that based on historical data, HF was the only pollutant that has the potential to approach its stack emission limits during normal operations.

Further explanation of the emissions inventory is provided in Section 3.1.6 of **Appendix C**.

The emission rates for the PM_{10}, TSP, NO_x, HF and heavy metals for all scenarios are summarised in **Table 17.** The regulatory emission concentration limits listed in **Table 17** are consistent with existing DECCW approved limits that appear in NCIA existing EPL and consent, and as such have been adopted for proposed stack emissions.

Table 17: Emission Concentrations and Rates

Source	Pollutant	Emission Rate	Emission Concentration	Regulatory Emission Concentration Limit
		g/s	mg/Nm^3	mg/Nm^3
Clay Preparation	TP	0.03	2.3	20
	PM_{10}	0.02	2.0	-
Pressing and Drying	TP	0.04	4.8	20
	PM_{10}	0.02	2.5	-
Dryer	TP	0.01	12.8	20
	PM_{10}	0.01	8.4	-
	NO_x	0.007	6.0	-
Glaze Line	TP	0.04	4.3	20
	PM_{10}	0.02	1.9	-
Selection Line	TP	0.003	6.3	20
	PM_{10}	0.003	6.3	-
Sprayer Dryer	TP	0.25	13.1	20
	PM_{10}	0.25	13.1	-
	NO_x	0.38	20	-

Source	Pollutant	Emission Rate	Emission Concentration	Regulatory Emission Concentration Limit
		g/s	mg/Nm^3	mg/Nm^3
Kiln	TP	0.03	5.3	20
	PM_{10}	0.03	5.3	-
	Total Fluoride	0.03	5.0	5
	Sulfuric Acid	0.06	9.6	100
	Sulfur Dioxide	1.38	210.0	-
	Haz. Substances **	0.0016	0.2	1
	Antimony	0.00009	0.01	-
	Arsenic	0.0001	0.02	-
	Beryllium	0.000002	0.0003	-
	Cadmium	0.00002	0.003	-
	Chromium	0.0001	0.02	-
	Copper	0.0002	0.03	-
	Lead	0.0002	0.03	-
	Magnesium	0.0002	0.03	-
	Manganese	0.0002	0.03	-
	Mercury	0.00007	0.01	-
	Nickel	0.00001	0.002	-
	Zinc	0.004	0.6	-
	NO_X	0.33	50.0	100
Hot Air Cooling	TP	0.04	2.3	5
	PM_{10}	0.01	0.3	-

*** Emission rate and concentration for Hazardous Substances is provided for comparison against EPL criteria only and has not been modelled as it is a compilation of the heavy metals subsequently listed.*

8.2.7 Sensitive Receptors

Within the AUSPLUM model, discrete sensitive receptors were modelled to identify air quality outcomes at specific locations. DECCW considers sensitive receptors to be areas where people are likely to either live or work, or engage in recreational activities (DEC, 2005). On this basis, representative sensitive receptors were positioned at 22 locations surrounding the project. These locations included the NCIA project boundary, existing residential locations in Rutherford and at locations in the proposed Heritage Green development. **Figure 11** shows the receptors modelled.

8.2.8 Assessment Criteria

Table 18 presents the GLC assessment criteria specified in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW DEC, 2005). These criteria apply to 100th or 99.9th percentile GLCs of air pollutants from a facility when combined with existing background air emission concentrations (defined as cumulative concentrations). In addition, GLCs have been examined in isolation from the background to assess the contribution of the project to the surrounding air shed.

Table 18: Relevant Air Quality Impact Assessment Criteria

Air Emission	Averaging Period	Regulatory Limit (µg/m^3)	Percentile
NO_x (as Nitrogen Dioxide (NO_2))	1 hour	246	100
	Annual	62	100
TSP	Annual	90	100
PM_{10}	24 hours	50	100
	Annual	30	100
Sulfur dioxide (SO_2)	10 minutes	712	100
	1 hour	570	100
	24 hour	228	100
	Annual	60	100
Hydrogen fluoride*	90 days	0.5	100
	7 days	1.7	100
	24 hours	2.9	100
Sulfuric acid (acid mist)	1 hour	18	99.9
Antimony	1 hour	9	99.9
Arsenic	1 hour	0.09	99.9
Beryllium	1 hour	0.004	99.9
Cadmium	1 hour	0.018	99.9
Chromium	1 hour	0.09	99.9
Copper (as dust)	1 hour	18	99.9
Magnesium	1 hour	180	99.9
Manganese	1 hour	18	99.9
Mercury	1 hour	0.18	99.9
Nickel	1 hour	0.18	99.9
Zinc	1 hour	90	99.9
Lead	Annual	0.5	100

General land use criteria used in this assessment, refer to **Section 4.1 in **Appendix C** for detailed discussion of the HF assessment criteria.*

8.2.9 Background Levels of Air Pollutants

Based on all monitoring data reviewed, the following ambient pollutant concentrations were adopted in this assessment:

- Particulate Matter less than 10 microns (PM_{10})
  - 24 hour average – 46.9 µg/m^3; and
  - Annual average – 27 µg/m^3;
- Fluoride:
  - 90 day average – 0.1 µg/m^3;
  - 7 day average – 0.3 µg/m^3; and
  - 24 hour average – 0.9 µg/m^3.

- Total Suspended Particulate (TSP)
  - Annual Average –82.5µg/m^3 ; and
  - The background TSP level is based on the assumption that approximately 40% of TSP in the Hunter Valley is PM_{10} (NSW Minerals Council, 2000)
- Nitrogen dioxide (NO_2):
  - 1 hour average – 126 µg/m^3; and
  - Annual average – 40 µg/m^3.

The background level for PM_{10} used by the AQIA is 46.9µg/m^3 comparable to the 24 hour average of 50 µg/m^3 regulatory limit. It can be seen in **Appendix C** that the background PM_{10} has on occasion been measured to be above this regulatory limit. The impact of this high background concentration of PM_{10} can result in exceedances of the regulatory limit with only a small additional contribution.

8.3 Potential Impacts

Dispersion modelling results for PM_{10}, TSP and Total Fluoride as HF for the project are provided in **Table 19** which lists the 100th percentile predicted GLC for each modelled air emission and the cumulative concentration at each indicative sensitive receptor modelled.

The modelled GLC results for all other air pollutants identified in **Table 18** were shown to be below the regulatory criteria at all sensitive receptors (existing and potential) and project boundary. Details of these modelling results are provided in **Appendix C**. The locations of the receptors are shown on **Figure 11**. Receptors 20, 21 and 22 are located with the proposed Heritage Green site. Further discussion on these results is provided below in relation to PM_{10}, TSP and HF.

Table 19: Project Maximum Predicted Air Emission GLCs for PM_{10}, TSP and HF (µg/m^3)

Sensitive Receptors		PM_{10}		TSP	Total Fluoride as HF		
		24 Hour	Annual	Annual	24 Hour	7 Day	90 day
Boundary Receptors	1	14.2 (**61.1**)	3.0 (30.0)	3.8 (86.3)	2.0 (2.9)	1.1 (1.4)	**0.59** (**0.69**)
	2	7.1 (**54**)	0.7 (27.7)	1.1 (83.6)	1.2 (2.1)	0.4 (0.7)	0.18 (0.28)
	3	8.3 (**55.2**)	0.8 (27.8)	1.3 (83.8)	1.5 (2.4)	0.5 (0.8)	0.21 (0.31)
Existing Residential Receptors	4	6.5 (**53.4**)	0.8 (27.8)	1 (83.5)	0.9 (1.8)	0.5 (0.8)	0.28 (0.38)
	5	4.2 (**51.1**)	0.7 (27.7)	0.9 (83.4)	0.7 (1.6)	0.4 (0.7)	0.23 (0.33)
	6	4.4 (**51.3**)	0.5 (27.5)	0.7 (83.2)	1.1 (2.0)	0.6 (0.9)	0.24 (0.34)
	7	3.6 (**50.5**)	0.2 (27.2)	0.3 (82.8)	0.7 (1.6)	0.1 (0.4)	0.06 (0.16)
	8	4.6 (**51.5**)	0.6 (27.6)	0.8 (83.3)	0.7 (1.6)	0.3 (0.6)	0.18 (0.28)
	9	2.8 (49.7)	0.4 (27.4)	0.5 (83.0)	0.5 (1.4)	0.2 (0.5)	0.10 (0.20)
	10	2.9 (49.8)	0.2 (27.2)	0.3 (82.8)	0.4 (1.3)	0.2 (0.5)	0.05 (0.15)
	11	4.7 (**51.6**)	0.5 (27.5)	0.6 (83.1)	0.7 (1.6)	0.2 (0.5)	0.09 (0.19)
	12	2.3 (49.2)	0.4 (27.4)	0.6 (83.1)	0.5 (1.4)	0.2 (0.5)	0.13 (0.23)
	13	3.1 (50)	0.4 (27.4)	0.5 (83.0)	0.6 (1.5)	0.3 (0.6)	0.11 (0.21)
	14	5 (**51.9**)	0.5 (27.5)	0.7 (83.2)	0.9 (1.8)	0.4 (0.7)	0.23 (0.33)
	15	2.5 (49.4)	0.3 (27.3)	0.4 (82.9)	0.4 (1.3)	0.2 (0.5)	0.10 (0.20)
	16	2.9 (49.8)	0.3 (27.3)	0.4 (82.9)	0.6 (1.5)	0.1 (0.4)	0.09 (0.19)
	17	4.7 (**51.6**)	0.5 (27.5)	0.7 (83.2)	1.4 (2.3)	0.5 (0.8)	0.27 (0.37)
	18	4 (**50.9**)	0.2 (27.2)	0.3 (82.8)	0.8 (1.7)	0.2 (0.5)	0.06 (0.16)
	19	2.3 (49.2)	0.2 (27.2)	0.3 (82.8)	0.6 (1.5)	0.2 (0.5)	0.10 (0.20)

Sensitive Receptors		PM_{10}		TSP	Total Fluoride as HF		
		24 Hour	Annual	Annual	24 Hour	7 Day	90 day
Potential Residential Receptors	20	10.8 (**57.7**)	1.9 (28.9)	2.5 (85)	1.8 (2.7)	1 (1.3)	0.49 (**0.59**)
	21	8.1 (**55.0**)	1.3 (28.3)	2.1 (84.6)	1.6 (2.5)	0.8 (1.1)	0.47 (**0.57**)
	22	5.8 (**52.7**)	1.0 (28.0)	1.7 (84.2)	2.3 (**3.2**)	1.3 (1.6)	**0.52** (**0.62**)
Criteria		**50**	**30**	**90**	**2.9**	**1.7**	**0.5**

Note: Cumulative data are indicated in parentheses with bold entries indicating where exceedances of criterion have been predicted.

8.3.1 PM_{10}

Modelled ground level concentrations of PM_{10} are predicted to increase slightly between the two modelling scenarios. The annual average PM_{10} GLC predicted to comply with the relative criteria at all sensitive receptors.

The maximum predicted GLCs at existing sensitive receptors for 24 hour average PM_{10} are significantly below the DECCW guideline when modelled in isolation from background PM_{10} concentrations. The cumulative results are predicted to occur under a worst-case scenario above the guidelines for 15 of the sensitive receptor locations including those at the proposed Heritage Green development. However, due to elevated current background concentrations, it is expected that the change in PM_{10} concentration beyond levels already experienced, would not be discernable at Rutherford. Generally, there were no individual exceedances (24 hour and annual), however there were a number of cumulative exceedances for the 24 hour average (refer **Table 19**).

Predictions for the project (i.e. operation of eight production lines) show the following:

- Maximum increase in the 24 hr average ground level PM_{10} concentration for existing sensitive receptors was 6.5 $\mu g/m^3$ at the closest, existing private receptor (Receptor 4) compared with a criterion of 50 $\mu g/m^3$;
- Maximum cumulative 24 hr average ground level concentration for existing sensitive receptors was 53.4 $\mu g/m^3$ at Receptor 4 against a criterion of 50 $\mu g/m^3$;
- Maximum increase in the 24 hr average ground level PM_{10} concentration for potential sensitive receptors at the proposed Heritage Green development was 10.8 $\mu g/m^3$ at Receptor 20 compared with a criterion of 50 $\mu g/m^3$; and
- Maximum cumulative 24 hr average ground level concentration for potential sensitive receptors at the proposed Heritage Green was 57.7$\mu g/m^3$ at Receptor 20 against a criterion of 50 $\mu g/m^3$; and
- The cumulative impact of predicted maximum PM_{10} GLC at all existing residential receptors is considered to be minor despite these predicted cumulative results being above the guidelines. It is not expected that the predicted PM_{10} impacts would be beyond levels already experienced due to the minor contribution of the project when compared to the elevated background PM_{10} concentrations.

8.3.2 TSP

The predicted TSP concentrations were below the guideline criteria for all scenarios modelled.

As shown in **Table 19**, the predicted ground level concentrations of TSP resulting from operation of the project were small. As such, operation of the project is unlikely to result in exceedances of TSP air quality criteria. Cumulative concentrations of TSP are not predicted to exceed the annual criteria. It should be noted that it is unlikely that the project would be operating continuously over a year, with actual ground level pollutant concentrations expected to be lower than the predicted levels.

8.3.3 Hydrogen Fluoride

GLCs of Total Fluoride as HF both in isolation and cumulatively were predicted to comply with the DECCW general vegetation HF criterion at all existing residential receptors.

Modelling was conducted at representative receptor locations for the proposed Heritage Green development as required by the EARs. Exceedances above the general vegetation criteria have been predicted at these indicative locations for Receptor 1, 20, 21, and 22 to the east of the project boundary.

The maximum predicted GLC cumulative contours for HF are shown in Figures 10 to 12 in **Appendix C**. These contours indicate potential exceedances predominately to the west (which is an existing industrial area) and to the east as described above.

In summary the exceedances are as follows:

HF 24 hour average

- No individual exceedances; and
- 2 cumulative exceedances (Receptors 20 and 22).

HF 7 day average

- No individual or cumulative exceedances.

HF 90 day average

- 2 individual exceedances (Receptors 1 and 22); and
- 4 cumulative exceedances (Receptors 1, 20, 21 and 22).

It should be noted that these predicted exceedances may occur under a worst case scenario with NCIA operating at its HF licence limit of 5mg/m^3. Recent stack emission tests have demonstrated compliance with the licence conditions with preliminary concentrations of HF measured on 1 June 2010 of 2.2mg/m^3 (Kiln stack 1) and 1.4 mg/m^3 (Kiln stack 2) measured on 27 November 2009 (see **Section 8.4.2**). As a result, these predicted exceedances represent a very conservative worst case outcome.

8.3.4 NO_x as NO_2

Ground level concentrations of NO_x as NO_2 are predicted to increase. Results for the project (operation of the eight production lines) show the following:

- Maximum cumulative 1 hr average ground level concentration for existing sensitive receptors was 161.5µg/m^3 at Receptor 4 (closest existing Sensitive Receptor) against a criterion of 246 µg/m^3; and
- Maximum cumulative Annual average ground level concentration for existing sensitive receptors was 41.4µg/m^3 at Receptor 4 against a criterion of 62 µg/m^3.

The maximum predicted GLC's at all the sensitive receptors for 1 hour average NO_2 are significantly below the DECCW guideline when modelled in isolation from background and cumulatively.

8.3.5 SO_2 and Hazardous Metals

Ground level concentrations of SO_2 and hazardous metals are predicted to increase. The maximum predicted GLCs at all the sensitive receptors for all average periods of SO_2 and hazardous metals are significantly below the DECCW guideline when modelled in isolation from background and cumulatively.

8.4 Mitigation Measures

8.4.1 Construction

Potential emissions to air from construction activities include products of fuel combustion from vehicles and equipment used in construction and transportation activities. Dust emissions may also occur during construction works.

A CEMP would be prepared prior to commencement of construction of the project which would include:

- Operational controls:
- Control of access via sealed roadways;`
- Adhere to vehicle speed limits onsite;
- Minimise areas of disturbed soils during construction;
- Minimise soil stockpiles;
- Minimise construction equipment idling time and ensure regular equipment servicing to minimise exhaust emissions;
- Continue to implement procedure to address any complaints received;
- Avoidance of dust-generating activities during undesirable conditions; and
- Dust suppression including water sprays or other media during windy periods (as required).

8.4.2 Operation

NCIA is incorporating engineering measures into the project's design to minimise the impact of the project on air quality.

Dust extraction baghouses would be integrated with the kiln stacks. Particulate and PM_{10} emissions from the kilns would be controlled to modelled levels with these baghouses. Fluoride emissions would also be managed to modelled levels with these baghouses by implementing a mechanism where a fine spray of lime particles is injected into the kiln exhaust flow. The lime then acts to absorb the fluoride and the baghouse then captures the lime for disposal. This process is similar to that currently implemented at NCIA and has proven successful in managing emissions to meet the air quality requirements of the project.

Dust extraction baghouses would also be integrated with the spray dryers. Particulate and PM_{10} emissions from the spray dryers would be controlled with these baghouses consistent with current approved practices. Fabric filters would also be implemented on the extraction fans located adjacent to the selection line.

Despite generally low emission rates of particulates from the stacks, NCIA is continuing to investigate and implement solutions to reduce its particulate and PM_{10} emissions from its kilns and spray dryer, as part of improvement plans for existing operations. These works include testing and identifying losses of efficiency of the dust extraction baghouses which mitigate particulate and PM_{10} emissions and would be implemented into the project as practical.

NCIA is committed to operating at or below the 5mg/m^3 emission limit for HF specified in their EPL, and on that basis, the 5 mg/m^3 limit has been applied to the modelling. Mitigation measures recently implemented have resulted in a reduction of HF emissions to concentrations below those modelled by this report and by extension the NCIA emission limits. Mitigation measures undertaken were as follows:

- Modification of the NCIA Kiln baghouse bag mounts to replace hard mounts with soft mounts which result in a better seal, reducing bypassing of bags;
- Change in the type of lime used in the baghouse to increase the percentage of Calcium available for scrubbing of HF;
- Installation of additional monitoring points to monitor baghouse operational parameters e.g. pressure drop to allow more efficient tracking of the performance of the baghouses;
- Baghouse bag brand was changed in an effort to improve the scrubbing efficiency and the lifespan of the bags; and
- All new production lines (from lines 3 to 8) will have all kiln stacks to exhaust external and filtration systems positioned internally to the buildings. The aim of this is to ensure more efficient management of the emissions.

These items have commenced or been actioned since the stack emissions testing undertaken in July and August 2009 that was used in the modelling. Recent stack tests have demonstrated compliance with the licence conditions with preliminary concentrations of HF measured on 1 June 2010 of 2.2mg/m^3 (Kiln stack 1) and 1.4 mg/m^3 (Kiln stack 2) measured on 27 November 2009 (compared to a limit of 5 mg/m^3).

8.4.3 Environmental Monitoring Program

The footprint of the project would cover the current southeast monitoring site (see **Figure 2**) and it would no longer be suitable as a location for ambient air and meteorological monitoring. Discussion with the DECCW in relation to the relocation or elimination of this site and general monitoring requirements relevant to the development of the project would occur.

NCIA would continue its Vegetation Monitoring Program which specifically looks at fluoride impacts on fluoride sensitive flora species in the vicinity of NCIA. The monitoring would take place annually or as otherwise agreed with DOP.

8.5 Conclusion

This AQIA predicted that concentrations of TSP, NO_2, SO_2, and hazardous metals would be below the assessment criteria defined by DECCW at existing residential receptors.

PM_{10} predictions suggest the potential for cumulative impacts under worst case conditions to be above the criteria due to elevated background concentrations (which is approaching the DECCW assessment criteria). However PM_{10} cumulative impacts from the project are not expected to be distinguishable from those attributable to the

existing facility and are not considered to be of concern. Recently implement mitigation measures have resulted in particulate emissions for NCIA's existing operations be measured well below the licence limit of 20mg/m^3:

- Kiln 1: 6.8 mg/m^3 (5 March 2010);
- Kiln 2: 11 mg/m^3 (27 November 2010); and
- Spray Dryer: 5.8 mg/m^3 (9 February 2010).

When compared to the air quality assessment prepared for the 2002 EIS, the same predictions occurred. The 2002 EIS stated that *"the 24 hour average particulate matter concentration under worst case dispersion conditions, the criteria may be exceeded since background levels already exceed the criteria".* In relation to PM_{10} it can be considered that the impacts of the project are consistent with those predicted in the 2002 EIS.

The dispersion modelling indicates that existing sensitive receptors are unlikely to experience adverse impacts from HF emissions from the project. However, predicted HF GLCs suggest near field impacts at locations across the proposed Heritage Green (within 400 m) have the potential to be above the relevant vegetation DECCW criteria. This assessment was against the generalised land use criteria. As the assessment was based around impacts on vegetation, not human health impacts, this assessment is considered conservative. Vegetation and grazing animals are more sensitive to fluoride than humans, as such emission limits require emissions to be well within safe levels for vegetation and grazing animals. Therefore, human health is also protected (DHS 2007).

The emission limits as specified in NCIA's existing consent and EPL were used in the modeling and would be expected to be applied to the project as these low limits would continue to be met. These limits for PM_{10}, HF and NO_x are all at or significantly below the stringent approved Group 6 limits, which are those limits set by DECCW for new industrial facilities. The Group 6 limit for HF is 10 times NCIA's limit of 5 mg/m^3, the Group 6 limit of NO_x is 5 times NCIA's limit of 100 mg/m^3 and the Group 6 limit for total particulates (which include PM_{10}) is 2.5 times that of NCIA's limit of total particulates from the kiln stacks. Recent stack tests have demonstrated compliance with NCIA's HF licence conditions with preliminary concentrations of HF measured on 1 June 2010 of 2.2mg/m^3 (Kiln stack 1) and 1.4 mg/m^3 (Kiln stack 2) measured on 27 November 2009 (compared to a limit of 5 mg/m^3).

Based on the results of the impact assessment and the existing and proposed air quality mitigation measures no significant adverse impacts are expected at existing sensitive receptors as a result of the project.

