

Aboriginal Heritage Assessment of Proposed Bulk Fuels Storage Facility Kooragang Island, NSW

17 July 2007

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HLA Ref: N6044401_Final_23Sept07



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17 July 2007

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GLOSSARY OF TERMS

Activity Area	A pattern of artefacts in a site indicating that a specific activity took place.
Adaptation	Adaptation means modifying a place to suit proposed compatible uses.
Adze	A chiselling or gouging tool used for shaping and trimming wooden artefacts.
Alluvial	Pertaining to the surface. A surface deposit.
Anvil	Object that supports a stone artefact that is being struck with a hammer.
Archaeological Potential	The likelihood of the presence of archaeological evidence ascertained through physical evaluation (survey, test excavations) and historical research.
Artefact Scatter	A collection of artefacts usually distributed across the surface of the ground.
Artefact	Any object which is physically modified by humans.
Assemblage	A collection of artefacts associated by a particular place or time and assumed generated by a single group of people. An assemblage can comprise different artefact types.
Assimilation	A 19th century idea that Indigenous people should be 'improved' by being 'civilised' and becoming Christians and learning how to work as Europeans did. From the 1930s assimilation became government policy.
Attribute	A well defined feature of an artefact that cannot be further subdivided. Archaeologists identify types of attributes, including form, style and technology, in order to classify and interpret artefacts.
Axe	A stone-headed axe characteristically containing two ground surfaces which meet at a bevel.
Backed Blade	A stone tool where one margin of a flake is retouched at a steep angle and that margin is opposite a sharp edge.
Background Scatter	A low density scatter of isolated finds that are distributed through the landscape without any obvious focal point.
Basalt	Igneous volcanic rock used to make stone artefacts. Basalt is common in eastern Australia where there has been recent volcanic activity.
Bifacial Flake	A chipped stone artefact which has flake scars on both surfaces. Such artefacts generally have lenticular cross-sections and platforms which are edges between the flaked surfaces.
Biome	Major biotic landscape in which distinctive plant and animal communities exist.
Bipolar Flake	A stone artefact made by striking into an anvil with a hammerstone. Bipolar flakes display crushing at either end.

Black Glass	A popular term for bottles of dark green or dark brown glass, the dark colour of which protected the contents. "Black" glass was first made in England in the mid-17th century.
Blade	A flake that is at least twice as long as it is wide.
Bondi Point	A small assymetrical microlith with a point at one end and backing retouch.
Bottle glass	A common, naturally coloured, dark greenish or brownish glass. The colour is characteristic of glass that includes traces of iron found in the natural silica used as the major ingredient. Sometimes, additional iron, in the form of iron oxide (or other materials), is added to darken the colour.
Bottle Seal	Its many meanings include an emblem impressed on wax or some other plastic substance as evidence of ownership or authenticity. Since the 17th century, many bottles have borne stamped glass seals that identify the producer of the contents, the tavern in which they were used, or the individual for whom the contents were bottled.
Bowsing	Technique for detecting buried features by thumping the ground and sensing the differences between compacted and undisturbed earth.
Burin	A stone tool flaked on one or both ends to form a small chisel or grooving tool.
Burra Charter	The Burra Charter provides guidance for the conservation and management of places of cultural significance Australia. It sets a standard of practice for those who provide advice, make decisions about, or undertake works to places of cultural significance, including owners, managers and custodians. The most recent version of the Burra Charter was adopted by Australia ICOMOS (the Australian National Committee of ICOMOS) on 26 November 1999.
Ceramic	Object of fired clay. Ceramic may be glazed or unglazed.
Chert	A fine-grained silicious rock commonly used in the manufacture of stone artefacts.
Civic	A term used to describe historic structures or material culture relating to past government or public activity, i.e. town halls and public parklands.
Commonwealth Heritage List	A database of cultural heritage places situated on Commonwealth lands that have acknowledged national heritage value. The list is established under the Environment Protection and Biodiversity Conservation Act 1999.
Composite Flake	A stone tool made up of two or more parts joined together.
Conjoin	A physical link between artefacts broken in antiquity.
Conjoin Set	A number of artefacts refitted together.
Conservation	As defined in The Burra Charter, conservation means all the processes of looking after a place so as to retain its cultural significance.

Conservation Management Plan	A document that outlines the cultural heritage significance of an object or area and policies, guidelines, maintenance and other related strategies for the conservation of the object or area.
Contact Site	A site that displays an interaction between early colonialists and Aboriginal Australians.
Coprolite	Excrement preserved by desiccation or fossilisation.
Core	A piece of flaked stone which has one or more negative flake scars but no positive flake scars.
Cortex	Weathered outer surface of a rock, usually chemically altered.
Country	A term used by Aboriginal people to refer to the land to which they belong and their place of Dreaming. Aboriginal language usage of the word country is much broader than standard English.
Crop Mark	Differential growth in crops and vegetation cover that reveals the outlines of archaeological sites from the air.
Cross-dating	Dating of sites by means of objects or associated artefacts of known age.
Crown land	Crown land is a class of public land, provided for the enjoyment and benefit of the people. See also Reserves.
Cultural Landscape	An area of land that contains numerous objects and/or areas of cultural heritage value that, when considered as a whole, are of cultural heritage significance.
Cultural significance	Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations (Australia ICOMOS Burra Charter Article 1.2).
Datum	The datum point is the location from which all measurements on a site are made. The datum point is tied into local survey maps.
Desktop Survey	A study that does not involve any field-based activity and only involves background research and reporting, e.g. university assignments, desktop historical research projects.
Diffusion	The spread of a cultural trait from one area to another by means of contact between people.
Distal	The terminating end of a flake opposite the bulb.
Dreaming	The Dreaming has different meanings for different Aboriginal groups. The Dreaming can be seen as an embodiment of Aboriginal creation which gives meaning to everything. It establishes the rules governing relationships between the people, the land and all things for Aboriginal people.
Dry Stone Wall	A wall that has been constructed without any binding material.
Edge Damage	The removal of small flakes, or crushing, from the edge of an artefact.
Elouera	A type of backed blade, triangular sectioned and resembling an orange segment in shape.
Excavation	An archaeological field method that involves the disturbance of the earth to reveal previously buried archaeological materials.

Faience	Glazed terracotta pottery.
Feature	An artefact that cannot be normally removed from a site, e.g. foundations.
Fish Trap	A structure within a creek or river intended to guide fish or eels into a confined space for collected. Usually made with stone but may be formed from wood or reeds.
Flake	Any piece of stone struck off a core. It has a series of characteristics showing that it has been struck off. The most indicative of these features are ringcracks, showing where the hammer hit the core. Also the ventral surface may be deformed in characteristic fashion, for example having a bulb or errillure.
Flaked Piece/Waste Flake	An unmodified and unused flake, usually the by-product of tool manufacture or core preparation.
Flotation	Recovering plant remains by using water to separate seeds from their surrounding deposit.
Fluvial	Pertaining to rivers and streams. Deposits by flowing water.
Gilding	The process of decorating by the use of gold leaf, gold paint, or gold dust. The gilding may be applied with size, or amalgamated with mercury.
Greywacke	Hard fine-grained rock of variable composition containing some quartz and feldspar but mostly very fine particles of rock fragments.
Grinding Groove	A depression formed in rock from the use of a grinding stone.
Grinding Stone	The abrasive stone used to abrade another artefact or to processes food.
Ground Edge Axe	A stone axe that is oval or round in shape and has edges formed by grinding and sharpening. Ground edge axes were hafted to wooden handles using resin.
Ground Visibility	A term used to describe the area of the ground's surface that is visible during archaeological field surveys.
Hafting	The process of attaching a stone artefact onto a wooden handle.
Hammerstone	A stone that has been used to strike a core to create a flake, often causing pitting or other wear on the stone's surface.
Hearth	Fireplace often recognised archaeologically through the presence of charcoal or burnt ground. Historical hearths are usually associated with a brick or stone structure.
Heritage	The word 'heritage' is commonly used to refer to our cultural inheritance from the past that is the evidence of human activity from Aboriginal peoples through successive periods of later migration, up to the present day. Heritage can be used to cover natural environment as well, for example the Natural Heritage Charter. In this document, cultural heritage refers to all Indigenous and non-Indigenous places and objects, and associated values, traditions, knowledge and cultures.
Historical Archaeology	Historical archaeology is a term to describe non-Indigenous or post-contact heritage.

Holocene	The geological period covering the last 10,000 years.
ICOMOS	ICOMOS (International Council on Monuments and Sites) is linked to UNESCO, with national committees in some 100 countries with the headquarters in France. ICOMOS promotes expertise in the conservation of cultural heritage. Australia ICOMOS was formed in 1976. Its fifteen member executive committee is responsible for carrying out national programs and participating in decisions of ICOMOS.
<i>In Situ</i>	In the natural or original position. Applied to a rock, soil, or fossil when occurring in the situation in which it was originally formed or deposited.
<i>In situ</i> conservation	Strategies and initiatives designed for the preservation and conservation of historical archaeological materials without the need to collect or excavate materials from their archaeological context.
Interpretation	A way of communicating meaning and relationships using original artefacts, by first-hand experience and by illustrations.
Isolated Find	A single artefact not located with any other.
Knapping	The process of striking rocks and causing them to fracture.
Koori	Koori is an Aboriginal term used to describe Indigenous people from southeastern Australia.
Lacustrine	Pertaining to lakes. Deposits from a lake system.
Lithics	Of or pertaining to, rock and stone.
Makers Mark	A mark that has been etched engraved or printed onto the surface of mass manufactured goods, including glassware and ceramics.
Manuport	An object that is unmodified but has been transported to its location by humans.
Maritime Archaeology	Maritime archaeology is often thought to be restricted to shipwrecks. The term applies to places and objects relating to industries such as sealing and whaling, and also includes structures such as jetties and piers, and ports infrastructure.
Megafauna	Large mammal animals that once lived in Australia.
Microlith	Very small stone artefacts often used in spears.
Midden	A deposit of occupation debris, rubbish, or other by-products of human activity.
Murri	Murri is an Aboriginal term used to describe Indigenous people from northeastern Australia.
Natural Transformation	Change in the archaeological record as a result of natural processes.
Object	An object means a moveable article, artefact or relic, and may include furniture, ornaments, cutlery, glass, crockery, works of art, honour boards, jewellery, and vehicles. Groups of objects are commonly referred to as a collection if there is a shared theme that links the objects.

