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ENVIRONMENTAL MANAGEMENT STRATEGY

LOT 218 AND LOT 220,
SALT ASH, NSW

FINAL

July 2016



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SALT ASH, NSW

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Prepared by
Umwelt (Australia) Pty Limited
on behalf of
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1.0 Introduction

Mackas Sand operations on Lot 218 and Lot 220 are located approximately 25 kilometres north east of Newcastle near Salt Ash in the Port Stephens local government area (LGA), New South Wales (refer to **Figure 1.1**). Mackas Sand directors have operated sand extraction operations in the area since 1992. Lot 218 and Lot 220 are owned by the Worimi Local Aboriginal Lands Council.

Mackas Sand was granted Project Approval No. 08_0142 (PA 08_0142) on 20 September 2009 by the Minister for Planning under Part 3A of the Environmental Planning and Assessment Act 1979 to operate sand extraction operations at Lot 220 and Lot 218. It is estimated that in excess of 21 million tonnes of sand resource will be extracted from Lot 218 and Lot 220, with Lot 218 having an indefinite extraction life due to the ongoing movement of sand from the adjoining mobile dunes.

A modification to PA 08_0142 (MOD1) was approved on 30 September 2013 by the NSW Planning Assessment Commission (PAC) under delegation of the Minister for Planning and Infrastructure. The modification includes a temporary reduction in extraction level and the approval of an alternate route to access Lot 218. The alternate route connects directly from Lot 218, northward to Nelson Bay Road, as depicted within **Figure 1.1**.

The Environmental Management Strategy (EMS) for Mackas Sand was originally submitted to the then Department of Planning (now Department of Planning & Environment – DPE) on 23 December 2009 and was approved on 6 December 2011. The current EMS and corresponding management plans and programs include updates to reflect changes as a result of MOD 2. MOD2 was approved by the PAC on 16 March 2016. The modification allows for an increase in maximum hourly truck movements (in and out) of Lot 218 via the approved alternate access road.

1.1 Regional Setting

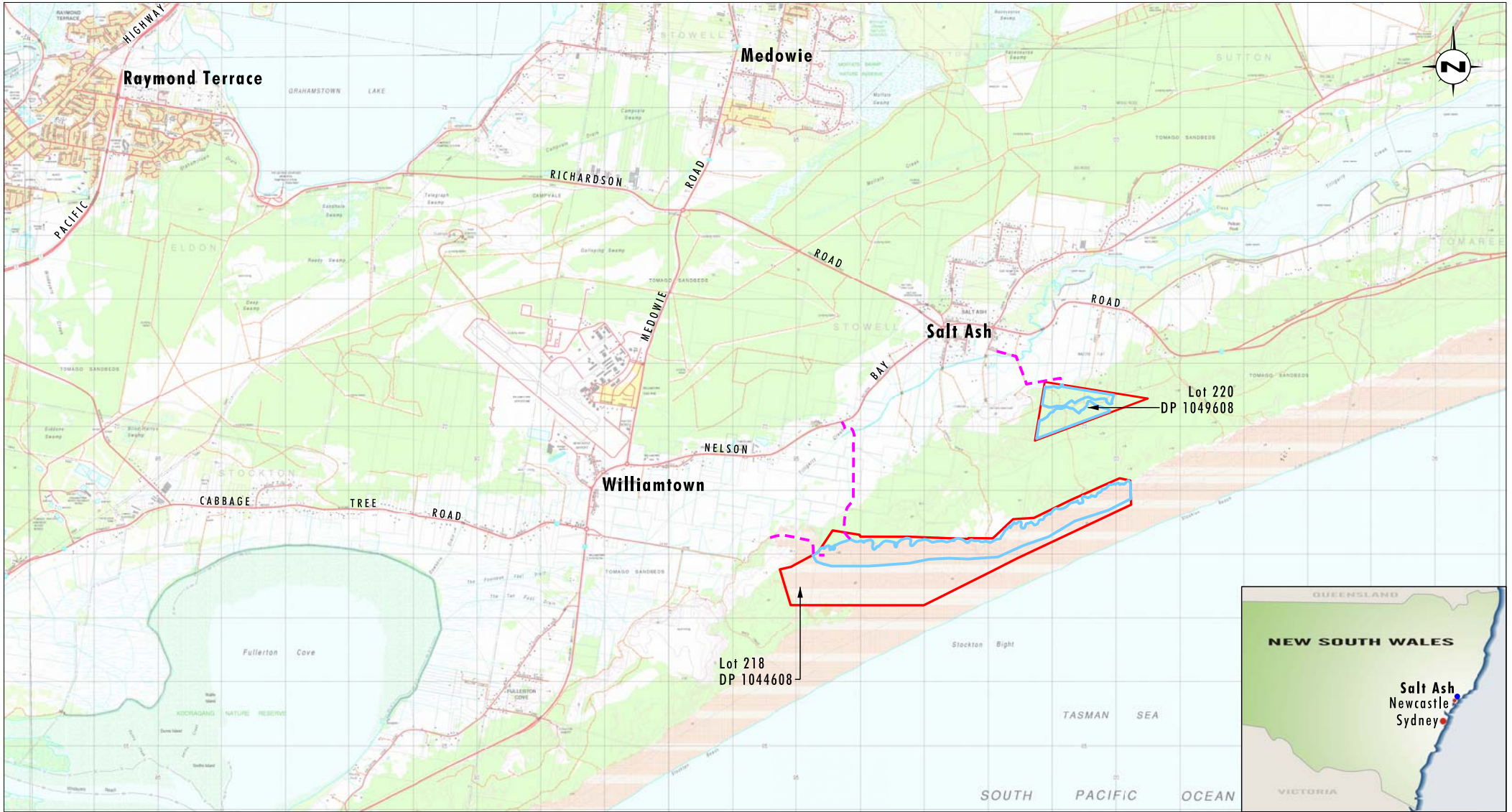
1.1.1 Sand Resources

The sand dunes of Stockton Bight comprise the largest mobile sand mass in New South Wales. The dunes have mostly formed in the last 6000 years from sand washed in from the sea and blown inland. The landward edge of the mobile dune system on Lot 218 is currently moving inland at a rate of up to five metres per year. The sand resource on Lot 220 is vegetated and provides a different quality of sand to the windblown sand that will be extracted from Lot 218.

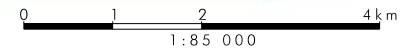
It is estimated that there is approximately 11.4 million tonnes of industrial grade sand within the approved extraction area on Lot 218 and 9.6 million tonnes within the approved extraction areas on Lot 220.

1.1.2 Conservation and Cultural Heritage

Stockton Bight has a high conservation value due to its rich Aboriginal cultural heritage and archaeological value, and habitat for threatened and endangered species.



Source: Department of Lands (2006)



- Legend**
- ▭ Lot Boundaries
 - ▭ Approval Areas
 - - - Approved Site Access

FIGURE 1.1
Locality Plan

Ownership of Lots 218 and 220 was transferred to Worimi Local Aboriginal Lands Council (WLALC) in 2001 in accordance with the provisions of Section 36 of the Aboriginal Land Rights Act 1983. Clause 45(2) of this act states:

45(2) Notwithstanding any other Act, but subject to this section:

- (a) any transfer of lands to an Aboriginal Land Council under section 36 includes the transfer of mineral resources or other natural resources contained in those lands,
- (b) any vesting of the title to lands in an Aboriginal Land Council under Section 37 includes, subject to that section, the vesting of the title to the mineral resources or other natural resources contained in those lands.

In February 2007, the Worimi Conservation Lands were proclaimed, forming a 4438 hectare conservation area that includes Worimi State Conservation Area, Worimi National Park and Worimi Regional Park. The conservation lands are now leased back to the government under an agreement that allows for the lands to be co-managed between the WLALC and the government. The agreement intends to provide for the protection of the cultural and natural heritage values of the Stockton Bight landscape, while allowing for safe and sustainable recreational and commercial use of the area by the broader community.

Utilisation of the sand resources within Lots 218 and 220 is a key element of WLALC cultural development program as it will provide a long-term source of income to facilitate implementation of the program.

1.2 Purpose and Scope

This Environmental Management Strategy (EMS) provides the strategic context for the environmental management of Mackas Sand operations. This document has been prepared to satisfy Condition 1 of Schedule 5 of the Project Approval 08_0142 (MOD2).

This EMS has been developed to identify, address and effectively manage the environmental aspects and impacts of the operation, including:

- sand extraction operations
- management of biodiversity and archaeology
- environmental monitoring and management programs
- rehabilitation and closure activities.

1.3 Objectives

The main objectives of this EMS include the following:

- to exist as an umbrella document for the Mackas Sands environmental management system (encompassing management plans and procedures) that has been developed to address environmental aspects that are specific to Mackas Sands operations
- to implement a fully functional and effective environmental management system that is used to drive improved environmental performance and reduced environmental risk

- to ensure ownership of the environmental management system at all levels and that employee knowledge and use of the system remain high
- to prioritise staff and financial environmental resources on the basis of environmental risk
- to continuously improve the environmental performance of the operations through improvement plans, audits and inspection processes, training programs and effective corrective action systems.

1.4 Regulatory Requirements

1.4.1 Project Approval Conditions

A detailed list of the PA 08_142 (MOD 2) conditions outlined in the Project Approval, and where they are addressed in this document is included in **Table 1.1**. As required by the Project Approval, a series of management plans have been developed to specifically address and manage environmental matters relevant at Mackas Sand. The strategies, plans and programs referred to in Condition 1(f) of Schedule 5 as required by PA 08_0142 (MOD2) are set out in **Table 1.2**.

Table 1.1 Project Approval Requirements

Conditions		Addressed in Section
Schedule 5 – Environmental Management and Monitoring Conditions		
Environmental Management Strategy		
1.	The proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Secretary. This strategy must:	
	a) be submitted to the Secretary for approval within 3 months of the date of this approval;	Section 1.0
	b) provide a strategic framework for environmental management of the project;	Section 1.5
	c) identify the statutory approvals that apply to the project;	Section 2.0
	d) describe the role responsibility, authority and accountability of all key personnel involved in the environmental management of the project ;	Section 1.6
	e) describe the procedures that would be implemented to: <ul style="list-style-type: none"> • keep the community and relevant agencies informed about the operation and environmental performance of the project; 	Section 3.1
	• receive handle and respond to, and record complaints;	Section 3.1.3
	• resolve any disputes that may arise during the course of the project;	Section 3.1.4

Conditions		Addressed in Section
	<ul style="list-style-type: none"> respond to non-compliance; 	Sections 4.3 and 5.0
	<ul style="list-style-type: none"> respond to emergencies; 	Section 3.3
	f) include: <ul style="list-style-type: none"> copies of the various strategies, plans and programs that are required under the conditions of this approval once they have been approved; and a clear plan depicting the monitoring currently being carried out within the project area. The Proponent shall implement the approved strategy as approved from time to time by the Secretary.	Appendices

Table 1.2 Strategies, Plans and Programs required by Consent Conditions

Schedule, Condition	Requirement	Appendix
3, 10	Prepare and implement a Noise Management Plan	1
3, 13	Prepare and implement an Air Quality Monitoring Program	2
3, 18	Prepare and implement a Soil and Water Management Plan	3
3, 23	Prepare and implement an Unexploded Ordnance Management Plan	4
3, 25	Prepare and Implement a Landscape Management Plan	5
3, 28A	Prepare and implement a Biodiversity Offset Strategy	5
3, 29	Prepare and Implement an Aboriginal Cultural Heritage Management Plan	6
3, 30	Prepare and Implement a Non-Indigenous Heritage Management Plan	7
5, 1	Prepare and implement an Environmental Management Strategy	This document
5, 1(f)	Clear plan depicting monitoring being carried out within project area	8

In addition to PA 08_0142 (MOD2) Mackas Sand holds other approvals and licences which require the development of management plans, programs or procedures. These approvals and corresponding plans are presented in **Table 1.3**.

Table 1.3 Additional Approvals and Corresponding Plans and Procedures

Approval/Licence	Management Requirement	Location
EPL 13218	Pollution Incident Response Management Plan (PIRMP)	www.mackassand.com.au
EPBC Approval 2011/6214	Landscape Management Plan	www.mackassand.com.au
Hunter Water Regulation 2010 Approval	Operations Management Procedure Hydrocarbon Spill Procedure	www.mackassand.com.au

In order to effectively implement the range of environmental protection and monitoring actions required within the EMS, a yearly planner, monthly checklist, action summary and induction materials list have been developed. These additional tools are included within **Appendix 8**.

1.5 Strategic Framework Context

Environment and community aspects and impacts for Mackas Sand are identified in consideration of the activities undertaken at the site as well as legislative requirements, project approvals conditions and other licences and approvals. This process aims to appropriately manage environmental and community aspects and minimise the potential environmental and community impacts of the operation.

Mackas Sand has identified the major environmental risks for the operation and their management strategies as part of the EMS for the project. Mackas Sand will review the environmental risks as discussed in **Section 1.3**.

The objectives and targets for Mackas Sand incorporated into this EMS have been developed based on the environmental assessment (EA), Project Approval, Environment Protection Licence (EPL), previous environmental performance, community concerns and other regulatory and company requirements. Objectives and targets set in order to meet the commitments and to measure the performance of the operation are outlined throughout the EMS.

1.6 Roles and Responsibilities

The Quarry Manager will be accountable for all aspects pertaining to the operations, environmental management and safety on the proposed site. The Quarry Manager may be contacted on (02) 4982 6227 (office) or 0408 490 911 (24 hour complaints line).

The implementation, day-to-day management and continued improvement of the EMS for sand extraction operations will be the responsibility of the Quarry Manager. The specific duties of the Quarry Manager include:

- ensuring compliance is achieved with relevant legislation and company policy by establishing and maintaining appropriate management and monitoring systems
- ensuring the management practices described in the EMS and associated plans and programs are implemented effectively
- ensuring that contractors fulfil their contractual obligations

- monitoring the performance of EMS strategies
- regular liaison with the government, community and other stakeholders
- implementing environmental induction procedures and appropriate training for Mackas Sand personnel and contractors
- reporting.

It is the responsibility of all quarry staff and contractors to comply with the regulations and procedures defined in the EMS, and to carry out their work in a way that minimises the social and the environmental impacts.

2.0 Statutory Approvals

2.1 Commonwealth Legislation

Commonwealth legislation governing the operations of the site includes the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) and Native Title Act 1993. These pieces of legislation were considered within the EA for the project (Umwelt 2012). It was determined that approval was required under the EPBC Act for the development of the Alternate access road. EPBC Approval 2011/6214 was granted on 29 November 2013.

A copy of EPBC Approval 2011/6214 is included as **Appendix 9**.

2.2 NSW State Legislation

2.2.1 Environmental Planning and Assessment Act 1979

The original proposal satisfied the definition of a Major Project under the State Environmental Planning Policy (Major Development) 2005 and approval was given in accordance with the requirements of the now repealed Part 3A of the EP&A Act. Modifications to projects approved under Part 3A that are outside the scope of the original approval are permitted with consent under Section 75W of the EP&A Act. The Minister for Planning and Infrastructure (now Minister for Planning and Environment) is the determining authority for modifications under Section 75W of the EP&A Act.

Modification (MOD 1) to the Project Approval 08_142 under 75W of the EP&A Act was granted on 30 September 2013 for the development of an alternate access road to Lot 218 and the temporary lowering of the quarry ground surface during extractive operations.

A copy of Project Approval 08_142 (MOD 2) is included as **Appendix 10**.

2.2.2 Hunter Water Regulations 2010

Mackas Sand was granted approval under Clause 10(1) of the Hunter Water Regulations 2010 for engaging in extractive industry in the North Stockton Sandbeds Catchment Area on 7 June 2012. The permit provided for extractive operations taking place only within the boundaries of Lot 218 and Lot 220 Nelson Bay Road, Salt Ash (refer to **Figure 1.1**) and meeting the requirements and criteria outlined in PA 08_0142 (MOD 1).

A copy of approval under the Hunter Water Regulations is included as **Appendix 11**.

2.2.3 Protection of the Environment Operations Act 1997

On 30 November 2009 Mackas Sand was issued with EPL 13218 under the Protection of Environment Operations Act 1997. EPL 13218 is for land-based extractive activity at Lot 218 and Lot 220 for a production level of between 500,000 and 2,000,000 tonnes per year. The licence stipulates a number of criteria for the monitoring of groundwater, sets out limits for noise emissions from the operation and details reporting requirements. These requirements are discussed further in the Noise Management Plan (see **Appendix 1**) and Soil and Water Management Plan (see **Appendix 3**).

A copy of EPL 13218 is included as **Appendix 12**.

3.0 Implementation and Operation

3.1 Consultation

3.1.1 Community Consultative Committee

In general all major extractive operations in NSW are required to establish a Community Consultative Committee (CCC) in accordance with the 'Guidelines for establishing and operating Community Consultative Committees for Mining Projects (DoP June 2007)'.

The main purpose of the CCC is to

... provide a forum for open discussion between representatives of the company¹, the community, the council and other stakeholders on issues directly relating to the mine's operations, environmental performance and community relations, and to keep the community informed on these matters. (DoP June 2007:1)

Membership of the CCC is made up of at least three members of the community, one member of the local council, an independent Chairperson, and two to three members of the project management team (including Environmental Managers).

The CCC meets at a frequency determined by the members to discuss issues relating to the operation and standing of Mackas Sand within the community in regards to environmental management. The CCC was formed and had its first meeting on 15 September 2010 and currently meets on a six monthly basis, with all members able to call an extraordinary meeting should they have particular matters they wish to discuss.

3.1.2 Communication with the Broader Community

It is generally accepted that as a member of the CCC, community members will encourage conversation regarding the operation to gauge the attitudes of the community and report back to the CCC at meetings. As well as informal communication such as this, the Chairperson may hold formal information sessions to communicate relevant information to special interest groups such as the local Chamber of Commerce.

In addition to this, a website (www.mackassand.com.au) will be used to display plans, strategies, monitoring results and reports and to keep the community informed.

3.1.3 Complaints Handling

In accordance development consent and EPL requirements, Mackas Sand has established a 24 hour complaints line. The number is listed on the Mackas Sand website (www.mackassand.com.au).

The Complaints Line number is: **0408 490 911**.

Complaints received on the number will be directed to the Quarry Manager who will respond to the complainant within 24 hours if the complainant is contactable. A record of all complaints will be kept on-site and published on the Mackas Sand website.

All complaints and information in regard to responses will be provided to the CCC. One of the functions of the CCC is to review complaints or disputes between Mackas Sand and members of the community.

3.1.4 Dispute Resolution

Part of the function of the CCC is to raise and discuss any disputes that may occur between the proponent and members of the local community or other relevant stakeholders, as part of working towards an amicable resolution. In the event of a dispute, the CCC will discuss and try and work towards a solution that satisfies all relevant parties. If required in these cases the Chairperson will act as a mediator between all relevant parties. Should the dispute remain unresolved the Chairperson will refer the matter to the Secretary.

3.2 Training and Induction

Mackas Sand aims to provide the necessary tools and training for its employees and contractors to enable the effective implementation of Mackas Sands management systems and to assist with the risk management process. A competency-based training scheme will be implemented to identify minimum qualifications and skills required, to ensure that adequate resources and training are provided to meet these requirements. All employees and contractors will be required to complete a structured site induction. The scope of the induction will include:

- an overview of the Mackas Sands operation and EMS
- an overview of the Mackas Sands EMS and standard operating procedures
- legislative requirements
- key environmental issues for Mackas Sands (i.e. groundwater, noise, dust, biodiversity and archaeology)
- environmental incident and community complaint reporting requirements;
- Workplace Health and Safety (WHS) requirements
- Emergency Response Procedures.

Training will be ongoing to improve the environmental and social understanding, capabilities and performance of personnel and contractors. In addition, specific training will be provided to personnel involved in:

- maintaining and operating pollution control equipment
- Aboriginal cultural awareness
- handling and storage requirements for tank traps
- storing and handling hydrocarbons
- management of unexploded ordnance
- Mackas Sand site transport rules
- responding to environmental incidents and emergencies.

An overview of induction materials are included within **Appendix 8**.

3.3 Operational Controls and Emergency Procedures

3.3.1 Dangerous Goods

Storage, handling and transport of dangerous goods such as fuels onsite will be undertaken and managed by suitably qualified persons in accordance with Australian Standards, particularly AS1940 and the Dangerous Goods Code.

Refuelling of equipment occurs on occasion within the extraction areas via the usage of mobile refuelling equipment, consisting of a fuel tank, spilt fuel bund/spill catch tray and spill kit. An additional mobile spill kit is located within the extraction area to enable prompt clean up in the event of a spill during refuelling activities. Any spills will be managed according to the Mackas Sand Operational Management Procedure (Umwelt 2013). Any contaminated material to be disposed of will be done so in accordance with relevant waste management requirements.

3.3.2 Public Safety

Following consent in 2009, Mackas Sand erected fences around the extraction areas on Lot 220 to ensure that public safety is provided for. However, fencing materials were removed and/or destroyed by persons seeking to pass through the site (e.g. dirt bike riders, 4WD vehicles, etc.). Additional means of preventing access to Lot 220 were attempted in consultation with the CCC, including placement of concrete blocks across access tracks where safe to do so. These too were ineffective and were found in some cases to hamper the bushfire brigade's ability to access fire zones. It has since been considered not practical to erect safety fencing that prevents access, whilst allows for sufficient fauna movement.

Signs indicating that it is private property and an active quarry site will be maintained around Lot 220 to ensure that the public is made aware of the dangers associated with unauthorised access and movement about the site. Similar signs will be erected at Lot 218 as required. Additionally, a relocatable rope/reflective tape or similar barrier will be erected on the duneward side of the extraction area of Lot 218, approximately 30 metres distant from the extraction face. This will alert drivers of 4WD vehicles of their proximity to the extraction face, preventing any unauthorised or inadvertent access.

3.3.3 Bushfire Management

Mackas Sand will be responsible for ensuring that fire management strategies are implemented and that there are always persons on-site trained in fire fighting. Bushfire management strategies that will be implemented include:

- regular slashing of surface vegetation around critical infrastructure such as the processing plant and other site facilities
- maintaining road ways and tracks that are either exiting the site or constructed as a requirement of the project in order to provide an effective fire break.

The site will be equipped with operational fire fighting equipment which will be serviced as required by the manufacturer's specifications.

Mackas Sand staff onsite in the event of a fire will assist Rural Fire Service and Emergency Service personnel as directed to contain or control any fire burning on site.

4.0 Monitoring and Compliance

4.1 Monitoring Programs

Environmental monitoring programs have been developed in accordance with PA 08_0142 and other approvals, licences, etc. to ensure that the required environmental monitoring is undertaken at Mackas Sand. The location of all Mackas Sand monitoring points are shown in **Figure 4.1**.

4.2 Environmental Inspections

As a minimum, environmental inspections as presented within the monitoring checklist included within **Appendix 8** are to be undertaken to determine compliance with legislation, standards, codes and other external requirements, the Project Approval and EPL. Inspections are to be conducted by the Mackas Sand Quarry Manager or his/her delegate and be recorded according to document control procedures (see **Section 1.4**).

Outcomes of the inspections shall be documented within the monitoring checklist to capture and track all actions. In the event a non-conformance is identified during the inspection, corrective and/or preventative actions are to be developed in accordance with **Section 4.5**. The completion and effectiveness of the corrective and/or preventative action is to be assessed during the next monthly inspection.

4.3 Compliance Assessment

A non-compliance can be defined as an exceedance of impact assessment criteria or relevant regulatory instrument. This can include but is not limited to:

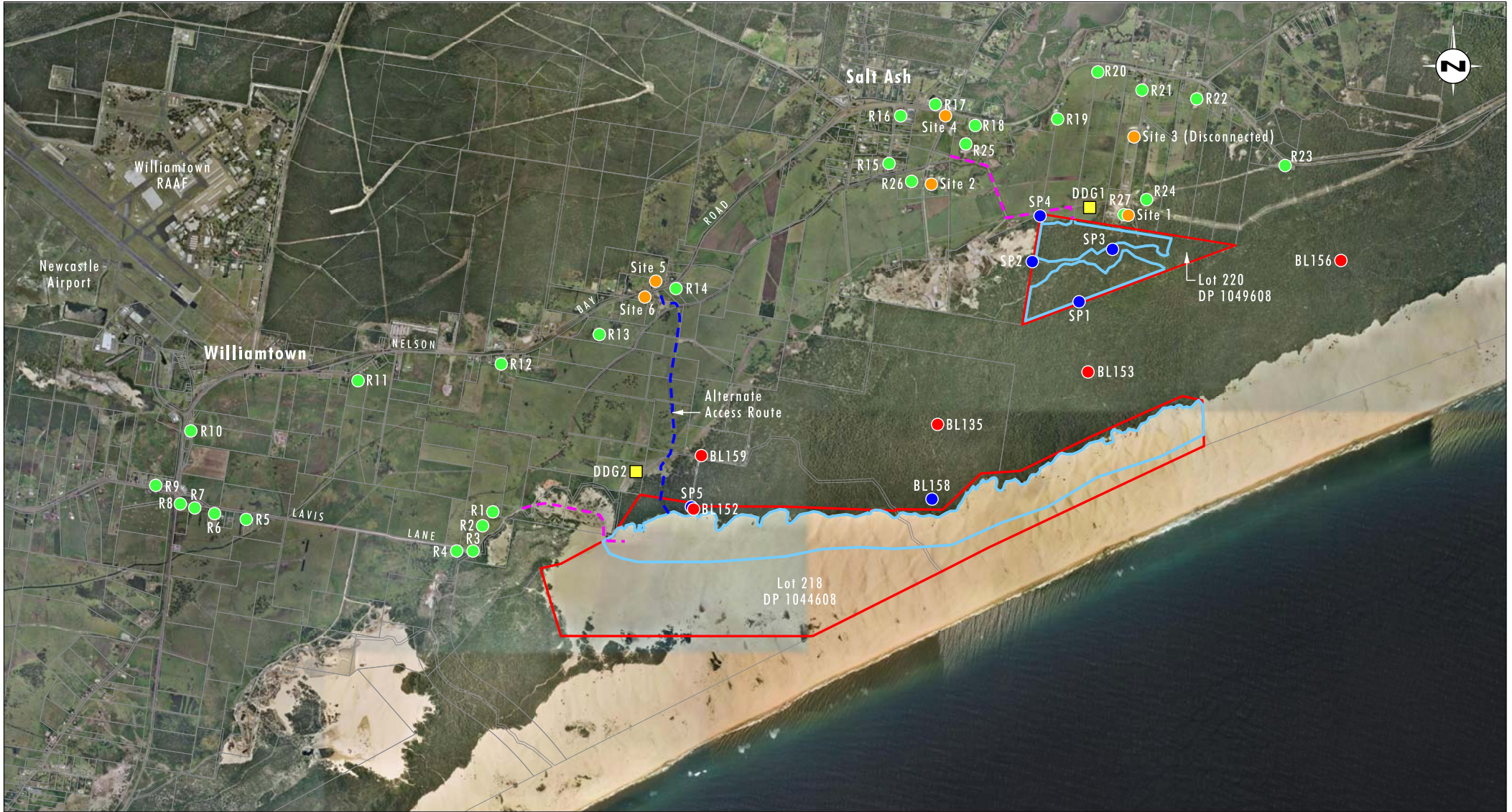
- any monitoring result that does not meet the acceptance criteria specified in PA 08_0142 or EPL 13218, noting any considerations within the EMS and related documents;
- any notice of non-compliance issued by Office of Environment and Heritage (OEH) or any other regulatory authority with environmental jurisdiction (e.g. NSW Office of Water (NOW), DPE etc); or
- any non-compliance with legislation, other approvals or licences.

Notification and reporting procedures for non compliance events are included in **Section 5.0**.

4.4 Independent Environmental Audit and Other Audit Procedures

Independent environmental audits are to be undertaken to verify compliance with legislation, licences, approvals and the EMS. Audit results are to be communicated to the CCC where relevant. The recommendations from independent environmental audits are to be consolidated into action plans and entered into an electronic database to allow tracking of progress against the audit actions.

Condition 5 of Schedule 5 of PA 08_0142 (MOD2) requires an Independent Environmental Audit to be undertaken within two years of commencing quarry operations and every three years thereafter. The proponent must commission and pay the full cost of these Audits.



Source: Department of Lands (2003)

0 0.5 1 2 km
1:45 000

Legend

- Lot Boundaries (218 & 220)
- Approval Area
- Approved Site Access
- Alternate Access Route
- Noise Monitoring Location
- Dust Monitoring Location
- EPL Groundwater Monitoring Location
- Hunter Water Groundwater Monitoring Location
- Residential Receivers

FIGURE 4.1

Mackas Sand Monitoring Locations

In accordance with the requirements of Condition 5 of Schedule 5 of PA 08_0142 (MOD2), the Independent Environmental Audits must:

- (a) be conducted by a suitably qualified, experienced, and independent team of experts whose appointment has been approved by the Secretary
- (b) assess the environmental performance of the project, and its effects on the surrounding environment
- (c) assess whether the project is complying with the relevant standards, performance measures and statutory requirements
- (d) review the adequacy of any strategy/plan/program required under this approval; and, if necessary
- (e) recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval.

Condition 6 of Schedule 5 of PA 08_0142 (MOD 2) requires that:

Within one month of completion of each of the Independent Audits, the Proponent shall submit a copy of the audit report to the Secretary and relevant agencies, with a response to any of the recommendations in the audit report.

Condition 7 of Schedule 5 of PA 08_0142 (MOD 2) states:

Within 3 months of submitting a copy of the audit report to the Secretary, the Proponent shall review and if necessary revise the:

- (a) strategies/plans/programs required under this approval; and
- (b) rehabilitation bond, to consider the:
 - effects of inflation
 - changes to the total area of disturbance
 - performance of rehabilitation against the completion criteria of the Landscape Management Plan, to the satisfaction of the Secretary.

Mackas Sand will review and revise strategies/plans/programs if necessary as required by Condition 7 of Schedule 5 of PA 08_0142 (MOD 2). The Quarry Manager will be responsible for ensuring these strategies/plans/programs are reviewed and revised.

In addition to Independent Environmental Audits, internal audits of operations and/or this EMS, or other aspects of PA 08_0142 will be undertaken to verify compliance with legislation, licences and approvals as part of the Annual Review process and more frequently as required. All internal and external auditors are to be appropriately qualified persons.

4.5 Corrective Action

An environmental non-conformance is taken to be any deviation from procedures implemented at Mackas Sand including identified objectives and targets. The non-conformance may be identified from routine inspections, audits or monitoring, or it can be from an external complaint. In the case of any non-conformance, corrective action will be developed and managed through internal tracking mechanisms. Additionally, any non-conformance resulting in an environmental incident will be managed in accordance with **Section 5.0**.

Corrective actions may also be identified through investigations of any environmental incidents (refer to **Section 5.0**) or non-compliances (refer to **Section 4.3**).

5.0 Reporting

5.1 Project Approval Requirements

5.1.1 Incident Reporting

Environmental incidents will be managed in accordance with the Mackas Sand EMS, which has been developed to:

- define and categorise environmental incidents
- manage hazards and incidents to minimise damage to people, environment, community and other assets
- identify factors that contributed to incidents through an investigation process and to learn from those events and prevent reoccurrence.

Condition 2 of Schedule 5 of PA 08_0142 (MOD 2) requires any exceedances of limits/performance criteria or incidents to be reported to the Department of Planning and Environment within 24 hours of the exceedances being recorded.

Following the reporting of an exceedance or incident to the DPE, Condition 3 of Schedule 5 of PA 08_0142 (MOD 2) requires the proponent to prepare a written report of the exceedance within six days of the exceedance being reported. The written report must contain:

- a) a description of the date, time and nature of the exceedance
- b) identification of the cause (or likely cause) of the exceedance
- c) a description of actions taken to date
- d) a description of the proposed measures to address the exceedance.

In the event of any exceedances or incidents which cause or may cause material harm to the environment, Mackas Sand will report in accordance with the requirements of Conditions 2 and 3 of Schedule 5. The Quarry Manager will be responsible for ensuring these reporting requirements are complied with.

Additionally, further incident reporting procedures are detailed within the Mackas Sand Pollution Incident Response Management Plan, available at www.mackassand.com.au

5.1.2 Material Harm Incidents

Mackas Sand is committed to minimising any potential for material harm to the environment and surrounding community. A PIRMP has been developed for Mackas Sand operations which outlines the response and notification procedures in the event of a potential material harm incident. In addition to reporting required by Condition 2 of Schedule 5 of PA 08_0142 (MOD2) incidents resulting or having the potential to result in material harm to the environment, (as defined by Section 147 of the Protection of the Environment Operations Act 1997) shall be reported to the following authorities (as relevant) as soon as it is safe to do so:

- the Appropriate Regulatory Authority (ARA)

- the EPA (if not the ARA)
- the Ministry of Health via the local Public Health Unit
- WorkCover;
- the Local Authority (Council) if not the ARA; and
- NSW Fire and Rescue.

In the case where immediate threat to human health or property has been identified, contact NSW Fire and Rescue as a first priority.

The decision on whether to notify should not delay immediate actions to ensure the safety of people or contain a pollution incident. However, incident notification should be made as soon as it is safe to do so.

The information about a pollution incident that must be notified includes:

- the time, date, nature, duration and location of the incident
- the location of the place where pollution is occurring or is likely to occur
- the nature, the estimated quantity or volume and the concentration of any pollutants involved, if known
- the circumstances in which the incident occurred, including the cause of the incident, if known
- the action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution, if known.

5.1.3 Annual Reporting

Condition 4 of Schedule 5 of PA 08_0142 (MOD 2) requires the proponent to prepare an Annual Review by the end of March each year, or other timing agreed by the Director-General. The Condition 4 requires the report to:

- (a) Describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the next year
- (b) Include a comprehensive review of the monitoring results and complaints records of the project over the past calendar year, which includes a comparison of the results against the:
 - Relevant statutory requirements, limits or performance measures/criteria
 - Requirements of any plan, program or strategy required under this approval
 - Monitoring results of previous years
 - Relevant predictions in the EA and EA (MOD 2).
- (c) Identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance

- (d) Identify any trends in monitoring data over the life of the project
- (e) Identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies
- (f) Describe what measures will be implemented over the current calendar year to improve the environmental performance of the project.

In addition, the Annual Review will also include:

- an Operations Report as required within the Approval under the Hunter Water Regulation
- a report addressing compliance with the Landscape Management Plan approved under EPBC 2011/6214.

The Quarry Manager will be responsible for ensuring these reporting requirements are complied with.

5.2 EPL Reporting Requirements

5.2.1 Annual Return Documents

For each 12 month reporting period Mackas Sand must provide to the Environment Protection Agency (EPA) a statement of compliance and a monitoring and summary of complaints for the 12 month period preceding. This Annual Return must be provided to the EPA within 60 days of the end of the reporting period.

The Quarry Manager will be responsible for ensuring these reporting requirements are complied with.

5.2.2 Annual Groundwater Monitoring Report

Mackas Sand will compile a report annually showing the results of all groundwater monitoring conducted on the premises. The report will graphically present the results of all groundwater results since monitoring began and note on the graph when any groundwater extraction and/or recharge began. Each parameter monitored will be graphed separately and results will be compared to relevant criteria, such as that developed by the Australian and New Zealand Environment Conservation Council (ANZECC). The report will also provide a commentary on the results that have been obtained, highlight any changes observed over time, and make recommendations where adverse effects are observed. The report will be submitted to the EPA annually with the Annual Return.

The Quarry Manager will be responsible for ensuring these reporting requirements are complied with.

5.2.3 Written Report

Where an EPA officer or other government representative suspects on reasonable grounds that the action of the operations may be causing or is likely to be causing harm to the environment the officer may request a written report of the event.

Should the report provided not give enough details to satisfy the EPA a request for further details from the proponent may be lodged.

The Quarry Manager will be responsible for ensuring these reporting requirements are complied with.

5.3 Access to Information

As required by Condition 9 of Schedule 5 of Project Approval 08_0142, all strategies, plans and programs will be displayed on the company website (www.mackassand.com.au) within one month of approval by the Secretary. The website will be updated at least once every three months.

The Quarry Manager will be responsible for ensuring reports are placed on the website as required by Condition 9 of Schedule 5 of PA 08_0142 (MOD 2).

6.0 Review and Improvement

6.1 Continuous Improvement

Where possible, Mackas Sand will attempt to implement all reasonable and feasible best practice mitigation measures throughout operations at Mackas Sand. The basis for continuous improvement will be through the ongoing monitoring of impacts and through the development of corrective/preventative actions.

6.2 Review

The EMS is to be reviewed in accordance with Condition 4A and Condition 7 of Schedule 5 in PA 08_0142, or as directed by the Secretary of DPE. The review will reflect changes in environmental requirements, technology and operational procedures.

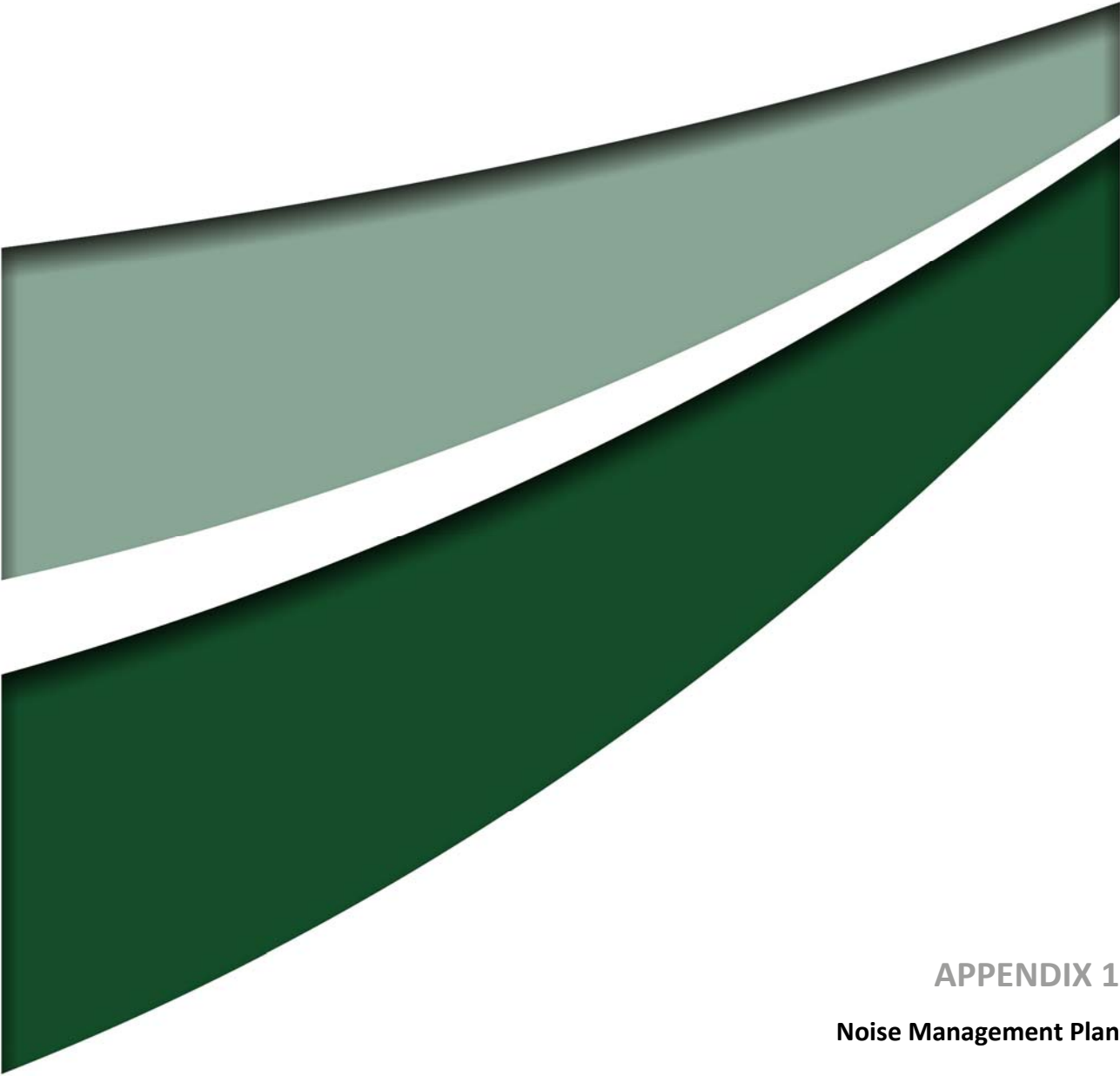
7.0 References

Department of Planning, June 2007. Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects.

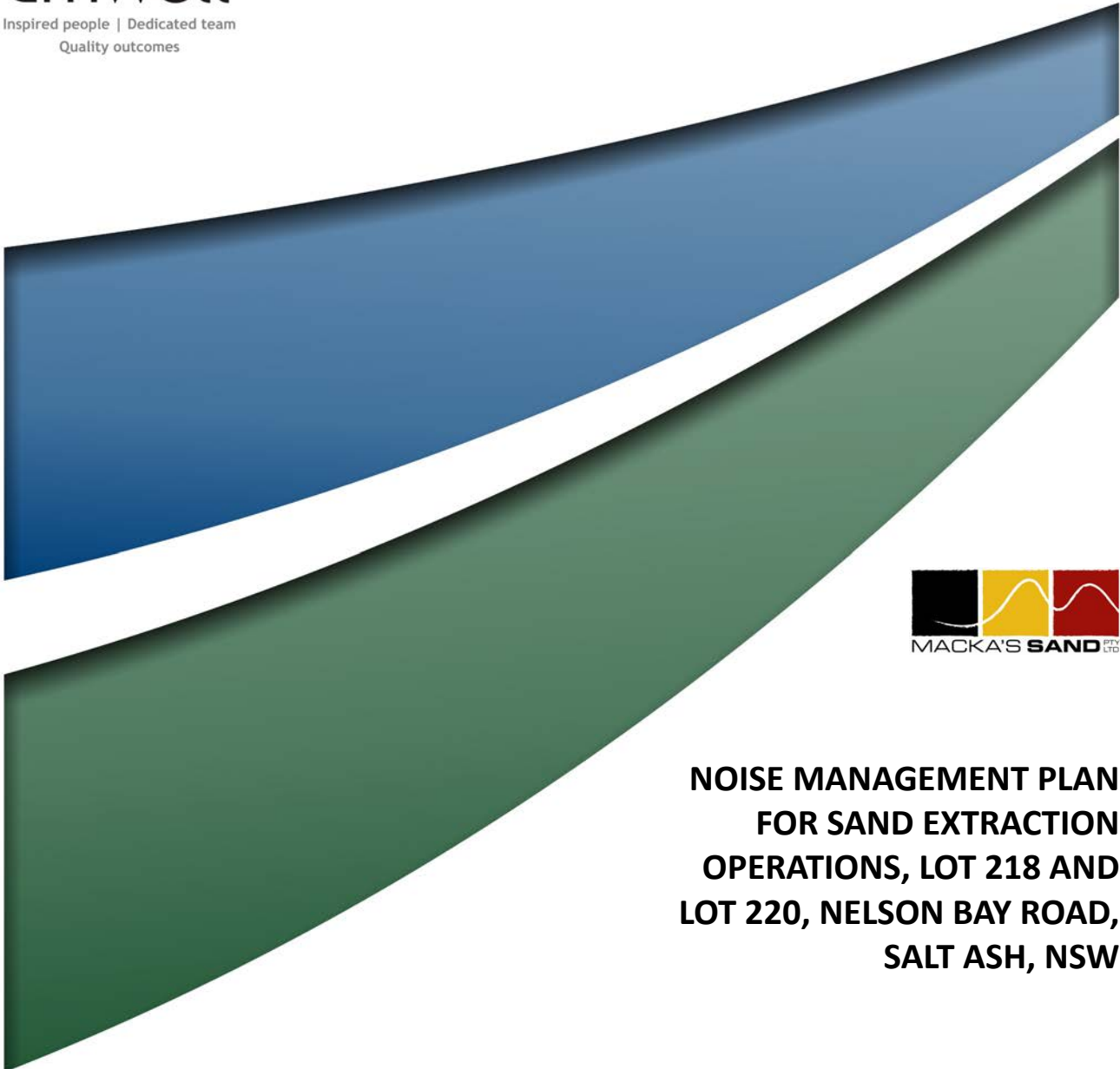
Umwelt (Australia) Pty Limited (2012). Environmental Assessment of Modifications to Sand Extraction Operations on Lot 218 and Lot 220, Salt Ash, NSW.

Umwelt (Australia) Pty Limited (2015). Environmental Assessment of Modifications to Mackas Sand Extraction Operations on Lot 218 Salt Ash NSW.

Umwelt (Australia) Pty Limited (2013). Mackas Sand Operational Management Procedure Lot 218 and Lot 220, Salt Ash, NSW.



APPENDIX 1
Noise Management Plan



**NOISE MANAGEMENT PLAN
FOR SAND EXTRACTION
OPERATIONS, LOT 218 AND
LOT 220, NELSON BAY ROAD,
SALT ASH, NSW**

FINAL

July 2016



NOISE MANAGEMENT PLAN FOR SAND EXTRACTION OPERATIONS, LOT 218 AND LOT 220, NELSON BAY ROAD, SALT ASH, NSW

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Mackas Sand Pty Ltd

Project Director: Peter Jamieson
Project Manager: Brendan Rice
Report No. 1646/R60/V1
Date: July 2016



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1.0 Introduction

Mackas Sand operations on Lot 218 and Lot 220 are located approximately 25 kilometres north east of Newcastle near Salt Ash in the Port Stephens local government area (LGA), New South Wales (refer to **Figure 1.1**). Mackas Sand directors have operated sand extraction operations in the area since 1992. Lot 218 and Lot 220 are owned by the Worimi Local Aboriginal Lands Council.

Mackas Sand was granted Project Approval No. 08_0142 (PA 08_0142) on 20 September 2009 by the Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* to operate sand extraction operations at Lot 220 and Lot 218. It is estimated that in excess of 21 million tonnes of sand resource will be extracted from Lot 218 and Lot 220, with Lot 218 having an indefinite extraction life due to the ongoing movement of sand from the adjoining mobile dunes.

A modification to PA 08_0142 (MOD1) was approved on 30 September 2013 by the NSW Planning Assessment Commission (PAC) under delegation of the Minister for Planning and Infrastructure (now Minister for Planning and Environment-DPE). The modification includes a temporary reduction in extraction level and the approval of an alternate route to access Lot 218. The alternate route connects directly from Lot 218, northward to Nelson Bay Road, as depicted within **Figure 1.1**.

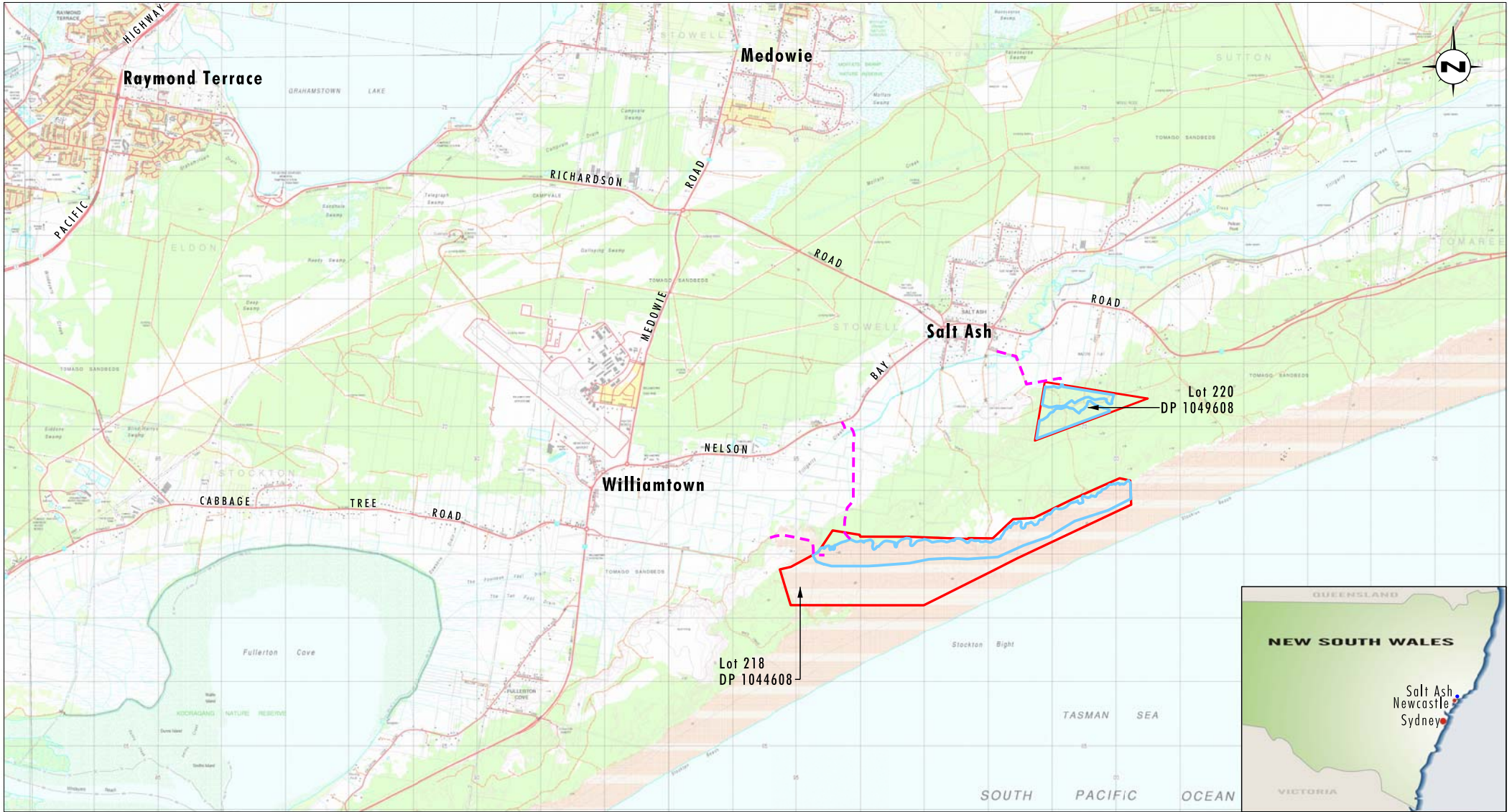
A second modification to PA 08_0142, (MOD2), was approved by the PAC on 15 March 2016. The modification allows for an increase in maximum hourly truck movements (in and out) of Lot 218 via the approved alternate access road. The initial version of this NMP was prepared in consultation with the Environment Protection Authority (EPA) and submitted to the DPE for approval.

1.1 Mackas Sand Operations

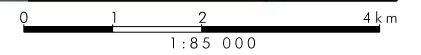
Key operational features relevant to this Noise Management Plan (NMP) are:

The approved hours of extraction being 24 hours a day 7 days a week except for operations within 250 metres of the Hufnagl Residence (R27) when operations are limited to 7.00 am to 6.00 pm Monday to Friday with no operations within 250 metres of R27 outside these times.

- Ongoing transportation of sand from Lot 220 in accordance with approval conditions which allows for transportation along Oakvale Drive between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays in accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142. Mackas Sand has agreements with the owners of residences facing Oakvale Drive. Copies of these agreements have been provided to the DPE.
- Revision of truck movements per hour allowed from Lot 218 as per MOD 2. Ongoing transportation of sand from Lot 218 in accordance with approval conditions which allows for transportation from Lot 218 along the Alternate Access Road between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays in accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142. Mackas Sand has an agreement with the owners of 2344, 2353 and 2368 Nelson Bay Road. Copies of these agreements have been provided to the DPE.



Source: Department of Lands (2006)



Legend

- ▭ Lot Boundaries
- ▭ Approval Areas
- - - Approved Site Access

FIGURE 1.1

Locality Plan

1.2 Purpose and Scope

To satisfy Condition 4 to 10 of Schedule 3 of the Project Approval 08_0142 (PA 08_0142 MOD 2), a NMP is required to be prepared and implemented for the project.

The purpose of this NMP is to define the control mechanisms to be implemented for the management and mitigation of potential noise impacts generated by extractive operations at Lot 218 in DP 1044608 and Lot 220 in DP 1049608 (hereafter referred to as the approval areas) Nelson Bay Road, Salt Ash.

This plan outlines the methodology used to determine compliance of the continued operations and response procedures to be followed in the event of a non-compliance or measured exceedances of the relevant criteria.

1.3 Regulatory Requirements

Mackas Sand will undertake environmental monitoring in accordance with the relevant legislation, Environment Protection License (EPL) and Project Approval conditions, Australian Standards and publications listed below. In the event that any of the regulatory requirements change, these amendments will be addressed appropriately:

- Protection of the Environment Operations Act 1997 (POEO Act) administered by Environment Protection Authority (EPA), formerly the Department of Environment, Climate Change and Water (DECCW)
- Protection of the Environment Operations (Noise Control) Regulation 2008
- *Environmental Planning and Assessment Act 1979* (EP&A Act), administered by the DPE
- NSW Industrial Noise Policy (INP) (EPA 2000)
- NSW Road Noise Policy (DECCW, 2011)
- AS IEC 61672.1-2004 Electroacoustics – Sound level meters – Specifications
- AS 1055.1:1997 Acoustics – Description and Measurement of Environment Noise – General Procedures
- AS 3580.14-2011 Methods for sampling and analysis of ambient air – Meteorological monitoring for ambient air quality monitoring applications.

An Environmental Management Strategy (EMS) (Umwelt, 2014) has been prepared for Mackas Sand and provides the strategic context for the environmental management of the operation.

1.3.1 Project Approval

A detailed list of the PA 08_142 (MOD 2) conditions and the relevant Statement of Commitments outlined in the Project Approval, and where they are addressed in this document is included in **Tables 1.1** and **1.2**.

Table 1.1 Project Approval Conditions

Conditions		Addressed in Section																																								
<p>Schedule 3 – Environmental Performance Conditions</p> <p>Impact Assessment Criteria</p>																																										
4.	<p>The Proponent shall ensure that the noise generated by the project, except for noise generated by the use of the Alternate access road, does not exceed the noise impact assessment criteria in Table 1.</p> <div> <p><i>Table 1: Noise impact assessment criteria dB(A) L_{Aeq} (15min)</i></p> <table border="1"> <thead> <tr> <th>Day</th> <th>Evening</th> <th>Night</th> <th>Night (L_{A1} (1 min))</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td>39</td> <td>39</td> <td>40</td> <td>45</td> <td>R18 – 300 Nelson Bay Road</td> </tr> <tr> <td>39</td> <td>39</td> <td>39</td> <td>45</td> <td>R1 – Lavis Lane residence</td> </tr> <tr> <td>36</td> <td>36</td> <td>37</td> <td>45</td> <td>R19 – 316 Nelson Bay Road</td> </tr> <tr> <td>36</td> <td>36</td> <td>35</td> <td>45</td> <td>R26 – Residence opp. Oakdale Farm</td> </tr> <tr> <td>36</td> <td>35</td> <td>35</td> <td>45</td> <td>R27 – Hufnagl residence</td> </tr> <tr> <td>35</td> <td>35</td> <td>36</td> <td>45</td> <td>R17 – 287 Nelson Bay Road</td> </tr> <tr> <td>35</td> <td>35</td> <td>35</td> <td>45</td> <td>All other residences</td> </tr> </tbody> </table> </div> <p><i>Notes:</i></p> <ul style="list-style-type: none"> To interpret the locations referred to Table 1, see the figure in Appendix 3. Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. The noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement. 	Day	Evening	Night	Night (L _{A1} (1 min))	Location	39	39	40	45	R18 – 300 Nelson Bay Road	39	39	39	45	R1 – Lavis Lane residence	36	36	37	45	R19 – 316 Nelson Bay Road	36	36	35	45	R26 – Residence opp. Oakdale Farm	36	35	35	45	R27 – Hufnagl residence	35	35	36	45	R17 – 287 Nelson Bay Road	35	35	35	45	All other residences	Section 2.1
Day	Evening	Night	Night (L _{A1} (1 min))	Location																																						
39	39	40	45	R18 – 300 Nelson Bay Road																																						
39	39	39	45	R1 – Lavis Lane residence																																						
36	36	37	45	R19 – 316 Nelson Bay Road																																						
36	36	35	45	R26 – Residence opp. Oakdale Farm																																						
36	35	35	45	R27 – Hufnagl residence																																						
35	35	36	45	R17 – 287 Nelson Bay Road																																						
35	35	35	45	All other residences																																						
<p>Schedule 3 – Environmental Performance Conditions</p> <p>Impact Assessment Criteria – Alternate Access Road to Lot 218</p>																																										
4A.	<p>The Proponent shall ensure that the noise generated by the use of the Alternate access road does not exceed the noise impact assessment criteria in Table 1A.</p> <div> <p><i>Table 1A: Alternate access road noise impact assessment criteria dB(A) L_{Aeq} (15min)</i></p> <table border="1"> <thead> <tr> <th>Shoulder</th> <th>Day</th> <th>Evening</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td>38</td> <td>40</td> <td>40</td> <td>2344 Nelson Bay Road</td> </tr> <tr> <td>39</td> <td>41</td> <td>41</td> <td>2353 Nelson Bay Road</td> </tr> <tr> <td>36</td> <td>38</td> <td>38</td> <td>2367 Nelson Bay Road</td> </tr> <tr> <td>38</td> <td>40</td> <td>40</td> <td>2368 Nelson Bay Road</td> </tr> <tr> <td>35</td> <td>35</td> <td>35</td> <td>All other residences</td> </tr> </tbody> </table> </div> <p><i>Notes:</i></p> <ul style="list-style-type: none"> To interpret the locations referred to Table 1A, see the figure in Appendix 3. Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. The noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement. 	Shoulder	Day	Evening	Location	38	40	40	2344 Nelson Bay Road	39	41	41	2353 Nelson Bay Road	36	38	38	2367 Nelson Bay Road	38	40	40	2368 Nelson Bay Road	35	35	35	All other residences	Section 2.1																
Shoulder	Day	Evening	Location																																							
38	40	40	2344 Nelson Bay Road																																							
39	41	41	2353 Nelson Bay Road																																							
36	38	38	2367 Nelson Bay Road																																							
38	40	40	2368 Nelson Bay Road																																							
35	35	35	All other residences																																							

Conditions	Addressed in Section
<p>Schedule 3 – Environmental Performance Conditions</p> <p>Operating Conditions</p>	
<p>4B.</p>	<p>The Proponent shall ensure, for the use of the Alternate access road, that:</p> <ul style="list-style-type: none"> (a) a speed limit of 40 km/hour is applied and enforced for all vehicles; (b) trucks slowing to use the intersection of the access road and Nelson Bay Road do not use engine or compression braking systems; (c) laden truck movements exiting the site do not exceed 14 per hour during the period from 5 am to 6 am, Monday to Friday (except for Public Holidays); (d) laden truck movements exiting the site do not exceed 8 per hour during the period from 6 am to 9 am, Monday to Friday (except for Public Holidays); (e) laden truck movements exiting the site do not exceed 24 per hour during the period from 9 am to 10 pm, Monday to Friday (except for Public Holidays); (f) laden truck movements exiting the site do not exceed 5 per hour between 5 am and 6 am on Saturdays (except for Public Holidays); (g) laden truck movements exiting the site do not exceed 9 per hour between 6 am and 7 am on Saturdays (except for Public Holidays); (h) laden truck movements exiting the site do not exceed 24 per hour between 7 am and 4 pm on Saturdays (except for Public Holidays); and (i) combined laden truck movements exiting from Lots 218 and 220 do not exceed 10 per hour in total on Sundays and Public Holidays. <p><i>Note: In this condition, “per hour” means within any period of 60 minutes following the change of hour.</i></p>
<p>Section 3.2</p>	

Conditions	Addressed in Section									
<p>Schedule 3 – Environmental Performance Conditions</p> <p>Land Acquisition Criteria</p>										
<p>5. If the noise generated by the project exceeds the criteria in Table 2, the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 6-8 of schedule 4.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><i>Table 2: Land acquisition criteria dB(A) L_{Aeq} (15min)</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Night</th> <th style="text-align: center;">Land</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">42</td> <td>R1 to R4</td> </tr> <tr> <td style="text-align: center;">41</td> <td>R20 to R23</td> </tr> <tr> <td style="text-align: center;">40</td> <td>All other residences</td> </tr> </tbody> </table> </div> <p><i>Note: The notes under Table 1 apply equally to Table 2.</i></p>	Night	Land	42	R1 to R4	41	R20 to R23	40	All other residences	<p>Section 2.2</p>	
Night	Land									
42	R1 to R4									
41	R20 to R23									
40	All other residences									
<p>Schedule 3 – Environmental Performance Conditions</p> <p>Cumulative Noise Criteria</p>										
<p>6. The Proponent shall take all reasonable and feasible measures to ensure that the noise generated by the quarrying operations combined with the noise generated by other extractive industries does not exceed the following amenity criteria on any privately owned land, to the satisfaction of the Director-General:</p> <ul style="list-style-type: none"> • LAeq(11 hour) 50 dB(A) – Day; • LAeq(4 hour) 45 dB(A) – Evening; and • LAeq(9 hour) 40 dB(A) – Night. <p><i>Note: Cumulative noise is to be measured in accordance with the relevant procedures in the NSW Industrial Noise Policy.</i></p>	<p>Section 2.3</p>									
<p>Schedule 3 – Environmental Performance Conditions</p> <p>Traffic Noise Impact Assessment Criteria</p>										
<p>7. The Proponent shall take all reasonable and feasible measures to ensure that the traffic noise generated by the project does not exceed the traffic noise impact assessment criteria in Table 3.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><i>Table 3: Traffic noise impact assessment criteria dB(A)</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Road</th> <th style="text-align: center;">Day/Evening</th> <th style="text-align: center;">Night - Shoulder</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Lavis Lane, Oakvale Road</td> <td style="text-align: center;">60 L_{Aeq} (1 hour)</td> <td style="text-align: center;">55 L_{Aeq} (1 hour)</td> </tr> <tr> <td style="text-align: center;">Nelson Bay Road</td> <td style="text-align: center;">60 L_{Aeq} (15 hour)</td> <td style="text-align: center;">55 L_{Aeq} (9 hour)</td> </tr> </tbody> </table> </div> <p><i>Note: Traffic noise generated by the project is to be measured in accordance with the relevant procedures in EPA's Road Noise Policy.</i></p>	Road	Day/Evening	Night - Shoulder	Lavis Lane, Oakvale Road	60 L _{Aeq} (1 hour)	55 L _{Aeq} (1 hour)	Nelson Bay Road	60 L _{Aeq} (15 hour)	55 L _{Aeq} (9 hour)	<p>Section 2.4</p>
Road	Day/Evening	Night - Shoulder								
Lavis Lane, Oakvale Road	60 L _{Aeq} (1 hour)	55 L _{Aeq} (1 hour)								
Nelson Bay Road	60 L _{Aeq} (15 hour)	55 L _{Aeq} (9 hour)								

Conditions	Addressed in Section
<p>Schedule 3 – Environmental Performance Conditions</p> <p>Additional Noise Mitigation Measures</p>	
<p>8. Upon receiving a written request from:</p> <ul style="list-style-type: none"> • the owner of residence R1, if the residence is habitable in the opinion of the Secretary; or • the owner of any residence where operational noise monitoring shows the noise generated by the project at night is greater than or equal to: <ul style="list-style-type: none"> ▪ 40 dB(A) LAeq(15 minute) for residences R1 to R4; ▪ 39 dB(A) LAeq(15 minute) for residences R20 to R23; and ▪ 38 dB(A) LAeq(15 minute) for all other privately-owned residences. ▪ The Proponent shall implement additional noise mitigation measures such as double glazing, insulation, and/or air conditioning at the residence in consultation with the landowner. <p>These additional mitigation measures must be reasonable and feasible. If within 3 months of receiving this request from the landowner, the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.</p> <p><i>Notes:</i></p> <ul style="list-style-type: none"> • <i>To interpret the locations referred to in this condition, see the figure in Appendix 3.</i> • <i>The noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.</i> 	<p>Section 2.5</p>

Conditions	Addressed in Section
------------	----------------------

Schedule 3 – Environmental Performance Conditions

Operating Hours

9.

The Proponent shall comply with the operating hours in Table 4.

Section 1.1

Table 4: Operating hours

<i>Activity</i>	<i>Day</i>	<i>Time</i>
Quarrying Operations (other than transportation)	Any day	Any time
Quarrying Operations on Lot 220 (other than transportation), when operating less than 250 metres from residence R27	Monday – Friday	7.00am to 6.00pm
	Weekends and Public Holidays	None
Transportation	Monday – Friday	6.00am to 6.00pm (EST) 6.00am to 7.00pm (DST)
	Saturday	7.00am to 4.00pm
	Sunday and Public Holidays	None

However, the Proponent may undertake:

- (a) quarrying operations within 250 metres of residence R27 if the Proponent has an agreement with the owner of the residence to extend the hours of operation; and/or
- (b) transportation outside the hours in Table 4, to a maximum of 5.00am to 10.00pm Monday to Saturday, and 8.00am to 12.00pm on Sundays and public holidays, if the Proponent has agreements to extend the hours of transportation with the following:
 - all owners of privately owned land with frontage to Lavis Lane (between the site and Nelson Bay Road), for transportation from Lot 218 the using Lavis Lane access road; and/or
 - all owners of 2344, 2353 and 2368 Nelson Bay Road, for transportation from Lot 218 using the Alternate access road; and/or
 - all owners of privately owned land with frontage to Oakvale Road (between the site and Nelson Bay Road), for transportation to Lot 220;

and the Proponent has advised the Department in writing of the terms of these agreements.

Notes:

- *To interpret the residence location referred to in this condition, see the figure in Appendix 3.*
- *For the purposes of this condition, transportation includes all laden and unladen truck movements on site access roads, Lavis Lane, the Alternate access road and Oakvale Road.*
- *Transportation is further restricted under condition 32 below.*
- *Maintenance activities may be conducted outside the hours in Table 4 provided that the activities are not audible at any privately-owned residence.*
- *This condition does not apply to delivery of material if that delivery is required by police or other authorities for safety reasons, and/or the operation or personnel or equipment are endangered. In such circumstances, notification is to be provided to EPA and the affected residents as soon as possible, or within a reasonable period in the case of emergency.*

Conditions	Addressed in Section	
Schedule 3 – Environmental Performance Conditions Noise Monitoring		
10.	The Proponent shall prepare a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must: <ul style="list-style-type: none"> (a) be prepared in consultation with EPA, and be submitted to the Secretary for approval within 3 months of the date of this approval; 	
	<ul style="list-style-type: none"> (b) include: <ul style="list-style-type: none"> • a description of the measures that would be implemented to minimise noise emissions from the project, with particular focus on: <ul style="list-style-type: none"> ▪ quarrying operations within 250 metres of residences on privately-owned land; ▪ transportation activities; and ▪ continual improvement of noise performance 	Sections 3.0, 3.1, 3.2 and 3.3
	<ul style="list-style-type: none"> • a noise monitoring protocol for evaluating compliance with the relevant noise limits in this approval (including traffic noise) 	Section 4.0
	<ul style="list-style-type: none"> • a protocol for the investigation, notification and mitigation of identified exceedances of the relevant noise limits; and 	Section 5.3
	<ul style="list-style-type: none"> • a continual improvement program for investigation, implementing and reporting on reasonable and feasible measures to reduce noise generated by the project <p>The Proponent shall implement the approved management plan as approved from time to time by the Secretary.</p>	Section 3.3
Schedule 3 – Environmental Performance Conditions Traffic Restrictions		
32.	<p>The Proponent shall restrict truck movements (in plus out) on Lavis Lane and Oakvale Road to a maximum of 10 per hour during the night time period and on Sundays and public holidays, unless otherwise approved by the Secretary.</p> <p><i>Note: The Secretary may consider allowing additional truck movements if the Proponent has agreements with residents on Lavis Lane and Oakvale Road, as described in condition 9 above.</i></p>	Section 2.4

Table 1.2 Statement of Commitments

Conditions		Addressed in Section
1.6.1	An Operational Noise Management Plan will be developed for the proposal and implemented prior to sand extraction commencing. The plan will incorporate a noise monitoring program to monitor noise emissions and determine compliance with the project specific noise goals. The plan will include specific measures to monitor and address potential noise impacts at residential receiver R27 (Hufnagl Residence).	This document
1.6.2	No sand extraction will be undertaken within 250 metres of receiver R27 during evening and night periods unless agreement is reached with the landholder.	Section 3.1
1.6.3	A Traffic Noise Management Plan will be developed and implemented for truck movements on the private haul road from Lot 220. The Plan will focus on but not be limited to truck movements between the hours of 5.00 am and 7.00 pm.	Section 3.2

1.3.2 Environment Protection Licence

Noise monitoring at Mackas Sand will be undertaken in accordance with the conditions of Environmental Protection Licence (EPL) 13218. The EPL was issued on 30 November 2009 for sand extraction operations on Lot 218 and Lot 220 Salt Ash.

A full list of the EPL conditions relating to noise limits and an indication of where they are addressed within this document are included in **Table 1.3**.