9.0 Greenhouse Gas and Energy Efficiency

AECOM was commissioned by NCIA to conduct a greenhouse gas (GHG) assessment for the project. The full GHG assessment is presented in **Appendix D** with a summary provided below.

9.1 Existing Environment

GHGs are gases found in the atmosphere that absorb outgoing heat that is reflected from the sun. The absorption of the heat energy warms the air, enabling life to survive, and is known as the Greenhouse Effect. The primary GHG is Carbon Dioxide (CO_2).

Human activities, such as the combustion of carbon-based fuels, increase the amount of GHGs in the atmosphere. This leads to greater absorption of heat and increases in atmospheric temperature, known as the Enhanced Greenhouse Effect. The atmospheric concentration of CO_2 has risen from 280 parts per million (ppm) in 1860 to approximately 388 ppm in January 2010 (NOAA, 2010). At the same time, the average global temperature has increased by nearly 1 ℃.

In 2007, Australia's net GHG emissions were 597.2 Mt CO_2-e (million tonnes of CO_2-e equivalent).

9.2 Assessment Methodology

Estimation of the GHG emissions associated with the approved and proposed operations was undertaken using the emission factors and methods outlined in the National Greenhouse Accounts (NGA) Factors for three assessment categories:

- **Scope 1**, which covers direct emissions from sources within the boundary of an organisation, such as fuel combustion and manufacturing processes;
- **Scope 2**, which covers indirect emissions from the consumption of purchased electricity, steam or heat produced by another organisation; and
- **Scope 3**, which includes all other indirect emissions that are a consequence of an organisation's activities but are not from sources owned or controlled by the organisation, such as product transport emissions and emissions from the generation of purchased electricity.

This assessment estimated emissions relating to:

- The manufacturing of tiles (Scope 1);
- Electricity consumption (Scope 2 and Scope 3); and
- Transport of product to customers (Scope 3).

Emissions were assessed for two scenarios:

- Approved maximum production of 253,440 tpa (Stages One – Four); and
- Proposed maximum production 506,880 tpa (Stages One – Eight).

Production data for the 2008/09 production year (equating to 67,293 tonnes from 1 August 2008 to 31 July 2009 – approximately 20kg per m^2) were obtained from NCIA. To estimate emissions for the two scenarios, these data were factored up assuming a linear relationship between all variables (fuel consumption, number of deliveries, etc.) and the tile production rate.

This approach was considered to be conservative as the project would develop progressively and would be more energy efficient than the existing plant as discussed in **Section 9.3.1**. As such, actual GHG emissions associated with the project, and the change in emission levels, are expected to be lower than the estimates provided in this assessment. The differences in emissions between the approved and proposed production rates were calculated to determine the change in impact.

9.3 Potential Impacts

Scope 1 GHG emissions associated with manufacturing tiles arise from the combustion of natural gas in stationary plant (such as the kilns and spray dryer) and onsite transport vehicles (forklifts and front-end loaders). Emissions for these sources were estimated using factors provided in the NGA Factors (June, 2009) and are presented in **Table 20** (see **Appendix D** for detailed analysis).

Table 20: GHG Emissions - Scope 1

Source	Approved (t CO_2-e) (Stages One – Four)	Proposed (t CO_2-e) (Stages Five – Eight)	Total (t CO_2-e) (Stages One – Eight)
Natural Gas	71,681.4	71,681.4	143,362.9
Diesel	320.6	320.6	641.1

Electricity consumption is accounted for as Scope 2 and Scope 3. Scope 2 emissions result from electricity directly consumed and Scope 3 emissions are associated with transmission losses. Scope 2 and Scope 3 are collectively referred to as full fuel cycle. GHG emissions from electricity consumption are presented in **Table 21**.

Table 21: GHG Emissions – Electricity Scope 2 & 3

Emission Type	Approved (t CO_2-e) (Stages One – Four)	Proposed (t CO_2-e) (Stages Five – Eight)	Total (t CO_2-e) (Stages One – Eight)
Scope 2 Electricity	45,128	45,128	90,257
Scope 3 Electricity	9,127	9,127	18,254
Full Fuel Cycle (total)	**54,255**	**54,255**	**108,511**

Based on the number of tiles produced and the assumed ratio of truck types and numbers indicated in **Section 11** the GHG emissions for the transport of tiles have been calculated and are presented in **Table 22**.

Table 22: GHG Scope 3 Emissions from Tile Transport

Emission Type	Approved (t CO_2-e) (Stages One – Four)	Proposed (t CO_2-e) (Stages Five – Eight)	Total (t CO_2-e) (Stages One - Eight)
Scope 3 Transport	1,053	1,053	2,016

Emission Summary

Table 23 shows the GHG emissions from all sources associated with the existing facility and the project.

Table 23: GHG Emissions (Natural Gas, Diesel and electricity)

Activity	Estimated Emissions (t CO_2-e)		
	Approved	Proposed	Total
Fuel combustion – stationary plant (Natural Gas)	71,681	71,681	143,363
Fuel combustion – onsite transport (Diesel)	320.6	321	641.1
Electricity use (Full Fuel Cycle)	54,255	54,255	108,511
Scope 1 and 2 Total (excludes product transport)	**126,257**	**126,257**	**252,515**
Product transport (truck)	1,053	1,053	2,106
Scope 1,2 and 3Total	**127,310**	**127,310**	**254,621**

The greatest source of GHG emissions from NCIA is stationary plant, followed by electricity use. The approved operations would generate an estimated 0.127 Mt CO_2-e per year (direct and indirect GHG emissions).

GHG emissions would increase to approximately 0.25 Mt CO_2-e at the proposed maximum production (under Stages One – Eight) of 506,880 tpa, which is equivalent to approximately 0.04 % of the total national emission levels (597.2 Mt CO_2-e).

In 2007, total NSW greenhouse gas emissions were 163 Mt CO2-e. Therefore NCIA's contribution to NSW GHG emissions would be 0.15% following the implementation and operation of the project.

As such, the additional emissions associated with the project would not substantially increase the total national emissions or impede emission reduction actions.

9.4 Mitigation Measures

9.4.1 Energy Saving

The NSW Government's Energy Efficiency Action Strategy established a number of energy saving initiatives under the *Energy and Utilities Administration Act 1987 No 103 Part 6A*, which commenced in 2005. The initiatives include the requirement for high energy users (i.e. those using more than 10 GWh of electricity per year) to prepare an Energy Savings Action Plan (ESAP) in accordance with the Guidelines for Energy Savings Action Plans (DEUS).

NCIA would prepare an ESAP which would include an analysis of energy use and strategies to minimise electricity consumption.

Wherever possible, potential energy savings actions would be identified prior to the selection and installation of new plant and equipment.

NCIA proposes to implement the tile manufacturing process technology known as Continua from Italian plant manufactures SACMI. SACMI has developed three energy recovery systems applicable to all the latest generation kilns which would be implemented as practical. The installation of plant with these energy recovery features would result in greater energy efficiency.

9.4.2 Co-generation Plants

The NCIA was unable to obtain sufficient details regarding the desired co-generation plant to adequately assess the potential environmental impacts. Therefore the integration of co-generation facilities into the scope of the project has not occurred. It is anticipated that a separate application would be made in the future.

NCIA proposes to design and develop the project in a way that would enable the future integration of electricity cogeneration plants across the production lines (both approved and proposed). The co-generation plants are most likely to be located at the clay preparation \ spray drier area (northern end of the factory building, see **Figure 5**). It is envisaged that the co-generation plants would capture waste heat from the turbine, which would be used to operate the spray driers.

9.5 Conclusion

The project would increase GHG emissions to that presently approved associated with:

- Combustion of fuel from stationary plant;
- Combustion of fuel from transport vehicles for the onsite product movements;
- Electricity use; and
- Tile transport.

The project would increase total GHG emissions (direct and indirect) to approximately 0.25 Mt CO_2-e per year. Total GHG emissions from NCIA would equate to approximately 0.04 % of Australian GHG emissions; as such, the project is not expected to substantially increase total national GHG emissions. NCIA proposes to implement a number of initiatives that would reduce energy consumption for the project to assist in minimising GHG emissions associated with electricity use.

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10.0 Noise

Heggies Pty Ltd (Heggies) was commissioned by AECOM on behalf of NCIA to prepare a noise impact assessment for the project. The full noise impact assessment can be seen as **Appendix E** to this EA. The objective of the noise impact assessment was to assess the potential impacts of noise from construction, operation and traffic associated with the project at the nearest existing and proposed noise-sensitive receivers

10.1 Existing Environment

Confirmation of background noise levels was undertaken by Heggies. The objective of the background noise survey was to measure L_{A90} (period) and L_{Aeq} (15 minute) noise levels at locations representative of the nearest potentially affected receptors during the day, evening and night-time periods to enable the determination of the intrusiveness and amenity criteria for the project.

Background noise levels were monitored at four separate locations, three of which were considered to be representative of the nearest potentially affected receptors from 5 June to 15 June 2009, inclusive. The fourth location, on the southern project boundary was used to determine noise emission levels from the existing development. The location of these loggers is shown on Figure 5 in **Appendix E**.

A summary of the results of the background surveys and hence adopted background levels are provided in **Table 24** with results displayed graphically in **Appendix E**. It should be noted that the estimated existing industrial noise contribution includes the existing facility and surrounding industrial premises.

Table 24: Summary of Existing Ambient Noise Levels

Location	Period	Background L_{A90} Noise Level (dBA)	Measured $L_{Aeq(Period)}$ (dBA)	Estimated Existing Industrial Contribution $L_{Aeq(Period)}$ (dBA)
3 Montvale Street Rutherford	Day	43	55	41
	Evening	43	50	41
	Night	38	48	41
115 Regiment Road Rutherford	Day	42	57	33
	Evening	39	53	33
	Night	36	49	33
256 Wollombi Road Farley	Day	38	55	39
	Evening	38	51	39
	Night	37	51	39
Southern Project Boundary	Day	45	54	45
	Evening	45	50	45
	Night	45	49	45

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
On Sundays and Public Holidays: Daytime 8.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 8.00 am.

10.1.1 Temperature Inversion

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. For a temperature inversion to be a significant characteristic of the area it needs to occur for approximately 30% of the total night-time during winter.

Analysis of the meteorological data provided by AECOM determined that Class F temperature inversions (1.5°C/100m - 4°C/100m) and Class G (>4°C/100m) are likely to occur for approximately 56% and 0%, respectively, during the winter evening and night-time periods. Temperature inversions have been considered as part of this investigation with a 3°C/100m temperature gradient used for the worst case scenario modelling.

10.1.2 Sensitive Receivers

The nearest potentially affected noise-sensitive receivers to the site are shown in Figure 4 in **Appendix E** and are as follows:

- Existing residential properties located in the suburb of Rutherford east of the site. The nearest are located in Kenvil Close approximately 800 m from the site boundary;
- Proposed Heritage Green residential subdivision located immediately east and south of the site. It is understood that this development may also include spaces for active recreation; and
- Existing residential properties located in the suburb of Farley south of the railway line. The nearest are located approximately 860 m south of the site boundary.

10.2 Assessment Methodology

Responsibility for the control of noise emission in New South Wales is vested in Local Government and DECCW. The Industrial Noise Policy (INP) was released in January 2000 and provides a framework and process for deriving noise criteria for consents and licences that would enable the DECCW to regulate premises that are scheduled under the *POEO Act*. The specific policy objectives are:

- *To establish noise criteria that would protect the community from excessive intrusive noise and preserve amenity for specific land uses;*
- *To use the criteria as the basis for deriving project specific noise levels;*
- *To promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects;*
- *To outline a range of mitigation measures that could be used to minimise noise impacts;*
- *To provide a formal process to guide the determination of feasible and reasonable noise limits for consents or licences that reconcile noise impacts with the economic, social and environmental considerations of industrial development; and*
- *To carry out functions relating to the prevention, minimisation and control of noise from premises scheduled under the Act.*

The INP provides two forms of noise criteria with the aim of achieving environmental noise objectives; one to account for intrusive noise which involves setting a noise goal relative to the existing acoustic environment and the other to protect the amenity of particular land uses.

10.2.1 Assessing Intrusiveness

For assessing intrusiveness, the background noise level must be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level (LA_{eq}) of the source should not be more than five decibels above the measured background level (LA_{90}).

10.2.2 Assessing Amenity

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include road, rail or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion. For high-traffic areas there is a separate amenity criterion.

The acoustical environment typifies an urban environment, with residences near existing industrial districts. Therefore, the residences in the general area have been assessed as “urban” receiver types as defined in the INP. The proposed Heritage Green development immediately to the east of the NCIA project boundary has been assessed as an active recreation area.

The existing L_{Aeq} noise levels in the vicinity of existing facility are dominated by road and rail traffic, local community activity and existing industry. Where it was found that existing industrial noise contributed to ambient noise levels at potentially affected areas in the vicinity of the project, appropriate adjustments in accordance with the INP have been made to the amenity for these locations.

Table 25 shows the project specific noise criteria determined by the above assessment methodology.

Table 25: Project Specific Noise Criteria

Location	Period	Intrusiveness Criteria LAeq(15minute) dBA	Amenity Criteria LAeq(Period) dBA	Project Specific Noise Criteria LAeq(15minute) dBA
3 Montvale Street Rutherford*	Day	48	60	48
	Evening	48	50	48
	Night	43	43	43
115 Regiment Road Rutherford**	Day	47	60	47
	Evening	44	50	44
	Night	41	45	41
256 Wollombi Road Rutherford***	Day	43	60	43
	Evening	43	50	43
	Night	42	44	42

** These criteria would be relevant to residences in the west of the existing Rutherford residential estate and also includes the proposed (but not approved) Heritage Green development.*
*** These criteria would be relevant to residences in the east of the existing Rutherford residential estate.*
****These criteria would be relevant to residences south of the project along Wollombi Road in the suburb of Farley.*

10.2.3 Assessing Sleep Disturbance

DECCW has acknowledged that the relationship between maximum noise levels and sleep disturbance is not currently well defined. Criteria for assessing sleep disturbance has not been identified under the INP and hence, sleep arousal has been assessed using the guidelines set out in the Environmental Noise Control Manual (ENCM) Chapter 19-3.

To avoid the likelihood of sleep disturbance, the ENCM recommends that the $L_{A1\ (1minute)}$ noise level of the source under consideration should not exceed the background noise level (L_{A90}) by more than 15 dBA when measured outside the bedroom window of the receiver during the night time hours (10.00 pm to 7.00 am).

The relevant sleep disturbance noise goals are provided in **Table 26.**

Table 26: Sleep Disturbance Noise Goals

Location	Period	Measured Background Noise level (L_{A90})	Sleep Disturbance Noise Goal $L_{A1(1\ minute)}$
3 Montvale Street, Rutherford*	Night	38 dBA	53 dBA
115 Regiment Road, Rutherford**		36 dBA	58 dBA
256 Wollombi Road, Rutherford***		37 dBA	59 dBA

** These criteria would be relevant to residences in the west of the existing Rutherford residential estate and also includes the proposed (but not approved) Heritage Green development.*
*** These criteria would be relevant to residences in the east of the existing Rutherford residential estate.*
****These criteria would be relevant to residences south of the project along Wollombi Road in the suburb of Farley.*

10.2.4 Road Traffic Noise

DECCW released the "Environmental Criteria for Road Traffic Noise" (ECRTN) in May 1999. The policy sets out noise criteria applicable to different road classifications for the purpose of defining traffic noise impacts.

All raw material deliveries and product despatch would utilise Racecourse Road and the New England Highway. The nearest potentially affected residential receptors are located on the New England Highway approximately 15 m from the edge of the road as there are no residential properties located on Racecourse Road. The New England Highway is classified as an arterial road which, by definition, carries predominantly through-traffic from

one region to another, forming a principal avenue of communication for urban traffic movements. The relevant road traffic noise criteria for the project are provided in **Table 27**.

Table 27: Road Traffic Noise Criteria

Type of Development	Criteria		
	Day (7 am - 10 pm)	Night (10 pm – 7) am	Where Criteria are Already Exceeded
Land use developments with potential to create additional traffic on existing freeways/ arterials	LAeq(15hour) 60 dBA	LAeq(9hour) 55 dBA	Where feasible, existing noise levels should be mitigated to meet the noise criteria. Examples of applicable strategies include appropriate location of private access roads; regulating times of use; using clustering; using 'quiet' vehicles; and using barriers and acoustic treatments. In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB.

The ECRTN also draws the following conclusions with regard to maximum noise levels and the likelihood of sleep disturbance:

- Maximum internal noise levels below 50-55 dBA are unlikely to cause awakening reactions; and
- One or two noise events per night, with maximum internal noise levels of 65-70 dBA, are not likely to affect health and wellbeing significantly.

10.2.5 Construction Noise

DECCW released the *Interim Construction Noise Guideline* in July 2009. The guideline sets out noise management levels, in relation to construction type activities, for residential and other sensitive receptors and how they are to be applied. The relevant construction noise goals have been developed with reference to the Interim Construction Noise Guideline and are shown in **Table 28**.

Table 28: Construction Noise Goals

Location	Period	Noise Goal LAeq(15minute)	
		Noise Affected (dBA)	Highly Noise Affected (dBA)
3 Montvale Street Rutherford*	Day	53	75
	Evening	48	n/a
	Night	43	n/a
115 Regiment Road Rutherford**	Day	52	75
	Evening	44	n/a
	Night	41	n/a
256 Wollombi Road Rutherford***	Day	48	75
	Evening	53	n/a
	Night	42	n/a

** These criteria would be relevant to residences in the west of the existing Rutherford residential estate and also includes the proposed (but not approved) Heritage Green development.*
*** These criteria would be relevant to residences in the east of the existing Rutherford residential estate.*
****These criteria would be relevant to residences south of the project in the suburb of Farley.*
Note: Highly Noise Affected level is not defined for the evening or night periods. A strong justification would typically be required for works outside the recommended standard hours. It is noted that construction activity for the project would not occur during the evening or night-time periods.

10.3 Potential Impacts

10.3.1 Operational Noise

Noise emission levels were predicted from the project (Stages Five – Eight). A cumulative assessment for a typical worst case operational scenario of eight production lines (Stages One – Eight) was undertaken. Noise contour maps, provided in **Appendix E**, show predicted noise levels from operation of eight production lines at surrounding areas for calm and prevailing meteorological conditions. **Figure 10** shows worst-case night time noise contours from the project under worst case meteorological conditions (i.e. temperature inversion).

As can be seen from **Figure 10**, operational noise levels are predicted to be significantly below the project specific noise criteria at all existing receptors under calm and prevailing weather conditions.

It is noted that the proposed Heritage Green development is located immediately east and south of the site. Noise emission predictions from the project indicate that there are some areas of the Heritage Green development that may be noise affected. The degree of affectation would depend on the type of development proposed for different areas of the proposed Heritage Green (i.e. the site layout and orientation). Other important factors influencing affectation include the implementation of proposed noise attenuation measures identified in the 2006 Heritage Green Statement of Environmental Effects (SEE), to mitigate the acknowledged industrial noise across parts of the Heritage Green site. These measures included noise barrier walls, buffer distances \ distance attenuation and the degree of residential building acoustic design.

10.3.2 Cumulative Noise Assessment

The project is situated within a developed industrial area in Rutherford. Existing industrial properties are located to the west and north of the project.

Potential cumulative noise impacts from existing and successive developments are embraced by the INP procedures by ensuring that the appropriate noise emission criteria (and consent limits) are established with a view to maintaining acceptable noise amenity levels for residences. Therefore, the cumulative impact of the project with existing industrial noise sources has been assessed in the determination of the amenity levels at surrounding potentially noise sensitive areas.

Existing industrial noise (i.e. cumulative noise from NCIA and the surrounding area) in the vicinity of the project has been measured and utilised in determining the relevant project specific noise criteria.

With regard to road and rail noise, the INP provides no requirement to assess the cumulative impact of these sources with noise from industrial-type operations. Road and rail sources are assessed under separate noise policy and guidelines. Road noise is addressed in **Section 10.3.4**.

10.3.3 Sleep Disturbance Analysis

In the interests of minimising sleep disturbance impacts the mitigation measures described in **Section 10.4** would be implemented during the night-time period. Notwithstanding this, some typical activities that may cause maximum noise events during the night-time period have been considered as part of this noise assessment. Indicative noise events that have been considered are:

- Forklifts loading/unloading pallets;
- Reversing alarms; and
- Front-end loader operation.

In assessing the potential for sleep disturbance, the typical L_{Amax} noise levels of the activities listed above were used as input to the noise model and predictions were made at the nearest residential areas in Rutherford and Farley (Wollombi Road) under adverse weather conditions at night. The use of the L_{Amax} noise level provides a worst-case prediction since the $L_{A1(1minute)}$ noise level of a noise event is likely to be less than the L_{Amax}.

The highest L_{Amax} noise level at any existing residential area was predicted by the model to be in the order of 40 dBA at Kenvil Close under the effects of a temperature inversion. This is significantly below the relevant criteria of 53 dBA.

The degree of sleep disturbance at the proposed Heritage Green development would depend on the type of development proposed for different areas of the site and the implementation of proposed noise attenuation measures with that development. Notwithstanding this, Heggies has considered a worst case scenario for the proposed Heritage Green development where no further mitigation measures have been included as part of the proposed residential development. Based on this assumption, depending on the location and the degree of shielding provided by the existing earth bund adjacent to the NCIA boundary, the potential area of affection within the proposed residential development could be approximately 70 m-190 m from the NCIA boundary. That is, within 70 m-190 m from the NCIA boundary there is potential for maximum noise levels from the NCIA site to be above the relevant sleep disturbance noise goal.

10.3.4 Road Traffic Noise Assessment

Road traffic noise criteria are set out in the ECRTN (**Table 27**). The criteria recommended in the policy document are based on the functional categories of the subject roads, as applied by the RTA. The estimated traffic movements generated by the approved facility and the project would be in the order of 228 vehicle trips per day including approximately 88 truck trips per day. All raw material deliveries and product despatch would utilise the New England Highway. The nearest potentially affected residential receptors are located on the New England Highway approximately 15 m from the edge of the road as there are no residential properties located on Racecourse Road or Kyle Street.