Obsidian	A volcanic mineral that was the first form of natural glass used by humans. It is usually black, but it can also be very dark red or green; its splinters are often transparent or translucent.
Opalised Glass	Glass that resembles an opal, being translucent and white, with a greyish or bluish tint. This appearance is often caused by exposure to sunlight.
Palynology	The study of pollen.
Pleistocene	The geological period equivalent to the last ice age and preceding the Holocene from ca 2 million years to 10,000 years ago. The Late Pleistocene generally refers to the period of time from 40,000 – 10,000 years ago.
Post-depositional	After deposition. A term commonly used with reference to factors affecting the preservation of artefacts and archaeological features.
Posthole	A hole that has been dug into the ground to house a post.
Potsherd	A fragment of a clay vessel.
Quartz	A hard transparent mineral commonly used in the manufacture of stone artefacts.
Quartzite	A large-grained silicious rock commonly used in the manufacture of stone artefacts.
Relief Cutting	A type of cut glass with decoration in high relief, made by removing the background.
Retouched Flake	A flake that has had secondary modification such as trimming or modification.
Reverse painting	The term applied to a number of decorative techniques, all of which involve painting on the back side of the glass a design that is viewed from the front (that is, through the glass). Because of this, the painter must apply the pigments in the reverse of the normal order, beginning with the highlights and ending with the background.
Rock Well/Gnamma Hole	A natural depression that may have been augmented through the removal of rock and from which water is collected.
Ruin	The remains of a former historic structure.
Salvage Excavation	The systematic documentation and recovery of an archaeological site immediately prior to its destruction.
Scarred Tree	A tree whose bark has been removed for the use for canoes, roofing, and trail blazes for example.
Scraper	A stone tool made on a flake or core with steep retouch along one or more edges.
Seam mark	A slight, narrow ridge on a glass object, which indicates that it has been made by moulding. The seams appear where gaps in the joints between parts of the mould have permitted molten glass to seep during formation. On well-made pieces, the seam marks are usually smoothed away by grinding or fire polishing.
Seasonality	Seasonal occupation of a site.

Seriation	Method used to place artefacts in chronological order. Similar artefacts are placed more closely together.
Settlement Pattern	Distribution of human settlement on the landscape.
Shell Midden	A mound or deposit containing shells, animal bones, and other refuse that indicates a site of a human settlement.
Significance	Significance is a term used to describe an item's heritage value. Values might include natural, Indigenous, aesthetic, historic, scientific or social importance.
Silcrete	A medium-grained silicious rock commonly used in the manufacture of stone artefacts.
Site	An area of particular focus of past human activity, usually (but not exclusively) characterised by physical evidence of this activity.
Slip	A fine, wet finish applied to the surface of a clay vessel prior to its firing and decoration.
Stela	A column or stone slab, often with an inscribed or sculptured surface.
Stone Arrangement	An arrangement of stones into a shape or pattern. Often used for ceremonial purposes of place markers.
Surface Site	A site where artefacts are found on the ground surface.
Sustainability	Sustainability is the ability to maintain the qualities that are valued in the built and natural environment. Sustainability can be measured in terms of economic, environmental and social factors.
Temper	Coarse material such as sand or shell added to fine pot clay to make it bond during firing.
Test Excavation	Excavation of small sections of an area to determine the archaeological remains and/or potential of an area.
Toe-Hold	Small scar on the trunk and branches of a tree originally to facilitate climbing.
Tuff	Solidified volcanic ash.
Tula	A flake with a prominent bulb, large platform and platform/ventral surface angle of about 130°, which is retouched at the distal end. Not to be confused with a tula adze.
Tula Adze	A composite tool observed ethnographically, consisting of a stone artefact (often a Tula), a wooden handle and resin.
UNESCO	UNESCO is the United Nations Educational, Scientific and Cultural Organization, founded on 16 November 1945. UNESCO promotes international co-operation among its Member States and Associate Members in the fields of education, science, culture and communication.
Unifacial Flake	Stone tool flaked on only one side.
Usewear	The wear displayed on an artefact as a result of its use.
Watching Brief	The monitoring of works in progress at a known or potential archaeological site.

EXECUTIVE SUMMARY

Marstel Terminals Pty Limited (Marstel) has commissioned HLA-Envirosciences Pty Ltd (HLA ENSR) to undertake an assessment of Aboriginal heritage issues that may be present within an area proposed for a Bulks Liquid Storage Facility on Kooragang Island, NSW. This project involves the construction of a terminal facility that will be used for the import, blending and distribution of high quality fuels and biofuels. The facility will be designed to receive fuels and biofuels via ship and truck, which will be stored in bulk storage tanks prior to blending and distribution to customers. The proposed terminal facility is to be located on Lots 1-4 DP 234887 on Greenleaf Road and abuts Walsh Point Reserve on Kooragang Island

The objective of this report is to determine the archaeological potential in the vicinity of works and recommend whether further assessment of Aboriginal heritage should be undertaken for the proposal. The archaeological potential of the works was assessed on two criteria; the presence or absence of archaeological materials on the ground surface, and the probability (low, moderate or high) of buried archaeological materials occurring. These criteria were addressed through a literature review of previous archaeological and environmental research conducted within the region and an archaeological site visit.

HLA advertised in the local newspaper calling for registration of interest of organisations who may want to be involved in the assessment. Following the end of the registration period five groups registered their interest, specifically Mur Moo Ma Inc, Nur Run Gee Pty Ltd, Awabakal Traditional Owners Aboriginal Corporation, Awabakal Descendants Traditional Owners Aboriginal Corporation, and Yarrawalk Enterprises. All of these groups were subsequently sent the proposed survey methodology and provided 21 days to comment.

Following the comment period, all groups were invited to undertake a site inspection. All registered groups sent a representative to the site inspection, which was undertaken on the 27 June 2007. The groups were subsequently provided with a copy of this report for comment.

In the 1950s BHP arranged for the transferral of lands with a large-scale reclamation work on the channels of the Hunter River islands. In 1958 Walsh and Moscheto Islands were joined in the first of several extensive reclamation projects. In 1964 Greenleaf Fertilizers became the first industry to establish on Kooragang Island located on what is now the Incitec sites (Williams *et al.* 2000). Over the next two decades the islands of the Hunter River were joined to form the large industrial estate now known as Kooragang Island (DPW 1980).

The study area was split into four sections for investigation Lot 1 DP234887 and Lot 2 DP234887 on the study area had been raised and covered in a tough compacted blue metal and road base, remnant from the steel workshops. Community consultation suggests that this was a surface modification only with no subsurface excavation or intrusion. In the last seven years this compact covering has begun to break up with pockets of introduced weeds and grass present. Site visibility beyond this compaction was virtually nil (<5%). Lot 3 PB 234887 and Lot 4 CP234887 have not been previously impacted upon. Visibility was also negligible at these sites.

Due to the nature of vegetation and the associated low visibility, no archaeological sites were identified. It is believed however, that the study area has high potential for subsurface archaeological remains below the fill level.

Recent work by Coffey (2007) indicates that the fill layers on site are a minimum of 2.5m in depth with fill layers. It is envisaged that in the study area the natural soil profile can be found

beneath this fill layer. It is believed that the natural soil profile has strong potential to yield archaeological remains. Therefore, the entire site can be considered a PAD.

The following safeguards should be placed in the **Statement of Commitments** for the Project Approval:

- Should excavation be proposed to the soil profile beneath the existing fill surface, either:
 - Ensure representatives of the Awabakal and Worimi Aboriginal communities and an archaeologist are present to monitor the subsurface activities of the development, and to document any archaeological material uncovered; or
 - Undertake initial exploration (and subsequent investigation as required) of the soil profile to depth and extent of impact for archaeological materials prior to development.
- Should archaeological material be found discussions with the proponent and the Aboriginal communities should be undertaken prior to the collection of any artefacts unearthed to identify appropriate storage for the artefacts;
- Should Aboriginal skeletal remains be found, work must cease immediately and consultation with the DECC, NSW Police, NSW Coroners Office and the Aboriginal communities must be undertaken to come to agreement on the most appropriate course of action. Actions might include either 1) the preservation of the remains *in situ*, or 2) the detailed recording and recovery of the remains by qualified personnel in conjunction with Aboriginal community representatives. The latter should also seek agreement on the subsequent location and/or re-burial of the remains prior to their removal; and,

All contractors should be made aware of these safeguards prior to commencing site works

1 INTRODUCTION

Marstel Terminals Pty Limited (Marstel) has commissioned HLA-Envirosciences Pty Ltd (HLA ENSR) to undertake an assessment of Aboriginal heritage issues that may be present within an area proposed for a Bulks Liquid Storage Facility on Kooragang Island, NSW. This project involves the construction of a terminal facility that will be used for the import, blending and distribution of high quality fuels and biofuels. The facility will be designed to receive fuels and biofuels via ship and truck, which will be stored in bulk storage tanks prior to blending and distribution to customers.

The objective of this report is to determine the archaeological potential in the vicinity of works and recommend whether further assessment of Aboriginal heritage should be undertaken for the proposal. The archaeological potential of the works was assessed on two criteria; the presence or absence of archaeological materials on the ground surface, and the probability (low, moderate or high) of buried archaeological materials occurring. These criteria were addressed through a literature review of previous archaeological and environmental research conducted within the region and an archaeological site visit.

Aboriginal consultation and involvement with five Aboriginal stakeholders was undertaken as part of this study, and is presented in **Section 4.2** in detail.

This document has been undertaken in accordance with the Department of Environment and Conservation's (now Department of Environment and Climate Change) (DECC) (1997) *Aboriginal Cultural Heritage Standards and Guidelines Kit* and (2004) *Interim Community Consultation Requirement for Applicants*.

Aims, Objectives and Timing

The main aims of the study are to identify and record the extent and nature of any Aboriginal heritage issues by:

- validation of known sites and/or items within the Study Area through archaeological survey;
- archaeological survey of the Study Area to locate any additional sites and/or items;
- assessment of the Study Area to delineate any areas of high archaeological sensitivity or potential;
- consultation with the relevant local Aboriginal community groups;
- assessing the potential impacts of the proposed development on any known archaeological materials and areas of archaeological potential within the Study Area;
- assessing the significance of any archaeological material identified; and
- presenting recommendations for the management of and/or mitigation of construction impact on the archaeological resources identified.

This project was instigated in March 2007 with fieldwork undertaken in late June 2007 and report finalisation by end of July 2007. Aboriginal consultation was undertaken from the start of the project and was ongoing throughout the project up to finalisation of the report.

1.1 Study Area

The proposed terminal facility is to be located on Lots 1-4 DP 234887 on Greenleaf Road and abuts Walsh Point Reserve on Kooragang Island (**Figure 1**).

The terminal facility is to be located approximately three kilometres north of the Newcastle CBD. The land on which the facilities are to be located will be leased from the Regional Land Management Corporation. The nearest residential areas are located at Fern Bay, Stockton and Carrington with the closest being 700 metres away. Neighbouring industry includes Incitec, Orica Limited and the Boral woodchip mill shown in **Figure 2**.

The site on Kooragang Island where the proposed development is to occur is understood to be on the former Walsh Island. Walsh Island and other Hunter River Islands, including Ash, Moscheto and Dempsey Islands, were modified with the reclamation of intersecting channels to form the larger Kooragang Island (**Figure 3**). The area has been the subject to land reclamation periodically since 1859. The entire study area forms part of the original Walsh Island.

