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SPECIALISTS IN PEOPLE AND PLACE

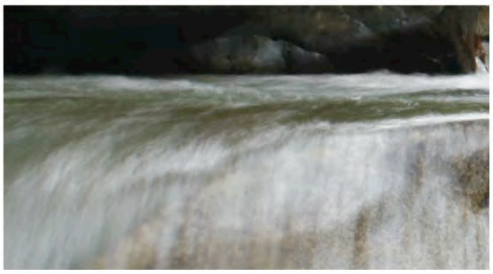
# ENVIRONMENTAL ASSESSMENT

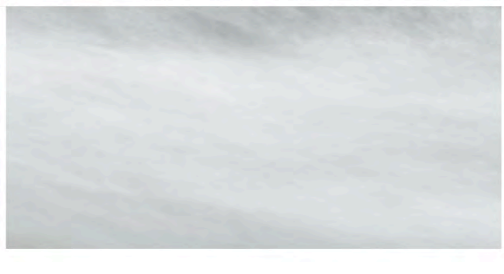
## Newcastle Gas Storage Facility Project

**Major Project Application Number 10-0133**

## Volume 4: Appendices 8 – 13

**May 2011**





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# ENVIRONMENTAL ASSESSMENT

## Newcastle Gas Storage Facility Project

Major Project Application Number 10-0133

**Volume 4: Appendices 8 – 13**

May 2011

CR 6023_8_v3

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| | | | |
|---|---|---|---|
| Project director | Carolyn Balint | | |
| Project manager | Edward Niembro | | |
| **Version:** | **Details:** | **Approved:** | **Date:** |
| CR 6023_8_v1 | Initial draft to client | CB | 14/02/2011 |
| CR 6023_8_v2 | Second draft to client and Department of Planning | CB | 24/02/2011 |
| CR 6023_8_v3 | Final to client | CB | 23/05/2011 |

# Appendix 9

**Cultural Heritage Assessment**

# Cultural Heritage Assessment

## Newcastle Gas Storage Facility Project


Prepared by:

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Prepared for:

**Coffey Natural Systems Pty Ltd**

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Report No: 103386-1
Version/Date: Final, April 2011

Document Status

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| Final | Revised for ASDST | PS/DR | TBM | 13-5-2011 | JH 13-5-11 | D Rigby | 13-5-11 |

Disclaimers

# Executive Summary

RPS Australia East Pty Ltd (RPS) was commissioned by Coffey Natural Systems Pty Ltd to undertake a Cultural Heritage Assessment (CHA) for a development application in support of the AGL Energy Limited (AGL) Newcastle Gas Storage Facility Project (NGSF Project) under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act).

A pedestrian survey of the NGSF Project Area was undertaken by RPS archaeologists, Philippa Sokol and Anna Nardis. The NGSF Project Area field survey was conducted by Philippa Sokol and Anna Nardis in partnership with Aboriginal stakeholders representing the Worimi Local Aboriginal Land Council (Paul Roberts), Mu-Roo-Ma Inc (MRM). (Anthony Anderson and Candice Anderson) and Nu-Run-Gee P/L (NRG) (Leanne Anderson and Chris Collison) over three days; November 30th through to December 2nd 2010. The Hexham portion of the NGSF Project Area field survey was conducted by Philippa Sokol in partnership with Aboriginal stakeholders representing the Awabakal Local Aboriginal Land Council (ALALC) (David Ahoy), Awabakal Descendents Traditional Owners Aboriginal Corporation (Shane Frost and James Frost) and Awabakal Traditional Owners Aboriginal Corporation (Kerrie Brauer).

One Aboriginal artefact scatter was identified during the field survey in the Tomago portion of the NGSF Project Area, RPS PHWY AS2. RPS PHWY AS2 was identified in the road verge adjacent to the Pacific Highway. The site was found in exposed soils in an extremely disturbed area that had undergone landform modification processes as a result of activities associated with the highway, Volgren industrial complex development, fence construction and emplacement of sub-surface existing gas pipelines. As such the site was classified as not *in situ*.

A summary of the recommendations arising from the heritage assessment area are as follows:

**Recommendation 1**
Once the dense vegetation layer within the gas plant footprint area is removed, a suitably qualified archaeologist and a representative from WLALC, NRG and MRM should inspect the land for any evidence of Aboriginal sites and/or objects. Further recommendations may be made with regard to Aboriginal heritage management within this location following this inspection.

**Recommendation 2**
If pipeline works are proposed to be built on private land immediately east of and adjacent to the Pacific Highway (SU6) area as opposed to within the buffer within 20 - 30m of the highway, a pre-construction survey is not considered a requirement for this area given the similar landform unit characteristics, low ground surface visibility, water inundated area and eroded bedrock.

**Recommendation 3**
All relevant AGL staff and contractors should be made aware of their statutory obligations for heritage under NSW NPW Act (1974) and the NSW Heritage Act (1977), which may be implemented as a heritage induction.

**Recommendation 4**
The location of RPS PHWY AS2 should be included in the AGL environmental management framework for the NGSF Project Area, so that all staff are aware that this area will require management.

**Recommendation 5**
If further Aboriginal site/s are identified in the study area, then all works in the area should cease, the area cordoned off and contact made with DECCW Environment Line 131 555, a suitably qualified archaeologist and the relevant Aboriginal stakeholders, so that it can be adequately assessed and managed.

**Recommendation 6**
In the unlikely event that skeletal remains are identified, work must cease immediately in the vicinity of the remains and the area cordoned off. The proponent will need to contact the NSW Police Coroner to determine if the material is of Aboriginal origin. If determined to be Aboriginal, the proponent, must contact the DECCW Environment Line 131 555, a suitably qualified archaeologist and representatives of the local Aboriginal Community Stakeholders to determine an action plan for the management of the skeletal remains, formulate management recommendations and to ascertain when work can recommence.

***European Cultural Heritage***

No European cultural heritage sites were located during the field survey investigation. During the course of any development works, the following management recommendation should be considered.

**Recommendation 7**
If, during the course of development works, significant European cultural heritage material is uncovered, work should cease in that area immediately. The NSW Heritage Branch should be notified and works only recommence when an appropriate and approved management strategy instigated.

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# Figures



# Tables



# Appendices

# 1 Introduction

RPS Australia East Pty Ltd (RPS) was commissioned by Coffey Natural Systems Pty Ltd to undertake a Cultural Heritage Assessment (CHA) for a development application in support of the AGL Energy Limited (AGL) Newcastle Gas Storage Facility Project (NGSF Project) under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act).

This CHA report has been prepared to meet the heritage assessment requirements for the proposed NGSF Project under Section 79(c) of the EP&A Act (1979). This assessment has also considered the environmental and archaeological context, developed a predictive model and reported on the results of an archaeological field survey conducted for the NGSF Project Area. Management recommendations have been formulated with consideration of the significance of Aboriginal and non-Aboriginal heritage, as well as, potential impacts and have been prepared in accordance with the relevant legislation.

## 1.1 The Newcastle Gas Storage Facility Project Area - Proposal

### 1.1.1 Gas Processing Facility, Access Road and Utility Corridor

The NGSF Project will comprise five components which will include the gas plant site, access road and utility corridor, gas pipeline access corridor, pipeline corridors (option 1 and option 2), and Hexham receiving station. The area containing the gas plant site, access road and utility corridor and gas pipeline access corridor is referred to as the Primary Project Area. The gas plant is proposed to be located in a sub-division of Lot 105 DP 1125747. This is located at 5 Old Punt Road, Tomago NSW 2322, north of the Tomago Aluminium Smelter within land currently owned by Tomago Aluminium Company (TAC) in the Port Stephens Local Government Area (LGA). The NGSF Project is located approximately 13 kilometres northwest of Newcastle Central Business District (CBD), 8 kilometres south of Raymond Terrace and 4 kilometres east of the Hexham industrial area (Refer Figure 1-1). The access road and utility corridor will join the gas plant to TAC Northern Access Road, a private road connecting the Tomago Aluminium Smelter to Old Punt Road.

### 1.1.2 Gas Pipeline Corridors

Two options are being considered for the gas pipeline corridor between the Hexham receiving station and the gas plant. Option 1 and option 2 will both travel 300 metres northeast of the Hexham receiving station. Horizontal directional drilling will be used to pass the pipeline under the Hunter River and the adjacent coastal wetlands listed in State Environmental Planning Policy (SEPP) No. 14. Option 1 will travel from Tomago Road in the southwest along the south side of the Pacific Highway to reach Old Punt Road in the northeast (approximately 1.7 kilometres). Option 2 will travel from Tomago Road in the southwest through the industrial area adjacent to Old Punt Road to reach Old Punt Road in the northeast (approximately 1.8 kilometres). A hybrid option will also be considered that will connect option 1 and option 2 in the southwest.

### 1.1.3 Hexham Receiving Station

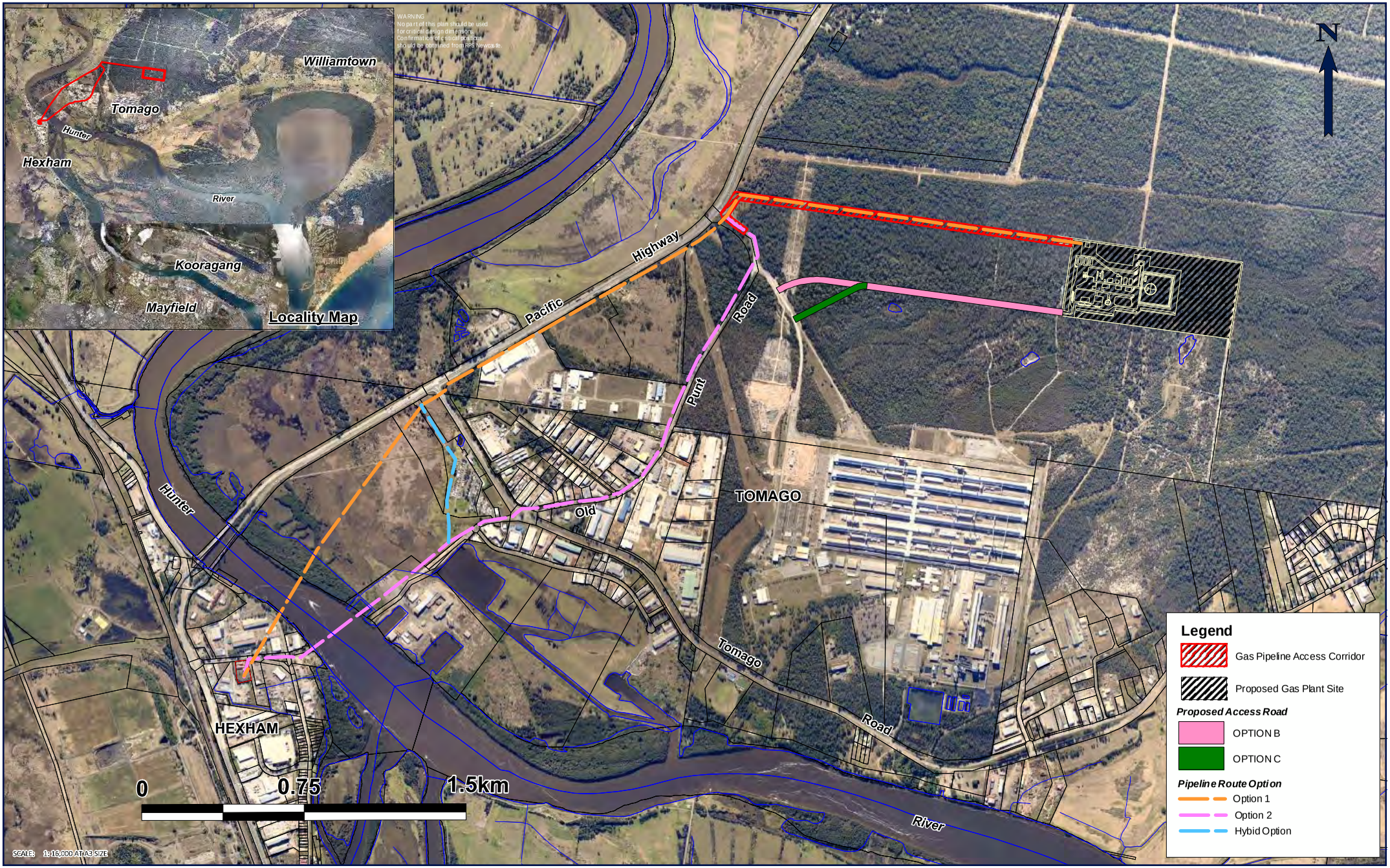
The Hexham receiving station will be used to connect the NGSF Project into the NSW gas network. The receiving station is proposed to be built on location at 235 Old Maitland Road adjacent to the Jemena Gate Station facility on Lot 1 DP 813606. This location is situated south of the Hunter River and lies within the Newcastle LGA. It is approximately 13 kilometres from the Newcastle CBD.

The NGSF Project location is detailed in Figure 1-1.

### 1.1.4 Size of the Development Footprint

The total developable footprint for the NGSF Project is approximately 32 hectares for either pipeline option 1 or option 2. The size for each developable component is as follows:

- Gas plant footprint (cleared) of 13.3 hectares within in a 28 hectares site – approximately 50% will remain uncleared.
- Access road and utility corridor, 1.4 kilometres long, 30 metres wide totalling approximately 4.8 hectares.
- Pipeline options up to 30 metres wide: Option 1 – 4.9 kilometres long (7.9 hectares); Option 2 – 5.3 kilometres long (8.7 hectares).
- Hexham receiving station 0.6 hectares.




TITLE: FIGURE 1-1 NEWCASTLE GAS STORAGE FACILITY PROJECT AREA

LOCATION: TOMAGO & HEXHAM

DATUM: N/A
PROJECTION: MGA ZONE 56 (GDA 94)

DATE: 7/01/2011
PURPOSE: CULTURAL HERITAGE ASSESSMENT

LAYOUT REF: J:\JOBS\103k\103386 Tomago\10- Drafting\Archaeology Drafting\MapInfo Workspaces
VERSION (PLAN BY): C A3 (NW-PS)



CLIENT: COFFEY NATURAL SYSTEMS PTY LTD
JOB REF: 103386-1

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## 1.2 Legislative Context

Aboriginal heritage (places, sites and objects) within NSW are protected by *National Parks and Wildlife Act (1974, as amended).* In some cases, Aboriginal heritage may also be protected under the *Heritage Act (1977)*. The *Environmental Planning and Assessment Act (1979)*, along with other environmental planning instruments, trigger the requirement for the investigation and assessment of Aboriginal heritage as part of the development approval process. For crown land, provisions under the Native Title Act (1993) may also apply.

### 1.2.1 National Parks and Wildlife Act (1974, as amended)

The primary state legislation relating to Aboriginal cultural heritage in NSW is the National Parks and Wildlife Act (NPW) (1974), as amended. The legislation is overseen by the Department of Environment, Climate Change and Water (DECCW), and specifically the Director-General of the DECCW.

The NPW Act provides statutory protection for all Aboriginal relics (not being a handicraft made for sale), with penalties levied for breaches of the Act. Part 6 of this Act is the relevant part concerned Aboriginal objects and places, with the Section 86 and Section 90 being the most pertinent. In 2010, this Act was substantially amended, particularly with respect to Aboriginal cultural heritage requirements.

There are now four major offences:

(1) A person must not harm an object that the person knows is an Aboriginal object;

(2) A person must not harm an Aboriginal object;

(3) For the purposes of Section 86, “circumstances of aggravation” include (a) the offence being committed during the course of a commercial activity; or (b) that the offence was the second or subsequent offence committed by the person.

(4) A person must not harm or desecrate an Aboriginal place.

Offences under sections 86 (2) and (4) are now strict liability offences, i.e., knowledge that the object or place harmed was an Aboriginal object or place needs to be proven. Penalties for all offences under Part 6 of this Act have also been substantially increased, depending on the nature and severity of the offence.