Based on the Annual Average Daily Traffic (AADT) data published by the RTA and discussed in **Section 11**, the project would generate an increase in traffic flow along the Highway of less than 1% and thus an increase in noise level of less than 0.5 dBA. This increase in road traffic noise will not be noticeable at the nearest residential locations adjacent to the New England Highway and is significantly below the 2 dBA allowance provided in the ECRTN.

10.3.5 Construction Noise

It is noted that construction activity for the project would not occur during the evening or night-time periods. Hence, predicted noise emission levels from construction activities have been compared to the relevant daytime criteria for each existing residential area. The results of construction noise predictions are provided in **Table 29** for the nearest residential areas.

It is anticipated that construction of the project would commence in 2011 and would last approximately 8 months. It is not anticipated that any residents would be located at the proposed Heritage Green development during the expected construction timeframe. As such construction noise and vibration at the proposed Heritage Green has not been considered further.

Table 29: Predicted Construction Noise Levels LAeq(15minute) (dBA)

Location	Period	Predicted Construction Noise Emission Level		Noise Affected Level
		Earthworks	Building Construction & Fitout	
3 Montvale Street Rutherford*	Day	42	35	53
115 Regiment Road Rutherford**		38	30	52
256 Wollombi Road Rutherford***		38	31	48

** These criteria would be relevant to residences in the west of the existing Rutherford residential estate and also includes the proposed (but not approved) Heritage Green development.*

*** These criteria would be relevant to residences in the east of the existing Rutherford residential estate.*

****These criteria would be relevant to residences south of the project in the suburb of Farley.*

As can been seen in **Table 29** the predicted noise emission levels from construction activities associated with the project are significantly below the relevant construction noise goal (or Noise Affected Level).

10.3.6 Construction Vibration

The major vibration generating activities would occur during the earthworks in preparing the site for construction, activities such as excavation and the use of vibratory rollers. The nearest residential premises to such construction activity is approximately 870 m (Kenvil Close). Due to the large separation distance to this and other residences, the level of vibration anticipated by construction activities is extremely unlikely to be perceptible at any of the nearest residential premises.

The nearest industrial building to potential vibration generating activities is situated approximately 60 m to the east from such potential construction activities. This magnitude of separation is expected to ensure that construction activities would have no impact on neighbouring industrial buildings.

10.4 Mitigation Measures

Noise mitigation and management procedures that have been incorporated into the model with the aim of reducing operational noise emissions are as follows:

- No truck deliveries of raw products or final product despatch would occur during the night time period;
- Electric, laser guided forklifts are utilised to transport final product from the proposed factory building to the product despatch area of the existing building;
- The transport route for both forklifts and delivery/product despatch truck has been designed to minimise the need for reversing and, as such, the use of reversing alarms;
- The bag-houses of the proposed kiln stacks would be located inside the proposed factory building; and
- The proposed dust extraction unit, located on the southern end of the eastern wall of the proposed factory building, would be enclosed to reduce noise emissions to the east and south.

It is also seen as an obligation of the proposed Heritage Green proponent to address potential noise impacts by considering a sensitive layout and design of the residential estate, which would include appropriate buffer distances and incorporating noise attenuation in construction design where appropriate.

10.5 Conclusion

Noise emission levels were predicted from the project for a cumulative operational scenario of eight production lines (Stages One – Eight). Noise contour maps are provided in **Appendix E** and show predicted noise levels from the operation of the project at surrounding areas which are significantly below the project specific noise

criteria at all existing residential locations under calm and prevailing weather conditions. **Figure 10** shows noise contours from the project under worst case meteorological conditions (i.e. temperature inversion).

Figure 10 also shows the predicted night time noise contours from the 2002 EIS for comparison with those for the project. It can be seen that the noise contribution from the project is approximately equivalent to that approved for the existing facility. This essentially means that the noise contribution of the project would not change significantly from that already approved. **Figure 10** demonstrates that the increase in the project noise goals compared to the existing facility is due to the increase in the background noise levels in the Rutherford region. This change in the background noise would likely be attributable to the development of new industrial facilities in the Rutherford Industrial Estate.

Noise emission predictions from the project indicate that there are some areas of the proposed Heritage Green development that may be noise affected. The degree of affectation would depend on the type of development proposed for different areas of the proposed development (i.e. the site layout and orientation). Other important factors influencing the degree of affectation across the proposed Heritage Green site includes the implementation of the proposed noise attenuation measures identified in the 2006 Heritage Green Statement of Environmental Effects (SEE). The possible noise attenuation measures to mitigate the identified industrial noise across parts of the Heritage Green site were noise barrier walls, buffer distances and the degree of residential building acoustic design.

The potential for sleep disturbance has also been assessed. The highest L_{Amax} noise level at any existing residential area is predicted to be in the order of 40 dBA at Kenvil Close which is significantly below the relevant criteria. With regard to the proposed Heritage Green development, there is potential for maximum noise levels from the NCIA site to be above the relevant sleep disturbance noise goal within approximately 70 m-190 m from the NCIA boundary.

An assessment of the potential for road traffic noise impacts has also been conducted. It is predicted that the estimated increase in traffic as a result of the project would generate a negligible increase in road traffic noise at the nearest residential locations adjacent to the New England Highway. This increase in road traffic noise will not be noticeable at the nearest residential locations adjacent to the New England Highway and is significantly below the 2 dBA allowance provided in the ECRTN.

Predicted noise emission levels from construction activities at the project site are significantly below the relevant construction noise goal. Furthermore, due to the relative separation distances, the level of vibration caused by construction activities at the project site is extremely unlikely to be perceptible at any of the nearest residential premises and unlikely to have any impact on neighbouring industrial buildings.

11.0 Traffic and Parking

Better Transport Futures was commissioned to prepare a Traffic Impact Assessment (TIA) for the project. The full TIA is presented as **Appendix F** and a summary is presented below.

11.1 Existing Environment

11.1.1 Site Location and Access

The site is located on the southern side of Racecourse Road, Rutherford (see **Figure 2**). The site has a single road frontage to Racecourse Road and all vehicle access to the project is via a gated driveway located on Racecourse Road (Photo 4 **Appendix F**). The site is currently occupied by the existing tile factory with all vehicle access via the existing driveway.

11.1.2 Existing Traffic Conditions

Immediately adjacent to the project is Racecourse Road, a local industrial road controlled by Maitland City Council. Racecourse Road provides one of the major access roads to the Rutherford Industrial Area. To the west of the project, Racecourse Road runs into Kyle Street that has a lower standard of construction but still allows for two-way traffic movements (Photos 7 and 8 **Appendix F**).

To the north of the project, the New England Highway provides the major route for traffic in the area. It forms part of the National Highway (H9) and any works along this road require concurrence from the NSW Roads and Traffic Authority (RTA). In the locality of the site, it provides a mixture of single and double lanes in each direction. Racecourse Road connects with the New England Highway via a two lane roundabout at its eastern end and at its western end via Kyle Street (single lane in each direction).

11.1.3 Traffic Management Works

Due to the comparatively low traffic flows along Racecourse Road, the MCC has no planned traffic management measures proposed in the general vicinity of the project. Advice from the RTA indicates that there are no projects planned to upgrade the intersection of the New England Highway and Racecourse Road.

It is noted that a new roundabout is to be constructed at the intersection of Kyle Street and the New England Highway as a consent condition relating to the staged industrial development at Anambah Business Park which is located on the north side of the New England Highway on the corner or Anambah Road and the New England Highway.

The recently announced funding for the construction of the F3 to Branxton Road would provide a significant benefit to the New England Highway in this location. The provision of this important road link would remove a large portion of the through traffic movements along the New England Highway.

11.1.4 Traffic Flows

As part of the TIA, a peak hour traffic survey was undertaken at the roundabout controlled intersection of New England Highway and Racecourse Road (Photo 9 **Appendix F**). The survey showed that the morning peak hour is between 7.30 and 8.30 AM and the afternoon peak is between 4.30 and 5.30 PM. The results of the traffic survey are presented in **Table 30.**

Table 30: Traffic Survey Results

Road	AM Peak	PM Peak
New England Highway – east of Racecourse Road	1,249 westbound	2,184 westbound
	770 eastbound	792 eastbound
Racecourse Road	84 northbound	62 northbound
	297 southbound	9 southbound
New England Highway – west of Racecourse Road	627 eastbound	1,047 eastbound
	1,155 westbound	1,321 westbound

Assuming the peak hour flows represent some 10% of the daily traffic flows, this would indicate the daily two-way traffic flows for the New England Highway in this locality are in the order of 20,750 vehicles per day.

There are currently some 50 staff working on site (Stages One – Two), split between work on production lines and office based work. The facility has an existing approval which would result in some 20 additional staff members (70 in total for Stages One – Four). It is noted that the existing facilities operate on a 24 hour basis, allowing for shift work to occur. The shift change times are 7.00 AM and 7.00 PM.

There are significant heavy goods vehicles in the locality, due to existing industrial users. The New England Highway also carries a high volume of heavy goods vehicles, associated with both local travel as well long distance interstate travel connecting with Queensland and areas in the Upper Hunter. NCIA contributes to this volume of heavy goods vehicles.

NCIA currently generates approximately 22 heavy vehicle trucking trips (2 way) split between dispatch and delivery as defined in **Table 31**. This would increase to approximately 44 heavy vehicle trucking trips under the existing approval (i.e. Stages One – Four).

Table 31: Existing \ Approved Vehicle Trips

Scenario	Staff	Dispatch (truck)*	Delivery (truck)*	Total
Stages One – Two (Existing Facility)	50	12	10	72
Stages One – Four (Approved Facility)	70	24	20	114

**It is assumed that there is a split of 70% B-Doubles (38 tonnes) and 30% Semi-trailers (24 tonnes)*

Observations on site show that the traffic flows along Racecourse Road generally operate with acceptable delays or congestion. However during afternoon peak hours, the intersection of the New England Highway and Racecourse Road suffers from delays. This is mainly due to high volumes of through traffic movements on the New England Highway blocking traffic from entering the roundabout from the side roads.

11.1.5 Parking

Racecourse Road provides an overall width in the order of 12.5 metres and can therefore accommodate parked cars with minimal impact upon through traffic movements. There is ample off-street parking provided at the project site to cater for the demands of Stages One - Four (in excess of 35 parking spaces). The majority of adjacent properties in the general locality of the site also accommodate their individual parking demands.

There was minimal on-street parking observed in Racecourse Road in the general vicinity of the site. The older development to the west off Kyle Street appeared to create some on-street parking demand. There was little if any on street parking demand to the east of the project site on Racecourse Road.

11.1.6 Access

Access to the project is via the main entrance off Racecourse Road which allows for safe access and egress for all vehicles. The driveway layout includes a raised central median to separate inbound movements from outbound movements as well as speed humps to control traffic speeds to the 20km/h limit.

All service vehicles can enter and exit the project in a forward direction, with little if any reversing required on site. The unloading and loading bays are designed to allow for vehicles to enter and exit the bays without the need to reverse.

11.1.7 Other Proposed Developments

To the immediate south-east of the site is the location for the proposed Heritage Green development which could provide up to 450 residential lots, with access connections provided to both Racecourse Road to the north and Regiment Road to the east.

A review of the area shows that there are a number of vacant blocks within the Rutherford Industrial Estate as well as the Homemaker Centre. It is considered that these blocks would be developed in time and would provide a similar type of industrial or commercial development to that currently found within the general locality.

The Anambah Industrial Park is currently being developed to the north of the Site, adjacent to the New England Highway with access via Anambah Road. There is a recently constructed roundabout at the intersection of New England Highway and Anambah Road.

11.2 Assessment Methodology

The scope of the TIA was to review the traffic and access implications for the project. The TIA report also provides advice on site access, internal site layout and issues relating to service vehicles.

The objectives of the TIA were to:

- Assess impact on the arterial and local road network due to the additional traffic flows;
- Assess the impact of the additional parking generated by the project;
- Review the access arrangements for the project;
- Review the internal site layout and the car park access arrangements;
- Review the service arrangement for the development; and
- Assess any other transport impacts associated with the project.

The aim of the TIA was to document the impacts of the project and provide advice on any infrastructure work required. In preparing the TIA, the following guides and publications were used:

- RTA Guide to Traffic Generating Developments, Version 2.2 Dated October 2002;
- Maitland City Council City Wide Development Control Plan (Parking); and
- Australian / New Zealand Standard – Parking Facilities Part 1: off-street car parking (AS2890.1:2004).

11.3 Potential Impacts

11.3.1 Traffic Generation

Additional traffic generated by the project would include those associated with:

- Staff movements;
- Tile dispatch trucks; and
- Raw material delivery.

The indicative increased traffic generated is summarised in **Table 32**. The information in **Table 32** compares the current operating situation (Stages One – Two), the potential cumulative impact of that already approved (Stages One – Four), and the isolated and cumulative impact of the project (Stages Five – Eight and Stages One – Eight).

Table 32: Approved and Future Daily Traffic Numbers (2-way trips)

Scenario	Staff*	Dispatch (truck)	Delivery (truck)	Total
Stages One – Two (Existing)	50	12	10	72
Stages One - Four (Approved)	70	24	20	114
Stages Five – Eight (the project)	70	24	20	114
Stages One – Eight (cumulative)	140	48	40	228

* The EA has assumed a conservative worst case scenario for staff traffic movements. This was done by overestimating the number of staff required at the factory at any one time. Once the operation of all eight stages commences, it is estimated that NCIA would employ approximately 140 staff, 10 office staff and 130 factory staff. Of the factory staff (130) there would be four shifts of staff working on a four days on then four days off roster. So at any one time there would be roughly 32 or 33 factory staff servicing the eight manufacturing lines for each 12 hour shift. This would result in 2 way staff movements being approximately half that assumed in **Table 32**.

11.3.2 Impact on Daily Traffic Flows

The New England Highway is classified as a regional road acting as an arterial road. As an arterial road, it can carry more than 15,000 vehicles per day, based upon advice from the RTA. The project could on average increase the daily traffic flows on the New England Highway to the east of the project as identified in **Table 32**. This traffic would then disperse along the New England Highway. This would potentially increase the average daily traffic flow from around 20,750 to 20,950 (approximately less than 1%). This would indicate that the AADT would remain within the acceptable limits for an arterial road.

The additional 44 truck movements (2 way) associated with the project (Stages Five – Eight) would have a minimal impact upon the overall road operation. The New England Highway currently carries a significant volume of trucks and the additional volumes generated by the project represent only a small increase in these volumes. Cumulatively (Stages One – Eight) would increase the number of trucks accessing the site to 88 trucks per day in total. Spread over a typical 10 hour day this gives in the order of 4 or 5 trucks per hour in each direction.

11.3.3 Peak Hour Impacts on Intersections

The critical intersections in the vicinity of the project are the roundabout controlled intersection of the New England Highway and Racecourse Road (Photo 9 **Appendix F**) and to a lesser extent Kyle Street with the New England Highway (Photos 7 and 8 **Appendix F**). Based on site observations the intersection of the New England Highway and Racecourse Road suffers from delays, due to the high through demand along the New England Highway. The intersection of Kyle Street and the New England Highway however suffers from minimal delays, as the majority of traffic movements are right in and left out, with low flows turning right out.

The results from the traffic survey of the roundabout controlled intersection of New England Highway and Racecourse Road were used to assess the operation of the roundabout between 6.30 AM and 7.30 AM (AM peak hour), when the shift change occurs for the existing and future operations.

It is considered that the PM peak period between 4.30 PM and 5.30 PM (as observed at the survey time) need not be tested for the project. This is due to the biggest potential impact due to the project would be staff vehicle movements during the shift change times associated with the project being 7.00 AM and 7.00 PM. The only movements through the intersection between 4.30 and 5.30 PM could be those associated with the administration staff and these numbers would largely be anticipated to remain within the current levels. As such the project is not expected to generate significant additional traffic on the roundabout controlled intersection of Racecourse Road and the new England highway during the PM peak period of 4.30 PM and 5.30 PM.

The operation of the intersection has been assessed using the standard computer program SIDRA. SIDRA is a traffic analysis tool developed originally by the Australian Road Research Board. It calculates the amount of delay to vehicles using an intersection, and gives a level of service rating which indicates the relative performance of the nominated intersection treatment. Levels of service of A to C are considered to be satisfactory, a level of service of D is acceptable, and levels of E and F are considered unsatisfactory. SIDRA also calculates the degree of saturation, which indicates the amount of spare capacity available.

The results of the morning peak traffic SIDRA analysis for the approved facility (Stages One – Four) and the cumulative impacts associated with the project (Stages one – Eight) are shown in **Table 33**.

Table 33: AM Peak Traffic Flows

Approach	Approved (Stages 1 - 4)		Cumulative (Stages 1 – 8)	
	Level of Service	Average Delay (Seconds)	Level of Service	Average Delay (Seconds)
New England Highway South	A	6.5	A	6.5
Denton Park Drive	B	13.2	B	14.5
New England Highway North	A	6	A	6.6
Racecourse Road	B	19.2	C	22.7
Overall	A	7.9	A	8.8

The above results demonstrate that the project would have a minimal impact upon the overall operation of the intersection. The traffic from Racecourse Road would suffer from some additional delay, but the critical movements on the New England Highway would experience little if any additional delay or congestion.

11.3.4 Impact of Construction Traffic

The construction work would occur over an 8 month period with most construction traffic approaching and departing to the east of the site via Racecourse Road and the New England Highway. The majority of construction material would be prefabricated off site, delivered to site and then assembled within the building.

Construction would occur between 7am to 7pm Monday to Saturday, with no works on Sunday or public holidays.

At peak times, there could be up to 50 construction workers on site generating up to 50 inbound movements at the beginning of the day and 50 outbound movements at the end of the day. The construction work would also typically generate up to 30 inbound and 30 outbound truck movements per day associated with material and equipment delivery. This would be during normal peak demands with lower flows when the demand for material delivery is lower. There could also be demand for over sized loads to deliver to the project, which would require a separate application to the RTA.

Overall, it is considered that the construction works would have a minimal impact upon the operation of the local road network. All of the construction work would occur within the site and away from the public roads. The construction workers typically commence work at 7.00 AM on site, before the peak hour on the New England Highway. The peak hour in the afternoon is between 4.30 PM and 5.30 PM and it is expected that the majority of construction traffic would have left the site by then.

It can also be seen that the volume of construction traffic (80 inbound and 80 outbound) would be slightly less than the additional staff and truck movements associated with the operation of the project. The assessment indicates that this construction traffic would have a minimal impact upon the operation of the key intersection of the New England Highway and Racecourse Road.

11.3.5 Traffic Distribution and Assignments

It is expected that the traffic movements would be predominantly to and from the east of the site, towards Newcastle, the F3 Freeway and the Pacific Highway. This means that traffic would predominantly use the roundabout controlled intersection of Racecourse Road and the New England Highway to access the New England Highway.

11.3.6 Impact on Road Safety

It is considered that the additional traffic flows associated with the project would have a minimal impact upon road safety. The existing site access provides a safe and clear layout for all users, with visibility splays that exceed the requirements of the RTA Road Design Guide. There are no recorded issues relating to the existing movements of staff or delivery vehicles in and out of the site at this location.

Whilst the project would increase the movements of both staff and materials vehicles, it is considered that the traffic movements would be of similar characteristics to the existing and would have a minimal impact upon road safety at this location.

The intersection of the New England Highway and Kyle Street (Photo 8 **Appendix F**) is well laid out and provides a sheltered right turn lane for traffic entering Kyle Street off the New England Highway. There is also a short length of left turn acceleration lane for traffic exiting Kyle Street. Visibility splays at this location are good, due to the straight alignment of the New England Highway at this location. The recent accident data for this intersection indicates that there have been three accidents close to this intersection, with one relating to a vehicle hitting an animal. It is considered that the accident data does not indicate that the intersection has a safety record issue.

The majority of the additional traffic generated by the project would use the roundabout controlled intersection of the New England Highway and Racecourse Road (Photo 9 **Appendix F**). The review of the accident data indicates that there have been 7 recorded accidents at this roundabout over the past 5 year period with three injuries and the accidents are fairly typical of a roundabout controlled intersection. It is considered that overall this roundabout provides an acceptable layout and the increased flows associated with the project would have a minimal impact upon safety at this intersection.

11.3.7 Pattern of circulation

The proposed (and existing) internal road network and car park location are shown on **Figure 4**. All staff vehicles are parked within the designated staff parking area located towards the centre of the existing building, on the western side. There is a hardstand area here that caters for all staff vehicles. Staff vehicles exit via this main driveway, which has an overall width of 6.0 metres and reversing manoeuvres are not required.

For inbound raw materials, trucks enter the project via the driveway off Racecourse Road and then turn left into the receiving dock located at the northern end of the building. They then exit this unloading area and turn left in an anti-clockwise direction to exit the site via the driveway to Racecourse Road.

For outbound material, the trucks enter the site and proceed along the driveway to the southern end of the existing building. The material is loaded onto the trucks at the trucks and then the trucks exit the site via the existing driveway, again after turning in an anti-clockwise direction.

The width of the internal driveways is 6.0 metres and allows for two-way traffic movements. This is in accordance with Councils' Design Guide and the layout allows for a safe and efficient movement of vehicles. Given the relatively low traffic flows proposed within the site it is considered that this design allows for safe movements of vehicles. The detailed design plans would be prepared as part of the Construction Certificate.

11.3.8 Parking

All parking for the project would be contained within the site. The existing and propped parking facilities are shown on **Figure 4**. The parking provision proposed is based on the requirements of the project and the existing use and level of parking provided on site. The current car park provides parking spaces for all staff as well as visitors. There is no record of issues or complaints from the public relating to car parking. The parking area on site would provide 70 spaces in total.