Table 1.3 Environment Protection Licence Conditions

Conditions	Addressed in Section																									
<p>L3.1 Noise from the premises must not exceed the limits specified in the following table:</p> <table border="1"> <thead> <tr> <th>Location</th> <th>Limit dBA LAeq(15 minute) Day</th> <th>Limit dBA LAeq(15 minute) Evening</th> <th>Limit dBA LAeq(15 minute) Night</th> <th>Limit dBA LA1(1 minute) Night</th> </tr> </thead> <tbody> <tr> <td>Residences north of the private haul road servicing the premises</td> <td></td> <td>40</td> <td>40</td> <td>45</td> </tr> <tr> <td>Residence R27</td> <td>36</td> <td>36</td> <td>35</td> <td>45</td> </tr> <tr> <td>Residences R1, R2, R3, R4, R5, R6, R7 and R8</td> <td>39</td> <td>39</td> <td>39</td> <td>45</td> </tr> <tr> <td>All other residences</td> <td></td> <td>36</td> <td>35</td> <td>45</td> </tr> </tbody> </table>	Location	Limit dBA LAeq(15 minute) Day	Limit dBA LAeq(15 minute) Evening	Limit dBA LAeq(15 minute) Night	Limit dBA LA1(1 minute) Night	Residences north of the private haul road servicing the premises		40	40	45	Residence R27	36	36	35	45	Residences R1, R2, R3, R4, R5, R6, R7 and R8	39	39	39	45	All other residences		36	35	45	Section 2.6
Location	Limit dBA LAeq(15 minute) Day	Limit dBA LAeq(15 minute) Evening	Limit dBA LAeq(15 minute) Night	Limit dBA LA1(1 minute) Night																						
Residences north of the private haul road servicing the premises		40	40	45																						
Residence R27	36	36	35	45																						
Residences R1, R2, R3, R4, R5, R6, R7 and R8	39	39	39	45																						
All other residences		36	35	45																						

Conditions		Addressed in Section
L3.2	<p>For the purposes of the table above:</p> <ul style="list-style-type: none"> a) Where LAeq means the equivalent noise level – the level of noise equivalent to the energy average of noise levels occurring over a measurement period. b) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and Public Holidays. c) Evening is defined as the period 6pm to 10pm. d) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8 am Sunday and Public Holidays. e) Residence locations are shown on Figure 4.4 of the report “Environmental Assessment – Sand Extraction Operations from Lot 218 and Lot 220, Salt Ash”. A copy of which has been filed on EPA file LIC08/1532. 	Section 4.0
L3.3	<p>The noise limits set out in the licence apply under all meteorological conditions except for the following:</p> <ul style="list-style-type: none"> a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or c) Stability category G temperature inversion conditions. 	Section 4.0
L3.4	<p>For the purposes of determining meteorological conditions:</p> <ul style="list-style-type: none"> a) Data recorded by the meteorological station identified as Bureau of Meteorology (BoM) Williamtown Weather Station (station 061078) must be used; and b) Temperature inversion conditions (stability category) are to be determined by the sigma theta method referred to in Part E2 of Appendix E to the NSW Industrial Noise Policy. 	Section 4.0

Conditions		Addressed in Section
L3.5	<p>To determine compliance:</p> <ul style="list-style-type: none"> a) With the Leq(15 minute) noise limits detailed in this licence, the noise measurement equipment must be located: <ul style="list-style-type: none"> ▪ Approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or ▪ Within 30 metres of a dwelling facade, but not closer than 3 metres, where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable ▪ Within approximately 50 metres of the boundary of a National Park or a Nature Reserve. b) With the LA1(1minute) noise limits detailed in the licence, the noise measurement equipment must be located within 1 metre of a dwelling facade. c) With the noise limits detailed in the licence, the noise measurement equipment must be located: <ul style="list-style-type: none"> ▪ At the most affected point at a location where there is no dwelling at the location; or ▪ At the most affected point within an area at a location prescribed by conditions (a) or (b) of this licence condition. 	Section 4.0
L3.6	<p>For the purpose of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy, January 2000, must be applied as appropriate, to the noise levels measured by the noise monitoring equipment.</p> <p>Note: Development Consent 08_0142 requires additional noise mitigation measure and land acquisition where certain criteria cannot be met.</p>	Section 4.3.1
O2.1	<p>All plant and equipment installed at the premises or used in connection with the licensed activity:</p> <ul style="list-style-type: none"> a) must be maintained in a proper and efficient condition; and b) must be operated in a proper and efficient manner. 	Section 3.0
O4.1	<p>There must be no extraction equipment operated within 250 metres of residence R27, as shown in 'Figure 4.4 Residential Receivers and Noise Logger Locations' of the Environmental Assessment, during evening and night periods unless agreement is reached with the landholder.</p>	Section 3.0

Conditions		Addressed in Section
O4.2	<p>Prior to sand extraction occurring within 250 metres of Residence R27 as shown in 'Figure 4.4 Residential Receivers and Noise Logger Locations' of the Environmental Assessment, a Noise Management Plan that specifically addresses noise controls to achieve compliance with the noise limits for R27, must be prepared and approved by EPA.</p> <p>Note: Specific controls were detailed in the Environmental Assessment when extraction works are conducted within 250 metres of residence R27.</p>	NA
O4.3	<p>Prior to activities commencing on site the proponent must develop and implement a Traffic Noise Management Plan. The Traffic Noise Management Plan (NMP) must include, but need not be limited to, particular focus on truck movements on the private access road between the hours of 5am and 7am to ensure that the licence noise limit is not exceeded:</p> <ul style="list-style-type: none"> • truck speed limits; • maintenance of the road in good conditions free of potholes, corrugations and other features causing generation of excessive noise; • use of quietest available trucks that meet operational requirements; • driver training; and • conditions in driver's contracts of employment requiring them to minimise noise generation; abide by the speed limits and other reasonable instructions to minimise noise, together with a system of sanctions for non-compliance. 	Section 3.2
M4.1	The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which the licence applies.	Section 5.2
M5.1	The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant unless otherwise specified in the licence.	Section 5.2
M5.2	The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.	Section 5.2

Conditions		Addressed in Section
M6.1	<p>To assess compliance with the noise limits of this licence, attended noise monitoring must be undertaken in accordance with limit requirements of this licence:</p> <ul style="list-style-type: none"> a) at the locations listed in the noise limit conditions of this licence; b) occur annually in a reporting period; c) occur during the time of year when noise propagation from the premises is likely to be its worst, that is, generally winter conditions; and d) occur during each day, evening and night period as defined by the NSW Industrial Noise Policy. <p>Note: It is the intention of the EPA to review the noise monitoring results required under this condition after a period of three (3) years to assess the suitability of the required noise monitoring.</p>	Section 4.0
R4.1	<p>A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the yearly monitoring. The assessment must be prepared by a suitability qualified and experienced acoustical consultant and include:</p> <ul style="list-style-type: none"> a) an assessment of compliance with the noise limits detailed in this licence; and b) an outline of any management actions taken within the monitoring period to address any exceedances of the limits contained in this licence. 	Section 5.1

1.3.3 Stakeholder Consultation Regarding this Document

This Plan was first submitted to the Department of Planning (now the Department of Planning & Environment) on 21 December 2009. A copy of the NMP was submitted to EPA concurrently with DPE.

1.4 Roles and Responsibilities

The Quarry Manager will be responsible for ensuring that the development is undertaken in accordance with the requirements of PA 08_142 (MOD2) and EPL 13218. Responsibilities in relation to noise management and monitoring are outlined in **Table 1.4**.

Table 1.4 Role and Responsibilities

Role	Responsibilities
Quarry Manager	<ul style="list-style-type: none"> • provide that sufficient resources are allocated for the implementation of this NMP; • ensure that noise impacts are considered when infrastructure or extraction planning changes; • ensure strategies to reduce noise impacts for the operation are effectively implemented; • ensure that the outcomes of monitoring are systematically evaluated; • ensure noise management measures are implemented and maintained; • authorise internal and external reporting requirements as well as subsequent revisions of this program; • ensure that the plan is relevant to current operations; • update monitoring data on the Mackas Sand website; • coordinate incident investigation processes including associated reporting requirements and the implementation of corrective actions and evaluate their effectiveness; and • ensure that all personnel are aware of noise management obligations.
All employees and contractors	<ul style="list-style-type: none"> • undertake all activities in accordance with this NMP; • undertake the compulsory site induction.

2.0 Noise Assessment Criteria

Noise assessment criteria for Mackas Sand have been derived from PA 08_142 (MOD2) conditions and Statement of Commitments in the EA (Umwelt, 2012) and EPL 13218. The noise assessment criteria are specified for day, evening and night-time periods at locations which are considered to be representative of residences potentially impacted by Mackas Sand.

2.1 Impact Assessment Criteria for Extraction Operations

The Project Approval conditions, including the noise impact assessment criteria are provided in **Table 2.1**. The noise impact assessment criteria for the alternate access route to Lot 218 are provided in **Table 2.2** with consideration of the notes within Condition 4A and Condition 8 listed within **Table 1.1**.

Table 2.1 Noise Impact Assessment Criteria, dB(A)

Location	Day LAeq, 15 min	Evening LAeq, 15 min	Night LAeq, 15 min	Night LA1, 1 min	Written Agreement Obtained
R18 – 300 Nelson Bay Road	39	39	40	45	No
R1 – Lavis Lane residence	39	39	39	45	No
R19 – 316 Nelson Bay Road	36	36	37	45	No
R26 – Residence opp. Oakvale Farm	36	36	35	45	No
R27 – Hufnagl residence	36	35	35	45	No
R17 – 287 Nelson Bay Road	35	35	36	45	No
All other residences	35	35	35	45	No

Table 2.2 Noise Impact Assessment Criteria – Alternate Access to Lot 218, dB(A)

Location	Day LAeq, 15 min	Evening LAeq, 15 min	Shoulder LAeq, 15 min	Written Agreement Obtained
2344 Nelson Bay Road	40	40	38	No
2353 Nelson Bay Road	41	41	39	No
2367 Nelson Bay Road	38	38	36	No
2368 Nelson Bay Road	40	40	38	No

Location	Day LAeq, 15 min	Evening LAeq, 15 min	Shoulder LAeq, 15 min	Written Agreement Obtained
All other residences	35	35	35	No

The monitoring program, designed to assess compliance with these criteria, and prepared in accordance with the INP (EPA, 2000) is outlined in **Section 4.0**.

2.2 Land Acquisition Criteria

The Project Approval conditions relating to land acquisition are provided in **Table 2.3**. If the noise generated by the operation of Mackas Sand exceeds the land acquisition criteria at any privately-owned residence, Mackas Sand will follow the acquisition process outlined in **Section 4.5**.

Table 2.3 Land Acquisition Criteria, dB(A)

Property Location	Night LAeq, 15 min
R1 to R4	42
R20 to R23	41
All other privately-owned residences	40

2.3 Cumulative Noise Criteria

The Proponent shall take all reasonable and feasible measures to ensure that the noise generated by the quarrying operations combined with the noise generated by other extractive industries does not exceed the amenity criteria on any privately-owned land, to the satisfaction of the Secretary:

- LAeq(11 hour) 50 dB(A) – Day
- LAeq(4 hour) 45 dB(A) – Evening
- LAeq(9 hour) 40 dB(A) – Night.

Cumulative noise is to be measured in accordance with the relevant procedures in the NSW Industrial Noise Policy.

2.4 Traffic Noise Impact Assessment Criteria

The Project Approval conditions relating to road traffic noise generated by quarry operations are provided in **Table 2.4**.

Table 2.4 Traffic Noise Impact Assessment Criteria, dB(A)

Road	Day/Evening	Night - Shoulder
Lavis Lane, Oakvale Drive	60 _{LAeq (1 hour)}	55 _{LAeq (1 hour)}
Nelson Bay Road	60 _{LAeq (15 hour)}	55 _{LAeq (9 hour)}

Condition 32 of Schedule 3 of the Project Approval requires Mackas Sand to restrict truck movements (in plus out) on Lavis Lane and Oakvale Drive to a maximum of 10 per hour during the night time period and on Sundays and public holidays, unless otherwise approved by the Secretary. Condition 32 notes that the Secretary may consider allowing additional truck movements if the Proponent has agreements with residents on Lavis Lane and Oakvale Road. Agreements have been obtained from all relevant residents along Oakvale Drive and relevant residents near the approved intersection to the Alternate Access Road on Nelson Bay Road.

If the traffic noise generated by the operation of Mackas Sand exceeds the traffic noise criteria at any privately-owned residence that does not have a written agreement, Mackas Sand will develop preventative/corrective actions in accordance with **Section 5.3**.

2.5 Additional Noise Mitigation Criteria

The Project Approval conditions relating to additional noise mitigation are provided in **Table 2.5**. Further information regarding additional mitigation measures is outlined in **Section 4.3.1**.

Table 2.5 Additional Noise Mitigation Criteria, dB(A)

Property Location	Night LAeq, 15 min
Residences R2 to R4 (and R1)	40
Residences R20 to R23	39
All other privately-owned residences	38

2.6 EPL Criteria

Additionally, EPL 13218 for sand extraction operations on Lot 218 and Lot 220 Salt Ash, requires that noise from the premises must not exceed the limits specified in **Table 2.6**.

Table 2.6 EPL 13218 Condition L6.1 Noise Limits, dB(A)

Location	Day LAeq, 15 min	Evening LAeq, 15 min	Night LAeq, 15 min	Night LA1, 1 min
Residences north of private haul road servicing Lot 220	-	40	40	45
Residence R27	36	36	35	45
Residences R1, R2, R3, R4, R5, R6, R7 and R8.	39	39	39	45
All other residences	-	36	35	45

3.0 Noise Management Controls

In order to minimise noise emissions, Mackas Sand is committed to implementing a range of controls which have been developed for different phases of the operation. These controls are detailed in **Sections 4.1 and 4.2** below.

3.1 Operational Controls

Mackas Sand is committed to implementing and/or maintaining the following operational controls to manage noise generation:

- controlling noise at the source through the use of equipment with appropriate sound attenuation fitted, where practical
- maintaining quarrying equipment to high standards to ensure high availability and to meet noise emission criteria
- ensuring all new equipment is procured against a specification for noise emission to meet noise criteria at the nearest private residences for total operations
- no sand extraction will be undertaken within 250 metres of receiver R27 during evening and night periods unless agreement is reached with the landholder
- conducting noise management training with relevant personnel and completion of regular tool-box talks to enforce the importance of noise mitigation
- undertaking the process of change management when operations change, including quarrying in new areas or when quarrying equipment changes (refer to Section 3.6).

Additional controls relating to traffic management are outlined in **Section 3.2**.

3.2 Traffic Management

Noise emissions generated by haul trucks movements can be present in the form of:

- vibration caused by excessive speed and deterioration of roads caused by heavy loads
- excessive engine noise caused poorly maintained or old vehicles
- engine braking of haul trucks.

To minimise road traffic noise impacts, Mackas Sand has implemented the following Traffic Noise Management Plan as required by Condition O4.3 of EPL 13218. Mackas Sand is committed to implementing and maintaining the following controls to manage noise generation:

- All trucks used to remove extracted sand from Lot 218 and Lot 220 will be modern and preferably the Best Available Technology Economically Achievable (BATEA). This will reduce engine noise and vibrations associated with older machinery

- Mackas Sand has written agreements in regard to traffic noise and hours of operations with landholders adjacent to Oakvale Drive and the corresponding private haul road utilised by Lot 220 sand extraction operations
- Mackas Sand has written agreements in regard to traffic noise and hours of operations with landholders adjacent to the intersection to the alternate access road to Lot 218 sand extraction operations
- The haul road providing access to Lot 220 is sealed adjacent to residences minimising the potential for noise generation as a result of rough road surfaces (i.e. as generated by potholes and corrugation on the road surface)
- The unsealed 500 metre section of the Lot 220 haul road will be regularly graded and maintained to repair any potholes or bumps that may occur
- Truck speed on the private haul road off Oakvale Drive is limited to 20 km/h and the use of exhaust brakes limited is prohibited by Mackas Sand Quarry Traffic Rules
- Truck speed on the Alternate access road to Lot 218 will be limited to 40 km/h
- The 200 metres of the Alternate Access Road closest to Nelson Bay will be sealed. The remaining unsealed section of the Lot 218 alternate access road will be regularly graded and maintained to repair any potholes or bumps that may occur
- All trucks transporting sand from Lot 218 and Lot 220 are to be regularly maintained
- Mackas Sand has prepared a Drivers' Code of Conduct which details management measures relating to hauling operations on Lots 218 and 220 to be adhered to by drivers of all project-related vehicles. Management measures include minimising truck noise impacts to residences
- Truck drivers will be suitably trained and informed as to the requirements for noise prevention under EPL 13218. This is included within driver contracts as possible. A system of sanctions for non-compliance is in place if exceedances due to driver fault are a regular occurrence.

3.3 Continuous Improvement

Where possible, Mackas Sand will implement all reasonable and feasible best practice noise mitigation measures. The basis for continuous improvement of noise mitigation measures will be through the ongoing monitoring of noise impacts and the corrective/preventative action process.

In the three years following the commencement of extraction operations at Lot 220, the following continuous improvement actions have been undertaken following performance monitoring events:

- installation of conveyor belt beneath the cattle grate at the access to Lot 220 to minimise truck noise on entry and exit from the site
- installation of conveyor belt on the tail gates of dump trucks to minimise operational noise
- improvement of road surfaces to minimise vehicle noise

It is noted that future noise-compliance monitoring will aim to be conducted during periods where there is minimal noise contribution from military aircraft operations. Air Force jet aircraft undertake bombing run sorties at the Williamtown RAAF situated north of the site and significantly influence measured noise levels.

3.4 Change Management

When change is considered to have an impact on the objectives of the NMP, the process below must be followed:

- identify the change
- assess the potential risks associated with the change and develop a risk management plan
- approve the change subject to the risk management plan
- communicate and implement the change and risk management actions.

3.5 Training

To ensure the effective implementation of this NMP, all Mackas Sand personnel and contractors working on the site (i.e. not truck drivers) will undertake an induction which outlines environmental awareness including the importance of noise management at the Mackas Sand site.

4.0 Noise Monitoring Methodology

4.1 Monitoring Standards

Noise monitoring will be undertaken in accordance with the relevant Australian Standards and OEH approved methods for sampling including:

- AS1055-1997 Acoustics, Description and Measurement of Environment Noise – General Procedures
- AS2702-1984 Acoustics – Methods for the Measurement of Road Traffic Noise
- AS IEC 61672.1 – 2004: Electroacoustics – Sound Level Meters
- NSW Industrial Noise Policy (EPA, 2000).

All acoustic instrumentation used for monitoring under the Noise Monitoring Program shall comply with the requirements of AS 1259.2 – 1990 Sound Level Meters and will have current NATA or manufacturer calibration certificates.

4.2 Noise Monitoring Program

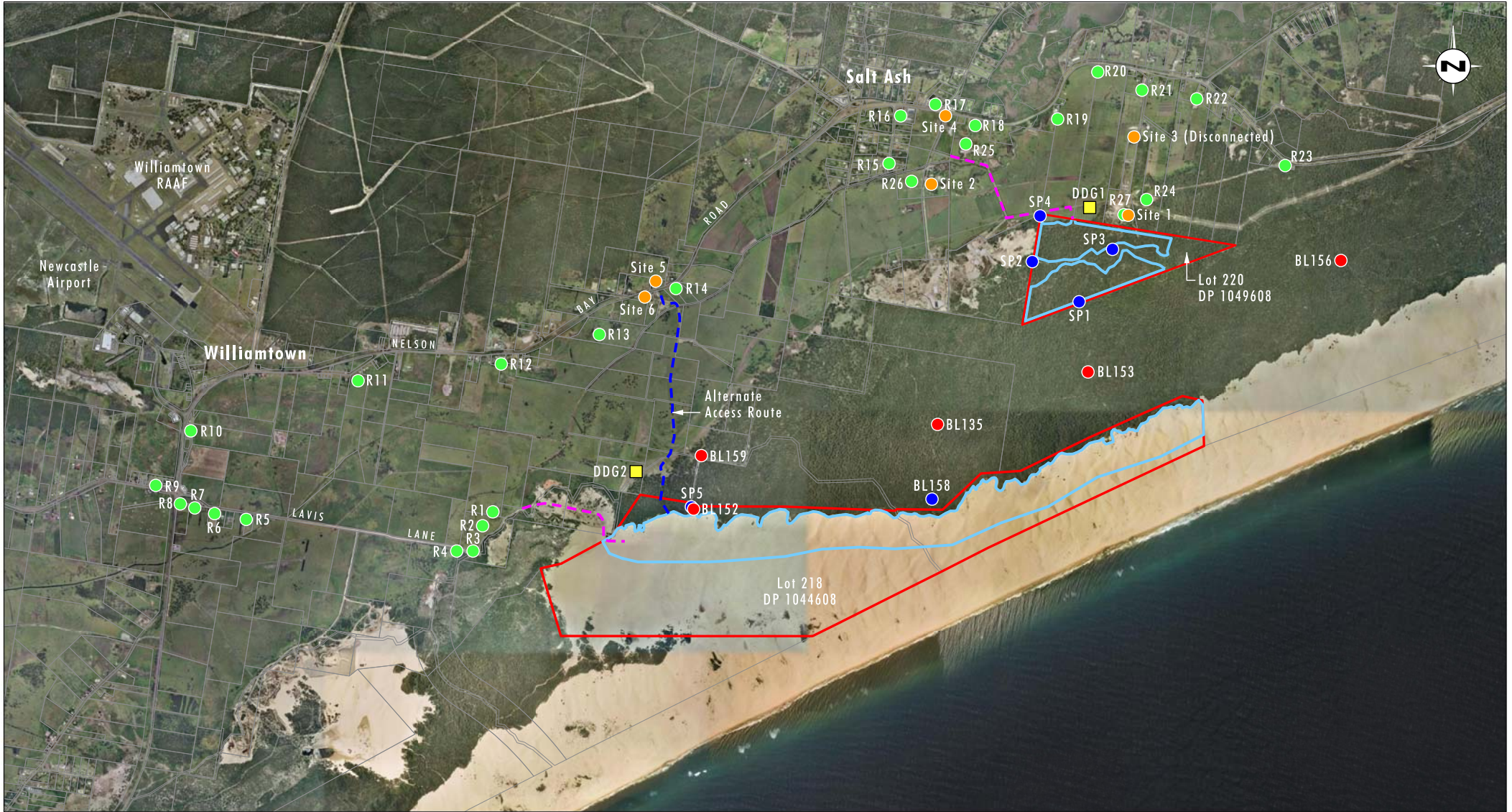
Noise monitoring at Mackas Sand will be undertaken in accordance with the requirements of PA 08_142 (MOD2) and EPL 13218. Monitoring will be undertaken annually in accordance with EPL condition M6.1 at the locations outlined in **Table 4.1**. All noise monitoring locations are shown on **Figure 4.1**. Ongoing monitoring will be undertaken on an annual basis during the winter months, until it is considered that maximum operations have been reached. ‘Maximum operations’ is defined on a per site basis, as annual extraction and transport of over 900,000 tonnes from either Lot 220 or Lot 218. If at that time it is shown that Mackas Sand can operate at maximum operations without exceeding compliance criteria discussed within **Section 2.0**, compliance monitoring will be undertaken in response to noise complaints, or otherwise in compliance with PA 08_142 (MOD2) and EPL 13218, in consultation with DPE. Additional performance monitoring will be undertaken up to quarterly if/as required by Mackas Sand as part of their continuous improvement policy.

Table 4.1 Noise Monitoring Locations

Monitoring Location*	Description
Site 1 (R27)	Private residence (Hufnagl residence, 10 Janet Parade, Salt Ash) MGA N = 6370639, MGA E = 399542
Site 2 (R26)	Private residence (6 Oakvale Drive, Salt Ash) MGA N = 6370830, MGA E = 397906
Site 4 (R17)	Private residence, Lot 2, DP 818198, 2642 Nelson Bay Road, Salt Ash (situated on the corner of Oakvale Drive and Nelson Bay Road) MGA N = 6371455, MGA E = 398102
Site 5 (R14)	Private residence (2353 Nelson Bay Road, Williamtown) MGA N = 395687, MGA E = 6370072)

Monitoring Location*	Description
Site 6 (R13)	Private residence (2344 Nelson Bay Road, Williamtown) MGA N = 395656, MGA E = 6370035)

*Note Monitoring at Site 3 was discontinued following discussions with DPE during 2014.



Source: Department of Lands (2003)

0 0.5 1 2 km
1:45 000

Legend

- Lot Boundaries (218 & 220)
- Approval Area
- Approved Site Access
- Alternate Access Route
- Noise Monitoring Location
- Dust Monitoring Location
- EPL Groundwater Monitoring Location
- Hunter Water Groundwater Monitoring Location
- Residential Receivers

FIGURE 4.1

Mackas Sand Monitoring Locations

4.2.1 Unattended Noise Monitoring

Unattended noise monitoring using continuous unattended noise loggers will be used to assess compliance with the traffic noise impact assessment criteria outlined in **Table 2.4**. Continuous unattended noise loggers will be used to record:

- a) date, time and temperature in 15-minute intervals
- b) LAeq, 15 minute for each 15-minute interval
- c) LA90, maximum, minimum and other statistical noise levels in 15-minute intervals
- d) recordings of noise for subsequent playback if necessary to discern noise sources
- e) local wind speed and direction, typically at 3 metres above ground level.

Records will be kept of when the continuous noise meters were calibrated, and of any adjustments made.

The 15-minute LAeq noise levels shall be used to calculate the daily LAeq, Day, LAeq, Evening and LAeq, Night noise levels.

4.2.2 Attended Noise Monitoring

Attended noise monitoring will be conducted in accordance with EPL 13218 and **Section 11** of the INP (EPA, 2000) to assess compliance with the impact assessment criteria outlined in **Table 2.1** and the EPL criteria outlined in **Table 2.6**. The attended noise monitoring will take the form of one or more 15-minute monitoring period at each monitoring location for the day-time, evening and night-time periods per monitoring session. The following information will be recorded for each attended monitoring survey, which will last for one or more 15-minute monitoring periods per monitoring location:

- operator's name
- locations of measurements
- height of the microphone above the ground and, if relevant, distances to building facades or property boundaries
- dates and times that monitoring began and ended at each location
- quantitative meteorological data (temperature, wind speed, wind direction and possibly humidity). All wind speed measurements need to state the height above ground at which the speed was measured. Because of the methodology of INP section 3.4, if any of the data in a 15-minute period are affected by rain or wind speeds in excess of 5 m/s then another entire 15-minute period of data unaffected by rain or excessive wind shall be undertaken
- qualitative meteorological information such as cloud cover, fog, rainfall or opinions as to the onset or breakup of temperature inversions should also be recorded
- statistical noise level descriptors over each 15-minute interval (Lmin, L90, L50, L10, L1, Lmax)
- the LAeq, 15 minute noise levels for each 15-minute period
- LA1, 1 minute noise levels (to allow comparison with the relevant sleep arousal criteria)

- notes identifying the noise source that could be heard for each peak (LA1 or LA, Max)
- notes identifying noise sources for periods of steady noise emissions when the LAeq level can be used to estimate the contribution from operations at the operations
- notes of operating conditions such as times of crib breaks or truck movements
- instrument calibration details before and after the monitoring period
- measurements in one-third octave bands from 25 Hz to 12 kHz inclusive (or a broader range of bands) for the 15-minute interval to assess if any of the noise sources exhibit tonal characteristics that require a modifying factor needs to be applied
- data suitable for assessing the relative contribution of Mackas Sand to the overall noise being measured by using a low-pass filter with a shoulder frequency of 630 or 1000 Hz.

4.2.3 Meteorological Monitoring

Meteorological information including prevailing wind direction, wind speed and frequency and occurrence of temperature inversions will be obtained from the Bureau of Meteorology weather station at Williamstown Airport which is approximately 3 to 5 kilometres west of the sand extraction areas on Lot 218 and Lot 220.

Local meteorological data will be collected during each of the attended monitoring periods using a weather monitor, positioned within 5 metres and at a corresponding height of the noise monitoring microphone.

4.3 Noise Mitigation Measures

Plant and equipment to be used at Mackas Sand operations at Lot 218 and Lot 220 have been carefully selected to ensure that they have low noise emission characteristics to minimise impacts on surrounding residences.

Where noise levels exceed the required criteria or goals, the three main strategies for noise control to reduce the noise impact on offsite receivers will be explored. These include:

- controlling noise at the source – There are three approaches to controlling noise generated by the source: Source elimination; Best Management Practice (BMP) and BATEA
- controlling the transmission of noise – There are two approaches: the use of barriers and land-use controls which attenuate noise by increasing the distance between source and receiver
- controlling noise at the receiver – There are two approaches: negotiating an agreement with the landholder or acoustic treatment of dwellings to control noise.

4.3.1 Additional Noise Mitigation Measures

A range of measures to reduce noise levels at R27 when operations are within 250 metres of this residence have been explored. These include construction of an acoustic bund between the extraction area and R27 and changing extraction operations to provide greater at source acoustic shielding and/or reduce the number of noise sources. Noise modelling indicates that construction of an acoustic bund alone is not effective as it would reduce noise levels at R27 by less than 0.5 dB(A). Modelling indicates that acceptable daytime noise levels can be achieved when operations are within 250 metres of R27 by either ensuring that extraction equipment is located within 25 metres of the extraction face, with the mobile screen located within 5 metres of the extraction face or shielded by a localised barrier, or by operating with only one front end loader/excavator.

Further appropriate measures to minimise potential for adverse noise impacts at R27 continue to be investigated, in consultation with the residents at R27. Appropriate management of potential noise impacts in consultation with the residents at R27 will be included within this NMP before the commencement of extraction within 250 metres of R27.

4.4 Noise Impact Assessment and Land Acquisition Criteria

The methodology for assessing compliance with both the noise impact assessment criteria and land acquisition criteria is the same. The LAeq, 15 minute noise assessment criteria (including traffic noise impact assessment criteria) provided in **Table 1.1** represent the allowable noise contribution from quarrying activities at Mackas Sand at each of the respective monitoring locations. Should noise levels exceed the allowable noise level criteria, Mackas Sand will be required to implement appropriate noise mitigation measures or, in some circumstances, could be required to acquire the relevant property upon written request of the landowner.

4.5 Independent Review and Land Acquisition Process

In the event that a landowner considers that Mackas Sand is exceeding noise criteria at his or her property, the landowner may request an independent review of the noise impacts at the property. The independent review will be conducted in accordance with the procedure described in Schedule 4, Conditions 4 to 8 of the Project Approval (refer to **Table 1.2**).

The procedure is summarised as follows:

- The Secretary receives a written request from a landowner for an independent review of the noise impacts at the residence.
- If the Secretary of the DPE confirms that the request is warranted, then Mackas Sand shall, within two months of being advised, consult with the landowner to determine his/her concerns and with the approval of the Secretary of the DPE, appoint a suitably-qualified person to undertake an independent review.
- The independent review would include noise monitoring over a suitable period of time and over a suitable range of meteorological conditions to determine whether the quarry is complying with the relevant impact assessment criteria in Schedule 3.
- A copy of the results of the independent review would be provided to the landowner and Secretary of the DPE by Mackas Sand.

- Depending on the results of the independent review, a number of actions could be pursued in accordance with the INP (EPA, 2000) and relevant Project Approval conditions. These actions are summarised as follows:
- If the independent review finds exceedances of noise criteria due to the Mackas Sand operation, Mackas Sand will take all reasonable and feasible measures to reduce noise impacts and/or will come to an agreement with the landowner, which may include acquisition of the property as laid out in conditions of the Project Approval.
- If the independent review finds that Mackas Sand is complying with the relevant impact assessment criteria in Schedule 3, then Mackas Sand may discontinue the review.

5.0 Reporting and Review

5.1 Reporting

Mackas Sand will regularly assess noise emissions from quarry operations and will keep a log of any incidents that have the potential to adversely impact on the noise of surrounding privately owned land. The Mackas Sand Quarry Manager will investigate any complaints and any exceedances of the noise impact assessment criteria.

Noise monitoring results will be discussed at the Mackas Sand Community Consultative Committee (CCC) meetings which are held 6 monthly or as agreed by the CCC. Performance monitoring, which includes an assessment of the effectiveness of controls and compliance with the relevant Project Approval and EPL conditions, may be discussed at CCC meetings where noise related complaints occur.

An Annual Review will be prepared and submitted to the Secretary and relevant agencies in accordance with the requirements of Condition 4 of Schedule 5 of PA 08_0142 (MOD 2). The Annual Review will include an assessment of the noise monitoring results against the air quality impact assessment criteria, any trends in monitored noise levels over the period and any additional noise management controls that have been implemented since the previous report. In addition, any complaints relating to noise emissions from Mackas Sand, and the response actions taken, will be reported in the Annual Review. Results from the yearly monitoring will also be provided to the EPA, as relevant under EPL conditions.

The Annual Review and noise monitoring results will be made publicly available on the Mackas Sand website (www.mackassand.com.au) in accordance with Condition 9 of Schedule 5 of the Project Approval.

5.2 Complaints Handling

In accordance development consent and EPL requirements, Mackas Sand has established a 24 hour complaints line. The number is **0408 490 911** and will be listed on the Mackas Sand website (www.mackassand.com.au).

Complaints received on the number will be directed to the Quarry Manager who will respond to the complainant within 24 hours if the complainant is contactable. A record of all complaints will be kept on-site and published on the Mackas Sand Pty Ltd's website.

All complaints and information in regard to responses will be provided to the CCC. One of the functions of the CCC is to review complaints or disputes between Mackas Sand and members of the community.

5.3 Noise Compliance Protocol

In accordance with the INP (EPA, 2000), compliance will be determined by attended monitoring surveys. Mackas Sand will be deemed to have recorded an exceedance of the Project Approval noise impact assessment criteria (refer to **Table 1.1**), if attended monitoring identifies that the noise impact assessment criteria are exceeded in any circumstances. Mackas Sand will be deemed to be in non-compliance with PA 08_0142 if noise levels are exceeded. Mackas Sand will be deemed to be in breach of EPL 13218 if continued and sustained exceedances greater than 2 dB due to excessive noise from the development are recorded.

The process to be utilised by Mackas Sand to determine if an exceedance/non-compliance/breach of the Project Approval noise impact assessment criteria has occurred is detailed below:

- during noise monitoring, if noise levels above noise impact assessment criteria attributable to Mackas Sand are observed, Mackas Sand will notify DPE and EPA
- during noise monitoring, if noise levels at least 2 dB above noise impact assessment criteria attributable to Mackas Sand are observed, additional noise mitigation strategies are to be implemented by Mackas Sand. These measures may include the relocation or shutdown of equipment
- immediately following the implementation of the controls, attended monitoring will be conducted to record noise levels attributable to Mackas Sand. Following the completion of attended noise monitoring, a report will be prepared detailing the attended noise monitoring results (see Section 4.2.2), including the identification of any noise mitigation measures implemented by Mackas Sand during the attended monitoring period
- if noise levels at least 2 dB above noise impact assessment criteria attributable to Mackas Sand are observed, additional attended monitoring will be undertaken by a noise consultant within eight weeks of the initial attended monitoring to determine if the noise impact assessment criteria is being met by Mackas Sand. If the additional attended noise monitoring identifies noise levels 2 dB above noise impact assessment criteria attributable to Mackas Sand, a breach of the noise impact assessment criteria will be reported by Mackas Sand in accordance with EPL 13218.

In the event that the additional attended noise monitoring survey identifies that noise levels from Mackas Sand are below the noise impact assessment criteria in **Tables 1.1** or **1.2**, Mackas Sand will not be considered to have recorded a breach of the noise impact assessment criteria under EPL 13218.

5.4 Incident Reporting Protocol

Following the reporting of an exceedance or incident to the DPE and other relevant agencies, Condition 3 of Schedule 5 of PA 08_0142 (MOD2) requires the proponent to prepare a written report of the exceedance within six days of the exceedance being reported. The written report must contain:

- a description of the date, time and nature of the exceedance
- identification of the cause (or likely cause) of the exceedance
- a description of actions taken to date
- a description of the proposed measures to address the exceedance.

In the event of any exceedances or incidents which cause or may cause material harm to the environment, Mackas Sand will report in accordance with the requirements of Conditions 2 and 3 of Schedule 5. The Quarry Manager will be responsible for ensuring these reporting requirements are complied with.

5.5 Corrective Action

Table 5.1 summarises the potential noise related issues that may arise and the appropriate corrective action to be taken.

Table 5.1 Corrective/Preventative Actions

Issue	Corrective Action
Exceedance of EPL or Project Approval Noise Conditions	Investigation of exceedance, undertaking noise mitigation measures for future operations where applicable. Report exceedance to EPA, DPE and other stakeholders, if/as required.
Exceedance of Project Approval Noise Land Acquisition Criteria	Investigation of exceedance, undertaking noise mitigation measures for future operations where applicable. Report exceedance to EPA, DPE other stakeholders, if/as required. Initiation of land acquisition process if required, as detailed in Section 4.5 .
Community complaints	Investigation of complaint, undertake noise monitoring in accordance with Section 5.2 , and if required, undertake mitigating measures where applicable (see Section 5.3) and provide feedback to the complainant. Report complaint to relevant stakeholders as required. Provide feedback to site personnel, where relevant.

5.6 Review

The NMP is to be reviewed in accordance with Condition 4A and Condition 7 of Schedule 5 in PA 08_0142, or as directed by the Secretary of DPE. The review will reflect changes in environmental requirements, technology and operational procedures

6.0 References

Department of Environment, Climate Change and Water, 2011. *NSW Road Noise Policy*.

NSW Environment Protection Authority, 1994. *Environmental Noise Control Manual*.

NSW Environment Protection Authority, 2000. *New South Wales Industrial Noise Policy*.

Umwelt (Australia) Pty Limited, 2009. *Environmental Assessment of Sand Extraction Operations from Lot 218 DP 1044608 and Lot 220 DP 1049608, Salt Ash*.

Umwelt (Australia) Pty Limited, 2009. *Environmental Assessment for Modifications to Mackas Sand Extraction Operations from Lot 218 and Lot 220, Salt Ash*.

Umwelt (Australia) Pty Limited, 2011. *Mackas Sand Annual Environmental Management Report 2010-2011*.

Umwelt (Australia) Pty Limited, 2014. *Environmental Management Strategy*.



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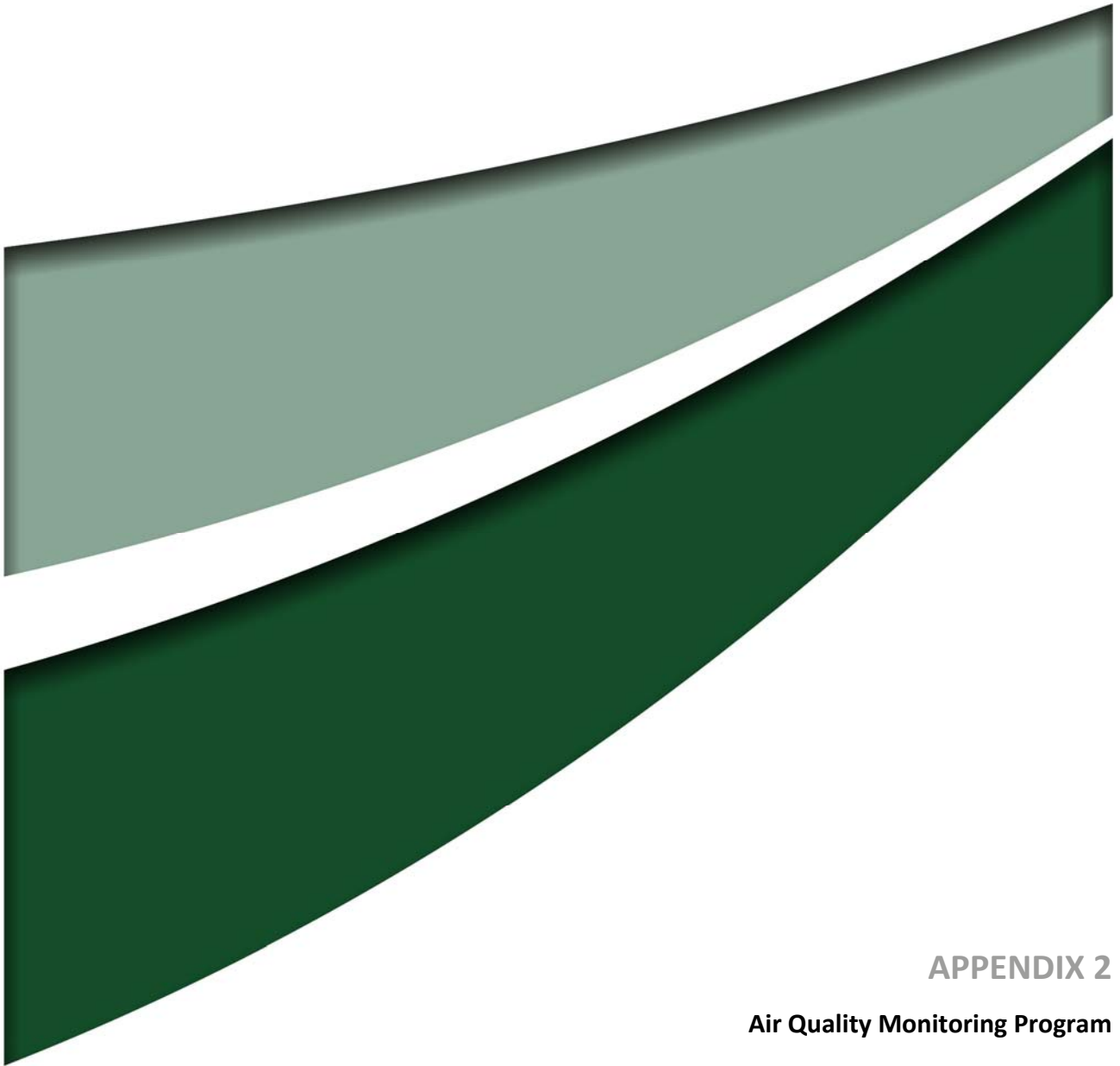
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APPENDIX 2

Air Quality Monitoring Program



**AIR QUALITY
MANAGEMENT PLAN FOR
LOT 218 AND LOT 220, SALT
ASH, NSW**

FINAL

July 2016



AIR QUALITY MANAGEMENT PLAN FOR LOT 218 AND LOT 220, SALT ASH, NSW

[Subtitle]

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Mackas Sand Pty Ltd

Project Director: Peter Jamieson
Project Manager: Brendan Rice
Report No. 1646/R62/V1
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1.0 Introduction

Mackas Sand operations on Lot 218 and Lot 220 are located approximately 25 kilometres north east of Newcastle near Salt Ash in the Port Stephens local government area (LGA), New South Wales (refer to Figure 1.1). Mackas Sand directors have operated sand extraction operations in the area since 1992. Lot 218 and Lot 220 are owned by the Worimi Local Aboriginal Lands Council.

Mackas Sand was granted Project Approval No. 08_0142 (PA 08_0142) on 20 September 2009 by the Minister for Planning under Part 3A of the Environmental Planning and Assessment Act 1979 to operate sand extraction operations at Lot 220 and Lot 218. It is estimated that in excess of 21 million tonnes of sand resource will be extracted from Lot 218 and Lot 220, with Lot 218 having an indefinite extraction life due to the ongoing movement of sand from the adjoining mobile dunes.

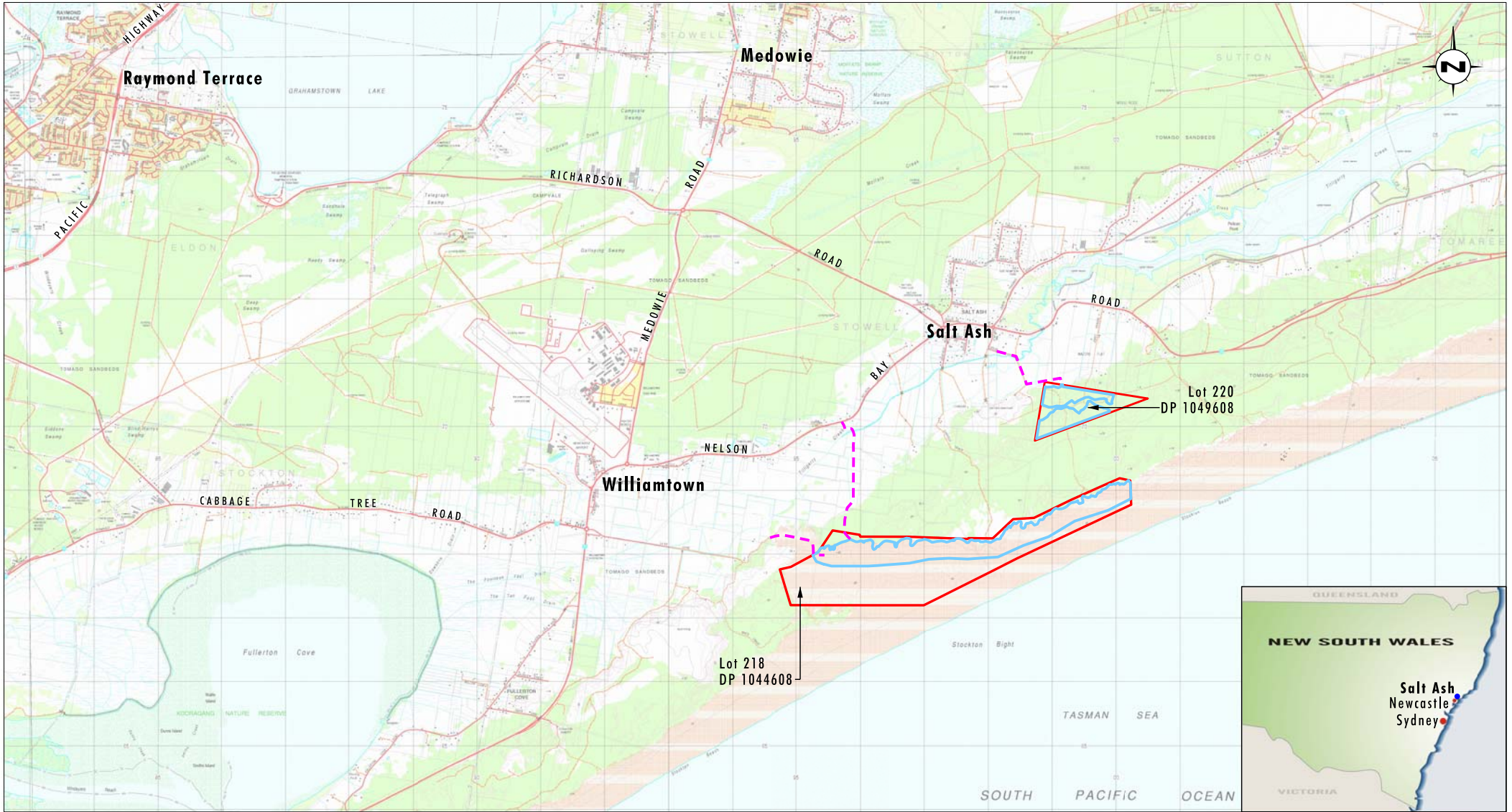
A modification to PA 08_0142 (MOD1) was approved on 30 September 2013 by the NSW Planning Assessment Commission (PAC) under delegation of the Minister for Planning and Infrastructure (now Minister for Planning and Environment-DPE). The modification includes a temporary reduction in extraction level and the approval of an alternate route to access Lot 218. The alternate route connects directly from Lot 218, northward to Nelson Bay Road, as depicted within **Figure 1.1**.

A second modification to PA 08_0142, (MOD2), was approved by the PAC on 16 March 2016. The modification allows for an increase in maximum hourly truck movements (in and out) of Lot 218 via the approved alternate access road.

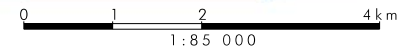
1.1 Mackas Sand Operations

Key operational features relevant to this Air Quality Management Plan are:

- The approved hours of extraction being 24 hours a day 7 days a week except for operations within 250 metres of the Hufnagl Residence (R27) when operations are limited to 7.00 am to 6.00 pm Monday to Friday with no operations within 250 metres of R27 outside these times. Ongoing transportation of sand from Lot 220 in accordance with approval conditions which allows for transportation along Oakvale Drive between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays in accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142 as Mackas Sand has agreements with the owners of residences facing Oakvale Drive. Copies of these agreements have been provided to the DPE.
- Revision of truck movements per hour allowed from Lot 218 as per MOD 2. Ongoing transportation of sand from Lot 218 in accordance with approval conditions which allows for transportation along the Alternate Access Road between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays. In accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142, Mackas Sand has an agreement with the owners of 2344, 2353 and 2368 Nelson Bay Road. Copies of these agreements have been provided to the DPE.



Source: Department of Lands (2006)



- Legend**
- Lot Boundaries
 - Approval Areas
 - Approved Site Access

FIGURE 1.1
Locality Plan

1.2 Purpose and Scope

To satisfy Condition 13 of Schedule 3 of PA 08_142 (MOD 2), an Air Quality Monitoring Program (AQMP) is required to be prepared and implemented for the project. The AQMP was prepared in consultation with the Environment Protection Authority (EPA) and submitted to the DP&E for approval.

The purpose of the AQMP is to:

- provide Mackas Sand employees and contractors with a clear and concise description of their responsibilities, regarding air quality management
- address the relevant project approval conditions in PA 08_142 (MOD 2), Statement of Commitments and legislative commitments and guidelines relevant to this document
- describe the measures to be implemented to monitor dust emissions from the operations against relevant regulatory criteria
- provide a mechanism for assessing air quality monitoring results against the relevant air impact assessment criteria
- provide mechanisms for the establishment of best practice with respect to minimising air quality emissions/impacts.

1.3 Objectives

The objectives of this AQMP include the following:

- detail the controls to be implemented to minimise dust emissions from the site (**Section 3.0**)
- operate an air quality management system to guide the day to day planning of extraction operations and the implementation of air quality mitigation measures to ensure compliance with the relevant conditions of this approval (**Section 3.0**)
- minimise any visible off-site air pollution (**Section 4.0**)
- manage air quality related community complaints in a timely and effective manner (**Section 5.0**)
- detail the requirement for reporting air quality criteria exceedances to the relevant stakeholders (**Section 5.0**).

1.4 Regulatory Requirements

1.4.1 Project Approval Conditions

A detailed list of the PA 08_142 (MOD 2) conditions and the relevant Statement of Commitments outlined in the Project Approval, and where they are addressed in this document is included in **Tables 1.1** and **1.2**.

Table 1.1 Project Approval Conditions

Conditions		Addressed in Section																							
<p>Schedule 3 – Environmental Performance Conditions</p> <p>Impact Assessment Criteria</p>																									
11.	<p>The Proponent shall ensure that the dust emissions generated by the project do not cause additional exceedances of the air quality impact assessment criteria listed in Tables 5, 6 and 7 at any residence on privately owned land, or on more than 25 per cent of any privately owned land.</p> <p><i>Table 5: Long term impact assessment criteria for particulate matter</i></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging period</th> <th>Criterion</th> </tr> </thead> <tbody> <tr> <td>Total suspended particulate (TSP) matter</td> <td>Annual</td> <td>90 µg/m³</td> </tr> <tr> <td>Particulate matter < 10 µm (PM₁₀)</td> <td>Annual</td> <td>30 µg/m³</td> </tr> </tbody> </table> <p><i>Table 6: Short term impact assessment criterion for particulate matter</i></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging period</th> <th>Criterion</th> </tr> </thead> <tbody> <tr> <td>Particulate matter < 10 µm (PM₁₀)</td> <td>24 hour</td> <td>50 µg/m³</td> </tr> </tbody> </table> <p><i>Table 7: Long term impact assessment criteria for deposited dust</i></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging period</th> <th>Maximum increase in deposited dust level</th> <th>Maximum total deposited dust level</th> </tr> </thead> <tbody> <tr> <td>Deposited dust</td> <td>Annual</td> <td>2 g/m²/month</td> <td>4 g/m²/month</td> </tr> </tbody> </table> <p><i>Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.</i></p>	Pollutant	Averaging period	Criterion	Total suspended particulate (TSP) matter	Annual	90 µg/m ³	Particulate matter < 10 µm (PM ₁₀)	Annual	30 µg/m ³	Pollutant	Averaging period	Criterion	Particulate matter < 10 µm (PM ₁₀)	24 hour	50 µg/m ³	Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level	Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month	Section 2.0
Pollutant	Averaging period	Criterion																							
Total suspended particulate (TSP) matter	Annual	90 µg/m ³																							
Particulate matter < 10 µm (PM ₁₀)	Annual	30 µg/m ³																							
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Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month																						
<p>Schedule 3 – Environmental Performance Conditions</p> <p>Operating Conditions</p>																									
12.	<p>The Proponent shall ensure any visible air pollution generated by the project is assessed regularly, and that quarrying operations are relocated, modified, and/or stopped as required to minimise air quality impacts on privately-owned land, to the satisfaction of the Secretary.</p>	Section 3.3 and 4.0																							

Conditions		Addressed in Section
Schedule 3 – Environmental Performance Conditions		
Air Quality Monitoring		
13.	<p>The Proponent shall prepare and implement an Air Quality Monitoring Program for the project to the satisfaction of the Secretary. This program must:</p> <ul style="list-style-type: none"> a) be prepared in consultation with EPA, and be submitted to the Secretary for approval within 3 months of the date of this approval; and b) include details of how the air quality performance of the project will be monitored, and include a protocol for evaluating compliance with the relevant air quality criteria in this approval. <p><i>Note: Initially, this program should concentrate on monitoring the dust deposition impacts of the project. However, in time, it may be expanded to include other pollutants.</i></p> <p>The Proponent shall implement the approved monitoring program as approved from time to time by the Secretary.</p>	Section 4.0

Table 1.2 Statement of Commitments

Condition		Addressed in Section
1.7.1	Dust suppression activities, such as spraying a suitable dust suppressant, will be undertaken on all unsealed access roads used to transport product from Lot 218 and Lot 220 so that at least a 75 per cent reduction in dust generation is achieved.	Section 3.1 (also see Soil & Water Management Plan)

1.4.2 Environment Protection Licence

The EPA provides set guidelines for air quality based on human comfort levels. Environment Protection Licences set out criteria for dust deposition and dust concentration levels and conditions for air quality monitoring and reporting. Air Quality monitoring at Mackas Sand will be undertaken in accordance with the conditions of Environment Protect Licence (EPL) 13218. The EPL was issued on 30 November 2009 for sand extraction operations on Lot 218 and Lot 220 Salt Ash.

A full list of the EPL conditions relating to air quality monitoring and an indication of where they are addressed within this document are included in **Table 1.3**.

Table 1.3 Environment Protection Licence Conditions

Conditions		Addressed in Section
O3.1	The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.	Section 3.0
O3.2	Activities occurring in or on the premises must be carried out in a manner that will minimise the generation, or emission from the premises, of wind-blown or traffic generated dust	Section 3.0
U1.1	<p>The licensee must implement a minimum of two (2) High Volume Air Sampler (HVAS) or Tapered Element Oscillating Microbalance (TEOM) units, to monitor particulate matter emissions from site operations at the nearest or most affected residential receivers for the following allotments.</p> <p>a) Lot 218 DP 1044608; and</p> <p>b) Lot 220 DP 1049608.</p> <p>The need for implementation and operation of ambient air quality monitoring for Lot 218 will be considered upon the determination of the modification application 08_0142 MOD1 that is currently (February 2013) with the NSW Department of Planning and Infrastructure.</p> <p>An ambient air quality monitor must be installed at a suitable location within the vicinity of residence R27 within 6 months of the owner of R27 requesting in writing that the unit be installed. EPA must grant approval to the proposed location of the monitor. Residence R27 is shown on Figure 4.4 of the Environmental Assessment “Sand Extraction Operations from Lots 218 and 220. Salt Ash” dated April 2009. A copy of this figure is filed on EPA file LIC08/1532.</p> <p>The licensee must advise the EPA within seven days of commissioning of each of the HVAS units.</p> <p>Note: It is the intention of the EPA to require on-going particulate matter monitoring at the premises at the implementation of the HVAS units required by this licence.</p>	Section 4.3

1.4.3 Stakeholder Consultation Regarding this Document

This Plan was first submitted to the DP&E in December 2009. A copy of the AQMP was submitted to the EPA concurrently with DP&E.

1.5 Roles and Responsibilities

The Quarry Manager will be responsible for ensuring that the development is undertaken in accordance with the requirements of PA 08_0142 (MOD 2) and EPL 13218. Responsibilities in relation to air quality management and monitoring are outlined in **Table 1.4**.

Table 1.4 Roles and Responsibilities

Role	Responsibilities
Quarry Manager	<ul style="list-style-type: none"> • provide that sufficient resources are allocated for the implementation of this AQMP; • ensure that air quality impacts are considered when infrastructure or extraction planning changes; • ensure strategies to reduce air quality impacts for the operation are effectively implemented; • develop and implement an air quality inspection schedule; • ensure dust controls are implemented and maintained; • authorise internal and external reporting requirements as well as subsequent revisions of this program; • ensure that the plan is relevant to current operations; • update monitoring data on the Mackas Sand website; • coordinate incident investigation processes including associated reporting requirements and the implementation of corrective actions and evaluate their effectiveness; and • ensure that all personnel are aware of noise management obligations.
All employees and contractors	<ul style="list-style-type: none"> • undertake all activities in accordance with this AQMP; and • undertake the compulsory site induction.

2.0 Air Quality Impact Assessment Criteria

The Project Approval conditions, including an indication of where the requirements are addressed in this plan, are provided in **Section 1.4.1**. This AQMP is designed to assess compliance with the criteria in **Section 2.0** using the methodology defined in **Section 4.0**.

2.1 Dust Concentration

Goals for dust concentration are referred to as long term (annual average) and short term (24 hour maximum) goals. Relevant goals for Total Suspended Particulates (TSP) and PM₁₀ are outlined in **Table 2.1** in relation to both Project specific and cumulative goals applied at a regional level. The TSP and PM₁₀ annual average goals relate to the total dust in the air and not just the dust from the Project.

Table 2.1 Impact Assessment Criteria for Deposited Dust

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	Annual	30 µg/m ³
	24 hour	50 µg/m ³

2.2 Dust Deposition

Dust deposition levels refer to the quantity of dust particles which settle out of the air as measured in grams per square metre per month (g/m²/month) at a particular location.

The Project Approval expresses dust deposition criteria in terms of an acceptable increase in dust deposition over the existing background deposition levels. For example, in residential areas with annual average dust deposition levels of between 0 and 2 g/m²/month, an increase of up to 2 g/m²/month would be permitted before it would be considered that a significant degradation of air quality had occurred. The criterion for dust deposition is included in **Table 2.2** below.

Table 2.2 Impact Assessment Criteria for Deposited Dust

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.

2.3 Cumulative Emissions

Cumulative air quality is a key issue for the local community. The air quality assessment component of the EA provided an indication of the cumulative dust emissions associated with the Project, determining that the approved haul routes would not increase potential air quality impacts on surrounding residential properties. The cumulative emissions associated with potential sources have been predicted in relation to TSP, annual average PM10 and dust deposition.

The potential cumulative effects of dust emissions from other operations within close proximity to Mackas Sand in relation to the volume of natural windblown sand are considered to be insignificant.

3.0 Air Quality Management Controls

In order to mitigate any potential air quality impacts from the operation, a number of air quality management controls will be implemented throughout the life of the operation. These controls are detailed in **Sections 3.1** and **3.2** below.

The principal measures used to control dust will be sealing of sections of the approved alternate haul route and the use of a water cart for dust suppression on the gravel section of haul roads as required. At this time it is not intended to use Lavis Lane to transport product from Lot 218.

In addition, dust control will be assisted by ongoing rehabilitation of parts of the extraction areas that were vegetated prior to sand extraction occurring on Lot 218 and Lot 220.

3.1 Operational Controls

Mackas Sand implements a number of procedures to control dust emissions which may be generated from trafficable areas and extraction and handling operations. As part of this system, Mackas Sand has an ongoing commitment to implement the following controls to manage dust generation:

- monitoring the private haul roads from Lot 218 and Lot 220 and sealing the most northern 200 metres of the alternate haul road to Lot 218 to minimise dust generation in proximity to residences along Nelson Bay Road
- water carts will be used when necessary on all active unsealed haul routes and unsealed working areas used for transporting sand product
- speed limits will apply and be enforced on all roads on the quarry site
- visual inspections of active haul routes and extraction operations to monitor dust impacts
- air quality monitoring utilising depositional dust gauges
- all personnel and contractors will be provided with training in dust controls during the Mackas Sand quarry induction.

3.2 Screening Operations

Sand screening operations on Lot 218 and Lot 220 are unlikely to result in any significant increase in dust generation. This is attributed to the low dust content of the sand that is being quarried and moisture content of the sand that assists in suppressing the entrainment or mobilisation of dust. Lot 220 is sheltered from prevailing winds by surrounding vegetation and as a result the likelihood of dust being transported off site is low. Lot 218 is screened by vegetation to the north and sand dunes to the south. Additional dust controls for sand screening operations are not considered to be required at Lot 218 or Lot 220 but will be reviewed as required.

3.3 Active Management Practices

Mackas Sand will investigate any complaints regarding impacts to air quality at private residences on a case by case basis. Should the investigation indicate adverse dust impacts from operations and transport, reasonable and feasible measures to mitigate dust at the affected receiver will be implemented.

All complaints will be logged and reported annually in the Mackas Sand Annual Review.

3.4 Continuous Improvement

Mackas Sand will implement all reasonable and feasible best practice air quality mitigation measures. The basis for continuous improvement of air quality mitigation measures will be through the ongoing monitoring of dust impacts and the corrective/preventative action process. Through the development of corrective/preventative actions, Mackas Sand will investigate ways to reduce the potential air quality impacts generated by the operation. Any new mitigation measures that are implemented as a result of these investigations will be reported in the Annual Review.

3.5 Change Management

When change is considered to have an impact on the (AQMP, the process below must be followed:

- identify the change
- assess the potential risks associated with the change and develop a risk management plan
- approve the change subject to the risk management plan
- communicate and implement the change and risk management actions.

3.6 Training

To ensure the effective implementation of this AQMP, all Mackas Sand personnel and contractors working on the site (i.e. not truck drivers) will undertake an induction which outlines environmental awareness including the importance of dust mitigation at the Mackas Sand site.

4.0 Air Quality Monitoring Methodology

In accordance with the requirements of PA 08_0142 (MOD 2) and EPL 13218, air quality monitoring will be undertaken as set out in the Air Quality Monitoring Program.

4.1 Monitoring Standards

Air quality monitoring will be undertaken in accordance with the relevant Australian Standards and OEH approved methods for sampling including:

- EPA's 'Approved methods for the sampling and analysis of air pollutants in NSW' (EPA 2007)
- The dust deposition gauges will be operated in accordance with *AS/NZS 3580.10.1:2003 Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method*.

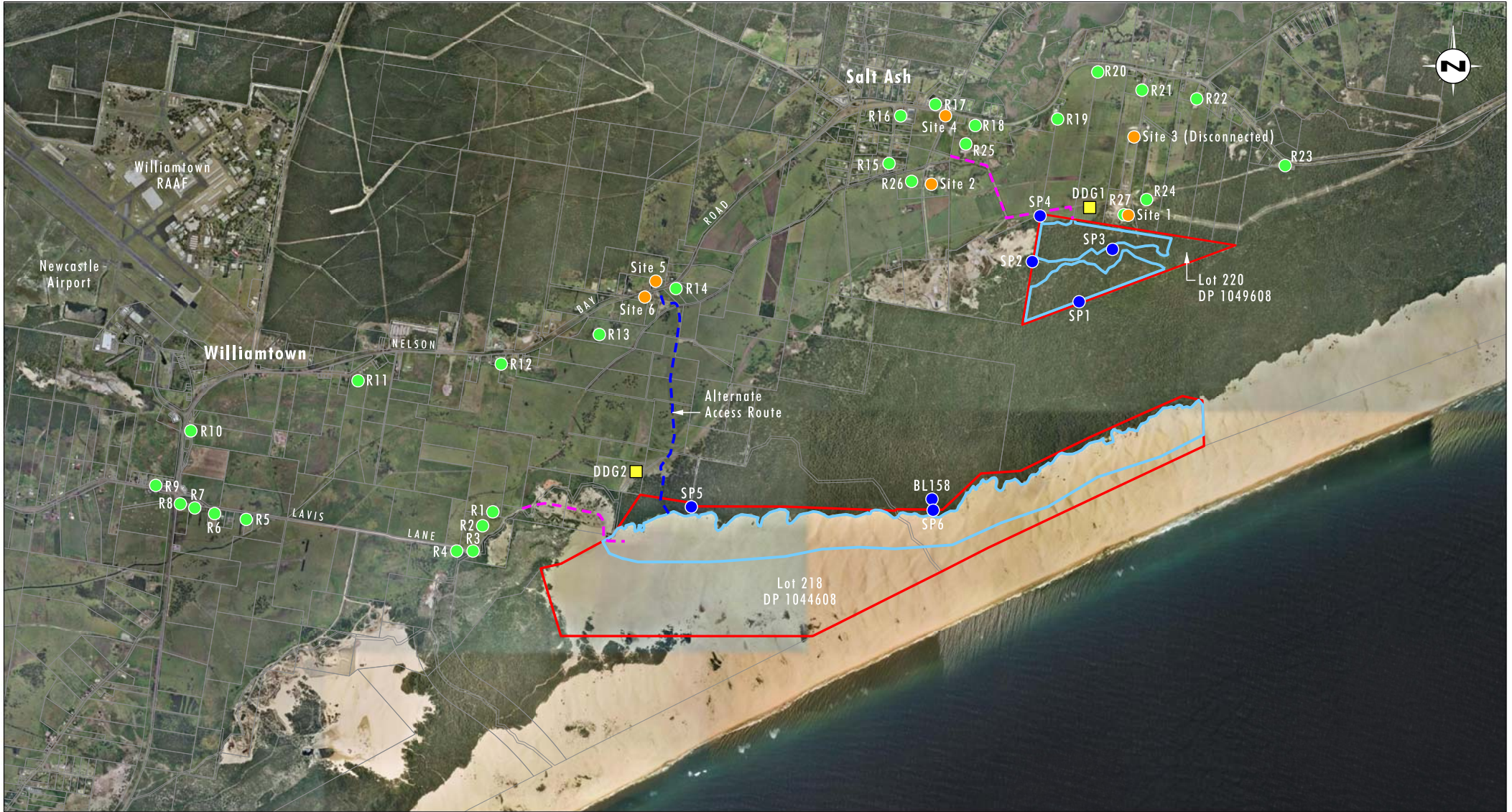
4.2 Air Quality Monitoring Program

In addition to visual monitoring, Mackas Sand has established dust deposition gauges in two locations to assess compliance against relevant Project Approval and EPL criteria. Dust monitoring locations are shown on **Figure 4.1** and summarised in **Table 4.1**.

Table 4.1 Air Quality Monitoring Points

Monitoring Site	Type of Monitoring	Frequency
DDG1	Dust Depositional Gauge	Monthly
DDG2	Dust Depositional Gauge	Monthly

Dust deposition levels will be recorded monthly and analysed in a NATA registered laboratory. Air quality monitoring locations will be reviewed and where necessary, modified over the life of operations according to progressive monitoring results or physical changes in sand extraction operations.



Source: Department of Lands (2003)

0 0.5 1 2 km
1:45 000

Legend

- Lot Boundaries (218 & 220)
- Approval Area
- Approved Site Access
- Alternate Access Route
- Noise Monitoring Location
- Dust Monitoring Location
- Groundwater Monitoring Bore Location
- Residential Receivers

File Name (A4): R62_V1/1646_435.dgn

FIGURE 4.1
Mackas Sand Monitoring Locations

4.3 Ongoing Air Quality Monitoring

Investigation of the installation of High Volume Air Sampling (HVAS) units occurred during 2012/2013 in consultation with the EPA. Investigations culminated in Variation Notice 1509957 to EPL 13218. Notice 1509957 sets out a Pollution Reduction Program (Condition U1), requiring the installation of HVAS or Tapered Element Oscillating Microbalance (TEOM) units close to Lot 218 and Lot 220 subject to certain constraints. Installation of a unit near Lot 220 is dependent upon the acceptance of the resident at R27 to have a unit on their property. Discussions with the resident at R27 indicated that they do not want a high volume sampler at this time and as such the high volume sampler will not be installed at R27. This will be revised if a written request is received from the resident at R27. The opportunity to have a HVAS unit installed will be offered annually to the resident at R27 in writing, unless a written statement nullifying this requirement from the resident at R27 is received.

Extraction operations at Lot 218 are distant from residential receivers (in excess of 1.5 kilometres) and unlikely to cause unacceptable levels of dust with the main source of dust being from product transport on unsealed haul roads. With the approval of the alternate haul route to Lot 218, trucks will no longer travel past dwellings adjacent to the formerly approved haul road that accessed Lavis Lane. In addition the most northern 200 metres of the alternate access road closest to residential receivers on Nelson Bay Road is sealed and the other operational controls detailed in **Section 3.1** will be implemented. Taking these factors into account, it is considered that HVAS or other monitoring of PM10 or TSP near Lot 218 is not considered necessary at this time.

5.0 Reporting and Review

5.1 Reporting

Mackas Sand will regularly assess dust emissions from quarry operations and will keep a log of any incidents that have the potential to adversely impact on the air quality of surrounding privately owned land. The Mackas Sand Quarry Manager will investigate any complaints and any exceedances of the air quality impact assessment criteria.

Air quality monitoring results will be discussed at the Mackas Sand Community Consultative Committee (CCC) meetings which are held 6 monthly or as agreed by the CCC. Performance monitoring, which includes an assessment of the effectiveness of controls and compliance with the relevant Project Approval and EPL conditions, may be discussed at CCC meetings where air quality related complaints occur.

An Annual Review will be prepared and submitted to the Secretary and relevant agencies in accordance with the requirements of Condition 4 of Schedule 5 of PA 08_0142 (MOD 2). The Annual Review will include an assessment of the air quality monitoring results against the air quality impact assessment criteria, any trends in monitored air quality levels over the period and any additional dust management controls that have been implemented since the previous report. In addition, any complaints relating to dust emissions from Mackas Sand, and the response actions taken, will be reported in the Annual Review. Results from the yearly monitoring will also be provided to the EPA, as relevant under EPL conditions.

The Annual Review and air quality monitoring results will be made publicly available on the Mackas Sand website (www.mackassand.com.au) in accordance with Condition 9 of Schedule 5 of the Project Approval.

5.2 Complaints Handling

In accordance development consent and EPL requirements, Mackas Sand has established a 24 hour complaints line. The number is listed on the Mackas Sand website (www.mackassand.com.au).

Complaints received on the number will be directed to the Quarry Manager who will respond to the complainant within 24 hours if the complainant is contactable. A record of all complaints will be kept on-site and published on the Mackas Sand website.

All complaints and information in regard to responses will be provided to the CCC. One of the functions of the CCC is to review complaints or disputes between Mackas Sand and members of the community.

5.3 Incident Reporting Protocol

Condition 2 of Schedule 5 of PA 08_0142 MOD2 requires any exceedances of limits/performance criteria within the approval to be reported to DPE within 24 hours of the exceedances being recorded. This included any incidents that cause (or may cause) material harm to the environment.

Following the reporting of an exceedance or incident to the DPE and other relevant agencies, Condition 3 of Schedule 5 of PA 08_0142 (MOD2) requires the proponent to prepare a written report of the exceedance within six days of the exceedance being reported. The written report must contain:

- a description of the date, time and nature of the exceedance
- identification of the cause (or likely cause) of the exceedance

- a description of actions taken to date
- a description of the proposed measures to address the exceedance.

In the event of any exceedances or incidents which cause or may cause material harm to the environment, Mackas Sand will report in accordance with the requirements of Conditions 2 and 3 of Schedule 5. The Quarry Manager will be responsible for ensuring these reporting requirements are complied with.