Further changes to the NPW Act made effective on 1 October 2010 include:

- increase penalties for Aboriginal heritage offences, in some cases from $22,000 to up to $1.1 million in the case of companies breach the NPW Act;
- ensuring companies or individuals cannot claim ‘no knowledge’ in cases of serious harm to Aboriginal heritage places and objects by creating new strict liability offences under the Act;
- introducing remediation provisions to ensure people who illegally harm significant Aboriginal sites are forced to repair the damage, without need for a court order;

- Uniting Aboriginal heritage permits into a single, more flexible permit and strengthen offences around breaches of Aboriginal heritage permit conditions.

Along with the new offences summarised above, new defences have been introduced which will apply where a person harms an Aboriginal object without knowing what it was and without a permit from DECCW, these include:

- A 'due diligence' defence will be available if a person follows the process steps to determine if an Aboriginal site exists and/or;
- A 'low impact' defence will be available if a person was performing a designated low impact activity listed in the Regulations.

### 1.2.2 Heritage Act 1977

Historical archaeological relics, buildings, structures, archaeological deposits and features are protected under the Heritage Act 1977 (as amended 1999). These may be identified on the State Heritage Register (SHR) or by and active Interim Heritage Order. Certain types of historic Aboriginal sites may be listed on the SHR or subject to an active Interim Heritage Order; in such cases they would be protected under the Heritage Act 1977 and may require approvals or excavation permits from the NSW Heritage Branch.

### 1.2.3 Environmental Planning & Assessment Act 1979 (EP&A Act)

This Act regulates a system of environmental planning and assessment for NSW. Land use planning requires that environmental impacts are considered, Including the impact on cultural heritage which includes Aboriginal heritage. Assessment documents prepared to meet the requirements of the EP&A Act including: Review of Environmental Factors (REF), Environmental Impact Statements (EIS) and Environmental Assessments (EA), should address Aboriginal heritage, and planning documents such as Local Environment Plans (LEP) and Regional Environmental Plans (REP) typically contain provisions for Aboriginal heritage where relevant.

Further details on the relevant legislative Acts are provided in Appendix 1.

## 1.3 Authorship and Acknowledgements

This report was written by Philippa Sokol, with assistance from Anna Nardis and was reviewed by Darrell Rigby, all of RPS.

The RPS team acknowledges the assistance in preparing this report of various organisations and individuals, including but not limited to:

**Table 1-1: Acknowledgements**

| Name | Organisation |
|---|---|
| Arianna Henty | Land and Approvals Manager, Upstream Gas AGL Energy Limited |
| Aaron Clifton | Environment Manger, Upstream Gas AGL Energy Limited |
| Paul Roberts | Sites Officer, Worimi Local Aboriginal Land Council |
| Anthony Anderson | Sites Officer, Mu-Roo-Ma Inc. |
| Candice Anderson | Sites Officer, Mu-Roo-Ma Inc. |
| Leanne Anderson | Sites Officer, Nur-Run-Gee P/L |
| Chris Collison | Sites Officer, Nur-Run-Gee P/L |
| David Ahoy | Sites Officer, Awabakal Local Aboriginal Land Council |
| Shane Frost and James Frost | Sites Officer, Awabakal Descendents Traditional Owners Aboriginal Corporation |
| Kerrie Brauer | Sites Officer, Awabakal Traditional Owners Aboriginal Corporation |

## 1.4 Terms and Definitions

| Abbreviation | Definition |
|---|---|
| ACS | Aboriginal Community Stakeholders |
| ADTOAC | Awabakal Descendents Traditional Owners Aboriginal Corporation |
| AGL | AGL Energy Limited |
| AHD | Australian Height Datum |
| AHIMS | Aboriginal Heritage Information Management System |
| ALALC | Awabakal Local Aboriginal Land Council |
| ATOAC | Awabakal Traditional Owners Aboriginal Corporation |
| BP | Before present (as in years before present) |
| cal. Years BP | Calibrated years before present, indicates a radiocarbon date has been calibrated using the dendochronology curves, making the date more accurate than an uncalibrated date |
| CNS | Coffey Natural Systems Pty Ltd |
| DECCW | Department of Environment, Climate Change and Water |
| EP&A Act | Environment Planning and Assessment Act 1979 |
| GSV | Ground Surface Visibility |
| LEP | Local Environment Plan |
| LGA | Local Government Area |
| LNG | Liquid Natural Gas |
| MRM | Mur-Roo-Ma Inc |
| NPW Act (1974) | National Parks and Wildlife Act (1974) |
| NGSF Project Area | Newcastle Gas Storage Facility Project Area |

| Abbreviation | Definition |
|---|---|
| NRG | Nur-Run-Gee Pty Ltd |
| PAD | Potential Archaeological Deposit |
| REP | Regional Environment Plan |
| REF | Review of Environmental Factors |
| TAC | Tomago Aluminium Company |
| TFT | Tomago Fire Trail |
| WLALC | Worimi Local Aboriginal Land Council |

# 2 Aboriginal Community Consultation

The purpose of Aboriginal community consultation is to provide an opportunity for the relevant Aboriginal stakeholders to have input into the heritage management process. The DECCW encourages consultation with Aboriginal people for matters relating to Aboriginal heritage. If an Aboriginal Heritage Impact Permit (AHIP) is required, then specific DECCW guidelines are triggered in respect to Aboriginal consultation. In some circumstances the DECCW consultation guidelines are also used as a framework for Aboriginal consultation, even if not specifically triggered by the preparation of an AHIP application.

This project is applying for approvals under Section Part 3A of the *Environmental Planning and Assessment Act* (EP&A Act) 1979 which stipulates that the 'Aboriginal Cultural Heritage Assessment and Community Consultation' guidelines be followed which includes the Interim Community Consultation Guidelines (DEC 2005). This project has complied in full with the above requirements and satisfied in excess of their requirements by following the newly issued (April 2010) *Aboriginal Cultural Heritage Consultation Requirements (ACHCRs) for Proponents* (DECCW 2010). All Aboriginal consultation has been undertaken in accordance with these requirements. Please note that AHIP's are not required for Part3A projects and instead all cultural heritage is managed under the auspices of a Cultural Heritage Management Plan.

The ACHCRs 2010 include a four stage Aboriginal consultation process and stipulates specific timeframes for each stage. Stage 1 requires that Aboriginal people who hold cultural information are identified, notified and invited to register an expression of interest in the assessment. Stage 1 includes the identification of Aboriginal people who may have an interest in the NGSF Project Area and hold information relevant to determining the cultural significance of Aboriginal objects or places. This identification process should draw on reasonable sources of information including: the *Aboriginal Land Rights Act* 1983, the relevant DECCW Environment Protection Regulation Group Regional Office, the Local Aboriginal Land Council(s), the Registrar, the National Native Title Tribunal, the Native Title Services Corporation Limited, the Catchment Management Authority and the Local Council(s). The identification process should also include an advertisement placed in a local newspaper circulating in the general location of the NGSF Project Area. Aboriginal organisations and/or individuals identified should be notified of the project and invited to register an expression of interest (EoI) for Aboriginal consultation. Once a list of Aboriginal stakeholders has been compiled from the EoI's, they need to be consulted in accordance with ACHCR's 2010 Consultation Requirements Stages 2, 3 and 4. Stage 2 requires the preparation of an assessment design to be sent to the Aboriginal stakeholders for comment and review. Stage 3 requires that the assessment report be provided to registered Aboriginal stakeholders for review and comment.

The ACS groups that registered their interest in the NGSF Project Area as a result of the newspaper advertisements and notification letters are listed in Table 2-1.

**Table 2-1: Aboriginal Community Stakeholders (ACS) who Registered Interest in the NGSF Project from the newspaper advertisement**

| Organisation | Name of Representative | Date registration of interest received |
|---|---|---|
| Worimi Local Aboriginal Land Council | Kyle Finlay | 15/09/2010 |
| Awabakal Local Aboriginal Land Council | David Ahoy | 15/09/2010 |
| Nur-Run-Gee P/L | Lennie and Leanne Anderson | 16/09/2010 |
| Cacatua Cultura Consultants | Donna Sampson | 20/09/2010 |

EoI letters were sent to the following ACS groups regarding the NGSF Project on Friday 08/10/2010 requesting that an EoI be provided to RPS by Friday 22/10/2010, refer to Table 2-2.

**Table 2-2: Recipients of the Expression of Interest (EOI) Letters**

| Organisation | Name of Representative | Date EoI sent to ACS |
|---|---|---|
| Awabakal Traditional Owners Aboriginal Corporation | Kerrie Brauer | 08/10/2010 |
| Mur-Roo-Ma Inc | Anthony Anderson | 08/10/2010 |
| Awabakal Descendents Traditional Owners Aboriginal Corporation | Shane Frost | 08/10/2010 |
| Maaiangal Aboriginal Heritage | Carol Ridgeway-Bissett | 08/10/2010 |

The ACS groups registered for Expression of Interest in the NGSF Project to RPS by Friday 22/10/2010 are listed in Table 2-3.

**Table 2-3: ACS who Registered for Expression of Interest in the NGSF Project**

| Organisation | Name of Representative | Date EoI Registration date |
|---|---|---|
| Awabakal Traditional Owners Aboriginal Corporation | Kerrie Brauer | 12/10/2010 |
| Mur-Roo-Ma Inc | Anthony Anderson | 12/10/2010 |
| Awabakal Descendents Traditional Owners Aboriginal Corporation | Shane Frost | 19/10/2010 |

Each of the registered ACS groups were provided with information regarding the NGSF Project including the survey methodology on Friday 22/10/2010, refer Table 2-4.

**Table 2-4: Recipients of the Survey Methodology Information Letters**

| Organisation | Name of Representative | Date Methodology sent |
|---|---|---|
| Worimi Local Aboriginal Land Council | Kyle Finlay | 22/10/2010 |
| Mur-Roo-Ma Inc | Anthony Anderson | 22/10/2010 |
| Nur-Run-Gee P/L | Lennie and Leanne Anderson | 22/10/2010 |
| Cacatua Cultura Consultants | Donna Sampson | 22/10/2010 |
| Awabakal Local Aboriginal Land Council | Cheryl Kitchener and David Ahoy | 22/10/2010 |

| Organisation | Name of Representative | Date Methodology sent |
|---|---|---|
| Awabakal Descendents Traditional Owners Aboriginal Corporation | Shane Frost | 22/10/2010 |
| Awabakal Traditional Owners Aboriginal Corporation | Kerrie Brauer | 22/10/2010 |

Three ACS groups returned their comments on the Survey Methodology by the closing date of Friday 19/11/2010 and are listed in Table 2-5.

**Table 2-5: ACS Responses to Survey Methodology Information**

| Organisation | Name of Representative | Date of Reply for Methodology due 19/11/2010 |
|---|---|---|
| Worimi Local Aboriginal Land Council | Kyle Finlay | 28/10/2010 |
| Nur-Run-Gee P/L | Leanne Anderson | 02/11/2010 |
| Awabakal Traditional Owners Aboriginal Corporation | Kerrie Brauer | 18/11/2010 |

The following ACS groups participated in the NGSF Project field survey, refer Table 2-6. The Tomago portion of the NGSF Project field survey was conducted from Tuesday 30/11/2010 through to Thursday 02/12/2010 by Aboriginal representatives of the Worimi. The Hexham receiving station field survey was conducted on Friday 03/12/2010 with representatives of the Awabakal.

**Table 2-6: ACS Field Survey Participants**

| Organisation (Worimi) | Name of Representative |
|---|---|
| Worimi Local Aboriginal Land Council | Paul Roberts |
| Mur-Roo-Ma Inc | Anthony Anderson and Candice Anderson |
| Nur-Run-Gee P/L | Leanne Anderson and Chris Collison |
| **Organisation (Awabakal)** | **Name of Representative** |
| Awabakal Local Aboriginal Land Council | David Ahoy |
| Awabakal Descendents Traditional Owners Aboriginal Corporation | Shane Frost |
| Awabakal Traditional Owners Aboriginal Corporation | Kerrie Brauer |

The following ACS groups received a copy of the NGSF Project final draft report for their perusal and comment, refer Table 2-7. Comments received on the final draft by the ACS should be received within 28 days after the ACS have received the report.

**Table 2-7: ACS Recipients of NGSF Consulted for Project Final Draft Report (Appendix 2)**

| Organisation | Name of Representative | Date of response to final draft | Response noted and report adjusted accordingly |
|---|---|---|---|
| Worimi Local Aboriginal Land Council | Kyle Finlay | 28/03/2011 | Yes |
| Nur-Run-Gee P/L | Leanne Anderson | 27/01/2011 | Yes |
| Mur-Roo-Ma Inc | Anthony Anderson | 13/02/2011 | Yes |
| Awabakal Local Aboriginal Land Council | David Ahoy | 22/03/2011 | Yes |
| Awabakal Traditional Owners Aboriginal Corporation | Kerrie Brauer | 11/02/2011 | Yes |
| Awabakal Descendents Traditional Owners Aboriginal Corporation | Shane Frost and James Frost | 09/02/2011 | Yes |

# 3 Environmental Context

An understanding of environmental context is important for the predictive modelling of Aboriginal sites, as well as, for their interpretation. The local environment provided natural resources for Aboriginal people, such as, stone (for manufacturing stone tools), food and medicines, wood and bark (for implements such as shields, spears, canoes, bowls, shelters, amongst others), as well as, areas for camping and other activities. The nature of Aboriginal occupation and resource procurement is related to the local environment and it therefore needs to be considered as part of the cultural heritage assessment process. The reporting of environmental context is also required by DECCW as specified in the NSW Department of Environment, Climate Change & Water, Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (2010).

## 3.1 Geology and Soils

The underlying geology can be important for Aboriginal occupation of an area, as siliceous rocks were used by Aboriginal people for manufacturing flaked stone tools. The exploitation of stone raw materials depends on the nature of the source, rock outcrops (primary source) may be exploited by quarrying, but may also be procured as or cobbles (secondary source) (Doelman, et al. 2008).

The NGSF Project Area portion of the study area situated in Tomago is predominantly situated on quaternary marine and freshwater deposits. Tomago Coal measures have also been noted in the area to include coal seams, tuff, sandstone, mudstone, clay and shale; which are highly susceptible to water erosion processes (Matthei 1995:30). The presence of tuff, mudstone and sandstone in the study area is important for Aboriginal occupation of the area because some types of silicified tuff and mudstone have been used by Aboriginal people for manufacturing flaked stone tools; and sandstone was used for grinding grooves, for shelter (if rockshelters are present), and engravings, amongst other uses. The Tomago portion of the NGSF Project Area is dominated by five soil landscapes which comprise the Tea Gardens and Tea Gardens variant, Shoal Bay, Beresfield, Hexham Swamp and Millers Forest.

The Tea Gardens and Tea Gardens variant soil landscape is generally characterised by Pleistocene sandsheets. Characteristics of this soil landscape include permanently high watertables, seasonal waterlogging, ground water pollution hazards, and strong acid soils of low fertility. (Mathei 1995:212). The Tea Gardens soil landscape generally O horizon which is a black sandy peat to organic loam (Matthei 1995:214). It has a shallow topsoil (0- 35cm depth) which occurs over two horizons ($A_1$ and $A_2$). The $A_1$ horizon black sandy peat to organic loam. The $A_2$ horizon is brownish black to brownish grey loose loamy sand. Underlying subsoil horizons (B and C) comprise of black organic pan and coarse saturated mottled sand. The subsoil horizons may be present at depths between 52 and 65 cm and extend to depths over 140cm (Matthei 1995:214).

The Shoal Bay Soil Landscape occurs in the northwest of the Tomago portion of the NGSF Project Area. This soil landscape is characterised by steep high dunes, as well as poorly drained flats and depressions. It is also affected by wind erosion, with some localised occurrences of permanent waterlogging, permanent high watertables, seasonal waterlogging and generally contains acid sandy non cohesive soils. The Shoal Bay soil landscape generally has shallow topsoil (0 – 30cm depth) which occurs in $A_1$ horizon. $A_1$ horizon is brownish grey loose sand. Underlying subsoil horizons ($A_2$ and B) comprise of loose bleached light grey sand and coherent organic and iron –stained sand. Thus subsoil horizons may be present at depths between 30 and 250cm and extend to depths over 700cm.