The RTA Guide to Traffic Generating Developments does not provide any guidance for parking requirements for this specific type of development. Whilst it provides parking guidelines for industrial uses, it can be seen that the project is a very specific user and that basing parking demand on floor area is not appropriate. The guide states that parking should be based on similar developments, thus using the existing parking demand and supply for the existing factory building and increasing the provision in line with the increased staff demands is considered appropriate.

Based upon the total staff numbers on site (140) it is considered that a parking provision of 70 spaces (0.5 spaces per staff) should be provided on site.

The current car park layout is in accordance with AS 2890. As part of the project, additional car parking would be provided to ensure adequate provision is provided for all staff and visitors and all new spaces would be delineated in accordance with AS2890.

The peak parking demand for the project is through the day, when there are both shift workers involved with the process lines as well as administration staff in the building. At night, the demands are less, as there are no administration personnel on site. The future total work numbers would be approximately 140 staff. Allowing for 10 administration staff, this provides in the order of 130 factory staff who work over four shifts on a four days on then four days off roster. So at any one time there would be roughly 32 or 33 factory staff servicing Stages One - Eight for each 12 hour shift.

Assuming all factory staff are onsite for a short period during shift change over, approximately 66 car parking spaces would be necessary. As the office staff do not commence till approximately 8am to 8.30am, it can be reasonably assumed that the shift change over, which occurs at 7.00am, will be complete before the office staff arrive.

As such the proposed 70 car parking spaces would adequately manage onsite car parking during shift change over and staff and visitor requirements during the day. This would be in accordance with the Council DCP and would ensure all staff can park onsite with no external parking demands or impacts.

The MCEDCP indicates that parking should be provided at the rate of 1 space per 2 employees or 1 space per 75 m^2 of ground floor area whichever is greater. A car parking provision rate of 1 space per 75m^2 for industrial developments, as specified in the MCWDCP is inappropriate for this development. Floor space of Stages One - Four is approximately 38,000m^2 and approximately 32,500m^2 for Stages Five – Eight. This equates to a total floor

space of 70,500m^2 which, at a rate of 1 space per 75m^2, would result in a ludicrous parking provision of 940 spaces.

Based on the limited staffing requirements in relation to the ground floor area, and the precedent set by the approved development, parking provision provided at the rate of 1 space per 2 employees is considered appropriate. Based upon achieving the total staff numbers onsite of 140 it can be seen that a parking provision of 70 spaces should be provided onsite. The car park design shall comply with *AS2890.1 1993 Off-Street Car Parking.* The car parking for the project is therefore generally in accordance with the objectives and requirements of the MCWDCP.

The service areas have been designed with adequate turning and manoeuvring space provided for service vehicles. The trucks park within the loading dock areas for unloading raw materials and for loading the finished products.

11.3.9 Other Developments

Another proposed development in the area is the adjacent proposed Heritage Green development. A review of unapproved concept plan for the Heritage Green residential development shows that some 65% of this development could access the wider road network via Racecourse Road with re remainder exiting via Regiment Road. Due to the proposed Heritage Green development delays at the roundabout controlled intersection of the New England Highway and Racecourse Road are anticipated to increase from an average 22.7 seconds to 38.5 seconds and decrease to a C rated level of service. The impact of this additional traffic has been assessed at the roundabout of Racecourse Road and the New England Highway and the results are presented in **Table 34**.

Table 34: AM Peak Traffic Flows - Project and Heritage Green

Approach	Level of Service	Average Delay (Seconds)
New England Highway South	A	6.7
Denton Park Drive	B	18.9
New England Highway North	A	8.4
Racecourse Road	C	38.5
Overall	A	13.0

The above results indicate that with the additional flows associated with the proposed Heritage Green development, the delays on the New England Highway would increase beyond the existing situation (compare **Table 33** and **34**). A review of the traffic flows indicates that the reason for the delay for traffic exiting Racecourse Road (Level of Service C and 38.5 second delay) is due in the main to the high through movements along the New England Highway in this location.

The proposed Heritage Green subdivision would not significantly impact upon the access options for the project, however moderate impacts would be expected on the operations of the Racecourse Road and New England Highway roundabout controlled intersection.

11.3.10 Mitigation Measures

Table 35 provides a summary of the works as recommended in the TIA.

Table 35: Proposed Traffic Mitigation Measures

Subject	Measure
Improvements to Access and Circulation	The existing site access and circulation provides a safe and appropriate access arrangement for the project. All new works would be designed and constructed in accordance with Council Design Standards and would take into account the specific requirements of the project.
Parking	As part of the project, onsite car parking would be increased to 70 spaces as required to ensure adequate provision is provided for all staff and visitors and all new spaces would be provided in accordance with AS2890.

No upgrades or modification are required to the existing road network or intersections as a result of the project.

11.4 Conclusion

It is considered that the impacts of the project on traffic and parking would be minimal. The SIDRA analysis showed that with the inclusion of the project (employee vehicle trips and truck trips) and the proposed Heritage Green development, the roundabout controlled intersection of Racecourse Road and the New England Highway would continue to function adequately, albeit with increased delays. The New England Highway already carries a significant number of heavy vehicles and trucks and the small increase spread across the day time period would be absorbed into the existing capacity of the road infrastructure.

12.0 Soils and Water

AECOM prepared a surface water management report to support the EA which is reproduced in **Appendix G** and summarised below.

12.1 Existing Environment

The site lies within the Stony Creek catchment which has a catchment area of 1,500 hectares upstream of the Main Northern Railway. Stony Creek passes to the south of the project site through the Heritage Green golf course in an easterly direction.

To the east of the site, a small tributary of Stony Creek travels north-south before joining Stony Creek and then passing to the southwest beneath the Main Northern Railway into Wentworth Swamp. Wentworth Swamp drains via Fishery Creek into Wallis Creek and subsequently to the Hunter River downstream of Maitland.

Upstream of the golf course, Stony Creek catchment drains rural land to the west and a proportion of the Rutherford Industrial Estate. The smaller unnamed tributary drains the remainder of the industrial estate as well as residential areas of Aberglasslyn and Rutherford and a proposed industrial estate north of the New England Highway. These watercourses travel through a number of dams as they pass through the golf course.

12.1.1 Soil

The geology at the project is shown on a regional geological map of the area (Department of Mines, 1966, *Newcastle Geological Series Sheet S1 56-2*, 1:250,000 Scale) which indicates that Permian Deposits, consisting of sandstone, siltstone, mudstone, shale, conglomerate, tuff, basalt and erratics are present.

An investigation undertaken by Douglas Partners as part of the 2002 EIS described the geology as generally being uniform across the site. Organic clay topsoil was encountered to depths of about 0.2 metres overlying alluvial clay, silty clay and sandy clay. Initially the clay was firm to stiff becoming stiff to very stiff or better below 1.85 metres to 2.5 metres depth. The clay continued to depths of greater than 12 metres where sand was encountered from 12.7 metres to 21.4 metres to the depth of the investigation. This soil profile is considered adequate to enable construction of the new factory building as was the case with the existing facility.

12.1.2 Water

Stormwater \ Surface water

The allotment on which the site is located has an area of 16.83 ha. The site is relatively flat with an average grade of 1%. The site falls towards the south east corner, at which point stormwater is discharged off-site through the Heritage Green golf course to Stony Creek. There is also an existing drain that runs from Racecourse Road, adjacent to and parallel with the western project boundary, to the south west corner of the project. The drain then continues south within a drainage easement to Stony Creek.

Surface water and stormwater are managed by the existing onsite stormwater management system and is highlighted on **Figure 2**. The existing management system is described in the 2002 EIS. Surface runoff from the project flows in a southerly direction and leaves via two outlets. These outlets are a channel that runs along the western boundary and a gully in the south-eastern corner of the site. All water leaving the developed areas of the site pass through a wet detention basin (or grass swale) that provides treatment. Since the wet basins are cascading, the runoff is treated more than once before leaving the project, improving the pollutant removal efficiency of the entire system.

The existing stormwater management system was designed to minimise the changes to the flow regime from the approved Stages One – Four. A series of four wet detention basins connected by grass swales is used to control stormwater. The wet detention basins and grass swales provide water quality treatment and ensure that peak flows at the site boundary do not exceed existing peak flows.

The existing stormwater management system aims to mitigate the impact of the impervious areas on peak site discharge and provide stormwater quality improvement prior to discharge. The majority of stormwater on site is conveyed overland as there is no guttering on the building or kerb and gutter along the roadways and car parks.

The wet detention basins consist of a permanent storage zone to assist with the improvement of water quality through settling of potential pollutants and a detention zone to attenuate the peak site discharges. Discharge from each basin is via an outlet pipe at the permanent water level, or a spillway for larger flows. The grass swales also provide pollutant removal. Drainage from the site is currently conveyed in a southerly direction in underground stormwater pipes beneath two golf fairways and connects directly to an existing artificial wetland within the adjacent golf course. However, it appears that no drainage easement currently exists for discharge from this point.

Groundwater
Free groundwater at depths of between 7 metres to 13.5 metres was determined during the geotechnical investigation undertaken by Douglas Partners as part of the 2002 EIS. This groundwater was located generally within or above the sand profile which is beneath the surface layer of reactive clays varying to a depth of approximately 13 metres below ground level.

Flooding
Studies investigating flood impacts of proposed urban development on the adjoining golf course by GHD (2008) indicate that flooding of the area is relatively confined to the local watercourses. The project site is elevated above these creeks and tributaries and as such is not affected by 1 in 100 year flooding from local watercourses. The 2002 EIS indicated that the site is also not affected by regional flooding.

Water Quality
Current potential water pollutants generated within the existing facility include heavy metals, oils and grease from roadways and car parks. Roof water within the existing facility is generally considered free of pollutants with the exception of any atmospheric deposition (i.e. very fine and suspended sediments). Handling of raw materials is conducted within the building and therefore potential sedimentation from the clays is not a potential water quality issue.

Stormwater from roofed areas of the existing facility is directed to the sites stormwater detention basins. No roof water is currently harvested for beneficial reuse or control of stormwater flows.

Stormwater within the existing facility is treated through a series of wet detention basins and grassed swales. The wet detention basins include a permanent water storage area for the capture of low flows.

Water Supply and Process Water

The existing facility currently uses mains water for the tile manufacturing process and wash down requirements. Water is also required for staff amenities, landscaping and fire fighting. All water is supplied by the Hunter Water Corporation supply network. When the approved Stages One – Four are operational, water consumption would be approximately 1,772 kL per week (approximately 92ML per annum).

Approximately 98% of the annual mains water demand is used for tile manufacturing, with all of this process water being converted during the production process and leaving as steam. The second largest demand is used for wash down. However 95% of wash down water is recirculated to the mill for use as process water. The remaining water is used for:

- Preparation of tile glaze (not recoverable); and
- Ancillary water use for staff amenities, watering of landscaping and fire fighting purposes if required.

Waste Water Disposal

No process water or waste water is discharged from the existing facility into drainage easements of the natural creek system. All process water is discharged from the existing facility as steam. All wash down water is collected and recycled into the milling stage of the production process.

12.2 Methodology

As part of this study AECOM prepared a cumulative Surface Water Assessment of the project (Stages Five – Eight) that includes the project and the approved facility. This report outlines the assessment carried out and determines appropriate development controls and standards for the project. It also provides mitigation measures to reduce or avoid any negative impacts on surface water, such as increased stormwater runoff and transport of sediment.

Water management for the project was assessed in relation to stormwater and process water issues. The project would increase the amount of impervious area and hence increase the volume and peak flows of stormwater runoff. A conceptual stormwater management strategy has been designed to retard the peak flows from the developed site to match existing levels and to achieve adequate treatment before stormwater is discharged.

The XP-RAFTS model was used to simulate the impact of the project on stormwater runoff from the site. Key changes modelled in XP-RAFTS to simulate the project (with no mitigation measures) included:

- Alteration of site sub-catchments to include impervious areas and changes in flow paths/connections; and
- Removal of two existing detention basins and replacement with two alternative detention basins and rainwater collection tanks.

The XP-RAFTS model of the project is shown in **Appendix G**.

12.3 Potential Impacts

12.3.1 Soil

The soils at the site would be impacted during the construction phase of the project. Construction of the project would require earthworks and civil works, such as excavation/levelling and construction of the building foundations, installation of underground services, and construction of internal roads and car park areas.

Areas of disturbed land may be subject to erosion and downstream transport of mobilised sediment. If allowed to enter the natural waterway system, this sediment would affect water quality, particularly turbidity, cause sedimentation and affect aquatic life then impacts can easily be managed through the preparation of a CEMP.

12.3.2 Surface Water \ Stormwater

The project would result in the alteration of the remaining undeveloped areas, and in particular would involve the introduction of large impervious areas. Therefore, it is expected that the project would result in a potential increase in stormwater runoff generated and a corresponding reduction in soil infiltration and evapo-transpiration.

These impacts have the potential to impact on downstream property and waterways by increasing inundation and total velocity and discharge. The hydrological changes can also result in an increased frequency of runoff which can impact on the hydrological regime and function of wetlands and waterways.

A concept stormwater management strategy has been developed to address these impacts is described in **Section 12.4**.

12.3.3 Groundwater

It is not expected that groundwater would be impacted by the project during construction or operation. This is due to onsite experience gained during construction on the existing facility where the ground water was not intercepted during the laying of the foundations or piers. The foundations for the excising facility are approximately 6 metres below ground surface with the groundwater located approximately 7-13 metres below ground surface.

12.3.4 Water Quality

During construction of the project areas of disturbed land may be subject to erosion and downstream transport of mobilised sediment. If allowed to enter the natural waterway system, this sediment would affect water quality, particularly turbidity, cause sedimentation and affect aquatic life.

Once construction is complete, potential sources of water pollution include an increase in the generation of heavy metals and hydrocarbons (oils and grease) from roadways and car parks, nutrients from site landscaping, and low levels of sediment from landscape areas. Very low levels of gross pollutants such as litter are expected and all raw material handling would occur within the building and would not provide a potential source of sediment.

12.3.5 Process Water

The project (Stages Five – Eight) would be expected to use an equivalent volume of potable water as the approved facility (Stages One – Four). This is approximately 1,772 kilolitres per week, or 92ML per annum. The majority of this demand is required for tile manufacturing, with all of this process water being converted during the production process and leaving the project as steam.

The cumulative demand for the NCIA facility (Stages One - Eight) for potable water would be expected to be approximately 3,544 kilolitres per week (184ML per annum).

12.4 Mitigation Measures

12.4.1 Soil

An Acid Sulfate Soils Management Plan (ASSMP) would be prepared in accordance with the *Acid Sulfate Soil Planning Guidelines* (NSW Acid Sulfate Soils Management Advisory Committee, 1998) prior to the commencement of construction of Stages Five - Eight.

12.4.2 Surface water \ Stormwater

The surface water \ stormwater modelling showed that on average, the proposed conceptual stormwater management strategy is effective in attenuating the developed site peak discharge. The outcomes of the modelling shows a comparison of peak site discharge for a range of storm durations for the 1 in 1, 1 in 10, and 1 in 100 year ARI events. The outcomes of the site discharge are shown graphically in Section 4.3.2 of **Appendix G**. The graphical outcomes of the modelling shows that the proposed conceptual stormwater management strategy on average keeps the peak site stormwater discharge at or below the sites pre-development levels.

Given the complexity of the project, matching the undeveloped site discharge for each stormwater event was only possible by providing substantial amounts of onsite storage. This storage is described in more detail below.

Figure 4 shows the location of the proposed wet detention basins and rain water tanks. Figure 5 in **Appendix G** shows the various catchment areas of the NCIA facility (Stages One – Eight) and where the surface water is directed.

12.4.3 Wet Detention Basins

Three additional wet detention basins are proposed throughout the project to replace the two existing basins being removed (see **Figure 2** for existing basins and **Figure 4** for the proposed basins) and to provide additional detention storage for the additional stormwater generated by the project. The basins include a permanent water storage zone for water quality improvement above the detention storage provided.

The use of grass swales along internal road ways and hardstand areas are included in the concept design to:

- Collect runoff from beside roadways;
- Provide connection between the wet detention basins;
- Reduce runoff velocities;
- Provide some infiltration of water; and
- Improve water quality.

12.4.4 Rainwater Tanks

Roof water from limited roof catchment areas would be collected in guttering and directed to a series of large 105kL rainwater tanks proposed to be located as indicted in **Figure 4**. The remaining roof areas, where they can be drained to a detention basin, would be allowed to discharge onto the surrounding ground surface before flowing into grass swales or wet detention basins.

To provide a dual function as stormwater detention and stormwater harvesting, 25% of each tank would be dedicated to water harvesting, which would be recovered and reused within the project for landscaping and non process related water use, using an outlet pipe and pump at the base of the tank. The remaining upper 75% of the tank would be dedicated to provide stormwater detention. This would be achieved by placing an outlet pipe at the 25% storage level within the tank to allow for controlled discharge from the tank during rain events.

These rainwater tanks would be connected to a pump system and the water would be available for reuse within the project for irrigation of landscaping, and potentially reuse within the project amenities or operations. The inlet of each tank would be fitted with a “first flush” device. Typically during the first few minutes of runoff, the “first flush” contains the accumulated sediment and debris from the roof catchment. A first flush device acts to divert this initial runoff away from the tank and therefore protect the quality of the water available for reuse. A conceptual layout of the proposed stormwater management system is provided in **Figure 4**.

12.4.5 Water Quality

The mitigation measures as they relate to water quality are provided below as they relate to the construction phase and the operational phase of the project.

Construction Phase

Construction works would be undertaken in accordance with the CEMP as outlined in **Section 8.4**. The CEMP would ensure works occur in a manner that minimises the potential for soil erosion and sedimentation in accordance with measures outlined in *Managing Urban Stormwater: Soils and Construction* (Landcom 2004), such as the following:

- Minimising area of disturbance required at any one time and progressive rehabilitation/ landscaping of completed areas;
- Minimising the volumes of water required to be handled by diverting clean water around all disturbed areas;
- Treating the surface of all areas required for construction traffic, parking, storage and amenities to provide adequate drainage and prevent soil loss (i.e. temporary seal or gravel pavement);
- Provision of sedimentation traps and fencing to capture and treat runoff from all disturbed areas, including a regime for inspection and removal of accumulated sediment;
- Storage of potential contaminants (i.e. fuels, oils or chemicals) offsite or within bunded, covered and lined areas; and
- Use of the wet detention basins for settling of sediment prior to discharge.

Operational Phase

The existing stormwater management system to address water quality includes grass swales and wet detention basins. This system is proposed to be modified and extended to cater for the project.

The combined used of grass swales and wet detention basins would provide a treatment train for the improvement of stormwater quality prior to discharge from the project. Both the grass swales and wet detention basins would be landscaped appropriately to maximise pollutant capture.

12.4.6 Waste Water Disposal and Recycling

As with the existing facility and consistent with the 2002 EIS, no waste water, process or wash down water would be discharged from site as a result of the project. Water used for process requirements would be discharged in the form of steam to the atmosphere. Wash down water that is not recirculated in the process would evaporate.

Water would be recycled within the production process to reduce the use of mains supply water in the process. Wash down water would be captured within an internal reticulation system and re-circulated for reuse as process water.

An internal wash down water reticulation system would be integrated into the design of the project. An approximately 24 kL tank would be located beneath the spray dryers towards the northern end of the new factory building. The floor of the clay preparation area and tile press area would be gently sloped towards the tank. Wash down water from these areas would flow to these tanks. The wash down water collected in these tanks would be pumped to the clay mill for use in the manufacturing process.

12.4.7 Process Water

The project site would continue to utilise recycled wash down water and would adopt new technology (i.e. dry clay glazing) as practical to minimise total potable water demand. Furthermore, the proposed stormwater management system includes rainwater harvesting infrastructure to reduce reliance on potable town water. Multiple (notionally eight), large rainwater tanks (105kL each) would be placed to capture some of the roof water runoff. Each of the proposed rainwater tanks includes 25% of the total volume dedicated to the capture and storage of roof runoff for reuse purposes. This equates to approximately 210 kL available storage for stormwater reuse on site. These rain water tanks would not be sufficient to meet the process water needs of the project (either current for proposed) however they would supplement NCIA's potable water requirements in relation to irrigation of existing and proposed site revegetation and landscaping and possibly staff amenities.

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13.0 Visual Impacts

Moir Landscape Architecture has been commissioned to prepare a Visual Impact Assessment for the project. The Visual Impact Assessment (VIA) is provided in full at **Appendix H** and is summarised below.

The objectives of the VIA were as follows:

- To identify and describe the existing visual/landscape environment and to evaluate its current qualities;
- Assess the project in relation to any landscapes of local or regional significance;
- Determine visibility from the general surrounds including major roads and surrounding residential areas;
- Determine visual impacts from the project; and
- Identify proposed mitigation measures to reduce visual impacts associated with the project.

13.1 Assessment Methodology

The method applied to this study involved systematically evaluating the visual environment pertaining to the project and using value judgements based on community responses to scenery. The assessment was undertaken in five stages as noted below:

- A description of the existing visual environment, including the identification and appraisal of visual catchments/landscape units;
- The undertaking of a viewpoint analysis to identify sites likely to be affected by the project;
- A photographic survey using a digital camera and a handheld GPS unit to record position and altitude;
- An assessment of visual impacts; and
- The preparation of recommendations for impact mitigation and suggestions for suitable development to maintain the area's visual quality.

13.2 Existing Environment

13.2.1 Regional Setting

The surrounding area of Rutherford is a mixture of old and new land uses with rural holdings, established and new residential areas, commercial and industrial development. The area is experiencing continued rapid development, primarily with the growth of the existing industrial subdivision and associated commercial development as well as the expansion of existing residential areas on former rural land.

The visual quality of the Maitland area is strongly defined by the rural land use with large areas of open pastures interspersed with pockets of native vegetation on surrounding low ranges. The local government area has a variety of landscape types such as highly scenic rural and natural landscapes, heritage streetscapes, existing and new residential areas, commercial and industrial development.

Visual catchments are areas of land that are usually defined by major ridgelines that prevent views beyond. The project site falls into a visual catchment defined most strongly by the surrounding ridgelines to the immediate west, south, and east. North of the New England Highway, flat pastoral land extends for some kilometres to distant low ranges.