1.2 Project Team

The Project Team consists of archaeologists and specialists from HLA ENSR. Cynthja Bolton carried out the site inspection with the relevant Aboriginal communities. Cynthja Bolton and Alan Williams prepared this report with Brett McLennan providing technical and QA review. Sandy Miles provided additional research and Kim Wilkinson and Tim Osborne provided administrative and drafting support.

1.3 Report Structure

The report structure relates the sections of the report and their contribution to the study.

- **Section 2.0** provides information on the project and proposed development;
- **Section 3.0** outlines the methods adopted, including Aboriginal community consultation and involvement;
- **Section 4.0** provides information on the applicable heritage legislation;
- **Section 5.0** provides discussion on the existing environment, including soils, geology, Aboriginal and archaeological site history, physical inspection and an assessment of the significance of Aboriginal sites;
- **Section 6.0** examines the potential impacts of the development on identified heritage; and
- **Section 7.0** discusses mitigation measures and a summary of recommendations.

1.4 Limitations

This assessment is based on the existing environmental and archaeological knowledge of the study area, within the larger context of Newcastle. If previously recorded surface archaeological materials are found within the immediate locality, they are identified and discussed. This discussion has been based on the reports prepared by others (as cited in this report) and HLA has relied on those reports and has not sought to independently verify the results and interpretations in those reports.

Predictions have been made about the probability of subsurface archaeological materials occurring within the study area. It is possible that materials may occur in any landscape context, and the assessment of subsurface materials refers to the likelihood of occurrence based on surface indications and environmental context.

HLA has undertaken a search of the Aboriginal Heritage Information Management System (AHIMS) held by the Department of Environment and Climate Change (DECC). The search results are provided in **Appendix A**.

As stated in the qualifying letter from the AHIMS Administrator, Register searches are constrained by the amount of data in the register and the quality of that data (for example grid references can be inaccurate). Large areas of NSW may not have been systematically searched and may contain Aboriginal objects and other heritage values not recorded on AHIMS.

Furthermore, the AHIMS reports database can only be searched by the title of the report, which may not indicate the geographical location of the area covered. This means that it is possible that some known sites and some reports may have been omitted from this study. Sites and reports are added and removed from AHIMS and therefore the accuracy of information provided from AHIMS is only valid on the day the register is searched.

A summary of the statutory requirements regarding Aboriginal heritage is provided in **Section 3**. This is provided based on experience with the heritage system in NSW and does not purport to be legal advice. It should be noted that legislation, regulations and guidelines change over time, and users of the report should satisfy themselves that the statutory requirements have not changed since the report was written.

2 PROJECT DESCRIPTION

Marstel wishes to develop a terminal that will primarily be used for the cost-effective import, blending and distribution of high-quality fuel and biofuels to the Hunter Region. Unleaded petrol and diesel will be received by ship. Ethanol and biodiesel will be primarily sourced from Australian markets and delivered by truck or ship. The fuels will be stored in bulk tanks prior to blending and distribution throughout the Hunter Region. The proposed project will increase the availability of more environmentally-friendly fuels and increase competition in the local fuel market. Marstel's future plans for development in the area include the construction of a new multi-user berthing facility that will be dedicated to Bulk Fuels.

The primary elements of the terminal facility are the six 17 m high storage tanks and the truck-loading gantry (**Figure 3**). Details of the main structures on site are provided in **Table 1**. Above-ground pipework will also be installed for the transfer of biofuels from the K2 wharf to the terminal facility.

The fuel storage tanks will be constructed on compacted crushed rock bases, and will have a polyethylene liner case in the base fitted with a tell-tale hole to detect under-floor leaks. The tank storage area will be surrounded by concrete bund walls 1.8 – 2 m high, with intermediate bunds 0.6 m high designed in accordance with AS 1940. The bunds will be lined with a Claymax liner and crushed rock, and sealed with a sprayed layer of non-combustible bituminous compound to create a barrier above the soil and groundwater and aid the collection of stormwater.

Table 1: Proposed Site Structures

Structure	Approximate Size	No.	Description
Diesel tanks	44 m diameter; 17 m high	1	Steel tanks with white exterior
Unleaded Petrol	30 m diameter 17 m high	2	Steel tanks with white exterior
Ethanol/biodiesel tanks	16 m diameter; 17m high	3	Steel tanks with white exterior
Office and amenities	7 m x 4 m; 5 m high	1	Steel wall and roof cladding; colourbond finish
Truck-loading gantry	25 m x 16.5 m; 8 m high	1	Steel frame with colourbond cladding (wall and roof)
Workshop	7 m x 4 m; 5 m high	1	
Fire pump house	10 m x 5 m; 5 m high	1	
Static water tank	16 m diameter; 15 m high	1	Steel tank with galvanised finish

Construction activities required for the project will include the following:

- Stripping of existing vegetation and top soil (which will be re-used in landscaped areas);
- Excavation of areas for tank foundations (details dependent on the results of the geotechnical study) to a depth of approximately 600 mm;
- Construction of reinforced concrete bund walls;

- Preparation of the bund floor (excavation, backfilling with crushed rock, installation of liner, additional backfilling with crushed rock and priming/sealing);
- Installation and diversion of services and infrastructure, including stormwater drainage lines;
- Construction of internal roadways (excavation, compacting of road base; pouring of concrete pavement (reinforced) for main driveway;
- Construction of a pipeline to transfer materials between the berth and the storage facility; and
- Construction vehicle movements.

Much of the material will be prefabricated and installed on site, particularly fuel facility components, thereby minimising the construction activities required on site.

The tanks will be prefabricated off-site prior to erection on their foundations. Following the welding and testing of the floor plates, the tank structures will be formed by welding together the rings in a staged approach, with temporary bracing added until the structure is completed and the roof is installed. The structure will be tested by x-ray, then filled with water and pressure tested.

3 APPLICABLE POLICY AND LEGISLATION

3.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) sets out the requirements for the approval of the Commonwealth Minister for the Environment and Heritage for actions that may have a significant impact on matters of National Environmental Significance (NES). Matters of NES include wetlands of national importance; Commonwealth listed threatened species, threatened ecological communities and migratory species.

Should an approval from the Commonwealth be required, it would be in addition to any approvals under NSW legislation. In such cases a Commonwealth approval would be triggered by a proposal which has the potential to have impact on a matter of NES. It is not anticipated that the proposed activities would result in any impacts to matters of NES in relation to heritage and as such referral to DEH would not be required.

3.2 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Heritage Protection Act) is the principal Commonwealth legislation protecting Aboriginal heritage. The Act complements state/territory legislation and is intended to support state/territory laws and processes.

Under the Heritage Protection Act the responsible Minister can make temporary or long-term declarations to protect areas and objects of significance under threat of injury or desecration. The Heritage Protection Act also encourages heritage protection through mediated negotiation and agreement between land users, developers and Aboriginal people.

Since the passage of this legislation:

- around 200 applications have been lodged under the Act;
- eight declarations have been made protecting objects of significance to Aboriginal people;
- emergency (i.e. temporary) declarations have protected five significant places, and
- two long-term declarations remain in place, one protecting women's sites under threat from a dam near Alice Springs and the other (with effect from July 2000) protecting Boobera Lagoon in northern New South Wales.

On 17 December 1998 responsibility for administration of the Heritage Protection Act was transferred by Administrative Arrangement Orders from ATSIC to the Environment and Heritage portfolio and the Heritage Protection Act is now administered by the Department of Environment and Water Resources (DEW).

3.3 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act* (EP&A Act) requires that consideration be given to environmental impacts as part of the land use planning process. In NSW environmental impacts are interpreted as including cultural heritage impact. Three parts of the EP&A Act are most relevant to heritage. Part 3 relates to planning instruments including those at local and

regional levels, Part 4 controls development assessment processes and Part 5 refers to approvals by determining authorities.

The EP&A Act requires that consideration be given to environmental impacts as part of the land use planning process. In NSW, environmental impacts include cultural heritage impacts.

This project is being assessed under Part 3A of the EP&A Act which provides a new approvals regime applying to all major projects. Major projects are defined under State Environmental Planning Policy (Major Projects) 2005 (SEPP 2005). It also applies to those projects which the Minister believes are required to deliver particular government plans or programs, known as critical infrastructure projects.

The new Part 3A applies to all projects where the Minister has the approval role. Under Part 3A, the Minister can issue a project approval or a concept approval. Both maintain the requirement for consultation with the community and relevant State Government agencies, but the requirement for certain other permits and licences is removed.

Section 75B(2) of the EP&A Act makes provision for 'major projects' to be identified through various means, including by way of declaration as a listed project in State Environmental Planning Policy (Major Projects) 2005 (SEPP 2005), or by notice in the Gazette.

Schedule 1 of SEPP 2005 identifies classes of development which are major projects. The proposed project is classified as a 'major project' under SEPP 2005 and the Minister for Planning is the approval authority.

Importantly for this study, under Section 75U (1) (d) of Part 3A, the proponent is not required to obtain certain permits under the *National Parks and Wildlife Act, 1974* (NPW Act), specifically:

- 1 The following authorisations are not required for an approved project (and accordingly the provisions of any Act that prohibit an activity without such an authority do not apply):
 - (d)a permit under section 87 or a consent under section 90 of the National Parks and Wildlife Act 1974.

Under Part 3A of the EP&A Act, the proponent is required to prepare a Statement of Commitments, in accordance with the Director-General's Environmental Assessment Requirements (EARs). The Statement of Commitments will then form part of the overall Project Approval. As such Marstel will be required to fully implement these commitments during and following the proposal. Recommendations of this report should be inserted into this Statement of Commitments.

3.4 National Parks and Wildlife Act 1974

The NPW Act was amended in 2001 and some of the terms relating to Aboriginal archaeology have changed and the provisions have been tightened.

Under the provisions of the NPW Act, Aboriginal archaeological sites are defined as Aboriginal objects (formerly called relics). Aboriginal object "means any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains".

It should be noted that this definition technically would seem to exclude PADs, which are potential Aboriginal sites rather than actual deposits, objects or material evidence.

The most relevant section of the legislation is section 90, which deals with the destruction of Aboriginal objects and is reproduced below.

Section 90 Destruction etc of Aboriginal objects or Aboriginal places

(1) A person must not destroy, deface, damage or desecrate, or cause or permit the destruction, defacement, damage or desecration of, an Aboriginal object or Aboriginal place.

It should be noted that section 90 applies to all Aboriginal objects irrespective of whether they are considered to be disturbed or not. The issue is whether reasonable precautions and due diligence were exercised to determine whether an Aboriginal object or place was going to be destroyed, defaced, damaged or desecrated. Thus if an area was identified as having archaeological potential and was disturbed or destroyed, the defence of reasonable precautions and due diligence would not be available.