The Beresfield soil landscape is a residual landscape comprising undulating low hills and rises on Permian sediments. Slope gradients in this area are commonly 3-15%, with a local relief to 50 metres and elevation of 20-50 metres (Matthei 1995: 30). The A horizon commonly contains friable brownish black loam of 5-15 cm, which overlies 5-30 cm of hard setting dull yellowish brown sandy clay loam, which then overlies 40-105 cm of pedal brown plastic mottled clay. Plastic pedal clays and silty clays are commonly situated on better drained upper slopes and some lower slopes (Matthei 1995: 31-32).

The Hexham Swamp soil landscape is a swamp landscape which is dominated by ground surfaces and soils which may seasonally waterlogged (Matthei 1995:216). The Hexham Swamp Soil typically has moderately deep topsoils (15-60cm depth) which occurs over the A horizon (Matthei 1995:221). A horizon is black pedal silty clay loam. Underlying subsoil horizon (B horizon) comprise of gleyed sticky plastic clay (Matthei 1995:221).

The Hexham portion of the NGSF Project Area lies is situated on Quaternary Holocene alluvial sediments that predominantly contain clay, silt and sand from overbank deposition of the lower Hunter and Williams Rivers. This portion of the project area only contains the one soil landscape being the Millers Forest.

The Millers Forest soil landscape is an area comprised of extensive alluvial floodplains and deltas on recent sediments in the Lower Hunter Plain region. Common landform elements include backswamps, ox-bows and constructed levees. Elevation in this landscape is commonly 6-<3 metres, with a local relief of <1 metres and slope gradient of <1% (Matthei 1995: 194). Soils are often deep (>150 cm) comprising imperfectly to poorly drained Prairie Soils. A horizon is typically a well structured brownish black silty clay loam (10-55 cm), which overlies a B horizon of >120 cm of well structured brown silty clay. At levees more than 60 cm weakly structured brown sandy clay loam often occurs (Matthei 1995: 195).

## 3.2 Topography and Hydrology

This section of the report considers the topography and hydrology prior to European settlement as well as post contact. The NGSF Project Area is situated to the north and south of the Hunter River; the topography is flat and less than 10 metres AHD (Australian Height Datum) (Topographic Map Sheet Beresfield 92323N 2006). Local relief does not

exceed 1m and slope gradients and less than 5%. The proximity of the Hunter River as well as nearby Hexham Swamp, would have provided good access to estuarine food and other resources for Aboriginal occupation of the local area.

The topography of the Tomago portion of the NGSF Project Area comprises gently inclined sandsheets, to broad, irregular sandy rises and aeolian deflation basins. Dunes are usually well drained, but minor swampy areas may occur in depressions. The area has potential for seasonal waterlogging and the watertable is generally <100cm below the surface.

The resources of both the Hunter River and Hexham Swamp would have provided good access to estuarine resources for the local Aboriginal occupation.

## 3.3 Flora and Fauna

The Tomago portion of the NGSF Project Area is situated in a landscape that has been partially cleared with vegetated areas supported by six natural vegetation communities. Such communities include Coastal sand apple – Blackbutt forest, Redgum – Apple – Banksia forest, Seaham spotted gum ironbark forest, Swamp mahogany – Paperbark swamp forest, Tomago sand swamp woodland, and Heath and Woodland rehabilitation (Ecobiological 2010).

This vegetation community provides habitat for a variety of animals and would have also provided potential food and raw material sources for Aboriginal people. Typical animals inhabiting this vegetation community include *Macropodidae* (Kangaroos and wallabies), sugar gliders, possums, echidnas, a variety of lizards and snakes, birds, as well as rats and mice. The bones of these animals have been recovered from Aboriginal sites in the Sydney region suggesting that they were sources of food (Attenbrow 2002:70-76), although the hides, bones and teeth of some of the larger mammals may have been used for Aboriginal clothing, ornamentation, or other implements. Evidence for consumption of faunal species has been recovered from Aboriginal archaeological excavations in the Sydney basin region (Attenbrow 2002:72-73). Various fish and shellfish species would have also attracted Aboriginal occupation to this area.

The Hexham portion of the NGSF Project Area is characterised by Swamp oak (*Casuarina glauca*), prickly-leaved paperbark (*Melaleuca styphelioides*), Tuckeroo (*Cupaniopsis anacardioides*) and occasionally Cabbage gum (*Eucalyptus amplifolia*). River mangrove (*Aegiceras corniculatum*) growing along the riverbanks. This swamp area would have supported estuarine resources such fish, shellfish and crabs.

## 3.4 Previous Land Use and Disturbance

The Tomago portion of the NGSF Project Area has been subject to levels of landuse and disturbances which were evident during the field survey investigation. The Primary Project Area is criss-crossed by numerous existing Tomago Fire Trails (TFT's). These tracks are all cleared and are easily accessible with a vehicle. There were distinct areas

outside of the fire trail tracks that had been affected by other disturbances. These included an area located in the southern portion of the gas plant footprint which was sand mined from 1972 through to about 1998. As a result, this area is characterised by scattered open and cleared areas with some uneven and undulating terrain which made for variable ground surface exposures. Recently, Energy Australia constructed a north to south trending electricity easement located in the west of the Primary Project Area, adjacent to Old Punt Road. There is also an easement corridor that bisects the gas plant site from the north.

Option 1 and option 2 within the Tomago portion of the NGSF Project Area are considered to be located in heavily disturbed and modified environments caused by a multiplicity of prior land use activities.

Likewise, the Hexham portion of the NGSF Project Area currently exists in areas that have been subject to repeated levels of disturbances and landuse over time. The receiving station is to be situated in an area that has previously undergone disturbances such as ground surface levelling along with some soil redeposition. The route for the Option Two pipeline will be along an existing road verge along Old Maitland Road. This area has already undergone disturbance from such activities as road upgrade and maintenance programmes and the construction of a minor drainage channel that runs parallel to the road in addition to general vegetation and lawn upkeep.

# 4 European History

## 4.1 Regional History

In 1797, a whaleboat party led by Lieutenant Shortland searching for runaway convicts first observed the mouth of the Hunter River (Newcastle Council 2010). Lieutenant Shortland proceeded to become the first European to explore the area and upon returning to Sydney he bought sketches of the river and reports of coal. In the following years, several boats visited the area and gathered enough of the coal for an export shipment to be sent to Bengal. Before long a small penal settlement had been established, however due to the difficulty faced in administering a convict group at such a distance from Sydney, the settlement was abandoned in 1802 (Zierer Jan., 1941).

Two years later, the site was re-established as a penal colony to be populated by those convicts considered too dangerous and unruly to remain in the Sydney penal settlements. These convicts were saddled with the task of working a drift mine beneath Beacon Head. This work allowed for continued trade with Calcutta - Newcastle coal in exchange for Bengal rum. In addition to coal, Cedar logging became a major product of the area particularly in Maitland. It is believed that around 700 convicts were stationed in the area in 1818. However, with such industry being successfully established, free settlers were not far behind and were arriving in growing numbers. By 1822 Newcastle was released from martial law and ceased to operate as a convict centre. The remaining convicts were sent to the penal colony of Port Macquarie (Zierer Jan., 1941).

The Australian Agricultural Company was handed 500 acres of coal fields and an unofficial monopoly over the NSW coal industry in 1826 which was to last nearly 30 years. Public disquiet forced the government to open the coal industry to smaller enterprises and competition in 1847.

Other important industries to the area included those of copper, zinc, agriculture and soap (Zierer Jan., 1941). The hunter region had a natural advantage in the establishment in heavy industry due to its extensive harbour and river system, huge quantities of coal and the rich alluvial lowlands of the Hunter Valley. Further to this, railway networks were an early addition to the area's landscape, the railway between Maitland and Newcastle-proper greatly enriched local industry. A major copper smelting project began in 1846 at Burwood near Merewether (NSWMIN retrieved 2009), with another being built in Broadmeadow around 1890 by The English and Australian Copper Company. The largest soap and candle factory in the southern hemisphere was set up by Charles Upfold between Tighes Hill and Port Waratah in 1885 (AusDictionary 2010). The Cockle Creek Industrial Centre was established by the Sulphide Corporation in 1896 for the treatment of zinc. Within a few years the plant became a smelting works for lead silver and gold ores. (Zierer Jan., 1941).

Agriculture was another early and important factor in the growth of the Hunter Region. Maitland was perhaps the earliest area set aside specifically for agricultural purposes,

being surveyed for that reason in 1829. Wheat was the dominant produce right up until 1865 when the rust associated with the coastal climate made wheat production impossible. Flour mills were set up in every village during this period. Morpeth was the original centre for agri-commerce; however, Maitland later became the primary rural market centre due to its rail link with Newcastle.

Despite the strength of these industries, Newcastle remained tied to its coal production. A description of the Newcastle given by an early (1860's) resident highlights the coal-centric nature of the area, "A miserable town having one sandy street lined by drab tin and wooden shops and houses, and existing chiefly for the shipment of coal from the mines, one of which was only short distance from the main street" (Zierer Jan., 1941).

The early 20th century bought with it a transformation in Newcastle's primary industry which would characterise the area for nearly 100 years; steel. The impact that BHP had in the area cannot be underestimated. From 1891 through to 1911, Newcastle recorded an almost stationary population of 50,000. After the establishment of the new steel industry the population of the Newcastle area rose to 85,000 in 1921 and to 105,000 by 1933 (Zierer Jan., 1941). The boom in growth and population was a combination of a well established need for such a project in Australia and also the advent of the First World War. As N. R. Wills comments in his article The Growth of the Australian Iron and Steel Industry:

> "Not only would it [BHP, Newcastle] be able to supply a local armament industry but it would help to meet domestic needs which were bound to suffer from an increasing shortage of iron and steel in world markets…. With an ever increasing local demand the industry prospered in a remarkable way for four years, and by 1919 Newcastle had established itself in the front line of Australia's new manufacturing regions" (Wills 1950).

The first half 20th Century also harboured a small clay industry specialising in bricks, tiles, sewer pipes, alongside rock-mining operations in Teralba and Fassifern which was used in the production of concrete (Zierer Jan., 1941). It is important to note that the manufacture of bricks in Newcastle had been occurring intermittently from its early days as a penal colony (Gemmell 1986).

The post-contact history of Newcastle is one utterly dominated by industry; originally that of coal and agriculture and later, steel. The viability of the more minor industries was absolutely reliant upon the success of the twin heavy industries of coal and steel. This aspect of the area's history has left an indelible mark on the character of the region.

### 4.1.1 Port Stephens

Port Stephens was named by Captain Cook when he passed on 11 May 1770, honouring Sir Philip Stephens, who was Secretary to the Admiralty (Bartlett 1980). The first ship to enter the port was the Salamander, a ship of the Third Fleet that later gave the suburb of Salamander Bay its name, in 1791 (Bartlett 1980). In that same year, escaped convicts,

then known as 'bolters', discovered coal in the area. In 1795 the crew of the HMS Providence discovered a group of escaped convicts, living with the Worimi people. Port Stephens became a popular haven for escaped convicts and so in 1820 a garrison of soldiers was established at what is now known as Soldiers Point (Bartlett 1980)

The Australian Agriculture Company carried produce from the hinterland to North Arm Cove from 1824, and there was a timber mill at Winda Woppa (Bartlett 1980), where they operated "Karua", one of the first steamers in Australia. Whalers were frequent visitors.

A number of small towns developed around the port as fishing, holiday and retirement communities (Bartlett 1980). Since the 1970s, with improved road access from Sydney, and the increasing popularity of coastal retirement lifestyles, there has been major expansion of these towns.

### 4.1.2 Newcastle

The first European to explore the Newcastle area was Lieutenant John Shortland in September 1797. Shortland entered the Hunter River, which he named after New South Wales' Governor, John Hunter (Docherty 1983). When Shortland returned with reports of the deep-water port and the area's abundant coal, coal was mined from the area and became New South Wales colony's first export.

Newcastle gained a violent reputation as it was a place where the most dangerous convicts were sent to dig in the coal mines as harsh punishment for their crimes (Docherty 1983). Philip Gidley King, the Governor of New South Wales from 1800, further exploited the now obvious natural resources of the Hunter Valley (Docherty 1983).

The settlement was first named Coal River, then Kingstown and finally called Newcastle. Newcastle first appeared by the commission issued by Governor King on 15 March 1804 to Lieutenant Charles Menzies of the marine detachment on HMS Calcutta, then at Port Jackson, appointing him superintendent of the new settlement (Docherty 1983).

In 1816, the oldest public school in Australia was built in East Newcastle (Docherty 1983). Newcastle remained a penal settlement until 1822, when the settlement was opened up to farming.

Military rule in Newcastle ended in 1823 and in 1847 Newcastle was proclaimed a city and named as the centre of a new Anglican Bishopric. BHP Newcastle steelworks were opened in 1915 and so began the transformation of Newcastle from coal city to steel city and in 1999, the steelworks closed after 84 years operation (Docherty 1983).

## 4.2 Local History

The name Tomago was derived from the Aboriginal word meaning “sweet water”. This was a name given to the fresh water well on the banks of the Hunter River. Land grants in the Tomago area began in the early 1820’s (NSW State Heritage Office 2008). Richard

Windeyer received a land grant of 850 acres on the Hunter River in 1839 and remained a prominent figure in the history of Tomago (NSW State Heritage Office 2008).

Agriculture and dairy farming were two of the main industries in Tomago up until the economic depression that be felled the town during the early 1840's. The arrival of mining industry in the 1930's revived the local economy (NSW State Heritage Office 2008). Tomago was essentially a coal mining village until a rayon plant was built there in 1950 (NSW State Heritage Office 2008). The construction of an aluminium smelter at Tomago in the 1980s also help increased the local population and economy of the area.

The first settlement at Hexham occurred during the 1820s. The area was given its name after the town of Hexham in England, as its association with Newcastle and the Hunter River mirrored the link between the city of Newcastle-on-Tyne and its historic neighbour, Hexham (RTA, 2004). The Hunter River Railway Company was formed in 1853 where a rail link between Newcastle, Maitland and beyond was commissioned. The project's first stage was proposed as a single line between Newcastle and Hexham, but the company experienced financial difficulty before the job was completed and the government took over its assets in 1855. The job was eventually completed in 1857 (RTA, 2004).

The early 1900s saw the Hexham foreshore operated by a punt system that would link to the Raymond Terrace shores. Eventually the punt was replaced by the first bridge in 1952 which would make on average 915 trips a week (Lovett and Barney, 1989:79).

## 4.3 Historical Archaeology

The Australian Heritage Database is managed by the Australian Government Department of Sustainability, Environment, Water, Population and Communities. It contains more than 20,000 places of natural, historic and Aboriginal significance. The Australian Heritage Database is an online database of items listed under the Commonwealth Heritage List, National Heritage List and the Register of the National Estate.

The State Heritage database is maintained by the NSW Heritage Branch and lists all items that have been identified as of heritage value on Regional Environment Plans (REP) and Local Environment Plans (LEP) throughout NSW. The State Heritage Register lists those places which are of State Significance.

### 4.3.1 Commonwealth Heritage List

The Commonwealth Heritage List controls the Australian Heritage Database and maintains a record of all items that have been identified as being of heritage value. The Commonwealth Heritage list records those places which are of Commonwealth Significance.

The search of the Commonwealth Heritage List identified two Commonwealth Significant items relevant to the Tomago portion of the NGSF Project Area and one item relevant to the Hexham portion of the NGSF Project Area.

**Tomago House, Grounds, Trees and Chapel, Tomago Rd, Tomago, NSW, Australia**

Tomago House is a Georgian style single building set surrounded by charming rural grounds, with extensive cellars and attic rooms above kitchen. The floor plan is rectangular with two circular bays connected with sandstone flagged verandahs, columns for these being a later Victorian cast iron type. Interiors contain much fine Georgian cedar joinery and elaborate fittings (Department of Sustainability, Environment, Water, Population and Communities, 2010).

The Chapel is also a listed item characteristic of a small Gothic Revival chapel designed by Maria Windeyer and her sister Miss Camfield and built of rubble sandstone coursed, with dressed reveals to the door and windows. The interior is painted stucco with exposed timber framed roof, cedar pews and joinery. It has a simple pitched roof covered with slates (Department of Sustainability, Environment, Water, Population and Communities, 2010).