The regional burgeoning residential and commercial markets are generating a strong change in visual character with residential housing and industrial/commercial development beginning to proliferate where rural uses previously dominated. This is especially true within the Rutherford area where the project site is located.

13.2.2 Local Setting

The project is located within an industrial estate, south of the New England Highway, in the township of Rutherford, and within the local government area of Maitland. The total site area is approximately 16.83 ha and the topography relatively flat with a slight fall to the south. Access to the site is off Racecourse Road. An existing internal road located along the western boundary provides access to the project site as well as an existing power line easement and the Great Northern Railway, further south of the project.

The study area assessed by this report is the visual catchment surrounding the project, which is the approximate area from where any proposed changes would be seen.

The site is bound by industrial development to the north and west. The site is fenced with chain wire security fencing on all boundaries. The site houses the existing facility which includes the existing factory building, stormwater management system and internal roads and car parking facilities

The land to the east and south of the project site is the former Westside golf course. A development application has been lodged (but not approved) with MCC for the Heritage Green residential subdivision at the former Westside golf course and associated land.

Earth mounds planted with bamboo occur on the Heritage Green land and adjoin the projects east and south boundaries. The earth mounds are approximately 4-5 metres high with dense screen planting of bamboo currently extending to approximately 10 metres in height.

The Main Northern Railway is located approximately 0.5km to the south of the project with the former Westside golf course to the immediate south. An existing Energy Australia electrical substation is located to the north, at the entry point to the site off Racecourse Road. The boundary to the substation is fenced with razor wire/ man proof fence.

The site and its immediate environs have a poor to low scenic quality. Factors that contribute to defining this level of scenic quality include the flat topography, low height of surrounding trees, adjacent industrial and commercial development.

13.3 Potential Impacts

13.3.1 View Point Analysis

The visual assessment considered the likely impact the project would have on the local environment by selecting prominent sites, otherwise referred to as viewpoints. Viewpoints (see **Figure 11**), were selected on the basis of where the project would appear to be most prominent, either based on the degree of exposure or the number of people likely to be affected. Viewpoints were selected by using topographical maps and field inspections to ascertain the visibility from these sites. Further viewpoints were selected by driving or walking around the NCIA property.

The greatest visual impact at existing receptors is likely to be from the surrounding residential areas to the east in Rutherford, points along Wollombi Road to the south and the New England Highway to the north. The project would also be visible from the proposed Heritage Green development. The project would be evident from a number of local and distant viewpoints. However, in the context of the surrounding industrial area, this change related to the project would have minimal impact. Within the visual catchment there are a number of significant viewing locations. These include:

- Parts of the industrial estate;
- The proposed Heritage Green development to the south and east;
- Rural properties along Wollombi Road to the south;
- Residential properties in Rutherford to the north-east and north; and
- Some distant views from some of the rural \ semi-rural properties of Rutherford to the west and north.

13.3.2 Visual impacts

Overall, the project would result in some impacts on the surrounding environment in terms of landscape and scenic values. The visual impacts associated with the project would vary depending on the viewing location. The existing facility is already visible from certain viewpoints and the project would result in changes to the existing visual environment. The potential visual impacts associated with the changes are assessed below. The detailed viewpoint analysis is provided in **Appendix H** which provides photographs from each view point clearly showing the existing views to the project site and the existing facility.

The key elements of the project that would predominantly be visible from the majority of accessible viewing locations include the highest section of the new factory building located towards the north which would have a height of 26 metres. The emission stacks for the kilns and spray dryers would also be visible from some viewing locations. The new factory building would be seen in the context of the industrial setting adjacent to the existing facility.

The existing earth bund and bamboo planting would obscure many views to the ground level hardstand, roadways and car parking. The earth bund and bamboo would also partially screen near field views for the proposed Heritage Green Site.

New England Highway

The project would be visible from points along the New England Highway. These visual changes would be most prominently from the east at the top of the ridgeline when entering Rutherford from Telarah (approximately 2-3 km to the east). It is noted that views when travelling from the west are limited and existing industrial development, north of the site, would screen the project from view.

Wollombi Road

Wollombi Road follows the ridgeline to the south of the site. The area is characterised by large homesteads on large, semi-rural lots. Vegetation here is predominately spotted gum / ironbark tall open forest. Much of the land has been cleared for pastoral lands. Remnant roadside vegetation contributes to the rural character and currently partially filters views of the project. The majority of houses on Wollombi Road would be able to see the project at a distance, with the nearest houses being approximately 1.2 km away (viewpoints 8, 9 and 10 in **Appendix H**).

Heritage Green

The proposed Heritage Green development is located directly south and east of the site. Most of the proposed Heritage Green development is sited at a lower level that the existing mounding (earth bund) and bamboo screen planting around the perimeter provides some screening of the adjoining industrial estate and hence the project. The project would be visible from the elevated entry to Heritage Green off Regiment Road, approximately 1.0 km away to the east (viewpoint 14 **Appendix H**). As a result of the Heritage Green site being lower than the project site it is considered that the existing screening would be more effectual from much of the Heritage Green site. The view from Heritage Green development would be considered consistent with the existing industrial views towards the existing facility and the Rutherford Industrial Estate generally.

Viewpoint 14 in **Appendix H** is the existing entrance to the Heritage Green site. The figure shows the view of the existing facility. It can be seen that the majority of the existing factory is shielded by the bamboo screening with only the northern section of the facility visible. The project would shield some views of the existing facility, as such the sensitivity of the potential change in viewscape is considered to be reduced. As the views towards the project would be considered similar to the existing views the overall visual impact from the proposed Heritage green is seen as similar to the existing situation.

The views from Heritage Green towards other industrial properties on Racecourse Road would be similar in nature to that of the views of the project.

Residential areas

To the east and north-east the major consideration is the potential views from residential areas of Rutherford, particularly the newer areas and any new residential development that would occur there. The newer subdivisions to the north-east (approximately 2 km) contain newly constructed houses on smaller lots. These residential areas have a moderate sensitivity due to the potential for impacts that would affect existing permanent residents. Residents in the most elevated areas (especially Clayton Crescent, Garwood Street and neighbouring roads within south Rutherford; and Adam Avenue and Joshua Close in the northern areas of Rutherford) would see the project at an approximate distance of 2km and 1.5km respectively (viewpoints 15 and 16 in **Appendix H**). However, their present views of the industrial estate surrounding the project already include a range of visually dominant building types and colours.

13.3.2.1 Semi-rural

The land to north of the New England Highway is predominantly rural in character. The topography is generally flat and extends in a northerly direction to distant low ranges. Contained within the foreground are scattered houses, an old drive-in, and Anambah land-fill site. Rutherford Aerodrome is located to the north-west. The area has a pleasant visual amenity which is degraded by views of industrial and residential development, and transmission lines crossing pastoral lands. The project would be visible from these semi-rural locations, however, the views to the project from these locations would be considered consistent with the existing views within the existing industrial context (viewpoints 5 and 6 in **Appendix H**).

13.4 Mitigation Measures

These recommendations seek to achieve a better visual integration of the project and the existing landscape character at both, local and regional scales. The mitigation measures attempt to lessen the visual impact of the project whilst enhancing the visual character of the surrounding environment.

13.4.1 Landscaping

Planting of native vegetation around the perimeter of the project would be undertaken in locations unaffected by buildings, internal road ways or infrastructure easements to assist in screening outside views. This also helps reduce the scale of the building and provide habitat for local flora and fauna.

General landscape principles include:

- Use of heavily mulched planting beds to reduce evapo-transpiration;
- The use of native plant materials, preferably those locally native to the area;
- No high maintenance plant selections;
- No lawn within non-accessible areas or high shade areas; and
- Use of ground covers that act like a green mulch.

Maintenance is essential to ensure that landscape works are allowed to grow to their full potential and that established landscaping is kept in top condition. Any landscape works should be maintained for a minimum of twelve months, after which the plants should be well established with quality soil material to ensure good growth and retention of water.

13.4.2 Colour and materials selection

The following suggestions for external construction materials are made:

- The use of appropriate colours to blend with the surrounding environment and reduce the visual dominance of the building; and
- The use of non metallic / shiny materials that may cause reflection / glare.

13.4.3 Lighting

The design for external lighting for the proposed facility shall be mounted, screened, and directed in such a manner so as not to create a nuisance to surrounding properties or roadways. The lighting shall be the minimum level of illumination necessary and shall comply with AS 4282 (INT) 1995 - Control of Obtrusive Effects of Outdoor Lighting.

Recommendations that aim to mitigate lighting to acceptable levels are:

- Lights shall not be placed to cause glare or excessive light spillage on neighbouring sites;
- Lighting near adjoining properties shall be shielded with cut off luminaries;
- Building illumination and architectural lighting shall be indirect; and
- Lighting to car park areas and for security purposes is to be low intensity.

13.5 Conclusion

The proposed height and scale of the project means that it would be visible on a local and regional scale from some limited locations. The site is generally difficult to see from surrounding locations other than nearby areas.

Views of less than one kilometre of the project are currently possible from areas within the industrial estate and from the proposed Heritage Green development. Viewers at these locations would see some of the visual changes associated with this project. However in the industrial context of the existing views, which include the existing facility and surrounding industrial premises, the sensitivity of the visual impact of the project is lessened.

Distant views of the project are currently possible from a number of locations, such as residential areas of Rutherford, Wollombi Road and rural properties off Wollombi Road, and the low range to the north.

Prominent elevated locations surrounding the project in residential\rural settings (along the Wollombi Road ridgeline, established residential areas to the east and new residential areas to the north east) would have views of the project. However, their present views of the industrial estate (including the existing facility and the project) include a range of visually dominant building types and colours. The project would be visible but consistent within the existing industrial context.

The VIA has determined that the visual impact of the project would be comparable to that of the existing facility. The project would be viewable from locations that already have views of the existing facility, hence a reduced visual impact would result from these locations.

This is particularly true for the proposed Heritage Green development. The Heritage Green development is sited lower than the project. This combined with the existing earth bund and substantial vegetation plantings adjacent to the southern and eastern project boundaries would result in the visual impact of the project from the proposed Heritage Green site being similar to that of the existing visual impact of the existing facility.

Impacts could be mitigated by:

- Landscape planting around the site perimeter (in locations unaffected by internal road ways or infrastructure easements);
- Appropriate building materials and colours; and
- Design and screening of external lighting.

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14.0 Other Environmental Issues

14.1 Ecology

14.1.1 Flora

The project site is currently unoccupied by buildings or structures. It is covered with exotic and native grasses, with one *Eucalyptus ampiflora* (Cabbage Gum) close to the southern eastern boundary.

A preliminary threatened species assessment, using the NSW National Parks and Wildlife Service Atlas of NSW Wildlife, was performed (26 February 2010) for threatened flora in the area surrounding the site. Using the Maitland Local Government Area (LGA) as the basis for the flora species search area, the Atlas of NSW Wildlife identified 6 threatened species. These are identified in **Table 36.**

Table 36: Threatened Flora Species in the Maitland LGA (search results from the Atlas of NSW Wildlife)

Scientific Name	Common Name	Legal Status
Rutidosis heterogama	Heath Wrinklewort	Vulnerable (TSC Act 1995)
Callistemon linearifolius	Netted Bottle Brush	Vulnerable (TSC Act 1995)
Eucalyptus glaucina	Slaty Red Gum	Vulnerable (TSC Act 1995)
Syzygium paniculatum	Magenta Lilly Pilly	Vulnerable (TSC Act 1995)
Cymbidium canaliculatum	Cymbidium canaliculatum in the Hunter Catchment	Endangered Population (TSC Act 1995)
Rulingia prostrata	Dwarf Kerrawang	Endangered (TSC Act 1995)

The maps provided by the Atlas of NSW Wildlife identifying the known locations of the threatened flora species indicate that none of the identified species are known to occur within the site boundary. Site inspections of the location of the project confirm the information provided by the Atlas of NSW Wildlife. None of the identified threatened flora species occur on the site and therefore these species would not be adversely impacted by the project.

Using the *EPBC Act* Protected Matters Search tool on 26 February 2010 (**Appendix I**) one threatened ecological community (White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland) was listed to potentially occur in the area. The ecological assessment performed as part of the 2002 EIS did not identify the appearance of this threatened ecological community at the project site.

The *EPBC Act* Protected Matters Search tool results also identified 5 threatened flora species potentially occurring with 10 km of the site. These are shown in **Table 37**.

Table 37: Threatened Flora Species from the EPBC Act Protected Matters Search Tool

Scientific Name	Common Name	Legal Status
Cryptostylis hunteriana	Leafless Tongue-orchid	Vulnerable
Eucalyptus glaucina	Slaty Red Gum	Vulnerable
Eucalyptus parramattensis subsp. decadens	Earp's Gum, Earp's Dirty Gum	Vulnerable
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	Vulnerable
Prasophyllum sp. Wybong (C.Phelps ORG 5269)	a leek-orchid	Critically Endangered

The land immediately adjacent to the site boundaries is unlikely to contain these identified threatened species because of the highly disturbed and modified nature of the industrial land uses to the west and north, cleared vacant land to the east and former Westside golf course to the south. Adjacent to the southern and eastern site boundaries is the 3 metre high earth bund with bamboo growing on it, providing little scope for native vegetation.

The ecological assessment performed as part of the 2002 EIS concluded that the project would not have any ecological impact on local populations of threatened flora species, would not adversely affect wetlands or open space bush land and would not affect koala habitat.

Based on the above, it is unlikely that this project would have a significant effect on threatened flora species. The site is void of any significant vegetation other than a mosaic of exotic grasses. This project would require the disturbance of surface soils and the removal of the one mature *Eucalyptus amplifolia* (Cabbage Gum) from the south east corner of the site. Measures would be incorporated into the construction phase to minimise potential impacts on threatened flora, including erosion and sediment control plan and stormwater management measures.

14.1.2 Fauna

Using the NSW National Parks and Wildlife Service Atlas of NSW Wildlife, a search was performed (25 February 2010) for threatened fauna in the area surrounding the site (**Appendix I**). Using the Maitland LGA as the basis for the threatened fauna search area, the Atlas of NSW Wildlife identified 35 species. These are identified in **Table 38.**

Table 38: Threatened Fauna Species in the Maitland LGA (search results from the Atlas of NSW Wildlife)

Scientific Name	Common Name	Legal Status
Amphibia (Frogs)		
Litoria aurea	Green and Golden Bell Frog	Endangered (TSC Act 1995)
Litoria littlejohni	Littlejohn's Tree Frog	Vulnerable (TSC Act 1995)
Aves (Birds)		
Pyrrholaemus saggitatus	Speckled Warbler	Vulnerable (TSC Act 1995)
Circus assimills	Spotted Harrier	Vulnerable (TSC Act 1995)
Hamirostra melanosternon	Black-breasted Buzzard	Vulnerable (TSC Act 1995)
Pandion haliaetus	Osprey	Vulnerable (TSC Act 1995)
Oxyura australis	Blue-billed Duck	Vulnerable (TSC Act 1995)
Stictonetta naevosa	Freckled Duck	Vulnerable (TSC Act 1995)
Ephippiorhynchus asiaticus	Black-necked Stork	Endangered (TSC Act 1995)
Ptilinopus regina	Rose-crowned Fruit-Dove	Vulnerable (TSC Act 1995)
Sterna albifrons	Little Tern	Endangered (TSC Act 1995)
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable (TSC Act 1995)
Daphoenositta chrysoptera	Varied Sittella	Vulnerable (TSC Act 1995)
Petroica boodang	Scarlet Robin	Vulnerable (TSC Act 1995)
Xanthomyza phrygia	Regent Honeyeater	Endangered (TSC Act 1995)
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable (TSC Act 1995)
Glossopsitta pusilla	Little Lorikeet	Vulnerable (TSC Act 1995)
Lathamus discolor	Swift Parrot	Endangered (TSC Act 1995)
Rostratula benghalensis australis	Painted Snipe (Australian subspecies)	Endangered (TSC Act 1995)
Ninox connivens	Barking Owl	Vulnerable (TSC Act 1995)
Ninox strenua	Powerful Owl	Vulnerable (TSC Act 1995)
Tyto novaehollandiae	Masked Owl	Vulnerable (TSC Act 1995)

Scientific Name	Common Name	Legal Status
Mammalia		
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable (TSC Act 1995)
Phascogale tapoatafa	Brush-tailed Phascogale	Vulnerable (TSC Act 1995)
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable (TSC Act 1995)
Mormopterus norfolkensis	Eastern Freetail-bat	Vulnerable (TSC Act 1995)
Petaurus norfolcensis	Squirrel Glider	Vulnerable (TSC Act 1995)
Phascolarctos cinereus	Koala	Vulnerable (TSC Act 1995)
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable (TSC Act 1995)
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable (TSC Act 1995)
Miniopterus australis	Little Bentwing-bat	Vulnerable (TSC Act 1995)
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Vulnerable (TSC Act 1995)
Myotis macropus	Southern Myotis	Vulnerable (TSC Act 1995)
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable (TSC Act 1995)
Vespadelus troughtoni	Eastern Cave Bat	Vulnerable (TSC Act 1995)

The maps provided by the Atlas of NSW Wildlife identifying the known locations of the threatened fauna species indicate that none of the identified species are known to occur within the project site.

The *EPBC Act* Protected Matters Search tool results also identified 12 threatened fauna species potentially occurring with 10 km of the project site (**Appendix I**). These are shown in **Table 39**.

Table 39: Threatened Fauna Species from the EPBC Act Protected Matters Search Tool

Scientific Name	Common Name	Legal Status
Aves (Birds)		
Anthochaera phrygia	Regent Honeyeater	Endangered
Lathamus discolor	Swift Parrot	Endangered
Rostratula australis	Australian Painted Snipe	Vulnerable
Amphibia (Frogs)		
Litoria aurea	Green and Golden Bell Frog	Vulnerable
Mixophyes balbus	Stuttering Frog, Southern Barred Frog (in Victoria)	Vulnerable
Mixophyes iteratus	Southern Barred Frog, Giant Barred Frog	Endangered
Mammals		
Chalinolobus dwyeri	Large-eared Pied Bat, Large Pied Bat	Vulnerable
Dasyurus maculatus maculatus (SE mainland population)	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (south eastern mainland population)	Endangered
Petrogale penicillata	Brush-tailed Rock-wallaby	Vulnerable
Potorous tridactylus tridactylus	Long-nosed Potoroo (SE mainland)	Vulnerable

Scientific Name	Common Name	Legal Status
Pseudomys oralis	Hastings River Mouse	Endangered
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable

Given the lack of native vegetation on site, it is considered that there would be little to no quality habitat for the identified threatened fauna species on site. It is considered that woodland (approximately 200 metres to the southwest and that located in the proposed Heritage Green site may provide habitat for the identified threatened species. However, the project is not expected to impact on these areas of vegetation and native fauna habitat.

The 2002 EIS included an ecological field survey and assessment. The ecological assessment concluded that the approved facility would not have any ecological impact on local populations of threatened fauna species, would not adversely affect wetlands or open space bushland and would not affect koala habitat.

The proposed location for the project would occur adjacent and to the east of the existing facility. This parcel of land is void of any significant vegetation or habitat for the threatened fauna species. As indicated above and reported in the 2002 EIS, there is significant quality habitat areas to the west and south west of the site (approximately 200 hectares).

The site is already highly modified and, as such, contains little habitat value for native species. It is concluded that this project is unlikely to have a significant effect on threatened fauna species or their habitat.

14.1.3 Onsite Vegetation Planting

As a result of this project NCIA has re-evaluated the onsite vegetation planting requirement as specified in the 2002 EIS. It should be noted that this revegetation requirements is not a condition of consent. Specifically the EIS stated:

> *"although clearing is gazetted as a threatening process, the proposal would only result in removal of less than 0.3 hectares of native vegetation which will be supplemented by approximately 3 hectares of indigenous vegetation planting"*

The limited vegetation that was removed was located in two small discrete locations on the southern and south western site boundaries. The remainder of the site was previously cleared except for these two mall pockets of remnant vegetation regrowth.

The planting as identified in the 2002 EIS is considered excessive given the limited areas of vegetation that were removed and is also no longer possible due to the necessary placement of the key project elements such as the factory building (Stages Five – Eight), internal roads and stormwater detention basins. On site planting is constrained along the northern and southern site boundaries. An overhead power line easement along the southern boundary negates planting in this area and the northern site boundary is earmarked for the proposed extension of the site access road for raw material delivery for Stages Five – Eight. Indigenous vegetation planting of three hectares of the project site as currently required by the 2002 EIS would create serious conflicts with NCIA's expansion plans. Additionally, extensive vegetation planting as required by the 2002 EIS is not an objective of the 4(a) General Industrial zone and would result in an outcome that conflicts with the zone objectives.

The 2002 EIS revegetation planting requirement that results in approximately three hectares of revegetation being required is excessive given the following:

- The plantings onsite would create no linkages as part of a critical habitat corridor;
- The site is zoned for industrial use and the project represents a logical extension of the existing tile manufacturing facilities;
- Three hectares is excessive given the lack of quality and fragmented nature of the vegetation removed;
- No clear justification for an approximate 10:1 offset ratio is provided in the 2002 EIS; and
- Effective and practical vegetation planting can be achieved without compromising the development potential of the site.

Given the above, NCIA have commenced revegetation activities as shown on **Figure 4**. The locations of the existing plantings are generally consistent with the 2002 EIS landscape design. Two additional phases of vegetation planting are planned which are also identified on **Figure 4**. The location of phase one of the additional

plantings is consistent with that detailed in the 2002 EIS and would incorporate plant species specified in the approved Landscape Management Plan

A mixture of native and non-native trees have been planted along the earthen drainage channel to the west of the site access road up to the existing car park. Native and non-native trees have also been plated around the existing car park, site office entrance and decorative landscaping has occurred around the site office. These planning locations are consistent with the 2002 EIS, however the mixture of native and non-native trees is not indicative of that proposed in the 2002 EIS nor the more recent planting or proposed future planting.