Section 87 of the Act covers permits to allow certain actions under section 86. This includes disturbing or excavating any land, or causing any land to be disturbed or excavated, for the purpose of discovering an Aboriginal object.

While the Sections 87 and 90 of the NPW Act do not apply in the case of this proposal (see **Section 3.3**), it is recommended that the intent of those sections of the act be retained in the Statement of Commitments. Hence, **Section 7** seeks to acknowledge the relevance and intent of the Act by placing them in a Part 3A framework.

3.5 Newcastle LEP 2003

The LEP for Newcastle requires that Aboriginal heritage assessments are conducted prior to the submission of development applications:

Section 31 Development affecting places or sites of Aboriginal heritage significance

Before granting consent for development that is likely to have an impact on a place of Aboriginal heritage significance or that will be carried out on an archaeological site of a relic that has Aboriginal heritage significance, the consent authority shall:

- (a) consider a heritage impact statement, which addresses the heritage impact of the proposed development, and*
- (b) notify local Aboriginal communities and the Director-General of National Parks and Wildlife of the proposed development and take into consideration any comments received in response within 28 days from the date of notification.*

Notwithstanding that the proposal is a matter for assessment pursuant to Part 3A of the EP&A Act, an Aboriginal heritage assessment of the scale required by Council in the LEP has been undertaken for this proposal. Council expects all relevant heritage requirements to be carried out in accordance with the NPW Act 1974 (as amended), and an assessment of archaeological significance be undertaken. Further, Council expects that the relevant steps (e.g. permit applications as necessary) are taken prior to project determination.

4 METHODOLOGY

4.1 General

This Aboriginal heritage assessment employed the following methods:

- Review of DECC's AHIMS and Reports databases for the study area to identify Aboriginal archaeological sites / places that may be in the vicinity of the proposed development activities;
- Review of the Register of National Estate and National Heritage Register for the study area and surrounding region to identify Aboriginal sites / places that may be in the vicinity of the proposed development;
- A literature review of the Aboriginal heritage of the area using primary and secondary sources identified through the AHIMS and other searches, including previous investigations;
- Consultation with the relevant Aboriginal organisations for the area; and
- A site visit to identify known Aboriginal sites and any other heritage items that may be present within the proposed impact zone.

All archaeological sites identified during the field investigation would be recorded using a hand held GPS, digital photography, sketches and a written description. Archaeological sites would be subsequently marked with brightly coloured stakes (at each corner of a centroid point dependent on site type) for detailed spatial recording.

4.2 Aboriginal Community Consultation

In response to a number of Land and Environment Court (LEC) rulings, DECC has developed the *Interim Community Consultation Requirements for Applicants* (2004). These new requirements have developed along the current guidelines (*Aboriginal Cultural Heritage Standards and Guidelines*, DECC 1997) making the consultation process longer and more thorough.

For this reason HLA undertook the following steps with regard to this project overall:

- Contacting the DECC's northeast EPRD to seek advice on the relevant Aboriginal stakeholders;
- Contacting the relevant Local Aboriginal Land Councils (LALC) to identify interest in the project;
- Searching the Native Title Tribunal to identify possible Native Title holders;
- Searching the Office or Registrar of Aboriginal Corporations; and
- Advertising the project in the *Newcastle Star* on 18 April and 24 April 2007.

Following information on the relevant Aboriginal stakeholders of the area from the DECC, HLA wrote to each of the identified groups (>40) and organisations and identified their interest in the project. No response was received from the Awabakal LALC. A further group, Yarrawalk Enterprises, registered their interest through the newspaper advert.

Following the end of the registration period five groups registered their interest, specifically Mur Moo Ma Inc, Nur Run Gee Pty Ltd, Awabakal Traditional Owners Aboriginal Corporation, Awabakal Descendents Traditional Owners Aboriginal Corporation, and Yarrawalk Enterprises. All of these groups were subsequently sent the proposed survey methodology and provided 21 days to comment.

Following the comment period, all groups were invited to undertake a site inspection. All registered groups sent a representative to the site inspection, which was undertaken on the 27 June 2007. The groups were subsequently provided with a copy of this report for comment. Responses from the community are provided in **Appendix B**.

4.3 Review of Existing Information

As required in the DECC guidelines, this report includes a desktop review of available information in respect of the existing environment, including a review of aerial photography, previous reports and publications available for the area. In addition, a search of the DECC's AHIMS (Aboriginal Heritage Information Management Systems) database for the area in question was undertaken (see **Appendix A**).

4.4 Field Investigation

The aim of the field survey was to ascertain whether the proposed development would impact upon either previously identified or unrecorded Aboriginal heritage sites. The survey encompassed the entire study area and consisted of:

- Four transects, some 350 metres long by 30 metres wide, encompassing the entire study area from the southern boundary abutting Walsh Point Reserve, the western boundary delineated by Greenleaf Road, the eastern boundary delineated by the Hunter River, and the northern boundary delineated by a series of pegs.

The field investigation consisted of a pedestrian traverse of the proposed development. This was done with reference to large-scale aerial photography of the study area and the proposed impact.

4.5 Assessment of Archaeological Potential

An assessment of archaeological potential is a way of gauging, from available evidence, which sectors within a survey area are more archaeologically "valuable" than others (where "value" is measured as the relative potential to provide information on past Aboriginal occupation or land use of an area).

Assessment of sensitivity is made on the basis of 1) the presence of known surface archaeological materials, 2) the probability of undetected surface archaeological materials, 3) the probability of subsurface archaeological materials, and 4) terrain nature and integrity.

Information on pre-recorded sites and sites identified in this assessment is used in combination with observations of terrain nature and integrity to assess archaeological potential. Potential can be rated in terms of low, moderate or high, as set out below:

Low Archaeological Potential

Areas where archaeological material is unlikely to occur. This can be due to the landscape being unsuitable for human occupation, or to the landscape being heavily modified in recent history by European

activity.

Moderate Archaeological Potential

Areas where archaeological materials may occur. Some indication of the natural soil profile or natural terrain remains, but where high site or artefact density is unlikely to occur.

High Archaeological Potential

Areas known or likely to contain archaeological materials. The terrain remains largely undisturbed, and sites are known to occur in this context in high concentrations or as a wide range of types.

5 EXISTING ENVIRONMENT

Until the early 1900s the Hunter River estuary where Kooragang Island now lies contained some seven islands separated by narrow intertidal river channels (**Figure 4.**). With the exception of the shipbuilding industry, no major development occurred until the latter half of the 20th Century when the islands were amalgamated into Kooragang Island. The study area is located on the original Walsh Island, described in the early 1800s as 'a low-lying spit'.

5.1 Environmental Context

Investigations of the distribution of Aboriginal objects and places include an analysis of information on the natural resources available in a region to gain an understanding of the range of cultural remains that can be expected. Resources are linked to the hydrology, geology and soil types in a region.

Water availability is a major influence on the intensity of Aboriginal occupation and evidence, usually in the form of flaked stone artefacts, is often associated with permanent or semi-permanent water sources.

The availability of stone sources for artefact manufacture also influences the types and density of sites that may be encountered. Areas in which suitable stone raw materials are available often contain higher concentrations of flaked stone artefacts than regions where stone for artefact manufacture is scarce.

Soil types are influential as accumulating sediments can cover cultural remains while areas of sediment removal through erosion can either uncover buried archaeological material or transport small items away from the original depositional context. Soil analysis has important ramifications for archaeological research through the potential impact of different soils on human activity (such as agricultural exploitation) and the impact of the soils on archaeological evidence (such as post-depositional movement). The soils known to occur throughout the study area are identified here in order to delineate their nature and impact on the survival and location of archaeological material.

5.1.1 Climate

The Lower Hunter Valley and Newcastle region enjoys a temperate climate. The local weather is mainly influenced by proximity to the ocean. Summer temperatures range from between 25°C to 35°C with hot periods being relieved by periods of cool easterly winds. Winter temperatures are cool to cold with a range between 15°C to 25°C. During the colder months from June to August the area comes under the influence of westerly winds. The average annual rainfall is 1100mm with winter conditions being drier than summer. The area is susceptible to severe summer storms which are associated with strong winds and frequent hail.

5.1.2 Topography and Hydrology

The study area lies within the broad physiographic area known as the Newcastle Bight. The general characteristics of the Newcastle Bight are essentially low-lying floodplains and sand dunes. Alluvial flats extend from the Hunter River and its major tributaries throughout the Lowlands. Bounding the Lowlands are abrupt transitions to steeper country on either side. The Hunter River is tidal for several kilometres upstream of the river mouth inducing estuarine conditions around Kooragang Island. Excess rainfall in the Hunter River catchment can cause severe flooding of the lower reaches, including Kooragang Island. Due to the estuarine nature of the study area and the increased industrial activity there are Potential Acid Sulphate (PAS) soils and a high saline water table (Henderson 1996).

5.1.3 Geology

The lower Hunter River is a barrier estuary formed by the deposition of river sediments in backswamps and swales. Approximately 6000 years ago sand barriers linked Nobbys Head and Birubi Point creating an extensive coastal lagoon between the Hunter River and Port Stephens. This lagoon has been gradually infilled with sediment from the Hunter River with Fullerton Cove being the lasting remnant. Wave action along Stockton Bight progressively brought sand onshore to form the mobile dunes of the Outer Barrier. The older Inner Barrier (Tomago Sandbeds) was formed by a similar process over 100,000 years ago.

The study area is comprised of Quaternary Alluvium as shown on the Newcastle 1:250,000 Geological Map Sheet (**Figure 5**). This Quaternary Alluvium consists of coastal sands, silts and clays characteristic of estuarine deposits. Beneath these alluvial and estuarine sediments lie older bedrock composed of massive grey sandstone and siltstone interspersed with shales and coal of the Tomago and Newcastle Coal Measures. Quaternary alluvium is pertinent in relation to archaeology since it can often retain buried archaeological material. Geotechnical studies at nearby Tourle Bridge show a stratigraphic sequence of sands with shell overlying sandy clays and gravels (Smec 2005). In relation to the study area, mudstone from Newcastle is likely to be the primary rock used for the production of stone tools (**Plate 1**). A superficial surface of mechanical fill covers the majority of Kooragang Island, particularly its eastern portion.

5.1.4 Soils

Natural soils on Kooragang Island comprise the Fullerton Cove soil landscape (Matthei 1995), an estuarine environment of tidal flats and creeks. Slope gradients are <3% and elevation and local relief <3 m a.s.l. Soils are deep (>100cm) and very poorly drained Solonchaks. The landscape is prone to flooding and wave erosion with saturated, saline soils tending to acid sulphate soils. The sediments are Holocene in age and comprise of mud, silt and clay with flood deposited shell layers. The tidal flats are regularly inundated with brackish tidal waters and flooding is common.