5.3.1 Material Harm Incidents

Mackas Sand is committed to minimising any potential for material harm to the environment and surrounding community. A PIRMP has been developed for Mackas Sand operations which outlines the response and notification procedures in the event of a potential material harm incident. In addition to reporting required by Condition 2 of Schedule 5 of PA 08_0142 (MOD2) incidents resulting or having the potential to result in material harm to the environment, (as defined by Section 147 of the Protection of the Environment Operations Act 1997) shall be reported to the following authorities (as relevant) as soon as it is safe to do so:

- the Appropriate Regulatory Authority (ARA)
- the EPA – Environment Line (if not the ARA)
- the Ministry of Health
- WorkCover
- the Local Authority (Council) if not the ARA
- Fire and Rescue NSW.

The information about a pollution incident that must be notified includes:

- the time, date, nature, duration and location of the incident
- the location of the place where pollution is occurring or is likely to occur
- the nature, the estimated quantity or volume and the concentration of any pollutants involved, if known
- the circumstances in which the incident occurred, including the cause of the incident, if known
- the action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution, if known.

5.4 Corrective Action

Table 5.1 summarises the potential air quality related issues that may arise and the appropriate corrective action to be taken.

Table 5.1 Corrective/Preventative Actions

Issue	Corrective Action
Exceedance of EPL or Project Approval Air Quality Conditions	Investigation of exceedance, undertaking air quality mitigation measures for future operations where applicable. Report exceedance to EPA, DPE and other stakeholders, as required.
Community complaints	Investigation of complaint, undertake dust monitoring in accordance with Section 4.2 , and if required, undertake mitigating measures where applicable (see Section 3.0) and provide feedback to the complainant. Report complaint to relevant stakeholders as required. Provide feedback to site personnel, where relevant.

5.5 Records

In accordance with EPL condition M1.2, monitoring records will be maintained on site for at least four years.

In addition, the following records must be kept in respect to any samples required to be collected as per EPL condition M1.3:

- date(s) on which the sample was taken
- time(s) at which the sample was collected
- the point at which the sample was taken
- the name of the person who collected the sample.

5.6 Review

The AQMP is to be reviewed in accordance with Condition 4A and Condition 7 of Schedule 5 in PA 08_0142, or as directed by the Secretary of DPE. The review will reflect changes in environmental requirements, technology and operational procedures.

6.0 References

Australian Standard AS 3580.14:2011 Methods for Sampling and Analysis of Ambient Air – Meteorological Monitoring for Ambient Air Quality Monitoring Applications.

Australian Standard AS/NZS 3580.10.1:2003 Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.

EPA, 2007. Approved Methods for the Sampling and Analysis of Air Pollutants in NSW.

Umwelt (Australia) Pty Limited, 2009. Environmental Assessment for Sand Extraction Operations from Lot 218 DP 1044608 and Lot 220 DP 1049608, Salt Ash.

Umwelt (Australia) Pty Limited, 2009. Environmental Assessment for Modifications to Mackas Sand Extraction Operations from Lot 218 and Lot 220, Salt Ash.

Umwelt (Australia) Pty Limited, 2011. Mackas Sand Annual Environmental Management Strategy.



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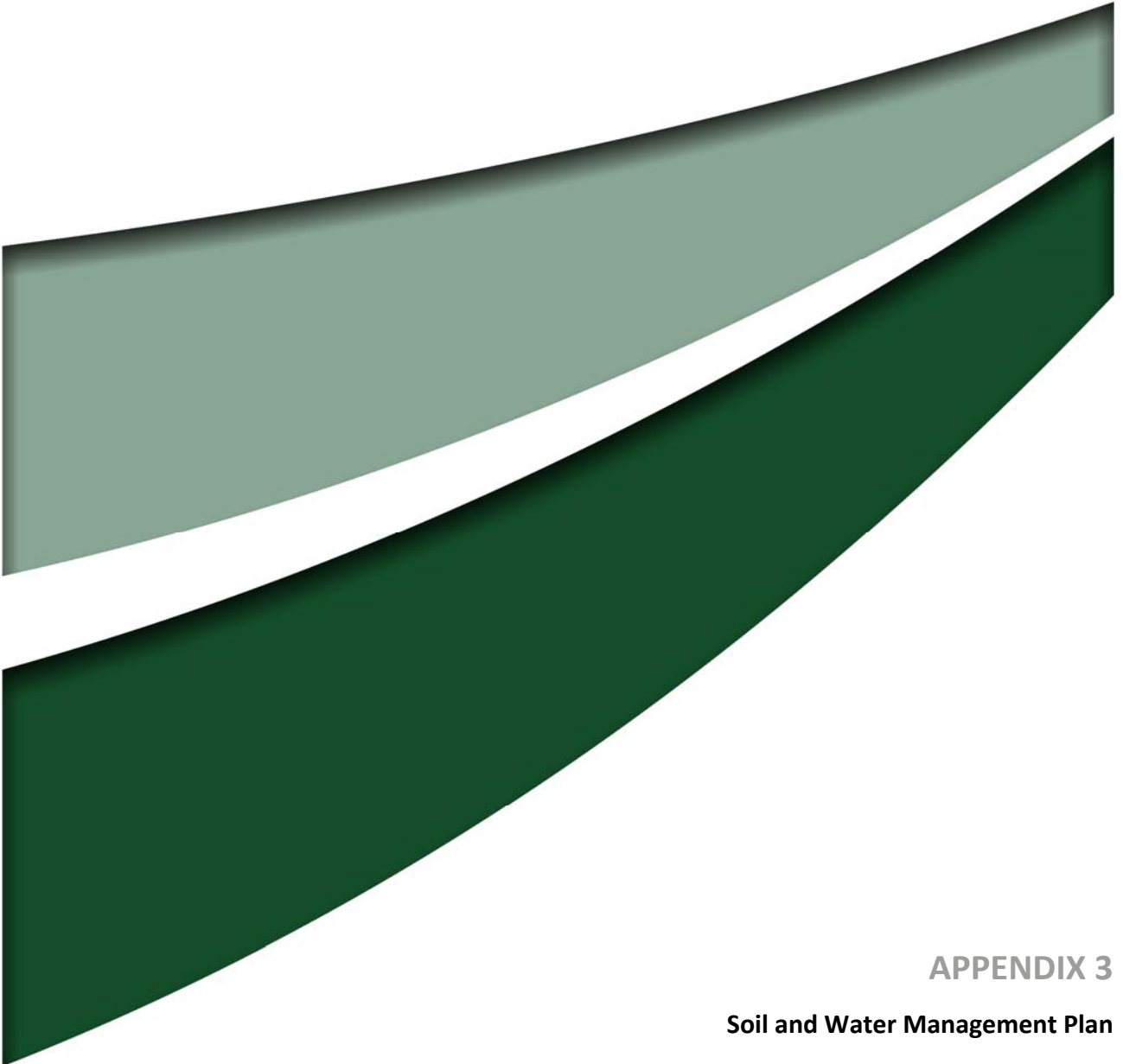
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APPENDIX 3

Soil and Water Management Plan



**SOIL AND WATER
MANAGEMENT PLAN FOR LOT
218 AND LOT 220,
SALT ASH, NSW**

FINAL

July 2016



SOIL AND WATER MANAGEMENT PLAN FOR LOT 218 AND LOT 220, SALT ASH, NSW

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Mackas Sand Pty Ltd

Project Director: Peter Jamieson
Project Manager: Brendan Rice
Report No. 1646/R63/V1
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1.0 Introduction

Mackas Sand Pty Ltd (Mackas Sand) operations on Lot 218 and Lot 220 are located approximately 25 kilometres north east of Newcastle near Salt Ash in the Port Stephens local government area (LGA), New South Wales (refer to **Figure 1.1**). Mackas Sand directors have operated sand extraction operations in the area since 1992. Lot 218 and Lot 220 are owned by the Worimi Local Aboriginal Lands Council.

Mackas Sand was granted Project Approval No. 08_0142 (PA 08_0142) on 20 September 2009 by the Minister for Planning under Part 3A of the Environmental Planning and Assessment Act 1979 to operate sand extraction operations at Lot 220 and Lot 218. It is estimated that in excess of 21 million tonnes of sand resource will be extracted from Lot 218 and Lot 220, with Lot 218 having an indefinite extraction life due to the ongoing movement of sand from the adjoining mobile dunes.

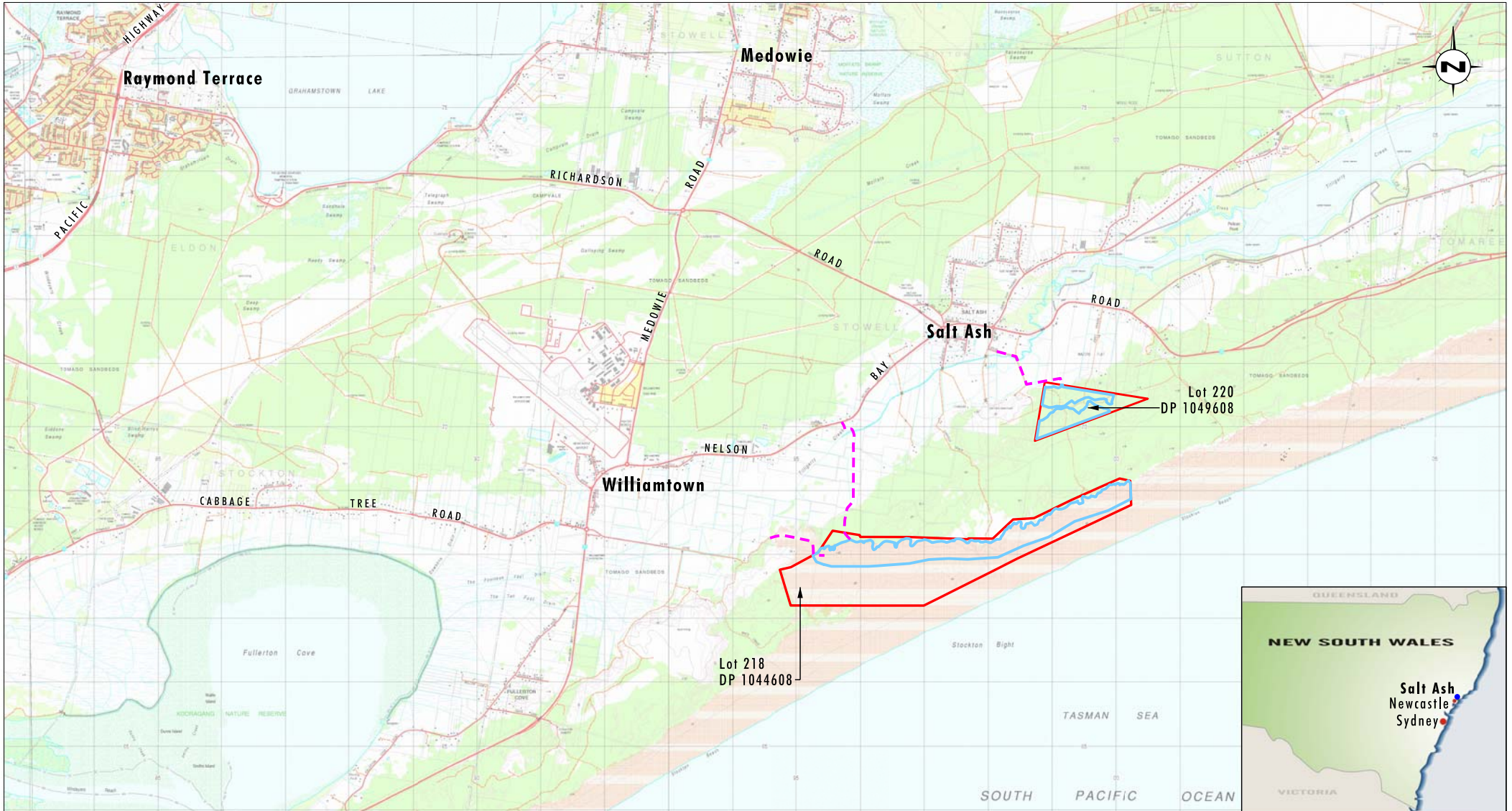
A modification to PA 08_0142 was approved on 30 September 2013 by the NSW Planning Assessment Commission (PAC) under delegation of the Minister for Planning and Infrastructure (now Minister for Planning and Environment-DP&E). The modification (PA 08_0142 MOD1) includes approval to extract within 0.7 metres of the highest predicted groundwater level provided the final landform is at least 1 metre above the highest predicted groundwater level and the approval of an alternate route to access Lot 218. The alternate route connects directly from Lot 218, northward to Nelson Bay Road, as depicted within **Figure 1.1**.

A second modification to PA 08_0142, (MOD2), was approved by the PAC on 16 March 2016. The modification allows for an increase in maximum hourly truck movements (in and out) of Lot 218 via the approved alternate access road.

1.1 Mackas Sand Operations

Key operational features relevant to this Soil and Water Management Plan (SWMP) are:

- The approved hours of extraction being 24 hours a day 7 days a week except for operations within 250 metres of the Hufnagl Residence (R27) when operations are limited to 7.00 am to 6.00 pm Monday to Friday with no operations within 250 metres of R27 outside these times. Ongoing transportation of sand from Lot 220 in accordance with approval conditions which allows for transportation along Oakvale Drive between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays in accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142 as Mackas Sand has agreements with the owners of residences facing Oakvale Drive. Copies of these agreements have been provided to the DPE.
- Revision of truck movements per hour allowed from Lot 218 as per MOD 2. Ongoing transportation of sand from Lot 218 in accordance with approval conditions which allows for transportation along the Alternate Access Road between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays. In accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142, Mackas Sand has an agreement with the owners of 2344, 2353 and 2368 Nelson Bay Road. Copies of these agreements have been provided to the DPE.



Source: Department of Lands (2006)

0 1 2 4 km
1:85 000

Legend

- ▭ Lot Boundaries
- ▭ Approval Areas
- - - Approved Site Access

FIGURE 1.1

Locality Plan

1.2 Purpose and Scope

To satisfy Condition 18 of Schedule 3 of the Project Approval 08_0142 (PA 08_0142 MOD 2), a SWMP has been prepared and implemented for the project. The original version of the SWMP was prepared in consultation with the Environment Protection Authority (EPA), Department of Primary Industries (DPI Water) and Hunter Water Corporation (HWC) and submitted to the DP&E for approval.

The purpose of this SWMP is to define the control mechanisms to be implemented for the management and mitigation of potential water quality impacts generated by extractive operations at Lot 218 in DP 1044608 and Lot 220 DP 1049608 (hereafter referred to as the approval areas) Nelson Bay Road, Salt Ash.

This plan outlines the methodology used to determine compliance of the continued operations and response procedures to be followed in the event of a non-compliance or measured exceedances of the relevant criteria.

1.3 Regulatory Requirements

1.3.1 Project Approval

A detailed list of the PA 08_0142 (MOD2) conditions and the relevant Statement of Commitments outlined in the Project Approval, and where they are addressed in this document is included in **Table 1.1** and **1.2**.

Table 1.1 Project Approval Conditions

Conditions		Addressed in Section
Schedule 3 – Environmental Performance Conditions		
Soil and Water Management		
18.	The proponent shall prepare and implement a Soil and Water Management Plan for the project to the satisfaction of the Director-General. This plan must:	Section 1.1
	(a) be prepared in consultation with EPA, NOW and HWC, and be submitted to the Director General for approval within 3 months of the date of this approval; and	
	(b) include a:	Whole Document
	<ul style="list-style-type: none"> • Site Water Balance; • Erosion and Sediment Control Plan; • Groundwater Monitoring Program; and • Surface Water Monitoring Program. 	

Conditions		Addressed in Section
19.	The Site Water Balance must: <ul style="list-style-type: none"> include details of: Sources and security of water supply; Water use on-site; Water management on site; Any off-site water transfers; and Reporting procedures. 	Section 2.0
	(a) investigate and describe measures to minimise water use by the project.	Section 2.6
20.	The Erosion and Sediment Control Plan must: <ul style="list-style-type: none"> a) be consistent with the requirements of <i>Managing Urban Stormwater: Soils and Construction Volume 1, 4th Edition, 2004</i> (Landcom); 	Section 3.1
	b) identify the activities that could cause soil erosion and generate sediment;	Section 3.2
	c) describe measures to minimise soil erosion and the potential for the transport of sediment off site;	Section 3.2
	d) describe the location, function and capacity of erosion and sediment control structures; and	Section 3.2
	e) describe what measures would be implemented to maintain these structures over time.	Section 3.3
21.	The Surface Water Monitoring Program must include: <ul style="list-style-type: none"> a) baseline data on surface water quality, where available; 	Section 4.1
	b) surface water impact assessment criteria;	Section 4.2
	c) a program to monitor surface water quality (particularly in project sediment basins); and	Section 4.3
	d) a protocol for the investigation, notification and mitigation of identified exceedances of the surface water impact assessment criteria.	N/A
22.	The Ground Water Monitoring Program must include: <ul style="list-style-type: none"> a) detailed baseline data on groundwater levels and quality, based on statistical analysis (including available HWC data); 	Section 5.1
	b) groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts;	Section 5.2

Conditions		Addressed in Section
	c) a program to monitor groundwater levels and quality, including a groundwater core sample testing program to monitor changes in metallic species above the maximum predicted groundwater level at Lot 218 that;	Section 5.3 and 5.3.1
	(i) is developed in consultation with the EPA;	Section 5.3.1
	(ii) samples to a depth at least 2 m below the proposed extraction depth of 0.7 m above the maximum predicted groundwater level, from at least two locations within the area proposed to be extracted within the first 3 years; and	Section 5.3.1
	(iii) includes testing for acid forming minerals at regular depth and time intervals;	Section 5.3.1
	(d) a protocol for further groundwater modelling to confirm the limits to excavation depth across the site permitted in accordance with condition 7 of schedule 2; and	Section 5.4
	(a) a protocol for the investigation, notification and mitigation of identified exceedances of the groundwater impact assessment criteria.	Section 5.4

Table 1.2 Statement of Commitments

Conditions		Addressed in Section
Groundwater		
1.8.1	A Groundwater Management Plan will be developed prior to any sand extraction activities to the satisfaction of the Department in consultation with EPA. The Plan will include a groundwater monitoring program that includes quarterly monitoring of groundwater level and quality (electrical conductivity, pH, turbidity, arsenic, manganese and iron) at groundwater monitoring bores SP 1 to SP 6 as shown on Figure 4.7 of the EA. The results of the monitoring are to be commented on and compiled into an annual report.	Section 5.0 and 6.1
1.8.2	Any refuelling of equipment used for the proposal will be undertaken by a registered contractor to remove the need for on-site storage of fuels. No maintenance of equipment or storage of chemicals will occur at either site.	Section 1.4
1.8.3	Prior to sand washing being undertaken on-site access to a suitable water supply will be obtained and evidence of this will be provided to the Department. Prior to sand washing commencing a detailed Water Management Plan for the sand washing operation will be prepared and provided to the Department.	Section 2.1

Conditions		Addressed in Section
Surface Water		
1.9.1	Table drains and flow dissipation structures will be installed along on-site access roads as required in accordance with the Erosion and Sediment Control Regional Policy (Port Stephens Council 2002) and the Code of Practice for Managing Urban Stormwater – Soils and Construction (Landcom 2004).	Section 3.1. and 3.2
1.9.2	Site Water Management Plans for operations on Lot 218 and Lot 220 will be submitted for approval to the Department in consultation with EPA prior to the commencement of sand extraction activities. The Plan will include details on the storage and handling of chemicals on the sites including refuelling of mobile equipment.	Whole Document
1.9.3	Access roads will be constructed so as to not impede flood flows on Tilligerry Creek floodplain. The alternate access road will be sealed between Nelson Bay Road and the southern edge of the Tilligerry Creek crossing to minimise sediment generation and transport adjacent to Tilligerry Creek.	Section 2.1

1.4 Extraction Operations on Lot 218 and Lot 220

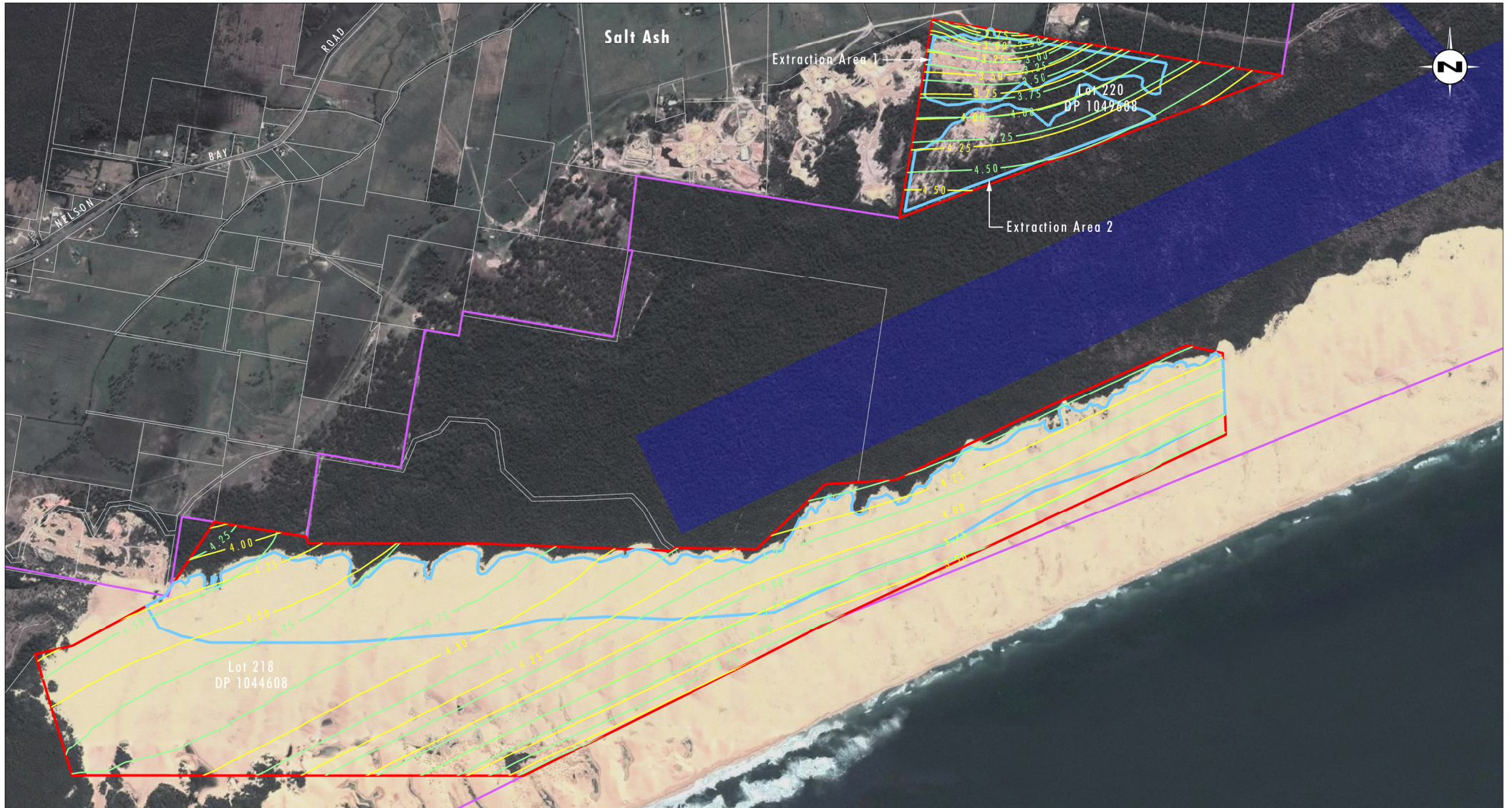
Extracted sand will either be loaded directly onto trucks using a front end loader or equivalent or will be screened on-site before being loaded onto trucks for transport off-site via Lavis Lane or the approved alternate haul route (Lot 218) or Oakvale Drive (Lot 220). Any sand processing on Lots 218 and 220 will consist of mechanical screening only of natural materials which poses limited potential to impact on surface or groundwater quality.

In accordance with the requirements of Condition 2 of Schedule 3 of PA 08_0142 (MOD 2), a Maximum Extraction Depth Map has been prepared and submitted to the DPE. Final landform will be maintained at a level of at least 1 metre above maximum predicted groundwater level and 2 metres above average groundwater level as depicted on the Maximum Extraction Depth Map (refer to **Figure 1.2**). Active extraction may occur to 0.7 metres above the maximum predicted groundwater level in accordance with PA 08_0142 (MOD2), Schedule 2, Condition 7 unless otherwise approved by relevant authorities.

Equipment will be refuelled on-site by an appropriately and qualified contractor in accordance with the Mackas Sand Operational Management Procedure (Umwelt 2013) with no fuel or oil being stored on-site.

The sand at extraction sites on Lot 218 and Lot 220 has high infiltration and permeability and as a result the site exhibits no surface drainage lines. The sand on-site has a typical particle size of 0.2 to 0.3 mm and is a Type C soil as defined in Landcom (2004).

A vegetated bund will be maintained along the northern edge of Lot 218 and Lot 220 extraction areas and will provide additional runoff control should runoff occur during extreme rainfall events.



Source: Google Earth (2012), Department of Lands (2003)

Legend

- ▭ Lot Boundaries (218 & 220)
- ▭ Approved Extraction Area
- ▭ North Stockton Catchment Area
- ▭ HWC Emergency Borefield Easement
- ▭ 2 metres above Average Groundwater Level
- ▭ 1 metre above Maximum Predicted Groundwater Level

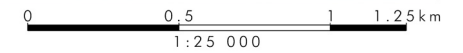


FIGURE 1.2

Maximum Extraction Depth Map
for Lot 218 and Lot 220

2.0 Site Water Balance

2.1 Water Use On-Site

The only water requirement for quarry operations on Lot 218 and Lot 220 is for dust suppression on the approximately 2.3 kilometres of unsealed haul roads, of which approximately 500 metres leads to Lot 220 and approximately 1800 metres leads to Lot 218 along the alternate access road.

PA 08_0142 (MOD2) includes the approval of an alternate route to access Lot 218. The approved access route to access Lot 218 will be constructed with an 8 metre wide combination of sealed (200 metres) and gravel (1.8 kilometres) pavement. On this basis, it is estimated that approximately 10 ML of water will be required for haul road dust each year. This water will be provided from off-site by a contract water cart or similar.

Additional water may be required for dust suppression on sand stockpiles at Lot 220. It is estimated that dust suppression of sand stockpiles will require in the order of 1 to 2 ML/year which will also be provided from off-site by a contract water cart or similar.

2.2 Sources and Security of Water Supply

As set out in **Section 2.1**, water demand for quarry operations will be limited to dust suppression needs with this water being provided by a contract water cart or similar.

2.3 Water Management On-site

Water management needs on-site are negligible with no surface runoff to be managed and water demands at Lot 218 and Lot 220 being met by the use of a contract water cart.

There will be no water storages constructed on either site as part of the current approval. There is no surface water runoff at either of the sites that requires diversion or specific management.

2.4 Off-Site Water Transfers

There will be no off-site transfers of water from the sand extraction operations on either Lot 218 or Lot 220.

2.5 Reporting Procedures

Mackas Sand will keep a record of any extraordinary water usage on-site and will compile and present this information as part of the Annual Review.

2.6 Measures to Minimise Water Use

Mackas Sand will continuously review water management on-site and where possible reduce water demand.

Measures to reduce water demand will include sealing or stabilising the surface of gravel haul roads to minimise dust suppression needs. The feasibility of this will be explored on an ongoing basis and any change to water management or water management requirements will be reported within the Annual Review.

3.0 Erosion and Sediment Control Plan

3.1 Managing Urban Stormwater (2004) Requirements

Managing Urban Stormwater: Soils and Construction Volume 1, 4th Edition, 2004 (Landcom) hereafter referred to as Landcom (2004) provides guidelines designed to minimise land degradation and water pollution at urban development sites in NSW. The eight general principles for achieving this during the construction phase of the Lot 218 alternate access road are:

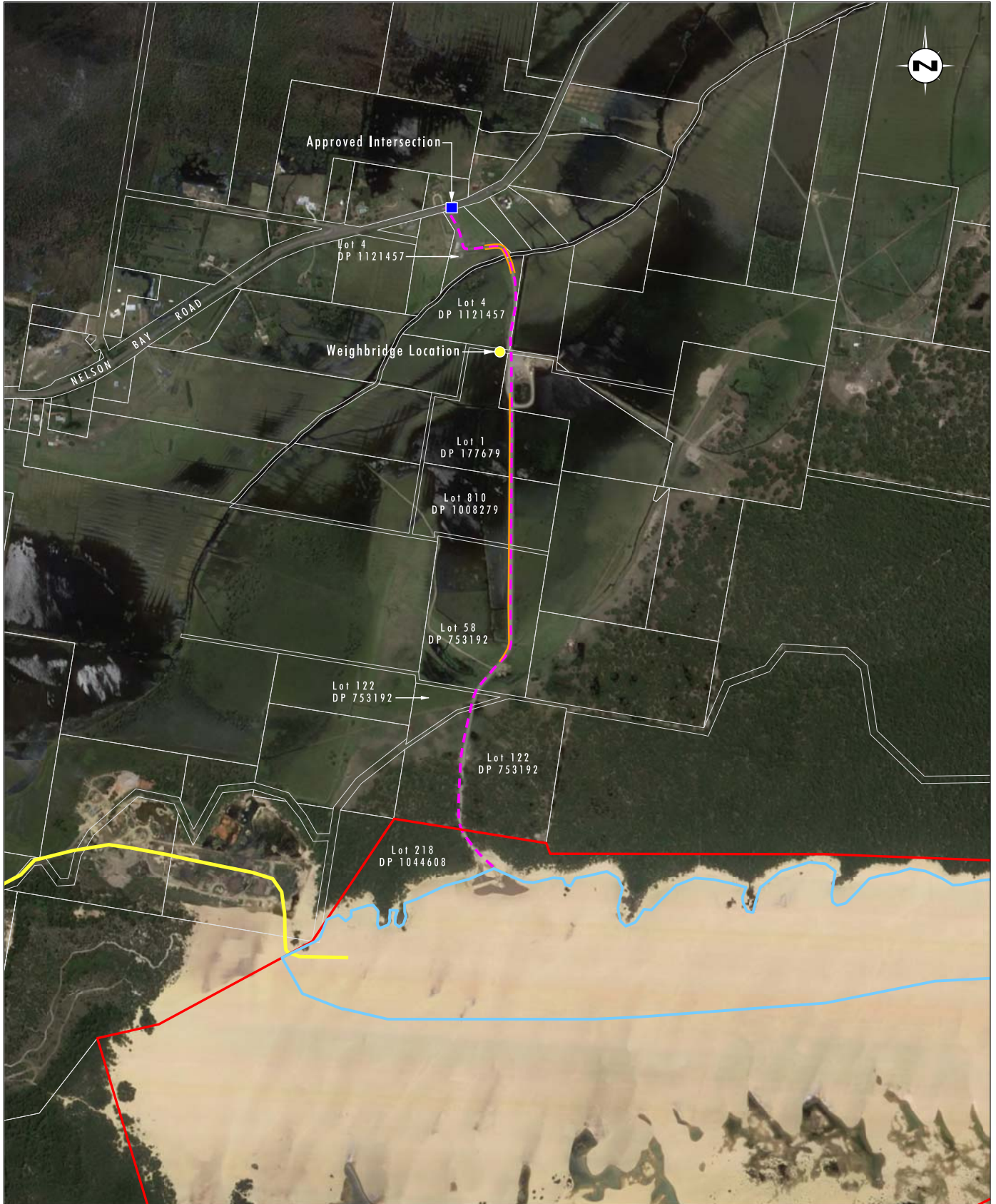
- (a) Assess the soil and water implications of the development including those related to ESD
- (b) Investigate the acid sulphate potential on lands near the coast where soil disturbance is likely to have an impact
- (c) Plan for erosion and sediment control concurrently with engineering design and before earthworks begin, ensuring proper assessment of site constraints and integration of various components
- (d) Minimise the area of soil disturbed and exposed to erosion
- (e) Conserve topsoil
- (f) Control water flow from the top of the development area, through the works and out the bottom of the site
- (g) Rehabilitate disturbed lands quickly
- (h) Maintain soil and water management measures appropriately during the construction phase.

This Soil and Water Management Plan has been prepared in accordance with these general requirements.

3.2 Potential Sources of Erosion and Sediment Generation and Their Controls

Construction of the alternate access road to Lot 218 has the potential to cause erosion and sediment generation. The approved alternate access route to Lot 218 from Nelson Bay Road traverses land on Lot 4 DP 1121457, Lot 1 DP 177679, Lot 810 DP 1008279 and Lot 58 DP 753129. The road will have grades ranging from 0% to 3% and will be constructed with a two way cross-fall with runoff from the road within 100 metres of drainage lines being directed to silt fence prior to dissipating onto the adjoining grassed/vegetated areas for the duration of construction (see **Figure 3.1**). Apart from the gravel road surface along the constructed haul route, there is negligible potential for sediment generation along this route. In addition, the weighbridge approved within the Environmental Assessment (Umwelt 2009) has been constructed in alignment with the approved alternate access road as depicted in **Figure 3.2**. The weighbridge is considered to generate negligible potential for sediment generation above that of the access road.

As discussed in **Section 2.0**, the extraction site on Lot 218 contains windblown sand and as a result there is no topsoil on the site that will require stockpiling or subsequent handling. In addition, as the site contains fine sand and negligible clay or silts that could be entrained in runoff from the site sediment basins. As a result the principal sources of sediment generation from extraction operations will be predominantly windblown sand from the extraction area and surrounding mobile dunes.



Source: Google Earth (2016)

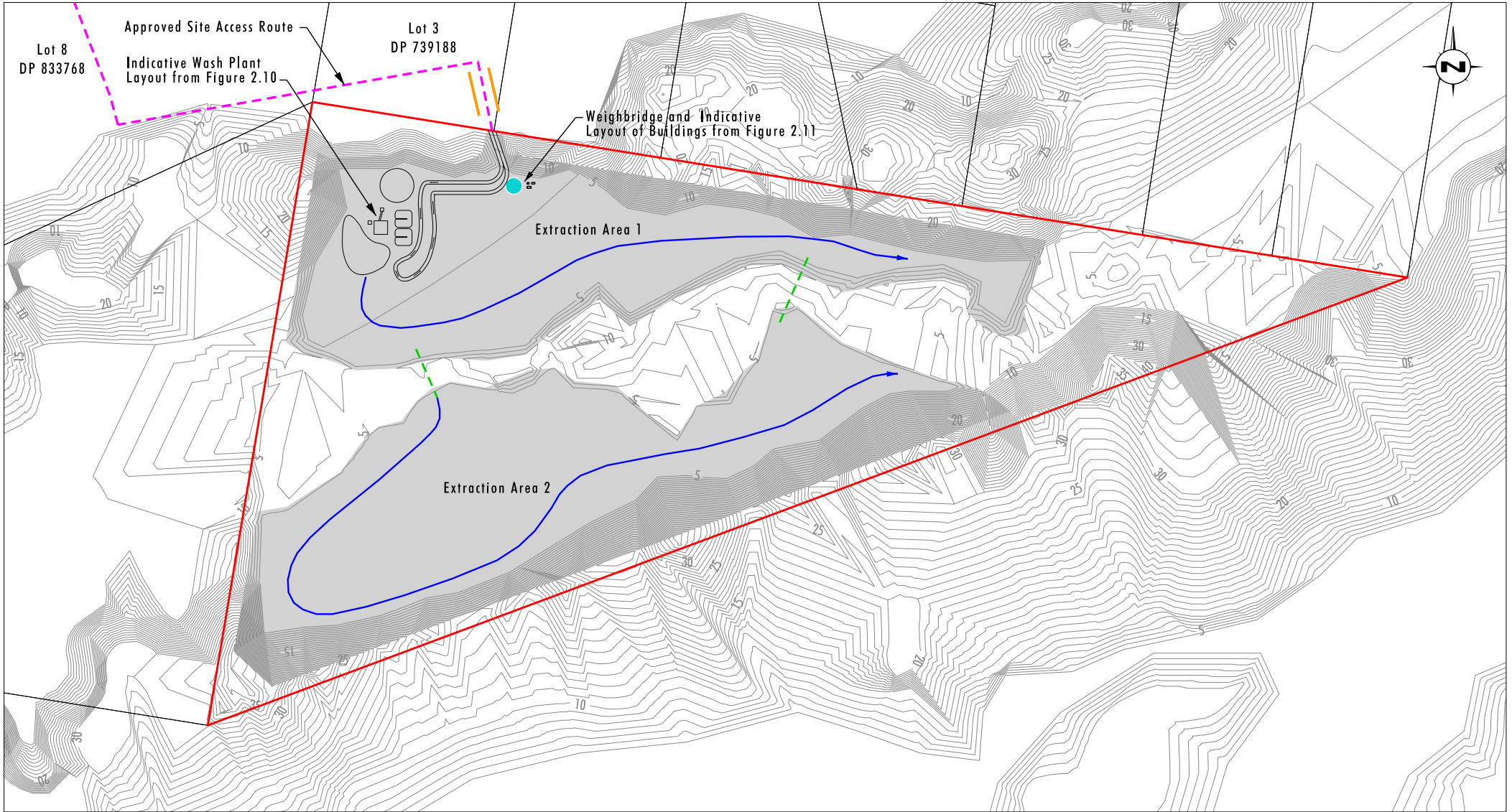
0 250 500 750 m
1:15 000

Legend

- ▭ Lot Boundary (218)
- ▭ Approved Operational Area
- ▭ Approved Site Access Route
- ▭ Lavis Lane Access Route
- Approved Intersection Location
- ▭ Silt Fence

FIGURE 3.1

Alternate Haul Route
Sediment and
Erosion Controls



Source: Department of Lands (2003)
Note: Contour Interval 10m

Legend

- Lot 220 Boundary
- - - Internal Access Roads
- - - Approved Site Access Route
- Direction of Extraction
- Silt Fence

FIGURE 3.2

Lot 220 Extraction Plan and
Silt Fence Locations

Erosion and sediment control for operations on Lot 220 have been implemented and will continue to be maintained through the life of the operation. Extraction operations on Lot 220 which is vegetated involves the stripping of the top 100 mm of sand material and stockpiling this around the perimeter of the extraction area for subsequent use in rehabilitation of excavation batters. There is also potential for sediment generation from the fine sediments on the 500 metre section of unsealed haul road accessing Lot 220. The access road ranges in elevation from approximately 2.0 mAHD to approximately 3.0 mAHD at the edge of the extraction area and will have grades ranging from 0% to 3%. The road has been constructed with a two way cross-fall with runoff from the road being directed to adjoining grassed area and silt fence in close proximity to drainage lines (see **Figure 3.2**).

The following additional erosion and sediment control principles will be implemented at Mackas Sand:

- temporary silt fences will be constructed immediately downslope of topsoil stockpiles at Lot 220 which have the potential to drain off site. Construction details for the silt fences are shown on **Figure 3.3**
- minimising all disturbed areas and stabilisation by progressive rehabilitation/stabilisation as soon as practicable
- clearly identifying and delineating areas required to be disturbed and ensuring that disturbance is limited to those areas. Clearing as little vegetation as required and minimising machinery disturbance outside of these areas
- construction of drainage controls such as table drains at roadsides and on hardstand areas and toe drains on stockpiles and emplacement areas
- interception of runoff from disturbed catchment areas in pit floors or sediment dams
- regular maintenance of all controls and inspection of all works weekly and following storm events, to ensure erosion and sediment controls are performing adequately
- immediate repair or redesign of erosion and sediment controls that are not performing adequately, as identified in field inspections.

For extraction on Lot 218, other than silt fencing along the edges of the alternate haul road alignment where necessary (see **Figure 3.1**) and the emplacement of the vegetated bund established along the landward side of the Lot 218 extraction area, there is no sediment and erosion control measures required as the haul roads are flat and have negligible potential for sediment generation or transport.

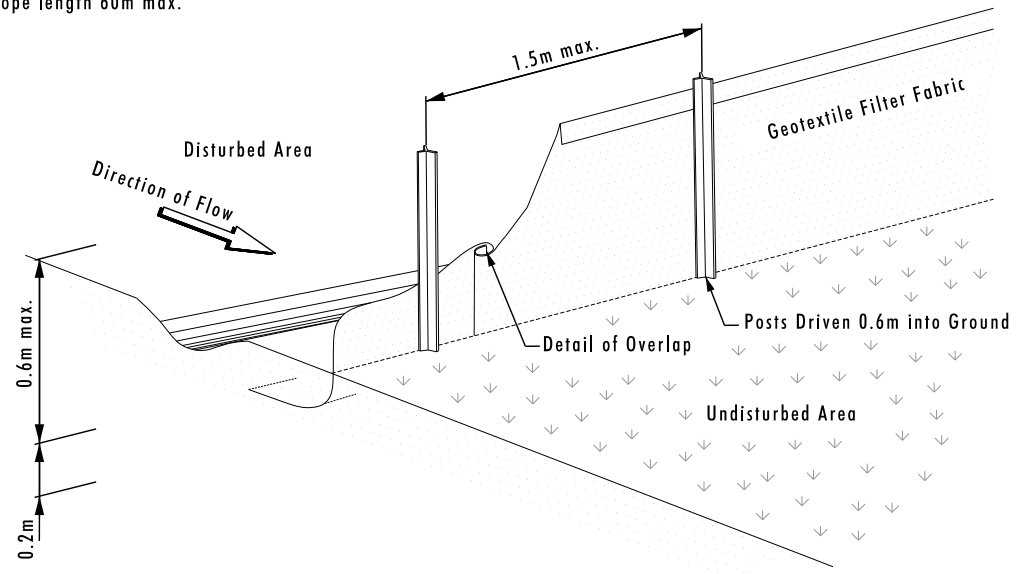
3.2.1 Site Inspection and Maintenance

The Quarry Manager is responsible for ensuring that inspections of the sediment and erosion control infrastructure is undertaken at least weekly and after rainfall events. The Quarry Manager's responsibilities include:

- a) ensuring that drains operate properly and that necessary repairs are undertaken
- b) maintaining sediment control measures in a fully functional condition until all earthworks are completed at the site and the site has been successfully rehabilitated to provide a stable non-erosive surface
- c) removing spilt sand to ensure that a minimum width of 5 metres is maintained between sand accumulations and areas of high flow concentration or ecologically sensitive areas

- d) removing trapped sediment from behind silt fences and level spreaders
- e) inspection of rehabilitated areas and maintenance of any erosion or rills that may occur from time to time
- f) constructing additional sediment and erosion control works where required to protect downslope areas if the implemented sediment and erosion controls are inadequate
- g) removing temporary sediment and erosion control structures as the last activity in the rehabilitation program
- h) keeping a weekly log book that will be kept as hard copy and records:
 - the occurrence of any high rainfall events
 - the condition of any soil and water management works
 - the condition of vegetation and any need to irrigate
 - the need for dust prevention strategies
 - any remedial works to be undertaken.

Drainage area 0.6ha. max.
Slope gradient 1:2 max.
Slope length 60m max.



Silt Fence

FIGURE 3.3
Sediment Erosion Control Structures

4.0 Surface Water Monitoring Program

4.1 Baseline Surface Water Quality

There are no surface flow or drainage lines on either Lot 218 or Lot 220 due to the high permeability of the underlying sand other than the man made shallow drainage channel that drains groundwater in an east to west direction along the northern boundary of Lot 220 and to the north and north-west of Lot 218. Groundwater is monitored as discussed in **Section 5.0**.

As a result there is no surface water that can be monitored to establish baseline conditions other than in low-lying areas that may intermittently be inundated when the groundwater level is high. As this water is intermittent and directly connected to the groundwater, it is considered that these areas would have water quality that is consistent with that recorded in the groundwater of the site as discussed in **Section 5.2**.

4.2 Surface Water Impact Assessment

There is negligible potential for surface water runoff from areas other than the access road and as a result no specific water quality criteria are required other than those determined for groundwater as discussed in **Section 5.2**.

4.3 Surface Water Quality Monitoring

The development has negligible potential to generate runoff or impact on surface waters. The base of the extraction area will be highly permeable and will be above the highest predicted groundwater level.

Surface water monitoring will comprise regular weekly visual inspection of silt fences to ensure that these don't become clogged with sediment and generate off-site runoff.

5.0 Groundwater Monitoring Program

5.1 Baseline Groundwater Quality and Levels

Groundwater levels recorded as part of Mackas Sand's operations until January 2014 are set out in **Table 5.1**. Note that groundwater quality results before 18 March 2011 are not considered valid due to high turbidity readings. Changes to monitoring practice from 18 March 2013 have ensured lower turbidity readings since this time. Also note that BL158 measurements have been taken from 10 April 2011 as a proxy bore for SP6 became covered by windblown sand of the mobile dune on Lot 218.

Table 5.1 Groundwater Baseline Data

	Scale	Date Commenced	Count	Min	Ave	Max
pH	pH Unit	18/03/2011	12	4.67	5.63	6.94
Conductivity	µS/cm	18/03/2011	12	84	201	541
Turbidity	NTU	18/03/2011	12	<0.1	4.6	32.2
Arsenic	mg/L	18/03/2011	12	<0.001	0.0012	0.004
Manganese	mg/L	18/03/2011	12	<0.001	0.0176	0.048
Iron	mg/L	18/03/2011	12	0.06	1.14	5.70
Level	mAHD	1/03/2010	28	0.25	2.09	3.37

Groundwater level monitoring in the vicinity of Lot 218 and Lot 220 is also undertaken by Hunter Water Corporation (HWC) at bores BL135, BL152, BL153, BL156, BL158, and BL159, which are considered nearby to operations (see Figure 1.2) and HWC recorded groundwater levels are set out in **Table 5.2**

Table 5.2 Hunter Water Corporation Groundwater Levels – mAHD

Date Range	Count	Min	Ave	Max
04/02/2010-12/08/2011	33	1.12	2.44	3.56

Recorded groundwater levels within or adjacent to Lot 220 (Monitoring Points SP1 to SP4) ranged from 0.25 mAHD (in the vicinity of the man made drain adjacent to SP4) to 2.94 mAHD while groundwater levels adjacent to the northern boundary of Lot 218 (Monitoring Points SP5 and SP6/BL 158) ranged from 1.89 mAHD at SP6 to 3.37 mAHD at SP5.

Analysis indicates that the groundwater profile at Lot 220 typically dips from the south (SP1 and SP3) to the north (SP4) indicating that groundwater drains towards Tilligerry Creek to the north of the site. Assessment against the maximum groundwater level predicted within Umwelt (2011) is presented in **Table 5.3**. It is noted that the maximum recorded groundwater levels at SP 2 and SP3 are marginally higher than the

predicted levels, however the difference is considered within a reasonable margin of error (<0.25 metres) and no further assessment of the maximum groundwater level and corresponding extraction level is required at this stage.

Table 5.3 Recorded and Predicted Maximum Groundwater Levels

Monitoring Point	Recorded Maximum	Approximate Predicted Maximum	Difference
SP1	2.45	3.6	-1.15
SP2	2.94	2.8	0.14
SP3	2.7	2.6	0.10
SP4	1.03	1.25	-0.22
SP5	3.365	3.6	-0.24
SP6	2.525	3.6	-1.08
BL158	3.125	3.7	-0.58

As summarised in Table 5.1, groundwater in the local area is typically acid (pH 4.67) to neutral (pH 6.94), has low conductivity (EC 84 to 541 $\mu\text{S}/\text{cm}$), turbidity levels are low (<0.1 to 32.2 NTU), low to moderate iron levels (0.06 to 5.7 mg/L) manganese ranged from <1 to 0.048 mg/L, and low arsenic concentrations (<0.1 to 0.004 mg/L). Analysis indicates that the groundwater in the study area does not comply with drinking water standards and would require treatment before use. This is consistent with previous monitoring of groundwater quality within the Stockton aquifer.

5.2 Groundwater Impact Assessment Criteria

The sand extraction operations on Lot 218 and Lot 220 are located within the North Stockton Catchment Area (see **Figure 1.1**) which have the potential to used as an emergency drinking water supply in the future. Water quality within the North Stockton Catchment Area does not currently comply with the Australian Drinking Water Guidelines (ADWG) 2011, as presented in **Table 5.4**.

Table 5.4 Australian Drinking Water Guidelines 2011

Parameter	Recommended Limit/Range
pH	6.5 – 8.5
Turbidity (NTU)	5
Fe (mg/L)	0.3
As (mg/L)	0.01
Mn (mg/L)	0.1

Groundwater in the North Stockton Catchment Area is capable of being used for drinking water supply following treatment. Treatment of the groundwater from the North Stockton Catchment Area typically involves pH adjustment and reduction of heavy metals such as iron, manganese and arsenic.

The ANZECC (2000) guidelines recommend that impact assessment criteria (trigger values) be used as a yardstick against which to compare the results of water quality monitoring and suggest that when monitoring results fall outside the impact assessment criteria there is a possible risk to environmental value and further action should be taken to investigate or address the cause. The impact assessment criteria are not exceedance criteria but are used to initiate investigations into the groundwater quality. Setting appropriate impact assessment criteria is a key issue in identifying and managing changes in groundwater quality.

Given that baseline groundwater levels are highly variable and largely outside of the ADWG 2011, trigger values have been developed based on the amount of treatment that would be required for groundwater to be compliant with ADWG 2011, based on existing groundwater quality, and potential impacts to quality due to operations.

Potential impacts to groundwater quality due to operations include:

- risks from acid sulphate soils (ASS), which can be identified through lowered pH and elevated arsenic levels
- fuel spills, identified through regular observation.

Taking into consideration the existing groundwater quality, potential impacts due to operations, and the ADWG 2011, trigger values for further investigation are presented in **Table 5.5**.

Table 5.5 Groundwater Investigation Trigger Values

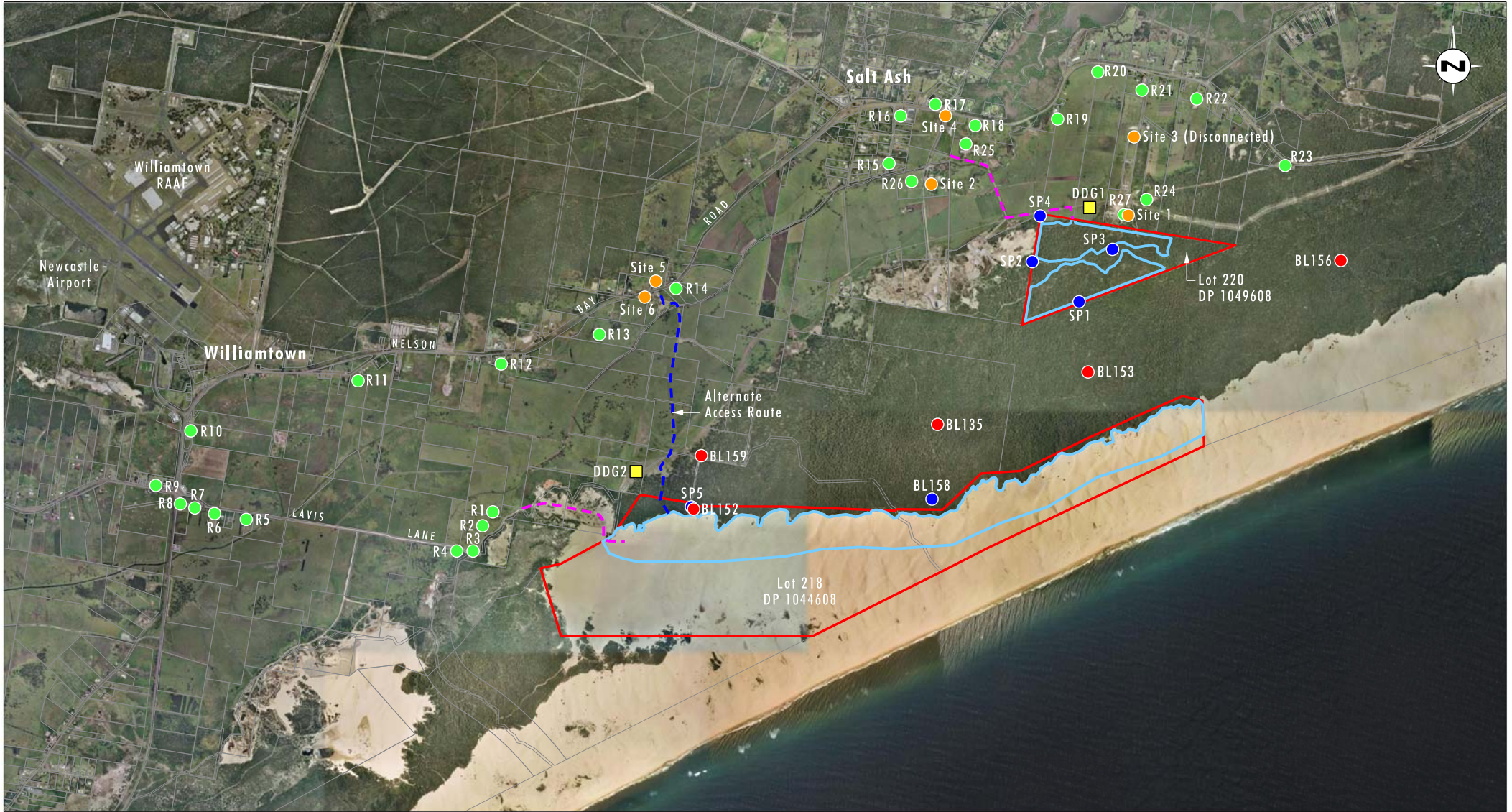
		Min	Max
pH	pH Unit	4.5**	8.5*
Conductivity	µS/cm	NA	600**
Turbidity	NTU	NA	50**
Arsenic	mg/L	NA	0.01*
Manganese	mg/L	NA	0.1*
Iron	mg/L	NA	5.70**

*these values based on ADWG 2011

** these values based long term groundwater monitoring from a previous operation in the local area

5.3 Groundwater Monitoring

In accordance with the requirements of condition M2 of EPL 13218 groundwater levels and groundwater quality will be monitored quarterly at the six monitoring bore locations (SP1 to SP5 and BL158), this monitoring data will be reviewed as necessary (refer to **Figure 5.1**).



Source: Department of Lands (2003)

0 0.5 1 2 km
1:45 000

Legend

- Lot Boundaries (218 & 220)
- Approval Area
- Approved Site Access
- Alternate Access Route
- Noise Monitoring Location
- Dust Monitoring Location
- EPL Groundwater Monitoring Location
- Hunter Water Groundwater Monitoring Location
- Residential Receivers

FIGURE 4.1

Mackas Sand Monitoring Locations

Groundwater depth and quality will be monitored quarterly at selected bores for the life of the operation for the following groundwater quality parameters:

- Level (mAHD)
- pH (Lab)
- conductivity ($\mu\text{S}/\text{cm}$)
- arsenic
- iron
- manganese
- turbidity.

5.3.1 Groundwater Core Sample Testing Program

In order to monitor the potential for impacts to ASS due to the lowering of the extraction height to 0.7 metres above the predicted maximum groundwater level approved under PA 08_0142, Mackas Sand has developed a groundwater core sample testing program for operations at Lot 218. The program was developed in consultation with the Environment Protection Authority (EPA) through the Environmental Assessment process. A separate document has been prepared that details the requirements of the Groundwater Core Sample Testing Program.

5.4 Groundwater Reporting and Contingency Measures

Quarterly results will be compiled and analysed to check for unforeseen impacts or trends in groundwater level or quality with reference to the trigger values in **Table 5.5** and the predictions made in Umwelt (2011). A short report will be prepared quarterly and provided to the Quarry Manager who will implement any necessary changes or controls that may be required.

Groundwater data will be reported annually within the Annual Review. If any unexpected trends in groundwater quality are observed or the trigger values outlined in **Table 5.5** are exceeded by less than 10% of each value, the reason for the unexpected trends or exceedances will be explored, potential contingency measures will be developed. If exceedances of more than 10% of each value occur, the reason for the unexpected trends or exceedances will be explored, potential contingency measures will be developed and a report will be prepared and submitted to the DPE and other relevant agencies (currently HWC, DPI-Water, and the EPA) in accordance with Section 6.3 and the Mackas Sand Pollution Incident Response Management Plan (PIRMP). This may include additional groundwater modelling to confirm the limits to excavation depth in accordance with Schedule 3, Condition 22 (d) of PA 08_0142.

6.0 Reporting and Review

6.1 Reporting

Mackas Sand will regularly assess groundwater level and quality from quarry operations and will keep a log of any incidents that have the potential to adversely impact on the groundwater level and quality of surrounding privately owned land. The Mackas Sand Quarry Manager will investigate any complaints and any exceedances of the water quality impact assessment criteria.

An Annual Review will be prepared and submitted to the Secretary and relevant agencies in accordance with the requirements of Condition 4 of Schedule 5 of PA 08_0142 (MOD 2). The Annual Review will include an assessment of observations and incidents recorded in the Quarry Manager's log book and the results of groundwater level and quality monitoring. This will include any investigations that have been undertaken to address unforeseen impacts and contingency/mitigation measures that have been implemented to address these unforeseen impacts.

The Annual Review and noise monitoring results will be made publicly available on the Mackas Sand website (www.mackassand.com.au) in accordance with Condition 9 of Schedule 5 of the Project Approval.

6.2 Complaints Handling

In accordance development consent and EPL requirements, Mackas Sand has established a 24 hour complaints line. The number is **0408 490 911** and is listed on the Mackas Sand website (www.mackassand.com.au).

Complaints received on the number will be directed to the Quarry Manager who will respond to the complainant within 24 hours if the complainant is contactable. A record of all complaints will be kept on-site and published on the Mackas Sand Pty Ltd's website.

All complaints and information in regard to responses will be provided to the CCC. One of the functions of the CCC is to review complaints or disputes between Mackas Sand and members of the community.

6.3 Incident Reporting Protocol

Condition 2 of Schedule 5 of PA 08_0142 MOD2 requires any exceedances of limits/performance criteria within the approval to be reported to DPE within 24 hours of the exceedances being recorded. This included any incidents that cause (or may cause) material harm to the environment.

Following the reporting of an exceedance or incident to the DPE and other relevant agencies, Condition 3 of Schedule 5 of PA 08_0142 MOD2 requires the proponent to prepare a written report of the exceedance within six days of the exceedance being reported. The written report must contain:

- a description of the date, time and nature of the exceedance
- identification of the cause (or likely cause) of the exceedance
- a description of actions taken to date
- a description of the proposed measures to address the exceedance.

In the event of any exceedances or incidents which cause or may cause material harm to the environment, Mackas Sand will report in accordance with the requirements of Conditions 2 and 3 of Schedule 5. The Quarry Manager will be responsible for ensuring these reporting requirements are complied with.

6.3.1 Material Harm Incidents

Mackas Sand is committed to minimising any potential for material harm to the environment and surrounding community. A PIRMP has been developed for Mackas Sand operations which outlines the response and notification procedures in the event of a potential material harm incident. In addition to reporting required by Condition 2 of Schedule 5 of PA 08_0142 (MOD2) incidents resulting or having the potential to result in material harm to the environment, (as defined by Section 147 of the Protection of the Environment Operations Act 1997) shall be reported to the following authorities (as relevant) as soon as it is safe to do so:

- the Appropriate Regulatory Authority (ARA)
- the EPA – Environment Line (if not the ARA)
- the Ministry of Health
- WorkCover
- the Local Authority (Council) if not the ARA
- Fire and Rescue NSW.

The information about a pollution incident that must be notified includes:

- the time, date, nature, duration and location of the incident
- the location of the place where pollution is occurring or is likely to occur
- the nature, the estimated quantity or volume and the concentration of any pollutants involved, if known
- the circumstances in which the incident occurred, including the cause of the incident, if known
- the action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution, if known.

6.4 Records

In accordance with EPL condition M1.2, monitoring records will be maintained on site for at least four years.

In addition, the following records must be kept in respect to any samples required to be collected as per EPL condition M1.3:

- date(s) on which the sample was taken
- time(s) at which the sample was collected

- the point at which the sample was taken
- the name of the person who collected the sample.

6.5 Review

The SWMP is to be reviewed in accordance with Condition 4A and Condition 7 of Schedule 5 of PA 08_0142, or as directed by the Secretary of DPE. The review process is to reflect changes in environmental requirements, technology and operational procedures.

7.0 References

ANZECC (2000), Australian and New Zealand Guidelines for Fresh and Marine Water Quality, October 2000.

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NHMRC & ARMCANZ (1996), Australian Drinking Water Guidelines – Summary. National Health and Medical Research Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra, ACT.

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Umwelt (Australia) Pty Limited (2009). Environmental Assessment of Sand Extraction Operations from Lot 218 DP 1044608 and Lot 220 DP 1049608, Salt Ash.

Umwelt (Australia) Pty Limited (2011). Determination of Maximum Predicted Groundwater Level and Maximum Extraction Level at Lot 218 and 220, Salt Ash.

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APPENDIX 4

Unexploded Ordnance Management Plan



A.C.N. 008 434 222

Gibson Nominees Pty. Ltd.

One-stop Seamless Strategic Support

For

Umwelt (Australia) Pty Ltd
Environmental Consultants
Post Office Box 838
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**UNEXPLODED ORDNANCE MANAGEMENT PLAN
FOR THE EXTRACTION OF WIND-BLOWN SAND
FROM LOT 218 IN DEPOSITED PLAN 1044608
AT WILLIAMTOWN NSW**

September 2011

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PREFACE

The Department of Defence (Defence) has established and sponsors the Defence Unexploded Ordnance Panel (DUXOP), to which a group of specially trained and skilled commercial ammunition search and technical contractors and consultants have been accredited (see <http://www.defence.gov.au/uxo/duxop.asp>). The primary role of the DUXOP is to provide UXO assessment, search and clearance services to Defence and to other Commonwealth departments. Accreditation to the DUXOP is frequently seen as a pre-requisite for the provision of such services outside Defence, including by some State Government Departments and by some commercial entities.

This Plan has been prepared by Gibson Nominees Pty Ltd. The company is not a member of the DUXOP. It does, however, provide an extensive range of strategic-level UXO-related services to Defence and, on occasions, other State and Territory departments.

A principal service provided by Gibson Nominees is assistance with establishment and maintenance of the DUXOP. This has involved assessment of proposals from companies aspiring to DUXOP membership. Having been privy to the confidential technical, commercial and financial details of each DUXOP tenderer, a significant conflict of interest were to arise if Gibson Nominees were to be accredited and permitted to commercially compete with other DUXOP members. Consequently, the company, although otherwise qualified, has not applied for DUXOP accreditation.

Gibson Nominees continues to provide a wide range of UXO-related consultancy services to Defence and other departments under a provision which allows the Commonwealth to engage a UXO consultant ex-Panel when it is in the interests of the Commonwealth to do so.

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APPENDIX:

1. Thomas, D.G. and Edwards, L.D. (2005): A Qualitative Screening Risk Assessment of Unexploded Ordnance-Affected Sites in Australia. Department of Defence, Canberra (unpub.).

EXECUTIVE SUMMARY

Mackas Sand Pty Ltd proposes to extract commercial grade windblown sand from Lot 218 in DP 1044608 on Stockton Beach near Williamtown NSW. Land within that title has been assessed by Department of Defence as potentially contaminated by unexploded ordnance (UXO), a legacy of World War II operational and training activities.

This paper summarises the military land use history of Lot 218 and adjacent properties. Gibson Nominees Pty Ltd has drawn on a number of sources of expert advice in the preparation of this plan.

The military land use summary identifies many of the types and natures of ammunition that were fired on the beach, malfunctioned items of which may be remnant on the land. Pictorial examples of these items are provided, both in new condition and in a condition following extensive exposure to the elements. It also examines the morphology of the site, especially in respect to the effect of mobile sand on UXO items that are potentially present.

The paper applies a qualitative screening risk assessment model, which has been developed by Department of Defence, to the site which indicates that the potential for UXO to be present in part of a former impact area on the land is substantial (although this impact area does not fall within the approved sand extraction area). Potential in other areas in the title vary between moderate and slight. However, the Macka's Sand proposal asserts that only windblown sand deposits laid down since the mid 1950's would be extracted. On that basis, the potential for hazardous items to be remnant within those levels in the approved extraction area has been assessed as slight.

The paper also suggests a plan to manage the potential UXO incidence. Pre-extraction search and clearance is not recommended and the plan details a number of precautionary measures to be observed by management and staff. These include a requirement for UXO search and clearance in any location in the former range danger area where excavation is necessary below the 1950's wind-blown sand deposition level. The plan also provides recommended action in the event that either a UXO item or evidence of an impact area is discovered.

The paper containing the Department of Defence Risk Assessment model is provided as an appendix.

1.0 INTRODUCTION

Macka's Sand Pty Limited, a company experienced in the extraction of commercial grade sands, proposes to extract windblown sand from the mobile beach dune area within Lot 218 in Deposited Plan 1044608, Parish of Stowell, County of Gloucester at Williamtown, NSW. The company is aware that the subject area is potentially contaminated by unexploded ordnance (UXO) which may pose a hazard to personnel and equipment engaged in extractive and processing procedures.

This paper summarises the military land use history of the Macka's Sand and adjacent properties. It outlines the factors which may have resulted in the legacy which may present hazards to the proposed operation. It provides an assessment on the nature and the possible effects of the hazard and on resultant risk magnitude and proposes a management plan designed to minimise the potential risk.

Gibson Nominees Pty Ltd has drawn on a number of sources of expert advice in the preparation of this plan¹. The expert ammunition technical opinions provided, based on the assessment of the historical research undertaken, indicates that given the inception of some simple safe working practices, the hazard posed by UXO is insufficient to prevent the proposed project.

2.0 SITE HISTORY – The Background Setting

By mid-1942, the Australian Government was forced to accept that for the first time in the history of white settlement, it may be about to become committed to a land battle on the Australian mainland. Japanese assets had bombed Darwin and on June 7 of that year, Newcastle was shelled by a Japanese submarine surface armament from Stockton Bight.

At this time, Australia was committed to denying Japanese access to the mainland by halting the latter's advance in New Guinea. Already hampered by losses associated with the fall of Singapore, the build-up of assets in the south-west Pacific was not yet complete. It was doubted that any Japanese incursion onto Australia's north-eastern coast line and a subsequent southern advance in strength could be contained well to the north and even more doubtful that it could be repulsed. The Australian strategy was to establish a series of delaying positions forward of a number of major defence lines with the intention of not only denying the enemy access to the developed centres but also to force him to expend valuable resources which were not easily resupplied from Japan's domestic support base over the distance involved. One such major defence line ran east-west through and south of Brisbane. A second such line was immediately north of Newcastle. An assessment had been made that any land force invasion would aim for the rapid acquisition of Australia's industrial centres in order to support further operations. Newcastle and Wollongong were assessed as priority objectives.

¹¹ The site history review and the identification of the natures and types of UXO which are possibly remnant has been drawn from a report by David Thomas, who as Staff Officer Grade 2 (UXO) at Headquarters 2nd Military District in 1988, completed a site assessment of those areas on Stockton Beach known or suspected to be UXO-affected.

The possibility that the more northerly defensive lines may fall, but more particularly be by-passed in a marine-borne operation was well realised. Likely landing sites were identified, with Stockton Beach being assessed as a suitable point of entry. On the establishment of a beach head toward the northern end (local defence and sea conditions being more favourable) an invading force would advance in strength parallel to the coast. It would be constrained by the sea on the left flank and Port Stephens and the Hunter River estuary on the right and would be confronted by delaying positions firstly on a line Tilligerry Creek to the sea in the vicinity of Salt Ash and a major defensive line from Fullerton Cove to the sea north of Fern Bay. The proposed sand extraction site lies between these two lines.

Both the Salt Ash and the Fern Bay lines were in range of a coastal battery of three 9.2 inch guns at Fort Wallace and at least one 6 inch gun at Fort Scratchley could bear on targets in the vicinity. Defensive targets on the Stockton and Tilligerry Peninsulas were probably registered by these batteries. In addition to these fixed batteries and given the likelihood that any incursive attempt would be supported by air assets, the north-eastern approaches to Newcastle were also defended by at least three mobile heavy (3.7 inch) anti-aircraft batteries.²

The Newcastle Defence Line was manned principally by infantry elements, but supported by other arms, including field artillery (18 and 25 pounder [pdr]) and both heavy (3.7 inch) and light (40mm Bofors) anti-aircraft artillery. It is likely that had these defences ever been operationally tested, armour and anti-armour assets (mounting principally 37mm, 2 pdr and 6 pdr weapons] would have deployed to augment the defence. Department of Defence records do not indicate, however, that these calibres were ever fired in other than a proof (testing and calibration) capacity. 20 Garrison Battalion, which was the principal infantry unit manning the line, is believed to have had a considerable mobile (truck mounted) capability. This suggestion is supported by the road construction and improvements (some of which are still evident today) through the vegetated dune system. It is reasonable to assume that a number of alternate delaying positions well forward of the defence line proper were established with a view to a planned fighting withdrawal to the main line if necessary. The pertinent factors in this observation include the likely support of not only the delaying actions by the battalion's mortar platoon (4.2 inch and possibly 3 inch mortars) and the battalion's lighter 2 inch mortars, but also their covering any planned withdrawal. Given that these scenarios were rehearsed, some ammunition of these calibres must be assumed to have impacted in the vicinity of the extraction site.

2.1 Proofing Activities

In 1942, prior to the inception of the Newcastle Defence Line, an ammunition and armour plate proof facility was established between what became the defence line and the former Stockton Rifle Range. The proof range proper was used up until the 1960's, primarily for the proof of armour plate and armour piercing kinetic attack

² Australian War Memorial (AWM) file 54-243/18/15 – Operational log books – Newcastle fortress (6 vols) from 12 March 1942 to 14 May 1944. However, the Newcastle Fortress Logbooks, which recorded all large calibre live fire activities in the Newcastle area, show no evidence that the land targets registered from Forts Wallace and Scratchley were ever engaged with high explosive ammunition. Similarly, all practices fired by the 3.7 inch anti-aircraft batteries were directed seawards.

(free from explosive) projectiles which were usually caught in massive sand traps and concrete butts behind the target³. The potential for explosive-filled projectiles originating from within the armour plate proof range to terminate in Lot 218 is consequently considered negligible.

One such proof activity which is pertinent, however, concerns the firing of high explosive (HE) artillery projectiles from locations east and north of the former rifle range along Stockton Beach in conjunction with proof and experimental trials. Proof rounds were fired to test or calibrate weapons, propellants or projectiles and/or components. When proofing involved weapons or propellant, it was not usual for HE-filled projectiles to be used. At Fern Bay, proof projectiles, filled with an HE substitute (HES - sand or pitch) and fitted with empty fuze bodies (or plugs that represented fuzes) were made up in order that their ballistic characteristics could be expected to be similar to HE-filled projectiles. Many of those projectiles which have been found over time have, therefore, given every external appearance of being HE-filled items and should be treated as such. Only when explosive demolition or intrusive measures were attempted the inert HES filling was discovered. At other times, however, it was necessary to use HE-filled projectiles for proof. During the period late 1943 to early 1946, proof of fuzes No 117 using 25 pdr filled HE as the proof vehicle was carried out on Stockton Beach⁴. Defence records indicate that a number of these projectiles failed to function as designed⁵.