Native vegetation planting (complete with irrigation) has occurred in the vacant space to the east of the site access road, west of the existing factory and north of the existing car park. The species chosen are those identified in the approved Landscape Management Plan (eucalypt and acacia species, see **Table 40**) which is based on the information provided in the 2002 EIS. This planting is representative of the two planned phases of future plantings, which are identified in **Figure 4**. These plantings would occur along the western drainage channel south of the car park linking up with the existing plantings along the drainage channel and along the entire eastern site boundary. The location of the planting along the western drainage channel (phase 1) would be consistent with the 2002 EIS planting locations, whereas the eastern boundary planting would be different to that identified in the 2002 EIS (due to the inaccessibility of land to the east of the existing factory where the new factory building is proposed).

The timeframe for the two additional areas of planting are as follows:

- Remainder of western boundary along the drainage channel (phase 1) is scheduled to be planted at the end of winter \ beginning of spring 2010 (late August \ early September). The ground preparation works have already commenced; and
- Eastern site boundary plantings (phase 2) would be undertaken within six months following the construction of the new factory building proposed as part of this EA.

The native vegetation planting strategy would maximise the available opportunities for vegetation planting without compromising the safe operation of the factory or expansion of the tile manufacturing facility. In total an estimated 1.34 hectares of onsite revegetation planting would be achieved following this approach identified in **Figure 4** which would build upon and improve the existing planting efforts. The existing plantings and that of the additional plantings of phases 1 and 2 represents an offset ratio of approximately 4.5:1 which is greater than the standard adopted for other approvals of 2:1 (see Eraring Power Station capacity increase and performance improvements, Project Approval Application No: 06_238, Condition 2.21).

All plantings along the remainder of western site boundary (phase 1) and the eastern site boundary (phase 2) (see **Figure 4**) would incorporate vegetation as specified in the existing Landscape Management Plan (LMP) as identified in **Table 40** (reproduced from the LMP). NCIA would update their existing LMP to formally incorporate this revegetation strategy and this would replace the three hectares indigenous vegetation planting requirement from the 2002 EIS.

Given the limited and fragmented nature of the vegetation cleared (as identified in the 2002 EIS) and the onsite vegetation planting currently undertaken and that proposed in this EA, additional vegetation offsets are not warranted in this instance.

Table 40: Suitable Native Vegetation Revegetation Species

Botanical Name	Common Name
Trees	
**Angophora costata*	Smooth barked apple
**Casuarina glauca*	Swamp oak
**Corymbia maculate*	Spotted gum
**Eucalyptus fibrosa*	-
**Eucalyptus paniculata*	-
**Eucalyptus molucanna*	Grey gum
**Eucalyptus tereticornis*	Forest red gum
**Melaleuca styphelloides*	Prickly paperbark
Shrubs and Groundcovers	

**Acacia falcate*	-
**Acacia implexa*	-
**Banksia spinulosa var. collina*	Hairpin Banksia
**Hakea dactyloides*	-
**Lambertia Formosa*	Mountain devil
**Melaleuca decora*	-
**Melaleuca nodosa*	Prickly paperbark
**Melaleuca thymifolia*	Thyme honey myrtle
**Persoonia linearis*	-
**Pultenaena villosa*	Bush pea
Grasses	
Imperata cylindrica	Blady Grass
Lomandra longifolia 'Cassica'	Mat rush
Poa labillardieri 'Eskdale'	Blue tussock grass
**Themeda australis*	Kangaroo grass

14.2 Hazard and Risk

A number of Dangerous Goods (DGs) would be stored and handled at the facility. Therefore a review of the hazards & risks associated with these goods was required. NCIA engaged AECOM to determine whether they can be effectively managed and was required and to review the hazards and risks of the DG stored and handled at the facility. The full report is provided as **Appendix J.**

14.2.1 Methodology

The quantities of DGs stored and handled at the project were reviewed and it was identified that these (primarily diesel fuel and natural gas) did not exceed the threshold levels listed in State Environmental Planning Policy (SEPP) No.33 (Hazardous and Offensive Developments), hence, SEPP 33 does not apply to the project. Notwithstanding this, a hazard analysis was conducted to determine whether the DGs proposed for storage and handling at the project posed a risk to the surrounding land uses.

Under the guidance of *Applying SEPP 33 "Hazardous and Offensive Development Application Guidelines"* (DOP 1994) a predominantly qualitative assessment was conducted to identify the hazards and determine the risks to surrounding land uses.

14.2.2 Potential Impacts \ Hazard Analysis

The following DGs were identified to be stored and handled at the project:

- Natural Gas – fed by pipeline that runs along the western site boundary to the factory for use in the drying areas, kilns and shrink wrapping machines (natural gas would not be stored on site); and
- Diesel Fuel – stored in a 5,000 L above ground tank (located within the existing factory building) and used for fuelling the front end loader and forklift trucks.

A hazard analysis was conducted and a number of hazards were identified associated with the gas use and the diesel storage.

Gas releases may occur during the manufacturing process as a result of leaks from flanges and valves, leading to the potential accumulation of gas, delayed ignition and explosion. However, as natural gas is lighter than air, this scenario was not considered a risk as the gas would rise and dissipate into the open air within the large factory building, escaping via the high level vents in the building. Gas explosions were therefore not considered a risk in the project. In the event of an immediate ignition of gas (from a leak) a jet fire may occur. The analysis conducted identified that the magnitude of the gas jet fires were insufficient to impact offsite and therefore no further analysis was conducted.

Spill of diesel fuel was identified as a potential hazard to the environment. However, it was identified that the diesel tank would be bunded to prevent spills escaping beyond the immediate area of the tank storage. Notwithstanding this, it was identified that spills during transfer of fuel from tankers to the tank and during

refuelling of vehicles could result in fuel escaping to the environment. In the unlikely event of an ignition of a spill it was identified that a pool fire could occur, resulting in heat radiation impact offsite. This incident was carried forward for further analysis.

14.2.3 Consequence Analysis

A review of the potential diesel release incidents that could result in fire identified that the worst case scenario was a diesel tank full bund fire. The analysis identified that a fire in the diesel tank bund would impact the site boundary at a heat radiation level less than 2 kW/m^2. The acceptable heat radiation impact level at the site boundary is 4.7 kW/m^2 (see *Hazardous Industry Planning Advisory Paper No.4 (1992) – Risk Criteria for Land Use Safety Planning, NSW Department of Planning*). Therefore it was identified that there would be no impact beyond the site boundary, exceeding acceptable criteria, as a result of diesel fuel incidents at the project.

14.2.4 Conclusions and Mitigation Measures

Based on the analysis conducted in the study (see **Appendix J**), it was concluded that the NCIA project would not result in hazards and risks at the adjacent land uses that would exceed the acceptable risk criteria.

Notwithstanding the above conclusion, recommendations are made:

1. Fuel handling management procedures should be included in the revised site Operational Environmental Management Plan; and
2. It was identified that in the event of an incident, albeit a low probability, it would be necessary to provide emergency response to ensure the risks are maintained in the As Low As reasonably Practicable (ALARP) range. It is therefore recommended that the existing site emergency plan be updated to include potential incidents at the expanded facility, including gas releases/fires and diesel releases/fires.

14.3 Heritage and Archaeology

14.3.1 Indigenous Heritage

AHIMS Data Base Search

A 2km^2 search of the AHIMS database (E:358700-360700; N:6378000-6380000) centred on the project site (NCIA site) was conducted for the Rutherford area on the 30 June 2010 by AECOM archaeologist, Luke Kirkwood. This search identified that there are currently 39 Aboriginal archaeological sites previously recorded in the local vicinity (see **Table 41** and **Figure 12**). One of these sites, Heritage Green 17/E is recorded twice within the AHIMS database (38-4-0731 & 38-4-0734). The majority of the sites recorded are either isolated artefacts or small artefact scatters averaging less than five artefacts per site. Nearly all recorded sites occur adjacent to the Stony Creek system and its adjacent flowing tributaries.

No sites are recorded within the project site and the nearest previously recorded site, an isolated artefact - HG 15/A (AHIMS 38-3-0715) is located less than100 metres away to the south between the current project site and Stony Creek.

Table 41: Recorded AHIMS Sites

Site ID	Site Name	Easting*	Northing*	Site Type	Recorder(s)
37-6-0119	Lochinvar; Farley; E;	359305	6378289	Artefact Scatter	Dyall
37-6-0120	Lochinvar; Farley; F;	358805	6378389	Artefact Scatter	Dyall
37-6-1939	Rutherford Employment Area Pad 3	359000	6379150	Artefact Scatter	McCardle
38-4-0417	Kyle Street 1 (KS1)	359985	6379629	Artefact Scatter	Dagg
38-4-0418	Kyle Street 2 (KS2)	360455	6379939	Artefact Scatter	Kuskie, Dagg

Site ID	Site Name	Easting*	Northing*	Site Type	Recorder(s)
38-4-0419	Kyle Street 3 (KS3)	360465	6379839	Isolated Artefact	Kuskie, Dagg
38-4-0420	Kyle Street 4 (KS4)	360465	6379739	Artefact Scatter	Kuskie, Dagg
38-4-0421	Kyle Street 5 (KS5)	360515	6379589	Artefact Scatter	Kuskie, Dagg
38-4-0422	Kyle Street 6 (KS6)	360555	6379359	Artefact Scatter	Kuskie, Dagg
38-4-0423	Kyle Street 7 (KS7)	360525	6379289	Artefact Scatter	Dagg
38-4-0424	Kyle Street 8 (KS8)	360615	6379409	Artefact Scatter	Dagg
38-4-0427	KS9	360605	6378859	Artefact Scatter	Dagg
38-4-0428	KS10	360205	6379159	Artefact Scatter	Dagg
38-4-0713	Heritage Green 23/G	359605	6378489	Artefact Scatter	Kuskie
38-3-0715	Heritage Green 15/A	359785	6378699	Isolated Artefact	Kuskie
38-3-0716	Heritage Green 16/A	360025	6378789	Artefact Scatter	Kuskie
38-3-0717	Heritage Green 17/A	360535	6378499	Isolated Artefact	Kuskie
38-3-0718	Heritage Green 17/B	360485	6378429	Artefact Scatter	Kuskie
38-3-0719	Heritage Green 17/C	360495	6378209	Artefact Scatter	Kuskie
38-3-0722	Heritage Green 17/D	360175	6378239	Artefact Scatter	Kuskie
38-3-0729	Heritage Green 18/A	360285	6378439	Artefact Scatter	Kuskie
38-3-0730	Heritage Green 22/A	359665	6378409	Isolated Artefact	Kuskie
38-3-0731	Heritage Green 17/E	360035	6378419	Isolated Artefact	Kuskie
38-3-0732	Heritage Green 21/B	359715	6378309	Isolated Artefact	Kuskie
38-3-0733	Heritage Green 19/A	359995	6378339	Artefact Scatter	Kuskie
38-3-0735	Heritage Green 23/A	360445	6378609	Isolated Artefact	Kuskie
38-3-0736	Heritage Green 23/B	360485	6378639	Isolated Artefact	Kuskie
38-3-0737	Heritage Green 23/F	360445	6378589	Artefact Scatter	Kuskie

Site ID	Site Name	Easting*	Northing*	Site Type	Recorder(s)
38-3-0738	Heritage Green 23/C	360565	6378399	Artefact Scatter	Kuskie
38-3-0739	Heritage Green 23/D	360605	6378449	Artefact Scatter	Kuskie
38-3-0740	Heritage Green 23/E	360605	6378539	Isolated Artefact	Kuskie
38-3-0741	Heritage Green 13/C	360355	6378669	Artefact Scatter	Kuskie
38-3-0742	Heritage Green 13/B	360355	6378699	Isolated Artefact	Kuskie
38-3-0743	Heritage Green 13/A	360355	6378909	Isolated Artefact	Kuskie
38-3-0744	Heritage Green 8/A	360725	6378379	Artefact Scatter	Kuskie
38-3-0745	Heritage Green 7/A	360675	6378579	Isolated Artefact	Kuskie
38-3-0746	Heritage Green 1/A	360515	6378899	Isolated Artefact	Kuskie
38-3-0747	Heritage Green 6/A	360665	6378619	Artefact Scatter	Kuskie
38-4-0834	Heritage Green 21/A (HG21/A)	359855	6378459	Artefact Scatter/ PAD	Kuskie

* All co-ordinates are in GDA94 Zone 56.

Previous Archaeological Survey Reports

The project site is located within the designated boundaries of the Mindaribba Local Aboriginal Lands Council (MLALC). The project site and its surrounds have been extensively surveyed since 1994 (**Table 42**). Three archaeological investigations have been conducted for the project site including survey and excavation with an additional review having been conducted as part of a larger Environmental Impact Statement for the NCIA site in 2002 (Dagg 1996, Umwelt 1997, Umwelt 1998, PB 2002).

The archaeological assessment by Dagg (1996) involved a stratified sampling survey of the Rutherford Industrial Estate. A total of eighteen transects were surveyed within the Estate. Three transects were located within the NCIA site in a north to south direction through the centre of the site and along the southern and western boundaries. Eight aboriginal sites and three Potential Archaeological Deposits (PADs) were identified to the north-east of the site in association with an unnamed tributary of Stony Creek. No items of Aboriginal cultural significance were identified within the NCIA site.

Following this a series of archaeological excavations were undertaken by Umwelt (1997, 1998) to further clarify and define the sites identified in during the Dagg (1996) survey. They indentified that apart from two sites KS4 & KS6 located immediately adjacent to the unnamed tributary, the density of artefacts for the previously recorded sites and PADs was extremely low.

An indigenous heritage study was also performed as part of the 2002 EIS for the NCIA site (PB 2002). It concluded, based on the active engagement with the MLALC (including site inspection), searches of the relevant databases and reviews of previous studies that the approved facility would not impact upon indigenous heritage. Consultations were conducted with the MLALC who had been extensively involved on the previous archaeological assessments of the areas including and surrounding the NCIA site. A follow-up site inspection was organized as part of the EIS on 02 December 2002 and included MLALC chairperson Rick Griffiths. Mr. Griffiths and the MLALC indicated that they did not have any cultural heritage issues with the proposed project (PB 2002).

In addition to these studies, a further 9 studies have taken place either immediately adjacent or within 500 metres of the current Project Area. A number of these involved field surveys and have indentified no new archaeological sites and/or potential areas of cultural heritage sensitivity. Further investigations have been conducted of the archaeologically sensitive areas identified by Dagg (1996) as part of the 'Heritage Green' development to the immediate east of the project site. Surveys and excavation conducted by South East Archaeology have confirmed the original findings of Dagg (1996). They identified areas immediately adjacent to existing creeklines as being highly archaeological sensitive and containing a number of sites. Areas away from the creek have been identified as being of low archaeological sensitivity indicative of "background discard" (South East Archaeology 2008). These more recent surveys and excavations have also identified that the north west of the 'Heritage Green' development has been highly disturbed with due to top soil stripping and landscaping and note that the presence of insitu archaeological deposits are unlikely to occur in this area.

Table 42 - Summary of Archaeological Assessments relevant to the Project Area*

Author	Study Type	Locality	Distance to Project Area	Report Description
Dagg (1996)	Field Survey	Lot 114 DP855618 & Lot 225 DP 773532, Rutherford	Study Area includes the current project site	Seven artefact scatters, one isolated artefact and 3 potential archaeological deposits (PAD) were identified (KS1-8, PAD 1-3). Only one of the sites had more than 10 artefacts (KS6 n=66) with the mean artefact count being less than 3. All sites except for one were located within 50 metres of a watersource.
Umwelt (1997)	Excavation	Lot 114 DP855618 & Lot 225 DP 773532, Rutherford	Study Area includes the current project site	Subsurface testing of two PADs (PAD 2 & PAD 3) previously identified by Dagg (1996). 25 artefacts were obtained from 51 test pits. PADs re-recorded as sites KS9 & KS10. Recommended obtaining consent to destroy sites KS9 & KS10 and site KS6 fenced with further archaeological investigations to be conducted.
Umwelt (1998)	Excavation	Lot 114 DP855618 & Lot 225 DP773532, Rutherford	Study Area includes the current project site	Subsurface testing of KS1, KS4 (n=88) & KS6 (n=370). KS6 was found to have the highest artefact count (n=370), while only 88 artefacts were recovered from KS4. No artefacts were recovered from KS1. Recommendations were made conserving part of KS4 & KS6.
PB (2002)	Environmental Impact Statement	Lot 101 DP1062820	Study Area includes the current project site	As part of a larger EIS, a review of past archaeological research conducted within the Project Area boundaries. Consultation and a site inspection was undertaken with the Mindaribba Local Aboriginal Lands Council who stated that they did not have any issues with the project.
Envirosciences Pty Ltd (1994)	Field Survey	Lot 16, 221102 Gardiner Road, Rutherford Industrial Estate, Rutherford	Immediate west of the project site	No archaeological sites were identified. The study concluded that the area had low to no archaeological potential.
Brayshaw (1997)	Field Survey	Lot 111 DP854273, Kyle Street, Rutherford.	100 m north of the project site	Field survey conducted. No archaeological sites were identified. The study concluded that the area had low to no archaeological potential.
ERM (2002)	Field Survey	Junction of New England Highway and Kyle Street, Rutherford	500m north east of the project site	No archaeological sites were identified. The study concluded that the area had low to no archaeological potential.

Author	Study Type	Locality	Distance to Project Area	Report Description
South East Archaeology (2004)	Field Survey	Lot 222 & 224 DP773532 & Part Lot 1223 DP1017710, Rutherford	Immediate east and south of the project site	A total of 27 sites were identified with the majority being located within 100m of Stony Creek. 12 sites were artefacts scatters with an artefact count of <5 ,11 were isolated artefacts. The highest artefact count was 32 at site HG21/A. The closest identified site to the current Project Area is HG15/A which is recorded as an isolated artefact. The report notes that despite high ground surface visibility, no additional artefacts were identified and the surrounding area was heavily disturbed through vegetation removal and landscaping. It concluded that the northwest of the golf course closest to the industrial estate was heavily impacted by ground disturbance 'rendering the potential for sub-surface deposits that may be in situ and/or of research value, very low' (pg 35).
Insite Heritage (2005)	Field Survey	Lot 223 DP1037300	200 m north east of the current project site	Survey found landform to be heavily disturbed due to landscaping as part of industrial activities since the early 1940s. No archaeological sites were identified. The study concluded that the area had low to no archaeological potential.
Indigenous Outcomes (2006)	Excavation	Lot 222 & 224 DP773532 & Part Lot 1223 DP1017710, Rutherford	Immediate east and south of the project site	Excavation of 83 shovel probes at sites HG6/A, 7/A, 8/A, and 21/A. 20 artefacts recovered.
South East Archaeology (2007)	Excavation	Proposed gravity fed drain along unnamed tributary running into Stony Creek	400 m east of the current project site	Archaeological conservation zone created which included five previously recorded sites (KS2-KS6). No new archaeological sites were identified.
South East Archaeology (2008)	Salvage Excavation	Proposed gravity fed drain along unnamed tributary running into Stony Creek	400 m east of the current project site	Salvage conducted at sites KS2-9 & HG1/A & HG23/B. One carbon date of 2838 ±39 BP was obtained at HG23/B (Wk23298). Concluded that past occupation for the Rutherford area focused on the lowest margins of the slopes, with sites found virtually within the basin of the drainage depression. Overall spatial distribution of artefacts within general vicinity is consistent with typical background discard patterns interspersed by a number of discrete areas of focused activity.

Author	Study Type	Locality	Distance to Project Area	Report Description
South East Archaeology (2010)	Field Survey	Rail reserve from Maitland to Minimbah	300 m south of the current project site	No archaeological sites were identified with in the vicinity of the current project site.

* Reports shaded encompass the current project site

Findings & Recommendations

A review of the past archaeological investigations of the Project Area and the surrounding region has identified the following:

- A review of existing AHIMS data indicated that no Aboriginal objects or places are recorded within the project site;
- Survey and site inspections since 1994 have not indentified any archaeological sites or areas of cultural heritage sensitivity within the project site;
- Consultation and a site inspection in 2002 with the Mindaribba Local Aboriginal Lands Council did not identify any Aboriginal cultural heritage issues with the current project site;
- Extensive survey and excavation in the neighbouring 'Heritage Green' project have identified that the majority of sites away from the creeks are either isolated artefacts or small artefact scatters (n≤5). They have also observed that the northwest of the 'Heritage Green' project has been impacted by ground disturbance limiting its capacity for the retainment of in situ sites;
- Detailed predictive models for Aboriginal cultural heritage sensitivity for the Western Rutherford area by South East Archaeology have concluded that sites are most likely to occur immediately adjacent to existing watercourses (Stony Creek and its tributaries) with all other areas containing either no archaeological significance or the presence of background discard; and
- The project site has been subject to ground disturbance involving the clearance of vegetation, landscaping and excavation of a drain along the eastern boundary (see Section 2.2);

Based on the results of previous investigations (survey and excavation) of the Project Area and its surrounds, consultation with representatives from the Mindaribba Local Aboriginal Lands Council, the level of current disturbance and the use of predictive models for the West Rutherford Area, it is considered extremely unlikely that Aboriginal cultural heritage is present within the current Project Area. Therefore, further detailed assessment is not warranted.

Contingencies

Even though no areas or objects of Aboriginal cultural heritage significance have been identified within the Project Area, there still remains the potential (albeit very low) that there may be Aboriginal cultural objects below the ground surface. Agreed management procedures for unexpected finds will provide an effective way to minimise project impacts on unrecorded Aboriginal cultural heritage. Therefore, the following standard procedures should be adhered to in order to manage the discovery of unexpected finds during project activities.

Procedure on the Discovery of Archaeological Deposits

This section outlines the procedures to be undertaken in the unlikely case that any Archaeological Deposits are discovered during development. The procedures take into account the following documents:

- The *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS 1997).