Kooragang Island comprises quaternary sediments derived largely from the Hunter River catchment over several hundred thousand years. However deposition of these sediments increased rapidly with the formation of the Hunter River islands over the last 3,000 to 4,000 years.

5.1.5 Vegetation

The study area is currently unoccupied, and is covered with grass (*Cynodon sp.*) and limited other vegetation including Bitou Bush (*Chrysanthemoides monilifera*), which is a noxious weed. Other vegetation on Kooragang Island includes the grey mangrove (*Avicennia marina*) and river mangrove (*Aegiceras corniculatum*), paperbarks (*Melaleuca sp.*) and samphire (*Sarcocornia sp.*). In the past vegetation on site would have consisted of river reeds and grasses (*Sarcocornia sp.*) with occurrence of the above woody plant species. The earliest references allude to the name of *Muloobinba* (meaning place of reeds or seagrass) for the Newcastle area (Newcastle City Council 2006, **Plate 2**).

5.1.6 Fauna

Personal observation has indicated that a large number of introduced feral animals, notably rabbits (*Oryctolagus cuniculus*), are present at the study site (**Plate 3**). No native mammals have been observed, however a number of threatened fauna species have been recorded in the area including the Australasian bittern (*Botaurus poiciloptilus*), eastern bent-wing bat (*Miniopterus shreibersii*), green and golden bell frog (*Litoria aurea*), and the grey-headed flying

fox (*Pteropus poliocephalus*). Arthropods in the area include the semi-terrestrial ghost crabs (*Ocypode sp.*) and the bait pipi (*Donax sp.*). A myriad of gastropods, algae and shellfish are found along the shoreline including periwinkles, barnacles, limpets and sargassum.

The site is located within 4 km of the Kooragang Island Nature Reserve, which forms part of the RAMSAR-listed Hunter Estuary Wetlands. The wetlands are an important area for migratory and Australasian wetland species, including species protected under the Agreement Between the Government of Japan and the Australian Government for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA) and the Agreement Between Australia and the People's Republic of China for the Protection of Migratory Birds and Their Environment (CAMBA). Over 190 species of migratory bird have been listed for the Hunter Estuary Wetlands. These include the rare ringed plover (*Chardrius hiaticula*), little whimbrel (*Numenius phaeopus*), pectoral sandpiper (*Calidris melanotos*), and ruff (*Philomachus pugnax*).

5.1.7 Summary of Environmental Conditions

Historically, the temperate climate of the lower Hunter Valley area would have permitted access to the survey area throughout the year. A lack of seasonal winds and rainfall would have made occupation during winter more appealing on the islands, with the floodplains inhabited during the summer months. The water in the major rivers would have been adequate for supporting large groups of people during the drier winter periods, whereas the small ephemeral streams or chain of ponds streams of nearby areas are unlikely to have been able to support groups except during the summer when rainfall was higher.

The Hunter River islands (now collectively Kooragang Island) are unstable environmental features that have been formed in delta-like conditions since the Holocene high-stand of approximately 5 000 years ago. The estuarine soils are considered unstable and prone to erosion, particularly during periods of inundation and storm surge, as has happened recently within the study area. The barrier beaches of the Stockton Bight have in-filled the backswamps of the Medowie Lowlands and, along with the northerly longshore drift across the Hunter River mouth, have ensured that sediment accumulation of the Hunter River islands outweighs sedimentary erosion. Given the unpredictability of estuarine and wetland soils, and knowing the Holocene establishment of the Hunter River islands, it is extremely unlikely that archaeological deposits older than 5 000 years will be found.

Although the current flora and fauna inhabiting the survey area is not necessarily representative of the range and quantity present prior to non-indigenous settlement, the composition of flora and fauna species present are indicative that there were sufficient resources to support a moderate size population of hunter and gatherers.

5.2 Aboriginal History

The Lower Hunter Valley is the country of the Worimi and Awabakal people. Worimi lands extend to the north of the Hunter River and Awabakal to the south. Early government documents indicate that the Hunter River islands were inhabited by the Ash Island clan. Threlkeld (in Gunson 1974) suggests this Ash Island clan belonged to the Awabakal people, while Elkin (1932) and Tindale (1974) indicate the Worimi boundary as the south bank of the Hunter River (**Figure 6**).

Although historical discrepancies arise over the traditional boundaries it is understood by both the Awabakal and Worimi people that the individual islands (where Kooragang Island now stands) were a meeting place for the two tribal groups. It is here that trade of knowledge and goods would have been conducted, ceremonies undertaken and family matters (i.e. potential marriages) discussed. The earliest known references to Aboriginal people living on the Hunter

River islands comes from reports by Grant (1803: 154) who notes that in 1801 "the fires of the natives and many individuals" were seen in the area of Ash Island as were parts of fishing nets and fishtraps. The early artist Joseph Lycett (c.1817) portrayed the life of the Ash Island clan and Awabakal people in a series of 18th Century paintings. These paintings depict men and women fishing with spears, diving for crayfish, hunting waterbirds and cooking over fires on the beach (**Plates 4 to 6** inclusive).

Ancestral Aboriginal people often lived and travelled in small groups of less than 20 people, but regularly met relations and neighbours for ceremonies where hundreds and sometimes thousands of people gathered for weeks at a time. Events like this were scheduled when and where seasonal resources were plentiful. Successive gatherings were rotated between a number of sites to allow the local environment to fully recover from periods of intensive exploitation. These gatherings were an opportunity to trade a wide range of goods from ceremonial songs and dances to stone axes, spears and native tobacco. Different groups sometimes specialised in producing high quality trade goods. There is little ethnographic evidence about where Aboriginal people camped other than the mention of the importance of fresh water. The Hunter Valley was subject to drought and permanent water was valuable. Creeks and rivers supported a range of vegetable foods and attracted game.

More recently, with the advent of contact with non-Aboriginal fisherman, whalers and later colonists, the islands of the Hunter River became important for quarantine reasons. Community consultation with both the Awabakal and Worimi have uncovered that the Aboriginal people living on the Hunter River islands removed themselves from their respective tribes in voluntary quarantine because of unidentified illness. These illnesses most likely comprised of the introduced smallpox, measles and venereal diseases. It is these people that the European observers named the Ash Island clan. It is highly likely, due to the infectious nature and seriousness of these diseases that many member of the Ash Island clan died on the Hunter River Islands.

The lifestyle of the Aboriginal people of the Hunter Valley was permanently shattered by the arrival of British Colonials who were attracted to the coal resources and grassed plains of the Hunter Valley. The rapid settlement of the area disrupted the Aboriginal economy and, in a very short time, the Aboriginal population was decimated by a combination of starvation, introduced diseases and massacres.

5.2.1 Colonial History

The first permanent settlement in the Newcastle region was a penal settlement, which was established in 1804 at the mouth of what was then known as the Coal River, later to be known as the Hunter River. Convicts were put to work at the newly opened coal mine, while others gathered and burned shells to produce lime for mortar to be used in the construction of Sydney's buildings. It is estimated that the majority of shell middens in the Newcastle area were destroyed in this way. Near the port of the river, gangs of men cut the timber called Coal River Pine, while further up stream, gangs of cedar cutters worked their way up towards the rich flats. Newcastle was supplied with grain and salt meat from Sydney, while the returning ships' cargo comprised cedar, coal, pine, and lime shell. At this time, the population of the settlement consisted of the military garrison, convicts and civilian officials. The lands in the region of the Hunter River were closed to free settlement and the resources therein were reserved for the use or the profit of the Government (Wood 1972).

For more than twenty years Newcastle was the most dreaded name among the convict population of New South Wales (Rienits 1970). It was here that the most dangerous and incorrigible convicts were sent as coalminers and lime-burners under hellish conditions. Fort Scratchley at Signal Hill in Newcastle was the original military defence for Newcastle. This establishment was built on the headlands to the harbour entrance to both protect the coal

resources of the Hunter Valley and to control the penal settlement. Nobby Hill was originally an island and was used to house the most difficult of convicts in solitary confinement (Umwelt 2003). By 1822 convicts had begun to be moved north to Port Macquarie with a free settlement being declared in 1846 (Rienits 1970).

By as early as 1825 the first free settlers had moved into the area. In that year the Australian Agricultural Company was granted leases to the west of the town of Newcastle and along the northern banks of the Hunter River (Rienits 1970). The Hunter River islands had been trialled for farming by the penal commandants in the early 1800s. Farming on Dempsey Island, Moscheto Island and nearby Mayfield had been dubbed 'Platts Folly' as all attempts at convict farming by the leaseholder John Platt were a dismal failure due to persistent flooding (Insite Heritage 2006). An independent dairy farm was established on Dempsey Island in 1845 (Umwelt 2006), with further farming occurring on Ash Island (**Figures 7-8**). Stock grazing and dairying continued on Ash Island until its reclamation into the larger Kooragang Island. This area of land now forms part of the Kooragang Island Reserve.

5.2.2 Reclamation and Recent Progress

After Federation in 1901 the Hunter River islands were gradually joined in a series of reclamation works. A stone wall built in 1897 facilitated the beginnings of reclamation as Walsh, Goat and Spectacle Islands were joined (Irwin 1968). This training wall was built around the eastern, southern and western boundaries of Walsh Island and extended northward across the channel (**Plate 7**). Dredged material and natural siltation eventually enclosed the smaller Goat and Spectacle Islands into the now-larger Walsh Island (Johnston 1998, see **Figure 4**). This enabled the establishment in 1913 of the Walsh Island Dockyards on the western site of Walsh Island (Cameron 1994, **Plate 8**). This early reclamation worked included the dumping of dredged silt from the harbour onto the northern end of Walsh Island. Dredgings were pumped ashore so that the island gradually rose to a height above high water mark. The dockyards eventually closed in 1933 due to transport issues (Cameron 1994).

In the 1950s BHP arranged for the transferral of lands with a large-scale reclamation work on the channels of the Hunter River islands. In 1958 Walsh and Moscheto Islands were joined in the first of several extensive reclamation projects. In 1964 Greenleaf Fertilizers became the first industry to establish on Kooragang Island located on what is now the Incitec sites (Williams *et al.* 2000, **Plate 9**). Over the next two decades the islands of the Hunter River were joined to form the large industrial estate now known as Kooragang Island (DPW 1980, **Figure 9**).

The extent of reclamation on the eastern portion of Kooragang Island cannot be certified with any precision as no comprehensive studies were undertaken prior to initial reclamation works. It is unclear as to how much the former Walsh Island has been raised from its original height. Changes in the hydrological regime of the Hunter River since agriculture began also add to the inconclusiveness of these modifications.