In addition, some otherwise inert projectiles are believed to have been fitted with red phosphorous smoke boxes. This marking device gave off a puff of white smoke when the projectile impacted, thus assisting observation and plotting of the fall of shot. The smoke box is capable of inflicting burns if such a projectile is interfered with.

2.2 Mortar Firings (Macs Track)

It is known that other firings took place in the Stockton area, not associated with proofing, and that some mortar firings onto the beach took place from the Macs track area⁶. The suspected impact area may have included Lot 218.

2.3 Firing from Williamtown Area

Interviews with local inhabitants at the time have revealed definite recollection of 25pdr artillery firing from Williamtown onto the beach. A resident (now deceased) interviewed claimed to remember watching shells impact into the sand dunes on the beach⁷. This information is corroborated by an entry in the Newcastle Fortress

³ Sinclair, Knight and Partners (SKP) for the Housing Commission of New South Wales, September 1983: 'Investigation of the presence of unexploded ordnance and feasibility of detection and clearance – site 4600 Fern Bay'.

⁴ Thomas, D.G. for Department of Defence (Army) May 1988: 'Unexploded ordnance site assessment – Stockton Rifle Range, Fern Bay Armour Plate Proof Range, Stockton Beach artillery proof range and Morna Point air weapons range.'

⁵ Letter, Deputy Master-General of Ordnance Eastern Command to Quartermaster General's Branch (E259/1/186), January 1962.

⁶ Deputy Master General of the Ordnance (DMGO) B259/1/186 of 12 January 1962.

⁷ Thomas, 1988. *Ibid.*

Logbooks of 28 January 1943⁸. It is possible that at least some of these projectiles terminated within Lot 218.

2.4 Newcastle Fortress Logbook Records

The logbook records of the Newcastle coastal defence system provide valuable insight to many aspects of military activity from Port Stephens to the central coast from March 1942 to May 1944 (by which time the Japanese threat to Newcastle had passed). It appears that while the Fortress Headquarters may not have been the approving authority for many of these activities, it played a key role in their coordination. As a result, outlines of many activities were recorded by fortress staff. Of relevance is the indication that impact areas for those coastal defence and training tasks which were fired were bounded, in part, by the high water mark. Consequently it would appear that Stockton Beach was not engaged by HE-filled ammunition from either Fort Wallace or Fort Scratchley. There are, however, records of proof firings and it is possible that as part of these, projectiles may have needed to be recovered. In this case, it is possible (but no-where has it been found to be confirmed) that they impacted on Stockton Beach. In this unlikely event, while any finds should be treated with due caution, it is likely that any hazard would be minimal from these sources.

2.5 3.7 inch Heavy Anti-Aircraft (HAA) Batteries

Newcastle was defended against air attack by wheeled 3.7 inch HAA weapons in a number of locations including the former Stockton rifle range, Cox's Track and Fern Bay. The 3.7 inch gun could traverse through 36 degrees horizontally and in excess of 180 degrees in the vertical plane. The danger areas for practices using these weapons were generally 22,000 yards (20km). Ammunition was fitted with a fuze which was designed to function the projectile (mainly HE or illumination) after a pre-set time of flight or, in later versions, on reaching a particular altitude. Non-operational procedures for the firing of these weapons imposed a left and right of arc (described as bearings) with all practices logged by the Newcastle Fortress as firing seaward. Consequently, unless these weapons engaged targets in anger (of which there is no record) any projectile that failed to function would have fallen into the sea. Some fragmentation which may have been from 3.7 inch projectiles which did function in the air over the beach has, however, been recovered in the past. However, from the records available, it would appear that negligible hazard is remnant from this source.

3.0 MORPHOLOGY

The effect of landform frequently contributes strongly to the characterisation of UXO-contaminated sites. However, it is probable that the dynamic effects of the landform in the dunal area proposed for sand extraction in this instance are difficult to equal. Firstly, many of the military activities which occurred on Stockton beach probably had little or no effect on the subject site. Those items which may have impacted on the land and failed to function as designed (principally 25 pdr and infantry support weapons such as 4.2 inch and 3 inch mortars and possibly hand grenades) have a

⁸ AWM File 54-243/18/15. *Ibid.*

maximum ballistic penetration depth of not more than two metres in sand⁹, which in most locations is insufficient to reach or penetrate the harder sedimentary ‘core’ of the dunes.

Due to the potential for the incidence of aboriginal heritage material being present on the land, the Environmental Management Strategy for this project¹⁰ indicates that sand will only be extracted from the post 1950’s level of windblown sand deposits with extraction not occurring below the underlying relict soil profile unless further archaeological investigation is undertaken. It is intended that a depth buffer of not less than 50cm of windblown sand from the mobile dune be maintained over the relict soil surface. In the event that a stabilised soil surface is exposed during extractive activities, works will cease in that location. At first appearance, these measures would seem to offer concurrent protection from the hazards of UXO. The rationale is that as the windblown deposits were laid down after the cessation of World War II hostilities, it is not possible for the material to be mined to contain UXO. However, this is not necessarily the case.

The effect of sand mobility in the high dunes at Stockton extends to many times the ballistic penetration depth of ordnance likely to be remnant. In 1989, a 3-metre long survey marker was placed in the summit of a dune to a depth at which the top 10cm protruded. The sand mobility was such that three weeks later, it had fallen over¹¹. This drifting effect results in complete items being covered by considerable (and unpredictable) depths of sand for long periods. With sand movement, some eventually become uncovered and a few may be discovered and disposed of. More importantly, however, those which become uncovered on a slope (such as the face of a wind-exposed relict dune) are likely to gravitate downslope once sand support around it is eroded. It is likely that such an item will then terminate in wind-blown deposits at the base of the relict dune as was in and prior to the 1950’s and at a level where it will once again become buried.

Consequently, there is some potential for hazardous material to be remnant in windblown sand deposits, particularly in the vicinity of the feet of relict dunes.

The Environmental Management Strategy for the project advises, however, that the windblown dunes are advancing inland at an approximate rate of 5 metres per year. In locations that are well away from 1950’s relict dunes, our assessment is that the potential for hazardous material resulting from World War II activities to be remnant is negligible.

4.0 OBSERVATIONS AND DEDUCTIONS

In 1995, all available Department of Defence Explosive Ordnance Incidence reports outlining finds on the southern end of Stockton Beach over the previous twenty years were reviewed as part of a study by ADI Limited¹² as part of planning by Mineral

⁹ Adaption of US Army Corps of Engineers data.

¹⁰ Umwelt (Australia) Pty Ltd (2009): Environmental management strategy for sand extraction at lot 218 and lot 220, Salt Ash, NSW. December.

¹¹ Thomas, D.G. (1989) for Department of Defence (Army): Post Operation Report – Operation ‘Sandsifter’.

¹² ADI Limited (1995): Site history review – hazard identification and assessment within proposed mineral sand extraction area in Crown reserve at Fern Bay, NSW.

Deposits Ltd to mine mineral sands at the southern end of Stockton Beach. They showed that incidental discoveries had become more frequent in the years immediately prior to 1995. From April 1974 until September 1983, ten reports were filed while from then until May 1994, 23 such reports were recorded¹³. The review noted that it was not considered that more items were becoming uncovered with time, but that increased public usage, awareness and possibly increased emotive sentiment in respect to the UXO issue may have been contributing factors. Two matters were, however, worthy of note. Firstly, of the 55 finds recorded, only 17 were assessed as *possibly having the potential* to have explosive fill or pyrotechnic (i.e., such as tracer or smoke box) components¹⁴. Of this 17, 11 must be assumed to have been filled, two of which (primer and fuze) are minor components in terms of fill quantity. The second matter is that of all of the 3.7 inch anti-aircraft projectiles reported by the Newcastle Fortress log books to have been fired, not one malfunctioned item has come to light, no doubt due to the primary danger areas being seaward.

Further examination of the nature of finds and the narratives provided with the reports established that at least 75% of the items reported had been recovered from, or in the vicinity of, the former armour plate proof range. Finds of some larger calibre (principally 25 pdr) ordnance must be assumed to have resulted from proofing activities on the beach artillery range.

Finally, in the years after 1995, extensive parts of the southern area of Stockton Beach were mined for mineral sand. The UXO management plan implemented for those operations was such that any ordnance-related material of greater than 75mm diameter was screened from extraction plant and deposited at the bottom of a dredge pond. The progressive re-filling of the dredge pond saw this material buried at depths from which they are never likely to re-surface.

As a likely consequence of this mining activity, a review of post 2000 Explosive Ordnance Disposal Reports held by Department of Defence indicates that significantly less finds are being made on the southern parts of Stockton Beach.

It should be noted, however, that Lot 218 does not fall within that area from which mineral sands were previously extracted. Consequently, any remedial action co-incident to the mineral sands extraction activity does not include the land title of interest.

4.1 Likely Incidence Levels, Natures and Types

From the data to hand, it appears that only a minor part of Lot 218 falls within a former impact area and that area is outside the proposed extraction area (see Figure 1.). Approximately half of the land is within a former 'danger area' (i.e., a buffer area into which projectiles that overshot or otherwise failed to terminate in the impact area could be expected to impact). In the absence of any firm evidence of previous recoveries from Lot 218, the likelihood of encountering hazardous items in the proposed sand extraction area can only be assessed as moderate to slight with a low incidence of items likely to be remnant.

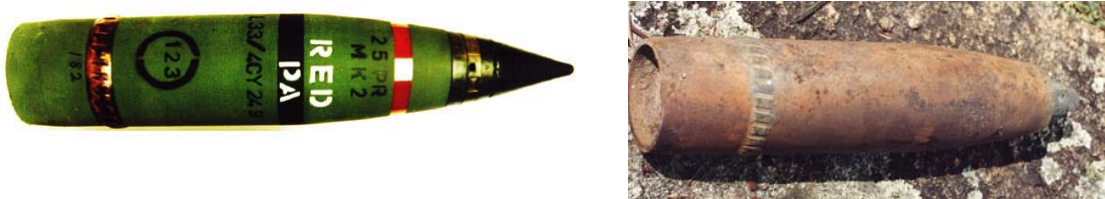
¹³ Explosive Ordnance Disposal Reports, Regional Explosive Ordnance Services (East), Department of Defence.

¹⁴ Ammunition technical advice at the time.

Incidental (i.e., single items rather than concentrations) of the following types and natures of ordnance are assessed as possibly being within Lot 218:

- Projectile, 25 pdr HE, HES, smoke and proof.
- Projectile, mortar, 4.2 inch, HE, white phosphorous, illumination and smoke.
- Projectile, mortar, 3 inch, HE, white phosphorous, illumination and smoke.
- Projectile, infantry, anti-tank, HE anti-tank.
- Grenade, fragmentation, 36M.
- Grenade, hand, No 69.

In order that these items can be recognised if encountered, photographs of new objects and, where available, of their likely appearance due to the effects of the ravages of time and decomposition, are provided below.



25 pdr smoke base ejection fuze point detonating (PD) No 221 (left) and UXO (partial function) (right).



25 pdr HE fuze PD No 119 (left) and UXO fuze PD No 117 (right).



4.2 in mortar HE Mk 2 fuze No 162.



3 inch mortar HE Mk2 fuze No 150 Mk1 (right) and UXO (left).



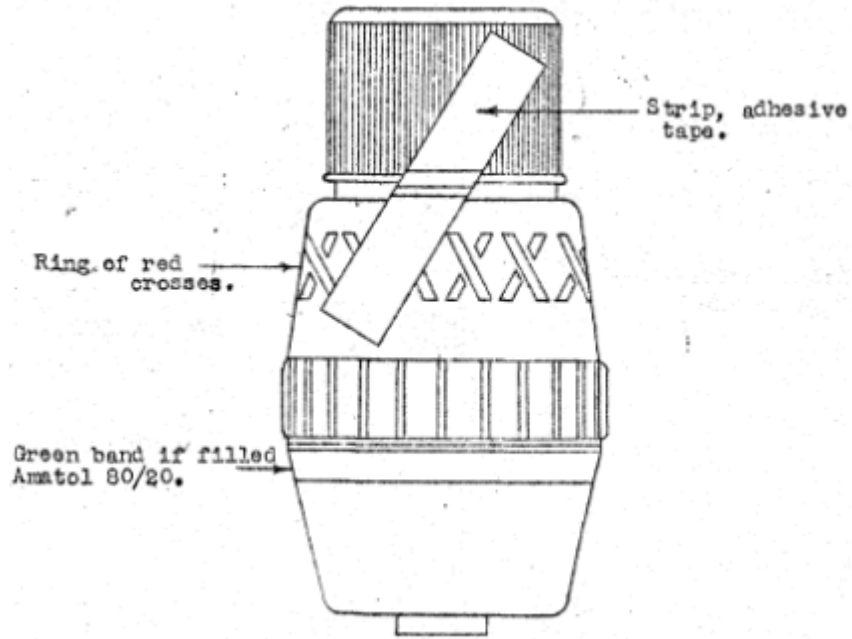
3 in mortar smoke.



Projectile, infantry, anti-tank



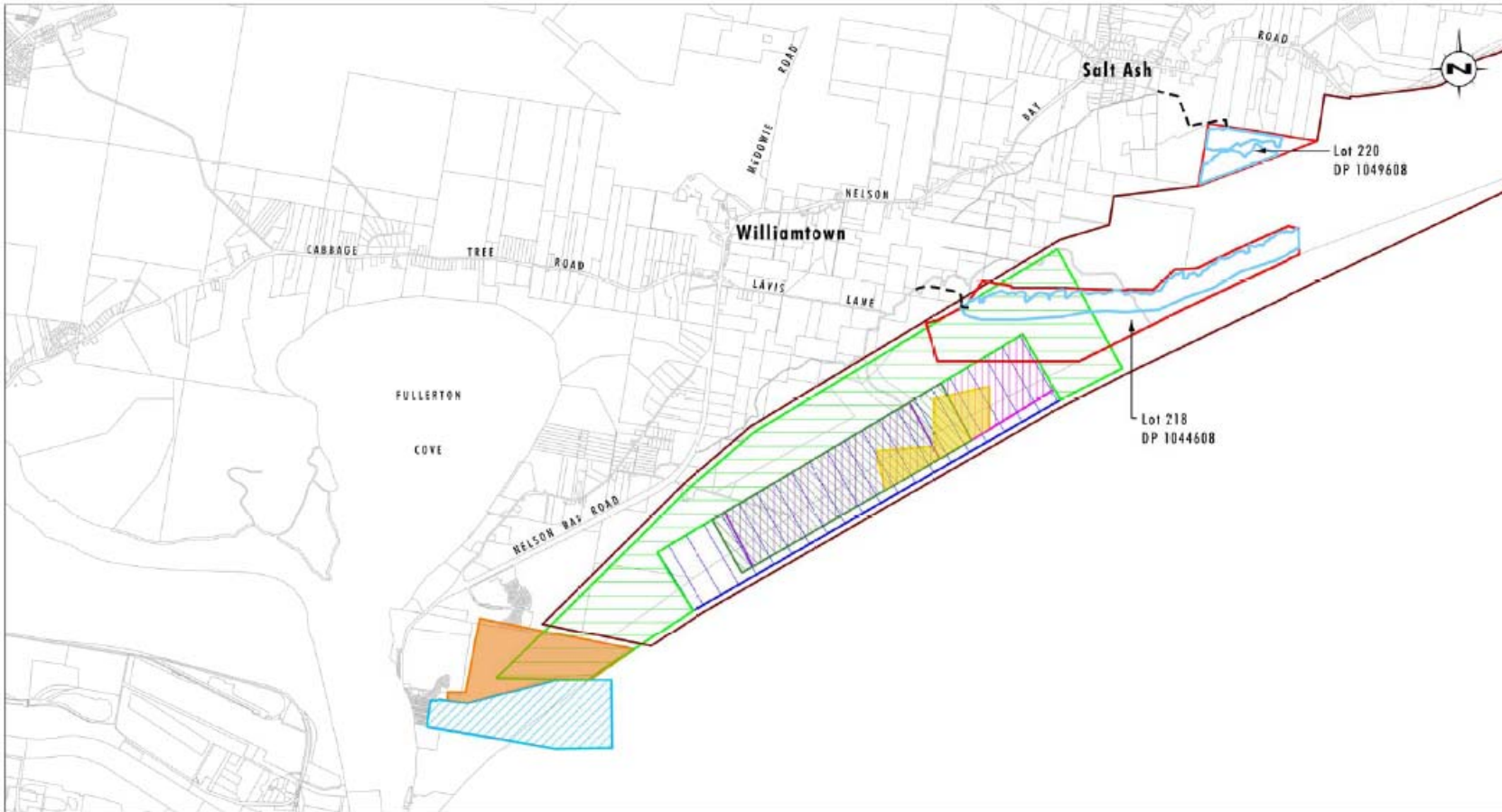
Grenade, fragmentation, 36M.



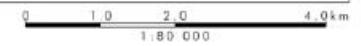
Grenade, hand, No 69 Mk 1. Note, the case of this weapon is bakelite.



Mortar 2 inch HE



Source: Department of Lands (2003)



Legend

- Lot Boundary
- Approval Extraction Areas
- Approved Access Roads
- Artillery Proof Impact Area
- Fern Bay Armour Plate Proof Range
- High Explosives Target Area
- Likely Area for UXO From Mortar Blinds Firing From Macs Track
- Danger Area
- Proof Range
- Stockton Beach Artillery Proof Range
- Stockton Rifle Range
- Likely live-fire manoeuvre area - Infantry (20 Garrison Bn) and supporting elements

File Name (A4): R33_V1/1646_265.dgn

FIGURE 1
Unexploded Ordnance Plan
Mackas Sand

5. RISK ASSESSMENT

In 2005, Department of Defence (Defence) devised a rapid screening qualitative risk assessment model that produced a nominal value in order to rank the degree of risk presented by potentially UXO-affected land against current or likely future land uses. The paper describing the model in detail is provided at Appendix 1.

The model takes into account four factors and within each factor allocates a value. These are:

- Likelihood, from site history, of UXO on-site (H) – scores 1 – 10.
- Ammunition Contamination Category (A) – scores 1-10
- Magnitude of Usage (M) – scores 0.1-5
- Exposure Likelihood Against Varying Proposed (or actual) Land Use Intensities – (E) – scores 2-10

In order to obtain a nominal value by which the risk presented by a range of potentially UXO-affected sites can be ranked (Defence has ranked each known site in each State and Territory) a formula has been devised using the values that are applicable to each site. That formula is:

$$\text{Risk (R)} = \frac{\text{HA}}{100} \times \frac{\text{M}}{5} \times \frac{\text{E}}{10}$$

5.1 Likelihood, from site history, of UXO on-site

The site history for Lot 218 indicates that various areas within the land have been:

- Use as a demolition range, land service impact area or an air or naval weapons range (impact area shown at Figure 1.). Extremely high likelihood – score 10. (Highest Possible Score [HPS] – 10).
- Use as a live firing range (not including an impact area) ammunition depot or former operational area (danger area shown at Figure 1.). Very high likelihood – Score 8. (HPS – 10).
- Use as a field training area or in close proximity to a live firing range (Other areas shown at Figure 1.). High likelihood – score 6. (HPS – 10).

5.2 Ammunition Contamination Category

The history of the site demonstrates that UXO in the category of ‘UXO2 - Blast/fragmentation potential (mortar, artillery, aircraft bomb) chemical and natures and types exhibiting high initiation sensitivity, attractiveness or portability potential’ either was known to have, or was likely to have, impacted the site – Hazard level is Extremely High – score 10. (HPS – 10)

5.3 Magnitude of Usage

The Defence rating for this factor for Stockton Beach Artillery Range is that it 'Acquired for use as a demolition range, land service impact area or an air or naval weapons range' and that usage was light – score 2.5. (HPS – 5). The score outside the known range impact area reflects that it was 'Acquired for use as a field training area or in close proximity to a live firing range' and that the magnitude of use was light – score 2.

5.4 Exposure Likelihood against varying proposed or actual Land Use Intensities

The proposed land use for Lot 218, as described in the model is 'High density housing, heavy commercial and industrial, roads, railways, bridges, mining, other intrusive activities and extractive industries' or Very High exposure likelihood - score 10. (HPS – 10).

5.5 Risk Values

Using the formula $R = \frac{HA}{100} \times \frac{M}{5} \times \frac{E}{10}$

The value established for the impact area (see Figure 1.) is:

$$R = \frac{10 \times 10}{100} \times \frac{2.5}{5} \times \frac{10}{10}$$

$$= 0.5$$

Similarly, the risk value established for the artillery range danger area is:

$$R = \frac{8 \times 10}{100} \times \frac{2}{5} \times \frac{10}{10}$$

$$= 0.32$$

And the risk value established for the remaining area outside the artillery range danger area is:

$$R = \frac{6 \times 10}{100} \times \frac{2}{5} \times \frac{10}{10}$$

$$= 0.24$$

5.6 Likely level of Risk as indicated by Model Scores

Because the Commonwealth of Australia is not considered responsible for the ongoing effects of UXO on land in which it has never had, or has disposed of, a legal interest¹⁵, the risk ranking of sites provided from the model do not dictate priorities for site remediation. Under the Commonwealth Policy, that is seen as the responsibility of the landowner/occupier. However, Defence will undertake field assessment of potentially UXO-affected sites where it is seen as appropriate to do so. In addition, Defence will render safe or remove any item of UXO once it has been found and reported (there is no charge for this service). For Defence purposes, the risk value can be used to determine the priorities for such assessment. The following values are used as a guide:

Low priority:	< 0.25
Moderate priority:	0.25 to 0.4
High priority:	> 0.4

These priority category scores do, however, reflect the potential type, nature and incidence of UXO as measured against actual or potential land use. Scores of less than 0.25 reflect a slight risk, those of between 0.25 and 0.4 reflect moderate risk and those above 0.4 reflect significant risk.

In these terms, then the risk levels in terms of the model for Lot 218 appear to be:

- Area outside the Stockton Beach Artillery Range danger area: Slight risk (0.24)
- Area within the danger area but outside the impact area: Moderate risk (0.32)
- Area within the impact area: Significant risk (0.5).

The risk scores generated by the Defence model do not and cannot take into account any mitigating measures intended for the proposed land use. In Lot 218, measures outlined in the Environmental Management Strategy¹⁶ will have some effect on reducing the *prima facie* risk.

5.7 Mitigating Measures

The proposal is to where possible during sand extraction to maintain a 50 cm buffer of windblown sand over the stabilized soil surface in order to preserve any indigenous significant sites and artifacts. It is understood that this measure will see sand removed from only post mid-1950's deposits. While this measure will not eliminate any potential for UXO to be encountered or disturbed (see paragraph 3 [Morphology] above) it could be expected to reduce the likely levels of incidence. On that basis, it is appropriate that the risk descriptions within the former impact area be reduced to Moderate and elsewhere to Slight. It is noted, however, that the approved sand extraction area does not fall within the known former impact area.

¹⁵ Commonwealth Policy on the Management of Land Affected by Unexploded Ordnance (See http://www.defence.gov.au/uxo/what_is_defence_doing/what_is_defence_doing_policy.asp)

¹⁶ Umwelt (2009) *ibid*. Page 25.

6.0 UNEXPLODED ORDNANCE MANAGEMENT PLAN

Unexploded Ordnance is defined as explosive ordnance (EO) that has been primed, fused, armed or otherwise prepared for action and which has been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installations, personnel or material but remains unexploded either by malfunction or design or for any cause. UXO includes items of military ammunition or explosives removed from their original resting-place for any reason, including souveniring by members of the public.

By design, unfired EO is inherently stable. The design is such that an item will not function if subjected to shock or many other forms of mistreatment. However, EO which has been fired and which has failed to function as designed can be expected to have had many of the safety features that make unfired EO safe, disengaged or damaged. Safety devices may be disengaged by such influences as set-back (i.e., inertial effects), spin (such as induced by the rifling in a barrel) time of flight of the projectile, changes in atmospheric pressure as a projectile gains height or even proximity to a target. For this reason UXO may be significantly more sensitive to shock, movement or tampering than unfired ammunition. Deterioration over time as a result of exposure to the elements will frequently exacerbate sensitivity in fuze chemicals and explosive or pyrotechnic filling. However, there is no record in Australia of a civilian having been killed or injured by an item of UXO other than it having been mistreated, tampered with or inappropriately handled. In such cases, the effects of an item of UXO functioning can be expected to be fatal or at best, inflict serious injury.

Depending on the type and nature of EO being fired, Defence statistics indicate that historically, between 2% and 5% of items failed to function as designed and become, by definition, UXO. By way of example, if an artillery regiment of, say, 50 field guns fires a fire mission of 6 rounds per gun, 300 projectiles will terminate in the impact area. If the malfunction rate is, say, 2%, the result will be six projectiles that failed to initiate.

Locations that have been subjected to HE EO impact can usually be readily identified by commercial UXO search and clearance specialists¹⁷. Designed functioning effects of HE-filled EO are both blast and fragmentation. The fragmentation effect of EO results in the disintegration of the casing (and other components) of the projectile and its spread under explosive force over considerable (but varying) distances, dependent upon the type and nature of the items being fired. Consequently, particles of fragmentation, which may be on or close to the surface (but in the case of Lot 218 may be at considerable depth due to the deposition of wind-blown sand to varying levels) is indicative of an impact area in which UXO is potentially present.

The essential elements, therefore, of an effective UXO management plan must be based on awareness, vigilance and appropriate response. There are two principal factors in implementing such a plan:

¹⁷ See <http://www.defence.gov.au/uxo/duxop.asp> for details of Department of Defence-accredited UXO consultants and contractors in Australia.

- Preparation, awareness and vigilance; and
- Action on discovery potential impact and of suspect item/s.

6.1 Preparation

The Site Operator (i.e., facility manager) must have a basic understanding of the likelihood of incidence of hazardous items and become familiar with the likely appearance of not only UXO items, but fragmentation and explosive ordnance waste that may be indicative of an impact area in which UXO may be remnant.

The facility manager should consider retaining a professional UXO consultant or contractor periodically (annually is suggested as appropriate) to brief management and employees on likely on-going hazards that may potentially result from the presence of UXO, its likely appearance after more than 50 years exposure to the elements and the appropriate action to take on discovery of UXO or suspected evidence of impact.

Access road and haul way construction works may require excavation in limited areas below the level of the 1950's deposits and possibly into relict dune strata. Prior to excavation at these levels search and clearance by a specialist UXO clearance contractor is warranted in conjunction with the required archaeological examination. In the event that relict dune strata are inadvertently broken into, further excavation should cease at that location until the required UXO and archaeological assessments have been completed. Wherever practical, unless UXO clearance is undertaken, a buffer of not less than 50cm of post-1950's deposit material should be maintained above the relict dune strata, in order to minimise the potential for a hazardous item to be struck or disturbed.

The responsibilities of employees in respect to UXO should be included in site inductions for new workers. This should include the need to be vigilant and watch for unfamiliar items during all stages of extraction and processing works and awareness of the action to be taken on discovery of a potentially hazardous item. The following preliminary briefing is appropriate:

“If you should find a suspicious item that may be a UXO, do not touch or disturb it. It has been there for many years, it won't hurt you if you don't disturb it. Tell your site supervisor who will contact Police - they will arrange for military experts to attend and dispose of it.

“Unless the UXO was deliberately disturbed (picked up, played with, kicked, thrown, etc.) there are no known instances, in Australia, where a UXO has injured a member of the public”.

The Occupational Health and Safety Plan for the site should incorporate the appropriate parts of this UXO Management Plan.

6.2 Action on Discovery

In the event that an item suspected to be UXO is found:

- Works should cease in the immediate area.
- **DO NOT TOUCH, DISTURB OR TAMPER WITH THE ITEM.** This includes making any attempt to move the item to a 'safe' location.
- Mark the location so that it can be found later. Coloured tape or paint make easily recognised marker material. In placing marking material **DO NOT TOUCH** the item. Note the best route or access to it.
- Keep people away from the item
- Inform the site supervisor of the find.
- The site supervisor should inform the police that a possible ammunition item has been found. They will attend and will request Defence attendance. Specially trained Defence personnel will attend and dispose of the item or render it safe. There is no charge for this service.

Prior to resumption of works in the area from which the item originated, a search -trained ammunition contractor should be engaged to ensure that there are no more potentially hazardous items in the vicinity of the find (see footnote to paragraph 5 for access to contact details for Defence-accredited UXO contractors/consultants).

In the event that concentrations of fragmentation and other items of explosive ordnance waste (such as fuze bodies or fuze fragments are encountered, they could be indicative of an impact area. In that event, works should be suspended in the immediate area and its surrounds and a search -trained ammunition contractor engaged to ensure that there are no potentially hazardous items in the vicinity.

7.0 CONCLUSION

The potential for UXO incidence in the extraction area of Lot 218 has been assessed as Slight. This level of potential is insufficient to require search and clearance of the sand deposits approved for extraction prior to the commencement of works. The implementation of the Management Plan detailed above will provide adequate precautions in the unlikely event that any hazardous items are encountered.

The Commonwealth Policy on the Management of Land Affected by UXO¹⁸ extends, on a case by case basis, an indemnity to landowners and occupiers. The Policy, in this respect, states:

¹⁸ See http://www.defence.gov.au/uxo/what_is_defence_doing/what_is_defence_doing_policy.asp

'Although the Commonwealth is not considered legally liable to do so, the Commonwealth will indemnify landowners/occupiers for:

- a. claims made against them in respect of personal injury and/or damage to property arising from detonation of UXO which is present on their land as a result of Commonwealth or allied military activities; or
- b. such injury or damage suffered by themselves;

unless the circumstances of a particular case render it inappropriate for the Commonwealth to give such an indemnity. Circumstances where an indemnity would be inappropriate include irresponsible conduct on the part of a landowner/occupier, prior knowledge and acceptance of a UXO risk, or the existence of an effective claim by the landowner/occupier against another party.

Each application for an indemnity will be individually assessed. Should a landowner/occupier wish to apply for an indemnity from the Commonwealth in respect of a personal injury or property damage which has arisen from detonation of UXO, the landowner/occupier should apply to the Department of Defence outlining all the relevant circumstances.'

While indemnity for any potential UXO incident within Lot 218 (however unlikely) would be adjudged by the Commonwealth on the merits of the particular case, it is suggested that the adherence to the Plan provided herein may constitute appropriate precautions in the terms of the Commonwealth indemnity provisions.

APPENDIX 1

**A QUALITATIVE SCREENING RISK ASSESSMENT OF UNEXPLODED
ORDNANCE-AFFECTED SITES IN AUSTRALIA**

A QUALITATIVE SCREENING RISK ASSESSMENT OF UNEXPLODED ORDNANCE-AFFECTED SITES IN AUSTRALIA

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Abstract

Responsibility for implementation of the Commonwealth Policy on the Management of Land Affected by Unexploded Ordnance (UXO) has devolved to the Directorate of Property Services, National Operations Division in respect to land in which the Commonwealth no longer has (or has never had) a legal interest and which is potentially (or actually) contaminated by UXO.

As part of its responsibilities under the Policy, Defence must undertake field assessment of such land and provide advice to State and Territory administrations on the management of any residual hazard to ensure that exposure to persons can be minimized.

In order to prioritise sites for assessment and in order to give appropriate advice in the face of residual hazard, Defence needed a preliminary risk assessment protocol as a basis on which to base risk magnitude. Two risk assessment models were considered, but which did not suit the Defence purpose. Using a number of elements inherent in these models, Defence then developed a protocol which takes into account history of military usage of the land, the types and natures of ordnance used on the land and the magnitude of that usage. It also takes into account the actual or proposed use of the land in terms of intensity of human usage. Numerical values are attached to each dimension of the model. A risk score is determined from the product of the values allocated in the case of each site. The methodology employed is fully explained.

In addition, by use of a risk score threshold, land which is potentially significantly affected and land which is potentially affected to a minor degree is determined. The threshold determination allows appropriate advices to be attached to each land area based broadly on risk magnitude.

Introduction

Under the provisions of the Commonwealth Policy, the implementation of management measures to protect the public from the hazards of Unexploded Ordnance (UXO) has devolved to Department of Defence¹⁹. In order to provide advice to State and Territory Governments and local authorities on appropriate management measures, Defence has agreed to review the priority and resources allocated to assessing UXO contamination of non-Commonwealth land. Following

¹⁹ Commonwealth Policy on the Management of Land Affected by Unexploded Ordnance dated 19 May 1999 (Paragraph 5).

this review, Defence will develop strategic and operational plans for the UXO site assessment program²⁰. For Defence to constructively participate in consultation with stakeholders, a procedure for allocating resources to site assessment studies on non-Commonwealth land is required. It would appear that the most appropriate manner in which to determine priorities for such site assessments is the application of a rapid, qualitative screening risk assessment to each potentially UXO-affected area²¹.

In Australia, most State and Territory Governments do not perceive UXO to be a contaminant of a similar nature to those that are usually the subject of environmental protection legislation and policy. In fact, most environmental protection authorities are unable to provide any meaningful guidelines on the management of UXO. Consequently, the development of disciplined assessment procedures has fallen to a few narrow, albeit very focused, interest groups. These have principally comprised specialist environmental consultancies (including EPA-accredited auditors) and contracting and consulting firms with a business interest in the provision of UXO assessment and remediation services.

Overseas, the development of UXO-risk assessment protocols has fallen mainly to defence agencies. A model produced by the United States Army Corps of Engineers is extremely complex and is considered to be too detailed to apply to a site-by-site Australia-wide risk assessment. In addition, it applies values to some cultural and topographical factors that are probably inappropriate to the Australian demographic and physical environments. The UK Ministry of Defence retained Enviros Aspinwalls PLC (a leading environmental engineering consultancy) to develop what the company calls a five-dimensional probability-based quantitative model that enabled explosive ordnance contamination to be considered similarly to standard land quality assurance procedures. However, this model is, in fact, a qualitative approach using judgment and qualitative data to present risks numerically. In Australia, Greg Guthrie (then with ADI Limited) has proposed a screening level risk assessment for Australian UXO sites²². Whilst the UK model also appears to have some cultural features that are diverse from some Australian scenarios (probably as the result of comparative population densities), both the UK and the Australian (Guthrie) examples would appear to offer some potential for Defence use.

This paper briefly reviews the qualities of both models and draws on each of them to produce a mechanism that can provide a rational basis for the preparation of a prioritised risk-based site assessment strategy.

²⁰ Australian National Audit Office Performance Audit - Environmental Management of Commonwealth land – Follow-up Audit dated July 2000.

²¹ Which may range from individual real property titles to hundreds of such land parcels, depending upon contamination characteristics.

²² Guthrie, Greg. G. (1997): Screening level risk assessment for UXO contamination in Australia. Parari '97 Conference, Canberra, November.

Part 1: Review

The MOD UK (Aspinwalls) Model

The model examines the circumstances under which a person may encounter an item of UXO and links the probability of contact with human behaviour. The method closely pursues the source - pathway - receptor continuum, which depends on the probability of the receptor making contact with the source. Five event descriptions are used:

1. UXO exists on site.
2. Persons have access to the site.
3. Persons have access to ordnance.
4. Item is capable of detonating or deflagrating under applied stimulus.
5. The explosive event is capable of causing significant harm to human health.

The probability of each event is rated from 0-3 on the bases that it is impossible, unlikely, likely, or certain to occur. Each assessed rating becomes a multiplier. The following, a former ammunition depot planned for residential redevelopment, is an example:

The example makes the following assumptions:

- a. The processing of ammunition would have been closely controlled, but its presence is still likely.
- b. The ordnance is likely to be in a condition under which it is safe for storage and transport within the depot.
- c. The depot would have been subjected to at least a careful search prior to closure and it is consequently unlikely that ordnance is easily accessible.

Consequently, each event was assessed as follows:

Event 1: Unexploded ordnance exists on site

The example steers away from assessing this factor as 'certain' but there is a low probability that some such items remain on the site. Hence this factor is scored as 'likely' and given a value of 2.

Event 2. Persons have access to the site

The proposed site use defines that public will access the site and a 'certain' rating and a value of 3 is allotted.

Event 3. Persons have access to ordnance.

Due to proposed construction and land use, potential for contact with ordnance items is likely – score 2.

Event 4. Item is capable of detonating or deflagrating under applied stimulus

Ammunition was stored in a safe condition; however, deterioration may result in increased sensitivity. Consequently, the functioning of an item under some form of applied stimulus is considered likely – score 2.

Event 5. The explosive event is capable of causing significant harm to human health.

The degree of hazard resulting from this event depends on the types and natures of ordnance handled in the former depot. The model assumes that the larger the item, the more probable the potential for harm. In this instance, likely harm is assumed – score 2.

This then led to the following Total Risk Score: $2 \times 3 \times 2 \times 2 \times 2 = 48$

Comment:

1. The model does not allow for concurrent activity. In the example above, ammunition depots are also typically used for ordnance disposal by means of burial, burning or explosive demolition. The likelihood for incidence of UXO (or abandoned ordnance items) as a result of any of these activities may be greater than that appreciated in the example, which deals only with the core business of a former ammunition depot. As a consequence, the resultant real risk may be greater than appreciated and assessed.
2. Further to the above comment, the model was developed by environmental consultants who had little experience in either the hazards presented by the different types and natures of ordnance or by the potential increase in hazard presented by those items failing to function when used (or, in the more likely event in respect to an ammunition depot, failing to function when subjected to explosive demolition action). Consequently, in presenting such factors for risk assessment, it is essential that the full range of activities that potentially (or actually) occurred and the effects (actual and potential) that have resulted be identified by an expert assessor.
3. It is likely that some peculiar topographical and demographic limitations are built into the UK model that would not necessarily apply to Australian scenarios, particularly, for example, where formerly used Defence sites that were still under control of the Commonwealth or where remote sites in which the Commonwealth has no longer any legal interest are concerned. In fact, the model scores the risk of a former small arms firing range at 72 in comparison with the above example at 48. The comparative scores associated with potential for access to both the site and ordnance are questionable. No allowance is made for the comparative degrees of hazard presented by small arms ammunition and (say) high-explosive-filled artillery projectiles.

The Guthrie Model

The model produced by Greg Guthrie in November 1997 initially concentrates on hazard identification and the consequent exposure potential. In hazard identification, the model precepts go further than the Aspinwalls model in that the employment of particular types of ordnance and the manner in which they were used is acknowledged. The exposure potential component assesses the probability of human interaction with hazardous items.

Hazard is identified as explosion, fragmentation, burning or chemical toxicity. Five ammunition-related categories are employed. These are:

- UXO(S) - Small arms ammunition and pyrotechnics;
- UXO – UXO other than UXO(S);
- EO – Explosive ordnance that has not been fired or used or subjected to other than normal handling or storage;
- EOW – Explosive ordnance waste that is free from explosive or pyrotechnic compounds; and
- EOP – Explosive ordnance packaging.

The model allows for the consideration of the likelihood of these categories being present through historical research of military land-use. Multiple land-use combinations are allowed for, either concurrently or chronologically. At this dimension, nine specific classifications were selected as follows:

- no history of military use;
- history of military occupancy;
- use as a close training area;
- use as a field training area;
- use as a live firing weapons range;
- use as an air or naval weapons range;
- use as a demolition range;
- use as an EO storage area; and
- in close proximity to a range.

By allotting a subjective quality reflecting the degree of probability of encountering each of the ammunition-related categories against each of the forms of military land-use, a two dimensional matrix is constructed as follows:

Table 1: Qualitative Ammunition Contamination Probability

Site Classification	Ammunition Contamination Category				
	UXO(S)	UXO	EO	EOW	EOP
No History of Military Usage	Very Low	Very Low	Very Low	Very Low	Low
History of Military Occupancy	Very Low	Very Low	Very Low	Very Low	Low
Use as a Close Training Area	Very High	Low	Medium	Very High	Very High
Use as a Field Training Area	High	High	High	Very High	Very High
Use as a Live Firing Range	High	Very High	High	Very High	Very High
Use as an Air/Naval Weapons Range	Low	Very High	Low	Very High	Very Low
Use as a Demolition Range	Very Low	Very High	Very High	Very High	Very High
Use as an EO Storage Area	Very Low	Very Low	High	Very High	Very High
In Close Proximity to a Range	Medium	Low	Medium	High	High

An innovative quality, dealing with the level of risk potentially generated by the range of UXO items that could normally be encountered, is the consideration of the UN classification system of specific items according to their primary hazard. For explosive ordnance, these generally comprise mass explosion (hazard division 1.1) or projection (hazard division 1.2). The hazard thus presented is then related to each of the five ammunition contamination categories by assessment of the probability of major injury being caused to a human receptor that is in contact with a functioning item from within each category:

- UXO(S) Moderate Risk of Injury
- UXO Serious²³ Risk of Injury
- EO Major Risk of Injury
- EOW Minor Risk of Injury
- EOP Minimal Risk of Injury

The second axis of the process is to assess the probability of human receptors coming into contact with the hazard most likely to be on the site. Guthrie identifies a number of additional factors that could be expected to emerge from a study of the site history:

- period of usage of the site
- volume of ordnance used within the site
- previous UXO incidents on the site
- nature of ordnance used within the site
- the natural features of the site, including climate, terrain, geology, flora and fauna
- current and anticipated land uses

The first four of these are seen as modifiers to the initial probability assessments. The final two modify exposure probability between any UXO remnant on the site and human receptors.

Probable UXO density, nature and location of UXO represent one end of the exposure pathway. The intensity and nature of human interaction completes the pathway. Guthrie uses 14 types of land-use, each of increasing intensity in this regard. Against each he scales three levels of UXO location probability: at the surface, near surface and sub-surface.

The final product is the qualitative result of combined consideration of worst case contamination probability, item risk and exposure potential. He states that this function can be expressed mathematically as:

$$\text{UXO risk} = (\text{contamination probability} \times \text{item risk}) + \text{exposure potential}$$

where each end of the exposure pathway is of equal value, for without either, risk does not exist. (See comment 2 below).

²³ The inbuilt mechanisms that make unfired EO inherently safe may become disengaged when an item is fired. Consequently, UXO is likely to be more unstable than EO. Thus risk from UXO is assessed as greater than from EO.

Comment

1. Guthrie has produced two versions of this risk assessment methodology. In this version, each value is a description, usually between 'very low' and 'very high'. A former version attached a numerical value rather than a description, between zero and, typically, 5. It is suggested that the method employing numerical expression goes some way to reducing the subjectivity of the assessment, but also allows a response, or a number of alternative responses to be triggered when certain end values result from a mathematical expression.
2. The mathematical expression produces a value for probability and risk that is a product of those two factors. However, the final risk value is arrived at by the addition to, rather than a further multiplication by, an exposure potential value. Consequently, it is possible to produce a risk value even if the 'contamination probability' and/or 'item risk' do not exist. To make the expression valid, it would be necessary to have 'exposure potential' as a multiplication factor rather than an added value. Further, it is suggested that the addition method overly decreases the significance of the equally important receptor end of the pathway.
3. The site classification area allows for former use as a live firing range, but makes no further distinction in respect to a dedicated impact area within such a range. Experience (and logic) indicates that the incidence of hazardous items is comparatively much greater under the latter form of use and that it offers similar potential for incidence as does an air or naval weapons range. Similarly, the model does not allow for EO resulting from disposal by burial. Again, experience has shown that this is a necessary factor to be addressed in former ammunition depots and probably on field firing ranges where EOW and EOP could realistically be mixed with UXO or hazardous EO components.

Part 2: The Defence Assessment Application

The construction of a model that is suitable for the development of a risk-based site assessment program by which the comparative levels of human exposure can be determined cannot be over simplistic; concurrently, it should be able to be used by any member of the Defence UXO Panel²⁴ to produce a consistent result i.e. reach the same conclusion at different sites that have similar characteristics. Further, it should ideally be able to assess varying degrees of risk within single sites as a result of different hazard properties and/or varying proposed (or current) land-use patterns within that site. The desired outcome is a tool that can rank risk in such a manner that assessment resources can be allocated according to priorities that are objectively determined. For this reason the allocation of factor values rather than descriptors is considered to be appropriate.

It is also desirable for such a model to fit neatly within wider environmental assessment processes. To this end, it is proposed to follow the source-pathway-receptor linkage used in the two models discussed above. The Aspinwalls model demonstrates where the process fits within such a scenario.

Precepts

Although derelict, unfired ordnance is not UXO within the terms of the popular definition, it is often accepted as such. However, unfired ammunition that poses a blast hazard is often inherently safer than UXO, regardless of age and deterioration in both explosive fill and, where ammunition is fuzed, safety mechanisms. This distinction is drawn as part of the risk assessment process (Table 3, column 6) where explosive ordnance (EO) is represented in an Ammunition Contamination Category that falls between category SAA 2 (Large quantities of concentrated small arms ammunition and pyrotechnics) and category UXO 1 (Blast/fragmentation potential posed by such types as fired practice ammunition).

In Australia, the most significant sites on the national UXO register, both by incidence and area, are former field firing ranges and ammunition depots. Regionally, operational World War II areas are also significant. Whilst the comparative hazard generally posed by all of these is a function of human interaction, the potential incidence of UXO within impact areas and demolition ranges compared with other locations is such that the resultant variation in consequent hazard levels should be acknowledged.

Consequently, the following model, which incorporates a number of factors devised by Guthrie, is suggested. It should be noted that most of the factors considered in the Aspinwalls model are inherent in the suggested application.

UXO / EO Contamination Likelihood

This dimension considers military land use against the likelihood of incidence of various UXO/EO being remnant and allocates a value for each.

²⁴ I.e., a panel of UXO-specialist contractors that retain persons with an expert knowledge of the input factors and the relative hazard potential of each.

Table 2: Likelihood of UXO on Site

Site History Description	Likelihood of UXO from this military land use	Score
No history of military land use	Very low	0.5
History of military occupancy as an administrative or non-EO-related logistic facility	Low	1
Use as military training area, but no recorded history of live firing	Moderate	2
Use as a field training area or in close proximity to a live firing range	High	6
Use as a live firing range (not including an impact area) ammunition depot or former operational area	Very high	8
Use as a demolition range, land service impact area or an air or naval weapons range	Extremely high	10

Ammunition Contamination Category

This factor allows consideration of the level of hazard to people posed by various contamination categories. It is probably appropriate to qualitatively reflect hazard on a continuum of potential to cause minor injury to potential to cause immediately fatal injury. Seven ammunition categories that present increasing levels of hazard are proposed:

Table 3: Ammunition Contamination Category

Ammunition Category	Hazard Level	Score
EOP	Extremely low	1
EOW	Very low	2
SAA1 (Small quantities of dispersed small arms ammunition.)	Low	3
SAA2 (Large quantities of concentrated small arms ammunition and pyrotechnics).	Moderate	5
Unfired EO other than SAA that may or may not have been prepared for action (i.e., fuzed and primed).	High	7
UXO 1 - Blast/fragmentation potential – (practice ammunition such as bomb dummy units).	Very high	8
UXO2 - Blast/fragmentation potential (mortar, artillery, aircraft bomb) chemical and natures and types exhibiting high initiation sensitivity, attractiveness or portability potential.	Extremely high	10

EOP allows consideration of the possible failure to remove any hazardous items when ammunition was unpacked or repacked. The likely incidence of such items being present at a site and the likelihood of such a hazard occurrence is usually minor against most military land uses. However, it may become moderate in locations where large amounts of ammunition were processed or used (ammunition depots, firing ranges and former operational areas).

The likelihood of incidence of explosive ordnance of a particular ammunition contamination category against historical military land use to can now be considered. The result termed 'Ammunition Contamination Likelihood' is derived indicatively by the product of the ammunition category probability score and the site history score.

A matrix can be constructed as follows (see Table 4):

Table 4: Preliminary Qualitative Ammunition Contamination Hazard Likely to Result from Former Land Use Categories

Site History Description (score)	Ammunition Contamination Category (score)						
	EOP (1)	EOW (2)	SAA 1 (3)	SAA 2 (5)	EO (7)	UXO 1 (8)	UXO 2 (10)
No history of military land use (0.5)	0.5	1	1.5	2.5	3.5	4.0	5.0
History of military occupancy as an administrative or non-EO-related logistic facility (1)	1	2	3	5	7	8	10
Use as military training area, but no recorded history of live firing (2)	2	4	6	10	14	16	20
Use as a field training area or in close proximity to a live firing range (6)	6	12	18	30	42	48	60
(8)	8	16	24	40	56	64	80
Use as a demolition range, land service impact area or an air or naval weapons range (10)	10	20	30	50	70	80	100

The indicative contamination hazard as a result of previous site usage falls into one of six usage categories and seven ammunition categories. By multiplying both factors we can see, for example, that the comparative likely hazard of large calibre artillery projectiles being remnant in an impact area is $10 \times 10 = 100$ (against a highest possible score [HPS] of 100). Similarly, the comparative likely hazard of large calibre UXO being remnant on a live firing range (other than in an impact area), in an ammunition depot or in a former operational area is $8 \times 10 = 80$ (again against a HPS of 100).

This exercise ties together the likelihood of ordnance being present on a particular site together with a comparative hazard/consequence/impact characteristic of the ordnance.

Magnitude of Usage

Magnitude of usage considers the likely (or possible) incidence of UXO as a result of the level of use to which the site was put. For example, a field firing range that was continually used over a number of years could expect to exhibit a greater incidence of UXO than would, say, a local Volunteer Defence Corps range that was used infrequently. In fact, some ranges have been identified for which there is no evidence of usage at all of a nature that could be expected to result in UXO incidence. Where site research prior to field assessment indicates that some areas were lightly used, if used at all, it would be inappropriate for this factor not to be acknowledged and reflected in the risk assessment process. One mechanism that may assist in identifying lightly used areas is the reflection of UXO incidence indicated by the number of Explosive Ordnance Reports (EORs) originating at a given site and the types and natures of UXO dealt with. However, this mechanism should not be considered solely. A number of areas that were formerly quite heavily used were subsequently subjected to minimal human activity, as a result of which UXO that may have been remnant was not discovered.²⁵ The values for Magnitude of Usage are reflected at Table 5.

Table 5: Magnitude of Usage

Site History Description	Indications of Use (score)		
	Indications of Extensive Use	Evidence of Light Use	No Evidence of Use
Acquired for military occupancy as an administrative or non-EO-related logistic facility	0.5	0.25	0.1
Acquired for use as military training area, but no recorded history of live firing	1	0.5	0.2
Acquired for use as a field training area or in close proximity to a live firing range	3	2	0.6
Acquired for use as a live firing range (not including an impact area) ammunition depot or former operational area	4	1.5	0.8
Acquired for use as a demolition range, land service impact area or an air or naval weapons range	5	2.5	1.0

²⁵ An example is Yarrabandi in Central Western NSW. A small parcel of Crown Land was acquired shortly after WW2 where large-scale demolitions of a range of natures and types of EO (including large calibre artillery ammunition) were undertaken in what can only be described as a questionable manner up until 1963. The area acquired was of insufficient size to contain the effects of the demolitions and EO and fragments were projected up to 2,500 metres into surrounding private land in which the Commonwealth had never had any legal interest. The incidence of EO on the private land did not start to become apparent until a subsequent land owner began a cultivation program in 1980.

Exposure Likelihood

This factor deals with UXO Exposure Likelihood related to various proposed or actual site uses. The potential has been scaled from Low to High. Values represent the level of likely human exposure and thus risk of injury if an item of UXO is present.

Because proposed land use reflects likely human exposure, which is seen as a critical risk assessment component, values allocated are between 1 and 10 (see below).

Proposed land use categories are comprised as follows:

- Low level – dry land grazing, isolated areas and non-intrusive activities.
- Medium level – agriculture (cropping), improved pasture grazing, shallow (300mm) intrusive activities, camping grounds, parkland, State and National parks, fire / 4WD trails.
- High level – medium density housing, rural residential, single dwelling housing, light commercial, light industrial.
- Very high level - High density housing, heavy commercial and industrial, roads, railways, bridges, mining, other intrusive activities and extractive industries

Table 6: Exposure Likelihood against Varying Proposed (or Actual) Land Use Intensities

Proposed (or actual) Land Use Category	Exposure Likelihood (score)
Low level	2
Medium level	5
High level	8
Very high level	10

All factors can now be formulated into a risk function:

$$R = \frac{HA}{100} \times \frac{M}{5} \times \frac{E}{10}$$

Where:

R = UXO-related risk;

H = Likelihood that, from the site history, UXO exists on the site (Table 2);

A = Ammunition contamination category (Table 3).

(The product of H and A results in a qualitative ammunition contamination hazard resulting from former land use Categories (Table 4));

M = Magnitude of Usage (Table 5).

E = Exposure resulting from Proposed (or actual) land use (Table 6).

As an example: A former heavily used WWII artillery field firing range (other than a known impact area) proposed for rural residential and light commercial development and open access parkland.

H = 8 (from Table 3, line 5)
 A = 10 (from Table 4, column 8)
 M = 4 (from Table 5, column 2)
 E = 8 (from Table 6, column 2, line 3)

$$R = \frac{8 \times 10}{100} \times \frac{4}{5} \times \frac{8}{10}$$

$$= 0.512$$

However, this progression reflects only the risk factor for rural residential land. That for supporting services, such as roads and buried services due to intrusive activity could have an 'E' factor of 10, resulting in a final risk factor of 0.64.

A further example could be a Volunteer Defence Corps temporary mortar range that was used on two occasions only. The proposed land use is rural residential:

H = 10 (within the known impact area) or 8 (elsewhere on the former range)
 A = 10
 M = 2.5 (within the known impact area) or 1.5 (elsewhere on the former range)
 E = 8

$$R = \frac{(10 \times 10) \times 2.5 \times 8}{5,000}$$

$$= 0.4$$

and

$$R = \frac{(8 \times 10) \times 1.5 \times 8}{5,000}$$

$$= 0.192$$

By comparison, consider a heavily used grenade range. The proposed land use is medium density residential.

H = 10
 A = 8
 M = 5
 E = 8

Then:

$$R = \frac{(10 \times 8) \times 5 \times 8}{5,000}$$

$$= 0.64$$

As a mid-line example, take an area used in 1992 for a combined arms live fire and manoeuvre exercise (such as one of the 'Kangaroo' activities) in which the impact area boundaries are known and where the proposed land use is cultivation for improved pasture.

Then, within the impact area:

$$H = 10$$

$$A = 10$$

$$M = 2.5$$

$$E = 5$$

$$R = \frac{(10 \times 10) \times 2.5 \times 5}{5,000}$$

$$= 0.25$$

Elsewhere in the manoeuvre area:

$$H = 8$$

$$A = 10$$

$$M = 1.5$$

$$E = 5$$

$$R = \frac{(8 \times 10) \times 1.5 \times 5}{5,000}$$

$$= 0.12$$

As an extreme example, take the scenario of a heavily used former air to surface bombing range proposed for high density residential use:

$$H = 10$$

$$A = 10$$

$$M = 5$$

$$E = 10$$

$$R = \frac{(10 \times 10) \times 5 \times 10}{5,000}$$

$$= 1.0$$

All of the examples above pre-suppose that each site has been used, to some extent, for purposes that may have resulted in a UXO contamination legacy. Consider, however, the effect on the resultant values when there is no evidence that land acquired for such purposes was, in fact, ever used.

Going back to the first example,

A former WWII artillery field firing range (other than a known impact area) proposed for rural residential and light commercial development and open access parkland.

$$\begin{aligned} H &= 8 \\ A &= 10 \\ M &= 0.8 \\ E &= 8 \end{aligned}$$

$$\begin{aligned} R &= \frac{8 \times 10}{5000} \times 0.8 \times 8 \\ &= 0.1024 \end{aligned}$$

It is worthy of note that in such a scenario, there would be no known ‘impact area’ and consequently, the 6th usage category in Table 4 would be inapplicable in many cases. But imagine that land had been acquired for an artillery range, a siting board convened and an intended impact area identified. If there were no evidence of subsequent range use, the following values would then apply against the scenario outlined above:

$$\begin{aligned} H &= 8 \\ A &= 10 \\ M &= 1 \\ E &= 8 \end{aligned}$$

$$\begin{aligned} R &= \frac{8 \times 10}{100} \times \frac{1}{5} \times \frac{8}{10} \\ &= 0.128 \end{aligned}$$

The inclusion of this factor, then, has a marked effect on the product. The process weighs sites for which there is no evidence of use in an appropriate manner. This perhaps raises the question ‘if there is no evidence of use, why is the site being assessed at all; in fact, why is it on the UXO register?’ The response must lie in the inability to give a 100% guarantee that no activity occurred on the site at any time that was likely to have resulted in a UXO legacy. It is suggested that where sites have been identified for such use, but no evidence of actual usage has (to date) been identified, such a guarantee would be, at best, imprudent. The process (and the product) adequately reflects the unlikelihood of such a legacy, and that is appropriate within this assessment process.

Site Assessment Prioritisation

In developing a strategic risk-based assessment strategy, priorities will need to be established in consultation with State and Territory authorities. Three priority levels are suggested as appropriate. This model, in addition to providing a rapid screening assessment tool, can be equally as well applied to determining the priority in which Defence site assessment resources are allocated. The following provisional priority values are suggested:

Low priority:	< 0.25
Moderate priority:	0.25 to 0.4
High priority:	>0.4

The priority threshold should be reconsidered following the assessment of a significant proportion of affected sites using this methodology.

Defence Advice – General Caution

The Commonwealth has a responsibility to advise private and non-Commonwealth public landowners and managers through State and Territory-Government agencies on appropriate action to be taken in the face of UXO hazard. Defence has developed a standard advice in the event that an item suspected of being ordnance-related is found. The advice is as follows:

“Actions on finding a suspicious item:

“If you should find a suspicious item that may be a UXO, do not touch or disturb it. It has been there for many years, it won't hurt you if you don't disturb it. Contact Police -they will arrange for military experts to attend and dispose of it.

“Unless the UXO was deliberately disturbed (picked up, played with, kicked, thrown, etc) there are no known instances, in Australia, where a UXO has injured a member of the public”.

Whilst more definitive advice can often not be given until after a field UXO assessment has been completed, there may be some correlation between ‘priority triggers’ suggested above and the appropriate detailed assessment and remediation action required to be taken. This correlation may relate to a relationship between assessment priority and advice to be provided if (and only if) the input to the risk assessment model is found, from field assessment, to be valid.

There are three levels of advice that have been accepted, by convention rather than by any direction, as appropriate for Defence to provide in accordance with the Commonwealth Policy. These are:

Advice 1 – Substantial Potential for UXO Incidence

This advice applies to those sites that present a known moderate to significant hazard based on incidence and UXO type/nature. Development and/or land usage re-zoning proposals for land parcels considered to be subject to a substantial UXO potential should only proceed following the conduct of UXO investigation and remediation. The advice states “The land within this title has been used for purposes that may have resulted in an unexploded ordnance hazard. Department of Defence advise that prior to any change in land use that is likely to increase human exposure to the hazard, the land should be subjected to a detailed assessment and, where required, remediation. A list of Department of Defence-accredited unexploded ordnance consultants and contractors is at <http://www.defence.gov.au/uxo>

Advice 2 – Slight Potential for UXO Incidence

This advice reflects potential low incidence and applies in areas with a confirmed history of military activities that may have resulted in residual UXO but Defence considers it inappropriate to assess as substantial and the Defence UXO site assessment recommended against a hazard reduction operation (HRO) being undertaken. The advice states: “All land usage within these areas may continue without specific UXO search or remediation.” However, the general caution remains applicable.

Advice 3 - Other

This advice relates to land in which Defence may or may not, at some time, have had a legal interest, but there is no evidence to suggest that it was used for a purpose that was likely to result in an ordnance-related legacy. The advice states: “Defence records do not confirm that the site was used for live firing. UXO or explosive ordnance fragments/components have not been recovered from that site. These sites have been included for general information purposes only. Defence makes no recommendations in regards to this category.”

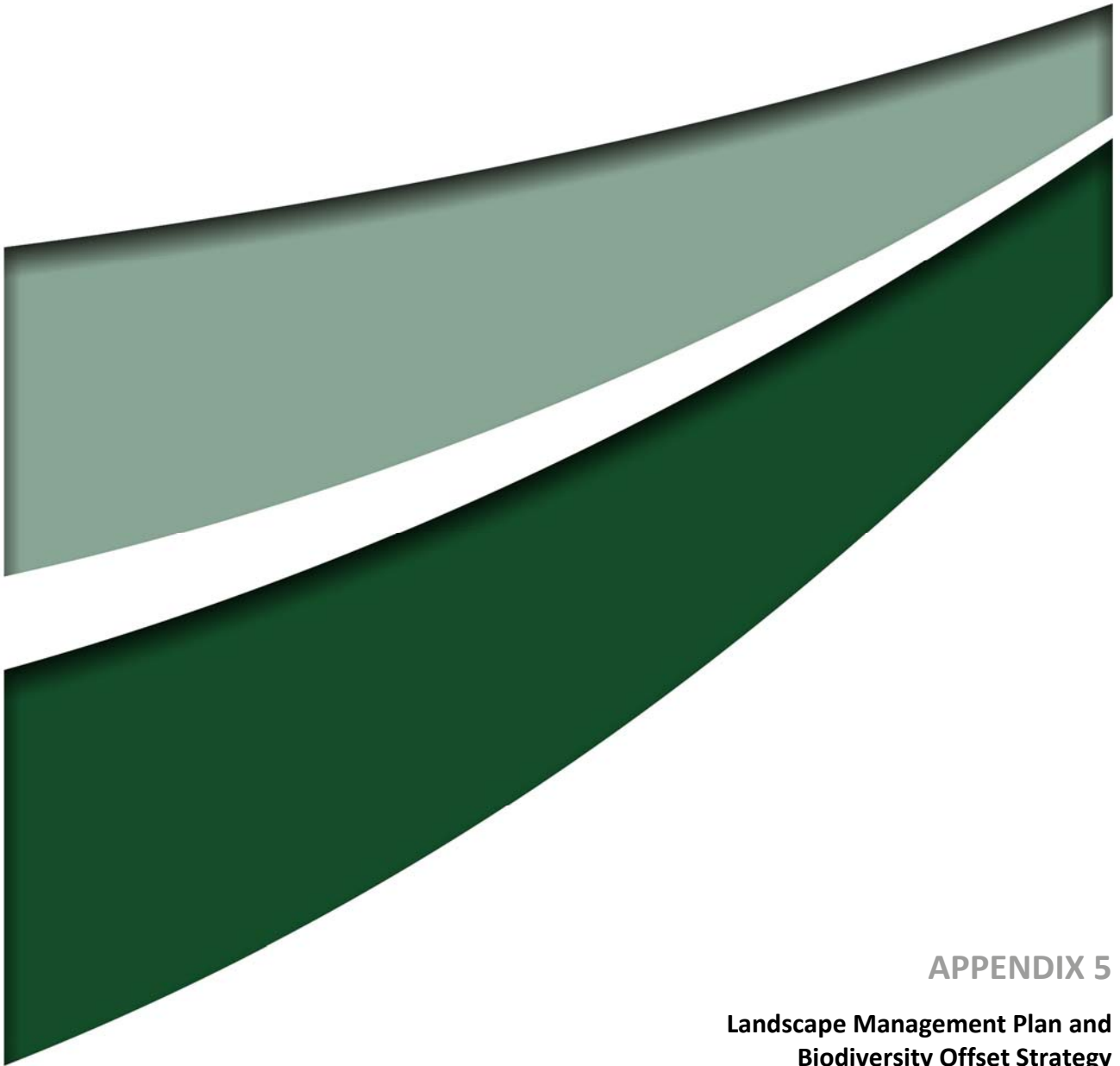
Conclusion

The above model is as objective as believed possible. There is no requirement for ‘educated guesses’ to be made; consequently, rankings should be standard regardless of who is applying the assessment. The model can be applied to particular locations where certain types of military activity occurred within a more general land use (such as a demolition range within a field firing range) or where particular types of land use and hence differing human exposure risks are proposed. Consequently, the detailed application of the model would allow for risk contours to be drawn on planning maps, thus assisting the design and scoping of, initially, more detailed assessment and, where required, remediation strategies.

The qualitative screening risk assessment model has been developed for application by Defence to a national program of UXO site assessments. The model may also assist State and Territory land authorities in their management of UXO-affected sites.

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APPENDIX 5

Landscape Management Plan and Biodiversity Offset Strategy



LANDSCAPE MANAGEMENT PLAN

Including Rehabilitation Management
Plan and Long Term Management
Strategy

FINAL

July 2016



LANDSCAPE MANAGEMENT PLAN

Including Rehabilitation Management Plan and
Long Term Management Strategy

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
[On behalf of]

Project Director: Peter Jamieson
Project Manager: Brendan Rice
Report No. 1646/R61/V1
Date: July 2016



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1.0 Introduction

Mackas Sand operations on Lot 218 and Lot 220 are located approximately 25 kilometres north east of Newcastle near Salt Ash in the Port Stephens local government area (LGA), New South Wales (refer to Figure 1.1). Mackas Sand directors have operated sand extraction operations in the area since 1992. Lot 218 and Lot 220 are owned by the Worimi Local Aboriginal Lands Council.

Mackas Sand was granted Project Approval No. 08_0142 (PA 08_0142 MOD1) on 20 September 2009 by the Minister for Planning under Part 3A of the Environmental Planning and Assessment Act 1979 to operate sand extraction operations at Lot 220 and Lot 218. It is estimated that in excess of 21 million tonnes of sand resource will be extracted from Lot 218 and Lot 220, with Lot 218 having an indefinite extraction life due to the ongoing movement of sand from the adjoining mobile dunes.

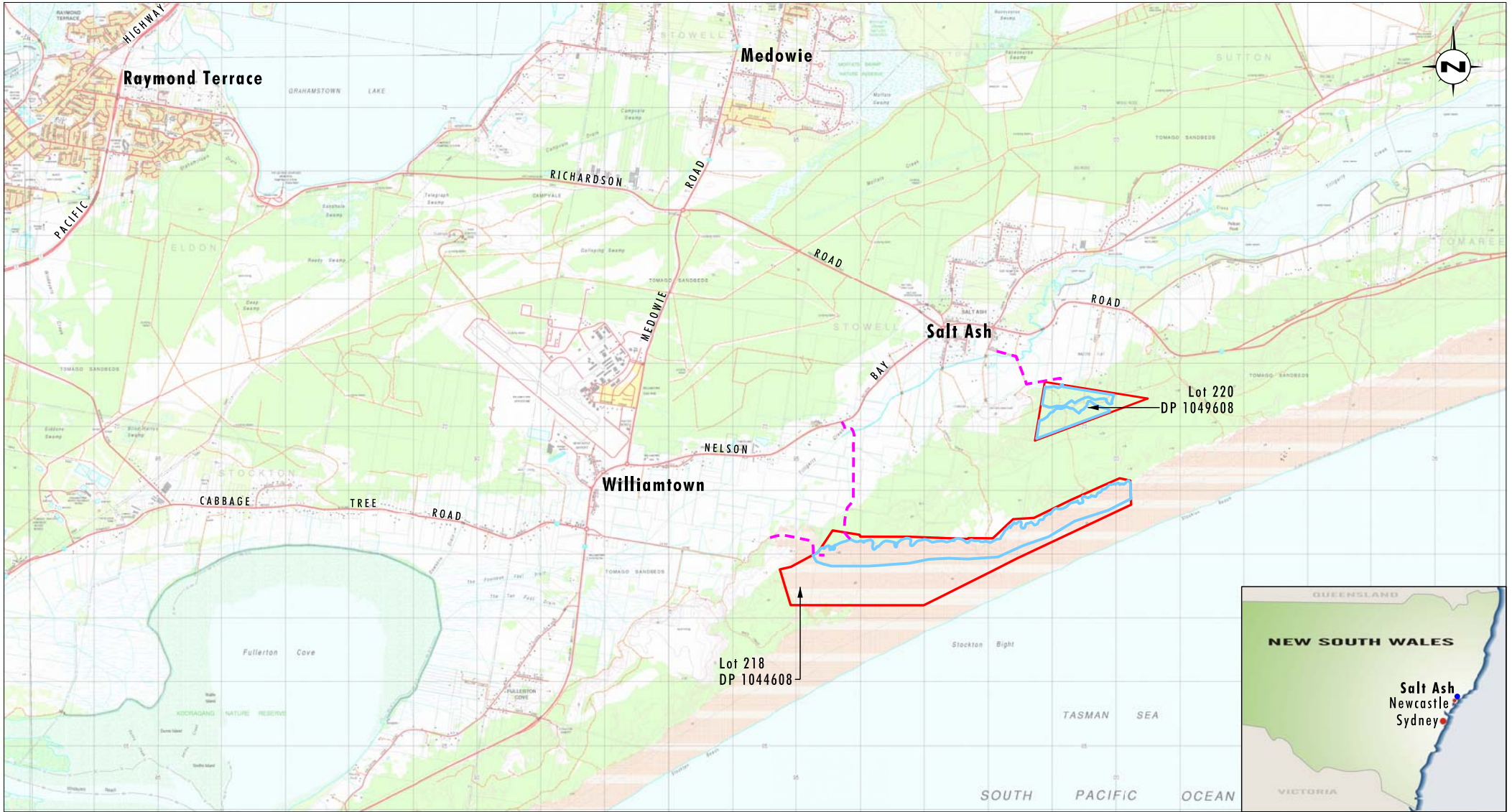
A modification to PA 08_0142 (MOD1) was approved on 30 September 2013 by the NSW Planning Assessment Commission (PAC) under delegation of the Minister for Planning and Infrastructure (now Minister for Planning and Environment-DP&E). The modification includes a temporary reduction in extraction level and the approval of an alternate route to access Lot 218. The alternate route connects directly from Lot 218, northward to Nelson Bay Road, as depicted within **Figure 1.1**.

A second modification to PA 08_0142, (MOD2), was approved by the PAC on 16 March 2016. The modification allows for an increase in maximum hourly truck movements (in and out) of Lot 218 via the approved alternate access road.

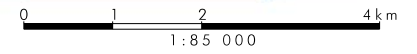
1.1 Mackas Sand Operations

Key operational features relevant to this Landscape Management Plan are:

- The approved hours of extraction being 24 hours a day 7 days a week except for operations within 250 metres of the Hufnagl Residence (R27) when operations are limited to 7.00 am to 6.00 pm Monday to Friday with no operations within 250 metres of R27 outside these times.
- Transportation of sand from Lot 220 along Oakvale Drive between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays in accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142 as Mackas Sand has agreements with the owners of residences facing Oakvale Drive. Copies of these agreements have been provided to the DPE.
- Transportation of sand from Lot 218 along the Alternate Access Road between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays in accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142 as Mackas Sand has an agreement with the owners of 2344, 2353 and 2368 Nelson Bay Road. Copies of these agreements have been provided to the DPE.