In the event that the excavation activity reveals possible archaeological deposits during construction activities, the following procedure are to be followed:

1) When suspected archaeological deposits are exposed, all excavation work is to cease immediately in the near vicinity of the find location and the Project Manager on site is to be immediately notified to allow assessment and management;
2) An area of 50 m radius is to be cordoned off by temporary fencing around the exposed archaeological deposits - excavation work can continue outside of this area as long as there is no risk of interference to the archaeological deposits;

3) The Project Manager on site is to notify the proponent;
4) An archaeologist should be commissioned by the proponent to inspect the deposit and make a determination of antiquity (pre-contact, historic or modern); and
5) If the archaeological deposits are verified, a meeting should be arranged to discuss the matter further with Cultural Heritage Officers from DECCW.

Procedure on Discovery of Human Remains

This section outlines the procedures to be undertaken in the unlikely case that any Human Remains are discovered during development. The procedures take into account the following documents:

- *Manual for the Identification of Aboriginal Remains* (DEC 2005);
- *Skeletal Remains – Guidelines for the management of human skeletal remains under the Heritage Act 1977* (NSW Heritage Office 1998); and
- *The Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS 1997).

In the event that the excavation activity reveals possible human remains during remedial activity, the following procedure is to be followed:

1) When suspected human remains are exposed, all excavation work is to cease immediately in the near vicinity of the find location and the Project Manager on site is to be immediately notified to allow assessment and management;
2) An area of 50 m radius is to be cordoned off by temporary fencing around the exposed human remains site - excavation work can continue outside of this area as long as there is no risk of interference to the human remains or the assessment of human remains;
3) The Project Manager on site is to notify the proponent;
4) The Police are to be contacted at the earliest reasonable time;
5) Contact DECCW's Environment line on 131 555 and the Heritage Office on (02) 9873 8500; and
6) A physical or forensic anthropologist should be commissioned by the proponent to inspect the remains in situ (organised by the police unless otherwise directed by the police), and make a determination of ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or modern):
    i) if the remains are identified as modern the area is deemed as crime scene; or
    ii) if the remains are identified as Aboriginal, the site is to be secured and DECCW and all Aboriginal stakeholders are to be notified in writing; or
    iii) If the remains are identified as non-Aboriginal (historical) remains, the site is to be secured and the Heritage Office is to be contacted.

The above process functions only to appropriately identify the remains and secure the site. From this time, the management of the area and remains is to be determined through one of the following means:

1) If the remains are identified as a modern matter liaise with the police;
2) if the remains are identified as Aboriginal liaise with the proponent, the DOP, the DECCW and Aboriginal stakeholders;
3) If the remains are identified as non-Aboriginal (historical) liaise with the proponent, the DOP (Heritage Branch);
4) If the remains are identified as not being human then work can recommence without delay.

14.3.2 Non-Indigenous Heritage

The non-indigenous heritage values of the site were determined through an examination of heritage registers including the State Heritage Register and relevant state, regional and local environmental plans undertaken as part of the 2002 EIS.

The following data sources were searched:

- Maitland City Council Local Environmental Plan (January 2002);
- Maitland City Council State of Environment Report 2000-2001;
- Hunter Regional Environmental Plan 1989 - Heritage;

- NSW State Heritage Inventory;
- Australian Heritage Inventory;
- Environment Protection and Biodiversity Conservation (EPBC) Act database; and
- Environment Protection and Biodiversity Conservation Act Online Database.

There were no listed non-indigenous heritage items known within the study area, or that would be impacted by this project. It is considered that this conclusion continues to be appropriate for the project site.

14.4 Land use

The site is located on the southern boundary of the Rutherford Industrial Estate, Rutherford, NSW. The site comprises 16.8 hectares and is predominately cleared of vegetation. Electricity transmission lines run along the southern and western boundaries of the site. A high pressure gas main also runs along the western boundary of the site. A shallow drainage line exists in the southeast corner of the site, which ultimately drains to an unnamed tributary of Stony Creek.

The existing ceramic tile factory is located on the western half of the site. The project would occupy the majority of the remaining land to the east of the existing facility. The entire site lot is zoned 4(a) General Industrial under the Maitland LEP (1993).

14.4.1 Surrounding Land Uses

Surrounding land uses are discussed in detail in **Section 2.4.** Immediately bordering the project site is:

- An Energy Australia electricity substation and an RSPCA facility to the north;
- General industrial development to the north and west of the site. Land to the north east of the project is zoned for general industrial use;
- The former Westside golf course and proposed Heritage Green site zoned as 6(b) Private Recreation is on the southern and eastern boundaries of the project; and
- General industrial development along Gardiner Street to the west.

Further afield is the New England Highway, running in an east-west direction approximately 880 metres to the north. Beyond that is a mostly vacant newly developed industrial estate west of Anambah Road.

Approximately 0.5 km to the south beyond the former golf course is the Main Northern Railway. Land to the south of the railway is generally zoned for rural purposes, with some rural residential development along Wollombi Road. Beyond the golf course to the east are the residential areas of Rutherford, Telarah and Maitland.

Land to the west of the Rutherford Industrial Estate is zoned 1(b) Secondary Rural land.

14.4.2 Land use conflicts

The former Westside golf course to the south and undeveloped land to the east of the project is zoned 6(b) Private Recreation and is subject to Clause 52 of the Maitland Local Environmental Plan (1993). Clause 52 conditionally permits development of up to 450 dwellings as well as commercial or retail development as long as it forms part of a major tourist facility, being a golf course. Clause 52 states:

> ***Certain Development at Mountvale Road, Rutherford (Heritage Green)***
>
> *1) This clause applies to Part Lot 1223, DP 1017710, Lot 222, DP 773532 and Lot 224, DP 773532, Rutherford as shown edged heavy black on the map marked "Maitland Local Environmental Plan 1993 (Amendment No 75)".*
>
> *2) Despite any other provision of this plan, a person may, with the consent of the consent authority:*
>
> > *(a) erect not more than 450 dwellings in a maximum of 6 community parcels, on the land to which this clause applies, and*
> >
> > *(b) carry out on the land development for commercial purposes or retail purposes, or both.*
>
> *3) The consent authority must not grant consent as referred to in subclause (2) unless the consent authority is satisfies that:*
>
> > *(a) the commercial or retail component of the proposed development is required as an integral part of a major tourist recreation facility, being a golf course, and*

(b) appropriate steps, including the preparation of a conservation management plan, have been taken to identify and preserve any sites or artifacts of Aboriginal significance, and

(c) the land to which this clause applies will be consolidated into one allotment prior to any subdivision under a community scheme.

4) The consent authority must not consent to a development referred to in this clause unless it has considered:

(a) an analysis of noise and air quality associated with rail and industrial activities, vegetation, fauna, surface and ground water quality, and hydrological regimes and an assessment of any changes likely to result from the proposed development on these considerations, and

(b) a description of the measures to be undertaken to guard against actual and potential disturbances from rail and industrial development, and to vegetation, fauna, water quality and hydrological regimes resulting from the carrying out of the development and whether those measures are satisfactory.

5) In this clause:

- *community parcel has the same meaning as in the Community Land Development Act 1989.*
- *community scheme has the same meaning as in the Community Land Development Act 1989.*

Therefore, the land adjacent to the NCIA facility could potentially be redeveloped in the future. However, Clause 52 also states the consent must not be granted for development of the land unless analysis of noise and air quality associated with industrial activities has been considered, and a description of the safeguards against actual or potential disturbances from industrial development has been deemed satisfactory. This mandatory condition should minimise any amenity conflicts concerning the project any potential future development of the former golf course.

With the potential for residential development occurring on land adjacent to the site, the environmental assessments and studies performed as part of this EA consider both the existing sensitive receptors and any potential sensitive receptors, albeit that the precise layout of the potential residential development has not been finalised or approved at this stage.

This EA has identified that air quality, noise and visual impacts are predicted across various areas of the proposed Heritage green development. Many of the potential impacts were described in the 2006 SEE for the proposed Heritage Green golf course redevelopment.

The following guidelines have been prepared by various regulatory authorities in Australia to provide strategic guidance when considering the appropriateness of various development applications where varying and conflicting land uses are proposed in close proximity to each other.

Odour Separation Distance Guidelines (March 2008)

The Clean Air Society of Australia and New Zealand (incorporated in New South Wales) has published draft Odour Separation Distance Guidelines. The Odour Separation Distance Guidelines recommend a separation distance from sensitive receptors (i.e. residences) of 500 metres from a ceramic works.

Odour emissions from the NCIA facility have not been a cause of concern for the Rutherford community in the past. This is largely due to the closest residents being approximately 1km away and the lack of odour causing materials or activities. This separation provides an adequate distance to buffer residents from potential odour impacts that relate to NCIA's ceramic manufacturing operations.

Recommended Buffer Distances for Industrial Residential Air Emissions (July 1990)

The Victorian Environmental Protection Authority (EPA) has published guidelines for the separation of sensitive (residential) land uses and industrial land uses.

The Recommended Buffer Distances for Industrial Residential Air Emissions recommends that a buffer distance of 200 metres for facilities that manufacture tiles with an annual production rate exceeding 10,000 tpa.

Guidelines for Separation Distances (December 2007)

The South Australian Environmental Protection Authority (EPA) has published guidelines for separation distances with an aim to ensure environmental impacts are minimised between incompatible land uses.

The South Australian EPA Guidelines for Separation Distances recommends a separation distance from sensitive receptors of 500 metres for ceramic works.

Separation Distances Between Industrial and Sensitive Land Uses (June 2005)

The Western Australian Environmental Protection Authority (EPA) has published guidelines for the separation distances between industrial and sensitive land uses.

The Western Australian EPA guidelines for the Separation Distances between Industrial and Sensitive Land Uses recommends a buffer distance of 300 to 500 metres for ceramics manufacturing depending on the size of the ceramics manufacturing facility.

14.4.3 Conclusion

The project would not result in a significant change in land use, since it is an expansion of an existing facility in a designated industrial estate on land that is zoned for industrial purposes.

As described in this EA the project would result in increased yet manageable environmental impacts. These increased impacts are unlikely to adversely impact on existing surrounding land uses, since land immediately adjacent to the project is predominantly industrial or undeveloped.

The requirements of Clause 52 of Maitland Local Environmental Plan (1993) (**Section 14.4.2**) place an onus on the developer of the Heritage Green site to carry out an assessment of the potential amenity impacts associated with the adjoining industrial activities and to address potential impacts in a satisfactory manner by adopting appropriate mitigation through layout or design. In combination with the mitigation measures detailed in this EA, this should provide adequate mitigation of adverse potential impacts of the project on any potential future residents of the Heritage Green site.

A basic premise of good environmental planning is to ensure appropriate separation between industrial development and proposed residential development on adjoining or nearby land. All reasonable mitigation measures have been proposed as part of this EA, however, potential impacts are predicted across sections of the proposed (but not approved) Heritage Green development. Appropriate design and planning of the proposed Heritage Green development is also required to manage the potential impacts.

14.5 Socio-Economic Impacts

The project would require a capital investment of approximately $65 million, which would be borne by the NCIA, with no economic costs or contribution borne by the community.

The existing facility (Stages One – Two) currently employs approximately 50 staff, the majority of which are process staff working on the production lines. The remaining staff are involved in management, administration, technical and sales/marketing. An additional 20 employees are likely to be engaged following the full implementation of the approved facility (Stages One – Four).

Socio-economic benefits to the community would include the direct employment of an additional 70 staff for the project and the generation of follow on jobs such as raw material suppliers, transporters, product distributors and ancillary service providers. These additional 70 employees would result in a total future workforce of approximately 140 employees. In addition to operating staff, a workforce of up to 50 staff would be required to complete the construction of project. It would be reasonable to assume that the majority of these workers would come from the Hunter Valley or the Central Coast region, which reinforces a self containment of employment. The generation of these additional employment opportunities as result of the project would have positive social and economic impacts on the surrounding area.

The project would strengthen the financial contribution that NCIA already makes to the Hunter Region and the improvement of Australia's current account through the substitution of imported ceramic tiles with quality local product and the potential creation of export opportunities.

The potential social impacts of this project addressed in this EA include minor impacts to air quality (**Section 8.0**), noise (**Section 10.0**), traffic and parking (**Section 11.0**) and visual impact (**Section 13.0**). Assessment of these key social aspects of this project indicate that provided appropriate environmental mitigation and management measures are implemented, the project would not result in significant adverse impacts at the existing sensitive receptors.

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15.0 Statement of Commitments

In accordance with the requirements under Part 3A of the *EP&A Act*, the following draft Statement of Commitments (SoC) is provided. The SoC states NCIA's environmental commitments and provides a summary of the environmental management measures to be undertaken for the project during its construction and operation.

NCIA commits to the preparation and implementation of the environmental management and environmental mitigation measures detailed in the SoC for the project.

The SoC has been prepared in respect of the project and has been compiled on an issues basis, as informed by the EA and the environmental analysis. The SoC has been written in a format which can be incorporated into approval conditions and is shown in **Table 41**.

Table 43: Statement of Commitments

Issue	Safeguard
Air Quality	**Construction** A Construction Environmental Management Plan (CEMP) would be prepared prior to commencement of construction of the project. The CEMP would include as a minimum: • Control of access via sealed roadways; • Vehicle speed limits on site; • Avoid dust-generating activities during undesirable conditions; • Minimisation of areas of disturbed soils during construction; • Dust suppression with water sprays or other media during windy periods (as required); • Stockpiling of soils on site kept to a practical minimum; • Construction equipment idling time minimisation and appropriate engine tuning and servicing to minimise exhaust emissions; and • Procedures to address any complaints received. **Operation** NCIA commits to the stringent air emissions concentration limits required of the approved facility for the project as detailed in the existing development consent as modified. Additionally: • Dust extraction baghouses would be integrated with the kiln stacks; • Fluoride emissions would be managed within the kiln baghouses by implementing a mechanism where a fine spray of lime is injected into the kiln exhaust flow to scrub the HF emissions; - Lime used in the baghouse would have a high percentage of Calcium available for scrubbing of HF; - Installation of additional monitoring points to monitor baghouse operational parameters e.g. pressure drop to allow more efficient tracking of the performance of the baghouses; and - All new production lines will have kiln stack filtration systems positioned internally to the buildings. The aim of this is to ensure more efficient management of the emissions. • Dust extraction baghouses would be integrated with the spray dryers; • Fabric filters would also be implemented on the extraction fans located adjacent to the selection line; • NCIA would continue their vegetation monitoring program as required by their existing consent and Environment Protection Licence; and • The clay preparation area would be located inside the factory building.

Issue	Safeguard
Greenhouse Gas and Energy Efficiency	• An Energy Savings Action Plan would be prepared; • New generation kilns would be installed that incorporate new energy recovery systems; and • The project would be designed to allow for the addition of electricity cogeneration facilities by way of leaving space and allowing for easy connection and integration at a later date.
Noise	• The project would commit to and adopt the operational noise criteria outlined in this EA; • No truck deliveries of raw products or final product despatch would occur during the night time period (night-time 10.00 pm to 7.00 am); • Electric, laser guided forklifts would be utilised to transport final product from the proposed factory building to the product despatch area of the existing building; • The transport route for both forklifts and delivery/product despatch truck would be designed to minimise the need for reversing and, as such, the use of reversing alarms; • The bag-houses for the proposed kiln stacks would be located inside the proposed factory building; and • The proposed dust extraction unit, located on the southern end of the eastern wall of the proposed factory building, would be enclosed to reduce noise emission to the east and south.
Traffic and Parking	• The onsite car parking would be increased to 70 spaces to ensure adequate provision is provided for all staff and visitors and all new spaces would be provided in accordance with AS2890.
Hazard and Risk	• The existing site emergency plan would be updated as required to include potential incidents at the expanded facility, including gas releases/fires and diesel releases/fires; and • Fuel handling management procedures would be included in the revised site Operational Environmental Management Plan.
Soil and Water	• Wet detention basins would be provided with the dual function of reducing peak stormwater flows and improving water quality by settling of sediment prior to discharge; • Rainwater tanks would be provided with the function of reducing peak stormwater flows; • Grass swales to collect runoff from beside roadways, to connect between the wet detention basins, to reduce runoff velocities, to provide some infiltration of water, and for water quality improvement; • Ground area disturbed would be minimised at any one time during construction and progressive rehabilitation/ landscaping of completed areas; • The volume of water required to be handled would be minimised by diverting clean water around all disturbed areas; • The surface of all areas required for construction traffic, parking, storage and amenities would be treated to provide adequate drainage and prevent soil loss; • Provision of sedimentation traps and fencing to capture and treat runoff from all disturbed areas would be provided, including a regime for inspection and removal of accumulated sediment; • Storage of potential contaminants (i.e. fuels, oils or chemicals) would occur offsite or within bunded, covered and lined areas; • The construction and operation of the project would not concentrate or lead to an increase in the rate of flow of stormwater discharged from the site over and above the predevelopment flow conditions, and • An Acid Sulfate Soils Management Plan (ASSMP) would be prepared in accordance

Issue	Safeguard
	with the Acid Sulfate Soil Planning Guidelines (NSW Acid Sulfate Soils Management Advisory Committee, 1998) prior to the construction of Stages Five - Eight.
Visual	• Planting of native vegetation around the perimeter of the site would be undertaken in locations unaffected by buildings, internal road ways or infrastructure easements to assist in screening outside views; • The use of appropriate building materials and colours to blend with the surrounding environment and reduce the visual dominance of the building; • Lights would be placed and designed to avoid causing glare or excessive light spillage on neighbouring sites; • Lighting near adjoining properties where appropriate would be shielded with cut off luminaries; • Building illumination would be discrete; and • Lighting to car park areas and for security purposes would be low intensity.
Ecology	• NCIA would continue its vegetation monitoring program for fluoride as required by their existing consent and EPL; and • NCIA would finalise their onsite revegetation generally in accordance with **Figure 4** and as described in **Section 14.1.3**.
Aboriginal Heritage	• Even though no areas or objects of Aboriginal cultural heritage significance have been identified within the project site, there still remains the potential (albeit very low) that there may be Aboriginal cultural objects below the ground surface. Agreed management procedures for unexpected finds will provide an effective way to minimise project impacts on unrecorded Aboriginal cultural heritage. Procedures for the Discovery of Archaeological Deposits and the Discovery of Human Remains are detailed in **Section 14.3.1** of this EA and would be implemented during the project.
Environmental Monitoring	• NCIA would continue their vegetation monitoring program as required by their existing consent and EPL; and • NCIA would negotiate with DECCW and DOP an appropriate Environmental Monitoring program.
Environmental Management and Reporting	• The existing site OEMP and environmental management plans would be reviewed, modified and updated to include the project; and • NCIA would continue with its environmental reporting and auditing requirements as specified in the existing development consent (where possible).

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16.0 Residual Risk Analysis

16.1 Approach

The Residual Environmental Risk Analysis for the project is based on a process adapted from Australian Standard AS 4360:2004 Risk Management. The process is qualitative and is based on the Residual Risk Matrix shown in **Table 44**.

Residual Environmental Risk is assessed on the basis of the significance of environmental effects of the project and the ability to confidently manage those effects to minimise harm to the environment.

The significance of environmental effects is given a numerical value between 1 and 5 based on the receiving environment, the level of understanding of the type and extent of impacts and community response to the environmental consequences of the project. This enables both actual and perceived impacts to be considered. The manageability of environmental effects is similarly given a numerical value between 1 and 5 based on the complexity of mitigation measures, the known level of performance of the safeguards proposed and the opportunity for adaptive management. The numerical value allocated for each issue is based upon the following considerations is provided in **Table 42** and **Table 43**.

Table 44: Significance of Effects

Significance of Effect	Description
5. Extreme	Undisturbed receiving environment; type or extent of impacts unknown; substantial community concern.
4. High	Sensitive receiving environment; type or extent of impacts not well understood; high level of community concern.
3. Moderate	Resilient receiving environment; type and extent of impacts understood; community interest.
2. Minor	Disturbed receiving environment; type and extent of impacts well understood; some local community interest.
1. Low	Degraded receiving environment; type and extent of impacts fully understood; uncontroversial project.

Table 45: Manageability of Effects

Manageability of Effects	Description
5. Complex	Complicated array of mitigation measures required; safeguards or technology are unproven; adaptive management inappropriate.
4. Substantial	Significant mix of mitigation measures required; limited evidence of effectiveness of safeguards; adaptive management feasible.
3.Straight forward	Straightforward range of mitigation measures required; past performance of safeguards is understood; adaptive management easily applied.
2. Standard	Simple suite of mitigation measures required; substantial track record of effectiveness of safeguards; adaptive management unlikely to be required.
1. Minimal	Little or no mitigation measures required; safeguards are standard practice; adaptive management not required

The numbers are added together to provide a result which provides a ranking of potential residual effects of the project when the safeguards identified in this EA are implemented. Rankings range from low through to medium and high/

Table 46: Residual Risk Matrix

Significance of Effects	Manageability of Effects				
	5 Complex	4 Substantial	3 Straightforward	2 Standard	1 Minimal
1 Low	6 (Medium)	5 (Low/Medium)	4 (Low/Medium)	3 (Low)	2 (Low)
2 Minor	7 (High/Medium)	6 (Medium)	5 (Low/Medium)	4 (Low/Medium)	3 (Low)
3 Moderate	8 (High/Medium)	7 (High/Medium)	6 (Medium)	5 (Low/Medium)	4 (Low/Medium)
4 High	9 (High)	8 (High/Medium)	7 (High/Medium)	6 (Medium)	5 (Low/Medium)
5 Extreme	10 (High)	9 (High)	8 (High/Medium)	7 (High/Medium)	6 (Medium)

16.2 Analysis

The analysis of residual environmental risk for issues related to the proposed project is shown in **Table 47**. This analysis indicates the environmental risk profile for the proposed project based on the assessment of environmental effects, the identification of appropriate safeguards, and the SoC included in this EA.