5.3 Archaeological Context

5.3.1 Regional Archaeological Studies

Lower Hunter Valley

Archaeological work in the Hunter Valley region started as early as 1928 with Thorpe (1928) describing 'grey chert' artefacts (now known to be composed of rhyolitic tuff) from the lower Hunter. Only a few years later, Enright (1932) identified the stone type as 'Merewether chert' in describing the artefacts he found between Port Stephens to Macquarie Harbour. In the 1930s there was research by Frederick McCarthy of the Australian Museum (McCarthy 1976). Prior to this time, only a few local individuals had taken an interest in the prehistory of the region. W. H.

Mathews, a surveyor, is one such example. He left accounts and drawings of some of the Aboriginal “relics” he found (in Moore 1970).

From 1965 to 1967, the Australian Museum sponsored a survey that found several types of sites; painted rock shelters, rock engravings, braided/grinding grooves, stone tools and manufacturing sites as well as habitation sites (Moore 1970). Moore excavated a series of sites to investigate the subsurface nature of open scatters as well as rockshelters. Moore’s work was a research project, with the aim of reconstructing the prehistory of the Hunter Valley’s occupation by Aboriginal people. The Hunter Valley had been chosen by the Australian Museum as it had not been previously systematically surveyed as had other areas around Sydney, and it was close to the Museum, allowing longer field trips.

From the late 1970s onwards, most of the archaeological work in the Hunter region was done as a result of Environmental Approvals (EAs) conducted when new developments were proposed. Initially these studies were general studies using a relatively unsophisticated methodology, but they gradually developed into more sophisticated studies involving intensive surveys and follow-up excavations. A difficulty with this work has been the understandable focus on areas of the Hunter Valley where large-scale development is occurring and the difficulty in getting an overview of how each EA project relates to the broader theme of Hunter Valley archaeology. As a result there has been little published research work on Hunter Valley archaeology, although there has been some on-going debate about the nature of reduction sequences for the production of microblades (see for example Hiscock 1986, 1993; Moore 2000).

A large number of sites have been found throughout the Holocene Outer Barrier of the Newcastle/Stockton Bight area have been discovered within the Newcastle Bight (see Koettig 1987; Dean-Jones 1990; Umwelt 2003; McCardle 2003, 2004). Studies on these sites indicate that occupation focussed on the coastal dune areas and proximity to water was clearly an important factor. Site numbers are significantly reduced away from the coast. Middens of varying types are found most commonly here. These include middens containing both shell and stone artefacts as well as some containing faunal material. A human burial has also been recorded in the Newcastle Bight area (Brayshaw 1982). A Pleistocene site dating to 17,000 BP has been found in Moffats Swamp situated on the Inner Barrier dune (Baker 1994).

Most of the archaeological evidence for Aboriginal occupation in the Hunter Valley comes from stone artefacts. Ethnographically, the only known mention of stone artefacts in the area is in regard to the use of quartz as a barb on spears and of stone hatchets (Brayshaw 1986). The distribution of stone axes is one example that has allowed archaeologists to map the extent of one trade network (Binns and McBryde 1972). Binns and McBryde identified stone axes that had originated from an axe quarry at Moore Creek near Tamworth that had been distributed throughout northern, central and western NSW. Some of these axes had travelled in the order of 1,000 kilometres from their source. The axe quarry is located near a bora ceremonial ground, one place where many people gathered from time to time.

Umwelt (2003) note that much of the evidence for archaeological material lies subsurface, within the A horizon of the soil profile. This archaeological material becomes visible only when there has been disruption to the soil surface. This position is also marked by Dean-Jones (2000) when she noted that several sites on the Stockton Peninsula lay on a thin mantle of recent sands overlying a partially deflated B horizon.

5.3.2 Local Archaeological Studies

There is little in the way of previous archaeological studies on Kooragang Island, with the only sites registered being totally destroyed. However, archaeological research on the nearby Stockton Bight gives an indication of the likely impacts of human occupation of the area.

Dyall noted a number of archaeological sites along the Newcastle coastline in the 1960s and 1970s, however these sites were not registered with the NSW National Parks and Wildlife Service (now DECC) and have not been relocated. From his publications it can be noted that the majority of sites in the region were located adjacent to waterways of the ocean, estuaries and lakes. Many sites were shell middens consisting of pipi, turban, winkles, rock oysters and whelks (Dyall 1971). Stone tools recorded by Dyall (1971) include edge ground axes, scrapers, microliths and bondi points.

Dean-Jones (1990) conducted a review of the archaeology of the Newcastle Bight area. Her study identified 119 sites of which shell middens were the most common site type, followed by artefact scatters. Several general aspects are worth noting in relation to this study:

- Archaeological deposits in this region typically contain stone artefacts of Holocene age. The most reliable dates are around 4000 BP (Before Present), however there is evidence of manufacture at 1000 BP (Mulvaney and Kamminga 1999). The oldest site in the Hunter Valley comes from Moffats Swamp, less than 10km north of the study area. This site has been reliably dated to 17,376 cal. BP (Baker 1994);
- Sites vary from large and complex middens and open campsites to small artefact scatters. The largest sites include marine, estuarine and terrestrial material;
- Much of the archaeological evidence is now below the soil surface but within the A horizon. This reflects a combination of occupation processes (e.g. fill) and bioturbation. Sites only become visible when there has been disruption of the soil surface; and
- Residential and industrial development and reclamation along the harbour shoreline are likely to have substantially disturbed the archaeological record in this region.

5.3.3 Previously Recorded Sites

HLA ENSR undertook a site search of the study area and its surrounds, using the DEC AHIMS database on 16 April 2007 (**Appendix A**). Initially this search was for Kooragang Island only, however the AHIMS search revealed no Aboriginal objects and sites in or near the location. An extended search on 1 June 2007 revealed nine registered sites within ten kilometres of the study area.

There are two sites on Kooragang Island (#38-4-0041, #38-4-0050), three sites on Stockton Bight along the northern banks of the Hunter River in Port Stephens (#38-4-51, #38-4-0052, #38-4-0257), one site at Nobbys Beach (#38-4-455), and a further three sites at Mayfield immediately south of the Hunter River in Newcastle (#38-4-0030, #38-4-0407, #38-4-0408). These sites comprise of middens and artefact scatters (open campsites). All of these sites are well over 200 metres from the proposed works and are not believed to be at risk from this development.

The two sites present on Kooragang Island, #38-4-0041 and #38-4-0050, and are described as follows:

- #38-4-0041 was originally recorded in 1970 by Moore. The site was located at Tourle Street Bridge and has been recorded as an open camp site, however the description reads as follows:

Midden by new bridge is almost completely bulldozed. In small undisturbed parts there are very marked lines of shells. Sample of shell types collected. No artefacts.

- #38-4-0050 was an open camp site located at the eastern end of the former Moscheto Island (see Dallas 1982).

These sites have both been destroyed.

5.3.4 Expected Site Types

The results of the AHIMS search show that the most dominant types of archaeological site within the study area are likely to be middens sites and stone artefact scatters of relatively low density. Artefact density may be higher in locations where sites occur in close proximity or range to environmental resource zones, such as fresh water and/or terrain that offers flat, comfortable and dry areas for Aboriginal campsites. The dominant raw material for stone artefact production in the area is mudstone (referred to as Nobbys Tuff, **Plate 1**). Stone artefact assemblages in the area comprise significant proportions of small amorphous flakes, flaked pieces and broken flakes. Other implements defined as blades occur in negligible quantities throughout the local area. The site at Nobbys Beach has been described as a Natural Mythological Site and no material remains have been identified.

From the evidence available at this time it appears that there has been a population of people living in the region for at least 17,000 years. Throughout this period it can be postulated that the communities lived in the area on a seasonal basis making no clear campsites. These people were obviously adept at using local resources, such as molluscs for food. The people of the area were proficient at using stone to make tools, as evidenced by the number of production pieces identified that have been left over from the making of useable tools. The presence of backed blades at some sites indicates knowledge of hafting for use in hunting. As a whole, it can be concluded that the Aboriginal population of the Kooragang Island region prior to colonial settlement were an intelligent and resourceful people capable of adaptation to change both spatially and temporally.

5.3.5 Summary of Archaeological Research

Over the last three decades years, archaeological survey, assessment and subsurface investigations have been carried out in a number of areas within the vicinity of the current study area. From the details of these investigations, a synthesis on the nature of the archaeological context of the lower Hunter Valley area can be constructed. Archaeological characteristics such as location and distribution of sites within landscape units, site type, site integrity, stone artefact attributes including raw material, implement type and density can be deduced. These features are necessary for determining the survey methodology to be undertaken, and for predicting the nature of site types and site distribution within the study area.

The greatest majority of identified sites within the local area are located within the Holocene landscape of coastal dunes and associated back swamps. Floodplains and alluvial flats have also been demonstrated as potential locations of archaeological sites within the area. However, the results of geomorphic investigations in the area to date have indicated the modified nature of localised buried soil deposits and the likelihood of the erosion of archaeological remains by fluvial and estuarine processes.

Although vegetation clearance in the area has contributed to erosion processes, the nature of the contemporary vegetation coverage (predominantly consisting of weed and pasture grasses) severely inhibits surface visibility throughout most of the area.

The most dominant type of archaeological site within the study area is likely to be shell midden deposits and artefact scatters of relatively low density hearths and burials are also archaeological features of the region. Artefact density may be higher in locations where sites occur in close proximity or range to environmental resource zones, such as fresh water sources and terrain that offers flat, comfortable and dry areas for campsites. The dominant raw material for stone artefact production in the local area is clearly mudstone, followed by silcrete and chert. Much smaller proportions of stone artefacts are made from the raw materials of quartz, and quartzite. Stone artefact assemblages in the area comprise significant proportions of small amorphous flakes, flaked pieces and broken flakes. Cores are recorded as present in much lower numbers. Other implements defined as blades, axes and scrapers occur in negligible quantities throughout the local area.

From the above a series of expectations were drawn relating to the study area:

- Land clearing is likely to have removed scarred and carved trees;
- Depositional and post-depositional process (relict and active) need to be assessed in order to identify whether artefact scatters are *in situ* or represent secondary contexts;
- To be meaningfully interpretable site recording would have to be compatible with other studies in order to allow comparison between study areas;
- Mudstone is the dominant raw material in the assemblages in this area; and
- The freehand percussion knapping method appears to be consistent across the Hunter Region.

6 RESULTS OF FIELD INVESTIGATION

This section presents information upon the transects investigated as part of this study (**Section 6.1.1**), and archaeological sites identified (**Section 6.2.1**) through background research and physical inspection.

6.1.1 Transect Descriptions

The study area was split into four sections (see **Section 4.4**) for investigation (**Figure 10**). The following describes the sections, including types of landform and effective coverage.