Source: Department of Lands (2006)



- Legend**
- ▭ Lot Boundaries
 - ▭ Approval Areas
 - - - Approved Site Access

FIGURE 1.1
Locality Plan

1.2 Purpose and Scope

To satisfy Condition 25 and 26 of Schedule 3 of PA 08_142 (MOD 2), a Landscape Management Plan (LMP) is required to be prepared and implemented for the project. The LMP is to be prepared in consultation with the Office of Environment and Heritage (OEH), DPI Water and Council and submitted to the DP&E for approval.

The scope of the Mackas LMP covers sand extraction operations on Lot 218 and Lot 220 approved under PA 08_0142 and involves the following:

- a Rehabilitation Management Plan that describes the short, medium, and long term measures to rehabilitate and landscape the site (**Section 3.0**)
- performance and completion criteria for rehabilitation and a program to monitor the progress of the rehabilitation measures against the performance and completion criteria (**Sections 3.2, 3.3 and 3.8**)
- a Long Term Management Strategy that defines the objectives and criteria for quarry closure and post-extraction management and future uses of the site (**Section 4.0**)
- measures to minimise or manage the ongoing environmental effects of the project (**Section 4.3**)
- a long term monitoring program to monitor the performance of the measures to minimise ongoing effects against performance criteria (**Section 4.4**).

Although there are limited rehabilitation opportunities within Lot 218, the long term final landform for this lot is included as part of this LMP as required by Condition 24 of PA 08_0142 (MOD2).

1.3 Regulatory Requirements

1.3.1 Project Approval

A detailed list of the PA 08_142 (MOD 2) conditions outlined in the Project Approval, and where they are addressed in this document is included in **Tables 1.1**.

Mackas Sand referred a controlled action to the Department of Environment for the construction of an alternate haul route from Nelson Bay Road to access the approved sand extraction area (EPBC Act Referral 2011/6214). Mackas Sand has received Federal Approval for referral 2011/6214 from the Department of Environment under the Environmental Protection Biodiversity Conservation Act 1999 (EPBC Act) on 29 November 2013. A separate LMP has been prepared to meet the requirements of EPBC Approval 2011/6214, and additional requirements from the EPBC LMP have been included within this document where relevant.

Table 1.1 Project Approval Conditions

Conditions		Addressed in Section
Schedule 3 – Environmental Performance Conditions		
Rehabilitation		
24.	<p>The Proponent shall progressively rehabilitate the site in a manner that is generally consistent with the final landform in the EA, to the satisfaction of the Secretary.</p> <p><i>Note: The department acknowledges that the rehabilitation activities on Lot 218 may be limited given the planned ongoing extraction on this lot. However, the long-term landform for Lot 218 must be addressed as part of the Landscape Management Plan.</i></p>	Whole document
Schedule 3 – Environmental Performance Conditions		
Landscape Management Plan		
25.	<p>The Proponent shall prepare and implement a Landscape Management Plan for the project to the satisfaction of the Secretary. This plan must:</p> <p>a) be prepared in consultation with OEH, DPI Water and Council, and be submitted to the Secretary within 6 months of the date of this approval, or prior to any vegetation clearing on Lot 220, whichever is sooner;</p>	Whole Document
	<p>b) include a:</p> <ul style="list-style-type: none"> ○ Rehabilitation Management Plan; and ○ Long Term Management Strategy. <p>The Proponent shall implement the approved management plan as approved from time to time by the Secretary.</p>	Section 3.0
26.	<p>The Rehabilitation Management Plan must include:</p> <p>a) the objectives for the site rehabilitation and site landscaping;</p>	Section 3.1
	<p>b) a description of the short, medium, and long term measures that would be implemented to rehabilitate and landscape the site;</p>	Sections 3.4, 3.5 and 3.6
	<p>c) detailed performance and completion criteria for the site rehabilitation and site landscaping;</p>	Sections 3.2 and 3.3

Conditions		Addressed in Section
	<p>d) a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:</p> <ul style="list-style-type: none"> • progressively rehabilitating disturbed areas; • landscaping the site to minimise visual impacts; • protecting vegetation and soil outside the disturbance areas; • preventing and/or minimising the accretion of sand dunes outside the project disturbance areas; • undertaking pre-clearance surveys; • salvaging and reusing material from the site for habitat enhancement; • managing impacts on fauna; • maintaining koala habitat linkages; • conserving and reusing topsoil; • collecting and propagating seed for rehabilitation works; • salvaging and reusing material from the site for habitat enhancement; • controlling weeds and feral pests; • controlling access; and • bushfire management. 	Section 3.7
	<p>e) program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;</p>	Section 3.8
	<p>f) a description of the potential risks to successful rehabilitation, and a description of the contingency measures that would be implemented to mitigate these risks; and</p>	Section 3.9
	<p>g) details of who would be responsible for monitoring, reviewing, and implementing the plan.</p>	Section 1.3
27.	<p>The Long Term Management Strategy must:</p> <ul style="list-style-type: none"> • define the objectives and criteria for quarry closure and post-extraction management; • investigate and/or describe options for the future use of the site; • describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and • describe how the performance of these measures would be monitored over time. 	Section 5.0

Conditions	Addressed in Section
<p>Schedule 3 – Environmental Performance Conditions</p> <p>Rehabilitation Bond</p>	
<p>28.</p>	<p>Within 3 months of the approval of the Landscape Management Plan, the Proponent shall lodge a rehabilitation bond for the project with the Secretary to ensure that the site rehabilitation is implemented in accordance with the performance and completion criteria of the Landscape Management Plan. The sum of the bond shall be determined by:</p> <p>a) calculating the full cost of rehabilitating the site in each 3 year review period (see condition 7 of schedule 5); and</p> <p>b) Employing a suitably qualified expert to verify the calculated costs, to the satisfaction of the Secretary.</p> <p><i>Notes:</i></p> <ul style="list-style-type: none"> • <i>If the rehabilitation is completed to the satisfaction of Secretary, the Secretary will release the bond.</i> • <i>If the rehabilitation is not completed to the satisfaction of the Secretary, the Secretary will call in all or part of the bond, and arrange the satisfactory completion of the relevant works.</i>
<p>Schedule 3 – Environmental Performance Conditions</p> <p>Biodiversity Offset Strategy</p>	
<p>28A.</p>	<p>The Proponent shall prepare and implement a Biodiversity Offset Strategy for the Biodiversity offset Area, in consultation with OEH and to the satisfaction of the Secretary. The strategy must include:</p> <p>a) performance criteria for the offset area;</p> <p>b) a description of the proposed short-term and long-term management measures for the offset area, including to:</p> <ul style="list-style-type: none"> • protect, conserve and enhance the vegetation within the offset area; • control access to the offset area; and • control weeds and feral pests. <p>c) a program to measure and monitor the effectiveness of the strategy against the performance criteria.</p> <p>The Proponent shall implement the approved strategy as approved from time to time by the Secretary.</p>

Conditions		Addressed in Section
Schedule 3 – Environmental Performance Conditions		
Long Term Security of Biodiversity Offset		
28B.	<p>Prior to the end of December 2014, or as otherwise agreed by the Secretary, the Proponent shall make suitable arrangements to provide appropriate long-term security for the Biodiversity Offset Area to the satisfaction of the Secretary.</p> <p><i>Note: Mechanisms to provide appropriate long-term security to the land within the Biodiversity Offset Strategy include a Biobanking Agreement under Part 7A Division 2 of the Threatened Species Conservation Act 1995, a Voluntary Conservation Agreement under Section 69B of the National Parks and Wildlife Act 1974, or any alternative mechanism that results in similar conservation outcomes. Any mechanism used to secure the land must remain in force in perpetuity.</i></p>	Section 4.7

1.3.2 Stakeholder Consultation Regarding this Document

The approved LMP was developed in consultation with the NSW Office of Environment and Heritage (OEH), NSW Office of Water (NOW), Department of Environment and Port Stephens Council (Council). The process of the consultation has involved engaging key people from each of these agencies when developing the rehabilitation and landscape strategies as part of the Environmental Assessment process.

A copy of the revised LMP will be submitted to OEH, NOW and Council for comment at the time the document is submitted to the Department of Planning and Infrastructure (now Department of Planning and Environment (DPE) for review. Relevant comments or issues that may be raised from these agencies will be addressed as part of a revision to the LMP, which will be re-submitted to DPE if any amendments are required.

1.4 Roles and Responsibilities

The Quarry Manager will be responsible for ensuring that the development is undertaken in accordance with the requirements of PA 08_0142 (MOD 2). Responsibilities in relation to landscape and rehabilitation management and monitoring are outlined in **Table 1.2**.

Table 1.2 Roles and Responsibilities

Role	Responsibilities
Quarry Manager	<ul style="list-style-type: none"> • provide that sufficient resources are allocated for the implementation of this LMP; • ensure that the requirements of this LMP are effectively implemented; • schedule rehabilitation activities as per this plan; • authorise internal and external reporting requirements as well as subsequent revisions of this program; • ensure that the plan is relevant to current operations; • ensure that all personnel are aware of noise management obligations; • periodically reviewing progress against closure objectives and rehabilitation criteria; and • authorising internal and external reporting requirements as well as subsequent revisions of this program.
All employees and contractors	<ul style="list-style-type: none"> • undertake all activities in accordance with this LMP; and • undertake the compulsory site induction.

1.5 Proposed Final Land Use Option and Rehabilitation Strategy

The final landform at Lot 218 will be governed by the natural movement of sand into the extraction area, with mobile sand progressively filling the extraction area over time. Rehabilitation of this site will consist of the establishment of a bunded vegetated area at the western edge of the extraction area to provide a physical barrier between the mobile sand and native vegetation on the landward side of the mobile dunes.

Rehabilitation will be undertaken progressively at Lot 220 as extraction operations continue. Rehabilitation objectives for the site will be to:

- Ensure that at the end of the life of the operation, all infrastructure and equipment other than access roads that may be used in the future will be removed from the site. The site will be rehabilitated to re-establish the Coastal Sand Apple – Blackbutt Forest community that currently exists at the site.
- Achieve a final landform that is compatible with the surrounding topography and provides at minimum a cover of 1 metre of sand above the predicted maximum groundwater level or 2 metres above average groundwater level, in accordance with Schedule 2, Condition 7A of PA 08_0142.

It is envisaged that the rehabilitated area may be incorporated into the Worimi Conservation Lands.

2.0 Existing Environmental Baselines

As outlined above, the project area forms part of the Stockton Bight dune system and is located approximately 20 to 25 kilometres to the north-east of Newcastle, near Salt Ash (refer to **Figure 1.1**). An overview of the existing environmental baselines for the area is outlined below.

2.1 Land Use and Tenure

Lots 218 and 220 are currently vacant and have previously been disturbed through activities such as vehicle and horse movements, walking and sand tours, weapons testing and squatting. Previous surveys undertaken in the area found evidence of vegetation clearing, suggesting other land uses may have occurred, such as grazing.

Both lots are zoned E3 Environmental Management under the Port Stephens Local Environment Plan (LEP) 2013. The access road into Lot 220, and the approved alternate access road to Lot 218 are located on land zoned 1(a) Rural Agriculture. Legal access is not granted to the public for entry to Lot 218 or Lot 220, although both sites are used by off-road vehicle users and horse riders for recreational activities.

The land capability and agricultural suitability of the study area was mapped by OEH in 2009 and was found to be very low. Both lots were found to have a land capability of VII to VIII and an agricultural suitability classification of 5 and are therefore unsuitable for agriculture.

The lots were previously Crown lands and were granted to Worimi LALC in 2001 under the Aboriginal Land Rights Act 1983.

2.2 Services

A 50 metre wide electricity transmission easement traverses Lot 220, roughly from east to west across site (refer to **Figure 2.1**). This easement has never been used and EnergyAustralia (now Ausgrid) has indicated that this easement is no longer required.

A 20 metre wide electricity transmission easement containing an overhead transmission line is located to the north of Lot 220. The access road on Lot 8 in DP 833768 and Lot 3 in DP 739188 that will be used to access Lot 220 follows an existing access track in this easement for approximately 300 metres. The easement and overhead transmission line continue along the edge of the interbarrier depression, and cross the approved alternate access road to the north of Lot 218.

2.2.1 Surrounding Land Uses

The study area is bounded by land zoned 1(a) Rural Agriculture to the north and 7(c) Environmental Protection – Water Catchment to the south, east and west. Stockton Bight and the foredunes are zoned 6(a) General Recreation. Land uses in the vicinity of the study area include:

- recreational uses of Stockton Bight including fishing, walking, off-road vehicle driving and horse riding, with access from Lavis Lane and other tracks along the dune area. Existing tracks on Lot 220 are shown on **Figure 2.1**

- sand extraction, from operations run by Toll Bulk Sands to the west of Lot 218 (Pt Portion 77, Portions 71, 72, 93, 99, 100 and 157), Quality Sands and Ceramics, Sibelco adjacent to the west of Lot 220 on Lot 4 in DP 774726, Hunter Quarries adjacent to the north of Lot 220 on Lot 43 in DP 247593 and existing Mackas Sand operations to the west of Lot 220 on Portion 3 in DP 753194 (refer to Figure 2.2)
- cattle grazing and other agricultural uses, which generally occur on low lying land such as the flats associated with Tilligerry Creek to the north
- water reserves – provision is made within the Water Sharing Plan for the Tomago Tomaree Stockton Groundwater Sources 2003 for Hunter Water Corporation (HWC) to obtain an allocation to utilise groundwater from the Stockton aquifer to supplement its existing reserves. A HWC easement in Water Reserve 57573 is located between the northern section of Lot 218 and the southern section of Lot 220. The easement contains no groundwater infrastructure at present but may, subject to licensing, be commissioned and used by HWC to access groundwater supplies if required in the future; and
- conservation, the Worimi Conservation Lands adjoin Lot 218 to the north, south and east and Lot 220 to the south. The conservation lands form a 4438 hectare conservation area that includes Worimi State Conservation Area, Worimi National Park and Worimi Regional Park.

A small number of residential and rural residential properties are located in the general area to the north of Lot 220, with one property located approximately 50 metres to the north of the lot boundary (refer to **Figure 2.2**). Two residences are located at the end of Lavis Lane, approximately 1 kilometre to the west of Lot 218, and six residences are located near the approved Nelson Bay Road intersection for the alternate haul route to Lot 218.

2.3 Groundwater

The study area is located on the Stockton Sandbeds, a groundwater resource that has been identified by HWC as a potential reserve of potable water. Groundwater resources in the region are managed in accordance with the Water Sharing Plan for the Tomago-Tomaree-Stockton Groundwater Sources. HWC currently utilises groundwater from the Tomago and Tomaree Sandbeds which are located to the north and north-east of the study area respectively. These groundwater aquifers provide approximately 20% of the potable water supplies to the Lower Hunter Region.

2.4 Acid Sulphate Soils

The Williamstown 1:25,000 Acid Sulfate Sulphate Soils Risk Map (NSW Department of Natural Resources 2006) classifies almost all of the study area as Wd4 and Wa4, which are described as landforms resulting from aeolian processes forming either dunes or sandplains at an elevation of above 4 metres Australian Height Datum (AHD). The probability of acid sulphate soils being present in this landform is considered to be low with any acid sulphate materials present likely to be sporadically distributed and at least 3 metres below the ground surface and possibly much deeper if buried by windblown sand.

Very small sections of the north-eastern corners of the Lot 218 operational area and Lot 220 are classified Wa2 and Ap2 soils respectively. These soils are also considered to have a low probability of containing acid sulphate soils, although may contain acid sulphate material between 1 and 3 metres below the ground surface. The section of Lot 220 that contains Ap2 soils will form part of the vegetation buffer that will surround the site and will not be disturbed.

It is considered that the proposal poses minimal risk of exposing acid sulphate soils, as sand extraction will not occur below the groundwater table. The probability of acid sulphate soils occurring within the project area is very low as all of the material to be extracted would have been exposed to the air in the past.



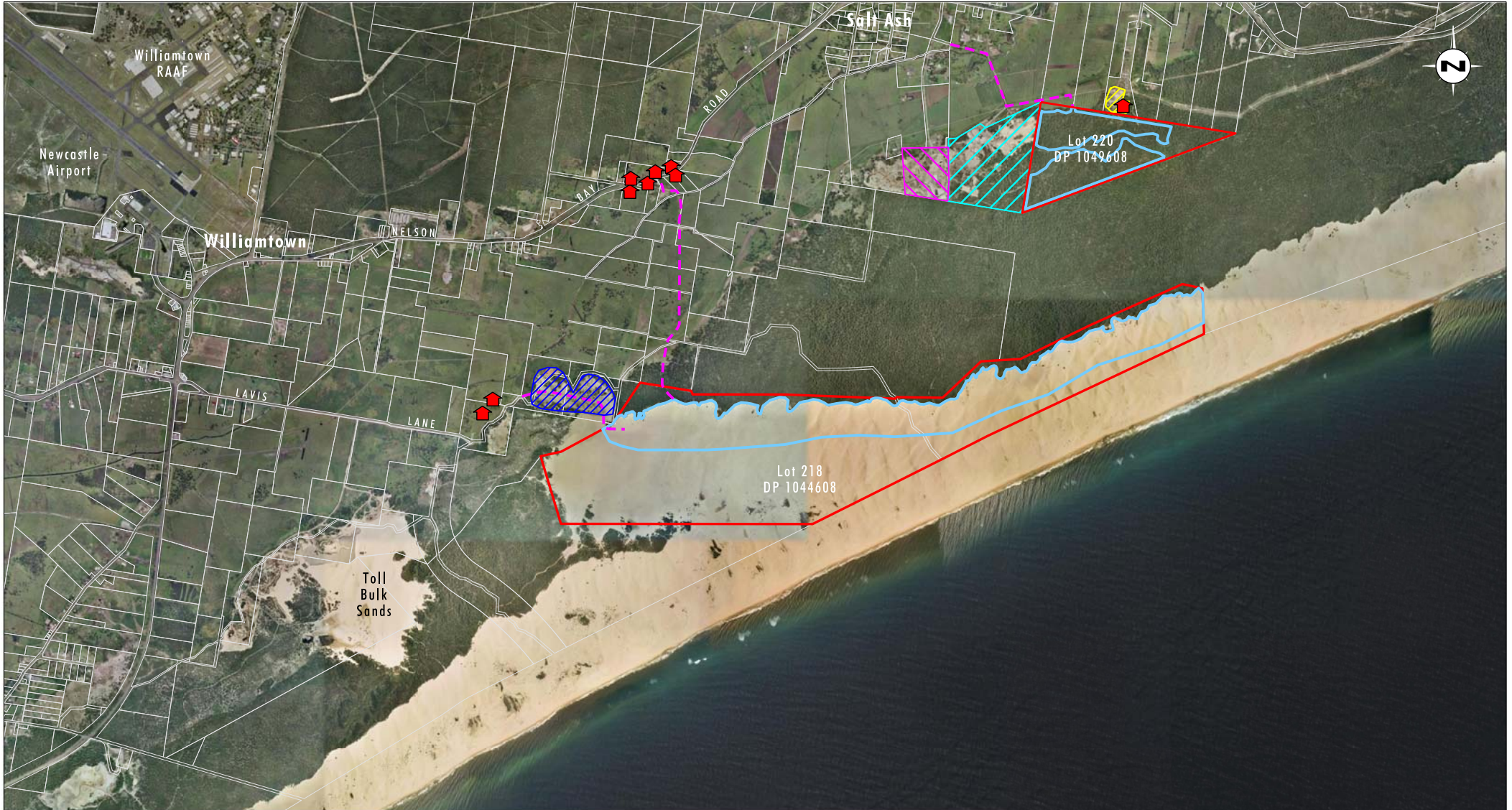
Source: Google Earth (2016)
Note: Reference Monitoring Sites (Section 3.8.1)

0 100 250 500m
1:10 000

Legend

- ▭ Lot 220 Boundary
- 🏠 Hufnagl Residence
- Existing Transmission Line in 20 metre Wide Easement
- Approximate Location of Existing Tracks
- Monitoring Plots

FIGURE 2.1
Lot 220 Features



Source: Google Earth (2012), Department of Lands (2003)

0 0.5 1.0 2 km
1:45 000

Legend

- Lot Boundaries (218 & 220)
- Approved Extraction Areas
- Mackas Sand (existing operations)
- Sibelco
- Hunter Quarries
- Quality Sands and Ceramics
- 🏠 Residence Receiver Locations
- Approved Site Access

FIGURE 2.2
The Study Area

2.5 Unexploded Ordnance

As outlined in the Mackas Sand Unexploded Ordnance Management Plan (UOMP), the extraction areas are unlikely to contain unexploded ordnance, although part of Lot 218 may contain debris from exploded ordnance. Extraction within Lot 218 will occur within windblown sand that has been deposited in the area after World War II and therefore the potential for this sand to contain unexploded ordnance is negligible. Any disturbance of the soil profile that existed prior to the 1950s will be excavated in accordance with the UOMP.

2.6 Flora

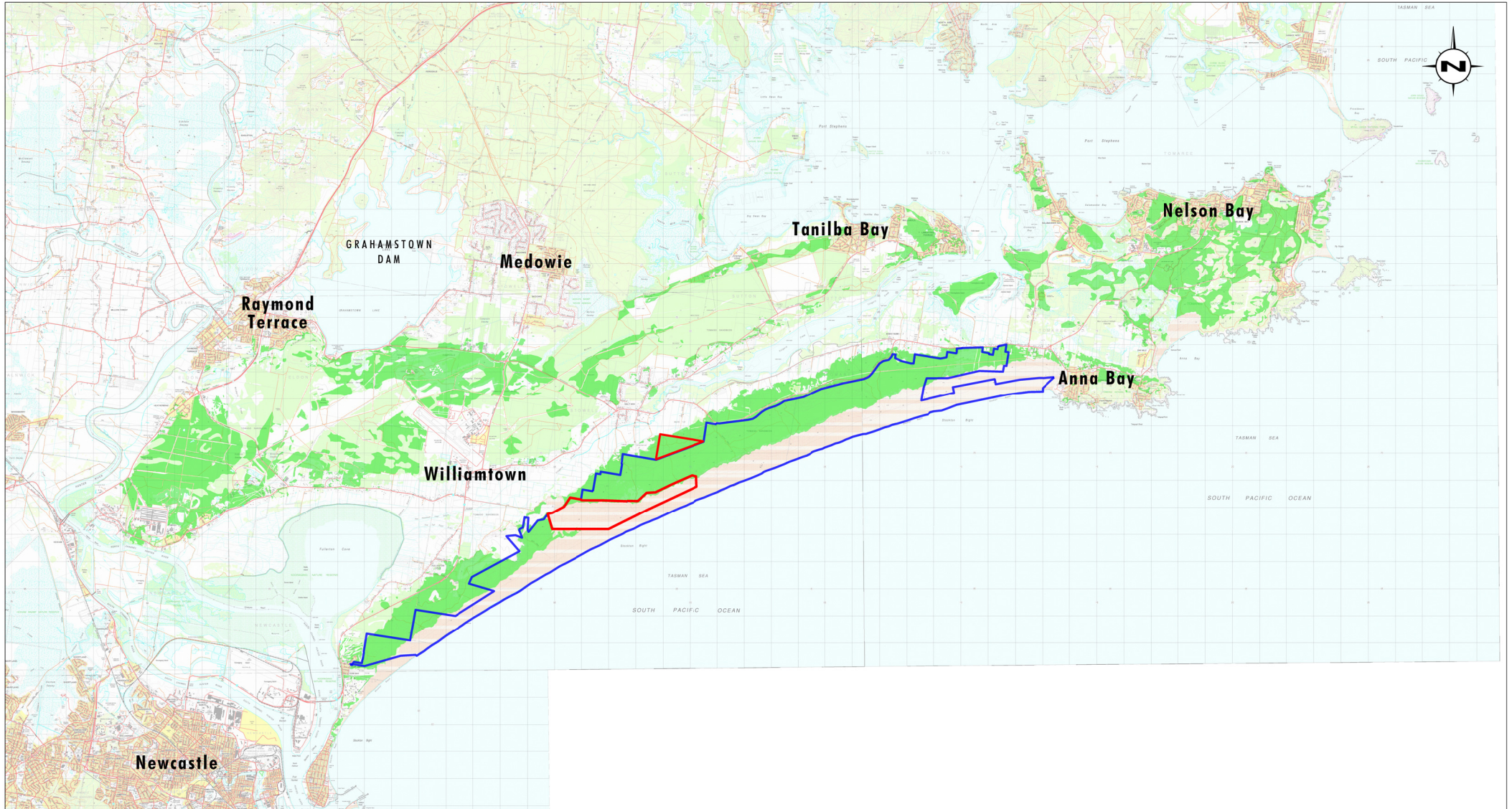
In total, 136 flora species were recorded within the study area, comprising 49 families. Of the 136 flora species recorded, 22 (16%) were introduced species. Three vegetation communities were recorded within the project area, including Coastal Sand Apple – Blackbutt Forest, Swamp Mahogany – Paperbark Forest and Previously Disturbed Grassland. The distribution of these communities within Lot 220 is shown in **Figure 2.3**. No vegetation occurs in the Lot 218 operational area.

As outlined in the EA (Umwelt 2012) for PA 08_0142 (MOD1), an intergrade of *Angophora floribunda* and *Angophora inopina* was identified approximately 500 metres from the approved access road and will not be impacted by access road construction or other aspects of the project. Additionally, the sand doubletail (*Diuris arenaria*) which is listed under TSC Act and rough doubletail (*Diuris praecox*) which is listed under TSC and EPBC Acts were both identified during targeted field surveys. Populations of neither ground orchid will be significantly impacted by the access road or other aspects of the project.

2.7 Fauna Habitat

The coastal forest areas of Lot 220 provide foraging, roosting and nesting habitats for a variety of fauna species. Two broad habitat types were identified along the proposed alternate haul route, these being open forest and previously disturbed/grassland. While the previously disturbed/grassland areas provide mostly foraging habitat value, the open forest areas provide a range of habitat niches for fauna species.

The canopy species in the forest habitat provide an abundant range of tree hollows for hollow-dependent and opportunistic fauna, including small and medium sized arboreal mammals, birds and reptiles.



Source: Department of Lands (2006), Hunter Councils (2003)

0 2.5 5 10km
1:200 000

Legend

- ▭ Lot Boundaries (218 & 220)
- ▭ Worimi Conservation Lands
- ▭ Coastal Sand Apple Blackbutt Forest

FIGURE 2.3

Coastal Sand Apple
Blackbutt Forest

Large tree hollows, suitable as nesting and roosting sites for large bird species, including owls and cockatoos, were sparsely recorded due to the lower abundance of large mature overstorey species. The canopy species provide foraging resources for nectarivorous bird and mammal species during the summer months. The swamp mahogany (*Eucalyptus robusta*) provides an important winter foraging resource for a wide range of species, in particular migratory birds such as the swift parrot (*Lathamus discolor*) and regent honeyeater (*Anthochaera phrygia*).

The open, mid-stratum of the open forest habitat supports tea-trees and paperbarks, providing a good nectar resource for birds and arboreal mammals. These shrubs, combined with the dense ground stratum of grasses and sedges, also provide important cover and refuge for reptiles, small mammals and birds.

The ground cover layer is dense, providing refuge for small mammals, birds and reptiles. The study area displays evidence of a frequent fire regime from burnt wood on the ground and trunks of mature trees. Several fallen logs of various sizes were identified which may provide nesting and refuge for medium to small mammals and reptiles. No rocky outcrops, aquatic or semi-aquatic habitats were identified within the study area.

The Lower Hunter and Central Coast Regional Biodiversity Conservation Strategy (House 2003) identified the Coastal Sand Apple – Blackbutt Forest occurring along the Stockton Bight dune system as regionally significant habitat and as a regionally significant habitat linkage. No significant habitat is located within the approved extraction area at Lot 218.

2.8 Fauna

Four threatened fauna species were identified in Lot 220 and an additional four species were recorded in proximate habitat to Lot 220 in previous surveys. No endangered fauna populations were identified in the project area and are none are known to occur in adjacent areas. As outlined in the EA (Umwelt 2012) for PA 08_0142 (MOD1), three threatened fauna species were identified in the study area and an additional 16 threatened or endangered fauna species are considered to have potential habitat within Lot 220.

No threatened fauna species were recorded within the alternate haul route alignment to Lot 218, however four threatened species were found in adjacent, contiguous habitats with the alternate haul route. It is considered that the local area around the alternate haul route provides potential habitat for similar species that were, or are expected to be, found within Lot 220.

Threatened species known to occur in the project area include:

- squirrel glider (*Petaurus norfolcensis*): recorded at three locations within Lot 220 during surveys in 2003 and 2008. The habitat throughout Lot 220 provides high quality nesting and food resources for this species
- grey-headed flying-fox (*Pteropus poliocephalus*): identified widely across Lot 220 during the 2003 survey. Mature flowering canopy species provide feeding resources for this species. No roost sites were identified in the study area. The species was also identified in proximity to the alternate haul route to Lot 218 during field surveys undertaken during 2012
- greater broad-nosed bat (*Scoteanax rueppellii*): recorded in 2003 on Lot 220 and proximate to the alternate haul route to Lot 218. These areas are expected to provide foraging and roosting habitat for this species
- eastern bentwing-bat (*Miniopterus schreibersii oceanensis*): recorded in 2003. Lot 220 is expected to provide foraging habitat for this species

- powerful owl (*Ninox strenua*): recorded to the south-west of Lot 220 (Umwelt 2004). Lot 220 is expected to form part of an extensive foraging habitat for this species
- koala (*Phascolarctos cinereus*): recorded to the south-west of Lot 220 (Umwelt 2004). Lot 220 has potential to be used as a corridor between preferred habitats however it is unlikely that Lot 220 would support a resident population of the species due to the lack of preferred koala feed trees
- eastern pygmy-possum (*Cercartetus nanus*): recorded to the south-west of Lot 220 (Umwelt 2004)
- masked owl (*Tyto novaehollandiae*): a pair of masked owls was recorded to the north of the study area in 2002. Surveys in 2003 and 2008 failed to identify the species and roost trees were not identified. The species may utilise the study area as part of an extensive foraging range, however the species does prefer to hunt in open vegetated areas
- grey crowned babbler (eastern subsp.) (*Pomatostomus temporalis temporalis*): recorded to the north of Lot 218 in proximity to the Worimi Conservation Area during surveys for the Alternate Access Road in October 2012 (Umwelt 2012)
- little bentwing-bat (*Miniopterus australis*): recorded to the east of the Alternate Haul Route in earlier surveys (Umwelt 2012).
- Ten migratory species listed under the Environmental Protection Biodiversity Conservation Act 1999 (EPBC) Act were recorded within the study area during surveys. Additionally, the following species were considered within the EPBC referral, for which EPBC Approval 2011/6124 was received in November 2013:
 - New Holland mouse (*Pseudomys novaehollandiae*)
 - long-nosed potoroo (*Potorous tridactylus tridactylus*)
 - spotted-tailed quoll (*Dasyurus maculatus maculatus*)
 - grey-headed flying-fox (*Pteropus poliocephalus*) (as described above)
 - large-eared pied bat (*Chalinolobus dwyeri*)
 - regent honeyeater (*Anthochaera phrygia*)
 - swift parrot (*Lathamus discolor*).

3.0 Rehabilitation Management Plan

This Rehabilitation Management Plan relates to both the short and medium term rehabilitation of the site. The long term management strategy, which includes preliminary closure criteria for the site, is included in **Section 3.6**.

3.1 Rehabilitation Objectives

The proposed final land uses for the project are outlined in **Section 1.5**. The key rehabilitation objectives to meet the intended land use will include the following:

- create a final landform with acceptable post mine land capability
- provide for the safety of employees and the public during and following the closure of the quarrying operations
- minimise the potential for long-term environmental impact and liability
- minimise the potential impacts from closure activities
- reduce the need for long term monitoring and maintenance
- complete the closure, decommissioning and rehabilitation works as quickly and cost effectively as possible
- through rehabilitation of disturbed areas, provide a sustainable plant cover using locally occurring plant species
- re-establish the native vegetation communities that existed prior to construction activities
- implement appropriate control and remediation strategies in the event that contamination sources are identified, so as to prevent off-site impacts
- provide that design periods and factors of safety for all site works take into account extreme events and other natural processes such as erosion
- provide for the successful sign-off on the rehabilitation recovery of the security bond.

3.1.1 Construction Controls

A range of controls will be implemented prior to the commencement of construction of the alternate haul route. These controls will ensure that potential impacts during the construction phase are minimised and that all works will be undertaken in accordance with the requirements of the approval.

3.1.1.1 Protecting Vegetation outside of the Disturbance Footprint

Vegetation clearance for construction of the alternate haul route to Lot 218 will be undertaken in accordance with the methodology described in **Section 3.7.5**. Pre-clearance surveys will be undertaken prior to any vegetation being cleared during construction activities for the Alternate Haul Route. The haul route will be demarcated for the duration of the route to ensure that only the approved haul route is cleared.

3.2 Preliminary Rehabilitation Completion Criteria

The preliminary rehabilitation completion criteria that have been determined for the site are outlined in **Table 3.1**. The preliminary rehabilitation criteria will be used to guide rehabilitation activities throughout the life of the operation with the aim of structuring rehabilitation activities towards final quarry closure requirements.

Table 3.1 Mackas Sand Pty Ltd Preliminary Rehabilitation Completion Criteria

Aspect	Preliminary Rehabilitation Criteria
Landform	<ul style="list-style-type: none"> • No significant erosion is present that would constitute a safety hazard or compromise the capability of supporting the end land use • Surface layer to be free of any hazardous materials • All infrastructure and equipment other than access roads that may be used in the future, will be removed from the site • Final landform is compatible with the surrounding topography and provides at minimum a cover of 1 metre of sand above the predicted maximum groundwater level • Within Lot 218, a bunded vegetated area at the western edge of the extraction area has been established to provide a physical barrier between the mobile sand and native vegetation on the landward side of the mobile dunes
Soil	<ul style="list-style-type: none"> • Topsoil/organic material or a suitable alternative has been spread uniformly over the rehabilitation surface within Lot 220 • Monitoring demonstrates soil profile development in rehabilitated areas (e.g. development of organic layer, litter layer) within Lot 220
Vegetation	<ul style="list-style-type: none"> • Revegetation areas contain flora species assemblages characteristic of the desired native vegetation community (i.e. Coastal Sand Apple – Blackbutt Forest community) • Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites • More than 75% of trees are healthy and growing as indicated by Long Term Monitoring • There is no significant weed infestation such that that weeds do not compromise a significant proportion of species in any stratum
Fauna	<ul style="list-style-type: none"> • Rehabilitated areas provide a range of vegetation structural habitats (e.g. target tree species present, shrubs, ground cover, developing litter layer etc.)
Bushfire Hazard	<ul style="list-style-type: none"> • Appropriate bushfire hazard controls have been implemented on the advice from the NSW Rural Fire Service

3.3 Developing and Refining Rehabilitation Completion Objectives and Criteria

It is the intention that the rehabilitation completion criteria will be refined as required and finalised following the outcomes of rehabilitation monitoring and stakeholder feedback as shown in **Figure 3.1**. The process of developing and refining rehabilitation criteria will be progressive and allow for continual improvement. Mackas Sand will refine rehabilitation completion criteria in consideration of the following:

- the environmental values to be protected as identified in baseline monitoring and pre mining environmental assessments including literature reviews
- government stakeholder expectations, legislative requirements, development approval conditions and Environmental Assessment commitments
- regional synergies, including integrating rehabilitation objectives with surrounding vegetation community
- opportunities for alternative sustainable post-extraction land uses
- provide for visual enhancement of the site
- realistic community expectations
- what is achievable by using current best practice rehabilitation methodologies
- likely successional processes and seasonal variability
- potential impacts from feral plants and animals
- suitable monitoring programs can be developed to demonstrate that criteria have been met.

The criteria to be developed will be designed to be flexible to accommodate technological improvements and any updated outcomes from ongoing research.

3.4 Short Term Rehabilitation Strategy – Construction Phase

3.4.1 Lot 218

As the rehabilitation strategy for Lot 218 will be governed by the natural movement of sand into the extraction area and will involve negligible revegetation, the short term rehabilitation strategy will be limited to the establishment of a vegetative bund on the western edge of the extraction area. The objective of the bund is to provide a physical barrier between the mobile sand and native vegetation on the landward side of the mobile dunes. This will initially commence following the extraction of a sufficient volume of sand to allow the bund to be established and will continue to be progressively established as sand extraction proceeds.

3.4.2 Lot 220

Sand extraction at Lot 220 has been undertaken for more than three years, and will continue to be generally undertaken in accordance with the EA for sand extraction operations (Umwelt 2009). As such, rehabilitation will be undertaken progressively as sand extraction proceeds. It is anticipated that rehabilitation will be undertaken at a rate of approximately two to three hectares annually, relative to the rate of extraction. Ongoing short term rehabilitation strategies will be primarily focused on maximising the availability and viability of biological resources for use in rehabilitation activities, such as:

- salvage and reuse of material for habitat enhancement (refer to **Section 3.5.1**)
- topsoil / upper 100 mm substrate management (refer to **Section 3.5.2**).

3.5 Medium Term Rehabilitation Strategy – Progressive Rehabilitation

The medium term rehabilitation strategy for Lot 218 will involve the continued establishment of the vegetative bund on the western edge of the extraction area as the sand extraction operation continues. As the operation is within an active mobile dune system with no pre mining vegetation, the primary aim of rehabilitation will be to minimise the potential for sand encroachment into the adjacent native vegetation area. No revegetation activities will be undertaken within the extraction area.

The medium term rehabilitation strategy for Lot 220 relates to the progressive rehabilitation at this site. The key aspects of this rehabilitation program are discussed below.

3.5.1 Salvage and Reusing Material for Habitat Enhancement

Tree hollows and trees/logs salvaged during pre-clearing surveys will be stockpiled and used in site rehabilitation on Lot 220 and the vegetated bund at Lot 218. Once rehabilitation is structurally mature, salvaged tree hollows will be replaced in similar densities to those in unaffected vegetation on the site. Salvaged logs, stumps and stags will be emplaced in rehabilitation areas (in areas not intended for future development) following topsoil spreading to enhance ground fauna characteristics. All tree hollows identified during pre-clearance surveys will be re-instated into rehabilitation areas once the vegetation is structurally mature enough to support the structures.

Nest boxes will be used in lieu of salvaged tree hollows if appropriate, as determined as part of the rehabilitation management of the site. Since nest boxes will be used where there is insufficient salvaged tree hollows, it is difficult to quantify the amount or type of additional nest boxes that will be required. In the event that sufficient tree hollows cannot be salvaged as part of tree clearing procedures, a suitably qualified and experienced ecologist will determine the most appropriate nest box requirement based on the types and number of tree hollows being cleared. Nest box design will consider the full range of hollow-dependant species recorded in the project area and known to occur in the local area in similar/contiguous habitat, in particular hollow dependant threatened fauna species such as the squirrel glider (*Petaurus norfolcensis*) and threatened tree roosting micro-bats. The density of salvaged tree hollows and nest boxes in rehabilitation areas will consider the carrying capacity of the rehabilitated vegetation in which the boxes are being established.

Salvaged logs, stumps and stags sourced from the clearing of the alternate haul route will be emplaced adjacent to the alternate haul route to enhance ground fauna characteristics. It is envisaged that tree hollows and salvaged logs will be utilised in the rehabilitation of the alternate haul route if possible, should extractive operations at Lot 218 cease.

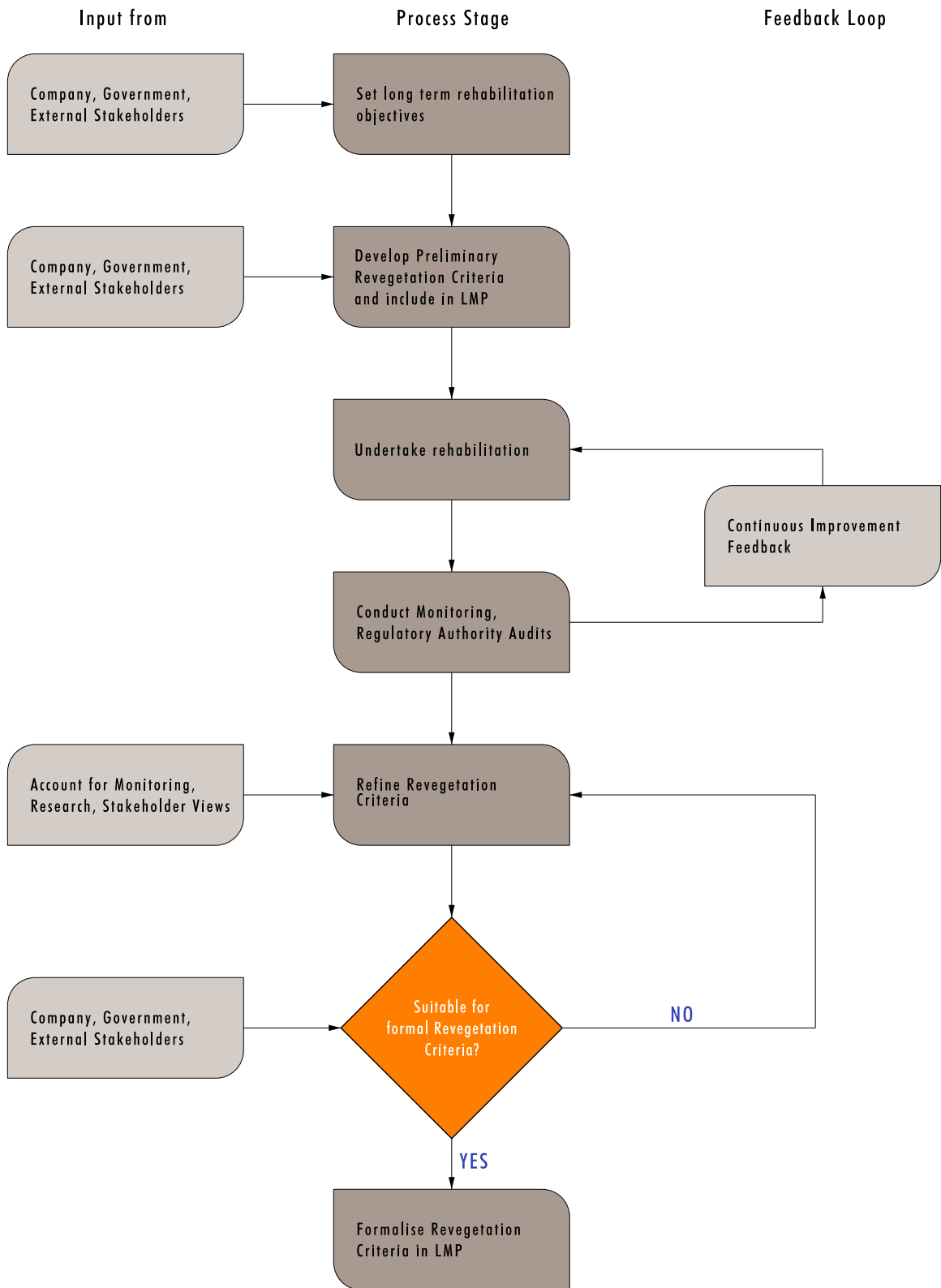


FIGURE 3.1

Process for Developing and Refining Rehabilitation Closure Criteria

3.5.2 Topsoil Management

Suitable soil material and vegetative debris will be stockpiled or directly reused so that it can be incorporated into the final landform to assist in providing a suitable growing medium for the establishment of trees and understorey species.

Where topsoil is available, the following measures will be adopted to protect its quality and enhance rehabilitation outcomes:

- where possible, topsoil will be stripped when moist to help maintain viability and to reduce dust generation
- where practical, topsoil will be direct-returned to reshaped quarry areas which are available for revegetation
- when direct return of topsoil is not practicable, stockpiles will be formed, located away from quarrying, traffic areas and watercourses
- level or gently sloping areas will be selected as stockpiles sites to minimise erosion and potential soil loss
- appropriate sediment controls will be installed at the base of stockpiles to prevent soil loss
- stockpiles to be kept longer than three months will be sown with a suitable cover crop to minimise soil erosion and invasion of weed species
- weed growth will be monitored and subsequently controlled if necessary
- prior to re-spreading, weed growth will be scalped from the top of the stockpiles to minimise the transport of weeds into rehabilitated areas
- stockpiles will be appropriately sign-posted to identify the area and minimise the potential for unauthorised use or disturbance.

It is generally considered that topsoil stockpiles should be no greater than 3 metres in height in order to preserve soil structure, maximise surface exposure and biological activity. Given that topsoil stockpiles at Mackas Sand are primarily sand, there is minimal soil structure to preserve. Also, with a strong focus of direct return of topsoil, the topsoil stockpiled is primarily from the first 12 months of operations. Accordingly it is considered that the site conditions within Lot 220 warrant the construction of higher stockpiles. The construction of a 4 to 5 metre high stockpile will minimise the surface area that is exposed to weed infestation and will make more area available for direct return of topsoil by reducing the footprint size of the stockpile.

3.5.3 Landform Design

In regards to Lot 218, the final landform will be governed by the natural movement of sand into the extraction area, with mobile sand progressively filling the extraction.

The rehabilitation strategy for Lot 220 aims to achieve a final landform that is compatible with the surrounding topography (refer to **Figure 3.2**) and provides at minimum a cover of 1 metre of sand above the predicted maximum groundwater level. Landform elements will be shaped, where possible, in undulating informal profiles in keeping with natural landforms of the surrounding environment.

3.5.4 Surface Preparation

Surface preparation activities for rehabilitated areas will be commenced as soon as possible following the completion of sand extraction activities. A general overview of surface preparation activities undertaken at the Mackas Sand site includes:

- topsoil will be applied for incorporation into the final shaped surface
- structures such as tree hollows and logs will be incorporated into the final landform to augment the habitat value of the rehabilitated areas
- suitable erosion control measures (e.g. silt fences, mulches etc.) will be implemented where required to minimise soil loss from areas undergoing rehabilitation.

3.5.5 Revegetation

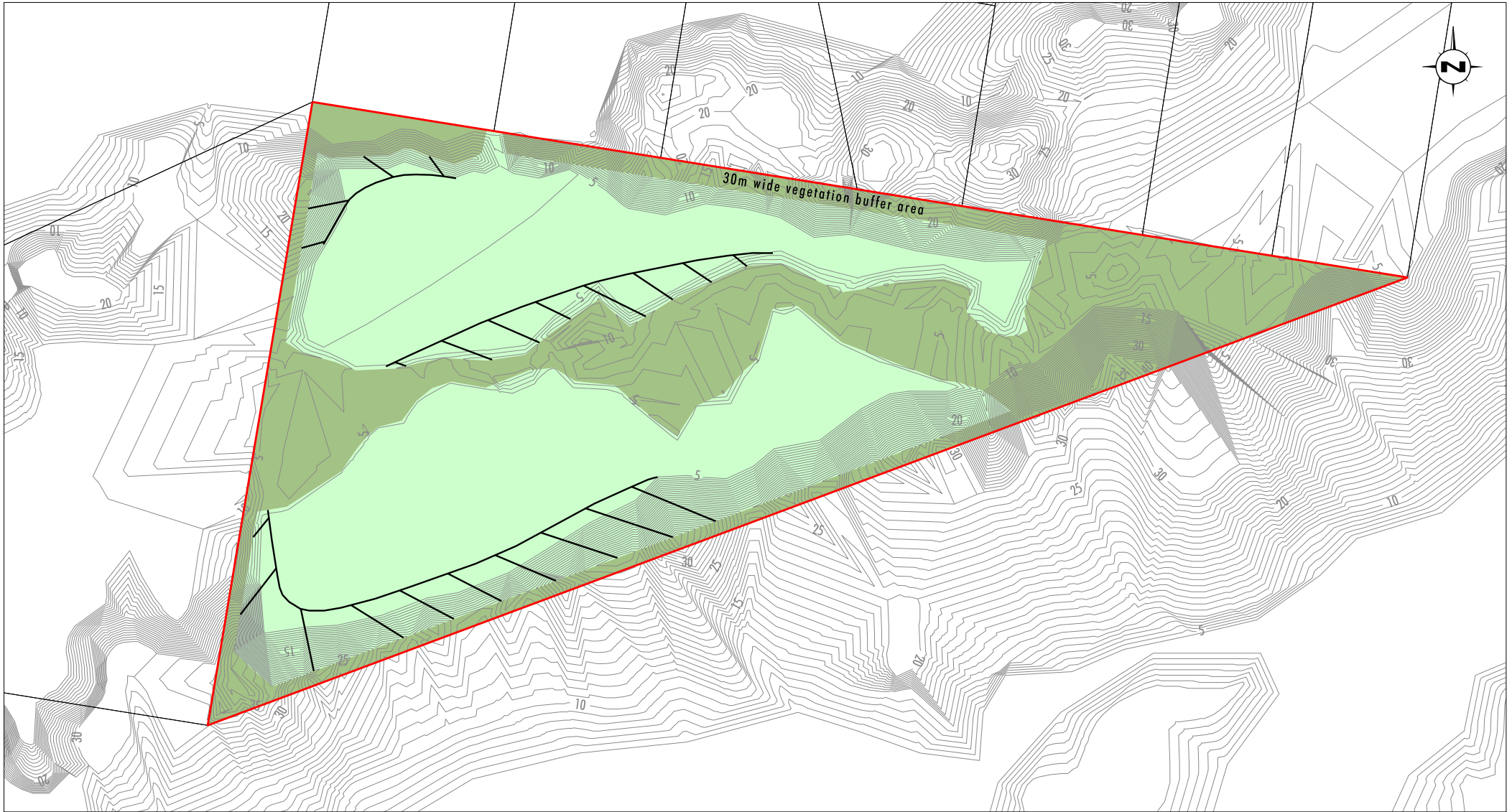
In general, revegetation activities across Mackas Sand operations will be undertaken in spring and autumn, however, opportunistic revegetation may be practised if areas become available for sowing in summer and winter.

The rehabilitation strategy aims to re-establish Coastal Sand Apple – Blackbutt Forest on disturbed areas of the site. It is envisaged that native trees will initially be planted at a density of approximately 1000 trees per hectare with subsequent infill planting of up to approximately 300 trees per hectare (as required) in the following year to replace any trees that may not survive.

Ongoing planting and weed control measures will be undertaken while a stable native vegetative cover is being established. Primarily, revegetation will involve direct seeding and planting of tube stock. Revegetation techniques will be continually developed and refined over the life of the quarry through a continual process of research, trialling, monitoring and improvement.

3.5.6 Rehabilitation Schedule

Rehabilitation will be undertaken progressively. It is envisaged that once the approximately 4 hectare processing plant area is established, that the remainder of the proposed extraction area will be cleared at a rate of approximately 3 hectares per year on average. Progressive rehabilitation will involve a similar area being progressively reshaped to final landform and planted with native species each year.



Source: Department of Lands (2003)
Note: Contour Interval 10m

0 100 200 400m
1:8000

Legend

- Lot 220 Boundary Planted
- Final Landform (Native Vegetation) - Coastal Sand Apple - Blackbutt Forest
- Existing Native Vegetation - Coastal Sand Apple - Blackbutt Forest
- Batter Reshaped

FIGURE 3.2

Rehabilitation Plan for Lot 220

3.6 Long Term Rehabilitation Strategy – Care and Maintenance

In the context of the Mackas Sand Project, the long term rehabilitation strategy relates to the care and maintenance activities required to progress rehabilitated areas towards meeting the appropriate objectives and criteria in a timely and cost effective manner. The scope of the rehabilitation care and maintenance phase may include the following:

- weed and feral animal control of rehabilitation and offset areas
- erosion and sediment control works
- re-seeding/planting of rehabilitation areas that may have failed due to adverse conditions or bushfire
- maintenance fertilising if required
- repair of fence lines, access tracks and other general related land management activities.

The scope of these works will be determined based upon the outcomes of the annual rehabilitation inspection and long term rehabilitation monitoring programs (refer to **Section 3.8**).

Australian native species such as those occurring in Coastal Sand Apple – Blackbutt Forest communities are well adapted to bushfire with germination of seeds commonly being triggered by bushfire events. If the rehabilitation areas are affected by bushfire, an assessment will be undertaken prior to the following planting season (autumn to spring) to see if natural regeneration following the fire is evident. If not, additional planting will be undertaken to replace those plants lost due to fire.

Dependent upon the success of rehabilitation works, a care and maintenance period of two to ten years post-extraction may be required before rehabilitation completion criteria are achieved.

3.7 Measures to be implemented over Next Three Years

An outline of the measures to be adopted over the next three years, which will continue to be implemented as required during the life of the operation, are discussed below.

3.7.1 Progressively Rehabilitating Disturbed Areas

As outlined in **Section 3.5.6**, it is the intention that rehabilitation will be progressively undertaken throughout the life of the project. Initial rehabilitation works have commenced on boundary bunds and within an approximately 2 hectare area where extraction is complete. Works have included revegetation and weed control. Additionally a small Gathering Place has been designated within the rehabilitation area in consultation with the Aboriginal Heritage Management Group as a place to meet and discuss Aboriginal cultural heritage as rehabilitation progresses and post-quarry closure.

3.7.2 Landscaping to Minimise Visual Impacts

The main method of mitigating visual impacts associated with the operation at Lot 220 is maintenance of a 30 metre wide vegetated buffer area along the northern boundary of the site with supplementary infill planting as required. This buffer provides sufficient screening to restrict views of the proposed operation from Nelson Bay Road (refer to **Figure 3.2**).

Buffer areas of 20 metres will also continue to be left undisturbed at the other boundaries of the site.

Extensive supplementary planting of suitable screening species will be undertaken within the section of the buffer area between Lot 220 and the Hufnagl residence and 50 metres either side, in consultation with the residents at the Hufnagl residence (see **Figure 2.1**). As of January 2014 residents verbally expressed that any planting was unnecessary and undesirable and they did not want it to occur at this stage. Nonetheless the commitment to establish a visual vegetation screen stands should circumstances change in the future.

3.7.3 Protecting Vegetation and Soil in Non-Disturbed Areas

In regards to Lot 220, the extraction plan will leave buffer areas of 30 metres from the northern boundary and 20 metres from the other boundaries undisturbed. The central low lying section of the site will also be left undisturbed, except where the two proposed access tracks will cross it, leaving a total area of approximately 28.6 hectares of the site undisturbed (refer to **Figure 3.2**).

Retained vegetation and soils on the site occur in a near-natural, undisturbed condition and will be protected to maintain values with the following measures:

- demarcation of areas (e.g. flagging tape, temporary fencing etc.) where required to prevent vehicle access and unauthorised clearing
- on-going ecological monitoring targeting factors detrimental to the ecological values and functions of retained vegetation with the annual rehabilitation inspection (see **Section 3.8.2.1**)
- on-going maintenance of weeds and feral animals, if required.

3.7.4 Prevention/Minimisation of Sand Dune Accretion

As discussed in **Section 3.4.1**, a vegetative bund will be established on the western edge of the extraction area of Lot 218. The objective of the bund will be to provide a physical barrier between the mobile sand and native vegetation on the landward side of the mobile dunes.

In regards to Lot 220, an objective of the progressive rehabilitation program will be to stabilise the dunes in order to minimise the potential for dune movement.

3.7.5 Pre-Clearance Surveys

A detailed pre-clearance survey will be undertaken prior to any vegetation clearing occurring as part of the operation. The following procedure will be implemented for all vegetation clearing required as part of the operation:

- prior to clearing, hollow-bearing trees and other habitat structures such as stags, logs and stumps will be clearly marked by an appropriately qualified and experienced person to prevent accidental clearing
- where possible, micro-habitats such as tree hollows, logs will be salvaged and retained for use in rehabilitation once re-established vegetation is suitably mature
- vegetation surrounding any marked habitat structures will be cleared and the marked structures left undisturbed for a period of 24 hours
- marked hollow-bearing trees will be shaken prior to felling using a bulldozer and then left for a short period to allow any fauna using the hollows to be observed

- hollow-bearing trees will be slowly pushed over using a bulldozer, with care taken to avoid damage to hollows
- immediately following tree felling any identified hollows will be examined for fauna by a suitably qualified and experienced person
- where practical, felled trees will be left for a 24-hour period prior to removal in order to allow species to move in to adjoining vegetation of their own volition
- any captured nocturnal species which do not immediately move into adjoining vegetation will be captured and kept in a warm, dark and quiet place prior to release on the evening of capture, within the same vegetation community from which it was captured at night
- suitable hollows and other habitat structures (including logs, stumps and stags) appropriate for relocation to areas not intended for future development or for use in rehabilitation, will be selected by an appropriately qualified and experienced person
- hollows intended for re-erection will be selected by a suitably qualified and experienced person, then removed and then capped with marine plywood or other suitable material
- logs, stumps, stags and hollows intended for ground habitat will be cut into sections, as required and stockpiled for use in rehabilitation
- in the event that injured fauna are identified, species will be immediately taken to the nearest veterinarian or certified wildlife carer for treatment.

Clearing operations will be timed so that potential impacts on breeding species, particularly the squirrel glider and threatened micro-bats are avoided. Where possible, clearing will be avoided in winter months when micro-bats and the eastern pygmy possum are in a state of torpor and squirrel gliders begin to breed.

3.7.6 Salvaging and Reusing Material from the Site for Habitat Enhancement

During clearing of native vegetation, measures as outlined in **Section 3.5.1** will be implemented to salvage appropriate material for habitat enhancement of rehabilitation areas.

3.7.7 Managing Potential Fauna Impacts

The timing of clearing operations will be designed to reduce the potential impact on breeding species, particularly the squirrel glider and threatened micro-bats. Clearing will (where possible) avoid the winter months when micro-bats and the eastern pygmy possum are in a state of torpor and squirrel gliders begin to breed.

To minimise fauna impacts, a vegetation clearance procedure has been developed (refer to **Section 3.7.5**) and will be implemented prior to clearing activities.

3.7.8 Maintaining Koala Habitat Linkages

The koala (*Phascolarctos cinereus*) has been recorded to the south-west of the operation (Umwelt 2004). Lot 220 has potential to be used as a corridor between preferred habitats however it is unlikely that Lot 220 would support a resident population of the species due to the lack of preferred koala feed trees.

Koala habitat linkages will be maintained across the site through the following mechanisms:

- setting up ‘no go’ areas around remnant vegetation that bisects the site and provides a potential koala movement corridor, to prevent unauthorised access
- the re-establishment of native vegetation communities to ensure the post-extraction landscape provides similar levels of corridor function to those currently occurring at and adjoining the site.

3.7.9 Topsoil Conservation and Reuse

Details regarding measures to conserve and reuse topsoil for rehabilitation purposes, which will commence at the time of clearing, are outlined in **Section 3.5.2**.

3.7.10 Collecting and Propagating Seed Rehabilitation Works

One of the objectives of the rehabilitation of the site is to revegetate disturbed areas with local, indigenous species with the goal of re-establishing the Coastal Sand Apple Blackbutt Forest vegetation community across the site. Local provenance seed (where available) will be used in rehabilitation where possible to help meet this objective. This will include exploring whether seed for rehabilitation of the site can be harvested from the adjoining Worimi Conservation Lands. However, where seed cannot be sourced from local sources it will be supplemented from external seed suppliers.

Seed collection practitioners will be employed to collect and propagate seed form within Lot 220 and on the adjoining Worimi Conservation Lands, if permitted, to maintain a site seed bank for use in rehabilitation. Seed will be collected from retained remnant vegetation and also from areas of vegetation that have not been subject to clearing as operations and rehabilitation progress.

3.7.11 Controlling Weeds

It is important that weeds are not allowed to establish on the site nor spread to other natural areas as a result of operations or rehabilitation. Weed monitoring and hand weeding will be undertaken on a regular basis on rehabilitated areas with a detailed survey and controls being undertaken annually as part of the Annual Rehabilitation Inspection.

In particular, bitou bush (*Crysanthemoides monilifera* subsp. *chrysanthemoides*) is a highly invasive species occurring in coastal habitats along the NSW coast with potential to invade the newly disturbed and rehabilitated site. This weed has a vigorous growth habit which results in the smothering of native groundcovers and inhibiting regeneration. This species will be targeted for eradication in any areas where it is recorded and measures such as herbicide sprays will be implemented to prevent it from establishing in new rehabilitation areas. Bitou bush control will be undertaken in accordance with procedures set out in:

Current management and control options for bitou bush (*Chrysanthemoides monilifera* ssp. *rotundata*) in Australia’, 2008.

If the occurrence of a previously unrecorded weed species is discovered, advice will be sought from a suitably qualified and experienced person on the management and control options for that species and appropriate measures for mitigating any impacts caused by its management on native species will be developed. Generally, weed control measures will include:

- monthly observation of rehabilitated areas to check for weeds and hand weeding of any weeds identified

- annual site inspections to identify areas of weed infestation and type of weed species
- development and implementation of an eradication plan applicable to the circumstances, which may include manual removal, spot spraying, boom spraying, aerial spraying or biological control
- regular contact with neighbouring property owners to attempt to eradicate weed species from the surrounding area
- minimisation of vegetation disturbance by reducing the number of tracks and using the same access routes
- minimisation of clearing and other disturbance of vegetation associated with civil works
- regular maintenance of topsoil stockpiles to eradicate weed infestation.

3.7.12 Controlling Feral Pests

There are no known pest feral animals on the site, however if the occurrence of a previously unrecorded feral fauna species is discovered, advice will be sought from a suitably qualified and experienced person on the management and control options for that species and appropriate measures for mitigating any impacts caused by its management on native species will be developed. Feral animal control would be undertaken in consultation with neighbouring landholders. Programs to control feral animals will include the determination of appropriate control practices, consultation with appropriate authorities, obtaining appropriate approvals, implementing control practices and undertaking follow-up monitoring and control as required.

3.7.13 Controlling Access

As outlined in **Section 2.1**, there has been evidence whereby parts of the project area, including both Lot 220 and Lot 218, have been used for unauthorised activities such as vehicle and horse movements. Whilst it is acknowledged that it will be impractical to prevent access to the entire project area, measures to be implemented at both sites to minimise unauthorised access will include the following:

- delineating high risk areas such as the extraction area, wash plant and site facilities (at Lot 220)
- installation of gates on the access points to the site, which will be closed to prevent access during non-operational periods
- demarcation of the site via means of signage to indicate that access is by authorised means only.

3.7.14 Bushfire Management

Bushfire control works will be undertaken in consultation with the NSW Rural Fire Service (RFS). In general, measures to be adopted on an ongoing basis will include the following:

- conducting a regular surface slashing program (as required) around critical infrastructure such as the wash plant and site facilities
- maintaining roadways and tracks that are either existing or constructed as a requirement of the project in order to provide an effective fire break
- provision and maintenance of on-site fire fighting equipment (as advised by RFS).

3.8 Rehabilitation Monitoring

Rehabilitation success will be monitored with the establishment of analogue/reference sites on site against which to compare the results of rehabilitation monitoring.

In designing the rehabilitation monitoring program, indicators and methods have been selected that:

- provide a good indication of the status of the environmental value that the project aims to protect
- are relatively simple to measure and are reproducible
- are cost effective.

Where relevant, the scope of the monitoring program is to cover each phase of the sand extraction operation including:

- pre-extraction baseline surveys
- rehabilitation
- post-rehabilitation.

Ongoing monitoring of rehabilitated areas will continue until they have satisfied the rehabilitation closure criteria with regards to the re-establishment of flora species community and fauna habitat.

3.8.1 Pre-extraction Baseline Surveys

Baseline ecological monitoring surveys have been conducted as part of the preliminary Environmental Assessment for the project (Umwelt 2009). Further to this, a total of three permanent analogue sites were established in February 2011. Monitoring of these sites will be continued every three years throughout the life of the operation. This information will be used to refine rehabilitation criteria and to assess the performance of rehabilitation on site. Analogue sites were established in retained remnant vegetation and are clearly marked on site and with a GPS to allow for repeatable surveys over time (see **Figure 2.1**).

A number of monitoring criteria have been considered in designing the pre-extraction baseline monitoring survey. These criteria should be considered throughout all phases of the project. As the objective of the rehabilitation is to return the site to a native ecosystem, reference/analogue sites are required based on the following criteria:

- analogue sites should occur in natural ecosystems, representative of the goal/target for rehabilitation
- where possible, analogue sites should occur in areas that have experienced minimal disturbance.

3.8.2 Rehabilitation Surveys

Rehabilitation surveys for the Mackas Sand project will involve the following:

- Annual Rehabilitation Inspection
- Long Term Rehabilitation Monitoring.

An outline of these programs is provided below.

3.8.2.1 Annual Rehabilitation Inspection

Mackas Sand will implement an annual rehabilitation inspection to evaluate how successful the rehabilitation onsite has been. The scope of the inspection is to include all existing and recently completed rehabilitation areas on site.

Outcomes of the annual rehabilitation inspection are to be recorded in an Annual Rehabilitation Inspection Form and any mitigation actions that are identified as part of the inspection are to be recorded for implementation. Where necessary, rehabilitation procedures should be amended accordingly with the aim to continually improve rehabilitation standards.

In the event that rehabilitation failure has occurred, further investigations to establish a cause and appropriate remediation strategy(s) should be undertaken. Issues to consider include the following:

- nutrient availability
- pH, salinity and metal toxicity
- shallow root depth
- other soil limitations
- insect attack
- lack of N-fixing legumes
- lack of organisms involved in litter breakdown (e.g. fungal fruiting bodies) and nutrient cycling (e.g. puff balls)
- predation
- evidence of drought effects or storm damage
- poor soil preparation
- weed competition.

3.8.2.2 Long-Term Rehabilitation Monitoring

The objective of long-term rehabilitation monitoring is to evaluate progress of rehabilitation towards fulfilling long term land use objectives. The monitoring program will be continued within rehabilitation areas as well as include analogue sites (refer to **Section 3.8.1**) until the rehabilitation completion criteria have been met.

As a minimum, the long term rehabilitation monitoring program report will:

- compare results against rehabilitation objectives and targets
- identify possible trends and continuous improvement
- link to records of rehabilitation to determine causes and explain results
- assess effectiveness of environmental controls implemented

- where required, identify modifications required for the monitoring program, rehabilitation practices or areas requiring research
- compare flora species present against original seed mix and/or analogue sites
- assess vegetation health
- assess vegetation structure (e.g. upper, mid and lower storey)
- the presence and abundance of any weed species
- assessment of natural regeneration/recruitment of new species
- where applicable, assess native fauna species diversity and the effectiveness of habitat creation for target fauna species.

Once the rehabilitation is considered to have met the preliminary rehabilitation criteria an ecological assessment will be undertaken in accordance with the relevant survey and assessment guidelines to ascertain the effectiveness of rehabilitation in providing vegetation community and fauna species and habitat re-establishment. Monitoring will include plot-based survey of vegetation communities and vegetation mapping and survey and assessment of all fauna groups. Ground fauna and bird diversity and abundance will be monitored to provide data on the re-establishment of native vegetation communities and habitats in the project area.

Permanent rehabilitation monitoring sites will be determined as operations extend over time. As additional areas become available for rehabilitation, additional permanent rehabilitation monitoring sites will be incorporated into the monitoring schedule. This will allow a range of sites, of varying stages of rehabilitation to be monitored and compared to the preliminary rehabilitation criteria and rehabilitation objectives.

3.9 Potential Risks to Successful Rehabilitation

A list of the potential risks to successful rehabilitation, applicable mitigation strategies and where they are addressed within this management plan is included in **Table 3.2**.

Table 3.2 Potential Risks to Successful Rehabilitation

Issue/Risk	Risk Rating	Management of Risk
Failure to meet government and community expectations	H	Closure criteria to be developed in consultation with relevant stakeholders (Sections 3.2 and 3.3)
Inadequate provision to meet the cost of rehabilitation	H	Rehabilitation Bond estimate to be developed 3 months of LMP approval (Section 3.10)
Delayed relinquishment of lease due to poor rehabilitation	H	Rehabilitation care and maintenance program to be implemented as per Section 3.6 and rehabilitation monitoring program as per Section 3.8

Issue/Risk	Risk Rating	Management of Risk
Lack of clarity on completion criteria	H	Completion criteria has been developed in Section 3.2
Failure of rehabilitation	H	A range of strategies have been developed to minimise risk of rehabilitation failure (Sections 3.5 to 3.8)
Failure to obtain sign-off on quality of rehabilitation	H	Lease and licence relinquishment strategy developed (Section 6.0)
Post-mining landform instability	M	Strategy for Landform Design (Section 3.5.3)
Damage to rehabilitation from adverse weather event (e.g. rainfall)	M	Rehabilitation care and maintenance program to be implemented as per Section 3.6 and rehabilitation monitoring program as per Section 3.8
Sand dune accretion	M	Strategy for minimisation of potential for dune accretion (Section 3.7.4)
Inappropriate species used in rehabilitation	M	Strategy for collecting and propagating seed rehabilitation works (Section 3.7.10)
Revegetation in sub-optimal seasonal conditions	M	Timing of rehabilitation targeted for spring and autumn (Section 3.5.5)
Weed infestation	L	Weed Control Strategy (Section 3.7.11)
Bushfire	L	Response measures following bushfire are discussed in Section 3.6

3.10 Rehabilitation Bond

In accordance with Condition 28 of Schedule 3 of PA 08_142 (MOD 2), a rehabilitation bond has been implemented in accordance with the performance and completion criteria discussed in **Section 3.2**. An initial bank guarantee was received by Mackas Sand on 7 February 2011 securing rehabilitation commitments made by Mackas Sand.

Costs of the bond were determined by a qualified expert and include the full cost of completing rehabilitation across the site over a three year period in accordance with Condition 7 of Schedule 5 of the PA 08_142 (MOD 2). These criteria will be revised within three months of the submission of a copy of an Independent Environmental Audit Report to the Director-General, generally every three years.

3.11 Rehabilitation Reporting

A summary of rehabilitation activities and progress against the Mackas Sand rehabilitation schedule will be reported annually in the Mackas Sand Pty Ltd Annual Review in accordance with Condition 4 of Schedule 5 of Project Approval 08_0142 MOD2.

4.0 Biodiversity Offset Strategy

A Biodiversity Offset Strategy was established as part of the Project to compensate for residual impacts on those species, vegetation communities and ecological features that could potentially be impacted by the Alternate Haul Route. The Biodiversity Offset Strategy was developed in accordance with Section 28A of the Consolidated Project Approval for the Mackas Sand Project (08_0142) and the *Principles for the Use of Biodiversity Offsets in NSW* (DECC 2008) with a particular focus on conserving habitat for the Newcastle doubletail (*Diuris praecox*), sand doubletail (*Diuris arenaria*) and leafless tongue orchid (*Cryptostylis hunteriana*).