Table 47: Risk Profile

Issue	Significance	Manageability	Residual Risk
Air Quality	3	3	6 (Medium)
Water	2	2	4 (Low/Medium)
Geology and soils	1	1	2 (Low)
Noise	3	2	5 (Low/Medium)
Ecology	1	1	2 (Low)
Community Resources	2	1	2 (Low)
Transportation	2	1	3 (Low)
Waste	1	1	2 (Low)
Greenhouse Gas and Energy Efficiency	2	2	4 (Low/Medium)
Hazard and Risk	2	1	3 (Low)
Socio-Economic Impacts	2	2	4 (Low/Medium)
Heritage and Archaeology	1	1	2 (Low)
Land use	3	2	5 (Low/Medium)
Visual Impacts	2	2	4 (Low/Medium

The above residual risk analysis indicates that the proposal presents an overall low to medium risk in relation to each of the identified environmental issues, provided that the recommended mitigation, management and monitoring measures are implemented.

17.0 Project Justification

17.1 Justification

This section provides a discussion of the justification for the project based upon the site location and economic, biophysical and social considerations. This section also examines Ecologically Sustainable Development (ESD) as it relates to the project and also the consequences of not proceeding.

The project provides an opportunity to expand an existing successful tile manufacturing operation which is consistent with other industrial activities in the area, and which has the potential to contribute positively to the local, regional, state and national economies.

The project is adjacent to the existing tile manufacturing facility on land that has been previously largely cleared and is located within the Rutherford Industrial Estate which is zoned for general industrial use. The site was originally selected as the preferred location for a ceramic tile manufacturing facility because it is close to both domestic and international product markets and is in a central location relative to the supply of raw materials.

Schedule 2 of the *EP&A Regulation 2000* requires that justification of any proposed project be provided with regard to biophysical, economic and social considerations together with the principles of ESD. The assessment of the project undertaken in this EA has integrated these considerations is discussed further below. The assessments performed and reported in this EA have considered both the project specific and cumulative impacts of the project.

17.1.1 Biophysical

Potential biophysical impacts of the project assessed in this EA include:

- Air quality including greenhouse gas and energy efficiency (**Sections 8.0 & 9.0**);
- Noise (**Section 10.0**);
- Soil and water quality (**Section 12.0**); and
- Ecology (**Section 14.1**);
- Waste management (**Section 4.8**).

Air quality impacts have been predicted to be low to medium with the implementation of appropriate design and management strategies. Impact to air quality from potential pollutants has been demonstrated to be minimal, with no predicted significant impact to existing sensitive receptors. The project would incorporate modern technologies to minimise particulate matter and fluoride emissions, and to ensure acceptable dispersion of nitrogen oxide (NO_x) emissions.

Minor 24 hour PM_{10} exceedances were predicted, however these were deemed attributable to the high background concentrations of PM_{10} in the region. Minor exceedances of the HF guidelines are predicted to occur at locations where potential sensitive receptors may be located within the proposed Heritage Green development. As the assessment was based around impacts on vegetation, not human health impacts this assessment is considered conservative therefore, human health would not be impacted.

Greenhouse Gas (GHG) emissions have the potential to impact climatic conditions by varying rainfall, modifying climatic temperature, and increase the risk of extreme natural events such as bushfires, drought and flooding. Scope 1, 2 and 3 emissions have been assessed for the project and cumulatively. The cumulative GHG footprint of NCIA following the project (Stages One – Eight) would equate to approximately 0.04 % of Australian GHG emissions. As such, the project is not expected to substantially increase total national GHG emissions.

Noise emissions during construction would be primarily limited to the day time period and are predicted to have no significant impact on the local community provided recommended design measures are implemented. The noise assessment demonstrated that the noise contributions from the project during operation would be well within the noise goals for the project hence they are not expected to significantly impact upon the existing nearby residential receptors. Some potential noise impacts may occur with parts of the proposed Heritage Green, however the

impacts could be mitigated by sensitive siting and design of any future development within the Heritage Green site. To ameliorate potential noise impacts, design strategies have been incorporated into the project.

The project has the potential to cause erosion and sedimentation, particularly during the construction period. To minimise potential impacts, a CEMP would be prepared for the project and would include erosion and sediment control measures. Mitigation measures would also be included in the final design and operation of the project as required.

Water impacts have been predicted to be manageable with the implementation of mitigation measures outlined in **Section 12.0**. No water would be discharged from site due to process activities. The stormwater system has been designed with detention basins and rainwater tanks so that overall on average the peak stormwater flows are maintained at or below pre-development levels. The project has the potential to impact upon water quality due to alteration of drainage paths and from pollutant runoff. Implementation of the CEMP during construction along with design features such as bunding of stockpile areas and improvement of current stormwater infrastructure would minimise the potential for release of contaminants and water from the project, reduce requirements for potable water and provide treatment for site runoff waters.

The site has been the subject of significant disturbance by extensive past clearing and little or no vegetation clearance is proposed as part of this project. It is considered that the project would have a negligible impact on both local and regional biological diversity. No threatened flora, fauna or ecological communities are identified on site.

Demand on external resources is expected to increase due to the project. However, NCIA is seeking to introduce new manufacturing plant that has reduced energy and water consumption when compared to existing manufacturing plant in Stages One – Four (more efficient kilns and limited wet glazing).

This EA demonstrates that construction and operation of the project would not result in significant adverse environmental impacts. This EA concludes that the residual risk associated with these potential impacts, after appropriate mitigation and management measures are implemented, is considered low to medium. The project is therefore justifiable in terms of the biophysical elements of the environment.

17.1.2 Economic

The project would be a significant contributor to the local, regional, state and national economies and provides the potential to meet local demand at the expense of imported products and also to earn export based revenues. The estimated capital expenditure for the project is $65 million AUD. Economic contributions would be generated from domestic earnings, taxes, salaries, and purchases of goods and services during the construction and operational phase of the development. It is envisaged that the majority of product from the project would be sold in the domestic market to support predicted growth in market demand for ceramic tiles. However opportunities for export may also become available following the commencement of operations of the project.

The project provides an opportunity to expand an existing successful operation, which is consistent with other industrial activities in the region. The site's central location to sources of raw materials, close proximity to distribution facilities and availability of support infrastructure and services demonstrates the suitability of the proposed location for manufacturing activities to continue and be expanded as demand for NCIA's product increases.

The project would provide local direct and indirect employment opportunities. The 8 month construction phase is expected to require a construction workforce peaking at 50 locally sourced personnel where possible. The operational phase of the project is expected to provide long term employment for 70 additional personnel (140 in total). Additional positions to contractors would be created in addition to strengthening job security within those businesses providing services (such as maintenance, transport, etc) and raw materials to NCIA.

The project is, therefore, considered to be justifiable from an economic perspective.

17.1.3 Social

Potential social impacts of the project have been discussed in **Section 14.6** of this EA. The potential environmental-social impacts of this project have been also addressed as part of this EA. These are:

- Air quality (**Section 8.0**);
- Noise (**Section 10.0**);
- Traffic and parking (**Section 11.0**);
- Hazard and risk (**Section 14.2**);

- Visual impacts (**Section 13.0**);
- Heritage and archaeology (**Section 14.3**); and
- Economic (**Section 14.6**).

The assessments presented in this EA indicate that provided appropriate mitigation and management measures as outlined in the Statement of Commitments (**Section 15.0**) are implemented, the project would have a low to medium and acceptable impact on socio-cultural issues.

With the exception of particulate matter, air emissions from the project would meet all of the NSW DECCW ambient air criteria at existing sensitive receptors. For particulate matter the annual average criterion would be met at all existing sensitive receptors with a small possibility for criteria exceedances to the east and northwest of the project. For the 24 hour average particulate matter concentrations the criteria may be exceeded under worst case dispersion conditions as background particulate levels often exceed criteria. This is likely to be due to the extensive extractive industries, existing traffic movements along the New England Highway and electricity generation activities in the region. To meet the assessment criteria under these circumstances the project would implement contemporary emissions controls of particulate matter.

Odour impacts are known to be a concern within the Rutherford local area. However, the project is not expected to cause any adverse odour impacts as there would be no significant odour generating materials or activities occurring on site (as is currently the case).

Noise from the project during operation is predicted to be would be well within the noise goals for the project hence they are not expected to significantly impact upon the existing nearby residential receptors. Some potential noise impacts may occur with parts of the proposed Heritage Green, however the impacts could be mitigated by sensitive siting and design of any future development within the Heritage Green site. Noise due to construction activities and future operation of the project are determined to be manageable with the implementation of mitigation measures (**Section 15.0**).

Traffic associated with the construction and operation of the project is likely to increase compared to the existing traffic flows associated with the approved operations. The traffic impact assessment conducted as part of this EA (**Section 11.0**) concluded that the project is not likely to result in significant impact on the road network and key intersections surrounding the project. General road performance levels would remain within technical intersection and road capacities.

The project would be located on land that is designated as suitable for general industrial use. The site is located within the Rutherford Industrial Estate and the visual appearance of the proposed facility would be compatible with the industrial context of the site (**Section 13.0**). Measures would be implemented to reduce potential visual impacts of the project. External building construction materials and colours would blend into the surrounding environment. Landscaping would be undertaken that would assist in screening views to the site, and would be integrated with existing plantings.

The project is not considered to be potentially hazardous under *State Environmental Planning Policy No. 33.* The project requires the use of the potentially hazardous materials such as natural gas and diesel (**Section 14.2**), however none of the hazardous or dangerous goods storage or transportation thresholds detailed in *Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines* (DOP 1994) are exceeded.

Indigenous and non-indigenous heritage values at the project were investigated for this EA (**Section 14.3**). There were no listed non-indigenous heritage items known and no Aboriginal sites located within or immediately adjoining the site.

The project will assist in meeting the current demand for ceramic tiles in the domestic market and potentially the export market. This would contribute to the local, regional, state and national economies resulting in both direct and indirect job creation.

The project is therefore justifiable on social grounds.

17.2 Ecologically Sustainable Development

Schedule 2 of the *EP&A Regulation 2000* establishes four interrelated principles of ecologically sustainable development (ESD): the Precautionary Principle; Intergenerational Equity; Biological Diversity and Ecological Integrity; and Valuation and Pricing of Environmental Resources.

Additionally, under the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999*, decision-making processes for a project need to be addressed by including economic, environmental, social and equitable considerations.

A ceramic tile manufacturing facility already exists onsite and has been operating since 2004. The implementation of ESD principles and decision-making processes associated with the project are provided below.

17.2.1 Precautionary Principal

The precautionary principle outlines the need to act with caution to prevent environmental degradation whether or not a risk to the environment has been scientifically demonstrated. The potential impacts to the environment as a result of the project have been scientifically assessed as part of this EA and to some extent these impacts can be assessed on the basis of the existing NCIA operation. The project has been designed to avoid significant environmental impacts.

The assessments undertaken in this EA have identified environmental management measures, existing and additional measures, in order to manage any identified potential impacts so that significant adverse environmental outcomes are avoided. This approach would enable the project to proceed while mitigating any potential significant adverse environmental impacts.

The EA for the project has identified no significant adverse environmental outcomes. The potential adverse environmental outcomes that have been identified are not significant and can be mitigated by current and proposed management and engineering measures, therefore it is considered that the Precautionary Principle is satisfied.

17.2.2 Intergenerational Equity

The principle of intergenerational equity places an onus on ensuring that the health, diversity and productivity of the environment are maintained, if not enhanced, for the benefit of current and future generations.

The project would provide ongoing social and economic benefits to the community through securing existing employment opportunities, creating additional employment opportunities and providing the potential to service both the domestic and export markets. The project would also generate follow on employment opportunities for material suppliers, ancillary service providers and construction personnel. The major consumables of clay, white granite and rhyolite would be sourced from Australian quarrying operations.

The project would have a manageable effect on the health of both the environment and local residents during construction and operation, through the inclusion of mitigation measures. Although the project involves net increases in air emissions due to increased production, the implementation of modern technologies, energy efficiency, water recycling facilities and mitigation measures represents a significant improvement in comparison to the existing operation. The surrounding environment would not be significantly impacted as a result of the project.

With the implementation of the identified environmental safeguards and mitigation measures, the project would help secure local involvement in the entire supply chain of a valuable and growing goods market without causing significant or irreversible environmental harm.

The project is, therefore, considered to be consistent with the principle of intergenerational equity.

17.2.3 Biological Diversity and Ecological Integrity

This principle requires the maintenance and conservation of a full and diverse range of plant and animal species such that conservation of biological diversity and ecological integrity should be a fundamental consideration.

The existing facility operated by NCIA was granted development consent in 2003 and was commissioned in 2004 (Stage One) and 2009 (Stage Two). Ecological assessments (**Section 14.1)** have found that the project site does not contain threatened or vulnerable ecological communities, flora, fauna or their habitats. On this basis the project itself will have a low ecological impact. Surrounding vegetation would not be significantly affected by the project because fluoride emissions would largely meet the specified DECCW limits.

The ecological assessment found there to be very limited potential for the project to have a significant impact on threatened ecological communities, important fauna habitats, movement corridors or potentially present threatened flora or fauna species or populations. NCIA are committing to native vegetation planting on site, to help compensate for the vegetation removal that occurred prior to the construction existing facility. This revegetation planting would result in an offset ratio of approximately 4.5:1.

Therefore, the project is consistent with the principle of biological diversity and ecological integrity.

17.2.4 Valuation and Pricing of Environmental Resources

The Intergovernmental Agreement on the Environment (IGAE) and *POEO Act 1997* require improved valuation, pricing and incentive mechanisms to be included in policy making and program implementation. In the context of environmental assessment and management, this would translate to environmental factors being considered in the valuation of assets and services.

Managing environmental impacts through development of appropriate safeguards, and including the cost of implementing the recommended safeguards in the total cost of the project, is a tangible way of integrating environmental needs and protection measures to the economics of a project.

Also relevant to the consideration of this principle are the impact assessment process and alternative options which have been developed during planning of the project. The relative costs of the chosen design and technologies are deemed to have a lower cost on the environment per tonne of product produced by comparison to the existing facility design and incorporated technologies.

The value of the environment is also managed through the legislative process by imposing financial penalties or requirements to rehabilitate on persons responsible for polluting the environment. As part of the project approval NCIA would implement the safeguards and monitoring requirements outlined in this EA to minimise any environmental impacts caused by the project. The cost of implementing these safeguards has been factored into the financial planning of this project.

The project would capitalise on the use of existing site infrastructure to for natural gas, potable water, electricity services and access roads. This use of existing infrastructure reduces the cost on the environment by limiting the resources required to integrate a new site to the electricity, gas, water supply and road networks.

The project is consistent with the principle of valuation and pricing of environmental resources.

17.2.5 Decision Making Process

The project seeks Project Approval under Part 3A of the *EP&A Act 1979*. In addition, the existing EPL would need to be varied under the *POEO Act*, as described in **Section 5.3.3** of this EA.

Consultation and engagement with government agencies, Council and the local community has taken place as part of this EA, with their feedback and responses detailed within the EA.

An assessment of the short, medium and long term impacts of this project, taking into account the principles of ESD is described in this EA. The Statement of Commitments in **Section 15.0** commits to the key environmental mitigation, management and monitoring requirements for the project.

The project approval process prescribed under Part 3A of the *EP&A Act* and subsequent environmental management frameworks ensure that decision making and monitoring of the project would be undertaken in an integrated manner, having regard to relevant issues associated with the project within its context.

Under the *EPBC Act* the matters of national significance were assessed and it was found that no significant impacts would occur as a result of the project, therefore it was considered that no referral under the Act was required.

17.3 Consequences of Not Proceeding

Prior to the development of the existing manufacturing facility, the majority of domestic ceramic tile consumption was of tiles imported from China, South East Asia, Brazil Italy and Spain. Since 2004-05, NCIA has been successful in meeting a proportion of the domestic tile demand thereby contributing significantly to the local economy. The project introduces new technologies into the tile making process, improving efficiencies in production costs, production rates and reducing environmental impacts.

Domestic ceramic tile imports during 2008 were approximately 33 million m^2 valued at approximately AU$280 million (Halliday 2008). Whilst the global financial crisis has softened short term demand, long term growth has been steady and is expected to remain so in the future. Recent market demand has shifted away from high-cost European tiles towards lower-cost tiles produced predominantly in China and South-East Asia. The success of NCIA's current operation is indicative of this trend as the tiles produced are aimed at this low to medium cost segment of the market.

Globally, the market for ceramic tiles has been steadily growing as hard-surface flooring has gained market share over carpets and rugs, and is tied to the new housing and remodelling markets (Sutton 2007). The USA is the world's largest market, and currently consumes 312 million m^2 per annum of which 81% is imported (Sutton 2007). Australian products and standards are readily accepted in the USA. This provides NCIA and opportunity to consider penetrating this significant market.

The project would allow NCIA to increase tile production from currently approved 12.8 million (Stages One – Four) to 25.6 million m^2 (Stages One – Eight) per annum, representing approximately 39% of the current Australian market.

If the project does not proceed, projected increases in demand are likely to be supplied from overseas operations, resulting in significant loss of market share for the local economy. It is also foreseeable that if NCIA does not continue to improve production capacity, their brands may suffer from underexposure and lose market share. Other consequences of the project not proceeding may be that competition from other companies may encourage NCIA to invest in capacity improvements elsewhere in Australia or overseas.

It is therefore important for the local economy and the national account balance that the Government ensure that current Australian tile manufacturing capabilities are supported and that viable local production is not substituted elsewhere.

The consequences of not proceeding with the project gravitate around an increasing demand for ceramic tiles locally and globally. If Australian demand for ceramic tiles is not met with local product then the potential for price rises and reductions to the Nation's current account (due to increasing imports) are probable. The economic consequences of the project not proceeding include the loss of investment capital (approximately $65 million), the ongoing loss of increased employment during operation and construction and reduced economic flow on effects associated with this significant industrial development. Additionally, not proceeding with the project would result in an underutilisation of well located suitably zoned and well serviced industrial land and the loss of potential environmental and economic synergies with the existing NCIA business.

17.4 Conclusion

NCIA proposes to undertake an expansion to its existing ceramic tile manufacturing facility at Rutherford, NSW. The project includes the construction and operation of a second factory building with four additional production lines on a parcel of land adjacent to the existing facility and its associated infrastructure. The project also proposes the relinquishment of NCIA's existing Development Consent (No. 449-12-2002-i) and the operation of all eight production lines (Stages One – Eight) under a new Project Approval.

This EA has been prepared consistent with the EARs issued 25 February 2009 (**Appendix A**) and supports NCIA's application for Project Approval under Part 3A of the *EP&A Act*.

Engagement with the appropriate regulatory authorities, agencies, community and neighbouring industrial stakeholders has taken place and the commencement and as required throughout the preparation of the EA. All issues raised are summarised in **Section 6** of the EA report and includes references to where the corresponding information is located. No comments or submissions from the local residential or industrial community were received. Several agencies and key stakeholders made formal submissions and these have been appropriately addressed.

The environmental assessments undertaken as part of this EA have identified that no significant environmental impacts are predicted to occur, and where minor impacts were predicted appropriate mitigation measures have been committed to (**Section 15**).

Air quality and noise amenity were the key environmental issues identified through the EA process which have been assessed in some detail in the EA document. NCIA now has the benefit of assessing the potential impacts based on monitoring existing environmental performance and on the conditions contained in the original development consent. The potential impacts of the project have been predicted with a reasonable level of certainty based on the existing operation and the monitoring undertaken in association with it.

Noting the above and the separation guidelines identified in **Section 14.4** (which already apply to the approved facility), the impacts could be mitigated by sensitive siting and design of any future development within the Heritage Green site.

In relation to Heritage Green, this EA has shown that there is likely to be some impacts over part of the proposed Heritage Green site as a result of the project. To a certain extent this is an inevitable consequence of planning

decisions which allow new residential developments to be located within close proximity to an existing industrial estate. When the Heritage Green site was rezoned and subsequently granted initial approval, it was recognised that there were a number of key amenity impacts created as a result of the site's location close to the Rutherford Industrial Estate. These key amenity impacts (noise, air quality, stormwater management, traffic and visual) are not significantly exacerbated by the project and all reasonable mitigation measures are proposed by NCIA to minimise these impacts. The proposed Heritage Green Development also has the responsibility to minimise such impacts by adopting appropriate mitigation in terms of the layout and detailed design of the development

Other environmental assessments have been carried out in relation to traffic and parking, visual impact, soil and water, greenhouse and energy efficiency and hazard and risk. Other issues addressed include ecology, heritage, land use and resources and infrastructure. All these assessments concluded that with the appropriate mitigation measures (**Section 15**) no significant adverse impacts would occur. **Section 16** provided a strong justification for the project on social, economic and environmental grounds. It is considered that the project and the preparation of the EA has been cognisant of the objectives of the *EP&A Act* and is generally consistent with the relevant objectives.

NCIA is a successful established business that is committed to the growth and development of its tile making facility in Rutherford. NCIA is the only ceramic tile manufacturer in Australia, without whom 100% of ceramic tile demand would necessarily be imported. Domestic demand for ceramic tiles is strong in Australia and NCIA seeks to strengthen its Australian made brands, penetrate the export market and continue supporting the Rutherford and regional economies both directly and indirectly.

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18.0 Project Team

The following table presents the EA project team that contributed to the preparation of the EA report and supporting technical studies.

Table 48: The EA Project Team

Name	Position\Role in EA Team	Company
James McIntyre	Project Manager and Author	AECOM
Dianne Munro	Review	AECOM
Andrew Cook	Technical Review	AECOM
Tim Osborne	Graphics	AECOM
Sharon Jenkinson	Administrative Support	AECOM
Ross Thompson	Air Quality Impact Assessment	AECOM
Holly Marlin	Greenhouse Gas Assessment	AECOM
Katie Teyhan	Noise Impact Assessment	Heggies
Sean Morgan	Transport Impact Assessment	Better Transport Futures
Amanda Kerr	Surfacewater Management	AECOM
Phill Walbank	Visual Impact Assessment	Moir Landscape
Steve Sylvester	Hazard Analysis	AECOM
David Watkins	Building Design	Drayton's Construction

The Project Team would like to acknowledge the support provided during the preparation of the EA by Len Pereira (NCIA, Managing Director) and Chris Schneider (NCIA, Financial Manager).

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