The Tomago House, Grounds, Trees and Chapel are located approximately 1km southeast of the Tomago portion of the NGSF Project Area and 4km east of the Hexham portion of the NGSF Project Area. The proposed works associated with the NGSF Project do not pose a threat to the cultural heritage significance of the State Listed item.

**Hunter Estuary Wetlands, Pacific Highway, Kooragang, NSW, Australia**

The Hunter Estuary Wetlands are located approximately 3 kilometres south and east of the NGSF Project Area. The proposed works associated with the NGSF Project do not pose a threat to the cultural heritage significance of the State Listed item.

### 4.3.2 NSW State Heritage Branch Register

The State Heritage Register lists those places which are of State Significance.

Listed for the Tomago area are:

**Tomago House & Landscape Setting, Tomago Chapel, Tomago Road, Tomago, NSW 2322**

Tomago House and its landscape setting is listed on both the Commonwealth Heritage List and is also listed on the NSW State Heritage Branch Register. For purposes of accuracy it has been included here in the State Heritage Register search. The distance of these state heritage items from the NGSF Project Area are listed in Table 4-1 below.

No heritage items were identified on the NSW State Heritage Branch Register for Hexham.

### 4.3.3 Port Stephens City Council Local Environmental Plan

The Port Stephens City Council LEP (2009) contains a listing of Heritage listed items for Tomago (Schedule 2) in Table 4-1.

**Table 4-1: Heritage Items list in Port Stephens Local Government Area**

| Item Name | Address | Heritage Listing | Closest Distance to NGSF Project Area |
|---|---|---|---|
| Tomago House Chapel | Tomago Road | Local Government | Approx 1.5km |
| Tomago House and its Landscape Setting | Tomago Road | Local Government | Approx 1.5km |

### 4.3.4 Newcastle City Council Local Environmental Plan

The Newcastle City Council LEP (2000) contains listings of Heritage listed items for Hexham (Schedule 6) in Table 4-2.

**Table 4-2: Heritage Items listed at Newcastle Local Government Area**

| Item Name | Address | Heritage Listing | Closest Distance to NGSF Project Area |
|---|---|---|---|
| Railway Station | Maitland Road | Local Government | 250m |
| Former Travellers Rest Hotel | 23 Maitland Road | Local Government | 1.5km |
| Oak Factory | 189 Maitland Road | Local Government | 500m |
| Hannel Family Vault | 398B Maitland Road | Local Government | 4km |
| Slab Shed | 2 Old Maitland Road | Local Government | 2km |
| Former Uniting Church and Hall | 63 Old Maitland Road | Local Government | 750m |
| Former Glen Lovett Hall | 187 Old Maitland Road | Local Government | 200m |
| Former Hexham Public School | 227 Old Maitland Road | Local Government | 100m |
| Hexham Shipbuilding Yards | 230 Old Maitland Road | Local Government | 100m |
| Goninans Administration Building | 230 Old Maitland Road | Local Government | 100m |
| J & A Brown's Hexham Workshops | 230 Old Maitland Road | Local Government | 100m |
| Hexham Bridge | Pacific Highway | Local Government | 400m |

## 4.4 Discussion

Research of listed Heritage Items has provided evidence into the type and approximate distance of the listed State Heritage items from the Tomago portion and Hexham portion of the NGSF Project Area. A detailed desktop investigation for the location of these listed items has shown that they are positioned in such a way that they will not be affected by the proposed works. A number of Newcastle listed heritage items in Table 4-2 are in close proximity to the Hexham Receiving Station and pipeline corridor options. These

items are not considered to be at risk of impact as the pipelines and associated work areas are to be situated in areas of high disturbance.

The Northern NSW Soccer Federation building currently occupies the north portion of 235 Old Maitland Road. The search of the above heritage databases did not reveal any information regarding for this item and is therefore not considered to be of registered historic significance.

## 4.5 Conclusion

It is considered that the Tomago portion and Hexham portion of the NGSF Project Area is well removed from any listed non-Aboriginal Heritage Items and therefore the proposed works will have no impact upon them.

# 5 Aboriginal Heritage Context

The Aboriginal heritage assessment process requires that the significance of Aboriginal sites within a study area is assessed. It is important that Aboriginal sites are contextualised within the local and regional landscape, in order to inform the assessment of significance. The Aboriginal heritage context is also needed in order to develop a predictive model of Aboriginal sites in the NGSF Project Area. Historical information also provides additional information for the interpretation of archaeological sites.

## 5.1 Historical Records

Some historical documents provide important information and insights into local Aboriginal customs and material culture at the time of non-Indigenous settlement and occupation of region. Nonetheless, it is important to note that the historical documents were produced for a number of reasons and thus may contain inaccuracies and/or bias in their reporting of events or other aspects of Aboriginal culture.

There are a number of ethno historical descriptions from the late nineteenth century of various Aboriginal tribes who populated both the Newcastle and Port Stephens region. Early historical records indicate that the Worimi people were the traditional owners of the land north of the Hunter River, including the Tomago area. Worimi territory stretched south as far as Stockton, north to Cape Hawke and inland to Dungog and Maitland (Tindale 1974). The Worimi lived north of the Awabakal with the Birpai further to the north. The various Aboriginal communities of the region demonstrated some level of interconnectedness. Lancelot Threlkeld, a missionary who established an Aboriginal mission at Belmont in 1825 noted that:

> "The [Aboriginal people] here are connected in kind of a circle extending to the Hawkesbury and Port Stephens" (Turner 1997)

Language groups such as the Worimi comprised a number of clan groups based upon religious and or totemic associations to country. Predominantly, the Hexham portion of the NGSF Project Area is located near two Awabakal clans which were the Pambulong, reported to be west around the rich swamplands at Hexham, and the Ash Island Clan, located on Ash Island.

Gunson (1974:30) argues that the Awabakal were the largest clan of a tribe in the Lake Macquarie region but because of Threlkeld's (an early missionary) well-known studies in the area, Awabakal became the name which represented the entire tribe. Early government documents indicate this large tribe was composed of a number of clans - the Awabakal (Lake Macquarie and Newcastle region), the Five Islands clan, the Ash Island clan, the Kurungbong clan (Cooranbong), and the Pambalong clan (Swamps District and near Newcastle) (Gunson 1974:30). Tindale (1974) shows the Awabakal as one independent group in Aboriginal Tribes of Australia. While the details of the clan

boundaries are unclear, the broad geographical and cultural boundaries are relatively consistent between sources.

The Awabakal appear to have been people of the coast, estuaries, lakes and wetlands, but also with attachment to the rugged sandstone country through the Sugarloaf and Watagan Ranges (Gunson 1974:35). The traditional country of the Awabakal people was bounded to the north by the Worimi, to the west by the Wonnarua, to the southwest by the Darkinjung and to the south along the coast by the Kuring-gai people (Gunson 1974:35).

### 5.1.1 Bark, Wood and Shell Implements

Tree bark was widely used for canoes, string, baskets, drinking containers and in burial practices (Brayshaw 1987). Vegetable and bark fibres were also used for fishing lines, nets and sewing. Clubs, yam sticks, boomerangs, spears, spear throwers and hatchets were made from wood and shields were made of both wood and bark. (Paterson 1801) (Bluff 1989; Erye 1959).

Shells were used as scrapers to sharpen spears and ground down on sandstone to produce fishhooks (Brayshaw 1987:67). Kangaroo bones were made into awls, which could be used to repair canoes, as well as, sewing possum or kangaroo skin clothing (Fawcett 1898). Dawson (Dawson 1830:115-116) also noted that kangaroo bone was also utilised as a comb.

### 5.1.2 Food and Useful Plants

The diet of the Aboriginal people included plant foods, shellfish and other estuarine species. (Grant 1803:161). Collins noted that for the coastal people “fish is their chief support” (Collins 1975 (1798):553), although is likely that kangaroos, wallabies, echidna, emus, possums, birds, goannas, snakes and honey from native trees was also utilised. Nearby swamps would have provided a rich source of animal and plant species for example, eels, fish and a variety of shellfish including mussels, water rats, frogs and ducks, as well as other water birds. Various nets and pit traps were likely used to capture such animals. Important staple food plants like Bungwall Fern were gathered from swamps and processed with special stone tools and was used to crush fern roots into an edible paste. Dawson (1830) and Fawcett (1898) suggest that fire was used by Aboriginal people for hunting, as well as, for signalling other tribes during hunting and ceremonial activities.

### 5.1.3 Clothing

Summer weather and the milder days of autumn and spring required little in the way of protective clothing; winter however, saw the use of animal skins for both clothing and as blankets. Tench (1996:52) describes Aboriginal people using possum skin cloaks with a ‘girdle of spun opossum hair next to the skin’ with their principal ornament a nautilus shell suspended around the neck on a string.

### 5.1.4 Camp Sites and Shelters

The Aboriginal people lived in huts or “Gunyah’s” which were prepared from bark. Tench described how native huts were constructed by laying pieces of bark together in the form of an ‘oven’. The end result consisted of a low shelter, which was opened at one end and sufficient to accommodate one person lying down (Tench 1996:53), although larger structures were observed by Collins `often large enough to hold six to eight people' (Collins 1975 (1798):557).

## 5.2 Regional Archaeological Heritage Context

The Tomago portion of the NGSF Project Area is situated on the Tomago Coastal Plain which is a Pleistocene coastal sand barrier of the Newcastle Bight Barrier System, the largest dual coastal system in NSW. The archaeological resources of the Newcastle Bight Region have a high regional and potentially national archaeological significance in terms of their site form, content and the potential to clearly demonstrate the relationship between the archaeological record and land use patterns in the surrounding landscape. Of substantial archaeological significance, are the antiquities of many sites located within the Newcastle Bight Barrier System.

Aboriginal occupation of the Hunter Valley and specifically the Newcastle Bight region dates back well into the Pleistocene period (approximately 1.8 million to 11,477 years ago), as evidenced by many Carbon 14 dates retrieved during archaeological excavations. One site with early dated evidence is Moffats Swamp, located about 8.5 kilometres northeast of the Tomago portion of the NGSF Project Area. Extensive excavations were conducted by Baker (1994) across a dune at Moffats Swamp, from which small charcoal fragments were retrieved. These charcoal fragments returned a calibrated date of 17 376 years BP (Baker 1994).

The large majority of dated sites for the Tomago Coastal Plain are less than 5,000 years old. It has been argued that this is a result of increased populations and ’intensification’, during this period. The frequency of sites dating to the last 5,000 years may also be a result of the last significant rise in sea level, approximately 6,000 years ago. The sea level rise would have submerged many of the older sites along the coastal fringe and forced Aboriginal groups westward to occupy the current coastline.

There have been various key studies undertaken in the Newcastle Bight Region. Two of the most significant studies were managed by Pam Dean-Jones (1990) & Resource Planning (1992) and highlighted that this region had considerable archaeological sensitivity. These results were reiterated in the Newcastle Bight Aboriginal Management Plan (Sullivan and Hibberd 1994).

The Newcastle Bight Study undertaken by Dean-Jones (1990) provides a concept pattern for past Indigenous land use throughout the region. The report highlights that there would have been a wide range of environmental landscapes that would have facilitated Aboriginal populations to prosper due to the abundant resources. Sand dunes stabilized by open dry sclerophyll woodlands provided habitat for numerous fauna species of which

the Aboriginal people were able to exploit, while freshwater wetlands would have provided an abundant habitat for bird, animal and plant life. The rich resources of these habitats are reflected in the density of artefacts recorded during the Bight Survey (Dean-Jones 1990).

Generally, previous archaeological research of the region reveals that freshwater resources such as Galloping, Campvale and Moffats Swamp have been extensively utilised by Aboriginal people in the past. Such freshwater wetlands would have provided excellent food and water resources for the Aboriginal population. Such research is supported by the detection of numerous sub-surface artefacts at Galloping Swamp (10kms away) and Moffats Swamp (8.5kms away) (Baker 1994).

Dyall's earlier 1971 assessment, examined sites from Port Stephens in the north to Swansea in the south which provided an overview of ocean, estuarine and freshwater wetland archaeological site types. Overall, Dyall (1971) made observations of the Aboriginal populations of the Port Stephens region and outlined a preference for establishing camp sites with access to abundant food resources and freshwater. Dyall further identified that a greater concentration of campsites were to be found on sand dune ridges, although acknowledging that it may have been a result of differential site preservation of the locality.

From a regional perspective there is a high potential for Indigenous archaeological sites to be preserved in Pleistocene sand beach ridges and sand sheets, particularly when located within the vicinity of wetlands and swamps. Typical site types that may occur in proximity to such landforms include middens and also artefact scatters. Artefact scatters are the most frequently recorded site type in Australia and are common across the Newcastle Bight Barrier System. This is likely due to the fact that stone tools are easily identified and may occur on any landform in any context. Furthermore, stone tools preserve well in the archaeological record whereas other site types containing organic material (eg: bone, timber) decompose over time.

Stone artefacts are an important source of information for archaeologists. Information about trade routes, raw material exploitation as well as manufacturing technology can be obtained through the study of these tools. Stone tools are also used by archaeologists to obtain relative dates for archaeological sites. A widely accepted system for the dating of sites containing stone tools on the east coast of Australia was introduced by Fred McCarthy in 1948 and is known as the Eastern Regional Sequence (ERS). Debates over the accuracy of the ERS system continue (Bird & Frankel 1991, Hiscock & Attenbrow 2002), and the sequence has been refined in recent years (Hiscock & Attenbrow 2004). However, it is generally accepted that the phases within the ERS are as follows:

**Pre- Bondaian (previously Capertian) –** Artefacts from this phase are typically of silicified Tuff, although where this material was difficult to obtain quartz and unheated silcrete were also utilised. Artefacts and cores vary widely size and are typically characterised by unifacial flaking. No backed artefacts, eloueras or ground stone

implements have been identified within this phase. This phase generally dates to pre 8,000 years before present (BP).

**Early Bondaian –** Artefacts of this phase tended to be manufactured from local raw materials and a reduction in use of silicified Tuff is apparent. Both unifacial and bifacial flaking were dominant techniques, with bi-polar flaking becoming more widely used in the later stages. This phase dates from 8,000 to 4,000 BP.

**Middle Bondaian –** Raw materials used in stone tool manufacture vary widely between sites during this phase, although the use of quartz increases. Backed artefacts are most frequent in this phase in comparison to others. Tools and core size is reduced and the use of bi-polar flaking increases. This phase in generally dated from 4,000 to 1,000 BP.

**Late Bondaian -** Use of raw material types continues to diversify, whilst quartz is the dominant material type in use. Artefacts were typically manufactured through the use of bipolar flaking. Eloueras, bone artefacts and shell fishhooks are common in this phase. This phase is dated from 1,000 BP to European contact.

A regional study of the Newcastle Bight (mapped in Figure 5-2) identified that Aboriginal sites are found within close proximity to water sources, such as deflation basins and swamps (Dean-Jones 1990). The study also identified that the Newcastle Bight was rich in bird, animal and plant life and the freshwater wetlands were particularly rich in natural resources. Aboriginal sites in the Newcastle Bight generally have dense concentrations of artefacts and it appears to have been regularly occupied by Aboriginal people. Dean Jones (1990) also identified Pleistocene sand dune deposits (dunes which are over 10 000 years old) which had the potential to contain very old Aboriginal sites.

## 5.3 Local Archaeological Context

The local Aboriginal heritage context provides a review of previous archaeological work conducted in the local landscape, identifies whether Aboriginal sites have been previously identified for the region surrounding the Tomago portion and Hexham portion of the NGSF Project Area and informs the predictive model of Aboriginal sites for the area. The review of previous archaeological work includes relevant local research publications, as well as, archaeological consultancy reports. Two types of archaeological investigations are generally undertaken; excavations and surveys. Archaeological excavations can provide high resolution data regarding specific sites, such as the dates or chronology of Aboriginal occupation, as well as, information on stone tool technology (reduction sequences, raw material use, tool production, usewear and similar). Archaeological surveys generally cover wider areas than excavations and can provide important information on the spatial distribution of sites. The detection of sites during survey can be influence by the amount of disturbance or erosion and therefore sensitivity mapping is sometimes also required to interpret survey results. The local Aboriginal heritage context also provides a framework for assessing local significance.