The proposed Biodiversity Offset Strategy will centre on the establishment of a dedicated biodiversity offset area located within Lot 122 DP 753192 and bordering Worimi Conservation Lands (refer to **Figure 4.1**). The biodiversity offset area is one hectare in size and encapsulates a suite of biodiversity values including known habitat for Newcastle doubletail (*Diuris praecox*) and sand doubletail (*Diuris arenaria*) and potential habitat for leafless tongue orchid (*Cryptostylis hunteriana*). The size and location of the offset area was determined through an assessment process whereby the predicted impacts of the proposed alternate haul route and the anticipated likely biodiversity offset requirements were compared to the Office of Environment and Heritage (OEH) guidelines *Principles for the Use of Biodiversity Offsets in NSW* (DECC 2008) and the EPBC Act Environmental Offsets Policy (DSEWPC, 2012). The following sections the management requirements for the biodiversity offset area.

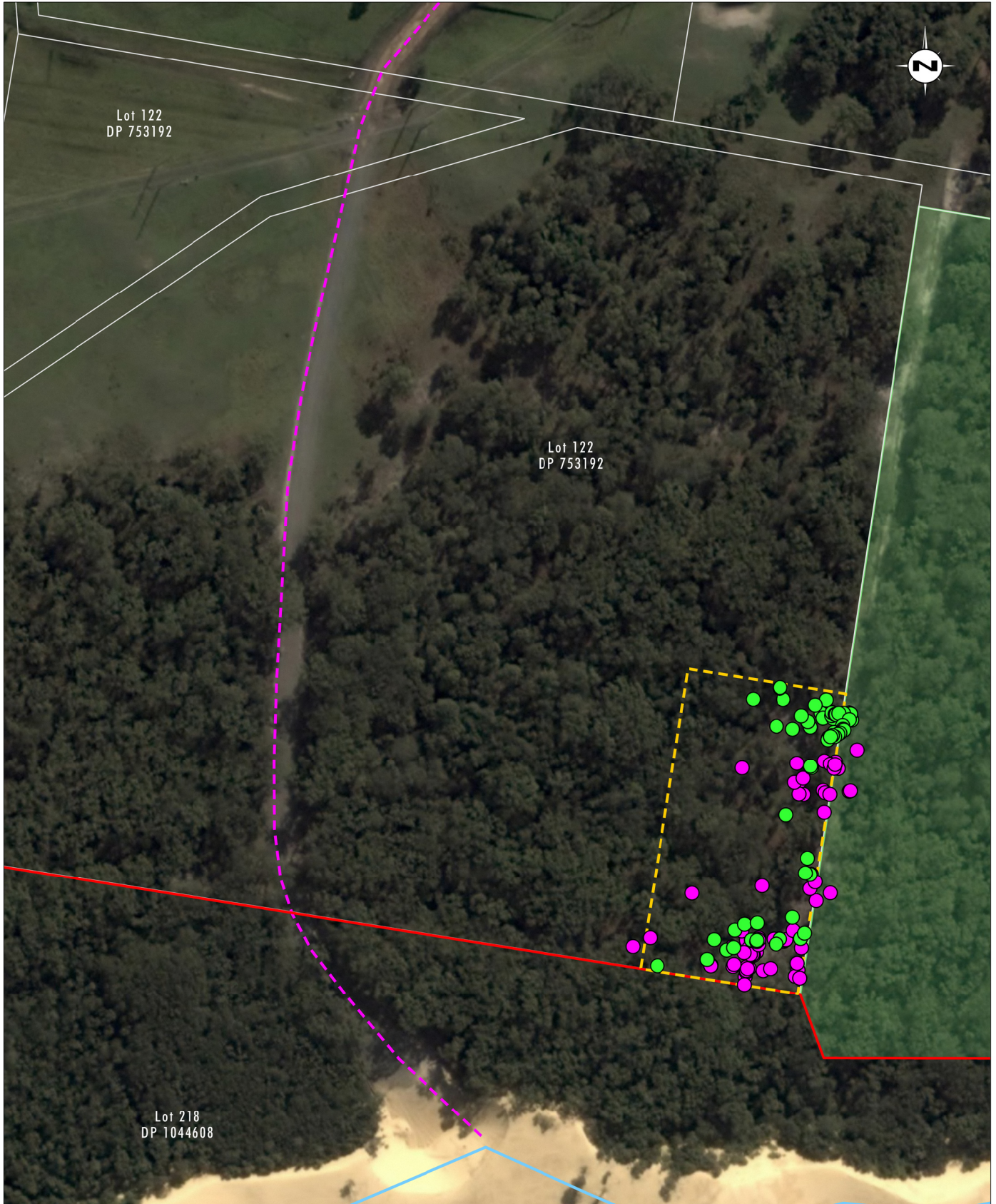
4.1 Ecological Values of Biodiversity Offset Area

The proposed biodiversity offset area was selected for its ability to adequately compensate for likely and potential impacts on the key offset drivers identified above as well as providing direct connectivity to approximately 4438 hectares of similar habitat within the Worimi Conservation Land.

The proposed biodiversity offset area contains one hectare of Coastal Sand Apple – Blackbutt Forest which is considered to be of comparable condition to the 0.37 hectares proposed to be removed for the alternate haul route. There is a fire break along the perimeter fence bordering the Worimi Conservation Land, where the mid and lower strata vegetation has been slashed. This area is known to provide favourable conditions for both Newcastle doubletail (*Diuris praecox*) and sand doubletail (*Diuris arenaria*). A total of 64 *D. praecox* and 72 *D. arenaria* were recorded within the proposed offset area during the baseline surveys in 2014 (refer to **Figure 4.1**).

During the baseline surveys of the biodiversity offset area, 19 hollow-bearing trees were recorded containing a range of hollows entry sizes from small (25 – 50 millimetres diameter) to large (100 – 300 millimetres diameter). A total of 22 small, 29 medium (50 – 100 millimetre diameter) and eight large hollows were observed providing suitable habitat for a range of fauna guilds including micro-bats, arboreal mammals and forest owls. The shrub layer and mid-stratum contain high densities of flowering Proteaceae species, mainly old-man Banksia (*Banksia serrata*), which provide an important food supply for the squirrel glider (*Petaurus norfolcensis*) and eastern pygmy possum (*Cercartetus nanus*). Hollow logs, leaf litter and reasonably dense pockets of bracken fern (*Pteridium esculentum*) and blady grass (*Imperata cylindrica* var. *major*) also occur within the proposed offset area, providing potential habitat for small terrestrial mammals including the New Holland mouse (*Pseudomys novaehollandiae*).

No pests, other than cattle, were observed within the biodiversity offset area and only one weed species, bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata*), was observed but in very low density.



Source: Aerial: Google Earth (2014), Cadastral: Department of Lands (2009)

0 50 100 125 m
1:2500

Legend

- Lot Boundary
- Approved Operational Area
- Worimi Conservation
- Biodiversity Offset Area
- Alternate Haul Route
- *Diuris arenaria*
- *Diuris praecox*

FIGURE 4.1

Proposed Biodiversity Offset Area and Targeted Orchid Survey Locations

4.2 Management of Biodiversity Offset Area

Effective and site specific management practices are pertinent to the success of any biodiversity offset area. The following sections outline the management practices that apply to the biodiversity offset area including short-term and long-term measures.

4.2.1 Signposting

The biodiversity offset area is located on private property with existing fences on two of the four sides separating it from the Worimi Conservation Land. It is therefore considered that fencing the remaining sides is unnecessary and could be detrimental to fauna movement. Signposts will be erected in the four corners of the biodiversity offset area requesting that human activities are kept to a minimum within the area however this is more of a precautionary measure in the event that members of the public accidentally trespass.

4.2.2 Weed and Vertebrate Pest Management

An annual weed management program is proposed for the one hectare biodiversity offset area. Weed diversity and density within the offset area was low during the initial inspection with only one species, bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata*), recorded. Weeds will be manually removed once a year, where necessary, with the initial weed control event to be undertaken prior to the subsequent rehabilitation inspection.

Given the small size of the offset relative to the adjoining Worimi Conservation Lands, it is considered that managing vertebrate pest species occurring within the biodiversity offset area would be difficult. It is unlikely that vertebrate pests are likely to substantially impact on any of the key drivers for offsetting within the one hectare biodiversity offset area and as such no pest management is proposed. Should it become apparent during monitoring surveys that vertebrate pest species are likely to be impacting on one or more of the ecological drivers for the biodiversity offset area, a targeted pest management program will be developed and implemented.

4.2.3 Orchid Habitat Maintenance

The threatened orchids recorded within the biodiversity offset area have been observed along a slashed track adjacent to the existing fence line. Both the Newcastle doubletail (*Diuris praecox*) and the sand doubletail (*Diuris arenaria*) are known to occur in, and prefer, areas of disturbance with other known populations occurring in regularly slashed locations such as powerline easements (Bell and Driscoll 2010).

Subsequently, it is proposed that strategic slashing occurs along the existing tracks within the proposed biodiversity offset area twice a year in May (prior to flowering) and October (post-flowering). The areas to be slashed will be adequately signposted and will be accessed via existing tracks.

4.2.4 Biodiversity Monitoring

Biodiversity monitoring is an integral part of managing biodiversity offset areas as it allows the land managers to determine the effectiveness of the management practices being implemented. An annual biodiversity monitoring program is proposed for the biodiversity offset area, with the specific monitoring methodologies detailed in **Section 3.0** below.

4.3 Proposed Biodiversity Offset Area Monitoring Program

4.3.1 Biodiversity Monitoring

A baseline survey was undertaken in August and September 2014. During this survey, a total of 64 *D. praecox* and 72 *D. arenaria* were recorded within the biodiversity offset area (refer to **Figure 4.1**).

Subsequent monitoring is proposed to be undertaken within the biodiversity offset area on an annual basis for the first three years after the 2014 baseline surveys and in conjunction with the peak flowering periods for *D. praecox* and *D. arenaria*. It is proposed that one monitoring survey is undertaken in the first two weeks of August each year with an additional survey required in the last two weeks of August if *D. arenaria* is not detected in the first survey. Should *D. arenaria* not be in full flower during the survey in the last two weeks of August, an additional survey will be required two weeks later, until the target species are identified or the end of the first week in October (being the end of the known flowering period for the species).

The biodiversity monitoring will include a habitat condition assessment of the entire biodiversity offset area and targeted surveys for and stem counts of *D. praecox* and *D. arenaria*. For the first three years, a yearly letter style report will be prepared and submitted to DPE and OEH. The report will detail the findings of the monitoring surveys and include recommendations for additional management measures, if needed, to be implemented for the next year.

After the three years a comprehensive report will be prepared for DPE assessing the outcomes of the management practises in terms of measurable impacts on habitat for the key identified drivers for offsetting and any significant population changes of *D. praecox* and *D. arenaria* in comparison to the 2014 baseline survey results). Monitoring will then be reduced to a biennial basis up until year nine. At this stage another comprehensive report will be prepared for the Department of Planning and Environment (DPE) with further recommendations made about the need for ongoing monitoring.

4.3.1.1 Habitat Assessment Methodology

The habitat assessment will target potential habitat and resources for fauna species, particularly threatened fauna species. The habitat assessment will record information on a range of attributes, including:

- evidence of disturbance such as fire, weeds, feral animals, dumping, erosion and logging
- presence of fallen timber/logs
- presence of stumps and stags
- presence of groundcover features such as rock, litter, grasses, logs, boulder, soil and lichen
- presence of dieback and/or insect attack
- mistletoe presence
- presence of perch sites, fallen and loose bark
- vegetation strata and composition

- tree size class (trunk diameter), and age (old growth, mature, regenerating, saplings)
- presence of other specific feed tree species (such as for cockatoos and honeyeaters)
- collection of detailed hollow data, including tree species and height, hollow size, orientation, position and height.

The data collection, where possible, will be semi-quantitative to allow comparisons to be made during each subsequent monitoring event. The attribute data collected will be tabulated in the annual monitoring letter report to allow easy comparisons across years.

As part of the habitat monitoring, three photos will be taken from each of the four corners of the offset area, directed at each of the other corners. These photos will be appended to the annual letter report and used as a tool to identify any substantial habitat changes in subsequent monitoring events.

4.3.1.2 Targeted Orchid Survey Methodology

Surveys targeting *D. arenaria* and *D. praecox* are to be undertaken by two ecologists and will involve walking parallel transects across the entire biodiversity offset area. The surveys will focus on the areas where the orchids have been recorded previously but will extend to all areas of the offset area. Each stem will be recorded and individually marked on a GPS and plant health data including number of flowers and flowering status will be recorded for each stem.

In the event that either species is not detected during the first surveys, an additional visit will be required within the following fortnight.

4.4 Performance Criteria for the Biodiversity Offset Area

4.4.1 Short Term Action Triggers

To ensure the performance of the biodiversity offset area for the approval duration (20 years), the performance criteria need to have short term management correction triggers. These triggers allow any short term non-compliances with the performance criteria to be assessed by the land managers to determine whether the short-term non-compliance is likely to be a result of natural fluctuation in the biological system or whether it relates to current management actions. The following triggers relate to the performance criteria listed below.

Management actions should be reviewed if:

- any area of Coastal Sands Apple – Blackbutt Forest, identified during the revised baseline survey, is cleared either by natural processes such as fire or anthropogenic processes such as clearing
- any area of specified Newcastle doubletail (*Diuris praecox*) or sand doubletail (*Diuris arenaria*) habitat is disturbed either by natural processes such as fire or anthropogenic processes such as clearing. In this instance, the approved strategic slashing is not considered to represent clearing
- the Newcastle doubletail (*Diuris praecox*) or sand doubletail (*Diuris arenaria*) stem count is less than 50% of the revised baseline count for three consecutive years
- the diversity or density of weed species is higher than the revised baseline results for more than two consecutive years.

Where a management action is required to be reviewed following a short-term threshold trigger, an adaptive management plan for the community, species or habitat value of relevance will be prepared in negotiation with the relevant authorities, including OEH, the Commonwealth Department of the Environment and DPE.

4.4.2 Long Term Performance Criteria

The long term performance criteria seek to ensure the maintenance of, or improvement in, the habitat for, or presence of the major drivers for the biodiversity offset area. These are the Coastal Sands Apple – Blackbutt Forest, Newcastle doubletail (*Diuris praecox*), sand doubletail (*Diuris arenaria*) and the removal of potential habitat for various fauna species. The biodiversity offset area, through the effective use of the management strategies and short term action triggers discussed above, will:

- maintain the same area of Coastal Sands Apple – Blackbutt Forest as identified in the 2014 baseline surveys
- maintain the same area of Newcastle doubletail (*Diuris praecox*) and sand doubletail (*Diuris arenaria*) habitat as identified in the 2014 baseline surveys
- over 20 years, show no net loss in the stem counts of Newcastle doubletail (*Diuris praecox*) or sand doubletail (*Diuris arenaria*) subject to seasonal variation
- maintain or reduce the diversity and density of weed species.

5.0 Long Term Security of Biodiversity Offset

In accordance with PA 08_0142 Schedule 3 Condition 28B, Mackas Sand will provide appropriate long term security to the land within the Biodiversity Offset Area through a Voluntary Conservation Agreement (VCA), being one of the recommended mechanisms listed under Condition 28B. Following completion of land management required under **Section 4.0**, and the long term performance criteria listed within **Section 4.4.2**, the VCA over the Biodiversity Offset Area will be recorded on the title of Lot 12 DP 753192 and other documentation as required. Under the VCA, ongoing land management practices will be based on the monitoring and management proposed under **Section 4** and in accordance with contemporary best practice. Any changes to best practice shall be included following review of this document as discussed in **Section 8.0**.

6.0 Conceptual Long Term Management Strategy

Given the initial phase of the project and as acknowledged in the Notes of Schedule 3 Condition 25 of PA 08_0142 (MOD 2), the long term management strategy for Lot 218 and Lot 220 is currently conceptual. It is the intention that this strategy will be updated in subsequent reviews of this document. The key aspects of the long term management strategy as required by Schedule 3, Condition 25 (b) and how they have been preliminary addressed within this LMP are outlined below.

6.1 Objectives and Criteria for Quarry Closure and Post-Extraction Management

Preliminary objectives and criteria have been defined in **Sections 3.1** and **3.2**. As outlined in **Section 3.3**, it is the intention that Mackas Sand will refine the rehabilitation completion criteria as required following the outcomes of rehabilitation monitoring, stakeholder feedback and in consideration of other factors including opportunities for alternative sustainable post-extraction land uses.

6.2 Options for Future Use of the Site

The proposed final land use for the site is outlined in **Section 1.4**. Opportunities for alternative sustainable land use options will be evaluated throughout the life of the operation. However, at least five years prior to closure of the operations, it is the intention to conduct a final land use investigation based on the environment and community constraints and opportunities that may exist at this time. It is envisaged that a detailed closure plan will be developed based upon the most sustainable/feasible land use option in consultation with the relevant government agencies.

6.3 Ongoing Management of Environmental Effects of the Project

A range of measures to minimise or manage the ongoing environmental effects of the project, particularly in relation to flora and fauna impacts, are discussed through **Section 3.0**. Further details regarding other environmental controls will be detailed in separate documents required by consent including the following:

- Noise Management Plan
- Soil and Water management Plan
- Aboriginal Cultural Heritage Management Plan
- Non-Indigenous Heritage Management Plan.

It is also a requirement of consent that measures be installed in relation to waste as well as emergency and hazardous management.

6.4 Performance Measurement

The above environmental management measures have been integrated into Mackas Sand Environmental Management Strategy (EMS) as per Condition 1 of Schedule 5 of the consent. The EMS is utilised as the key mechanism by which the performance of these measures is monitored over time. This will form part of the Annual Review.

7.0 Approvals Relinquishment Process

On the basis of rehabilitation monitoring when Mackas Sand Pty Ltd is of the opinion that rehabilitation (or parts thereof) is ready for signoff, the following steps are to be undertaken:

- arrange for a suitably qualified and experienced person to complete a final rehabilitation inspection to determine that all rehabilitation objectives and criteria have been met
- collate all relevant records, monitoring and research data, including previous long term rehabilitation monitoring reports, which are to be used as supporting information for assessing compliance with rehabilitation criteria
- submit a rehabilitation completion criteria report for DPE, OEH, NOW and Port Stephens Council for review and comment
- arrange for a close-out inspection with government agencies, to obtain consensus that the necessary requirements have been fulfilled and that no further work is required. As part of the meeting, justification (e.g. rehabilitation monitoring results) as to how closure criteria have been met should be presented to the government agencies. If consensus is not achieved, an action plan is to be developed to address any potential outstanding issues in order to achieve sign-off.

It is the intention that where rehabilitation has been assessed as meeting the appropriate criteria that opportunities for progressive sign-off of areas will be sought through the life of the operation. This includes opportunities to reduce the rehabilitation security bond held for the site.

8.0 Review and Reporting

An independent review of the Landscape Management Plan is to be in accordance with Schedule 5 Condition 4A and Condition 7 of Project Approval 08_0142.

A summary of rehabilitation and associated monitoring activities and results will be reported annually to the Secretary of Department of Planning and Environment and relevant government agencies as part of the Annual Review that is required by Condition 4 of Schedule 5 of Project Approval 08_0142.

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APPENDIX 6

Aboriginal Cultural Heritage Management Plan



ABORIGINAL CULTURAL HERITAGE MANAGEMENT PLAN

FOR SAND EXTRACTION OPERATIONS
FROM
LOT 218 DP 1044608 AND
LOT 220 DP 1049608, SALT ASH

FINAL

July 2016



ABORIGINAL CULTURAL HERITAGE MANAGEMENT PLAN

FOR SAND EXTRACTION OPERATIONS FROM
LOT 218 DP 1044608 AND
LOT 220 DP 1049608, SALT ASH

FINAL

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1.0 Introduction

Mackas Sand Pty Ltd (Mackas Sand) operations on Lot 218 and Lot 220 are located approximately 25 kilometres north east of Newcastle near Salt Ash in the Port Stephens local government area (LGA), New South Wales (refer to **Figure 1.1**). Mackas Sand directors have operated sand extraction operations in the area since 1992. Lot 218 and Lot 220 are owned by the Worimi Local Aboriginal Lands Council.

Mackas Sand was granted Project Approval No. 08_0142 (PA 08_0142) on 20 September 2009 by the Minister for Planning under Part 3A of the Environmental Planning and Assessment Act 1979 to operate sand extraction operations at Lot 220 and Lot 218. It is estimated that in excess of 21 million tonnes of sand resource will be extracted from Lot 218 and Lot 220, with Lot 218 having an indefinite extraction life due to the ongoing movement of sand from the adjoining mobile dunes.

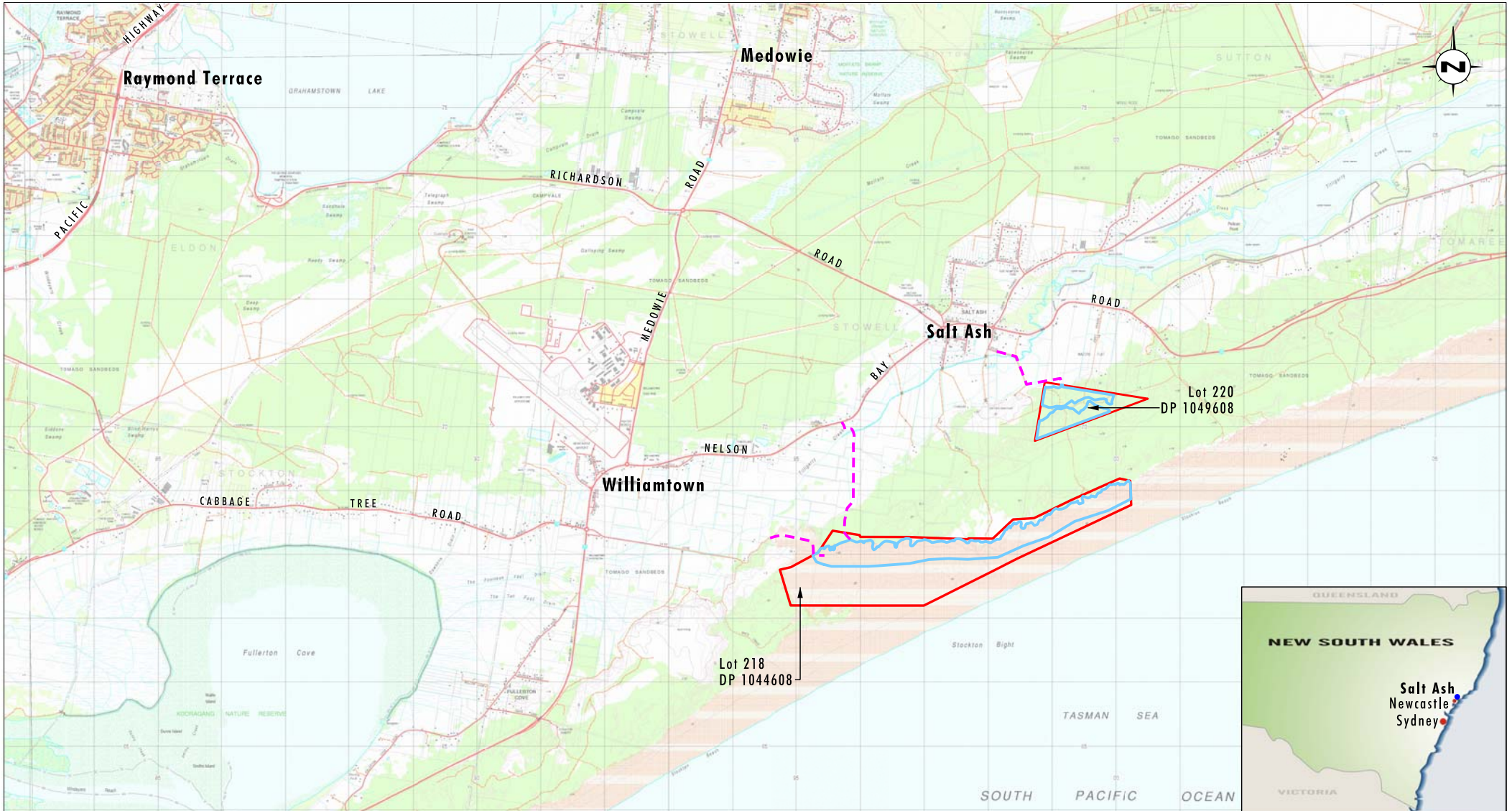
A modification to PA 08_0142 was approved on 30 September 2013 by the NSW Planning Assessment Commission (PAC) under delegation of the Minister for Planning and Infrastructure (now Minister for Planning and Environment-DP&E). The modification (PA 08_0142 MOD1) included approval to extract within 0.7 metres of the highest predicted groundwater level provided the final landform is at least 1 metre above the highest predicted groundwater level and the approval of an alternate route to access Lot 218. The alternate route connects directly from Lot 218, northward to Nelson Bay Road, as depicted within **Figure 1.1**.

A second modification to PA 08_0142, (MOD2), was approved by the PAC on 16 March 2016. The modification allows for an increase in maximum hourly truck movements (in and out) of Lot 218 via the approved alternate access road.

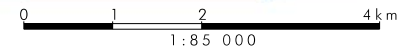
1.1 Mackas Sand Operations

Key operational features relevant to this Aboriginal Cultural Heritage Management Plan (ACHMP) are:

- The approved hours of extraction being 24 hours a day 7 days a week except for operations within 250 metres of the Hufnagl Residence (R27) when operations are limited to 7.00 am to 6.00 pm Monday to Friday with no operations within 250 metres of R27 outside these times.
- Transportation of sand from Lot 220 along Oakvale Drive between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays in accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142 as Mackas Sand has agreements with the owners of residences facing Oakvale Drive. Copies of these agreements have been provided to the DPE.
- Transportation of sand from Lot 218 along the Alternate Access Road between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays in accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142 as Mackas Sand has an agreement with the owners of 2344, 2353 and 2368 Nelson Bay Road. Copies of these agreements have been provided to the DPE.



Source: Department of Lands (2006)



- Legend**
- ▭ Lot Boundaries
 - ▭ Approval Areas
 - - - Approved Site Access

FIGURE 1.1
Locality Plan

1.2 Project Approval Requirements

Condition 29 of Project Approval 08_0142 requires that Mackas Sand prepares and implements an ACHMP that addresses Aboriginal heritage matters identified by the Department of Planning and Environment. Condition 29 is provided in full below:

The Proponent shall prepare and implement an Aboriginal Cultural Heritage Management Plan for the project to the satisfaction of the Secretary. This plan must:

- a) *be prepared in consultation with OEH and the Aboriginal community and be submitted to the Secretary for approval prior to the disturbance of any Aboriginal object or site; and*
- b) *include a:*
 - *detailed salvage program and management plan for all identified Aboriginal sites within the project disturbance area;*
 - *detailed description of the measures that would be implemented to protect Aboriginal sites and PAD outside the project disturbance area;*
 - *protocol for monitoring operations and vegetation removal on the site;*
 - *protocol for undertaking additional archaeological investigation, and where warranted excavation and/or salvage, on:*
 - *any identified stabilised soil surfaces on Lot 218 that are proposed to be disturbed; or*
 - *any area of the identified PAD on Lot 220 that is proposed to be disturbed;*
 - *Protocol for monitoring of reject material;*
 - *description of the measures that would be implemented if any new Aboriginal objects or skeletal remains are discovered during the project; and*
 - *protocol for the ongoing consultation and involvement of the Aboriginal community in the conservation and management of Aboriginal cultural heritage on the site, including the establishment of a management group comprising Aboriginal stakeholders and a suitably qualified archaeologist.*

The Proponent shall implement the approved management plan as approved from time to time by the Secretary.

Mackas Sand has engaged Umwelt (Australia) Pty Limited (Umwelt) to prepare an ACHMP in accordance with Condition 29 of Project Approval 08_0142. Aboriginal stakeholder comments in regard to this ACHMP are provided in **Appendix A**.

1.3 Background Information

The approval areas consist of two areas of land (Lot 218 in DP 1044608, with adjoining access across Lot 227 in DP 1097995 and Lot 220 in DP 1049608, with access across Lot 3 in DP 739188 and Lot 8 in DP 833768). Both Lot 218 and Lot 220 are owned by Worimi Local Aboriginal Land Council. These two areas are located within the Stockton Bight dune system approximately 20 to 25 kilometres to the north-east of Newcastle, near Salt Ash. Lot 218 is comprised of approximately 412 hectares of mobile sand dune, of which the approved extraction area and related activities occupy an area of approximately 150 hectares (refer to **Figure 1.1**). Lot 218 is adjoined by the Worimi Conservation Lands to the north, south and east and the Quality Sands and Ceramics sand quarry to the north-west. An alternate access road connecting Lot 218 to Nelson Bay Road was approved (08_0142 MOD1) in September 2013. This ACHMP applies to the areas of Lot 218 and the alternate access route that will be subject to impact under Project Approval 08_0142 (MOD2).

Lot 220 has an area of approximately 76 hectares and will be accessed via an unsealed access road extending from an existing electricity easement across Lot 8 DP 833768 and Lot 3 DP 739188 (refer to Figure 1.1). This approval area adjoins an existing sand extraction operation immediately to the west, operated by Sibelco Australia Limited (previously Unimin). Mackas Sand & Soil is also located approximately 750 metres to the west. Rural land holdings and a sand quarry operated by Hunter Quarries adjoin the site to the north and vegetated sand dunes that form part of the Worimi Conservation Lands adjoin Lot 220 to the east and south.

The approval areas were the subject of an Aboriginal cultural heritage assessment conducted as a component of an Environmental Assessment (EA) (Umwelt 2009: Appendix 5 and Umwelt 2012: Appendix 4). The 2009 Environmental Assessment incorporates a Statement of Commitments, of which **Section 5.3** relates to Aboriginal heritage and was developed on the basis of mitigation and management recommendations provided in the Aboriginal cultural heritage assessment. A modification was proposed to DA-08-0142 in November 2012 that was approved in September 2013 through the NSW Planning Assessment Commission (PAC). The proposal is for the temporary reduction in approved extraction height, and the development of an alternate haul road as depicted within **Figure 1.1**.

1.4 Purpose and Scope of the ACHMP

This ACHMP has been prepared in accordance with Condition 29 of Project Approval 08_0142 and the Statement of Commitments and Environmental Assessment (including an Aboriginal cultural heritage assessment) submitted to DPE as part of the approval process, including all modifications. The ACHMP is prepared in consultation with the relevant Aboriginal stakeholders and has been referred to the Office of Environment and Heritage (OEH – previously Department of Environment, Climate Change and Water) and DPE for review and comment. Any updates or revisions to the ACHMP will also be forwarded to OEH and DPE.

In order to meet the requirements of Condition 29 of the Project Approval 08_0142 and to provide clear guidance to Mackas Sand regarding the management of Aboriginal cultural heritage within the approval areas, the ACHMP incorporates the following information:

- a review of relevant legislation
- a review of the cultural heritage context of the approval areas including the results of the Aboriginal cultural heritage assessment (Umwelt 2009: Appendix 5, Umwelt 2012: Appendix 4) of the approval areas

- a description of consultation that has been undertaken with the relevant Aboriginal stakeholders in relation to the approval areas
- the provision of detailed Aboriginal cultural heritage management strategies
- a clear outline of the roles and responsibilities of the entities involved in the ACHMP and its implementation.

An ACHMP will be in place for the duration of the project (unless otherwise directed by relevant legislation or approvals), with this ACHMP subject to review 12 months after the date of commencement of operations, and as required thereafter in consultation with the Aboriginal Heritage Management Group (AHMG).

2.0 Consultation

2.1 Aboriginal Stakeholder Consultation

The Aboriginal cultural heritage assessment of the approval areas (Umwelt 2009: Appendix 5) was completed in accordance with the Interim Community Consultation Requirements for Applicants (2004) (the requirements). Consultation undertaken in relation to the assessment is detailed in **Appendix A** and is summarised below.

Five Aboriginal stakeholder groups registered an interest in being consulted regarding the Aboriginal cultural heritage assessment of the approval areas. These groups are listed below and are referred to in this document as the relevant Aboriginal stakeholders:

- Worimi Local Aboriginal Land Council
- Nur-Run-Gee Pty Ltd (Nur-Run-Gee)
- Carol Ridgeway-Bissett (previously Maaiangal Aboriginal Heritage Co-operative)
- Mur-Roo-Ma Incorporated (Mur-Roo-Ma)
- Viola Brown.

Each of these stakeholder groups was provided with a draft of the Aboriginal cultural heritage assessment (and a subsequent minor modification to the assessment) and were requested to provide comment on the draft assessment. Comments were received from all relevant stakeholders.

A draft of this ACHMP was forwarded to all of the registered stakeholders on 7 October 2009. The draft ACHMP was accompanied by an invitation to a meeting to review and discuss the draft ACHMP.

Les Ridgeway (formerly of Worimi Traditional Aboriginal Elders and Owners Group) advised that he would be unable to attend the meeting but provided some comments during a telephone conversation with Nicola Roche on 14 October 2009. Mr Ridgeway stated that there was a known camping area at Tilligerry/Salt Ash in proximity to Lot 220 and that he felt that it was possible that burials associated with this camping area may be present in Lot 220. Mr Ridgeway recognised that the ACHMP contains procedures and protocols relating to skeletal material but indicated that he would prefer it if Aboriginal people were present during operations at Lot 220. In subsequent correspondence, Mr Ridgeway was informed that Aboriginal people would be employed by Mackas Sand and whilst they would be employed for operational purposes, they would be present should any skeletal material be uncovered during operations.

A meeting to discuss the draft ACHMP was held on 21 October 2009 and attended by the following Aboriginal stakeholders:

- Jamie Tarrant (Chair, Worimi Local Aboriginal Land Council)
- Val Merrick (Deputy Chair, Worimi Local Aboriginal Land Council)
- Andrew Smith (Chief Executive Officer, Worimi Local Aboriginal Land Council)
- Jamie Merrick (Senior Sites Officer, Worimi Local Aboriginal Land Council)

- Lennie Anderson (Nur-Run-Gee Pty Ltd)
- Anthony Anderson (Mur-Roo-Ma Inc).

The draft ACHMP was reviewed in its entirety during the meeting and the Aboriginal stakeholder representatives provided a number of comments. These comments were all addressed during the meeting and resulted in some alterations to the ACHMP, as described in the meeting summary provided in **Appendix A**. A summary of the meeting and the resultant alterations were sent to all Aboriginal stakeholder groups, with a request that those stakeholder groups attending the meeting review the summary. Endorsement of the comments and changes to the draft ACHMP included in the summary was received from all stakeholder groups attending the meeting (refer to **Appendix A**).

Carol Ridgeway-Bissett also met with Nicola Roche on 21 October 2009 to discuss the draft ACHMP and the results of the meeting described above. Ms Ridgeway-Bissett's comments are included in **Appendix A**. Ms Ridgeway-Bissett maintained her objection to the approved project, stating that sand mining and extraction should not be permitted in Stockton Bight. She also objected to the structure and selection methods for the Aboriginal Heritage Management Group (AHMG) as discussed in **Section 5.1** and proposed that the AHMG should be a group within DECCW (now OEH) and should involve consultation with relevant State Government advisory bodies. Ms Ridgeway-Bissett felt that the removal of vegetation within Lot 220 would result in the removal of a wildlife corridor and important plant species, which are an important consideration for Aboriginal cultural heritage. She did not consider that the remaining vegetation corridor within Lot 220 would be sufficient. During this meeting, Ms Ridgeway-Bissett was advised that her comments would be discussed with Mackas Sand but that it would be difficult to address them within the parameters of the approved project. However, she was informed that all comments would be included and discussed in the final ACHMP.

2.2 Department of Environment, Climate Change and Water Consultation

In accordance with Condition 29 of DA-08-0142 this ACHMP has been prepared in consultation with DECCW (now OEH). The EA for the project included details of the matters to be addressed by the ACHMP and this was the subject of substantial comments by DECCW (now OEH). These comments have been taken into consideration in the preparation of a draft ACHMP.

On 6 October 2009 an email was sent to Brett Nudd (Acting Manager Planning & Aboriginal Heritage Section, North-East Branch) advising him that the draft ACHMP was being completed. The email requested advice regarding DECCW (now OEH)'s preference for consultation regarding the draft ACHMP and the appropriate DECCW (now OEH) representative with whom to consult. On 23 October 2009 Nicola Roche contacted Sarah Paddington (Archaeologist, North-East Branch) by telephone to discuss the draft ACHMP. Ms Paddington provided some advice regarding elements that DECCW (now OEH) typically consider that an ACHMP should address. These elements have all been incorporated into this ACHMP.

3.0 Legislative Context

Major Project Approval 08_0142 was granted to Mackas Sand under Part 3A of the EP&A Act and the proposed modification is sought under Section 75W of the EP&A Act.

3.1 EP&A Act

The EP&A Act regulates development activity in New South Wales. Part 3A of the EP&A Act (now repealed) previously applied to projects that were declared to be a 'Major Project' (in accordance with Section 75B of the EP&A Act) and the current approval was granted under Part 3A. The proposed modification will be considered under Section 75W of the EP&A Act and as the project approval was issued in accordance with Part 3A of the EP&A Act, the following provisions also apply to the proposed modification. Under Section 75U of the EP&A Act, it is not necessary to obtain an Aboriginal Heritage Impact Permit (AHIP) permit under the National Parks and Wildlife Act 1974 (NPW Act) – as discussed below) in relation to activities approved under Part 3A of the EP&A Act. Projects approved under Part 3A of the EP&A Act are subject to conditions of approval issued by DPE and (where relevant) Aboriginal cultural heritage is addressed by appropriate conditions. Furthermore, Section 75J (5) of the EP&A Act states that conditions of approval for the carrying out of a project may require the proponent to comply with obligations made in a statement of commitments submitted by the proponent as part of the development approval process.

In relation to Aboriginal cultural heritage assessments, current DPE guidelines indicate that consultation should be undertaken in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (Department of Environment, Climate Change and Water (DECCW)) as the established process for ongoing consultation for projects approved under Part 3A.

3.2 New South Wales National Parks and Wildlife Act 1974

OEH is primarily responsible for regulating the management of Aboriginal cultural heritage in New South Wales under the NPW Act (as amended October 2010). The NPW Act is accompanied by the National Parks and Wildlife Regulation 2009 (the Regulation), the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW 2010) and other industry-specific codes.

The objectives of the NPW Act include:

The conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including, but not limited to: (i) places, objects and features of significance to Aboriginal people.

The NPW Act defines an Aboriginal object as:

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.

Under Section 84 of the NPW Act, an Aboriginal Place must be declared by the Minister as a place that, in the opinion of the Minister, is or was of special significance with respect to Aboriginal culture.

In accordance with Section 86(1) of the NPW Act, it is an offence to harm or desecrate a known Aboriginal object, whilst it is also an offence to harm an Aboriginal object under Section 86(2). Similarly, Section 86(4) states that a person must not harm or desecrate an Aboriginal place. Harm to an object or place is defined as any act or omission that:

- a) destroys, defaces or damages an object or place, or
- b) in relation to an object – moves the object from the land on which it had been situated, or
- c) is specified by the regulations, or
- d) causes or permits the object or place to be harmed in a manner referred to in paragraph (a), (b) or (c),

but does not include any act or omission that:

- a) desecrates the object or place, or
- b) is trivial or negligible, or
- c) is excluded from this definition by the regulations.

Section 87(1) of the NPW Act specifies that it is a defence to prosecution under Section 86(1) and Section 86(2) if the harm or desecration of an Aboriginal object was authorised by an AHIP and the activities were carried out in accordance with that permit. As discussed above, the provisions of Part 3A of the EP&A Act can overrule the requirement for an AHIP under the NPW Act, with these provisions applying to activities approved under Part 3A only. However, the other provisions of the NPW Act are still applicable.

Consultation with the Aboriginal community is an integral part of identifying and assessing the significance of Aboriginal objects and/or places and determining and carrying out appropriate strategies to mitigate impacts upon Aboriginal heritage.

Furthermore, ongoing consultation with the Aboriginal community has been undertaken as part of Mackas Sand operations through the AHMG. The AHMG is guided by the ACHMP developed as part of Project Approval 08_0142. Consultation with regard to the project commenced on 27 February 2010 under the Interim Community Consultation Requirements for Applicants. However, in recognition of the change in consultation expectations, all consultation undertaken after November 2010 was generally in accordance with Section 80C (2-11) of the Regulation.

3.3 Other Legislation

There is a range of other legislation that establishes requirements and responsibilities that may affect Aboriginal cultural heritage and therefore are relevant to this ACHMP. These include:

- *Noxious Weeds Act 1993 details the responsibilities of landholders to control specified and declared noxious weeds;*
- *Rural Fires Act 1997 delineates the circumstances under which the managers must undertake a hazard reduction burn;*
- *Native Vegetation Act 2003 relates to the sustainable management and conservation of native vegetation;*

- *Water Management Act 2000 relates to the sustainable and integrated management of water resources; and*
- *Hunter Water Act 1991 applies to water resources within the Chichester, Grahamstown, Nelsons Bay, North Stockton and Tomago Catchment Areas.*

It is a requirement that the works necessary in relation to these Acts do not adversely impact Aboriginal cultural heritage and thus contravene the NPW Act.

4.0 Contextual Information

The development and implementation of appropriate management strategies requires an understanding of contextual information relevant to Aboriginal cultural heritage within the approval areas. For this reason, information regarding the environmental and archaeological context of this management plan is provided below.

4.1 Environmental Context

The approval areas are located in dune fields that are part of the Outer Barrier of Stockton Bight. The Lot 220 approval area contains two major dune ridges that consist of high, comparatively steeply sloping dunes that were formed during two separate phases of dune formation and stabilisation and are referred to as Ridge I and Ridge II type dunes. The Ridge I and Ridge II dunes are separated by a system of low relief dunes and swales.

The Lot 218 approval area is located within an area that contains large quantities of recently deposited wind-blown sand. These sand deposits have transgressed over former Outer Barrier stabilised dunes that are similar in nature to those in the Lot 220 approval area. Wind action and sand movement in the Lot 218 approval area periodically results in the burial, exposure and, in some instances, deflation of former stabilised soil surfaces associated with these dunes.

The active movement of sand within the Lot 218 approval area dictates that vegetation coverage in this area is relatively sparse. In contrast, the Lot 220 approval area is very heavily vegetated.

4.2 Archaeological Context

The Stockton Bight area has been the subject of numerous archaeological investigations that have resulted in the identification of relatively high numbers of archaeological sites. This contextual information was reviewed in detail in Section 4 of the Aboriginal cultural heritage assessment (Umwelt 2009: Appendix 5). As a result, a number of trends were identified, as listed below:

- The majority of sites within the region consist of middens (containing beach and/or estuarine shell species) and stone artefact scatters, with sites varying from single artefacts to dense concentrations of material in both a surface and sub-surface context.
- Due to vegetation coverage and the nature of sand deposits, the detection of sites is directly related to levels of exposure and visibility. Sub-surface deposits may be at a considerable depth below the current mobile dune surface (in association with stabilised soil surfaces) and therefore are unlikely to be detectable unless significant disturbance has occurred.
- The Outer Barrier of Stockton Bight has undergone significant transformation over the last 6000 years comprising at least two major periods of stabilisation, resulting in the formation of stabilised soil surfaces across dune fields that include elevated areas (dunes), adjoining slopes and a former deflation basin. In some areas, the Ridge I and Ridge II stabilised surfaces have undergone a cycle of burial, deflation and sometimes reburial, resulting in a discontinuous and unpredictable distribution of stabilised soil surfaces beneath wind-blown sand deposits.

- Archaeological material (including burials) within the active transgressive dune field and current deflation basin primarily consist of exposed and/or deflated deposits that were once associated with former stabilised surfaces linked to Ridge II and presumably Ridge I periods of stabilisation. Although some archaeological material may have been deposited during periods of instability (i.e. not in association with a stable soil surface), this material is likely to have been limited in both extent and distribution.
- Within the stabilised dune fields, it is suggested that greater concentrations of archaeological material (in terms of site numbers and artefact densities) are located on low ridgelines, spurs and low dunes associated with wetland resources.

These trends were used to develop a predictive model and to inform the survey of the approval areas. The survey was conducted in consultation with the relevant Aboriginal stakeholders and resulted in the identification of archaeological sites and areas of Potential Archaeological Deposit (PAD), as discussed below.

4.2.1 Archaeological Sites within the Approval Areas

Four archaeological sites were identified during the survey of the approval areas, as listed in **Table 4.1** below and shown in **Figures 4.1** and **4.2**. Site cards for these sites are provided in **Appendix B**.

Table 4.1 Sites within the Approval Areas

AHIMS #	Site	E (MGA)	N (MGA)	Site type	Comments	Archaeological Significance
38-4-1147	Mackas 1	398600	6368393	Midden		Moderate
	MFMS1	399127	6370581	Midden	Includes sites A6, A7 and A8	Low to moderate
	MFMS2	399672	6370380	Midden		Moderate
38-4-1148	MFMS3	398995	6370285	Midden		Moderate

Mackas 1 is located within the Lot 218 approval area on a stabilised soil surface extending from an elevated stabilised dune into the active transgressive dune field. Several bone fragments, scattered shell and five stone artefacts were identified within an area of stabilised soil exposure measuring approximately 30 metres by 40 metres. The site had been disturbed by vehicle activity but it is likely that the stabilised surface continues outside the area of exposure and may have been protected from impacts by wind-blown sand. The stabilised soil surface associated with Mackas 1 was designated a Potential Archaeological Deposit (PAD), as discussed below.

The Lot 220 approval area contains three sites, two of which (MFMS 1 and MFMS2) were identified during a previous archaeological assessment (Umwelt 2004). These sites consist of very low density shell scatters, with MFMS1 dispersed over a relatively large area (refer to **Figure 4.2**).



Source: Aerial: Google Earth, 2008

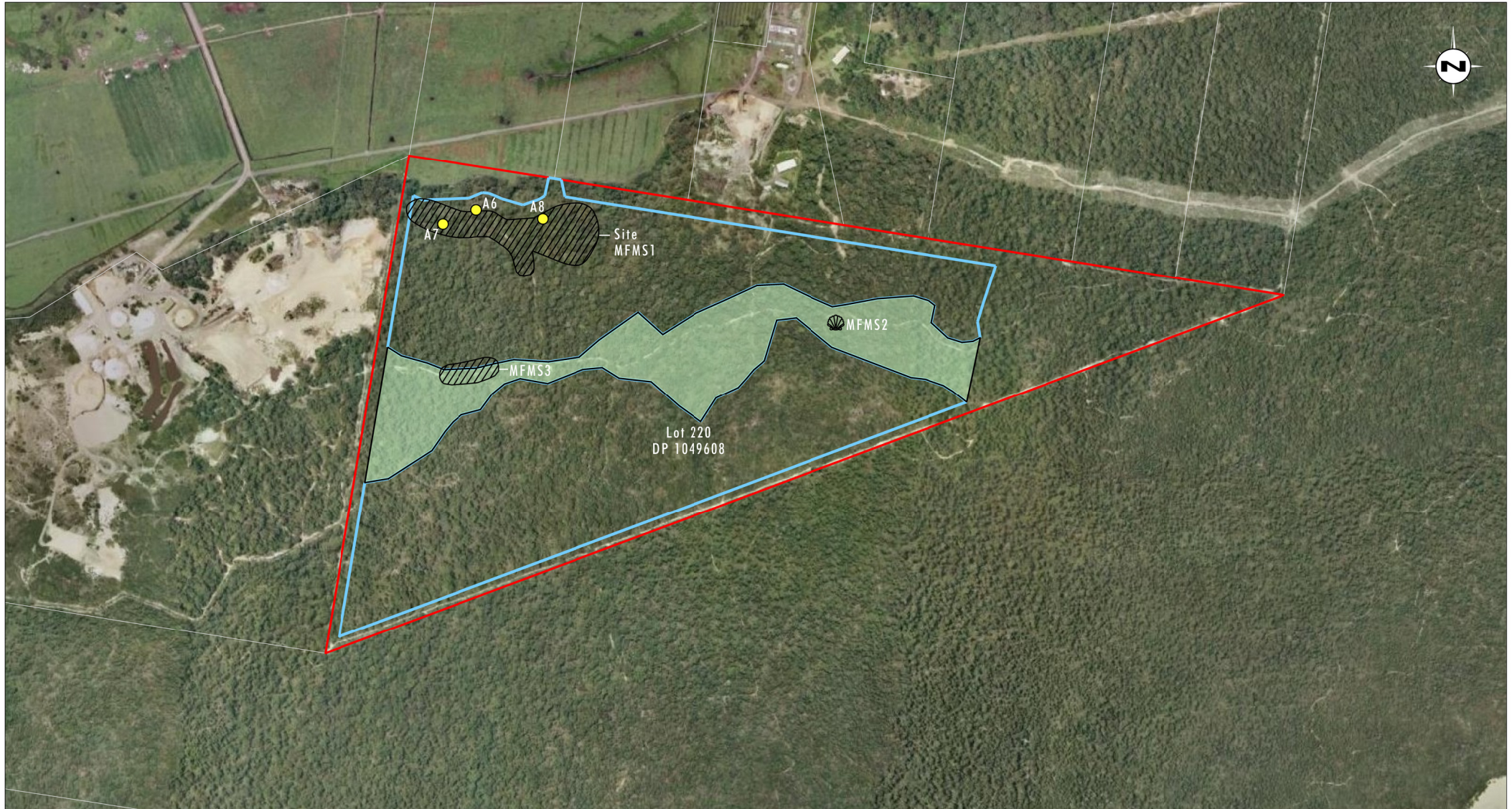
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Legend

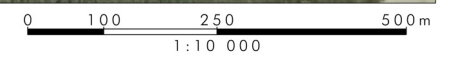
- Lot 218 Boundary
- Lot 218 Approval Area
- Midden with Associated PAD

FIGURE 4.1

Recorded Sites/PADs within
the Lot 218 Approval Area



Source: Aerial: Google Earth 2008



Legend

- Lot 220 Boundary
- Approval Area
- Area Containing PAD
- Previously Recorded Artefacts
- 🐚 Shell
- Site

FIGURE 4.2

Recorded Sites/PADs within the Lot 220 Approval Area

A new site, MFMS3 was identified within the central portion of Lot 220. It consists of a low density scatter of fragmented shell dispersed along a track exposure and also contained one area of concentrated shell deposit (including whole pipi shell) associated with dark grey black sand exposed via animal burrowing. The area of concentrated shell deposit was on a low relief dune and it is likely that the other shell fragments within this site also originated from this landform and had subsequently been dispersed by use of the track. Importantly, the presence of a concentration of pipi shell in association with small amounts of a sand matrix typical of stabilised soil surfaces indicates that relatively intact and possibly comparatively dense midden deposits may be present in a sub-surface context within this area. Furthermore, the site contains fragments of cockle and whelk in addition to pipi shell, indicating that MFMS3 contains evidence of the use of both beach and estuarine resources.

4.2.2 Potential Archaeological Deposit (PAD)

The term 'potential archaeological deposit' (PAD) can be defined in a number of different ways. For the purposes of the assessment of the approval areas, a landform or area was only designated as a PAD if it met one or more of the following criteria:

- it was likely that the PAD will contain enough archaeological material to allow for statistically viable detailed analysis and comparison of the artefact assemblage both within and between sites
- the PAD had not significantly disturbed and was likely to retain a degree of archaeological integrity
- it was predicted that the PAD should contain materials that can be dated, either in relative or absolute terms.

When assessed against these criteria, the area of stabilised soil surface in the Lot 218 approval area that is associated with Mackas 1 was identified as a PAD. Furthermore, based on the findings of previous assessments, it was considered likely that additional areas of stabilised soil surface would be present below the active transgressive dune. Due to the complex geomorphic history of this region, it was not possible to predict with any certainty where such soil surfaces would be located nor was it possible to determine their original landform context and therefore their archaeological potential. Consequently, the identification of areas of PAD (with the exception of that associated with Mackas 1) within the Lot 218 proposal area was and is extremely problematic. For this reason, no areas of PAD (except that associated with Mackas 1) have yet been identified within the Lot 218 proposal area. However, as the approved operations proceed, it is likely that stabilised soil surfaces will be exposed to a greater extent and can be assessed as to whether they constitute a PAD. This management plan provides a series of mechanisms and protocols with which to manage this process.

Lot 220 is primarily comprised of Ridge I and Ridge II dunes of relatively high elevation with slopes of an inclination that makes them unsuitable for occupation. Thus, whilst archaeological material may be present across these landforms (as evidenced by MFMS1), it is unlikely that it will occur in sufficient densities to warrant designation as a PAD. In contrast, low relief dunes that provide access to low-lying areas and associated freshwater resources have been identified as having a high likelihood of containing concentrated deposits of archaeological material that may retain a degree of stratification. Landforms of this type are present throughout the central portion of Lot 220 and the presence of associated archaeological material in a sub-surface context is demonstrated at site MFMS 3. As the level of topographic information was not sufficient to distinguish the low relief dunes from adjoining swales, this central area (refer to **Figure 4.2**) was designated as a PAD however it was noted that it is the low-relief dune ridges and not the swales that comprise the PAD.

4.2.3 Significance Assessment

The significance of the approval areas and the sites and PADs they contain were assessed in terms of both Aboriginal cultural significance and archaeological significance. Based on the information provided by the relevant Aboriginal stakeholders, the approval areas were assessed as being of high Aboriginal cultural significance.

As shown in **Table 4.1**, the sites within the approval areas were assessed as being of moderate or low to moderate archaeological significance. When assessed in landscape terms, the Lot 218 approval area was assessed as being of low to moderate archaeological significance and the Lot 220 approval area was assessed as being of moderate to high archaeological significance.

5.0 Aboriginal Cultural Heritage Management Strategies

This section of the management plan establishes strategies for the effective management of Aboriginal cultural heritage within the approval areas. These strategies have been developed in accordance with Condition 29 of DA-08-0142, the Statement of Commitments and recommendations provided as part of Environmental Assessment (incorporating the recommendations of the Aboriginal Cultural Heritage Assessment of the approval areas), the EP&A Act, the NPW Act and the requirements of the relevant Aboriginal stakeholders, OEH and DPE.

5.1 Establishment of the Aboriginal Heritage Management Group

Mackas Sand will form an Aboriginal Heritage Management Group (AHMG) that will oversee the implementation and ongoing application of the ACHMP. For the first year of operation, the AHMG will be comprised of up to five Aboriginal stakeholder representatives and the Mackas Sand Quarry Manager, with a qualified archaeologist included on an on-call basis. The Aboriginal stakeholder representatives will be selected by Mackas Sand on the basis of the following criteria:

- Aboriginal descent
- relevant experience and qualifications in working with the management of Aboriginal cultural heritage
- ability to communicate information relating to the management of Aboriginal cultural heritage within the approval areas with the broader Aboriginal community
- ability to interact and work effectively in group situations.

In relation to the selection of the initial AHMG, Mackas Sand will invite each of the five registered stakeholder groups to submit Expressions of Interest that address the selection criteria. Representation on the AHMG will be subject to review on an annual basis or at other intervals determined by the AHMG.

Decisions made by the AHMG will be made on the basis of the opinion of the majority of the AHMG.

The roles and responsibilities of the AHMG will be discussed in greater detail for each of the additional management strategies outlined in this document.

5.2 Cultural Heritage Awareness Training

Mackas Sand has developed a brief Aboriginal cultural heritage awareness training package in consultation with the AHMG, and it has been incorporated into the induction for Mackas Sand employees and contractors. The training package includes information on the following:

- types and locations of Aboriginal sites and artefacts that are present within the approval areas, with clear discussion of the potential for other sites to be identified during the course of operations
- the diagnostic features of scarred trees, midden material and stone artefacts and the procedure to follow should any of these be identified

- the Aboriginal cultural heritage value and archaeological significance of sites and the general landscape of the approval areas
- the identifying characteristics of a former stabilised soil surface
- the obligation to ensure that recorded archaeological sites and areas of PAD are protected from impacts until such time as impact becomes necessary and the appropriate actions have been carried out
- procedures to follow should a former stabilised soil surface or archaeological material be identified during the course of operations
- a general summary of relevant aspects of this ACHMP
- the relevant aspects of the NPW Act in relation to the protection of Aboriginal cultural heritage, in particular, the potential for prosecution should sites be subject to impacts that are not in accordance with the procedures outlined in this ACHMP.

The Aboriginal cultural heritage awareness training package is subject to review when deemed necessary by the AHMG.

5.3 Strategies for Recorded Archaeological Sites and PADs

Mackas Sand (in consultation with the AHMG) will be responsible for ensuring that recorded archaeological sites and areas of PAD are protected from impacts associated with the approved activities until such time as impact becomes necessary. Cultural heritage awareness training will be used as a mechanism to advise all staff and contractors of the obligation to protect recorded sites and PADs unless appropriate actions have been taken in accordance with the management strategies outlined below.

5.3.1 Mackas 1 and Associated PAD

Should Mackas 1 and the associated area of PAD be subject to impact, a surface collection of Mackas 1 will be conducted in accordance with the methodology provided in (Umwelt 2009: Appendix 5), and reproduced in **Section 5.17**. The stabilised soil surface associated with Mackas 1 and currently identified as PAD will be reassessed as outlined in **Section 5.5**. If it remains defined as a PAD, it will be test excavated in accordance with the methodology provided in **Section 5.17**. Should test excavation identify any of the following, salvage excavations will be conducted in accordance with the methodology outlined in **Section 5.17**:

- consolidated shell midden deposits (comprising packed shell as opposed to dispersed shell fragments)
- stone artefact scatters that contain high densities of artefacts (greater than three artefacts per test pit, or as otherwise agreed by the relevant stakeholders and an archaeologist, if required) and/or an artefact assemblage of notable complexity or research value
- hearth or heat treatment feature.

5.3.2 MFMS1, MFMS2 and MFMS3

Surface artefacts within sites MFMS1, MFMS2 and MFMS3 will be subject to surface collection prior to initial vegetation clearance in the area surrounding these sites. The surface collection will be conducted by the AHMG (including an on-call archaeologist, if required) in accordance with the methodology provided in **Section 5.17**.

5.3.3 Lot 220 PAD

In accordance with the recommendations of the Aboriginal cultural heritage assessment (Umwelt 2009: Appendix 5), no sand extraction will be undertaken in the central area of Lot 220, which contains areas of PAD. Mackas Sand (in consultation with the AHMG) will ensure that the central area of the Lot 220 approval area that contains areas of PAD is clearly demarcated to prevent unintentional impacts during operations. However, it will be necessary to construct up to three access roads in this area. The location of these access roads will be determined in consultation with the AHMG (including an on-call archaeologist, if required) and if the construction of access roads will result in impacts to the low dune ridge landforms identified as PAD, these areas will be subject to test excavation in accordance with the methodology provided in **Section 5.17**. Should test excavation identify any of the following, salvage excavations will be conducted in accordance with the research design and methodology outlined in **Section 5.17**:

- consolidated shell midden deposits (comprising packed shell as opposed to dispersed shell fragments)
- stone artefact scatters that contain high densities of artefacts (greater than three artefacts per test pit, or as otherwise agreed by the relevant stakeholders and an archaeologist, if required) and/or an artefact assemblage of notable complexity or research value
- hearth or heat treatment feature.

5.4 Strategy for Operations within the Lot 218 Approval Area

The Lot 218 proposal area is comprised primarily of wind-blown sand that has been deposited within the last 50 years and therefore will not contain archaeological materials in their original depositional context. However, former stabilised soil surfaces that are typically associated with archaeological materials are likely to be present beneath the wind-blown sands in a discontinuous and unpredictable distribution. The approved activities have been designed to minimise impacts to Aboriginal cultural heritage by avoiding disturbance of former stabilised soil surfaces, where possible. Due to operational requirements, it may be necessary to disturb stabilised soil profiles in some areas. The alternate haul route extends from the wind-blown dunes to Nelson Bay Road across the Inter-Barrier depression as depicted within **Figure 1.1**.

The management strategy outlined below for operations within the Lot 218 approval area and alternate haul route will provide an informal conservation outcome (for the majority of stabilised soil surfaces where impacts can be avoided) whilst also providing a mechanism for the appropriate salvage (involving surface collection and/or sub-surface salvage) of archaeological material subject to impacts.

Mackas Sand will ensure that operations in the Lot 218 approval area and alternate haul route are undertaken in accordance with the strategy outlined below:

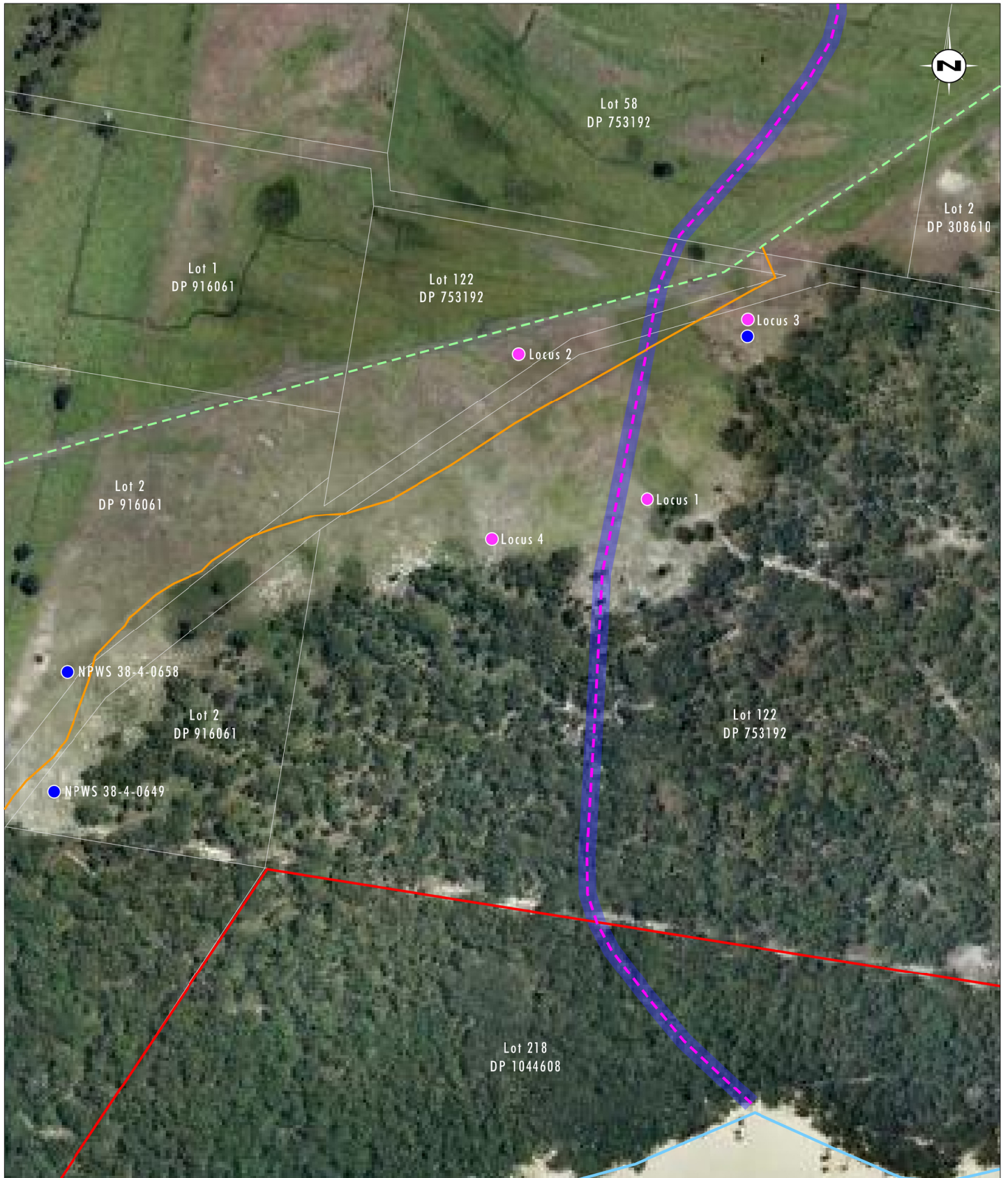
- Within the extraction area, an initial 'first workings' path approximately 12 metres in width at the base will be developed for each section of operations. Earth-moving equipment will be utilised to remove wind-blown sand in the first workings path until a former stabilised soil surface is exposed OR a suitable working depth is reached (whichever comes first).

- If a stabilised soil surface is exposed within the first workings path, an archaeologist will be contacted to record its location in three dimensions (easting, northing and elevation) with a hand-held GPS. Following recording, subsequent operations will adhere to the following process.
 - Where disturbance of the stabilised soil surface is not essential to operations, once the stabilised soil surface or suitable working depth is reached, a sand buffer of at least 50 centimetres in thickness will be created above the surface and, if it is an area to be trafficked by road-going vehicles, an additional layer of soil topped by roadbase will be laid down to provide a working surface and a buffer above the stabilised soil surface (if present).
 - Subsequent sand extraction will then proceed from the first workings path at approximately the same depth.
 - Should a stabilised soil surface be exposed at any time during extraction, works will cease at that depth and if possible, extraction will only occur to within fifty centimetres of the stabilised soil surface.
 - Should it be necessary to undertake disturbance to a stabilised soil surface, the AHMG and an on-call archaeologist will be contacted and the soil surface will be assessed to determine whether it constitutes a PAD under the definition provided in **Section 4.2.2**. This allows flexibility throughout the life of the proposal because as works proceed and a greater understanding of archaeological expectations within Lot 218 is obtained, it is likely that the identification of PADs will be more refined and mitigation strategies will therefore be more targeted. If the stabilised soil surface is not considered a PAD but archaeological material is visible, a surface collection will be conducted in accordance with the methodology provided in **Section 5.17** and works may proceed following completion of the surface collection. If the soil surface is identified as a PAD, surface collection and test excavation of the stabilised soil surface (within the area to be impacted) will be conducted in accordance with the methodology outlined in **Section 5.17**.
- Should test excavations identify any of the following, salvage excavations will be conducted in accordance with the research design and methodology outlined in **Section 5.17**:
 - consolidated shell midden deposits (comprising packed shell as opposed to dispersed shell fragments)
 - stone artefact scatters that contain high densities of artefacts (greater than three artefacts per test pit, or as otherwise agreed by the relevant stakeholders and an archaeologist, if required) and/or an artefact assemblage of notable complexity or research value
 - hearth or heat treatment feature.

5.4.1 Access Route Construction

During the construction of the alternate haul route, the procedure outlined above has also been followed:

1. In consultation with the AHMG, demarcate the route boundary from the edge of the Inter-Barrier Depression south to the intersection with the Lot 218 approved operational area (i.e. within the area identified as PAD). This demarcation should be done prior to route construction and any surface artefacts within the demarcated area should be collected in consultation with the AHMG (refer to **Figure 5.1**) and in accordance with the approved methodology detailed in **Section 5.17**.
2. Vegetation clearance from the edge of the Inter-Barrier Depression south to the intersection with the Lot 218 approved operational area (i.e. within the area identified as PAD) will occur as a staged process in accordance with the following methodology:
 - understory vegetation and all trees smaller than approximately 50 centimetres diameter at chest height will be removed by earth-moving equipment or similar and placed outside the newly cleared area so that all of the newly cleared area is visible. At this stage, the AHMG will be invited to undertake an inspection of the newly cleared area;
 - following the initial inspection, the remaining large trees will be cleared by machinery (in accordance with ecological tree clearance procedures) and the AHMG will be invited to inspect the additional area of ground disturbance resulting from large tree clearance at a time determined in consultation with the AHMG; and
 - during vegetation clearance inspections (as discussed above), any Aboriginal objects such as stone artefacts and shell will be collected in accordance with the approved methodology detailed in **Section 5.17**.
3. Following vegetation clearance, construction of the alternate haul route from the edge of the Inter-Barrier Depression south to the intersection with the Lot 218 approved operational area should proceed by creating a level surface of approximately 8 metres in width along the length of the alternate haul route, with a turning bay of approximately 30 metres by 30 metres located in the area adjoining Lot 218 and an overall potential construction width of 10 metres; and
4. laying geotextile material over the natural ground surface and introducing additional fill material (i.e. not sand from other sections of the alternate haul route) over the geotextile to provide a suitable road surface. This will be done after surface artefacts have been collected and in a progressive fashion so that all heavy vehicle movement associated with road construction and subsequent use is confined to the area in which geotextile and fill have already been introduced.



Source: Department of Lands (2003) and Google Earth (2006)

0 50 100 150m
1:3000

Legend

- Lot Boundary
- Approved Operational Area
- 10m Disturbance Easement
- Approved Alternate Access Route
- Existing Track
- Electricity Easement
- Artefact
- Loci

FIGURE 5.1

Alternate Haul Route
with Identified Sites and Features

5.5 Strategy for Operations within the Lot 220 Approval Area

Within the Lot 220 area, operations cannot be undertaken without impacting stabilised soil surfaces and the associated archaeological material (if present). The Lot 220 proposal area contains considerable areas of PAD that are likely to have very high research value and therefore it is not archaeologically justifiable to recommend the destruction of this area without undertaking mitigating activities involving salvage of archaeological materials (including surface collection and potentially sub-surface salvage). Mackas Sand will ensure that all operations within the Lot 220 approval area are conducted in accordance with the strategy provided below.

- As part of the Aboriginal cultural heritage awareness training and prior to removal of any vegetation, all staff and contractors will be made aware of the diagnostic features of Aboriginal scarred trees and advised that should any possible Aboriginal scarred trees be identified during vegetation clearance, all clearance in the immediate vicinity of the possible scarred tree should cease until it can be inspected by the AHMG (including an on-call archaeologist, if required).
- Vegetation clearance will occur as a staged process, with the aim of minimising ground surface disturbance resulting from vegetation clearance. Vegetation clearance will be undertaken in accordance with the following methodology:
 - during undergrowth clearance activities the AHMG will be provided with the opportunity to inspect the area following the removal of vegetation. During the inspection, the stakeholders may collect surface archaeological materials (such as stone artefacts and shell) in accordance with the research design and methodology provided in Attachment 3 of Appendix 5 of the EA (Umwelt, 2009).
 - understorey vegetation and all trees smaller than approximately 50 centimetres diameter at chest height will be removed by earth-moving equipment or similar and placed outside the newly cleared area so that all of the newly cleared area is visible. At this stage, the AHMG will be invited to undertake an inspection of the newly cleared area
 - following the initial inspection, the remaining large trees will be cleared by machinery (in accordance with ecological tree clearance procedures) and the AHMG will be invited to inspect the additional area of ground disturbance resulting from large tree clearance at a time determined in consultation with the AHMG.
- If determined appropriate by the AHMG, inspections of ground disturbance resulting from large tree clearance may be delegated to a Mackas Sand employee who has undergone sufficient training. If artefactual material is found during inspections after ground disturbance resulting from large tree clearance, the AHMG will be contacted to organise for the collection of material in accordance with **Section 5.17**.
- During vegetation clearance inspections (as discussed above), any surface archaeological materials such as stone artefacts and shell) will be collected in accordance with the methodology provided in **Section 5.17**.
- Should any of the following be identified during vegetation clearance inspections within Lot 220, test excavations will be conducted in accordance with the methodology provided in **Section 5.17**:
 - high densities of stone artefacts, shell or bone fragments (as assessed by the AHMG including an on-call archaeologist, if required).