Lot 1 DP234887 and Lot 2 DP234887 (**Plate 10**) on the study area were once the site of the workshops for the steel fabricators A. J. Meyer and Transfield Pty Ltd for a period of time until 2000. The majority of these sections are bordered by a dilapidating cyclone fence (**Plate 11**). This part of the study area had been raised and covered in a tough compacted blue metal and road base, remnant from the steel workshops (**Plate 12**). Community consultation suggests that this was a surface modification only with no subsurface excavation or intrusion. In the last seven years this compact covering has begun to break up with pockets of introduced weeds and grass present (**Plate 13**). Site visibility beyond this compaction was virtually nil (<5%). Over the surface of the site were noted scatters of broken shell remnant from previous flooding. Deposition of shell material on top of this blue metal is indicative of the nature of flood deposits and swash zones present on the island despite modification.

Lot 3 PB 234887 and Lot 4 CP234887 (**Plate 14**) have not been previously impacted upon. This is indicated by site investigation and background research. The surface is lower than both Lot 1 DP234887 and Lot 2 DP234887. It has been suggested that elsewhere on the island that the surface has been levelled in the past (see **Section 5.2.3**); however there is no evidence of that here. Recent storm activity and associated rainfall has induced a thick cover of grass across this part of the study area (**Plate 15**). As a result visibility was negligible (<5%). At the few areas where grass was not present flood deposits of broken shell pieces could be observed (**Plate 16**).

6.1.2 Sites Identified

Due to the nature of vegetation and the associated low visibility, no archaeological sites were identified. It is believed however, that the study area has high potential for subsurface archaeological remains below the fill level.

Potential Archaeological Deposits (PADs) are places where the sub-surface profile is assessed as having a high probability of containing cultural heritage materials in a relatively undisturbed context. Factors that need to be considered when assessing PADs include:

- the depth of the A horizon in the natural soil profile;
- any potential disturbances to the sub-surface environment;
- the probability of cultural materials being present as assessed through the environmental setting and/or surface artefact assemblage; and
- any geomorphic agencies likely to have affected the area.

Recent work by Coffey (2007) indicates that the fill layers on site are a minimum of 2.5m in depth with fill layers comprised of "dredged sand/silty sand, with some gravel and clay lenses, variable density". In this zone rock, slag, and concrete have been noted as has silt fill from the river bed. Fill by definition, is mixed material brought in to the site from other areas and therefore any archaeological remains found on site will not be *in situ*. It is envisaged that in the

study area the natural soil profile can be found beneath this fill layer. It is believed that the natural soil profile has strong potential to yield archaeological remains. Therefore, the entire site can be considered a PAD.

6.2 Sensitivity Rating

Zones of archaeological sensitivity can be delineated on the basis of this assessment of the probability of additional archaeological material occurring in the study area. This assessment relates to the probability of material occurring and does not address scientific significance or the cultural significance of the material to Aboriginal community members.

Although Kooragang Island was formed largely through reclamation activities, recent archaeological investigations in the area have indicated that archaeological deposits may be present within the soil profile. Material remains found within the fill layer (as defined by Coffey 2007), will already be of a heavily disturbed nature and will not be *in situ*, therefore this fill layer will have a low archaeological significance. In light of the recent (as yet unreleased) discovery of skeletal remains nearby, it is suggested that extreme caution be used for any subsurface activity below this fill level.

For these reasons, the entire study area has been assigned a moderate sensitivity rating. If development activities are to be undertaken below the fill layer then further archaeological investigation will be required prior to development.

7 POTENTIAL IMPACTS

This section provides consideration of the potential impacts to Aboriginal heritage of the proposed development within the study area.

Based on discussions and information from Marstel in relation to the proposed bulk fuels storage facility, the potential impacts include:

- topsoil removal including the possibility of the uncovering of archaeological deposits not visible at the surface survey; and
- surface and subsurface impacts through the installation of foundations and services to the area, including gas release mechanisms, electricity, water, etc. These services are likely to cause impact to both surface and subsurface deposits in their proposed locations and immediate areas.

While all of the activities have the potential to impact Aboriginal sites and heritage, the initial construction activities are likely to cause the most impact. Most notably are the tasks that will require extensive vegetation clearance or earthmoving, such as the installation of the access roads, foundations and service lines, but also the use and storage of equipment.

Other activities include the use of heavy machinery, access, well locations, parking, turn around areas, maintenance, etc.

8 MITIGATION MEASURES

This investigation was based on previous archaeological research, both local and regional, and a field investigation. No archaeological sites were identified in the project area during field investigation. However, the entire study area was identified as a PAD, due to the potential for subsurface archaeological materials to occur. Based on geotechnical information (Coffey 2007) it is apparent that a buried landsurface and intact Quaternary soil profile may be present beneath the surface fill layers.

As stated in **Section 3**, this project has been declared as a Major Project under Part 3A of the EP & A Act. Therefore, section 87 and 90 permits under the NPW Act are not required. Hence, the management of the sites must be considered in this document as part of the Statement of Commitments for the Environmental Approvals of the project.

Since, the project is being undertaken under Part 3A of the EP&A Act, the following options can be provided to investigate and/or mitigate against the Aboriginal heritage risk that may be present within the study area:

- 1 Any subsurface excavation undertaken during the development would require monitoring by an archaeologist and/or Aboriginal person for archaeological material;
- OR
- 2 The investigation of areas proposed for subsurface impact should be first investigated by exploratory test pitting for archaeological material.

In relation to the former, a monitor would be required to observe the subsurface excavations at all times. Should archaeological material be found, the monitor should be afforded the opportunity to investigate and document the materials appropriately. Typically, monitoring is only recommended if NPW Act permits may be required (since these take several months to obtain).

In relation to the latter, investigations should be initially exploratory to identify natural soil profiles and identify previous impact or clearing. If no natural soil profile or archaeological material is found in the exploration phase, no further archaeological work would be required. If a natural soil profile is present, and is likely to be destroyed, additional test pitting to the satisfaction of the archaeologist (in consultation with the Aboriginal communities) should be undertaken to investigate and collect all archaeological material present. This investigation should not extend beyond the extent of the subsurface disturbance proposed by Marstel.

One further condition that this report recommends is placing in the Statement of Commitments a statement for the protection of any Aboriginal skeletal remains uncovered. Aboriginal skeletal remains are protected under the NPW Act and, if remains are identified during development then all works must stop and contact with the NSW Police, DECC and the NSW Coroners Office immediately initiated. Management of any Aboriginal skeletal bodies found should be developed in conjunction with DEC, the Aboriginal communities and trained archaeologists. Management options could include preservation *in situ*, or detailed excavation and recording followed by retrieval. In relation to the latter, consideration to the ultimate location of the remains should be decided prior to retrieval.

8.1.1 Recommendations

The following safeguards should be placed in the **Statement of Commitments** for the Project Approval:

- Should excavation be proposed to the soil profile beneath the existing fill surface, either:
 - Ensure representatives of the Awabakal and Worimi Aboriginal communities and an archaeologist are present to monitor the subsurface activities of the development, and to document any archaeological material uncovered; or
 - Undertake initial exploration (and subsequent investigation as required) of the soil profile to depth and extent of impact for archaeological materials prior to development.
- Should archaeological material be found discussions with the proponent and the Aboriginal communities should be undertaken prior to the collection of any artefacts unearthed to identify appropriate storage for the artefacts;
- Should Aboriginal skeletal remains be found, work must cease immediately and consultation with the DECC, NSW Police, NSW Coroners Office and the Aboriginal communities must be undertaken to come to agreement on the most appropriate course of action. Actions might include either 1) the preservation of the remains *in situ*, or 2) the detailed recording and recovery of the remains by qualified personnel in conjunction with Aboriginal community representatives. The latter should also seek agreement on the subsequent location and/or re-burial of the remains prior to their removal; and,
- All contractors should be made aware of these safeguards prior to commencing site works.