### 5.3.1 Aboriginal Heritage Information Management Systems (AHIMS)

A search was undertaken of the DECCW Aboriginal Heritage Information Management System (AHIMS) for a 10km radius centred on an area located between the Tomago portion and Hexham portion of the NGSF Project Area on 23rd April 2010. This identified a total of 24 sites.

Of the 24 Aboriginal sites, 15 comprise artefact scatters (Refer Table 5-1), with two additional artefact scatter sites containing features of burnt organic material and shell midden also recorded in the region. As detailed in Table 5-1 below it is clearly apparent that stone artefacts are the single largest Aboriginal site identified in the search area that comprise 75% of the total sites identified on the AHIMS register.

The number of scarred tree, burnt organic material and shell midden sites are low (n=1) in the search area. This may reflect the ability of the Tomago and Hexham shorelines to support local resources thus resulting in shell middens and burnt organic material sites.

Notably absent are grinding grooves, rockshelters, art and engravings, which simply reflects the fact that the Tomago and Hexham area may not have geological characteristics suitable for these site types to occur.

**Table 5-1: AHIMS Site Types**

| Site Type | Count | Percent |
|---|---|---|
| Artefact Scatter | 15 | 62.5 |
| Isolated Find | 3 | 12.50 |
| Potential Archaeological Deposit | 3 | 12.50 |
| Artefact Scatter; Burnt Organic Material | 1 | 4.17 |
| Artefact Scatter; Shell Midden | 1 | 4.17 |
| Scarred Tree | 1 | 4.17 |
| **Total** | **24** | **100%** |

WARNING
No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from RPS Newcastle.


TOMAGO

Pacific Highway

Old Punt Road

Tomago Road

Hunter River

HEXHAM

38-4-0681
38-4-0246
38-4-0245
38-4-0244
38-4-0247
38-4-0243
38-4-0242
38-4-0676
38-4-0679
38-4-0647
38-4-0648
38-4-0966
38-4-0967
38-4-0965
38-4-0964
38-4-0961
38-4-0962
38-4-0963
38-4-0249
38-4-0248
38-4-1139
38-4-0075

N

0 1 2km

SCALE: 1:21,500 AT A3 SIZE

## Legend

- Gas Pipeline Access Corridor
- Proposed Gas Plant Site
- Hexham Receiving Station

***Proposed Access Road***

- OPTION B
- OPTION C

***Pipeline Route Options***

- Option 1
- Option 2
- Hybrid Option

***AHIMS***

- Artefact Scatter
- Artefact Scatter, Burnt Organic Material
- Isolated Find
- Midden and Artefact Scatter
- Potential Archaeological Deposit
- Scarred tree



TITLE: FIGURE 5-1NEWCASTLE GAS STORAGE FACILITY PROJECT AREA WITH AHIMS RESULTS

LOCATION: TOMAGO & HEXHAM

DATUM: N/A
PROJECTION: MGA ZONE 56 (GDA 94)

DATE: 7/01/2011
PURPOSE: CULTURAL HERITAGE ASSESSMENT

LAYOUT REF: J:\JOBS\103k\103386 Tomago\10- Drafting\Archaeology Drafting\MapInfo Workspaces
VERSION (PLAN BY): C A3 (NW-PS)

CLIENT: COFFEY NATURAL SYSTEMS PTY LTD
JOB REF: 103386-1

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4940 4200 F: 02 4961 6794 www.rpsgroup.com.au

### 5.3.2 Local Archaeological Studies

A number of archaeological studies have been undertaken in the vicinity of the study area. Information obtained from the Aboriginal Sites Decision Support Tool (ASDST) show the previous studies which have been undertaken within a 5 kilometre radius of the study area; the location of these studies has been provided in Figure 5-2 to assist the DOP to put the proposed project and its potential impacts into perspective. Other relevant studies have also been summarised to provide background for this report.

## 5.4 Studies identified from the ASDST Search

**Brayshaw 1981. Archaeological survey for the proposed Tomago Aluminium Smelter**

An archaeological survey was undertaken for a proposed aluminium smelter development area (Figure 5-2). Brayshaw (1981) surveyed 496 hectares and described the area as lower than 10m above sea level. Ground surface visibility and exposure was generally low due to thick vegetation including paperbark. No Aboriginal sites were identified as a result of the survey.

**Brayshaw 1986. Archaeological Survey of Proposed Stockpiles at Hexham.**

The archaeological survey investigated a 60ha area on behalf of Coal and Allied for proposed coal stockpiles (Figure 5-2). Landforms surveyed were lowlying flats, subject to periodic inundation. No Aboriginal sites were identified during the survey (Brayshaw 1986).

**Dean Jones 1990. Newcastle Bight Study.**

This study was undertaken as a regional study, although part of the area investigated is in close proximity to the current study area (Figure 5-2). Results of the study are described in the regional archaeological section.

**Dean Jones 1992. Archaeological Survey for State Highway 9-New England Highway.**

This study was commissioned by the RTA for a proposed interchange (Figure 5-2). The area surveyed comprised cleared area, much of which had been subject to urban development and therefore comprised modified landforms. The area surveyed was 300m wide and 1.2km in length. No Aboriginal sites were identified (Dean-Jones 1992).

**Kuskie 2007 Chichester Trunk Gravity Main Upgrade, Tarro to Shortland**

This assessment was undertaken for a proposed pipeline upgrade and was commissioned by GHD (Kuskie 2007). Approximately 22 kilometres of proposed pipeline was subject to archaeological survey to the south of the Hunter River (mapped in Figure 5-2). Landforms surveyed included gentle rises and lower flats which were subject to periodic inundation. Portions of the survey area had high disturbance from previous infrastructure installation. Two isolated finds were identified on crests overlooking Hexham Swamp and were assessed to be of low significance.

**AHMS 2007 Sandvik National Headquarters, Tomago: Aboriginal Heritage Impact Assessment**

Commissioned by ATB Morton Pty Ltd, Archaeological and Heritage Management Solutions Pty Ltd (AHMS) undertook an Aboriginal heritage impact assessment of the proposed development at a proposed National headquarters for Sandvik P/L at Lots 1 and 2, DP 808400, Tomago Road, Tomago, NSW. The site was 11.6 hectares in size and was zoned for industrial development. The AHMS (2007) study area is approximately 1.5km from the NGSF Project Area (Figure 5-2).

The topography and distribution of natural resources in the study area indicated a potential for open artefact scatter, Aboriginal burials and isolated finds. The survey yielded no Aboriginal sites or objects in the study area. It was recommended that a research design and methodology be prepared for undertaking archaeological test excavation across the area assessed as moderate to high archaeological potential and that the excavation be undertaken prior to the commencement of development work in the area (AHMS 2007).

**Insite Heritage 2008 Archaeological Survey for Proposed Expansion of Operations at Minmet Tomago**

The archaeological survey was commissioned by Minmet Pty Ltd for the expansion of facilities for battery recycling (Figure 5-2). The survey covered 2.5 ha of a flat lowlying plain area, of which approximately half had been disturbed by previous industrial land uses. No Aboriginal sites were identified (Insite Heritage 2008).

## 5.5 Other Studies

**Smith 1988. Archaeological Survey of the Tomago to Karuah Section of the Tomago to Taree 132kV Transmission Line**

An archaeological survey was conducted by Smith (1988) in relation to the Tomago to Karuah section of the Tomago to Taree 132kV transmission line reconstruction. The line runs from the Tomago Sub-Station to Reedy Creek, 2kms west of Karuah, with the entire route approximately 22km long. The Smith (1988) study area is approximately 1km from the NGSF Project Area. The site survey was undertaken on foot.

The survey route between Tomago and Medowie was located on Quaternary deposits of sand, gravel, silt and clay with outcrops of the Tomago Coal Measures, consisting of shale, mudstone, sandstone, tuff and coal. Three creek lines all with high banks are crossed during the route; Pipeclay, Twelve Mile and Reedy Creek. Several swamps were also crossed with extensive areas between Pipeclay and Twelve Mile Creek and around Reedy Creek. A large swamp, Telegraph Swamp, was also found near one of the sites (TK2). Two artefact scatters (TK1 and TK2) and one isolated artefact were found within the proposed easement. Artefacts found at TK1 (more than 50) were scattered over a large area inside and outside of the easement, thought to be transported there during dumping of sand along a vehicle track. Maximum artefact density is 3 per square metre and the average density was 1 per 5-10 square metres.

Artefacts found at TK2 (upwards of 1,000) were extensively scattered within the existing transmission easement eroding out of a sandy knoll. Maximum artefact density was 10 per square metre. An isolated artefact was found on south facing slopes within the existing transmission line easement. The artefact was a fine grained silcrete amorphous flake with further artefacts unlikely. None of the sites or artefacts found were to be affected by the proposed reconstruction of the transmission line; with no further archaeological works were required (Smith 1988).

**Brayshaw McDonald Pty Ltd 1990. Archaeological Survey of Proposed Raymond Terrace By-Pass, Pacific Highway**

Brayshaw was commissioned by the Road and Traffic Authority (RTA) to undertake an archaeological survey for the route of the proposed Raymond Terrace (relief route) By-Pass on State Highway No. 10 (the Pacific Highway). The Brayshaw McDonald Pty Ltd (1990) study area is approximately 4km northeast from the NGSF Project Area. The survey was undertaken on foot with the exception of approximately 800m in the vicinity of Windeyers Creek and the Sewage Treatment Works as the area was not viable to survey and considered unlikely to contain archaeological deposits.

The study route transversed mainly Quaternary sands, related to the eustatic sea level rises. Towards the northern end of the route, where it crosses the catchment of the Grahamstown Lake there are Permian sandstones, conglomerates and shales of the Branxton Formation. Three open sites (RT 1-3), an isolated stone artefact and one potential Aboriginal scarred tree (RT4) were located during the survey. An open site was found (RT1) located south of Mount Hall Road and north of the Grahamstown Drain. An open site was found (RT2) located south of Grahamstown Drain in an exposed area. An open site was found (RT3) located north of Masonite Road. Twelve artefacts were recorded, all being mudstone. One artefact was a backed blade, with the majority of the remaining artefacts focal platform flakes (6), broad platformed flakes (2) and amorphous flaked pieces (3). At site RT4 which is located south of Richardson Road a large scar tree was found, along with an isolated artefact located 60m southwest of the site RT4 (Brayshaw 1990).

**Brayshaw McDonald Pty Ltd 1990. Additional Archaeological Survey of Proposed Variation along Raymond Terrace By-pass Pacific Highway**

This report was an appendix to the original report conducted by Brayshaw McDonald Pty Ltd (1990) and detailed above. The Roads and Traffic Authority (RTA) amended the original route at its southern end. The variation covered a total distance of approximately 3km in a south-easterly direction of the original proposal. The Brayshaw McDonald Pty Ltd (1990) study area is approximately 4km northeast from the NGSF Project Area.

One new site and an extension to a previously identified site (RT3) were located during the survey. An open site was found (RT5) located east of RT3 on the bank of Windeyers Creek. In the previously identified site (RT3) located north of Masonite Road, two more artefacts were identified some 60m east of the original site. One was a grey silcrete flake, the other a very good quality red silcrete amorphous flaked piece. The further artefacts found at the previously identified site (RT3) indicate that the site extends over a greater distance than originally found. Therefore, further archaeological investigations were

recommended to define the nature and extent of the site (Brayshaw McDonald Pty Ltd 1990).

**Resource Planning Pty Limited 1991. Raymond Terrace Traffic Relief Route Additional Archaeological Investigations – Sites RT1 and RT3**

This study is an extension of the original report and appendix conducted by Brayshaw McDonald Pty Ltd (1990) and detailed above. The Roads and Traffic Authority (RTA) commissioned Resource Planning Pty Limited to undertake further investigation of the two Aboriginal sites identified within the proposed road corridor (RT1 and RT3). The Resource Planning Pty Ltd (1991) study area is approximately 5.5km northeast from the NGSF Project Area.

A preliminary research permit was granted with a grid pattern of shovel pits to be used in investigation of Site RT3. A total of 19 pits were excavated, with a 5m grid selected for shovel testing. No additional artefacts were identified on the surface. RT3 was considered to have high scientific and cultural significance. At site RT1 investigations indicated that there was a very low probability that in-situ archaeological material remained with few artefacts recorded on the surface during previous studies (Brayshaw and McDonald Pty Ltd). Overall RT1 was considered to have low scientific and cultural value (Resource Planning Pty Ltd 1991).

**Effenberger 1996. Archaeological Monitoring Report Mineral Sand Mining Lease Tomago near Masonite Road Port Stephens LGA, NSW.**

A preliminary archaeological surface survey was conducted by Effenberger in relation to a proposed mineral sand mine on the Tomago Sandbeds, for RZM Pty Ltd. The study area of approximately 6ha was located off Masonite Road, between Deep Swamp and Blind Harry's Swamp. The Effenberger (1996) study area is approximately 5km northeast from the NGSF Project Area. The survey was undertaken on foot to locate and record any visible sites, including those already registered with NPWS.

The survey area occurs on the inner margin of the Stockton Bight barrier dune system and Tomago Sand Beds amongst low lying wetland and stabilised sand sheets with a medium scattering of timber. The most common landform was determined to be a disturbed landscape on a sand sheet, with the entire substrate having been removed, mined and sieved and replaced previously. The remaining sections of the site were established on the Pleistocene sand sheets of the Tomago coastal plain with a local relief of up to 1m.

A previously registered artefact scatter site was examined with the raw material comprised of yellow chert and grey tuff with some grey/buff silcrete. Artefact density was 50m x 50m area. It was concluded that the scatter had no context and low significance as it would have been industrially screened with the ground having been cleared, mined and revegetated over a 20 year period. A large grey silcrete artefact was removed in 1996 by the person who originally found the scatter. An application for "consent to destroy" was submitted. No further sites were identified during the course of the archaeological survey. It was however concluded that with the existence of the previously registered site and the results from studies conducted in the immediate area, sub-surface testing of the undisturbed lands was required prior to ground disturbance (Effenberger 1996).

**ERM, 2003. Indigenous Cultural Heritage Assessment for Electricity Supply Access Road – Tomago to Salt Ash.**

ERM was commissioned by Energy Australia to conduct the Indigenous Cultural Heritage Assessment as a component of the Review of Environmental Factors for the Electricity Supply Access Road – Tomago to Salt Ash. The ERM (2003) study area is approximately 4km east from the NGSF Project Area. The study area extended from Tomago substation to Salt Ash and extended approximately 23 kilometres in length and was 50 metres wide. The study area was located in the Newcastle Bight sand barrier system and included both the Pleistocene and Holocene dune barriers with sediments of marine, estuarine and Aeolian deposits. The closest reliable water sources consisted of Fullerton Cove in the west and Tilligerry Creek in the east.

The site survey was conducted on foot and six archaeological sites were identified. A1 was an open camp site with 29 microliths of silcrete and Nobby's tuff, comprised of flakes and flake pieces, bondi point, broken blades and cores. A2 comprised an open camp site with one scraper and two broken flakes of Nobby's tuff. A10 comprised an open camp site nine microliths of silcrete and Nobby's tuff that consisted of flakes and a core. A3 comprised an open campsite that contained six flakes, one broken flake, and pipi shells. Mud whelk, oyster and pipi shells were scattered around the site. A4 comprised an open campsite that contained microliths of blades, cores, flakes, a thumbnail scraper and bondi points. Raw materials used consisted of Nobby's tuff, silcrete, chert and some quartz and ironstone. A9 comprised an open campsite that contained a broken flake with evidence of use wear and scatters of pipi shells.

The location of the sites indicated a direct link to local resources. ERM concluded that the sites provided valuable information about prior occupation of the area, utilisation of environmental resources for diet, raw material acquisition and transport, stone tool manufacture and Aboriginal group movements along the dune systems (ERM 2003b).