- Should test excavations identify any of the following, salvage excavations will be conducted in accordance with the methodology provided in **Section 5.17**:
 - consolidated shell midden deposits (comprising packed shell as opposed to dispersed shell fragments)
 - stone artefact scatters that contain high densities of artefacts (greater than three artefacts per test pit, or as otherwise agreed by the relevant stakeholders and an archaeologist, if required) and/or an artefact assemblage of notable complexity or research value
 - hearth or heat treatment feature.

5.6 Collection and Inspection of Screen Reject Material

Mackas Sand will ensure that all reject material from the coarse screen will be stockpiled within the Lot 218 and Lot 220 approval areas. The reject material will be provided to AHMG on a monthly basis for inspection to be conducted in conjunction with the monthly monitoring inspection for the Lot 218 approval area (as discussed in **Section 5.7**). Should the samples contain shell material or stone artefacts, the AHMG (and an on-call archaeologist, if required) will be contacted as material is identified in order that they may further record and assess these materials. Should the proportion of archaeological material within the screen reject material be considered high by the AHMG (including an on-call archaeologist, if required), the source of the material and the possible presence of additional concentrated archaeological deposits will be discussed by the AHMG and an inspection of the relevant approval area may be undertaken.

5.7 Monitoring Inspections by AHMG

Mackas Sand will coordinate monitoring inspections by the AHMG of both the Lot 218 and Lot 220 approval areas. Inspections of the Lot 218 approval area will be conducted on a monthly basis for the first 12 months of operation in conjunction with inspection of screen reject material from the Lot 218 and Lot 220 approval areas (in accordance with **Section 5.6** above). Inspections of the Lot 220 approval area will be conducted on a biannual basis for the first 12 months of operation. The inspection periods for both approval areas will be subject to alteration after 12 months of operation at Lot 218.

During the inspections the AHMG will be provided within the opportunity to inspect all aspects of operations that can be safely accessed including the active extraction area, the reject screening area and any associated reject piles.

5.8 Management of Unexpected Sub-Surface Deposits (other than Human Skeletal Material)

Mackas Sand will ensure that, should operations result in the exposure of compact shell midden, animal bones with potential cultural significance or suspected hearth or heat treatment features within the approval areas, works will cease and the area will be cordoned off for 10 metres from all edges of the archaeological material. The AHMG (including an on-call archaeologist, if required) will be notified and provided with the opportunity to inspect the material.

The AHMG will assess the significance of the material in accordance with significance assessment criteria in Table 6.1 of Umwelt 2009, Appendix 5. The material will then be salvaged in accordance with the sub-surface salvage methodology provided in Section **5.17**.

Works will not proceed in the identified area until approval has been provided by the AHMG (including an on-call archaeologist, if required).

A site card will be lodged with OEH for any new site identified and will provide details of the site and the salvage activities undertaken at the site.

5.9 Human Skeletal Material

Human skeletal material has been found within the active transgressive dune field on Stockton Bight and it is not possible to rule out the possibility that human skeletal material may be present in the approval areas. Human skeletal material is generally of very high archaeological significance and is of particular significance to Aboriginal people. It is not possible to predict the location, condition or nature of human skeletal that may be present within the approval areas. The following recommendations are therefore provided to give certainty that if human/possible human skeletal material is found, it will be managed in accordance with legal requirements, the wishes of the relevant Aboriginal stakeholders and OEH requirements.

In the unlikely event that a potential burial site or potential human skeletal material is exposed within the Project area, the following procedure should be followed in accordance with the Policy Directive – Exhumation of Human Remains (NSW Department of Health 2013), Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977 (NSW Heritage Office 1998) and the Aboriginal Cultural Heritage Standards and Guidelines Kit (NPWS 1997):

- if the skeletal remains suspected to be human are exposed, work in the vicinity of the remains is to halt immediately to allow assessment and management
- Mackas Sand Manager and/or Environmental Representative (if applicable) will be informed and will contact local police, OEH and the Heritage Branch
- a physical or forensic anthropologist should inspect the remains in situ, and make a determination of whether the remains are human and if so, the likely ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or forensic)
- if the remains are identified as forensic the area is deemed as a crime scene
- if the remains are identified as Aboriginal, the site is to be secured and OEH and all registered Aboriginal parties are to be notified in writing
- if the remains are non-Aboriginal (historical) remains, the site is to be secured and the Heritage Branch is to be contacted.

The above process functions only to appropriately identify the remains and secure the site. From this time, the management of the remains is to be determined through liaison with the appropriate stakeholders (New South Wales Police Force, forensic anthropologist, OEH, Heritage Branch, registered Aboriginal parties etc) and in accordance with the Public Health Act 1991.

If the skeletal material is not human, mitigation activities or works can proceed in accordance with the other strategies outlined in this ACHMP.

5.10 Analysis and Interpretation of Results of Mitigation Activities

The mitigation activities to be undertaken under this ACHMP will result in the salvage of archaeological material, namely stone artefacts and shell. The mitigation strategies have been developed to assist in increasing our knowledge of how Aboriginal people used this area. The analysis and interpretation of the results of the mitigation activities is an integral component of this process. Following each major stage of mitigation activities, the following activities will be completed:

- the salvaged stone artefacts will be subject to detailed analysis in accordance with the methodology provided in **Section 5.17**. Shell will be identified to species (where possible) and weighed
- a report will be compiled that presents the findings of the activities. Reports will be completed in accordance with OEH guidelines and requirements and will include:
 - a description of the results of the activities including general environmental information, landscape information, soil descriptions and excavation profiles (where applicable)
 - the results of detailed artefact recording and analysis of salvaged archaeological material
 - the use of recovered data (artefact analysis and environmental information) to address the research questions identified in **Section 5.17**.

5.11 Care and Control of Salvaged Materials

An area within Lot 220 that will not be subject to further impact was decided to be a suitable location for reburial of the archaeological material by the AHMG on 4 September 2013. All materials collected previously (e.g. screened material from MFMS1) will be deposited at this artefact reburial location. Following reburial of the archaeological material, an updated site card will be submitted to OEH.

An additional artefact reburial location was identified for the deposition of material collected in relation to the construction of the alternate haul route to Lot 218 on 4 November 2013 by the AHMG. All material collected in relation to access route construction will be deposited within the artefact reburial location. Following reburial of the archaeological material, an updated site card will be submitted to OEH.

5.12 Activities outside Current Approval Areas

Should Mackas Sand need to conduct activities resulting in vegetation clearance or ground surface disturbance outside the current approval areas, these activities will be discussed with the AHMG (including an on-call archaeologist, if required). The AHMG will provide advice regarding any requirements for additional cultural heritage inspections/investigations and/or the need to obtain appropriate permits or consents from OEH prior to undertaking any such activities outside the current approval areas.

5.13 Involvement of AHMG in any Salvage Activities

Mackas Sand will be responsible for ensuring that all salvage activities are discussed with the AHMG prior to commencement. Aboriginal stakeholder representatives (as determined in consultation with the AHMG) will be offered the opportunity to be involved in all salvage activities.

5.14 Site Rehabilitation, Bushfire Management, Weed and Feral Animal Control, Unexploded Ordnance Management Plan

The Lot 220 approval area will be subject to rehabilitation on the basis of a comprehensive Landscape Management Plan that will be prepared in consultation with OEH and DPE. The Landscape Management Plan will also provide mechanisms for bushfire management and weed and feral pest control. The requirements of the Landscape Management Plan will be consistent with the ACHMP.

It is intended that the rehabilitation of the Lot 220 approval area will achieve a final landform that is similar to the surrounding topography in that it will be shaped, where possible, in undulating profiles in keeping with natural landforms of the surrounding environment. Rehabilitation will result in the re-establishment of similar vegetation communities to those currently present within the approval area. Where feasible, the AHMG will be consulted regarding progressive rehabilitation and will be provided with the opportunity to have input into the re-establishment of vegetation communities that contain valuable Aboriginal resource plants and that may attract Aboriginal faunal resources.

An Unexploded Ordnance Management Plan will also be completed for Lot 218. Any excavations conducted under the ACHMP on Lot 218 will be consistent with the requirements of the Unexploded Ordnance Management Plan.

5.15 Review of the ACHMP

The review of the ACHMP will reflect any changes or modification to approved activities or areas and any improvements to or refinements of the proposed management strategies. Ongoing review of the ACHMP will be undertaken in accordance with Condition 4a and Condition 7 of Schedule 5 of PA 08_0142, in consultation with the AHMG.

5.16 Post-Operations

At the conclusion of operations, Lot 220 and Lot 218 will be subject to final rehabilitation in accordance with the Landscape Management Plan. This ACHMP applies only to the period of operations and will require review at the cessation of operations in relation to any future land use.

5.17 Methodology

The methodology provided in this section relates specifically to mitigation activities within the approval areas. The recommended mitigation activities include: surface collection; test excavation and sub-surface salvage. The mitigation activities are tiered, with specified outcomes leading to a requirement for further mitigation activities, resulting in the maximum archaeological benefit from these activities. Artefacts salvaged will be recorded in accordance with Attachment 2 of Appendix 5 of the Environmental Assessment (Umwelt 2009).

5.17.1 Surface Collection

Surface collection will be undertaken within the Lot 218 approved extraction area at any exposed stabilised soil surface subject to impact and within the Lot 220 approved extraction area at any location where surface archaeological material is identified during post-clearance inspection. Surface collection will also be undertaken where surface archaeological material is exposed in the access route to Lot 218. The spatial recording, collection and subsequent analysis of surface archaeological material within these areas will provide information about the distribution of archaeological material and may provide information

regarding the location of specific activity areas. The proposed surface collection methodology is provided below.

- The distribution of surface archaeological material will be assessed and where appropriate, archaeological material will be grouped into loci for the purposes of recording and analysis.
- All surface archaeological material and/or loci of surface archaeological material will be flagged and photographed.
- The location of each loci or isolated area of surface archaeological material will be recorded and mapped using a hand-held 12 channel GPS, with records to be taken in three dimensions (easting, northing and elevation).

5.17.2 Methodology for Test Excavations

Test excavations have been recommended for any area of stabilised soil surface within the Lot 218 approved extraction area that is subject to impact and is identified as a PAD and within any area of the Lot 220 approved extraction area that contains high densities of stone artefacts, shell or bone fragments as assessed by the AHMG and an archaeologist (if required). The proposed methodology for test excavations is provided below.

- The area of stabilised soil surface subject to impact (in relation to the Lot 218 approved extraction area) or containing a high density of archaeological material (in relation to the Lot 220 approved extraction area) will be clearly defined and demarcated by an archaeologist and the AHMG.
- The defined area will then be divided into a grid with 10 metre intervals, or if the dimensions of the area to be impacted are not sufficient, a grid with 5 metre intervals.
- A pit measuring approximately 50 centimetres by 50 centimetres will be excavated at the intersection of each of the 10 metre intervals (or 5 metre intervals for areas on a 5 metre grid), with the exact spacing and location of the pits to be determined in the field in order to avoid excavating in areas of localised disturbance.
- All pits will be excavated in approximately five centimetre spits to a minimum depth of 30 centimetres but may continue to the top of the B horizon or to the maximum achievable depth within a 50 centimetre by 50 centimetre pit (taking into account WHS restrictions and the inherent difficulties of excavating in sand). It is unlikely that the B horizon will be reached in test pits however it is argued that excavation to a depth of 30 centimetres within a stabilised soil surface will provide a very good indication of the nature of any archaeological materials it may contain.
- All excavated materials (with the exception of sediments from a hearth or heat treatment pit) will be passed through a five millimetre and two millimetre gauge sieve (where soil texture and level of moisture allows) in order to ensure that all archaeological material is retained.
- Should a possible hearth or heat treatment pit be identified during salvage activities, the following methodology will be followed:
 - the surface of the feature will be cleaned by hand (using trowels, hand shovels and brushes as required) to allow the edges of the feature to be identified

- the feature will then be excavated in cross-section (half-sectioned) to investigate the dimensions and orientation of the feature to more accurately assess whether it is a cultural feature or the result of natural process (for example, a burnt tree root/stump). The excavation will proceed according to the stratigraphy (if any) of the in-filling materials
- if it is identified as a hearth/heat treatment pit, it will be photographed in cross-section and a stratigraphic profile of the cross-section will be recorded
- if it is identified as a hearth/heat treatment pit, it will then be excavated in its entirety. All excavated materials (including those from original cross-sectional excavation) will be retained for analysis and samples of relevant materials will be sent for additional analysis, including radio-carbon dating
- if the feature is identified as a hearth or heat treatment pit, the excavation of the feature will continue until the AHMG and the archaeologists agree that the entire feature has been removed
- following the removal of all in-filling material within a hearth or heat treatment pit, the remaining cut feature will be planned to scale and photographed
- following this excavation can resume in the vicinity of the excavated feature.

5.17.3 Methodology for Salvage Excavations

Salvage excavations will be undertaken within areas of Lot 218 and Lot 220 approved extraction areas where test excavations have identified consolidated shell midden deposits, artefact assemblages of a specific nature and/or hearths/heat treatment features. The proposed methodology for salvage excavations is outlined below:

- The area to be subject to salvage excavation will be clearly defined and demarcated by an archaeologist and the AHMG.
- The defined area will then be divided into a grid with one metre intervals.
- A number of one metre by one metre squares equivalent to at least 40% of the defined salvage area will then be selected by an archaeologist and the AHMG in order to include the portions of the salvage excavation area most closely associated with the identified archaeological materials discussed above. These squares will constitute the initial excavation squares. Additional squares may be excavated if necessary to obtain a representative sample of consolidated shell material or stone artefact scatters or to complete the excavation of a hearth or heat treatment feature (refer to **Section 5.17.2** above). The location of any additional squares will be determined by an archaeologist and the AHMG.
- The squares will be one metre by one metre in size and will be excavated in 50 centimetre quadrants using five centimetre spits until the B horizon is reached or the excavation becomes unsafe, whichever comes first (it may be necessary to step or shore the excavation if the sand becomes unconsolidated).
- All excavated materials (with the exception of sediments from a hearth or heat treatment pit) will be passed through a five millimetre and two millimetre gauge sieve (where soil texture and level of moisture allows) in order to ensure that all archaeological material is retained.
- Should any features (such as a hearth or heat treatment pit) be identified, they will be excavated in accordance with the methodology provided in **Section 5.17.2**.

6.0 Roles, Responsibilities and Timeframes

Title	Company	Roles and Responsibilities	Timeframe
Mackas Sand Quarry Manager	Mackas Sand	Establish the AHMG based on the criteria outlined in Section 5.1	Request Expressions of Interest from prospective AHMG representatives within one week of acceptance of the ACHMP and select AHMG representatives within one month of acceptance of ACHMP
		Provide adequate resources for the implementation and application of the ACHMP	Ongoing
		Assist in developing an Aboriginal cultural heritage awareness training package	Training package should be finalised within one month of acceptance of ACHMP
		Ensure Aboriginal cultural heritage awareness training is provided to all employees and contractors as part of the induction process	Ongoing
		Ensure that salvage of recorded sites and PADs is conducted in accordance with the strategies outlined in Section 5.3	Advise AHMG (including on-call archaeologist, if required) of need to undertake salvage at least three months prior to proposed impacts
		Ensure that central area of the Lot 220 approval area that contains areas of PAD is demarcated to prevent unintentional impacts during operation	Prior to the commencement of clearance activities in the Lot 220 approval area
		Undertake consultation with AHMG (including on-call archaeologist, if required) regarding location of any access roads required in the central area of the Lot 220 approval area that contains areas of PAD	A minimum of three months prior to proposed road construction

Title	Company	Roles and Responsibilities	Timeframe
		Ensure that operations within the Lot 218 approval area are undertaken in accordance with the strategy provided in Section 5.4	Ongoing
		Ensure that operations within the Lot 220 approval area are undertaken in accordance with the strategy provided in Section 5.5	Ongoing but ensure that AHMG is given at least one week's notice of anticipated completion of each section of vegetation clearance
		Coordinate collection of screen material as required in Section 5.6	Monthly following commencement of operations
		Coordinate inspections of operations in the Lot 218 and Lot 220 approval areas, as required in Section 5.7	Monthly for Lot 218 approval area Bi-annually for Lot 220 approval area
		Ensure that all works cease in the vicinity of previously unrecorded sub-surface deposits exposed by operations and the deposits are managed in accordance with the strategy provided in Section 5.8	As required
		Ensure that all works cease in the vicinity of any potential human remains, and any potential human remains are managed in accordance with the strategy provided in Section 5.9	As required
		Advise the AHMG of any vegetation clearance or ground surface disturbance activities proposed for areas outside the current approval areas	At least two months prior to intended commencement of proposed activities
		Advise on-call archaeologist (if required) of reburial location for salvaged archaeological material and ensure a site card is submitted to DECCW	Within one week of selection of a reburial location
		Ensure AHMG is consulted regarding proposed rehabilitation of the Lot 220 approval area	As required

Title	Company	Roles and Responsibilities	Timeframe
		Instigate review of ACHMP	Within 12 months of commencement of operations
Prospective AHMG representatives	Relevant Aboriginal stakeholder groups	Submit Expression of Interest that addresses criteria outlined in Section 5.1	Within one week of receiving request from Mackas Sand
AHMG	Aboriginal stakeholder representatives	Assist in developing an Aboriginal cultural heritage awareness training package	Training package should be finalised within one month of acceptance of ACHMP
		Provide advice and input regarding the demarcation of the central area of the Lot 220 approval area that contains areas of PAD	Prior to the commencement of clearance activities in the Lot 220 approval area
		Provide input regarding the location of any access roads required the central area of the Lot 220 approval area that contains areas of PAD	A minimum of three months prior to proposed road construction
		Participate in any inspection of stabilised soil surfaces in the Lot 218 approval area	As required
		Participate in post-vegetation clearance inspections within the Lot 220 approval area	As required
		Participate in all inspections of unexpected sub-surface deposits and any potential human skeletal material as required in Sections 5.8 and 5.9	As required
		Provide cultural advice regarding any activities proposed outside the current approval areas, as outlined in Section 5.12	As required

Title	Company	Roles and Responsibilities	Timeframe
		Assist in determining Aboriginal stakeholder representation in all salvage activities	Establish representation requirements at least one month prior to proposed salvage activity
AHMG	On-call archaeologist	Submit site card to OEH for reburial location of salvaged archaeological material (if required)	Within one month of reburial of salvaged archaeological material
		Participate in post-vegetation clearance inspections within the Lot 220 approval area (if required)	As required
		Provide expert advice regarding the identification and recording of archaeological material and PAD (if required)	As required
		Participate in all inspections of any sub-surface deposits and any potential human skeletal material uncovered by operations as required in Sections 5.8 and 5.9 (if required)	As required
		Provide archaeological advice regarding any activities proposed outside the current approval areas, as outlined in Section 5.12 (if required)	As required

7.0 References

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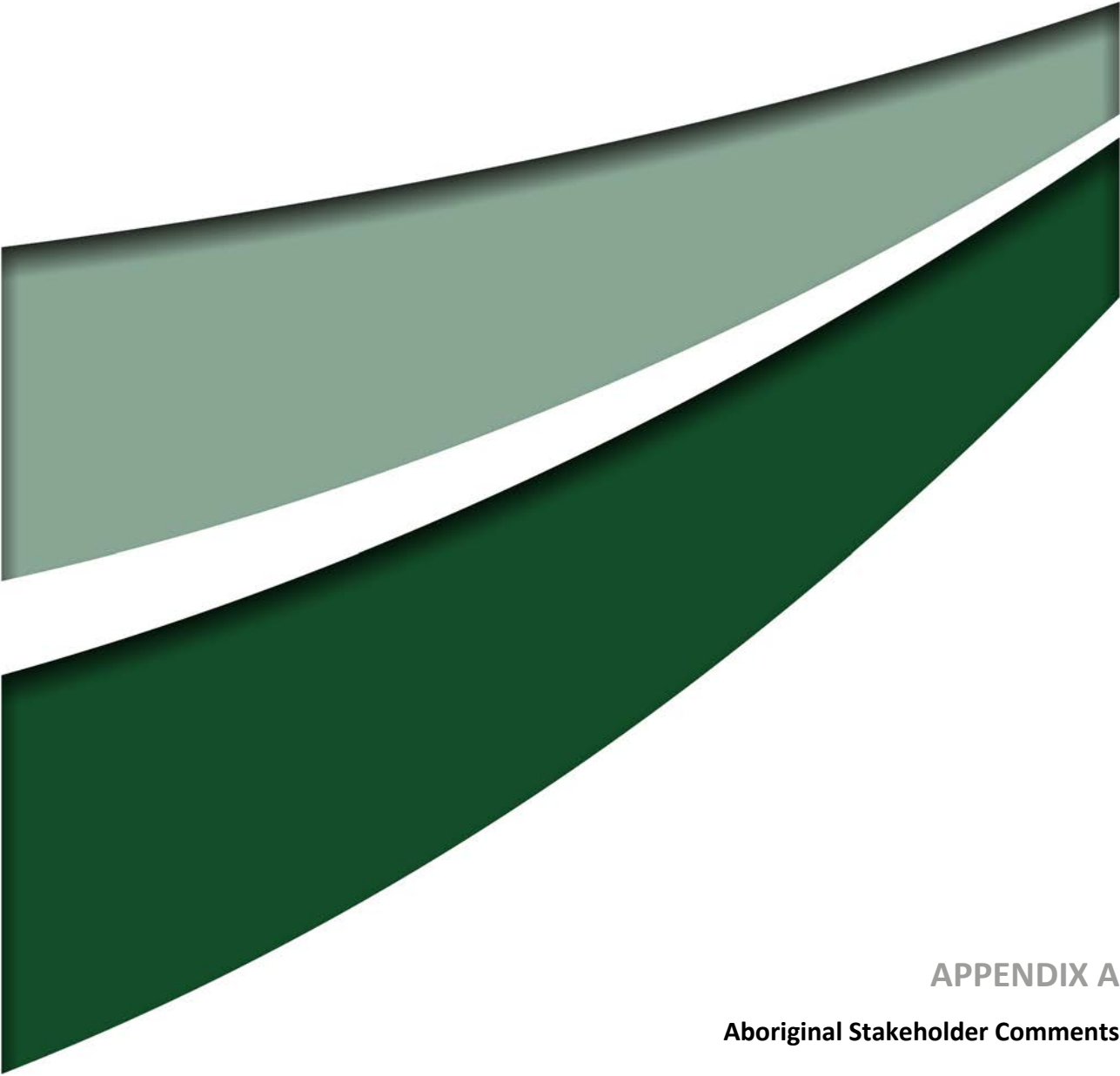
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Umwelt (Australia) Pty Limited, 2009. *Environmental Assessment of Sand Extraction Operations from Lot 218 DP 1044608 and Lot 220 DP 1049608, Salt Ash Report to Mackas Sand*.

Umwelt (Australia) Pty Limited, 2012. *Aboriginal Cultural Heritage Assessment of Alternate Haul Route to Lot 218 DP 1044608, Salt Ash, Report to Mackas Sand*.



APPENDIX A

Aboriginal Stakeholder Comments

Draft ACHMP Stakeholder Meeting Summary

Wednesday 21 October 2009

Attendees: Jamie Tarrant (Chair, Worimi Local Aboriginal Land Council)
Val Merrick (Deputy Chair, Worimi Local Aboriginal Land Council)
Andrew Smith (Chief Executive Officer, Worimi Local Aboriginal Land Council)
Jamie Merrick (Senior Sites Officer, Worimi Local Aboriginal Land Council)
Lennie Anderson (Nur-Run-Gee Pty Ltd)
Anthony Anderson (Mur-Roo-Ma Inc)
Bruce Mackenzie (Mackas Sand)
Robert Mackenzie (Mackas Sand)
Nicola Roche (Umwelt)

Format of the meeting

The meeting followed a discussion format where each section of the ACHMP was briefly reviewed and discussed amongst all present. Where particular matters were raised, these were addressed as detailed below. Except where comments/proposed alterations were noted, all stakeholder representatives present indicated that they agreed with the information and management strategies provided in the draft ACHMP.

Matters addressed relating to the ACHMP

Section 5.1 Establishment of Aboriginal Heritage Management Group

It was agreed that Mackas Sand should invite each of the five registered stakeholder groups to submit an Expression of Interest (EOI) for participating in the Aboriginal Heritage Management Group (AHMG).

It was agreed that the criteria for selection for the AHMG should include being of Aboriginal descent.

It was reiterated that Mackas Sand (namely Robert and Bruce Mackenzie) will be responsible for assessing the EOIs against the criteria in order to select the AHMG.

It was agreed that the AHMG should operate on a consensus basis, with decisions to be made on the basis of the opinions of the majority of the AHMG.

Section 5.4 Strategy for Operations within the Lot 218 Approval Area

It was stated that windblown sand can include fragments of windblown shell and bone and that the on-site operators should be aware of this. It was agreed that the material provided in the induction package would be sufficient to ensure that operators are aware of their responsibilities.

Section 5.5 Strategy for Operations within the Lot 220 Approval Area

The methods for vegetation clearance were reviewed in detail. It was agreed that inspection following felling of large trees was necessary but that it may not necessarily have to occur immediately after tree clearance. It was agreed that the timing of the inspection after felling of large trees should be determined by Mackas Sand and the AHMG.

Section 5.6 Collection and Inspection of Screen Reject Material

The methods and practicalities of collection and inspection of screen reject material were discussed. It was agreed that it would be helpful if each bag of sample reject material was marked with the date of collection as this would assist in determining the origins of artefactual material if any was to be present in the screen reject sample.

Section 5.8 Management of Unexpected Sub-Surface Deposits (other than Human Skeletal Material)

The possibility that animal bone can also be of high archaeological and cultural significance was discussed in relation to animal skeletal remains previously excavated in the local area. It was agreed that Section 5.8 should include a provision for animal bones that may have cultural significance, with this obviously excluding non-native animal bones.

Section 5.9 Human Skeletal Material

It was agreed that it should be specified (rather than implied) that, if possible human skeletal remains are identified, the AHMG should be contacted in conjunction with the cessation of works in the vicinity of the skeletal material.

Section 5.14 Site Rehabilitation, Bushfire Management, Weed and Feral Animal Control, Unexploded Ordnance Management Plan

It was agreed that the statement that 'the rehabilitation of the Lot 220 approval area will achieve a final landform that is compatible with the slopes and vegetation communities of the surrounding area..' may give an unrealistic expectation that the rehabilitated area will be the same as the surrounding area. It was agreed that this wording should be changed and this section of the management plan should be more specific about the end product of landform rehabilitation.

General

The Aboriginal stakeholder representatives stated that they felt that the AHMG would have sufficient experience and understanding of archaeology within the region that the AHMG would be qualified to determine when the assistance of an archaeologist was required. It was therefore agreed that any reference to an on-call archaeologist include the phrase 'as required'.

Outcomes

The changes to the draft ACHMP resulting from the above discussions are provided below, with the changes highlighted.

Section 5.1 Establishment of Aboriginal Heritage Management Group

Mackas Sand will form an Aboriginal Heritage Management Group (AHMG) that will oversee the implementation and ongoing application of the ACHMP. For the first year of operation, the AHMG will be comprised of up to five Aboriginal stakeholder representatives and the Mackas Sand Quarry Manager, with a qualified archaeologist included on an on-call basis. The Aboriginal stakeholder representatives will be selected by Mackas Sand on the basis of the following criteria:

- **Aboriginal descent;**
- relevant experience and qualifications in working with the management of Aboriginal cultural heritage;
- ability to communicate information relating to the management of Aboriginal cultural heritage within the approval areas with the broader Aboriginal community; and
- ability to interact and work effectively in group situations.

In relation to the selection of the initial AHMG, Mackas Sand will invite each of the five registered stakeholder groups to submit Expressions of Interest that address the selection criteria. Representation on the AHMG will be subject to review on an annual basis or at other intervals determined by the AHMG.

Decisions made by the AHMG will be made on the basis of the opinion of the majority of the AHMG.

The roles and responsibilities of the AHMG will be discussed in greater detail for each of the additional management strategies outlined in this document.

Section 5.5 Strategy for Operations within the Lot 220 Approval Area

Within the Lot 220 area, operations cannot be undertaken without impacting stabilised soil surfaces and the associated archaeological material (if present). The Lot 220 proposal area contains considerable areas of PAD that are likely to have very high research value and therefore it is not archaeologically justifiable to recommend the destruction of this area without undertaking mitigating activities involving salvage of archaeological materials (including surface collection and potentially sub-surface salvage). Mackas Sand will ensure that all operations within the Lot 220 approval area are conducted in accordance with the strategy provided below.

- As part of the Aboriginal cultural heritage awareness training and prior to removal of any vegetation, all staff and contractors will be made aware of the diagnostic features of Aboriginal scarred trees and advised that should any possible Aboriginal scarred trees be identified during vegetation clearance, all clearance in the immediate vicinity of the possible scarred tree should cease until it can be inspected by the AHMG (including the on-call archaeologist).
- Vegetation clearance will occur as a staged process, with the aim of minimising ground surface disturbance resulting from vegetation clearance. Vegetation clearance will be undertaken in accordance with the following methodology:
 - understory vegetation and all trees smaller than approximately 50 centimetres diameter at chest height will be removed by earth-moving equipment or similar and placed outside the newly cleared area so that all of the newly cleared area is visible. At this stage, the AHMG will be invited to undertake an inspection of the newly cleared area; and
 - following the initial inspection, the remaining large trees will be cleared by machinery (in accordance with ecological tree clearance procedures) and the AHMG will be invited to inspect the additional area of ground disturbance resulting from large tree clearance **at a time determined in consultation with the AHMG.**
- During vegetation clearance inspections (as discussed above), any surface archaeological materials such as stone artefacts and shell) will be collected in accordance with the methodology provided in Attachment 3 of **Appendix 2.**
- Should any of the following be identified during vegetation clearance inspections within Lot 220, test excavations will be conducted in accordance with the methodology provided in Attachment 3 of **Appendix 2:**
 - high densities of stone artefacts, shell or bone fragments (as assessed by the AHMG including the on-call archaeologist).
- Should test excavations identify any of the following, salvage excavations will be conducted in accordance with the methodology provided in Attachment 3 of **Appendix 2:**
 - consolidated shell midden deposits (comprising packed shell as opposed to dispersed shell fragments);
 - stone artefact scatters that contain high densities of artefacts (greater than three artefacts per test pit, or as otherwise agreed by the relevant stakeholders and an archaeologist) and/or an artefact assemblage of notable complexity or research value; and/or
 - hearth or heat treatment feature.

Section 5.6 Collection and Inspection of Screen Reject Material

Mackas Sand will ensure that a sample of the reject material from the coarse screen will be bagged each day of operations within the Lot 218 and Lot 220 approval areas and labelled with the date of collection. The bagged samples will be provided to AHMG on a monthly basis for inspection to be conducted in conjunction with the monthly monitoring inspection for the Lot 218 approval area (as discussed in **Section 5.7**). Should the samples contain shell material or stone artefacts, the AHMG on-call archaeologist will further record and assess these materials. Should the proportion of archaeological material within the screen reject sample be considered high by the AHMG (including the on-call archaeologist), the source of the material and the possible presence of additional concentrated archaeological deposits will be discussed by the AHMG and an inspection of the relevant approval area may be undertaken.

Section 5.8 Management of Unexpected Sub-Surface Deposits (other than Human Skeletal Material)

Mackas Sand will ensure that, should operations result in the exposure of compact shell midden, animal bones with potential cultural significance or suspected hearth or heat treatment features within the approval areas, works will cease and the area will be cordoned off for 10 metres from all edges of the archaeological material. The AHMG (including an on-call archaeologist, if required) will be notified and provided with the opportunity to inspect the material.

The AHMG will assess the significance of the material in accordance with significance assessment criteria in Table 6.1 of **Appendix 2**. The material will then be salvaged in accordance with the sub-surface salvage methodology provided in Attachment 3 of **Appendix 2**.

Works will not proceed in the identified area until approval has been provided by the AHMG (including an on-call archaeologist, if required).

A site card will be lodged with DECCW providing details of the site and the salvage activities undertaken at the site.

Section 5.9 Human Skeletal Material

Human skeletal material has been found within the active transgressive dune field on Stockton Bight however it is not possible to rule out the possibility that human skeletal material may be present in the approval areas. Human skeletal material is generally of very high archaeological significance and is of particular significance to Aboriginal people. It is not possible to predict the location, condition or nature of human skeletal that may be present within the approval areas. The following recommendations are therefore provided to give certainty that if human/possible human skeletal material is found, it will be managed in accordance with legal requirements, the wishes of the relevant Aboriginal stakeholders and DECCW requirements. Should human/possible human skeletal material (single bones or an intact burial) be located within any area, it will be managed in accordance with the following strategy:

- Excavation works within the immediate vicinity of the skeletal material will cease, the AHMG will be contacted and the area will be cordoned off for 10 metres from all edges of the skeletal material.
- The skeletal material will be inspected to determine whether it is human or animal. If necessary, advice will be sought from a forensic specialist.
- If the skeletal material is human, DECCW and NSW Police will be contacted. No further works will proceed until an appropriate course of action has been determined in consultation with DECCW, NSW Police and the relevant Aboriginal stakeholders. Works will not proceed within the identified area until written approval has been received from DECCW and NSW Police.

If the skeletal material is not human, mitigation activities or works can proceed in accordance with the other strategies outlined in this ACHMP.

Section 5.14 Site Rehabilitation, Bushfire Management, Weed and Feral Animal Control, Unexploded Ordnance Management Plan

The Lot 220 approval area will be subject to rehabilitation on the basis of a comprehensive Landscape Management Plan that will be prepared in consultation with DECCW and DoP. The Landscape Management Plan will also provide mechanisms for bushfire management and weed and feral pest control. The requirements of the Landscape Management Plan will be consistent with the ACHMP.

It is intended that the rehabilitation of the Lot 220 approval area will achieve a final landform that is similar to the surrounding topography in that it will be shaped, where possible, in undulating profiles in keeping with natural landforms of the surrounding environment. Rehabilitation will result in the re-establishment of similar vegetation communities to those currently present within the approval area. Where feasible, the AHMG will be consulted regarding progressive rehabilitation and will be provided with the opportunity to have input into the re-establishment of vegetation communities that contain valuable Aboriginal resource plants and that may attract Aboriginal faunal resources.

An Unexploded Ordnance Management Plan will also be completed for Lot 218. Any excavations conducted under the ACHMP on Lot 218 will be consistent with the requirements of the Unexploded Ordnance Management Plan.

General

Throughout the document, the reference to the involvement of an on-call archaeologist has been modified. References to the involvement of an on-call archaeologist now include the phrase 'as required'.

Acknowledgement of Consensus among Meeting Attendees

At the conclusion of the meeting it was agreed that, in order to facilitate the consultation process, a copy of the above information should be provided to all of the registered stakeholder groups for their review. It was agreed that, should the above record be an accurate one, the meeting attendees would endorse their comments and that this should constitute their feedback to the draft ACHMP. A declaration to this effect and space for endorsement is provided below.

I, _____(insert name) am authorised to provide feedback on the draft ACHMP on behalf of _____(insert stakeholder group name). I acknowledge that this is a true and accurate account of the meeting conducted on 21 October 2009 to review the draft ACHMP for Mackas Sand. I endorse the comments and changes to the draft ACHMP provided above.

Signed _____

**Comments received from Carol Ridgeway-Bissett
(Worimi Knowledgeholders Aboriginal Corporation – formerly Maaingal
Aboriginal Heritage Corporation)**

21 October 2009

Carol Ridgeway-Bissett provided verbal comment to Nicola Roche (Senior Archaeologist, Umwelt) on 21 October 2009. Carol indicated that she would like the following comments included as her response to the draft ACHMP. Carol's direct comments are shown in italics.

Carol fundamentally objects to the approved project.

Stockton Bight is the largest moving sand mass in the southern hemisphere it should be federally listed for its natural and cultural heritage values. Sand mining and sand extraction should not be allow to proceed in this area.

Carol stated that Aboriginal artefacts will not always be present on the surface.

As dunes build up over years and years, there could be artefacts present at great depth, including human remains.

Carol objects to the structure and selection methods for the AHMG. She objects to Mackas Sand selecting the AHMG and stated that DECCW should be responsible for selecting the AHMG.

The AHMG can't be associated with the mine and should be a group within DECCW that considers broader heritage issues for the Worimi area. The AHMG should involve consultation with a wider proportion of the Aboriginal community via public meetings.

Carol also suggested that there is a relevant Aboriginal body that advises State Government on issues to do with Aboriginal cultural and heritage and that this body should be consulted regarding the Mackas Sand approval. Carol also objected to the 'majority rules' aspect of the AHMG.

Carol indicated that she would like to see any salvaged artefacts reburied close to the area in which they were found and thought that the Lot 220 area would be suitable for this purpose.

Carol is concerned that the removal of vegetation in Lot 220 will result in the removal of a wildlife corridor and important plant species.

The corridor that will not be mined in Lot 220 is not enough to guarantee that wildlife will be able to pass through and that important plant species will be preserved.

Carol feels that it is important that the rehabilitation of Lot 220 involves consultation with local Dune Care groups who have experience in rehabilitating dunes. She agreed that it is important that Aboriginal resource plants and those that attract fauna that would have been targeted by Aboriginal people are used in the rehabilitation. Carol discussed the importance of flora, fauna and the landscape in considerations of Aboriginal heritage and emphasised that any impacts to these elements are also impacts to Aboriginal heritage.

I, Carol Ridgeway-Bissett, am authorised to provide feedback on the draft ACHMP on behalf of _____(insert stakeholder group name). I acknowledge that this is a true and accurate account of the comments regarding the draft ACHMP for Mackas Sand that I provided to Nicola Roche on 21 October 2009. I endorse the comments provided above.

Signed _____



APPENDIX B

Site Cards



Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording Additional

information

SITE IDENTIFICATION					
Site name	Majors Flat Macka's Sand 2 (MFMS 2)			NPWS Site Number	
Owner/manager	Mr Lennie Anderson				
Owner Address	Worimi Local Aboriginal Land Council 'Murrook' 173 Nelsons Bay Road Williamtown NSW 2318				
LOCATION					
Location	The site is located within Lot 220 in DP 1049608 (originally Lot 8 in Water Reserve 57573, Salt Ash) South of Nelson Bay Road				
How to get to the site	See attached Figure 1.1.				
1:250,000 map name	Newcastle			NPWS map code	
AMG Zone	56	AMG Easting	399567	AMG Northing	6370190
Method for grid reference	Hand-held GPS	Map scale (if method = map)	1:25,000	Map name	Williamtown 9232-2-N
NPWS District Name (see map)				NPWS Zone (see map)	Northern Zone
Portion no.	Lot 220 DP1049608			Parish	Stowell
SITE DESCRIPTION					
Site type(s)	Midden			Site type code (NPWS use only)	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	<p>The site is located on a vehicle track in a low lying area between two ENE/WSW trending sand dunes (Plate 5), approximately one kilometre southeast of Tilligerry Creek and seven and a half kilometres east of the township of Williamtown. A lens of whole shells and fragments of weathered pipi and cockle were eroding out of the soil profile (5 to 15 cm below the surface and less than one metre in length) on the southern edge of a vehicle track (Plate 6). The soil was a dark grey/black over a powdery, bleached sand. The shells are eroding from below the dark/grey humic layer in the A Horizon, within the top layer of the the A2 horizon. A light density scatter of shell is distributed across the surface south of the road over an area of approximately five metres by five metres. One shell fragment was found one metre to the north of the road. The sand dune is part of the Outer Holocene Barrier System of Stockton Bight and is located south of the Interbarrier Depression that separates it from the Inner Pleistocene Barrier.</p> <p>Three shell midden sites, recorded by McCardle (2002), are located 600 m to the NNE of this site (A6, A7 and A8, NPWS # 38-4-0651 to 0653). The sites contain low density scatters of pipi, cockle and mud whelk over an area of approximately 300 m x 60 m. The shell extended over the fence to the south where stone artefacts can be observed over the fenceline.</p> <p>A large midden site (A5, NPWS #38-4-0650) containing a buried soil profile and stone artefacts is located 300 metres to the NNW of the site.</p> <p>Visibility within the site was limited to 5% away from the vehicle track due to thick vegetation cover (predominantly bracken fern) and leaf litter. The area has been disturbed by the construction of a vehicle track through the centre of the site. Horse riding is a favourite pastime in the area. The area was burnt in a bush fire late last year (2002).</p>				

Version: June 1998

Data entered by:

Date entered:



Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

	<p>Attach photographs and sketches, eg. plan & section of shelter. Do NOT dig, disturb or damage site or contents.</p>
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Standard Site Recording Form

SITE ENVIRONMENT

Land form	low lying depression between two dune ridges	Aspect	SSE	Slope	<1 degree
Mark position of the site					
Local rock type	Sandy podzol	Land use/effect	previously Crown Land, now owned by Worimi Local Aboriginal Land Council		
Distance from drinking water	300 m from permanent spring	Source	Tillberry Creek 1.5 km to the NW		
Resource zone (eg. estuarine, river, forest)	Estuarine	Vegetation	Coastal Sands Apple Blackbutt Woodland		
Edible plants	Bracken fern, Macrozamia, kangaroo grass, Dianella, bladey grass, geebung, Acacia, Banksia, sarsaparilla plant	Faunal resources (include shellfish)	Pipi, cockle, mud whelk, mud crabs, fish, kangaroo, goanna, snake		
Other exploitable resources (eg. ochre)					
Are there other sites in the locality	Yes	Are they in the Sites Register	Yes	Other site types include	Shell midden with stone artefacts

SITE MANAGEMENT

Site condition	Disturbed	Disturbed by tree clearing, bush fires, construction of a vehicle track and tank traps (WWII).			
Management recommendations	<p>A Section 90 Heritage Impact Permit with Salvage (subsurface investigation) is sought for site Majors Flat Macka's Sand 2.</p> <p>The extent and methodology of the subsurface investigation to be decided in consultation with Worimi LALC, Worimi TAE&OG and NPWS.</p>				
Have artefacts been removed from site	No	When			
By whom		Deposited at			
Consent applied for	<input type="checkbox"/>	Consent issued	<input type="checkbox"/>		
Date of issue		Consent number			

SITE INSPECTION AND RECORDING

Reason for investigation	Archaeological investigation for a proposed sand mine				
Were local Aborigines contacted or present for the recording	<input type="checkbox"/> Not contacted <input checked="" type="checkbox"/> Contacted and present <input type="checkbox"/> Contacted but not present	Names and addresses	Anthony Anderson Worimi Local Aboriginal Land Council 'Murrook' 173 Nelsons Bay Road Williamtown NSW 2318		
Is the site important to local Aborigines	Yes				



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Verbal/written reference sources	Archaeological and Aboriginal Cultural Heritage Assessment of Lot 220, DP 1049608. A Report to Macka's Sand and Soil	ASR report number(s) (or title)	C- 0 C-
Photographs taken	Yes	No. of Photos attached	2 (Plates 5 & 6)
Site recorded by	Leila McAdam	Date of recording	14 November, 2003
Address/institution	Umwelt (Australia) Pty Limited		



Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

New Recording Additional

information

SITE IDENTIFICATION					
Site name	Majors Flat Macka's Sand 1 (MFMS 1) – (additional information for Sites A6, A7 and A8 recorded by P McCardle NPWS #38-4-0651-0653 on 7.11.2002)			NPWS Site Number	
Owner/manager	Mr Lennie Anderson				
Owner Address	Worimi Local Aboriginal Land Council 'Murrook' 173 Nelsons Bay Road Williamtown NSW 2318				
LOCATION					
Location	The site is located within Lot 220 in DP 1049608 (originally Lot 8 in Water Reserve 57573, Salt Ash) South of Nelson Bay Road				
How to get to the site	See Figures 1.1 and 5.1.				
1:250,000 map name	Newcastle			NPWS map code	
AMG Zone	56	AMG Easting	399020	AMG Northing	6370390
Method for grid reference	Hand-held GPS	Map scale (if method = map)	1:25,000	Map name	Williamtown 9232-2-N
NPWS District Name (see map)				NPWS Zone (see map)	Northern Zone
Portion no.	Lot 220 DP1049608			Parish	Stowell
SITE DESCRIPTION					
Site type(s)	Midden			Site type code (NPWS use only)	
Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet/dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	<p>The site is located on several crests on a minor sand ridge, above a permanent spring, 600 metres southeast of Tilligerry Creek and approximately seven kilometres east of the township of Williamtown (Figure 5.1). The dune is part of the Outer Holocene Barrier System of Stockton Bight and is located south of the Interbarrier Depression that separates the Outer Barrier from the Inner, Pleistocene Barrier.</p> <p>Fragments of weathered Plebidonax deltoids (pipi), Anadara sp. (cockle) and Pyrazus ebeninus (mud whelk) and occasional whole shells are thinly scattered over several crests and upper slopes of the ridgeline. Plate 2 shows shell fragments in a clearing of vegetation within the site.</p> <p>The site area extends from AMG 398770E 6370390N to 399060E 6370390N. Small fragments of shell are continuous over an area of approximately 100 metres in length and 50 metres in width. The site includes the three sites (A6, A7 and A8) recorded by P McCardle in 2002 during her Survey incorporates from Tomago to Tomaree, for Energy Australia (ERM 2003). Stone artefacts can be observed over the fenceline (Site SA1, NPWS # 38-4-0298), outside the project area for this investigation. It is assumed that site Majors Flat Macka's Sand 1 is an extension of a general light scatter of highly weathered and fragmented marine and estuarine shells that extend from Site SA1, however, no stone artefacts were found within the project area.</p> <p>Majors Flat Macka's Sand 1 (MFMS 1) is located in a resource rich area and provides a good lookout point. Plate 3 shows the outlook across the swampy Interbarrier Depression towards Tilligerry Creek. Tilligerry Creek is reported by local residents to have contained a good supply of mud crabs and fish in the past.</p> <p>Visibility within the site was limited to 5% due to thick vegetation cover (predominantly bracken fern) and leaf litter (Plate 4). The soil consists of a slightly darker, humic five cm layer of sand</p>				

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Data entered by:

Date entered:



Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

over loose yellow sand. The area has been disturbed by the construction of a vehicle track through the eastern end of the site and several rows of cement tank traps (WWII) are located along the boundary of the site. Horse riding is a favourite pastime in the area. The area was burnt in a bush fire in January this year exposing the surface to further erosion..

Attach photographs and sketches, eg. plan & section of shelter.
Do NOT dig, disturb or damage site or contents.



Aboriginal Sites Register of NSW

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SITE ENVIRONMENT						
Land form	crest, saddle and upper slope of dune ride		Aspect	Mainly N & S but in all directions away from crests	Slope	Varies from 360 degrees to 4-5 degrees
Mark position of the site						
Local rock type	Sandy podzol		Land use/effect	previously Crown Land, now owned by Worimi Local Aboriginal Land Council		
Distance from drinking water	50 m from permanent spring		Source	Tillberry Creek 600 m to the NW		
Resource zone (eg. estuarine, river, forest)	Estuarine		Vegetation	Coastal Sands Apple Blackbutt Woodland		
Edible plants	Bracken fern, Macrozamia, kangaroo grass, Dianella, bladey grass, geebung, Acacia, Banksia, sarsaparilla plant		Faunal resources (include shellfish)	Pipi, cockle, mud whelk, mud crabs, fish, kangaroo, goanna, snake		
Other exploitable resources (eg. ochre)						
Are there other sites in the locality	Yes	Are they in the Sites Register	Yes	Other site types include	Shell midden with stone artefacts	
SITE MANAGEMENT						
Site condition	Disturbed		Disturbed by tree clearing, bush fires, construction of a vehicle track and tank traps (WW2).			
Management recommendations	<p>Section 90 Heritage Impact Permit with Salvage (surface collection) for Majors Flat Macka's Sand 1.</p> <p>The surface collection should be undertaken by Worimi LALC and Worimi TAE&OG, the material collected to be reburied at a location chosen by Worimi LALC and Worimi TAE&OG in consultation with NPWS</p>					
Have artefacts been removed from site	No		When			
By whom			Deposited at			
Consent applied for	<input type="checkbox"/>		Consent issued	<input type="checkbox"/>		
Date of issue			Consent number			
SITE INSPECTION AND RECORDING						
Reason for investigation	Archaeological investigation for a proposed sand mine					
Were local Aborigines contacted or present for the recording	<input type="checkbox"/> Not contacted <input checked="" type="checkbox"/> Contacted and present <input type="checkbox"/> Contacted but not present		Names and addresses	Lennie Anderson and Anthony Anderson Worimi Local Aboriginal Land Council 'Murrook' 173 Nelsons Bay Road Williamstown NSW 2318		



Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Is the site important to local Aborigines	Yes		
Verbal/written reference sources	Archaeological and Aboriginal Cultural Heritage Assessment of Lot 220, DP 1049608. A Report to Macka's Sand and Soil	ASR report number(s) (or title)	C- 0 C-
Photographs taken	Yes	No. of Photos attached	3 (Plates 2-4 in Report)
Site recorded by	Leila McAdam	Date of recording	13 November, 2003
Address/institution	Umwelt (Australia) Pty Limited		



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APPENDIX 7

Non Indigenous Heritage Management Plan



NON-INDIGENOUS HERITAGE MANAGEMENT PLAN

FOR SAND EXTRACTION OPERATIONS
FROM
LOT 218 DP 1044608 AND
LOT 220 DP 149608, SALT ASH

FINAL

July 2016



NON-INDIGENOUS HERITAGE MANAGEMENT PLAN

FOR SAND EXTRACTION OPERATIONS FROM
LOT 218 DP 1044608 AND
LOT 220 DP 149608, SALT ASH

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Mackas Sand Pty Ltd

Project Director: Peter Jamieson
Project Manager: Brendan Rice
Report No. 1646/R65/V1
Date: July 2016



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1.0 Introduction

Mackas Sand Pty Ltd (Mackas Sand) operations on Lot 218 and Lot 220 are located approximately 25 kilometres north east of Newcastle near Salt Ash in the Port Stephens local government area (LGA), New South Wales (refer to **Figure 1.1**). Mackas Sand directors have operated sand extraction operations in the area since 1992. Lot 218 and Lot 220 are owned by the Worimi Local Aboriginal Lands Council.

Mackas Sand was granted Project Approval No. 08_0142 (PA 08_0142) on 20 September 2009 by the Minister for Planning under Part 3A of the Environmental Planning and Assessment Act 1979 to operate sand extraction operations at Lot 220 and Lot 218. It is estimated that in excess of 21 million tonnes of sand resource will be extracted from Lot 218 and Lot 220, with Lot 218 having an indefinite extraction life due to the ongoing movement of sand from the adjoining mobile dunes.

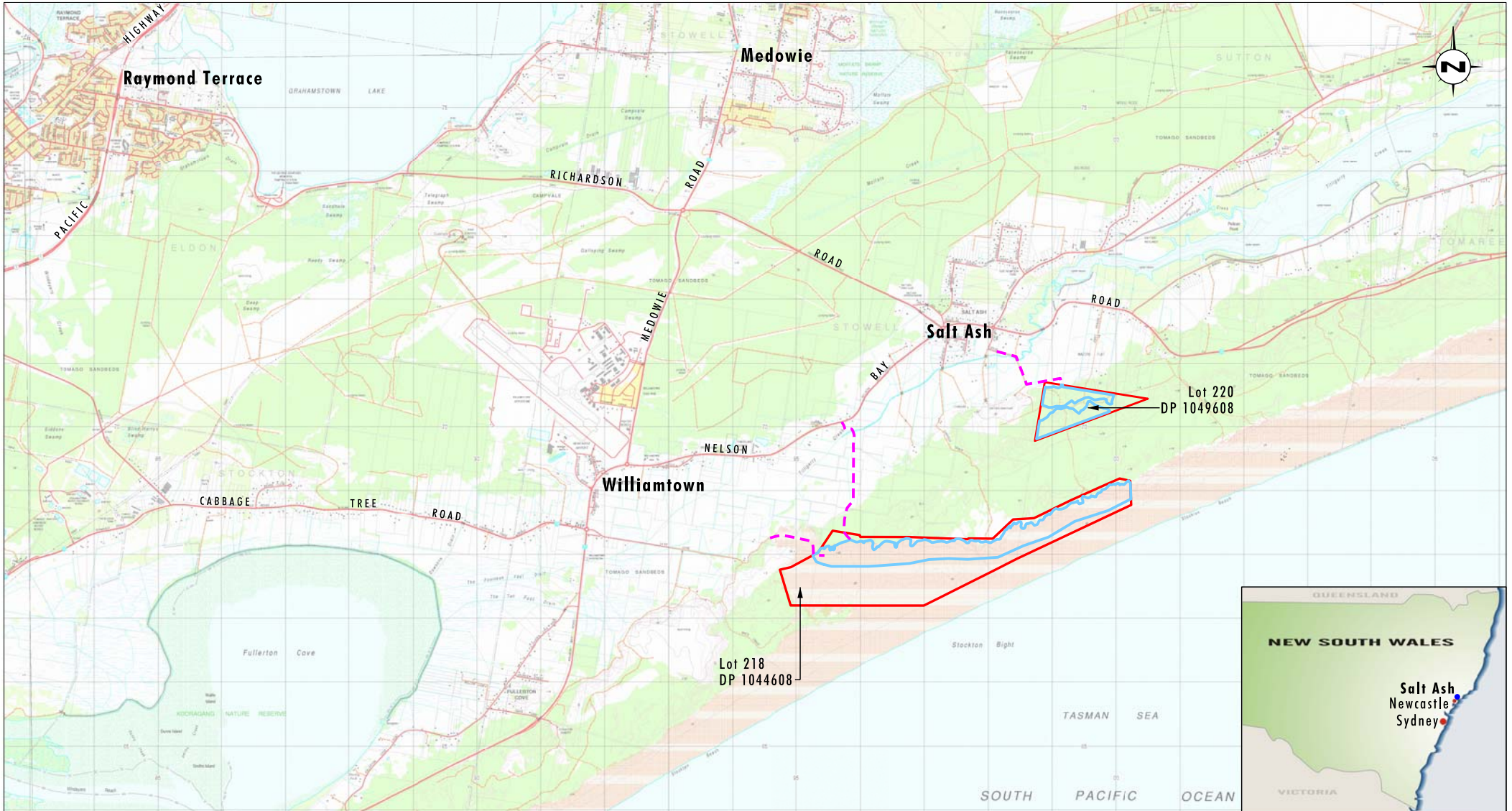
A modification to PA 08_0142 was approved on 30 September 2013 by the NSW Planning Assessment Commission (PAC) under delegation of the Minister for Planning and Infrastructure (now Minister for Planning and Environment-DP&E). The modification (PA 08_0142 MOD1) includes approval to extract within 0.7 metres of the highest predicted groundwater level provided the final landform is at least 1 metre above the highest predicted groundwater level and the approval of an alternate route to access Lot 218. The alternate route connects directly from Lot 218, northward to Nelson Bay Road, as depicted within **Figure 1.1**.

A second modification to PA 08_0142, (MOD2), was approved by the PAC on 16 March 2016. The modification allows for an increase in maximum hourly truck movements (in and out) of Lot 218 via the approved alternate access road.

1.1 Mackas Sand Operations

Key operational features relevant to this Aboriginal Cultural Heritage Management Plan (ACHMP) are:

- The approved hours of extraction being 24 hours a day 7 days a week except for operations within 250 metres of the Hufnagl Residence (R27) when operations are limited to 7.00 am to 6.00 pm Monday to Friday with no operations within 250 metres of R27 outside these times.
- Transportation of sand from Lot 220 along Oakvale Drive between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays in accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142 as Mackas Sand has agreements with the owners of residences facing Oakvale Drive. Copies of these agreements have been provided to the DPE.
- Transportation of sand from Lot 218 along the Alternate Access Road between 5.00 am and 10.00 pm Monday to Saturday and 8.00 am to 12.00 pm Sundays and Public Holidays in accordance with provisions of Condition 9 (b) of Schedule 3 of PA 08_0142 as Mackas Sand has an agreement with the owners of 2344, 2353 and 2368 Nelson Bay Road. Copies of these agreements have been provided to the DPE.



Source: Department of Lands (2006)

0 1 2 4 km
1:85 000

Legend

- ▭ Lot Boundaries
- ▭ Approval Areas
- - - Approved Site Access

FIGURE 1.1

Locality Plan



Source: Aerial: Google Earth, 2008

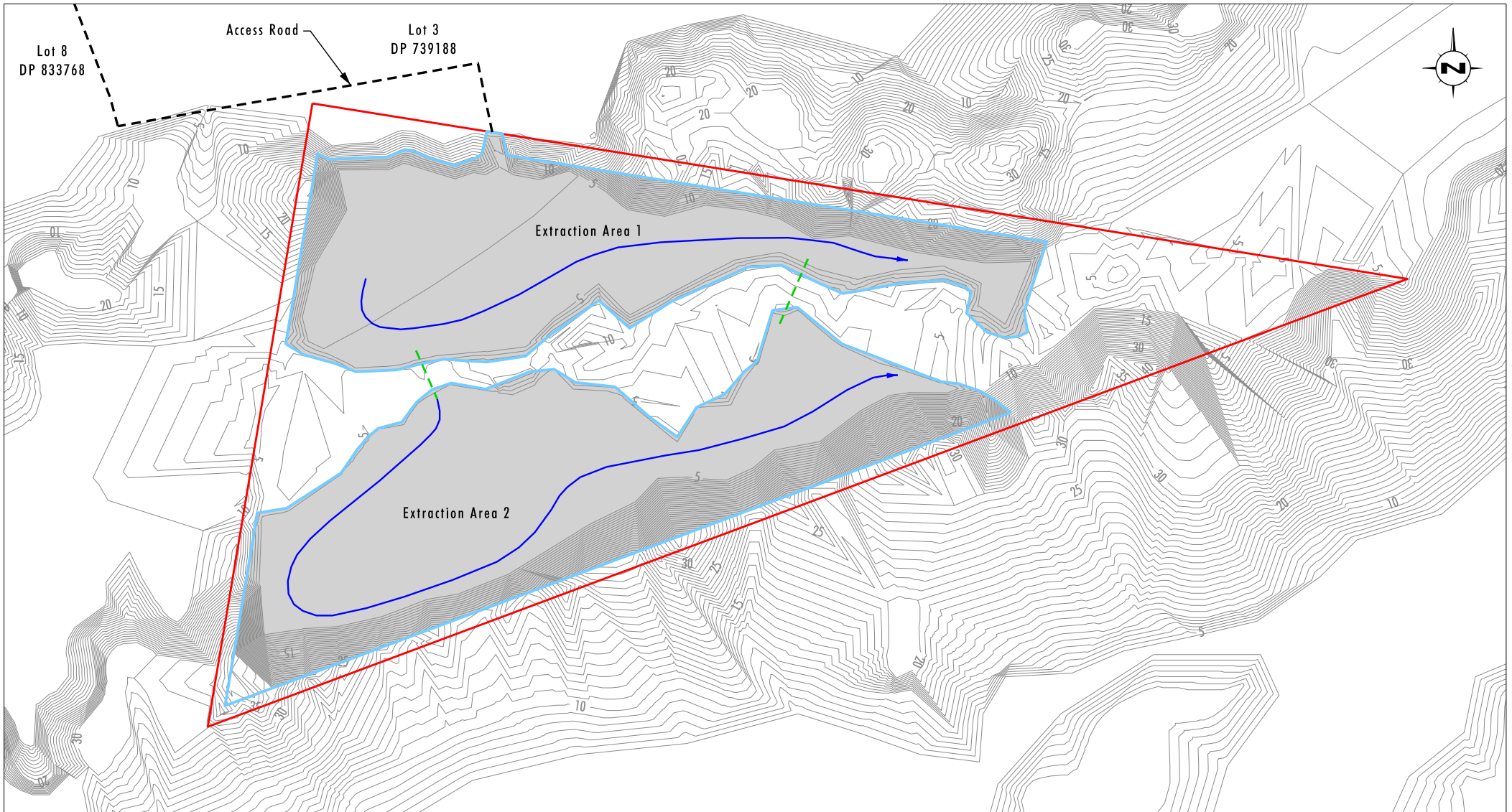
0 0,5 1 1,25km
1:25 000

Legend

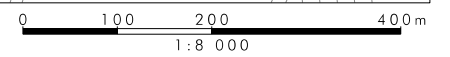
- Lot 218 Boundary
- Lot 218 Extraction Area
- Approved Site Access

FIGURE 1.2

Extraction Area Lot 218



Source: Cadastral: Department of Lands, 2003
 Note: Contour Interval 10m



Legend

- Lot 220 Boundary
- Lot 220 Extraction Area Boundary
- - - Internal Access Roads
- - - Access Road
- Direction of Extraction

FIGURE 1.3

Extraction Area Lot 220

1.2 Project Approval Requirements

Condition 30 of Project Approval 08_0142 requires that Mackas Sand prepares and implements a NIHMP that addresses historical heritage matters identified by the Department of Planning and Environment. Condition 30 is provided in full below:

The proponent shall prepare and implement a non-indigenous Heritage Management Plan for the project to the satisfaction of the Secretary. This plan must:

- a) *be prepared in consultation with the Heritage Branch and Council, and be submitted to the Secretary for approval prior to the disturbance of any heritage item, including the identified tank traps;*
- b) *include:*
 - o *archival recording of the tank traps, in accordance with the requirements and guidelines of the Heritage Branch;*
 - o *a protocol for the investigation, removal and storage of the tanks traps, and their reinstallation following quarrying operations; and*
 - o *a description of the measures that would be implemented if any new heritage objects or items are discovered during the project.*

The Proponent shall implement the approved management plan as approved from time to time by the Secretary.

Mackas Sand has engaged Umwelt (Australia) Pty Limited (Umwelt) to prepare this NIHMP in accordance with Condition 30 of Project Approval 08_0142.

1.3 Background Information

The approval areas consist of two areas of land – Lot 218 in DP 1044608 (with adjoining access across Lot 227 in DP 1097995) and Lot 220 in DP 1049608, (with access across Lot 3 in DP 739188 and Lot 8 in DP 833768) as shown on **Figures 1.2** and **1.3**. Both Lot 218 and Lot 220 are owned by Worimi Local Aboriginal Land Council. These two areas are located within the Stockton Bight dune system approximately 20 to 25 kilometres to the northeast of Newcastle, near Salt Ash. Modification to Project Approval 08_0142 was approved in September 2013 for the construction of an alternate access track to Lot 218 and temporary lowering of extraction depth.

Lot 218 is comprised of approximately 412 hectares of mobile sand dune, of which the approved extraction area and related activities occupy an area of approximately 150 hectares. A small unsealed road of approximately 50 metres in length will be constructed within mobile sands in Lot 227 to provide access to Lot 218. Lot 218 is adjoined by the Worimi Conservation Lands to the north, south and east and the Quality Sands and Ceramics sand quarry to the north-west. This NIHMP applies to the areas of Lot 218 and Lot 227 that will be subject to impact under Project Approval 08_0142.

Lot 220 has an area of approximately 76 hectares and is accessed via an unsealed access road extending from an existing electricity easement across Lot 8 DP 833768 and Lot 3 DP 739188 (refer to Figure 1.3). This approval area adjoins an existing sand extraction operation immediately to the west, operated by Sibelco. An existing Mackas Sand and Soil Pty Ltd operation is also located approximately 750 metres to the west. Rural land holdings and a sand quarry operated by Hunter Quarries adjoin the site to the north and

vegetated sand dunes that form part of the Worimi Conservation Lands adjoin Lot 220 to the east and south.

The approval areas were the subject of a Historical Heritage Review conducted as a component of an Environmental Assessment (EA) (Umwelt 2009a: Appendix 6). The EA incorporates a Statement of Commitments, of which Section 5.4 relates to Historical/non-indigenous heritage and was developed on the basis of mitigation and management recommendations provided in the Historical Heritage Review (Umwelt 2009a).

1.4 Purpose and Scope of the NIHMP

This NIHMP has been prepared in accordance with Condition 30 of Major Project Approval 08_0142 and the Statement of Commitments and Environmental Assessment (including the Historical Heritage Review) submitted to DPE as part of the approval process.

In order to meet the requirements of Condition 30 of the Project Approval 08_0142 and to provide clear guidance to Mackas Sand regarding the management of non-indigenous heritage within the approval areas, the NIHMP incorporates the following information:

- a review of relevant legislation
- a review of the historical context of the approval areas including the results of the Historical Heritage Review of the approval areas (Umwelt 2009: Appendix 6)
- the provision of detailed non-indigenous heritage management strategies
- a clear outline of the roles and responsibilities of the entities involved in the NIHMP and its implementation.

The NIHMP will be in place for the duration of the project (unless otherwise directed by relevant legislation or approvals).

2.0 Legislative Context

The Environmental Planning and Assessment Act 1979 (EP&A Act) and the Heritage Act 1977 (NSW) are the primary statutory controls protecting historic heritage within New South Wales.

2.1 Environmental Planning & Assessment Act 1979

The EP&A Act regulates development activity in New South Wales. The activities approved under Major Project Approval 08_0142 were assessed as a 'Major Project' under Part 3A of the EP&A Act. Under Section 75U of the EP&A Act, it is not necessary to obtain an excavation permit under Section 139 of the Heritage Act or approval under Part 4 of the Act. In addition, Division 8 of part 6 of the Act does not apply to prevent or interfere with the carrying out of an approved project.

Projects approved under Part 3A of the EP&A Act are subject to conditions of approval issued by DPE and (where relevant) non-indigenous heritage is addressed by appropriate conditions. As discussed above, non-indigenous heritage is directly addressed by Condition 30 of Major Project Approval -08-0142.

Furthermore, Section 75J (5) states that conditions of approval for the carrying out of a project may require the proponent to comply with obligations made in a statement of commitments submitted by the proponent as part of the development approval process. The Terms of Approval for Major Project Approval 08_0142 state that except where varied by specific approval conditions, the approved activities should be carried out in accordance with the Statement of Commitments and recommendations provided as part of the EA (Umwelt 2009a). As discussed in **Section 1.1**, **Section 5.4** of the Statement of Commitments established commitments in relation to non-indigenous heritage, which reflected the recommendations provided in the Historical Heritage Review component of the EA (Umwelt 2009a: Appendix 6).

2.2 Heritage Act 1977 (NSW)

As discussed above, the project is defined as a major project and has approval under Part 3A of the EP&A Act. As such, the Minister for Planning is the determining authority and the provisions of the Heritage Act 1977 do not apply.

3.0 Historical and Archaeological Context

The development and implementation of appropriate non-indigenous management strategies requires an understanding of contextual information relevant to non-indigenous heritage within the approval areas. For this reason, information regarding the historical and archaeological context of this management plan is provided below.

3.1 European Historical Context of the Approval areas

This section provides a brief synopsis of the historical context prepared as part of the EA (Umwelt 2009a, Appendix 6) to provide a context for the historical heritage values of the approval areas.

In 1797 Lieutenant John Shortland came ashore along Stockton Bight during a search for escaped convicts and discovered the coal resources responsible for much of the later European settlement in the wider Hunter region (ERM, 2006). Miners and merchants seeking timber soon followed and Governor King decided to establish a permanent settlement at Newcastle. This initial attempt at settlement in the area proved to be unsuccessful and was recalled in approximately 1801. The settlement at Newcastle was re-established in 1804 as a penal colony. The penal settlement was closed in 1823 in favour of a penal colony at Port Macquarie. In 1823 assistant surveyor Henry Dangar laid out the Newcastle town plan, the core of which makes up the current Newcastle CBD.

The early industries in the region included timber, coal mining, salt making, lime burning and shipbuilding. From 1808 shell deposits in the Stockton area and along Fullerton Cove (originally known as Limeburners Bay) were exploited for the production of lime for cement (Suters, 1997). Attempts to establish small farms in the vicinity of the approval areas were unsuccessful as a result of the sandy soils and lack of transportation. To the south of the approval areas Stockton was the subject of formalised settlement from the mid 1830s. A foundry was established in Stockton in 1838, in addition to a textile factory (destroyed by fire in 1851), vitriol works (established 1853) and a tin smelter (established 1872). By 1886, the Stockton Coal Company had also been established (ERM, 2006).

By the late 1870s the Port of Newcastle was handling more than 1 million tonnes of coal a year, supplying both Sydney and Melbourne and exporting to Asia and America. With the growth of Newcastle as a major port and industrial city came the need to protect the port and its surrounding areas, including associated infrastructure and resources. In 1880 Fort Scratchley was established, followed by the Shepherds Hill Battery in 1896. Following the sinking of four light German cruisers near Cocos Island by HMAS Sydney in 1914, there was an increase in the coastal defences of Australia, including an upgrade of the facilities at Fort Scratchley. However, no defences were established along Stockton Bight at this time, with the exception of Fort Wallace to the south of the approval areas.

During the Great Depression the natural resources of Stockton Bight, in particular the availability of sea food, attracted people to the area. One of the first permanent structures on Stockton Bight was a fisherman's hut near Little Beach to the south of the approval areas. This was demolished during World War II when gun pits were constructed by the army (ERM 2006). A small fishing village constructed using corrugated iron and tin, known as Tin City, is located along the beach to the northeast of the approval areas. The earliest hut is thought to have been established during the 1930s. Approximately 12 huts remain today (ERM, 2006).

World War II brought heavy fighting closer to Australia's borders (New Guinea and the Coral Sea) and for the first time mainland Australia was attacked with strikes at Sydney, Broome and Darwin. World War II now involved the Australian civilian community, either indirectly as war workers, or as victims of enemy action.

Strikes against Malaya following Pearl Harbour led to a Japanese advance towards Australia. To deal with the national emergency, the Federal Government, under John Curtin, took full control over the Australian labour force and defence works were pressed ahead including coastal defences, anti-aircraft batteries, anti-tank defences, ditches, anti-aircraft shelters and slit trenches (Fort Drummond, Port Kembla batteries, Lithgow anti-aircraft sites, Anti-tank defences at Belmont). There were plans to demolish major bridges and to evacuate people from strategic areas. Famous landmarks such as Manly and Bondi Beaches became draped in barbed wire (Heritage Branch nd). The rapid expansion in the use of mechanised and armoured vehicles resulted in the construction of coastal tank barriers, aimed at slowing any potential Japanese advance inland, at strategic locations between the coast and the tablelands (NHL listing Yooroonah Tank Barrier).