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Figures



1	Reserve
2	Toll Logistics
3	BTA
4	Woodchip Mill - Boral
5	Orica
6	Waco Kwikform
7	Westham Dredging
8	Incitec
9	P&O



 Site boundary

Environmental Assessment - Kooragang Island Bulk Liquids Storage Facility

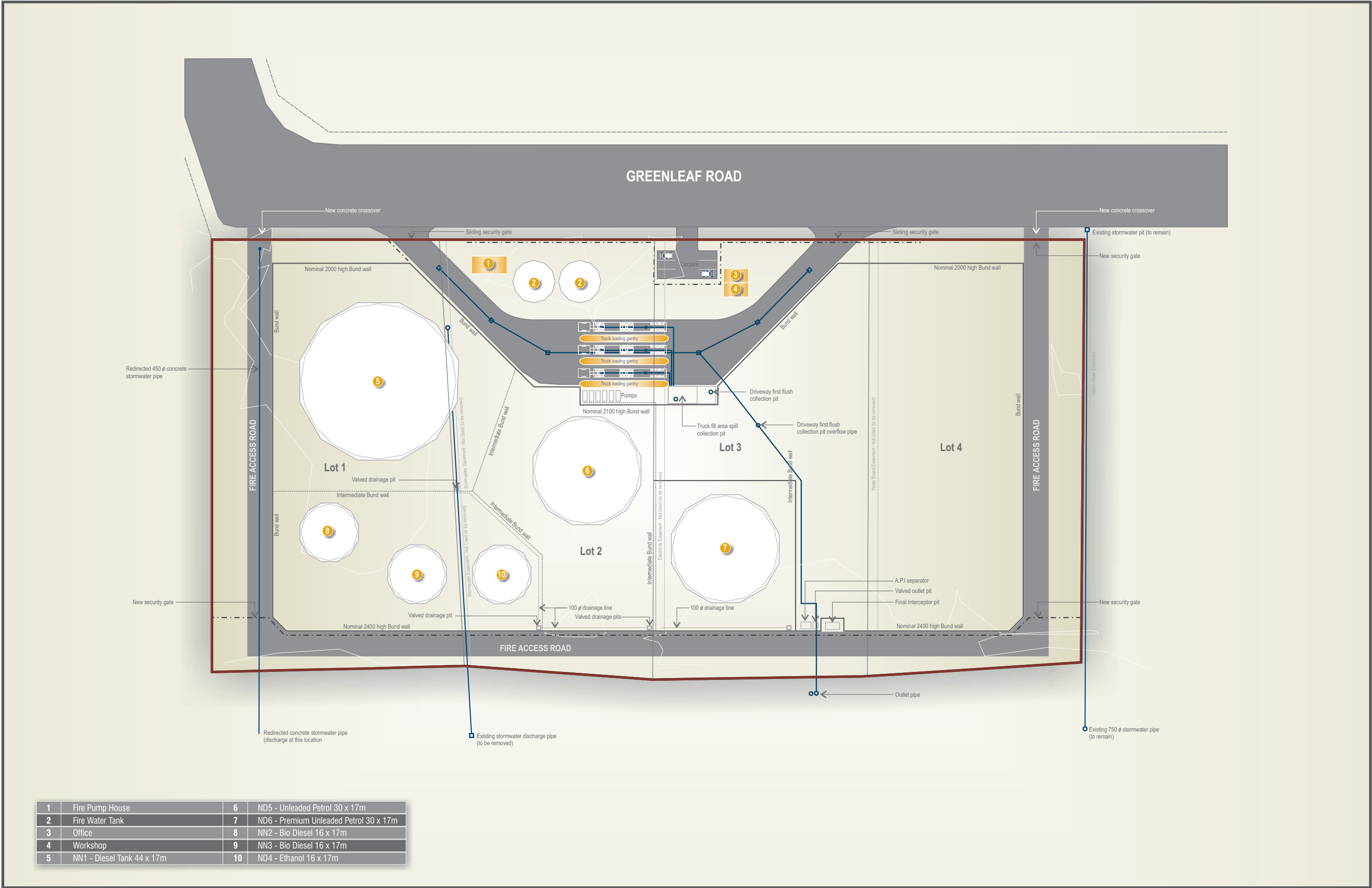
Marstel Terminals

Kooragang Island



Figure 2

Neighbouring Industries



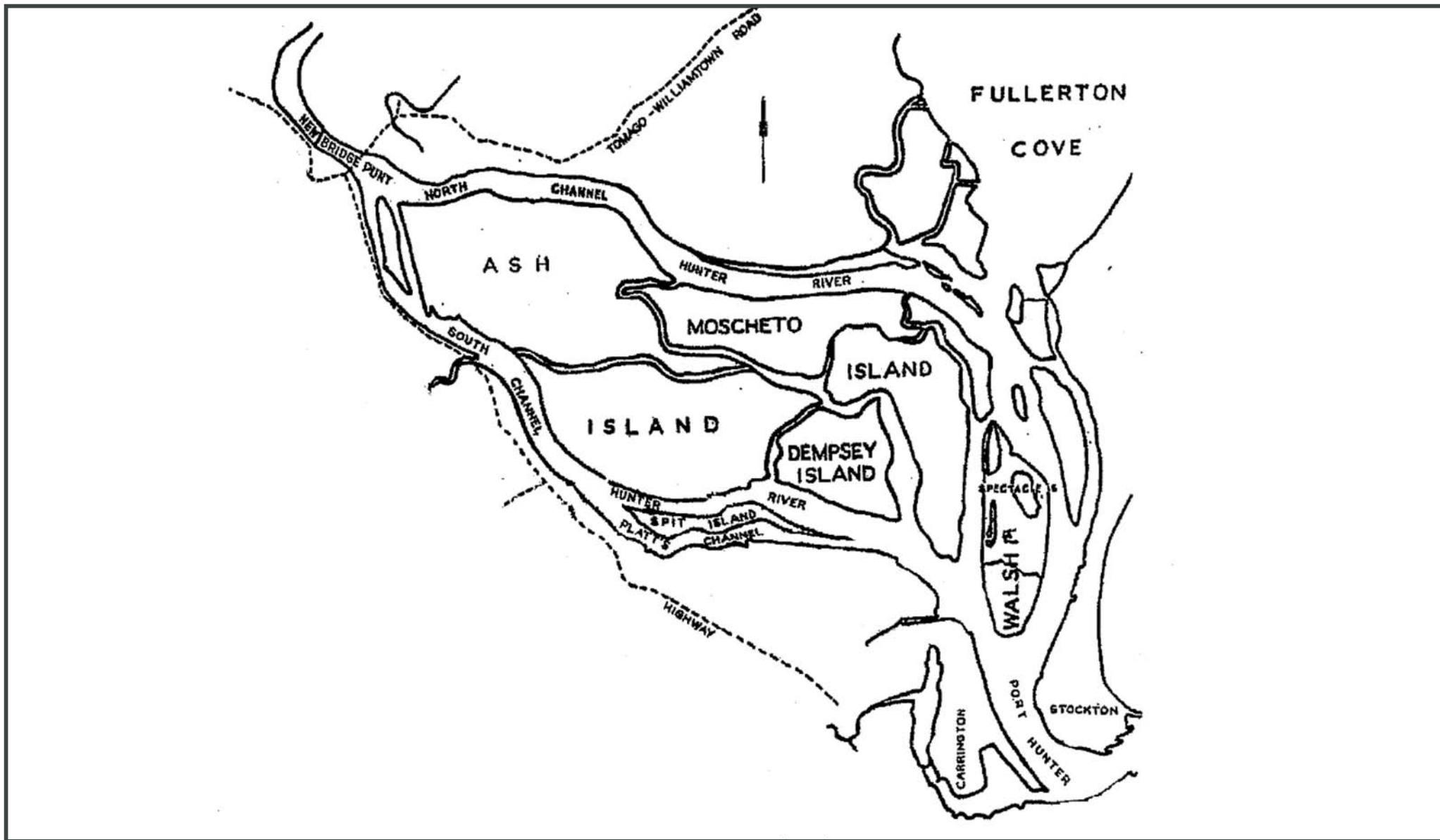




Figure 5

Geology of the Hunter Region

Environmental Assessment - Kooragang Island Bulk Liquids Storage Facility

Marstel Terminals

Kooragang Island



Figure 6

Tindale's Tribes of the Hunter Valley

Environmental Assessment - Kooragang Island Bulk Liquids Storage Facility

Marstel Terminals

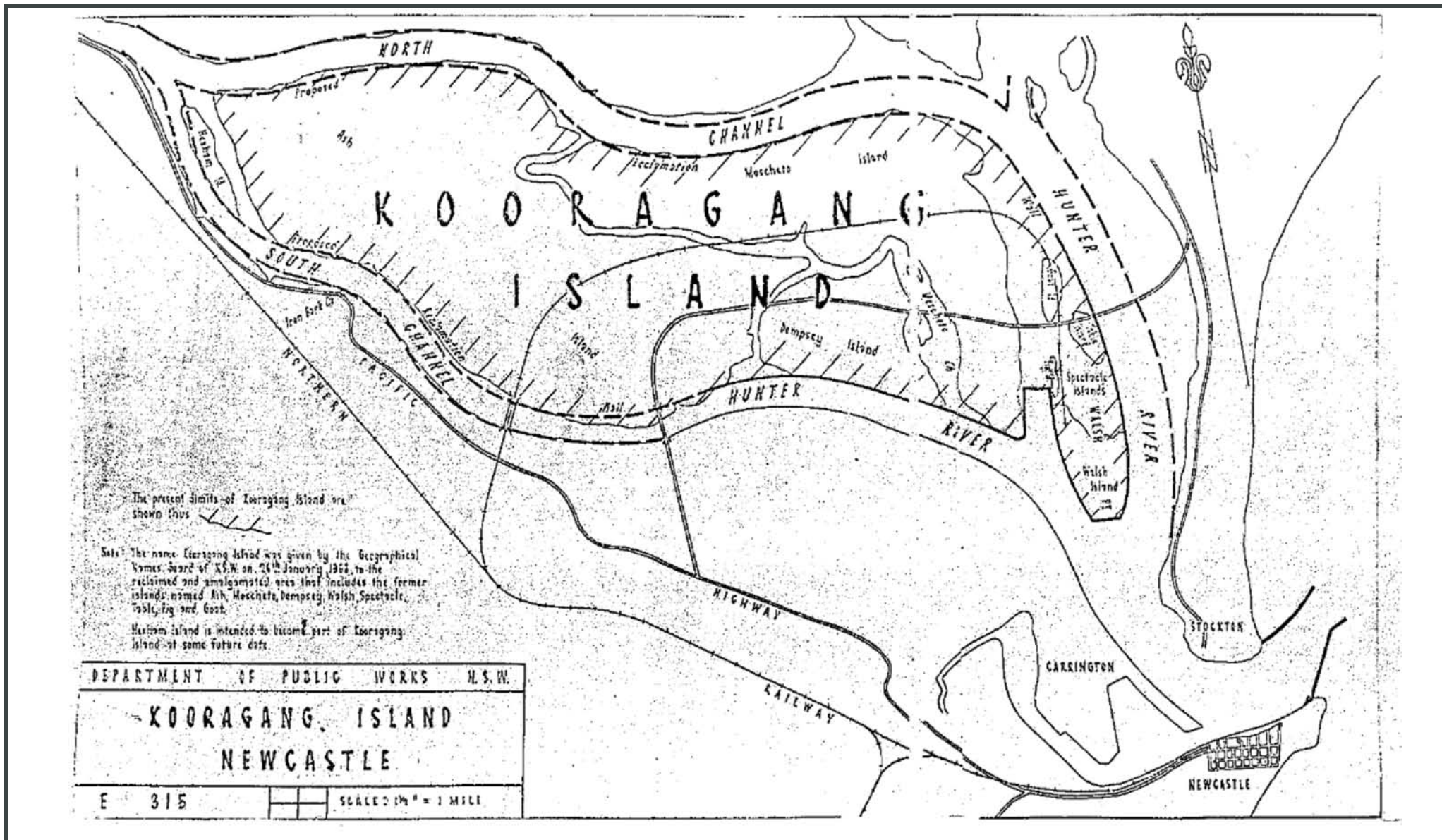
Kooragang Island



Figure 7
Parish of Newcastle (Detail) Showing Island Leases (1912)
Environmental Assessment - Kooragang Island Bulk Liquids Storage Facility
Marstel Terminals
Kooragang Island



Figure 8
Parish of Stockton (Detail) Showing Walsh Island (1915)
Environmental Assessment - Kooragang Island Bulk Liquids Storage Facility
Marstel Terminals
Kooragang Island





Plates



Plate 1: Outcropping of Nobbys Tuff Mudstone seen at Nobbys Beach, Newcastle



Plate 2: Muloobina Floating Dock, Newcastle Wharves



Plate 3: Rabbit Scats on site DP3



Plate 4: Aborigines Hunting Waterbirds. Joseph Lycett c.1817



National Library of Australia

nla.pic-an2962715-s15-v

Plate 5: Aborigines Resting by Camp Fire, near the Mouth of the Hunter River, Newcastle, NSW
Joseph Lycett c.1817



National Library of Australia

nla.pic-an2962715-s17-v

Plate 6: Aborigines Spearing Fish, others Diving for Crayfish, a Party Seated Beside a Fire Cooking Fish. Joseph Lycett c.1817



Plate 7: Rock Wall at Eastern edge of DP3, Kooragang Island



Plate 8: Walsh Island Dockyards c.1916



Plate 9: Greenleaf Fertilizers, Walsh Island Newcastle 1966



Plate 10: Sites DP 234887 1 and 2, looking South



Plate 11: Dilapidating Cyclone Fence surrounding DP1 and DP2



Plate 12: Remnant Roadbase from Steel Workshops



Plate 13: Looking West over DP1, showing Weed Colonisation



Plate 14: Sites DP 234887 2 and 3, looking North



Plate 15: Visibility and Grass cover at DP 234887 3



Plate 16: Storm Swash of Shell Fragments at DP 234887 4



Appendix A: Consultation Log



Appendix B: Community Responses



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