**ERM, 2003. Indigenous Cultural Heritage Assessment for Electricity Supply Upgrade from Tomago to Tomaree.**

ERM was commissioned by Energy Australia to prepare an Environmental Impact Statement (EIS) for the proposed upgrading of electricity powerlines from Tomago to Tomaree and the associated access road from Salt Ash to Tomaree. The ERM (2003) study area is approximately 4km east from the NGSF Project Area. The study area was approximately 40kms long and ranged from 15m to 50m wide. The study area was located in the Newcastle Bight sand barrier system and incorporated both the Pleistocene and outer Holocene dune barriers. Sediments included marine, estuarine and Aeolian deposits, with Tillegerry Creek a prominent drainage line. The northern portion of the survey was conducted by vehicle with the remainder of the survey conducted on foot, with a total of fifteen sites found. Six of these sites were discussed above during the access road survey from Tomago to Salt Ash (sites A1-A4, A9 and A10).

Three sites were identified during the survey (A6-A8), one site was a new recording (A5) and two sites were already registered on the AHIMS database (38-4-0313 and 38-4-0485). Three previously recorded sites were middens (38-4-0659, 38-4-0660 and 38-4-

0661), however, further examination concluded the features indicated a natural concentration of shell rather than an Aboriginal midden. Site A6 (38-4-0651) was on a dune crest, Site A7 (38-4-0652) was located on the next dune approximately 40m west and Site A8 (38-4-0653) approximately 40m east on the next dune. All sites had pipi shell pieces and fragments evident in areas of erosion, and it was considered that further subsurface materials were likely to be present at all sites. Site A5 (38-4-0650) was a previously recorded major shell midden/camping ground, with shell and artefacts exposed due to erosion. The size and depth of the artefacts indicated the area was extensively used over time, with raw materials transported in and possibly traded (ERM 2003a).

**McCardle Cultural Heritage, 2003. Proposed Residential Subdivision Development along Mount Hall Road, Raymond Terrace.**

McCardle Cultural Heritage Pty Ltd was commissioned by Project Plan to conduct an Indigenous Cultural Heritage Assessment for Lot 2 DP 8584853 and Lot 2 DP 787819 Mount Hall Road Raymond Terrace. The study area was approximately 6.5 hectares in size which was allocated for 84 residential lots. The McCardle Cultural Heritage (2003) study area is approximately 5km northeast from the NGSF Project Area Landforms covered the sandy fill from Newcastle Bight that consisted of Pleistocene Aeolian sandsheets and low dunes of marine and fluvial/ estuarine origin. The closest reliable water sources were the Williams and Hunter rivers in the west, approximately 2 kilometres away.

This study area consisted of two landforms. The north was flat with previously cleared pasture and the south had a gentle slope with evidence of previous pasture clearing and open forest re-growth. The entire study area had very thick vegetation cover so the only accessible tracks were surveyed by foot. Two sites were identified during the survey, RT1 and PAD1. RT1 was located in the western dirt road reserve just outside of the study area. An isolated artefact flake of Nobby's tuff was located amongst shell and pieces of bone. PAD1 was identified in the southern portion of the Study area which included the gentle slope that declined towards the drainage area. The identification of these sites along with previously recorded sites in the region resembled strategic occupation patterns for areas in close proximity to water sources, food and plant resources which include local rock outcrops for stone tool manufacture (McCardle Cultural Heritage Pty Ltd 2003).

**Indigenous Outcomes 2006 An Archaeological Aboriginal Heritage Assessment of the Proposed Industrial Development Tomago Road, Tomago**

Indigenous Outcomes was commissioned by Redlake Enterprises Pty Ltd to conduct an Aboriginal archaeological assessment of Lot 161 DP 774440 and Lot 1 DP 1003492, Lot 1 DP 597972 and Lot 513 DP 585256 Tomago Road, Tomago in order to meet the requirements for the lodgement of a proposed industrial subdivision development application. The study area was 114.85 ha in size and the survey was conducted on foot. The Indigenous Outcomes (2006) study area is approximately 2km northeast from the NGSF Project Area

The survey revealed 7 sites and these comprised 128 stone artefacts. The survey involved the examination of low lying swamp land and a sample of other landscape elements. During the survey it was observed that prior infrastructure, such as residential

dwelling and development of the low sands had disturbed the study area significantly and erosion following the land clearance activities had resulted in substantial loss of topsoil throughout the study area. The study area was considered to be archaeologically and culturally sensitive and therefore unsuitable for development until cultural materials were removed via Consent to Destroy application from DECC (Indigenous Outcomes 2006).

**Harper Somers O'Sullivan 2006 Cultural Heritage Assessment: Proposed Raw Water Supply from Tomago Sandbeds to Pacific Dunes Golf Course at Medowie**

Harper Somers O'Sullivan (HSO) was commissioned by Pacific Port Stephens to conduct an archaeological survey for a proposed pipeline for the provision of a raw water supply from Tomago Sandbeds to Pacific Dunes Golf Course at Medowie. The aim of this investigation was to identify and record any items of Aboriginal heritage that may have been impacted upon by the pipeline route. The significant feature of the subject area was its low relief and proximity to a number of fresh water swamps. The area had been subjected to prior mineral mining by Associated Minerals Consolidation Ltd and RZM Mines Pty Ltd had conducted extensive test drilling in the same area. The Harper Somers O'Sullivan (200) study area is approximately 8km east from the NGSF Project Area.

While the study area would have included part of the resource strategy of the Aboriginal people, its location on flat land some distance from preferred fresh water swamp resources would indicate that its use would have been minimal. The subsequent mining of the area would have removed or relocated any archaeological evidence. Based on these findings HSO recommended that no further archaeological survey of the subject area was required and that all staff involved in the construction of the pipeline were made aware of their responsibilities in regards to Aboriginal objects and places (Harper Somers O'Sullivan 2006)**.**

**AHMS 2008 Sandvik Machine Manufacturing and Maintenance Facility, Tomago: Aboriginal Archaeological Test Excavation Report**

ATB Morton engaged AHMS to undertake Aboriginal an archaeological test excavation in advance of a proposed development for the National headquarters for Sandvik P/L at Lots 1 and 2, DP 808400, Tomago Road, Tomago, NSW. The site was located on the northern side of Tomago Road, 300 metres north of the Hunter River and approximately 5km east of the Pacific Highway. The AHMS (2007) study area is approximately 1.5km from the NGSF Project Area.

The methodology involved mechanical excavation of 1 metre by 1 metre test trenches at regular intervals along transects aligned to sample the range of landforms in the area of moderate to low and moderate to high potential identified in the Aboriginal Heritage Impact Assessment. Overall, there were 24 trenches excavated along 6 transects, located according to vegetation clearance. Out of the 24 trenches, 14 were excavated in the area classified as moderate to high potential at intervals of 20 metres across the simple slope landform adjacent to the swamp located on the southeast corner of the study area. The 10 remaining trenches were excavated in the area of moderate to low potential at intervals of 40 metres, which sampled low crests, simple slope and low lying areas. The test trenches were excavated by a small mechanical excavator under archaeological supervision.

No Aboriginal objects or sites were recorded during the excavation. This excavation demonstrated that the study area generally had nil to very low potential for archaeological deposits. Based on the results of the excavation it was recommended that no further Aboriginal archaeological investigations be pursued in advance of development in the study area. Monitoring was also recommended for initial earth moving works in the moderate to low and moderate to high potential areas in the areas of development impact by a member of the Worimi Local Aboriginal Land Council (AHMS 2008).

### 5.5.1 Literature Review Summary

The AHIMS search results and literature reviews presented above indicates that the most common site type for potential occurrence in the NGSF Project Area is likely to be stone artefacts. Both sets of data reflect two main trends (The AHIMS & Literature Review above); that stone tools are durable and usually survive the passage of time far better than other Aboriginal site types that may have be manufactured from organic materials, and therefore they are more prolific across much of the region.

The most common form of archaeological sensitivity and site type identified in the literature reviews above were culturally sensitivity landforms and artefact scatters/ open camp sites. At no time in either the AHIMS results or in the 12 different studies summarised above are grinding grooves, rockshelters, art and engravings present. Consequently, the AHIMS data and above archaeological summaries confirm that the NGSF Project Area is highly unlikely to comprise geological characteristics suitable for these site types to occur.

NING
o part of this plan should be used
for critical design dimensions.
Confirmation of critical positions
should be obtained from RPS Newcastle.

**LEGEND**

Study Area

Information Supplied by ASDST

- AHMS 2007
- Brayshaw 1981
- Brayshaw 1986
- Dean Jones 1990
- Dean-Jones 1992
- Insite 2008
- Kuskie 2007

RPS PHWY AS 2

0 0.5 1
kilometres

SCALE: 1: 12,500 AT A3 SIZE

TITLE: FIGURE 5-2: ASDST INFORMATION

LOCATION: TOMAGO & HEXHAM

DATUM: N/A
PROJECTION: MGA ZONE 56 (GDA 94)

DATE: 29/03/2011
PURPOSE: CULTURAL HERITAGE ASSESSMENT

LAYOUT REF: J:\JOBS\103k\103386 Tomago\10- Drafting\Archaeology Drafting\MapInfo Workspaces
VERSION (PLAN BY): C A3 (NW-PS)



CLIENT: COFFEY NATURAL SYSTEMS PTY LTD
JOB REF: 103386-1

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## 5.6 Predictive Model for Archaeology in the NGSF Project Area

A predictive model was created to provide an indication of Aboriginal sites likely to occur within the complete NGSF Project Area. It draws on the review of the existing information from the regional and local archaeological context, as well as, the environmental context. The predictive model is necessary to formulate appropriate field methodologies, as well as, providing information for the assessment of archaeological significance.

There are a number of factors which influence Aboriginal occupation of an area. These include essential subsistence resources such as food (flora and fauna), as well, as freshwater. However, occupation would have been influenced by occurrence of other resources such as stone raw materials, wood and bark, animal skins, reeds for uses such as basket weaving, string, clothing and similar.

Landscape features such as dunal ridges, creek lines, swamp areas, ridges, flat elevated areas, rockshelters and similar, may have also influenced Aboriginal occupation of an area. In addition, cultural activities may have also taken place at certain locations in the landscape for example corroborees, mythological places, initiation sites and similar.

## 5.7 Site Predictions

The following site predictions for the Tomago portion and Hexham portion of the NGSF Project Area have been made on the basis of the environmental context, available historic observations of Aboriginal people in the region, archaeological studies, as well as, analysis of the AHIMS data.

### 5.7.1 Site Type

The Primary Project Area is located inland on a portion of land that is currently owned by the Tomago Aluminium Company. The area containing the gas plant, access road and service corridor, and pipeline access corridor has been subject to low levels of development. Exceptions are the electricity easements and Tomago fire trails. On the basis of the AHIMS data as well as review of the available information, it is considered that stone artefact sites (scatters and isolated finds) will be the most likely site type to be present in the study area. Scarred trees may be present in areas that have not been impacted upon and contain trees of sufficient age.

The Hexham portion of the NGSF Project Area is located on land that has been subject to a high level of modification and disturbances. The area proposed for the receiving station is not currently built on, but shows evidence of ground surface modification. The majority of pipeline in this area will be bored underground but the portion that will be constructed as a trench will be placed in an area that has been subjected to road modification processes. Therefore the only site type predicted to survive such levels of disturbance would be stone artefact sites (scatters and isolated finds) that will probably not be *in situ* and potentially scarred trees and middens sites, but these will depend on the prolonged

industry developments that border the southern bank of the Hunter River in Hexham and their collective impact on Aboriginal archaeological material.

### 5.7.2 Site Locations

Research shows the majority of artefact scatters and isolated finds in the vicinity of the study area were identified within 300m of a water bodies. The main watercourses for the area are the Hunter River and Fullerton Cove which both support an estuarine environment to the south of the Tomago Aluminium Smelter. Fresh water reserves would most likely be sourced from the inland portion of the Hunter River to the west of the Tomago portion of the NGSF Project Area. It is therefore predicted that landforms near water sources on elevated ground that remain relatively undisturbed in the Tomago portion and Hexham portion of the NGSF Project Area will have an increased potential for containing artefact scatters and/or isolated finds, and in some instances scarred trees and shell middens may occur.

### 5.7.3 Site Contents

A review of previous archaeological investigations and review of local geology indicates that artefact scatters and isolated finds in the local and regional area generally comprise flaked stone artefacts made from the following stone raw materials: tuff, silcrete, chert and quartz. Stone tool types in the area predominantly incorporate artefacts from the Holocene period such as backed blades, bondi points and a selection of retouched flakes. If shell midden sites are to occur in the area their dominant material will comprise pipi shells, mud whelk and oyster.

## 5.8 Predictive Model for Historic Archaeology in the Newcastle GSF Project Area

The Tomago area was originally settle for agricultural purposes and remnant built items may remain associated with this early phase of post-contact occupation. These may be in the form of old fence lines, stockyards, market gardens, barns or storage sheds. It is possible that mining or industrial heritage items may also be present such as skips, railway tracks, dams and so on. Newcastle point area was the initial colonisation point of the area with Hexham and Maitland areas soon to follow. Settlement of the area was promoted for the opportunity to mine coal and develop an export industry along the Newcastle shoreline and the growth of an agricultural industry outside of Newcastle leading and in the Maitland area. Remnant built and industrial items may still be present in the Hexham portion of the NGSF Project Area. These may be in the form of coal processing and loading machinery, coal export ships, agricultural fencing and stock sheds to name a few.

# 6 Archaeological Survey

## 6.1 Archaeological Survey Methodology

This Aboriginal heritage assessment has been undertaken in accordance with best practice guidelines for survey reporting and included the following components:

- Documentation of survey coverage
- Documentation of results; and
- Documentation of significance of sites/areas to the Aboriginal community.

The survey methodology aimed to provide adequate coverage of the study area, sample coverage of all landforms, areas of exposure, as well as, vegetated areas. The locations of previously recorded sites were also inspected.

Survey units were described for each survey area, in particular, exposure and ground surface visibility were reported to ensure comparability of survey results between different areas of the local landscape, as well as, to contextualise survey results. Areas with high visibility and exposure generally have a lot of land surface disturbance, which can expose high quantities of archaeological material (particularly stone artefacts). Conversely, areas with low visibility and exposure particularly due to native vegetation coverage, are generally more intact (undisturbed) landscapes, while the identification of sites (particularly artefact scatters) in such areas are generally low, there is potential for intact archaeological deposits, which have been protected by vegetation coverage.

Survey observations were recorded using digital photography, GPS recording (differential), as well as, field notes.

In accordance with DECCW guidelines (2005), photographic recording was undertaken of landforms, survey units, Aboriginal cultural material, areas of archaeological or cultural sensitivity, levels of disturbance, as well as, other areas/items of interest. Photographs were scaled, as appropriate.

Field notes incorporated details including the size, location, contents and condition of Aboriginal heritage in the area, as well as, survey units. Size was recorded, either by GPS or tape measure. The condition of Aboriginal sites/areas of sensitivity were recorded including providing a description of the levels and cause of disturbances such as, erosion, land clearing and similar factors.

The Aboriginal stakeholder/s participating in the survey were asked about the cultural significance of the survey area and where applicable and/or appropriate, about the significance of Aboriginal sites and/or areas of archaeological sensitivity. An opportunity to comment on cultural significance was also provided in the survey preparation documentation and post survey reporting.

## 6.2 Archaeological Survey Results

A field survey of the Tomago portion and Hexham portion of the NGSF Project Area was undertaken by RPS archaeologists, Philippa Sokol and Anna Nardis. The Tomago portion of the NGSF Project Area field survey was conducted by Philippa Sokol and Anna Nardis in partnership with Aboriginal stakeholders representing the Worimi Local Aboriginal Land Council (Paul Roberts), Mu-Roo-Ma Inc. (Anthony Anderson and Candice Anderson) and Nu-Run-Gee P/L (Leanne Anderson and Chris Collison) over three days; November 30th through to December 2nd 2010. The Hexham portion of the NGSF Project Area field survey was conducted by Philippa Sokol in partnership with Aboriginal stakeholders representing the Awabakal Local Aboriginal Land Council (David Ahoy), Awabakal Descendents Traditional Owners Aboriginal Corporation (Shane Frost and James Frost) and Awabakal Traditional Owners Aboriginal Corporation (Kerrie Brauer) on 03 December 2010.

The study area was surveyed in 9 survey units (Refer Figure 6-1); exposure and visibility for each survey unit was assessed according to the criteria listed in Table 6-1 and the survey coverage for the study area is recorded in Table 6-2.

### 6.2.1 Survey Units

#### Survey Unit 1

Survey Unit 1 (SU1) comprised the northeast of the Tomago portion of the NGSF Project Area proposed for the gas plant. A few dirt tracks bisected the area in the north and southwest, one of which is a continuation of an existing north to south electricity easement to the north and outside of the study area parameter. This track contained introduced fill material of road base, gravel, sand and coal chitter (Plate 1). These tracks were capable of supporting vehicle movement and are utilised as the Tomago Fire Trails. Therefore, a high degree of soil disturbance occurred on the tracks particularly the easement line. The land to the far east of SU1 showed signs of exposed groundwater and regular inundation. A disturbed area in the southern portion of SU1 occurred as the result of previous sand mining activities. The topography in this area was in most part undulating from the mining disturbance and ground surface exposure was good in a number of areas which allowed for a more thorough inspection. As a result of previous activities, there were quite a number of felled trees in this portion with shrubby vegetation coming through as regrowth (Plate 2). The remaining vegetated areas were far more dense which limited visibility in areas. These areas contained a high ground surface cover of dried leaf litter, grass, fern like plants, small branches and bark detritus.

Running in an east to west trending direction through SU1, appeared to be a dune crest. This formation was considered by the Aboriginal community stakeholders as the most likely area to contain Aboriginal cultural material. The dune crest was subsequently investigated but due to the very thick shrub vegetation cover and dense floor cover no artefactual material could be identified. Scattered areas of ground surface exposure was investigated but nothing of an archaeological nature was identified (Plate 3). No cultural heritage material was evident in any of the disturbed soils. It was determined that the likelihood of in situ archaeological material was extremely low. Dean-Jones (1990)

undertook an extensive Aboriginal archaeological investigation of the Newcastle Bight area including the Tomago area and found that aeolian material in this part of the Tomago area showed a distinct lack of shell or bone and determined that the area may have been used for procurement, prior to transporting the material to open camp sites some distance from the swampy areas (Dean-Jones 1990:107). Dean-Jones (1990) also noted that artefacts did not extend beyond the B horizon which is generally exposed in the drainage lines (Dean-Jones 1990:106). The central area of the dune through which the access track is cut is generally classified as Pleistocene sand sheets by Matthei (1995: 212) and therefore was identified as a potential high sensitivity area. However, the field survey identified that the area had been severely highly disturbed by previous sand mining activity and that the high steep dunes had been removed.

**Survey Unit 2**

Survey Unit 2 (SU2) comprised the northern extent of the Tomago portion of the NGSF Project Area that ran in an east to west direction. This area is proposed to form the pipeline access corridor. A buffer zone of 20-30 metres was attempted for investigation. The majority of this area was covered by the Tomago Fire Trail One and was bisected by an electricity easement in the west that ran in a north to south direction. This electricity easement area had been cleared and modified to accommodate the new electrical powerline construction and as such no archaeological material was identified. The buffer zone for SU2 extended into the vegetated area south of the fire trail, a majority of this area offered low visibility and thick ground cover which made inspection for archaeological material difficult (Plate 4). The fire trail was the only area that allowed for good ground surface exposures and was subsequently investigated for artefactual material. The electricity easement area was open and cleared of vegetation; the area had also been modified to accommodate the development (Plate 5). The fire trail lead west through the easement to a well maintained grassy area with isolated trees adjacent to and northeast of the junction to Old Punt Road and the Pacific Highway (Plate 6). The area had evidence of both ground disturbance and modification containing low to nil ground surface exposures with no artefactual material identified.

A discussion was held with all participants of the survey team regarding the limited access to the 10m buffer zone situated in the vegetated area to the south of Tomago Fire Trail One. These buffer areas were assessed as comprising the same landform unit as the areas inspected on the track. Consequently it was agreed that there was no need for additional inspections.

**Survey Unit 3**

Survey Unit 3 (SU3) comprised the Tomago portion of the NGSF Project Area that is proposed for the access road and service corridor which will run in an east to west direction. A buffer zone of 20-30 metres was attempted for investigation in SU3. In the west of SU3, the access corridor is proposed to join onto the TAC Northern Access Road but due to the recent construction of the north to south trending electricity easement additional options need to be considered to avoid the electricity easement footprint. Therefore, two different access road options were investigated. The vegetation and landform features in SU3 varied between the east and west portions. Where possible the survey area was accessed via the fire trail routes which still remained as the best areas

for visibility and ground surface exposure. The portion of SU3 in the east was a predominantly dry area with open forest and relatively thick shrub cover. Given the time of the year for the field survey the vegetation and ground cover was thick which made access into much of the area difficult and visibility limited (Plate 7). Mature trees in the area were inspected for cultural scarring and any exposed areas for artefactual material.

The western portion of SU3 appeared to contain slightly different vegetation from the east and was situated adjacent to and north of the Swamp mahogany – paperbark swamp forest (ecobiological). In the areas that are proposed for the two access road options, lantana was thick and the area was situated adjacent to Swamp Mahogany – Paperbark Swamp Forest environment in the southeast (Plate 8). Access into this area was inhibited in many parts due to the very thick vegetation and pockets of water inundated areas. As visibility was low and ground surface exposure very low, no artefactual material was identified. The few large trees in the area were inspected but no cultural scarring was apparent. The Aboriginal community stakeholders have sound knowledge of the area and were happy with the survey area covered and given previous disturbances, they considered there to be no need for further archaeological inspections prior to project works commencing.

**Survey Unit 4**

Survey Unit 4 (SU4) comprised of the proposed pipeline Option 2 corridor which will follow the Old Punt Road verge. A buffer zone of 20-30 metres was attempted for investigation of SU4. The majority of SU4 was paved with road base and was extensively used by local traffic. Off the road, the ground surface visibility was hindered by grass and leaf litter. Some exposed areas off the road showed signs of clay. At the northern end of Old Punt Road, a fence line was also observed on either side of the road which bounded heavy vegetated areas. Litter and domestic rubbish was also recorded in these areas.

Old Punt Road then continued south into an urban development area which accommodated warehouses, small office buildings and car parks. Off road, there were few trees with no signs of ground surface exposures (Plate 9). The road continued in the south west which eventually turned into a gravelled road. This portion of the road was investigated for Aboriginal cultural material but none was identified.

**Survey Unit 5**

Survey Unit 5 (SU5) comprised the southwest land on the southern side of Tomago Road, noted as the hybrid option. A buffer zone of 20-30 metres was attempted for investigation. The hybrid option would link the Hexham Receiving Station to the gas pipeline access corridor via the northeastern portion of pipeline option 1 along the Pacific Highway and the southwestern portion of pipeline option 2 along Old Punt Road south of Tomago Road.

SU5 was accessed off Tomago Road and through the caravan park area. Thick swamp grass was situated along the proposed hybrid line and no ground surface exposures were evident (Plate 10). The survey unit then continued south of the caravan park along an existing track. The track dissected swampy marshes and thick grasses which were on either side of it and headed northwest towards the Pacific Highway (Plate 11).

The southwest area of SU5 was then surveyed. Willow trees were noted along the edge of the swampy areas and the thick grass cover hindered ground surface visibility. This section of SU5 led to the grounds of a caravan park which included caravans, paved roads and well maintained gardens. No Aboriginal cultural heritage material was identified in SU5.

**Survey Unit 6**

Survey Unit 6 (SU6) comprised of the option 1 corridor that runs parallel and to the east of the Pacific Highway. A buffer zone of 20-30 metres from the edge of the highway was attempted for investigation but many areas inhibited this activity such as industrial areas and associated fencing, swamp marshes, property boundaries, steep bedrock and thick vegetation. The survey unit comprised of Crown Land while the portion of land immediately southeast of SU6 is situated on private land. The survey team started the inspection from the Tomago Road intersection and continued north along SU6 to Old Punt Road intersection. A drainage area containing swamp like vegetation with standing water prevented full access to the buffer zone area (Plate 12). The Aboriginal community commented on the extent of disturbance of the area and the possible importing of soil fill in order to have such built up industrial developments.

An artefact scatter site (RPS Pacific HWY AS2) was identified adjacent to an industrial complex in extremely disturbed soils where it is unsure whether the soil is local to the area or imported. The site is not *in situ* as evidenced by the existing sign posts in the area indicating the prevalence of potential gas pipelines sub surface. The site comprised of five tuff and three silcrete stone artefacts of flaked tools, flaked pieces and cores (Plate 13 and 14).

The remainder of the survey uncovered steep, eroding bedrock verges that were considered too dangerous to climb being situated so close to the highway. The eroded areas contained no archaeological material (Plate 15). The driveway and front lawn of a house in this location was inspected for archaeological material. At the intersection of the Pacific Highway and Old Punt Road, the area to the southeast opened up to form a large inundated area containing tall grasses, which abut the predicted buffer zone of the survey area.

The private land in the southeast was noted and observed in conjunction with the crown land survey area. This area appeared to reflect similar characteristics and was situated on landform units similar to the Crown Land area in the northwest. Some parts differed, such as drainage areas containing swampy grasses in the southwest and northeast of SU6, as well as private land occupied by industrial complexes such as Volgren and a residential dwelling.

**Survey Unit 7**

Survey Unit 7 (SU7) comprised the Hexham portion of the NGSF Project Area to the southwest of the Hunter River. The survey commenced in the southern portion of 235 Old Maitland Road, Hexham. The northern portion of this site was occupied by a building used by the NSW Soccer Federation. This area appeared to have been modified as the

ground surface was very level with tall trees situated at the southern border of the area adjacent to a small man made drainage line (Plate 16). Very few areas of exposed soil occurred in the area. All these exposed areas were inspected for archaeological material but none was identified. The proposed trench area for Option 2 corridor incorporated an existing road verge along Old Maitland Road. This area had already undergone disturbance by such activities as road upgrade and maintenance and the construction of a minor drainage channel that runs parallel to the road, as well as general vegetation and lawn upkeep. The section where the pipeline was to be under bored was reached and the area was thoroughly investigated. Much of this area contained fill soils to increase the height of the landform in order to support the existing industry, therefore a mixture of soil, gravel and road base was noted (Plate 17).

### 6.2.2 Ground Surface Visibility

Ground surface visibility (GSV) is defined as the amount of bare ground on exposures which might reveal artefacts or other archaeological material although it is not considered a reliable indicator for detecting buried archaeological material. Visibility in an area may be affected by vegetation, leaf litter, loose sand, stony ground or introduced materials and the GSV ratings are described in Table 6-1 below.

**Table 6-1: Ground Surface Visibility Rating**

| GSV Rating | Overall Rating | Description |
|---|---|---|
| 0 – 9% | Low | Heavy vegetation with scrub foliage, debris cover and/or dense tree cover. Ground surface not clearly visible. |
| 10 – 29% | Low | Moderate level of vegetation, scrub or tree cover. Small patches of soil surface visible resulting from animal tracks, erosion or blowouts. Patches of ground surface visible. |
| 30 – 49% | Moderate | Moderate levels of vegetation, scrub and/or tree cover. Moderate sized patches of soil surface visible possibly associated with animal tracks, walking tracks and erosion surfaces. Moderate to small patches across a larger section of the study area. |
| 50 – 59% | Moderate | Moderate to low level of vegetation, tree and/or scrub. Greater amounts of areas of ground surface visible in the form of erosion scalds, recent ploughing, grading or clearing. |
| 60 – 79% | High | Low levels of vegetation and scrub cover. High incidence of ground surface visible due to recent or past land–use practices such as ploughing, grading and mining. Moderate level of ground surface visibility due to sheet wash erosion, erosion scalds and erosion scours. |
| 80 – 100% | High | Very low to nonexistent levels of vegetation and scrub cover. High incidence of ground surface visible due to past or recent land use practices, such as ploughing, grading and mining. Extensive erosion such as rill erosion, gilgai, sheet wash, erosion scours and scalds. |

### 6.2.3 Ground Surface Exposure

As outlined in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (2010), exposure estimates the area likely to reveal buried artefacts or deposits by observation of the ground surface. It is calculated as the percentage of the land for which erosion and exposure is sufficient to reveal archaeological evidence on the surface of the ground. Exposures may result from processes such as sheet wash, gullying, blowouts, salt scalds, tracks or animal pads. Ground disturbance on track exposures can be exacerbated by motor vehicles. Effective coverage is generally calculated on the landscape limitations experienced at the time of field survey and what effect this may have on the area surveyed, such as swamp and inundated areas, unstable and potential dangerous terrain and inaccessible vegetation. Table 6-2 details the outcome of survey coverage for the NGSF Project Area.

**Table 6-2: Survey Coverage Data**

| Survey Unit | Landform | Survey Unit Area (Square metres) | Exposure (%) | Visibility (%) | Effective Coverage Area (square metres) | Effective Coverage (percent) |
|---|---|---|---|---|---|---|
| 1 | Vegetated and disturbed | 280,420 | 85 | 55 | 182,273 | 65 |
| 2 | Disturbed and Modified | 64,685 | 85 | 25 | 54,982 | 85 |
| 3 | Vegetated and disturbed | 47,904 | 50 | 25 | 33,533 | 70 |
| 4 | modified Landscape | 83,507 | 45 | 25 | 72,651 | 87 |
| 5 | Disturbed and inaccessible | 32,337 | 70 | 65 | 27,486 | 85 |
| 6 | modified Landscape and inaccessible | 34,870 | 65 | 35 | 24,409 | 70 |
| 7 | modified Landscape | 19,514 | 60 | 20 | 17,563 | 90 |

WARNING
No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from RPS Newcastle.

## Legend

- Gas Plant Layout
- Pipeline Route Options
- Artefact Scatter

***Survey Units***

- SU 1
- SU 1-East West Dune
- SU 2
- SU 3
- SU 4
- SU 5
- SU 6
- SU 7

Hunter River
Pacific Hwy
RPS PHWY AS 2
Old Punt Road
Tomago Road
Hunter River
N
0
500
1,000m
SCALE: 1:12,500 AT A3 SIZE

TITLE: FIGURE 6-1: SURVEY UNITS
LOCATION: TOMAGO & HEXHAM
DATUM: N/A
PROJECTION: MGA ZONE 56 (GDA 94)
DATE: 29/03/2011
PURPOSE: CULTURAL HERITAGE ASSESSMENT
LAYOUT REF: J:\JOBS\103k\103386 Tomago\10- Drafting\Archaeology Drafting\MapInfo Workspaces
VERSION (PLAN BY): C A3 (NW-PS)



CLIENT: COFFEY NATURAL SYSTEMS PTY LTD
JOB REF: 103386-1

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4940 4200 F: 02 4961 6794 www.rpsgroup.com.au

### 6.2.4 Aboriginal Sites

The type and details of the Aboriginal site recorded during the field survey assessment is provided in Table 6-3.

**Table 6-3: Summary of Site, Location Recorded in GDA94/MGA, Zone 56**

| No. | Site Code | Site Name | Eastings | Northings | Site Type |
|---|---|---|---|---|---|
| 1 | RPS PHWY AS2 | RPS Pacific Hwy AS2 | 378274 | 6368460 | Artefact Scatter |

### 6.2.5 Area of sensitivity

Only one area of archaeological sensitivity was identified and recorded during the field survey assessment, details of which are provided below.

**Table 6-4: Area of sensitivity, Location Recorded in GDA94/MGA, Zone 56**

| Description | Landform type | Location | Eastings | Northings | Sensitivity rating |
|---|---|---|---|---|---|
| East west trending sand dune | Remnant Sand dune (largely disturbed) | Survey Unit 1 | 381204 | 6368823 | Moderate - low |

### 6.2.6 Discussion of Aboriginal Survey Results

The majority of the Tomago portion of the NGSF Project Area was situated on either modified or disturbed land, especially along the pipeline routes, in sand mined areas and along fire trails. Thick vegetation tended to occur on relatively undisturbed land. Waterlogged or inundated land was also noted in vegetated areas and along some dirt tracks. In most of these sections, especially the low disturbance areas, dense vegetation was prevalent and ground visibility was zero. Archaeological data for the Tomago region shows that inundated and disturbed landform types do not generally contain highly sensitive archaeological features, nor are they likely to harbour archaeological material except for isolated artefacts which would represent a transitory use of the land by Aboriginal people, or material deposited by natural landscape formation processes or via landform modification.

Archaeological settlement patterning across the region indicates that the region may contain low archaeological potential. Local site patterning has shown that elevated landforms overlooking the interbarrier depression were favoured by Aboriginal people in the past as locations for camp sites.

An east to west trending dune was identified in SU1. This is considered to be on a naturally elevated landform, but is quite isolated from readily accessible resources and its exposed areas have been severely affected by vehicle movements and construction of the electricity easement line and previous sand mining. Also of note is the limited number of Aboriginal artefact sites, stone artefacts to be exact, in the immediate locality. Stone

artefact sites are the largest proportion of Aboriginal artefact sites recorded on AHIMS for the region with all of these sites being located near to the Hunter River and Fullerton Cove. Because the dune in parts is relatively undisturbed, it does retain potential for undiscovered Aboriginal sites. However, consideration must be given to the regular inundation of the area generally which may well have compromised the intact nature of parts of the dune and the evidence to date which indicates that due to its distance from the Hunter River it may well posses no artefactual material at all.

The pipeline access corridor, access road and service corridor, pose little to no risk to the east to west trending dune noted in SU1. These areas are intended to be constructed further west and outside of the gas plant site and will form two separate corridors that are spaced approximately 250 metres apart. Whereas the gas plant footprint will be located in the area of the dune and options for Aboriginal cultural will need to be taken into consideration.

An artefact scatter site was identified on the Pacific Highway option despite the area being predicted to have very low archaeological potential. Given the high disturbance and modification of the landscape from nearby industry development and emplacement of pipelines, the site was recognised as not being in situ and was found to have low archaeological significance. Mitigation options for reduced impact to the sites have been formulated in Section 8.

The Hexham portion of the NGSF Project Area was situated on highly disturbed and modified land, incorporating occasionally inundated areas and imported fill. Most of the survey area had been affected by disturbance at one point or another and this varied depending on the use for the area. Most of the Hexham portion of the NGSF Project Area comprises a low lying flat landform. Some areas are more elevated than others and it was considered that old built structures such as the Hexham Public School which dates back to 1869 and lies about 50 metres to the southeast of the proposed Hexham receiving station, were most likely constructed on the original landform. Later industry demands in the area introduced fill which modified the natural landforms. It is therefore unlikely that evidence of occupation will be found in these areas, including the swamp land bordering the Hunter River, as the majority of the original landforms in the vicinity of the project area have now been built upon with exposed ground surface being very limited.

In summary, the Newcastle GSF Project Area generally has low archaeological potential owing to the lack of suitable landforms for Aboriginal occupation and localised disturbance caused by previous land uses and regular water inundation. The exception is the east to west trending dune in SU1 that may have increased archaeological potential in isolated pockets that have not been disturbed by past land use practices.

# 7 Significance Assessment

In order to develop appropriate heritage management outcomes, it is necessary for the significance of Aboriginal sites or areas of archaeological sensitivity to be assessed. Aboriginal heritage can be significant for cultural and/or scientific reasons. Aboriginal people are the best placed to assess cultural significance and are therefore consulted in the Aboriginal heritage management process. Scientific significance is assessed according to scientific criteria outlined in DECC heritage guidelines (2005).

## 7.1 Cultural Significance Criteria and Assessment

An assessment of cultural significance incorporates a range of values which may vary for different individual groups and may relate to both the natural and cultural characteristics of places or sites. Cultural significance and Aboriginal cultural views can only be determined by the Aboriginal community using their own knowledge of the sites and their own value system.

As cultural significance is a criterion that only Aboriginal people can assess, a detailed appraisal of cultural significance for the study area has not been included as part of this study. However, response and comment on the study area was discussed with Aboriginal representatives during the survey. RPS does acknowledge that the Worimi and Awabakal Aboriginal community stakeholders who participated in this assessment (Section 1.5) have a responsibility to their People to provide the utmost of protection for Aboriginal culture and heritage in their country. The main area considered for potential to hold cultural significance was the east west trending dune identified in SU1 and as such has been recommended by the Aboriginal community stakeholders for additional investigation during clearance works and prior to construction. Further details are included in the Aboriginal consultation log (Appendix 2).

Report responses from the ADTOAC indicated that the Hexham area has been subject to varying levels of modification, but there have also been habitable areas suitable for building construction and the early settlement by Aboriginal people. Full documentation for report comments from the Aboriginal community stakeholders is available in Appendix 2.

## 7.2 Aboriginal Archaeological Significance Criteria

Archaeological significance, also referred to as scientific significance, is determined by assessing an Aboriginal heritage site or area according to archaeological criteria. The assessment of archaeological significance is used to develop appropriate heritage management and impact mitigation strategies. The following archaeological significance criteria have been used: rarity, representativeness, integrity, connectedness, complexity and research potential and are defined in Table 7-1.

**Table 7-1: Archaeological Significance Criteria**

| Criteria | Description |
|---|---|
| Rarity | This criterion examines the frequency of the identified site types with others previously recorded in the local or regional landscape |
| Representativeness | All sites are representative of a site type, however, some sites may be in better condition, or demonstrate more clearly a particular site type. Representativeness is based on the understanding of extant sites in the local or regional landscape and the purpose of this criteria is to ensure a representative sample of sites area conserved for future generations |
| Integrity | This refers to site intactness. A site with contextual integrity can provide information relating to chronology, social systems, tool technology, site formation processes, habitation, frequency of use as well as other occupation indicators. Moderate to high levels of disturbance will generally result in low integrity. |
| Connectedness | Relates to inter-site relationships, that is whether a site can be linked to an archaeological complex, or where sequence of activities can be discerned. For example, a quarry (stone extractions site), may be linked to an adjacent heat treatment pit and knapping floor, these site thus could be linked as part of a stone tool production sequence. |
| Complexity | Refers to the contents of the site, such as, the variety and nature of features and/or of artefacts present. For example, rockart sites with many motifs may be ranked highly in terms of complexity, or artefact scatters with a wide variety of raw materials and/or or tool types may be more complex than surrounding sites. |
| Research Potential | This criteria is used to identify whether a site has the potential to contribute new information which to the interpretation of Aboriginal occupation in the area. |

The archaeological significance criteria are usually assessed on two scales: local and regional; in exceptional circumstances; however, state significance may also be identified. Archaeological significance criteria is assessed in three levels to which scores are assigned; low (score=1), moderate (score=2) and high (score=3).

A combination of these scores then provides an overall significance ranking of the site to be determined.

- Low significance 6-10
- Moderate significance 11-14
- High significance 15-18

### 7.2.1 Assessment of Aboriginal Archaeological Significance

The archaeological significance of the identified Aboriginal site has been assessed and is summarised in Table 7-2 below.

**Table 7-2: Assessed Levels of Archaeological Significance**

| Site | Significance scale | Rarity | Representativeness | Integrity | Connectedness | Complexity | Research Potential | Overall Significance |
|---|---|---|---|---|---|---|---|---|
| RPS PHWY AS2 | Local | 1 | 1 | 1 | 1 | 1 | 1 | Low |
| | Regional | 1 | 1 | 1 | 1 | 1 | 1 | Low |
| East West trending dune | Local | 1 | 2 | 2 | 1 | 1 | 1 | Low |
| | Regional | 1 | 2 | 2 | 1 | 1 | 1 | Low |

### 7.2.2 RPS PHWY AS2

The RPS PHWY AS2 site has been assessed to have low significance on both a local and regional scale because of the areas previous disturbance levels and the modified landform it is situated upon. No mature trees were identified nearby as the area has been cleared during the modification process which formed the road verge and allowed the emplacement of sub surface pipelines. In addition, the site was located in a verge area outside of and immediately adjacent to a large industrial complex and associated sheds giving it an increased chance of having suffered impact from the development and boundary fence construction. As such, its integrity has been severely compromised and is negligible. Variety does exist at the site for flake type and raw material but given the high disturbance and the chance that the artefacts may not be from the immediate area has necessitated the classification to be assessed as low significance for complexity. Overall, this site has a low local and regional significance.

### 7.2.3 East West trending remnant dune

The east west trending dune has been assessed to have low significance on both a local and regional scale. As previously discussed, even though it is considered to be a naturally elevated landform, is quite isolated from readily accessible resources and its exposed areas have been severely affected by vehicle movements, construction of the electricity easement line and previous sand mining. Also of note is the limited number of Aboriginal artefact sites (stone artefacts to be exact), in the immediate locality as evidenced by the AHIMS search and local Aboriginal community's knowledge of the area. Stone artefact sites are the largest proportion of Aboriginal artefact sites recorded on AHIMS for the region with all of these sites being located near to the Hunter River and Fullerton Cove. Yet, because the dune in parts is relatively undisturbed, it does retain potential for undiscovered Aboriginal sites with consideration given to the regular inundation of the area generally which may well have compromised the intact nature of parts of the dune and the evidence to date which indicates that due to its distance from the Hunter River it

may well posses no artefactual material at all. Overall, this site has a low local and regional significance.

# 8 Impact Assessment and Mitigation

This section provides an assessment of the proposed development footprint in relation to the Aboriginal heritage. Conservation of Aboriginal sites and areas of archaeological sensitivity is the preferred heritage outcome. However, other mitigation options have been developed in case this is unfeasible as part of the proposed development. The identified risks to heritage, as well as, proposed conservation and mitigation strategies have been summarised in Table 8-1.

**Table 8-1: Summary of Potential Impacts, Risks to Heritage and Mitigation Options**

| Impact | Risk to Heritage | Mitigation Option 1 | Mitigation Option 2 | Mitigation Option 3 |
|---|---|---|---|---|
| Excavation (for pipelines) | Disturbance/damage to identified artefact RPS PHWY AS2 | Create buffer zone around sites to avoid impact; under bore pipeline | Move artefact under CHMP to location outside impact area | Collect artefact under CHMP |
| | Disturbance/damage to areas that may be of potential archaeological sensitivity | - | Archaeological Excavation according to CHMP methodology | - |
| Gas plant construction works | Disturbance/ damage to east to west dune formation | Limit vehicle number and movement across dune | Pre construction survey of area during vegetation clearance works | - |
| | Disturbance/ damage to potential sites and areas of archaeological sensitivity along and immediately adjacent to the dune formation | Clearance of vegetation at the ground surface in order to avoid sub-surface impact | An Aboriginal Stone Tool Induction conducted for machinery operators to assist with artefact identification during clearance works | - |
| Plant/vehicle movement | Disturbance/damage to identified artefact RPS PHWY AS2 | Avoid | Move artefacts under CHMP to location outside impact area | Collect artefact under CHMP |
| | In wet conditions, heavy plant equipment/ vehicles may disturb soil profiles at artefact site RPS PHWY AS2 | Avoid | Restrict heavy plant/vehicle movement to dry weather conditions | - |

## 8.1 Principles of Ecologically Sustainable Development

The principles of ecologically sustainable development need to be considered under section 2A of the NPW Act. Inter-generational equity is part of these principles, which allows future generations to access the cultural and environmental diversity of the present generation.

Inter-generational equity has been considered as part of the assessment of significance. State significant Aboriginal sites should be considered for blanket protection for future generations, as these sites have been assessed as having highest significance within NSW. No Aboriginal sites of state significance were identified in this assessment.

# 9 Conclusions and Recommendations

This report has considered the environmental and archaeological context of the study area, developed a predictive model and reported on the results of an archaeological survey of the study area. The following management recommendations have been formulated with consideration of the significance of Aboriginal heritage, as well as, potential impacts and have been prepared in accordance with the relevant legislation.

The two identified areas of interest for Aboriginal cultural heritage management are RPS PHWY AS2 and the SU1 dune. Mitigation measures (Section 8) have been formulated so that areas of sensitivity can be established by all staff prior to the commencement of works in order to either avoid potential impact or keep to a minimum. In conclusion, the Newcastle GSF Project Area generally exhibits low archaeological potential owing to the lack of suitable landforms for Aboriginal occupation and localised disturbance and modifications. The remnant east west trending dune has also been considered for the potential to hold cultural significance by the Aboriginal community and as such has been recommended by them for additional investigation during vegetation clearance works and prior to construction. The nature of this investigation will be fully detailed in the Cultural Heritage Management Plan to be developed in association with the relevant Worimi Aboriginal Stakeholders that will be needed for the Newcastle GSF Project Area upon approval by D.O.P.

European cultural heritage items listed in Table 4-2 are identified in proximity to the Hexham Receiving Station and pipeline corridor options. These items are not considered to be at risk of impact due to existing high disturbance and modification of the surrounding areas. The methodology adopted in relation to the pipeline corridor underboring in this vicinity will effectively mitigate against impacts both to visual amenity and structural integrity.

## 9.1 Aboriginal Cultural Heritage

**Recommendation 1**

Once the dense vegetation layer within the gas plant footprint area is removed, a suitably qualified archaeologist and a representative from WLALC, NRG and MRM should inspect the land for any evidence of Aboriginal sites and/or objects. Further recommendations may be made with regard to Aboriginal heritage management within this location following this inspection.

**Recommendation 2**

If pipeline works are proposed to be built on private land immediately east of and adjacent to the Pacific Highway (SU6), as opposed to within the buffer within 20 - 30m of the highway, a pre-construction survey is not considered a requirement for this area given the similar landform unit characteristics, low ground surface visibility, water inundation and eroded bedrock.

## 9.2 General Recommendation for the Management of Heritage within the Study Area

The following recommendations apply to the overall management of proposed works within the study area.

**Recommendation 3**

All relevant AGL staff and contractors should be made aware of their statutory obligations for heritage under NSW NPW Act (1974) and the NSW Heritage Act (1977), which may be implemented as a heritage induction.

**Recommendation 4**

The location of RPS PHWY AS2 should be included in the AGL environmental management framework for the NGSF Project Area, so that all staff are aware that these areas will require management.

**Recommendation 5**

If further Aboriginal site/s are identified in the study area, then all works in the area should cease, the area cordoned off and contact made with DECCW Environment Line 131 555, a suitably qualified archaeologist and the relevant Aboriginal stakeholders, so that it can be adequately assessed and managed.

**Recommendation 6**

In the unlikely event that skeletal remains are identified, work must cease immediately in the vicinity of the remains and the area cordoned off. The proponent will need to contact the NSW Police Coroner to determine if the material is of Aboriginal origin. If determined to be Aboriginal, the proponent, must contact the DECCW Environment Line 131 555, a suitably qualified archaeologist and representatives of the local Aboriginal Community Stakeholders to determine an action plan for the management of the skeletal remains, formulate management recommendations and to ascertain when work can recommence.

## 9.3 European Cultural Heritage

No European cultural heritage sites were located during the field survey investigation. During the course of any development works the following management recommendation should be considered.

**Recommendation 7**

If, during the course of development works, significant European cultural heritage material is uncovered, work should cease in that area immediately. The NSW Heritage Branch should be notified and works only recommence when an appropriate and approved management strategy instigated.

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# 11 Plates

**Plate 1: Imported fill along easement in SU1**

**Plate 2: Previous disturbance in SU1**

**Plate 3: Minimal ground surface exposure along dune area in SU1**

**Plate 4: Buffer zone and fire trail vegetation in SU2**

**Plate 5: Electricity easement in SU2**

**Plate 6: Cleared and modified area adjacent to Pacific Highway in SU2**

**Plate 7: Thick tree and shrub cover in SU3**

**Plate 8: Heavy ground surface cover and lantana in SU3**

**Plate 9: Industrial area on Old Punt Road in SU4**

**Plate 10: Thick grass and low ground surface visibility in SU5**

**Plate 11: Exposed track in SU5**

**Plate 12: Inundated area at Tomago Road in SU6**

Plate 13: Location of RPS PHWY AS2 in SU6


Plate 14: Artefacts in SU6 RPS PHWY AS2

Plate 15: Exposed track in SU6

Plate 16: Southern section of 235 Old Maitland Road in SU7

**Plate 17: Under bore section of SU7**