During World War II Newcastle was an important coal export, steel producing and shipbuilding centre. As a result, the Northern Defence Line was established immediately north of Newcastle, in an area which includes the approval areas. A second defence line was established south of Brisbane. The Northern Defence Line included anti-aircraft artillery and the coastal batteries at Fort Wallace and Fort Scratchley also formed part of the Line in addition to tank traps being placed along Stockton Bight to deter shore invasions. Experimentation and proofing took place within the area of Stockton Bight at Fern Bay Armour Plate Proof Facility to the southwest of the approval areas. In addition, high explosive mortar and artillery projectiles were tested at Stockton Beach Artillery Proof Range. This range was located adjacent to the low water mark and covered approximately 420 hectares (ERM, 2006).

There is insufficient information to establish how many tank barriers were actually built during World War II, either in New South Wales or nationally, as many structures erected during this period were not intended to last beyond the war. As a result, there is no evidence surviving of some of the sites originally established during World War II.

Following World War II, construction of the Hexham and Stockton Bridges in 1952 and 1971 opened up the area to car travel, placing it within 2 hours of Sydney. Consequently, tourism dramatically increased in the area, making it a popular holiday location for people from Sydney and inland cities like Dubbo and Tamworth. The Stockton sand dunes are now popular for both tourism and leisure activities. The presence of the tank traps form part of the attraction of the area for tourism.

3.2 Historical Themes

A historical theme is a research tool, which can be used at the national, state or local level to aid in the identification, assessment, interpretation and management of heritage places (AHC 2001:1). Nine national historical themes have been identified by the Australian Heritage Commission (now DEWHA). The Heritage Division, Office of Environment and Heritage (OEH) has identified 35 historical themes for understanding the heritage of NSW. The development of the project area is broadly reflective of the history of the local region, and can be assessed in the context of the broader historic themes defined by the Heritage Branch and DEWHA. In accordance with the Heritage Division and DEWHA framework of historic themes, the themes tabulated in **Table 3.1** are relevant to the project area and locality.

Table 3.1 Historical Themes

National	National Sub Themes	State Themes	Local Themes/Application
Governing.	Defending Australia.	World War II sites.	Activities associated with defending places from hostile takeover and occupation. Coastal defences.
Developing local, regional and national economies.	Developing primary production.	Pastoralism. Mining. Forestry.	Pastoralism. Development of coal mining. Timber getting. Lime burning.
Building settlements, towns and cities.	Making settlements to serve rural Australia. Remembering significant phases in the development of settlements, towns and cities.	Land tenure. Early settlement.	Land tenure and early settlement including the history of selection.
Working.	Working on the land. Organising workers and workplaces.	Pastoralism	Other industries – timber clearing, lime-burning. Development of coal mining.
Developing Australia's Cultural Life.	Organising recreation. Going to the beach.	Enjoying the natural environment. Tourism.	Stockton Sand Dunes tourism and leisure activities.

3.2.1 Thematic Listings Program

World War I and II sites are one of four themes included in the Thematic Listings Program 2009-2010. The Thematic Listings Program is a Heritage Council strategic initiative to maintain a balanced and credible State Heritage Register that accurately records the most significant places and objects in, and which reflects the cultural richness and diversity of, the State of New South Wales. The World War I and II sites are included to:

...acknowledge the important contribution of servicemen and women during both World Wars and the 70th anniversary of the beginning of WWII (Heritage Branch nd)

Evidence for World War I and II sites in the NSW landscape is widespread but not always well recognised today. The thematic Listings Program aims to ensure that sites of significance to both World Wars are located, identified and assessed for their heritage values (Heritage Branch nd).

3.3 Historical Archaeological Context

This section provides a summary of known non-indigenous heritage items/sites identified during inspection of the approval areas or previously known.

3.3.1 Lot 218

Lot 218 is composed mainly of mobile transgressive sand dunes which lack vegetation. The active transgressive dune in this area has been relatively recently deposited. Based on the analysis of aerial photography, active transgression of the dune within Lot 218 has occurred within the last 50 years. Only the northern and western margins of the lot are vegetated with Coastal Sands Apple Blackbutt Woodland. The Oakfield Track runs into the mid northern margin of the lot and a four wheel drive track runs into the eastern end of the lot, continuing from Lot 220.

An alignment of tank traps has previously been observed within northeast portion of Lot 218 operational area but was not located during site inspections in 2008 by Umwelt (refer to Section 5.2) as the alignment has been buried by the encroaching sand dunes. These tank traps are part of a row of tank traps that originate in Lot 220. Their likely location beneath the encroaching sand dunes can be predicted as the alignment is visible running into the dunes in the northeast portion of Lot 218 from the adjacent bushland (refer to **Plate 3.1** and **Figure 3.1**).

No other heritage items or potential historical archaeological sites were identified during the site inspection of Lot 218.

3.3.2 Lot 220

Lot 220 is located within the vegetated dunes of Stockton Bight. The vegetation is comprised of Coastal Sands Apple Blackbutt Woodland. A number of four wheel drive tracks are located within the lot, with one track traversing the lot in an approximately north to south direction from the northwest corner to the southern boundary of Lot 220 and later intersecting with the eastern part of Lot 218. This track is associated with a discontinuous alignment of tank traps, forming an approximately north to south running barrier, likely to have been constructed during World War II as part of the establishment of the Northern Defence Line (refer to **Figure 3.1**).

The tank trap alignment comprises a single broken line of 218 concrete tetrahedrons generally distributed along the length of the four wheel drive track (refer to **Figure 3.1** and **Plate 3.2**). Although there are two distinct breaks in the alignment of tank traps, likely resulting from prior removal of some of the tetrahedrons, the original linear arrangement of the traps remains in situ. As a result of the likely prior removal of some of the tetrahedrons there are now three distinct groups surviving on Lot 220 (refer to **Figure 3.2**):

- A group of 92 tank traps (TT1 to TT92) are located in the northwest corner of the lot forming an approximate northwest to southeast alignment.
- A group of 24 tank traps (TT93 to TT 116) are located in the centre of the lot orientated approximately northwest to southeast.
- The third group of 102 tank traps (TT117 to TT 218) are located in the south portion of Lot 220 approximately perpendicular to the southern boundary of the lot orientated approximately north to south.

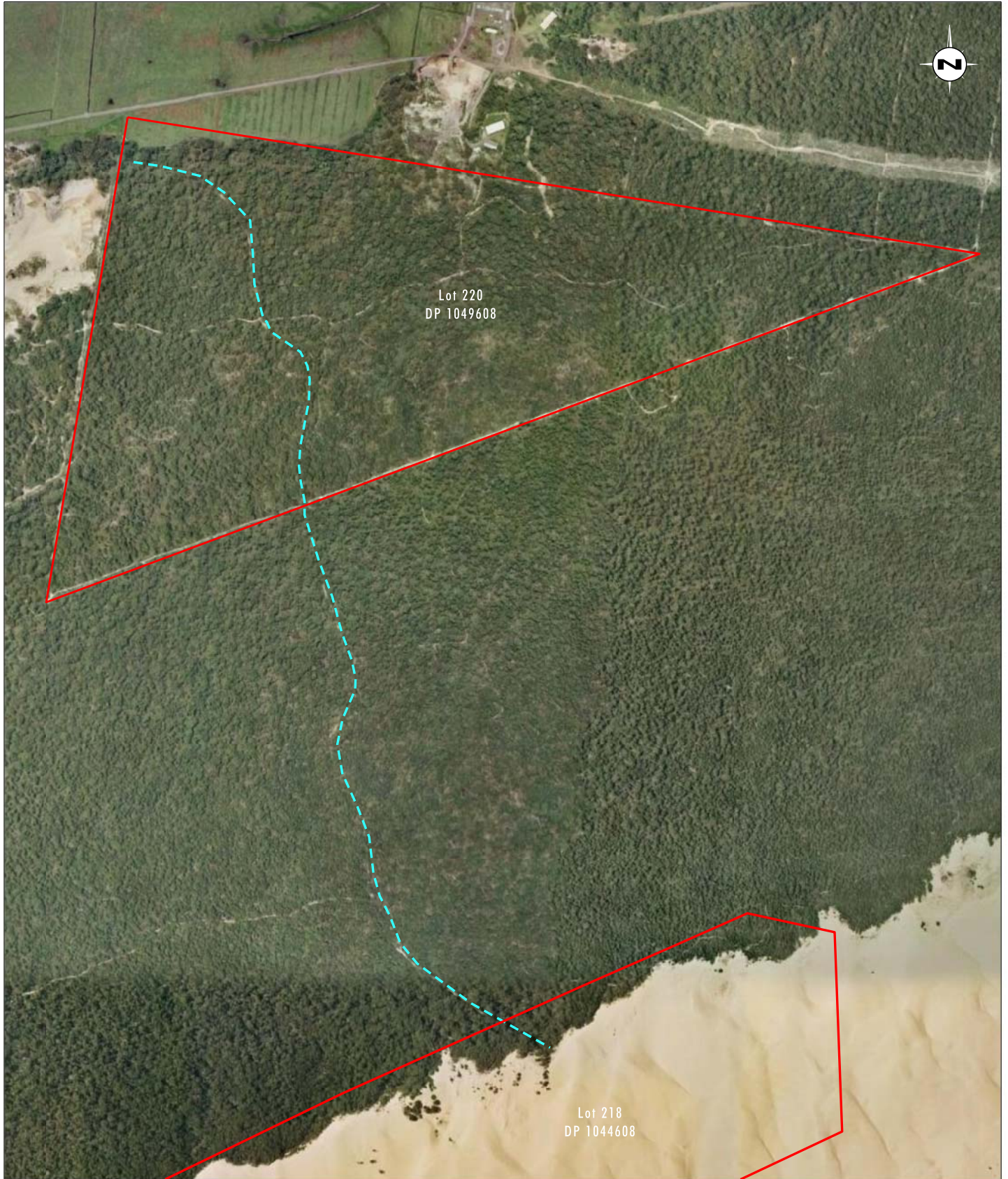
The tetrahedrons are approximately 1.75 metres high and are between 50 and 500 millimetres apart at the base. At the time of installation the tank traps are likely to have been placed so they were almost touching; creating a continuous barrier. They have a metal hoop/hook fixed close to the base of the side facing the track and a reinforcing iron bar which extends approximately 100 millimetres from the peak of each tetrahedron. In places barbed and line wire survives attached to individual tetrahedrons utilising the hoop/hook and bar. This wire also appears to have originally been utilised to link the tank traps together (refer to **Plates 3.3** and **3.4**). The individual tank traps are generally in good condition although there is some damage/concrete decay evident, particularly at the top and bottom corners of the tetrahedrons.

3.4 Summary of Potential Historic Heritage Resource

The alignment of tank traps crossing Lot 220 and the potential for the alignment continuing into the northeast portion of Lot 218 comprises the only identified historical heritage item within the approval areas.

While no other historical heritage items or historical archaeological sites have been identified within the approval areas, there is some potential for other items or sites (possibly associated with the World War II Northern Defence Line) to be located within the approval areas.

Although considered unlikely, vegetation clearing and sand extraction activities may uncover as yet unknown historical heritage items or sites within the approval areas. However, the active transgressive dune that comprises the surface context across the majority of Lot 218 has been deposited over approximately the last 50 years and therefore is unlikely to contain any in situ historical heritage resource other than the continuation of the tank trap alignment in the northeast portion of the approved extraction area on Lot 218 where tank traps may have been buried by windblown sand.



Source: Aerial: Google Earth 2008

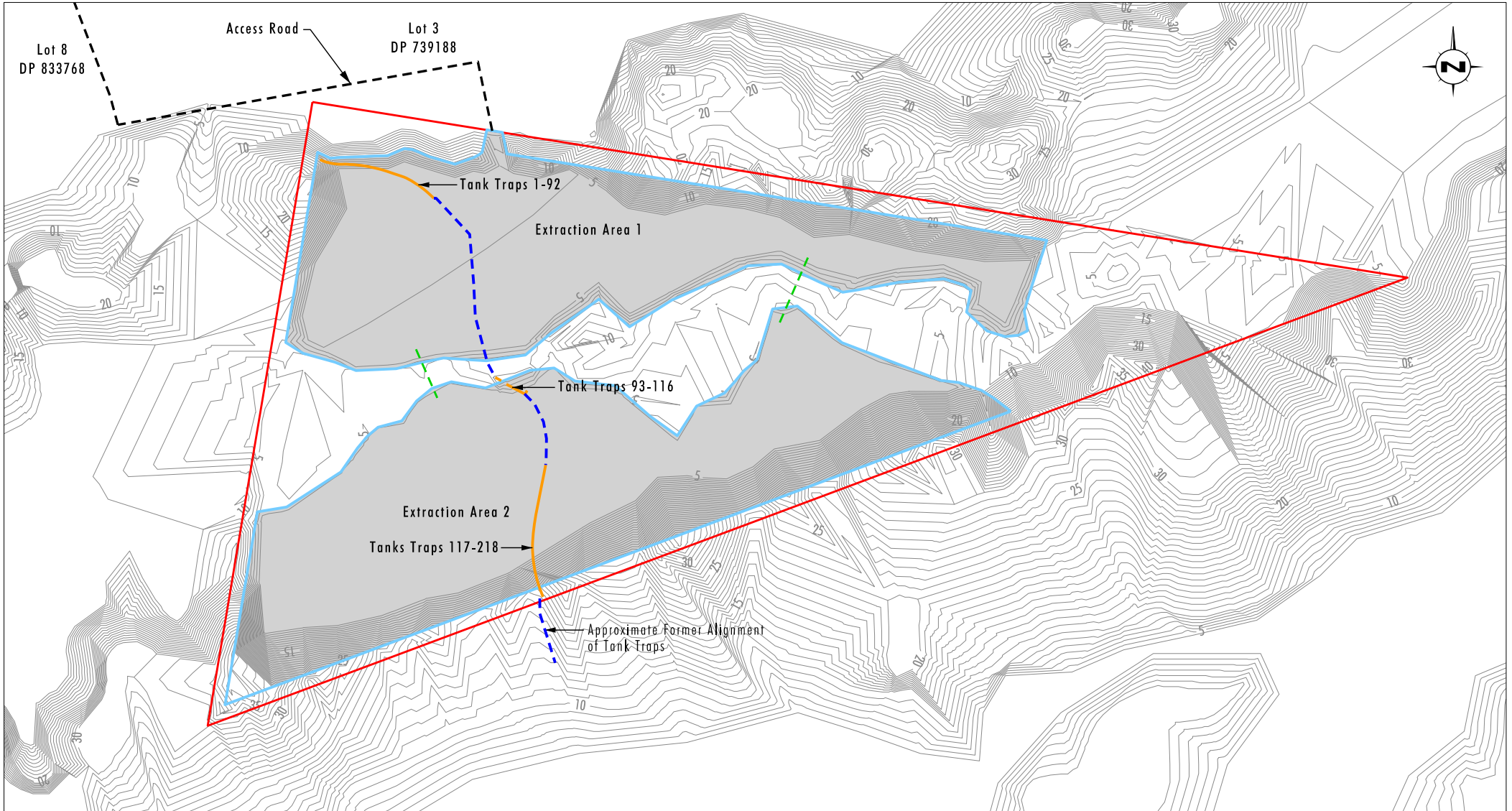
0 100 250 500m
1:10 000

Legend

- Lot Boundaries (218 & 220)
- Approximate Discontinuous Tank Trap Alignment alongside Four Wheel Drive Track

FIGURE 3.1

Approximate Alignment of
Tank Traps in Lots 220 and 218



Source: Cadastral: Department of Lands, 2003
 Note: Contour Interval 10m

0 100 200 400m
 1:8 000

Legend

- Lot 220 Boundary
- Lot 220 Extraction Area Boundary
- - - Internal Access Roads
- - - Access Road
- Surveyed Locations of Tank Traps

FIGURE 3.2

Surveyed Location of Tank Trap Alignment in Lot 220



PLATE 3.1

View to north showing tank traps running into dunes in northeast portion of Lot 218



PLATE 3.2

View to south showing tank trap alignment alongside four wheel drive track in Lot 220



PLATE 3.3
View to northeast showing barbed and line wire linking tank traps in Lot 220

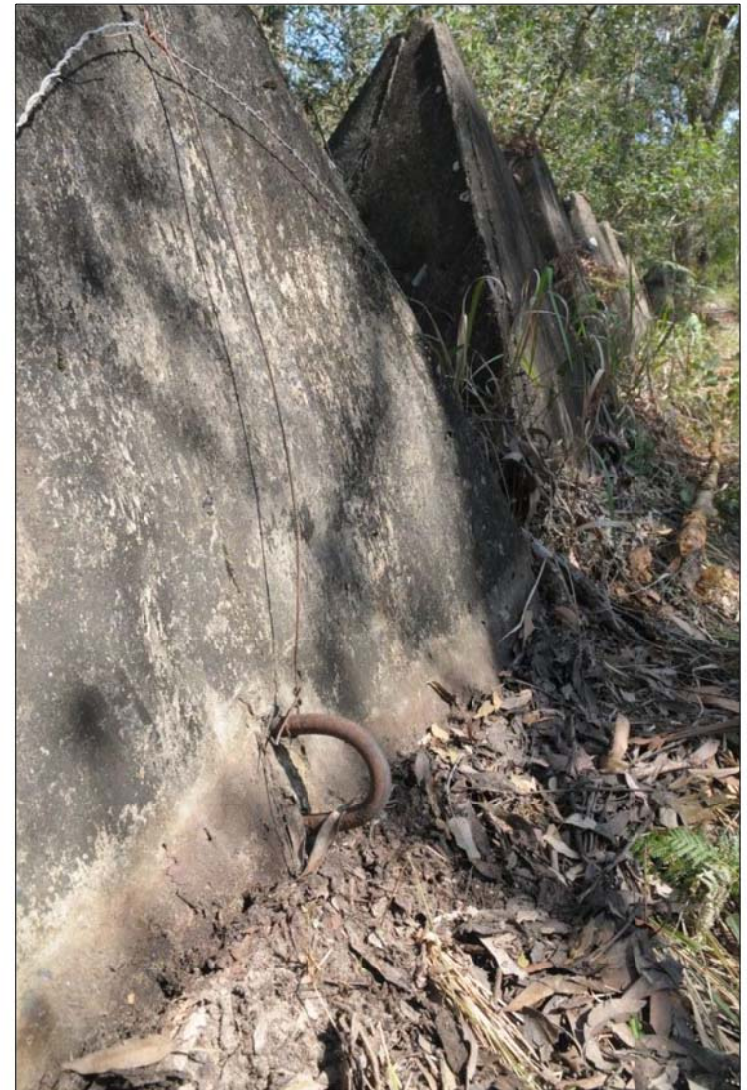


PLATE 3.4
View to southeast showing detail of barbed and line wire attached to tank trap in Lot 220

4.0 Significance Assessment

As discussed in **Section 3.0**, with the exception of the tank traps no other historical heritage items or potential historical archaeological sites have been identified within the approval areas. The tank traps have previously been included in significance assessments of the Stockton Dune System and the Stockton Bight undertaken by Port Stephens Council and ERM of the Stockton Dune System and the Stockton Bight. The previously undertaken significance assessments are briefly discussed below.

4.1 Port Stephens LEP 2013

Port Stephens LEP 2013 identifies the tank traps within Lots 216-219 as being part of the Stockton Dune System, which it has assessed as being of State significance. The tank traps within Lot 220 do not form part of this listing.

The Stockton Dune System, or the tank traps themselves, are not listed on the State Heritage Register (SHR) maintained by the NSW Heritage Council.

4.2 ERM Cultural Heritage Assessment 2006

The ERM 2006 Cultural Heritage Assessment recommended that Stockton Bight

...has national heritage value due to its association with the events of WWII which played a significant role in the evolution of the nation. Structures relating to WWII are evident within the study area in the form of the tank traps that were part of the Northern Defence Line...the in situ tank traps....represent rare aspects of Australia's WWII history (ERM 2006).

The ERM assessment concludes that the Stockton Bight area has

...state significance as it contains structures associated with a significant historical phase, WWII, and is part of a sequence of facilities related to Defence Force activity, which, although they differ in purpose, provide an indication of the role of the area in Australia's WWII efforts (ERM 2006).

5.0 Non-Indigenous Heritage Management Strategies

This section of the management plan establishes strategies for the effective management of non-indigenous heritage within the approval areas. These strategies have been developed in accordance with Condition 30 of Project Approval 08_0142, the Statement of Commitments and recommendations provided as part of EA (incorporating the recommendations of the Historical Heritage Review of the approval areas), the EP&A Act, the Heritage Act 1977 (NSW) and the requirements of DoP (now DPE).

5.1 Impacts

5.1.1 Lot 218

Tank traps are likely the only potential heritage items within Lot 218. As discussed in **Section 3.3.1** an alignment of tank traps has previously been observed within Lot 218 operational area but is now buried beneath the encroaching sand dunes.

Sand extraction at Lot 218 will only remove transgressive sand deposited over approximately the last 50 years. This may include sand that has covered any tank traps that may be present beneath the transgressive sand in the north eastern corner of the Lot 218 extraction area.

5.1.2 Lot 220

The known alignment of tank traps crossing Lot 220 comprises the only identified historic heritage identified at that site.

Sand extraction operations will disturb all three distinct groups of tank traps surviving on Lot 220:

- Tank traps TT1 to TT92 located within Extraction Area 1 (refer to **Figure 3.2**) will be disturbed during proposed quarrying works within Extraction Area 1.
- Tank traps TT93 to TT116 located within Extraction Area 2 (refer to **Figure 3.2**) will be disturbed during proposed quarrying works within Extraction Area 2.
- Tank traps TT117 to TT218 located within Extraction Area 2 (refer to **Figure 3.2**) will be disturbed during proposed quarrying works within Extraction Area 2.

Sand extraction is not proposed in the central low lying vegetation area of Lot 220 between Extraction Area 1 and Extraction Area 2. Although part of the second group of tank traps (TT93 to TT116) is located within the central vegetation area and may remain in situ during sand extraction operations, the proximity of the tank traps to approved sand Extraction Area 2 may result in their disturbance.

5.2 Management Strategies

5.2.1 Lot 218

5.2.1.1 Archival recording

Sand extraction in the northeast corner of Lot 218 may occur to a depth that disturbs the tank traps. If excavations do encounter tank traps, a photographic recording will be prepared by a suitably qualified heritage consultant in accordance with Heritage Council of NSW requirements for archival recording prior to any disturbance. The photographic record would include:

- photographic catalogue sheets, photographic plans and survey plans;
- thumbnail image sheets (contact sheets) processed with archivally stable inks on archivally acceptable photographic paper;
- CD or DVDs containing electronic image files; and
- one set of colour prints processed with archivally stable inks on archivally acceptable photographic paper.

Three copies of the record would be produced comprising:

- One copy for DPE containing full set of prints;
- One copy for the State Library of NSW or Local Council Library containing photocopy of full set of prints; and
- One copy for Mackas Sands containing photocopy of full set of prints.

5.2.1.2 Investigation, Removal, Storage and Reinstallation

Investigation

No tank traps or other historical heritage items or potential historical archaeological sites were identified within Lot 218 operational area during field survey by Umwelt and representatives of Aboriginal stakeholders groups (Worimi Local Aboriginal Land Council, Nur-Run-Gee Pty Ltd and Mur-Roo-Ma Incorporated) in July 2008. However, as discussed in **Section 3.3.1**, there is potential for tank traps buried beneath the encroaching sand dunes.

Sand extraction in the northeast corner of Lot 218 may not occur to a depth that disturbs the tank traps. If excavations do encounter tank traps all works in the immediate area will cease and the location of these remains/items would be surveyed by a qualified surveyor and recorded by a suitably qualified heritage consultant or archaeologist in accordance with Heritage Branch requirements and guidelines. This would include photographic recording. As discussed above, the photographic recording and the survey plans would be compiled into a photographic record of any tank traps present in Lot 218.

Removal and Storage

If appropriate it is proposed to temporarily relocate any tank traps uncovered that may be disturbed during quarrying.

The tank traps will be temporarily relocated adjacent to the northern edge sand extraction area in an area that will not be disturbed by further quarrying (refer to **Figure 1.2**). Tank traps will be temporarily relocated, after survey and photographic recording has been undertaken, in advance of quarrying continuing in the vicinity and will be placed outside the sand extraction area sequentially from the east to the west. No quarrying will take place in proximity to the proposed temporary location of the tank traps. The temporary storage of the tank traps within Lot 218, in close proximity to their original alignment, rather than off site will reduce the potential for damage to occur during their temporary relocation.

The tank traps will be lifted using an excavator or front end loader fitted with a fork lift attachment. The use of a fork lift attachment to lift the tank traps is considered the most appropriate option as the structural integrity of the lifting bars and hooks on the tank traps has potentially been reduced as a result of rusting over the approximately 67 years since the traps were placed in position.

Following completion of quarrying in the northeast portion of Lot 218 any tank traps that have been temporarily relocated will be reinstated (see below).

Reinstallation

Once quarrying in the northeast portion of Lot 218 is completed any tank traps that have been temporarily relocated within Lot 218 will be replaced, utilising the lifting methodology proposed above, into their original surveyed position, thus retaining their original alignment.

The replacement of the traps in their original alignment will ensure that their significance, as identified by ERM (ERM 2006), as part of the Northern Defence Line is retained. The tank traps will continue to illustrate a rare aspect of Australia's World War II history as part of the facilities related to Defence Force activity and provide an indication of the role of the area in Australia's war efforts. In addition, they will continue to provide a role in the tourism industry of Stockton Bight.

5.2.2 Lot 220

5.2.2.1 Archival recording

Prior to disturbance of the tank traps in Lot 220 a photographic recording of the traps and their alignment was prepared in accordance with Heritage Council of NSW requirements for archival recording.

Umwelt, on behalf of Mackas Sands, completed the on site photographic recording of the tank traps located in Lot 220 in December 2009. These photographs and accompanying plans form part of the archival recording of the tank traps located within Lot 220. The final photographic record includes:

- photographic catalogue sheets, photographic plans and survey plans
- thumbnail image sheets (contact sheets) processed with archivally stable inks on archivally acceptable photographic paper
- CD or DVDs containing electronic image files
- one set of colour prints processed with archivally stable inks on archivally acceptable photographic paper

Three copies of the record will be available as follows:

- One copy for DPE containing full set of prints.

- One copy for the State Library of NSW or Local Council Library containing photocopy of full set of prints.
- One copy for Mackas Sands containing photocopy of full set of prints.

5.2.2.2 Investigation, Removal, Storage and Reinstallation

Investigation

The location of each of the 218 tank traps present on Lot 220 was identified during field survey by Umwelt and representatives of Aboriginal stakeholders groups (Worimi Local Aboriginal Land Council, Nur-Run-Gee Pty Ltd and Mur-Roo-Ma Incorporated) in July 2008. The tank traps have subsequently been surveyed by Le Mottee Group surveyors (refer to **Figures 5.1 to 5.3**). As discussed above, the tank traps and their alignment have also been photographically recorded and form part of the photographic record of the tank traps in Lot 220.

Removal and Storage

As discussed in **Section 5.1.2**, sand extraction operations have disturbed one and will likely disturb the two other distinct groups of tank traps surviving on Lot 220. As such it is proposed to temporarily relocate the tank traps prior to sand extraction works commencing. Survey and photographic recording of the tank traps in Lot 220 was undertaken in December 2009 (as discussed above).

The first group of tanks traps (TT1 to TT92) were temporarily relocated from their current location in advance of quarrying in Extraction Area 1 (refer to **Figure 3.2**). The tank traps were temporarily relocated along the alignment of an existing track that traverses the central axis of the vegetation corridor. The vegetation corridor is located between Extraction Area 1 and Extraction Area 2 and will not be disturbed by quarrying. The track within this area runs approximately perpendicular to the existing alignment of the tank traps. Tank traps will be removed in advance of quarrying and placed along the road from the west to the east with tank trap TT92 placed at the edge of the western end of the road and then tank traps TT91 to TT1 placed sequentially from west to east along the track. No quarrying will take place in proximity to the proposed temporary location of the tank traps. No notable damage occurred to the tank traps during the temporary relocation. TT1 to TT92 have been reinstated (see below).

Prior to sand extraction occurring in Extraction Area 2, tank traps TT93 to TT218 (refer to **Figure 3.2**) will be temporarily relocated to the eastern end of the access track within the vegetation area between Extraction Area 1 and Extraction Area 2 utilising the methodology discussed below. Following completion of quarrying in Extraction Area 1, TT93 to TT218 will be reinstated (see below).

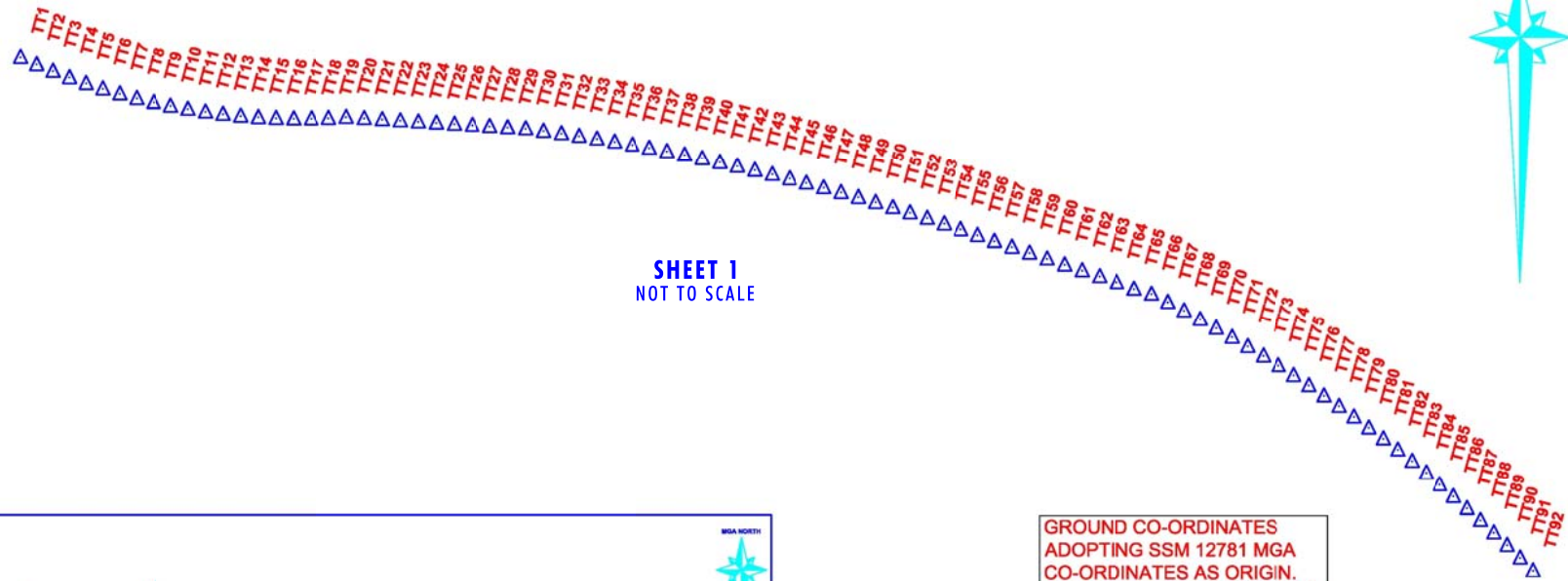
The tank traps will be lifted using an excavator or front end loader fitted with a fork lift attachment. The use of a fork lift attachment to lift the tank traps is considered the most appropriate option as the structural integrity of the lifting bars and hooks on the tank traps has potentially been reduced as a result of rusting over the approximately 67 years since the traps were placed in position.

Reinstallation

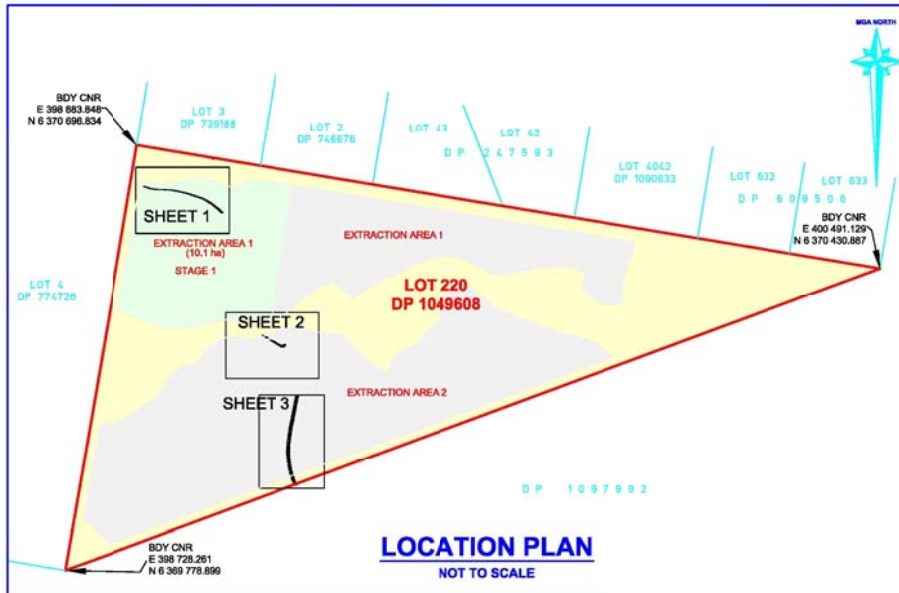
Tank traps TT1 to TT92 have been replaced, along the original alignment of the tank traps as surveyed by Le Mottee Group surveyors utilising the lifting methodology discussed above. The final placement of the tank traps will be confirmed following survey of the alignment.

Once quarrying in the Extraction Area 2 is completed tank traps TT93 to TT218 will be replaced, utilising the lifting methodology discussed above, along the original alignment of the tank traps as surveyed by Le Mottee Group surveyors.

MGA NORTH



SHEET 1
NOT TO SCALE



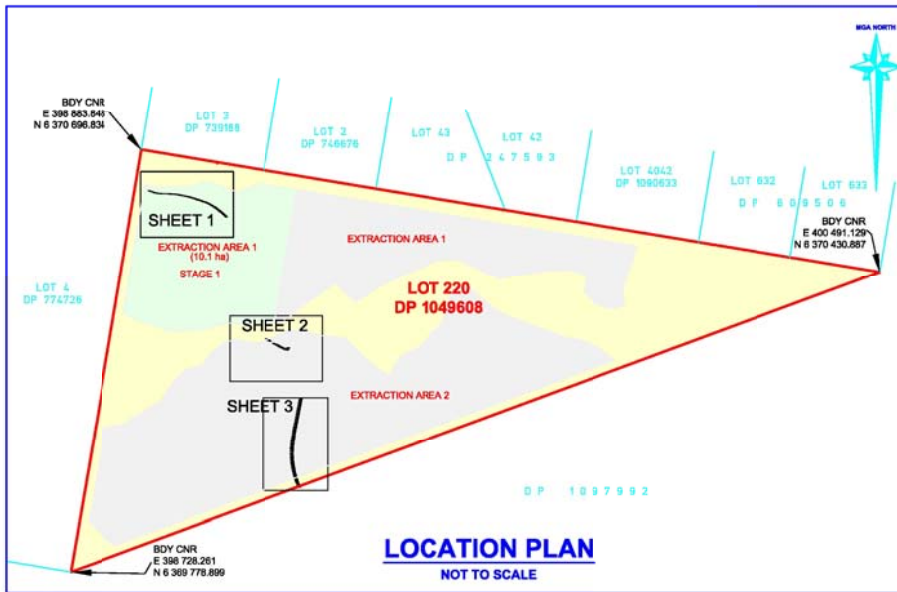
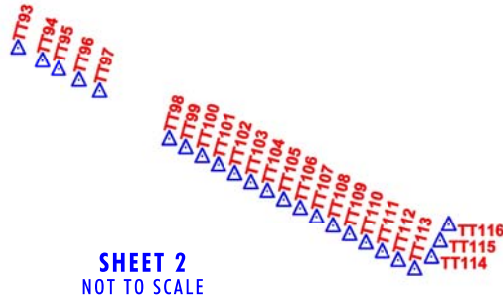
GROUND CO-ORDINATES
ADOPTING SSM 12781 MGA
CO-ORDINATES AS ORIGIN.
CO-ORDINATES AT 25/11/2009
E 395 688.119
N 6 370 100.289
ZONE 56

GROUND CO-ORDINATES TABLE

POINTS	EASTING	NORTHING	POINTS	EASTING	NORTHING	POINTS	EASTING	NORTHING	POINTS	EASTING	NORTHING	POINTS	EASTING	NORTHING
TT1	388895.36	6370604.34	TT21	388933.507	6370597.588	TT41	388972.89	6370592.72	TT61	389011.082	6370581.373	TT81	389048.396	6370562.096
TT2	388897.149	6370603.552	TT22	388935.496	6370597.471	TT42	388974.824	6370592.287	TT62	389013.016	6370580.724	TT82	389049.992	6370560.862
TT3	388898.957	6370602.811	TT23	388937.485	6370597.343	TT43	388976.754	6370591.839	TT63	389014.95	6370580.076	TT83	389049.572	6370559.605
TT4	388900.784	6370602.117	TT24	388939.474	6370597.216	TT44	388978.681	6370591.376	TT64	389016.884	6370579.428	TT84	389051.136	6370558.328
TT5	388902.628	6370601.47	TT25	388941.463	6370597.089	TT45	388980.605	6370590.897	TT65	389018.819	6370578.718	TT85	389052.688	6370557.052
TT6	388904.489	6370600.872	TT26	388943.452	6370596.962	TT46	388982.524	6370590.403	TT66	389020.752	6370578.131	TT86	389054.217	6370555.717
TT7	388906.365	6370600.322	TT27	388945.441	6370596.835	TT47	388984.439	6370589.894	TT67	389022.682	6370577.215	TT87	389055.723	6370554.382
TT8	388908.254	6370599.822	TT28	388947.43	6370596.708	TT48	388986.351	6370589.399	TT68	389024.616	6370576.277	TT88	389057.23	6370553.029
TT9	388910.155	6370599.371	TT29	388949.419	6370596.581	TT49	388988.267	6370588.829	TT69	389026.55	6370575.316	TT89	389058.712	6370551.657
TT10	388912.068	6370598.989	TT30	388951.408	6370596.454	TT50	388990.18	6370588.274	TT70	389028.489	6370574.353	TT90	389060.176	6370550.295
TT11	388913.991	6370598.617	TT31	388953.374	6370596.327	TT51	388992.098	6370587.704	TT71	389030.428	6370573.39	TT91	389061.622	6370548.857
TT12	388915.922	6370598.25	TT32	388955.337	6370596.201	TT52	388994.016	6370587.139	TT72	389032.369	6370572.431	TT92	389063.05	6370547.43
TT13	388917.86	6370597.884	TT33	388957.298	6370596.074	TT53	388995.934	6370586.573	TT73	389034.304	6370571.472			
TT14	388919.804	6370597.512	TT34	388959.257	6370595.947	TT54	388997.852	6370586.007	TT74	389036.244	6370570.513			
TT15	388921.753	6370597.141	TT35	388961.213	6370595.821	TT55	388999.77	6370585.441	TT75	389038.184	6370569.554			
TT16	388923.704	6370596.77	TT36	388963.167	6370595.695	TT56	389001.688	6370584.875	TT76	389040.124	6370568.595			
TT17	388925.658	6370596.401	TT37	388965.118	6370595.569	TT57	389003.603	6370584.309	TT77	389042.064	6370567.636			
TT18	388927.613	6370596.026	TT38	388967.065	6370595.443	TT58	389005.518	6370583.743	TT78	389044.004	6370566.677			
TT19	388929.568	6370595.651	TT39	388969.01	6370595.317	TT59	389007.433	6370583.177	TT79	389045.944	6370565.718			
TT20	388931.518	6370595.276	TT40	388970.952	6370595.191	TT60	389009.348	6370582.611	TT80	389047.884	6370564.759			

FIGURE 5.1

Surveyed Locations of
Tank Traps 1 to 92 in Lot 220



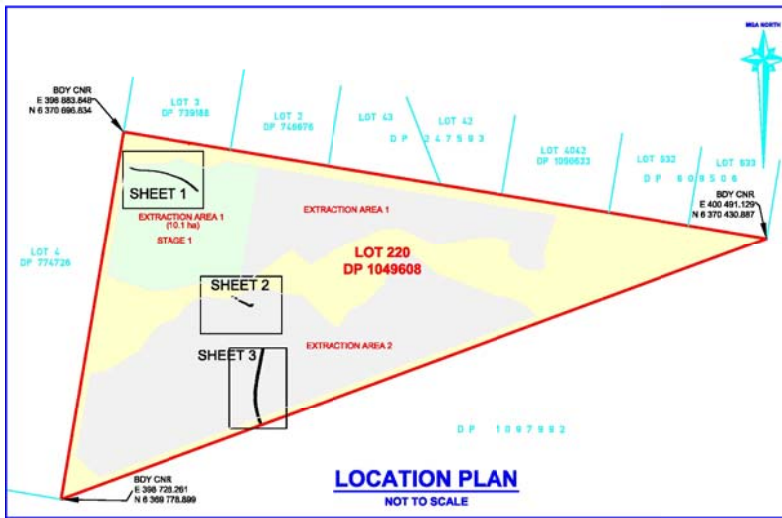
**GROUND CO-ORDINATES
ADOPTING SSM 12781 MGA
CO-ORDINATES AS ORIGIN.
CO-ORDINATES AT 25/11/2009**
E 395 688.119
N 6 370 100.289
ZONE 56

GROUND CO-ORDINATES TABLE

POINTS	EASTING	NORTHING
TT93	399153.514	6370263.487
TT94	399156.163	6370282.08
TT95	399157.929	6370281.141
TT96	399160.166	6370279.952
TT97	399162.403	6370278.764
TT98	399169.958	6370273.585
TT99	399171.74	6370272.84
TT100	399173.523	6370271.695
TT101	399175.305	6370270.75
TT102	399177.087	6370269.605
TT103	399178.869	6370286.96
TT104	399180.651	6370287.915
TT105	399182.433	6370290.87
TT106	399184.216	6370289.025
TT107	399185.998	6370285.08
TT108	399187.78	6370284.135
TT109	399189.562	6370283.19
TT110	399191.344	6370282.245
TT111	399193.127	6370281.3
TT112	399194.909	6370280.355
TT113	399196.691	6370279.41
TT114	399198.473	6370280.708
TT115	399199.448	6370282.475
TT116	399200.385	6370284.242

FIGURE 5.2

Surveyed Locations of
Tank Traps 93 to 116 in Lot 220



GROUND CO-ORDINATES
ADOPTING SSM 12781 MGA
CO-ORDINATES AS ORIGIN.
CO-ORDINATES AT 25/11/2009
E 395 688.119
N 6 370 100.289
ZONE 56

GROUND CO-ORDINATES TABLE

POINTS	EASTING	NORTHING	POINTS	EASTING	NORTHING
TT117	399227.869	6370154.699	TT168	399209.589	6370055.15
TT118	399227.476	6370152.637	TT169	399209.366	6370053.228
TT119	399227.084	6370150.736	TT170	399209.143	6370051.304
TT120	399226.692	6370148.725	TT171	399208.921	6370048.379
TT121	399226.299	6370146.744	TT172	399208.698	6370047.452
TT122	399225.907	6370144.733	TT173	399208.476	6370045.523
TT123	399225.514	6370142.731	TT174	399208.254	6370043.584
TT124	399225.122	6370140.3	TT175	399208.032	6370041.663
TT125	399224.729	6370138.819	TT176	399207.811	6370039.732
TT126	399224.337	6370136.838	TT177	399207.589	6370037.8
TT127	399223.944	6370134.857	TT178	399207.367	6370035.866
TT128	399223.552	6370132.875	TT179	399207.145	6370033.935
TT129	399223.159	6370130.894	TT180	399206.923	6370032.003
TT130	399222.767	6370128.913	TT181	399206.701	6370030.071
TT131	399222.374	6370126.932	TT182	399206.479	6370028.14
TT132	399221.982	6370124.951	TT183	399206.257	6370026.209
TT133	399221.589	6370122.969	TT184	399206.035	6370024.28
TT134	399221.197	6370120.988	TT185	399205.813	6370022.351
TT135	399220.804	6370118.007	TT186	399205.591	6370020.424
TT136	399220.412	6370116.026	TT187	399205.369	6370018.499
TT137	399220.019	6370114.045	TT188	399205.147	6370016.575
TT138	399219.627	6370112.063	TT189	399204.925	6370014.653
TT139	399219.234	6370110.082	TT190	399204.703	6370012.734
TT140	399218.842	6370108.101	TT191	399204.481	6370010.817
TT141	399218.449	6370106.12	TT192	399204.259	6370008.902
TT142	399218.057	6370104.139	TT193	399204.037	6370006.987
TT143	399217.664	6370102.157	TT194	399203.815	6370005.062
TT144	399217.272	6370100.176	TT195	399203.593	6370003.137
TT145	399216.879	6370099.195	TT196	399203.371	6370001.212
TT146	399216.487	6370097.214	TT197	399203.149	6369999.287
TT147	399216.094	6370095.233	TT198	399202.927	6369997.362
TT148	399215.702	6370093.252	TT199	399202.705	6369995.437
TT149	399215.309	6370091.271	TT200	399202.483	6369993.512
TT150	399214.917	6370089.29	TT201	399202.261	6369991.587
TT151	399214.524	6370087.309	TT202	399202.039	6369989.662
TT152	399214.132	6370085.327	TT203	399201.817	6369987.737
TT153	399213.739	6370083.346	TT204	399201.595	6369985.812
TT154	399213.347	6370081.364	TT205	399201.373	6369983.887
TT155	399212.954	6370079.383	TT206	399201.151	6369981.962
TT156	399212.562	6370077.402	TT207	399200.929	6369980.037
TT157	399212.169	6370075.421	TT208	399200.707	6369978.112
TT158	399211.777	6370073.44	TT209	399200.485	6369976.187
TT159	399211.384	6370071.459	TT210	399200.263	6369974.262
TT160	399210.992	6370070.478	TT211	399200.041	6369972.337
TT161	399210.599	6370068.497	TT212	399199.819	6369970.412
TT162	399210.207	6370066.516	TT213	399199.597	6369968.487
TT163	399210.814	6370064.535	TT214	399199.375	6369966.562
TT164	399210.422	6370062.554	TT215	399199.153	6369964.637
TT165	399210.03	6370060.573	TT216	399198.931	6369962.712
TT166	399209.638	6370058.592	TT217	399198.709	6369960.787
TT167	399209.246	6370056.611	TT218	399198.487	6369958.862

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SHEET 3
NOT TO SCALE

DP 1097992

FIGURE 5.3

Surveyed Locations of
Tank Traps 117 to 218 in Lot 220

The replacement of the traps in their original alignment will ensure that their significance, as identified by ERM (ERM 2006), as part of the Northern Defence Line is retained. The tank traps will continue to illustrate a rare aspect of Australia's World War II history as part of the facilities related to Defence Force activity and provide an indication of the role of the area in Australia's war efforts. In addition, they will continue to provide a role in the tourism industry of Stockton Bight.

5.3 New Heritage Items or Objects

The active transgressive dune that comprises the surface context across the Lot 218 operational area has been deposited over approximately the last 50 years and therefore is unlikely to contain any in situ historical heritage resource other than possible tank traps in the north eastern corner of the approved extraction area.

Mackas Sand and Soil Pty Ltd is currently operating a sand quarry to the east of Lot 220 and no items of potential historic heritage, or other items, have been uncovered during quarrying works. It is considered unlikely that any items of historic heritage will be uncovered within Lot 220, with the exception of the identified tank trap alignment.

However, in the unlikely event that unexpected or significant archaeological remains or as yet unidentified heritage items are discovered (possibly associated with the World War II Northern Defence Line) all works in the immediate area will cease and the Heritage Division, OEH notified, in accordance with Section 146 of the Heritage Act 1977 (NSW).

If appropriate and following consultation with the Heritage Division, the location of these remains/items will be surveyed and the remains/items recorded by a suitably qualified heritage consultant or archaeologist in accordance with Heritage Division requirements and guidelines.

5.4 Non-Indigenous Heritage Inductions

Mackas Sand has organised a Historical Heritage Awareness induction to be incorporated into an induction for Mackas Sand employees and contractors. The induction includes (but not necessarily be limited to) the following:

- the nature and location of the historical heritage resource present within the approval areas (the tank trap alignment in Lot 220), with clear discussion of the likelihood for other sites to be identified during the course of operations (for example the continuation of the tank trap alignment into Lot 218)
- the historical heritage values and significance of the tank trap alignment and any other potential historical heritage resource
- the nature of the management strategies for the historical heritage items within the approval areas
- procedures for contacting the Mackas Sand Project Manager if previously unknown historical heritage items and/or artefacts are uncovered by vegetation clearance or sand extraction
- information related to the relevant legislation for the protection of historical heritage items and the penalties which may arise if items are disturbed/destroyed.

The induction must be completed prior to employees commencing work within the extraction area. Records must be kept by Mackas Sand to demonstrate that all relevant personnel and contractors have participated in and completed the induction.

5.5 Interim NIHMP

An 'Interim' NIHMP was prepared by Umwelt on behalf of Mackas Sands in December 2009 in accordance with the provisions of Condition 8 of Project Approval 08_0142:

With the approval of the Director-General, the proponent may submit any management plan or monitoring program required by this approval on a progressive basis.

The 'Interim' NIHMP was prepared to seek approval from the Director-General to submit the NIHMP on a progressive basis, enabling quarry activities on Lot 220 to continue in a safe and controlled manner prior to finalisation of this NIHMP. Mackas Sand received approval from the DPE (Major Development Assessment, Industry and Mining) on 4 January 2010 to allow quarrying in Lot 220 Extraction Area 1 to commence, in accordance with the management protocols discussed in **Sections 5.2 to 5.4** above, prior to this NIHMP being completed (refer to **Appendices 1 and 2** for 'Interim' NIHMP and subsequent letter of approval from the DPE).

5.6 Aboriginal Cultural Heritage Management Plan

An Aboriginal Cultural Heritage Management Plan (ACHMP) (Umwelt 2009b) has also been prepared, in consultation with the relevant Aboriginal stakeholders, for the extraction of sand resources from Lot 218 and Lot 220. All works will be undertaken in accordance with the ACHMP (Umwelt 2014).

5.7 Site Rehabilitation and Landscape Management Plan

The Lot 220 approval area will be subject to rehabilitation on the basis of a comprehensive Landscape Management Plan has been prepared in consultation with the Office of Environment and Heritage and DPE and approved by DPE. The Landscape Management Plan provides mechanisms for bushfire management and weed and feral pest control. The requirements of the Landscape Management Plan are consistent with the NIHMP.

It is intended that the rehabilitation of the Lot 220 approval area will achieve a final landform that is similar to the surrounding topography in that it will be shaped, where possible, in undulating profiles in keeping with natural landforms of the surrounding environment. Rehabilitation will result in the re-establishment of similar vegetation communities to those currently present within the approval area and the reinstallation of the tank traps along the original surveyed alignment.

5.8 Unexploded Ordnance

An Unexploded Ordnance Management Plan has also been completed for Lot 218. Any excavations conducted on Lot 218 will be consistent with the requirements of the Unexploded Ordnance Management Plan.

5.9 Post-Operations

At the conclusion of operations, Lot 220 and Lot 218 will be subject to final rehabilitation in accordance with the Landscape Management Plan. This NIHMP applies only to the period of operations and will require review at the cessation of operations in relation to any future land use.

6.0 Roles, Responsibilities and Timeframes

Title	Company	Roles and Responsibilities	Timeframe
Mackas Sand Quarry Manager	Mackas Sand	Ensure non-indigenous heritage induction is provided to all employees and contractors as part of the induction process as outlined in Section 5.4	Prior to the commencement of clearance activities within approval areas Ongoing
		Ensure that operations within the Lot 218 approval area are undertaken in accordance with the strategy provided in Section 5.2.1	Ongoing
		Ensure that operations within the Lot 220 approval area are undertaken in accordance with the strategy provided in Section 5.2.3	Archival recording and survey of tank traps to be undertaken prior to the commencement of clearance activities within approval areas Ongoing
		Ensure that all works cease in the vicinity of previously unidentified or unknown historical archaeological remains or historical heritage items exposed by operations and the remains/items are managed in accordance with the strategy provided in Section 5.3	As required

7.0 References

Australian Heritage Commission (AHC), 2001. *Significance Assessment of Heritage Places*. Australian Heritage Commission, Canberra.

Environmental Resources Management (Australia) Pty Ltd (ERM) 2006. *Stockton Bight Remaining Lands Cultural Heritage Significance Assessment*. New South Wales National Parks and Wildlife Service, Nelson Bay.

Heritage Branch, Department of Planning. Accessed on 4 January 2010.
<http://www.heritage.nsw.gov.au/>

National Heritage List (NHL) *Yooroonah Tank Barrier, Waterfall Way, Ebor, NSW*, Place ID 105802

State Heritage Register and Inventory. <<http://www.heritage.nsw.gov.au>>

Suters Architects and Planners, Lavelle, S., C and MJ Doring Pty Ltd and Turner, J, 1997. *Newcastle Archaeological Management Plan* prepared for Newcastle City Council

Umwelt (Australia) Pty Limited, 2009a. *Environmental Assessment Sand Extraction Operations from Lot 218 DP 1044608 and Lot 220 DP 1049608, Salt Ash*

Umwelt (Australia) Pty Limited, 2009b. *Aboriginal Cultural Heritage Management Plan for Sand Extraction Operations from Lot 218 DP 1044608 and Lot 220 DP 1049608, Salt Ash*

Umwelt (Australia) Pty Limited, 2014. *Aboriginal Cultural Heritage Management Plan for Sand Extraction Operations from Lot 218 DP 1044608 and Lot 220 DP 1049608, Salt Ash*.



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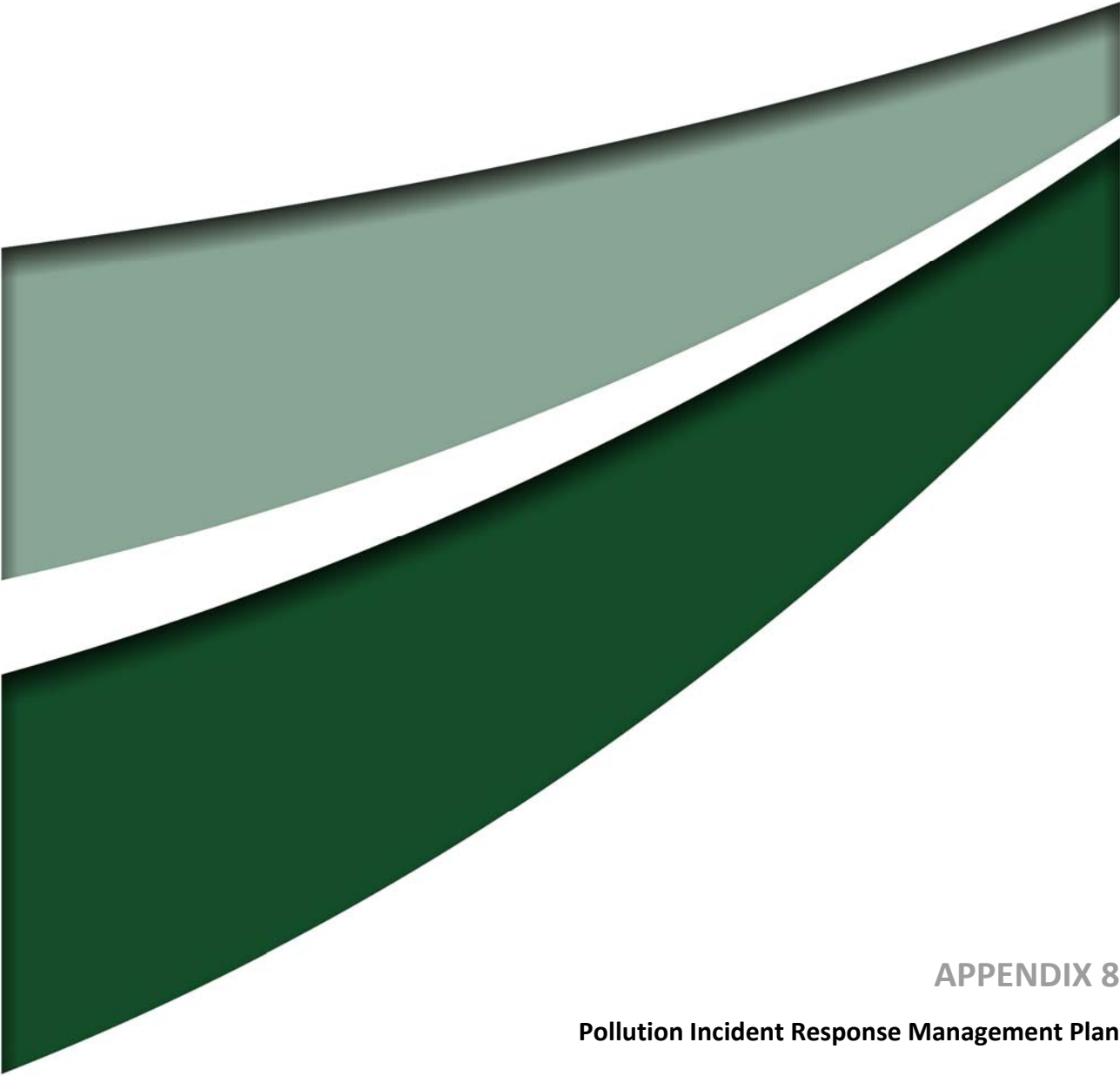
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APPENDIX 8

Pollution Incident Response Management Plan



POLLUTION INCIDENT RESPONSE MANAGEMENT PLAN

FOR EPL 13218

FINAL

July 2016



POLLUTION INCIDENT RESPONSE MANAGEMENT PLAN

FOR EPL 13218

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Mackas Sand

Project Director: Peter Jamieson
Project Manager: Brendan Rice
Report No. 1646/R67/V1
Date: July 2016



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Appendices

Appendix 1 Environmental Risk Assessment

1.0 Introduction

1.1 Background and Scope

The Protection of the Environment Legislation Amendment Act 2011 (POELA Act) received assent on 16 November 2011 resulting in changes to the Protection of the Environment Operations Act 1997 (POEO Act). The intent of the POELA Act is to improve the way pollution incidents are reported and managed. Provisions include a requirement for holders of an Environmental Protection Licence (EPL) to prepare, keep, test and implement a Pollution Incident Response Management Plan (PIRMP). The specific requirements for PIRMPs are set out in Part 5.7A of the POEO Act and the Protection of the Environment Operations (General) Regulation 2009 (POEO(G) Regulation). In summary, this legislation requires the following:

- holders of an EPL must prepare a Pollution Incident Response Management Plan (section 153A POEO Act);
- the plan must include the information detailed in the POEO Act (section 153C) and the POEO(G) Regulation (clause 98C) and be in the form required by the POEO(G) Regulation (clause 98B);
- licensees must keep the plan at the premises to which the EPL relates (section 153D, POEO Act);
- licensees must test the plan at least every 12 months and after a pollution incident in accordance with the POEO(G) Regulation (clause 98E); and
- if a pollution incident occurs in the course of an activity so that material harm to the environment is caused or threatened within the meaning of Part 5.7 of the POEO Act, licensees must immediately implement the plan (section 153F, POEO Act).

This PIRMP document has been developed to satisfy requirements of the POEO Act and covers EPL 13218 held by Mackas Sand.

This document also details the procedures for notification of pollution incidents resulting in or having the potential to cause material harm to the environment. The notification of environmental incidents under this PIRMP is only required for those incidents causing or threatening to result in material environmental harm (a material harm incident) as defined in the POEO Act (see **Section 5.0**).

1.2 Regulatory Requirements

Specific detail is required for inclusion in the PIRMP. Table 1.1 lists information mandated under Section 153C of the POEO Act and clause 98C of the POEO(G) Regulation and details where this information is located in this document.

Table 1.1 PIRMP Requirements and where they are addressed in this Document

Section 153C	Detail Required	Location in Document
(a)	<p>The procedures to be followed by the holder of the relevant EPL in notifying a pollution incident to:</p> <ul style="list-style-type: none"> (i) The owners or occupiers of premises in the vicinity of the premises to which the EPL relates, and (ii) The local authority for the area in which the premises to which the EPL relates are located and any area affected, or potentially affected, by the pollution, and (iii) Any persons or authorities required to be notified by Part 5.7 (of the POEO Act). 	Section 5.2
(b)	A detailed description of the action to be taken, immediately after a pollution incident, by the holder of the relevant EPL to reduce or control any pollution.	Section 4.0
(c)	The procedures to be followed for co-ordinating, with the authorities or persons that have been notified, any action taken in combating the pollution caused by the incident and, in particular, the persons through whom all communications are to be made.	Section 5.2
(d)	<p>Any other matter required by the Protection of the Environment Operations (General) Regulation 2009 (as set out below):</p> <p><i>98C (1)(a)</i></p> <p><i>A description of the hazards to human health or the environment associated with the activity to which the licence relates (the “relevant activity”).</i></p>	Section 2.2
	<p><i>98C (1)(b)</i></p> <p><i>The likelihood of any such hazards occurring, including details of any conditions or events that could, or would, increase that likelihood.</i></p>	Section 2.2
	<p><i>98C (1)(c)</i></p> <p><i>Details of the pre-emptive action to be taken to minimise or prevent any risk of harm to human health or the environment arising out of the relevant activity.</i></p>	Section 4.0
	<p><i>98C (1)(d)</i></p> <p><i>An inventory of potential pollutants on the premises or used in carrying out the relevant activity.</i></p>	Section 2.3
	<p><i>98C (1)(e)</i></p> <p><i>The maximum quantity of any pollutant that is likely to be stored or held at particular locations (including underground tanks) at or on the premises to which the licence relates.</i></p>	Section 2.3

Section 153C	Detail Required	Location in Document
	<p>98C (1)(f)</p> <p><i>A description of the safety equipment or other devices that are used to minimise the risks to human health or the environment and to contain or control a pollution incident.</i></p>	Section 4.0
	<p>98C (1)(g)</p> <p><i>The names, positions and 24-hour contact details of those key individuals who:</i></p> <p><i>(i) are responsible for activating the plan, and</i></p> <p><i>(ii) are authorised to notify relevant authorities under section 148 of the POEO Act, and</i></p> <p><i>(iii) are responsible for managing the response to a pollution incident.</i></p>	Section 3.2
	<p>98C (1)(h)</p> <p><i>The contact details of each relevant authority referred to in section 148 of the POEO Act.</i></p>	Section 5.2
	<p>98C (1)(i)</p> <p><i>Details of the mechanisms for providing early warnings and regular updates to the owners and occupiers of premises in the vicinity of the premises to which the licence relates or where the scheduled activity is carried on.</i></p>	Section 5.3
	<p>98C (1)(j)</p> <p><i>The arrangements for minimising the risk of harm to any persons who are on the premises or who are present where the scheduled activity is being carried on.</i></p>	Section 4.0
	<p>98C (1)(k)</p> <p><i>A detailed map (or set of maps) showing the location of the premises to which the licence relates, the surrounding area that is likely to be affected by a pollution incident, the location of potential pollutants on the premises and the location of any stormwater drains on the premises.</i></p>	<p>Figure 1.1</p> <p>Note: No stormwater drains are located on the premises.</p>
	<p>98C (1)(l)</p> <p><i>A detailed description of how any identified risk of harm to human health will be reduced, including (as a minimum) by means of early warnings, updates and the action to be taken during or immediately after a pollution incident to reduce that risk.</i></p>	Section 4.0; and Section 5.3

Section 153C	Detail Required	Location in Document
	<p><i>98C (1)(m)</i> <i>The nature and objectives of any staff training program in relation to the plan.</i></p>	Section 6.1
	<p><i>98C (1)(n)</i> <i>The dates on which the plan has been tested and the name of the person who carried out the test.</i></p>	Section 6.2
	<p><i>98C (1)(o)</i> <i>The dates on which the plan is updated.</i></p>	Section 6.2
	<p><i>98C (1)(p)</i> <i>The manner in which the plan is to be tested and maintained.</i></p>	Section 6.2

2.0 Premises Details

2.1 Site Details

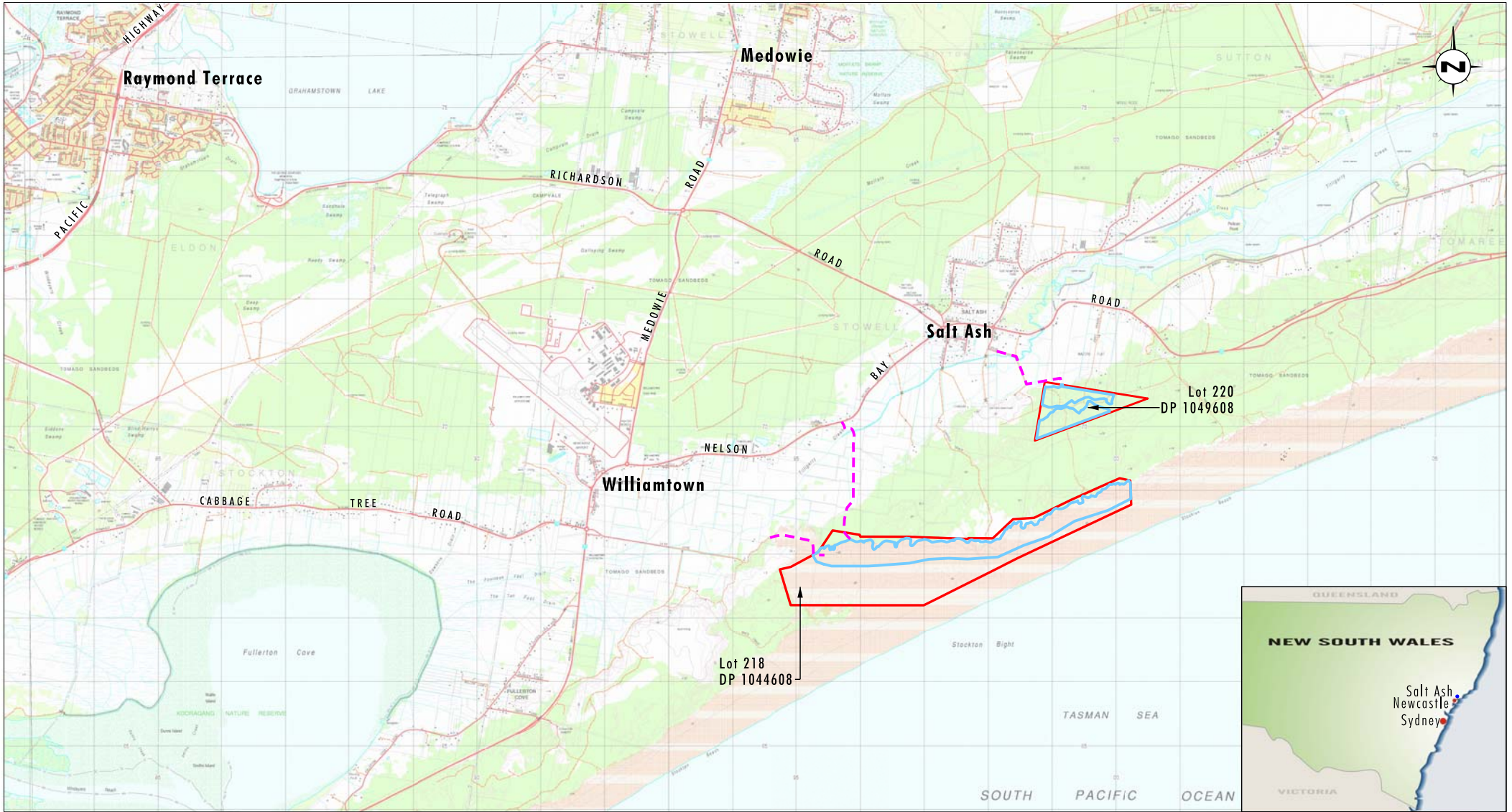
Mackas Sand was granted Project Approval (PA) 08_0142 in September 2009 by the Minister for Planning under Part 3A of the Environmental Planning and Assessment Act 1979 to operate sand extraction operations at Salt Ash, approximately 25 kilometres north-east of Newcastle, in the Port Stephens local government area of New South Wales (refer to **Figure 2.1**). PA 08_0142 was modified on 30 September 2013 to incorporate an alternate access route to Lot 218, and temporarily lower the quarry floor (PA 08_0142 MOD 1). Mackas Sand operations are regulated through PA 08_0142 MOD 1, EPL 13218, approval under the Hunter Water Regulation 2010, and EPBC 2011/6214. The operation is serviced by the Mackas Sand and Soils administration and workshop facilities which are located off site, and are regulated under a separate EPL, being EPL 12108.

A second modification to PA 08_0142, (MOD2), was approved by the PAC on 16 March 2016. The modification allows for an increase in maximum hourly truck movements (in and out) of Lot 218 via the approved alternate access road.

The site is located within the coastal zone of Stockton Bight, is part of the North Stockton Catchment Area and is predominantly surrounded by rural residential land and remnant bushland which may potentially be impacted by a pollution incident as a result of operations.

Stockton Bight has a high conservation value due to its rich Aboriginal cultural heritage and archaeological value, and habitat for threatened and endangered species. Ownership of Lots 218 and 220 was transferred to Worimi Local Aboriginal Lands Council (WLALC) in 2001 in accordance with the provisions of Section 36 of the Aboriginal Land Rights Act 1983. In February 2007, the Worimi Conservation Lands were proclaimed, forming a 4438 hectare conservation area that includes Worimi State Conservation Area, Worimi National Park and Worimi Regional Park. The conservation lands are now leased back to the government under an agreement that allows for the lands to be co-managed between the WLALC and the government. The agreement intends to provide for the protection of the cultural and natural heritage values of the Stockton Bight landscape, while allowing for safe and sustainable recreational and commercial use of the area by the broader community.

Utilisation of the sand resources within Lots 218 and 220 is a key element of WLALC cultural development program as it will provide a long-term source of income to facilitate implementation of the program.



Source: Department of Lands (2006)

0 1 2 4 km
1:85 000

Legend

- ▭ Lot Boundaries
- ▭ Approval Areas
- - - Approved Site Access

FIGURE 2.1

Locality Plan

2.2 Main Hazards

The potential main hazards relevant to this PIRMP which have been identified for Mackas Sand operations are:

- spills (e.g. hydrocarbon, chemicals, greases and oils etc.) resulting in land contamination; and
- spills (e.g. hydrocarbon, chemicals, saline or sediment laden water, etc.) resulting in contamination of water bodies (including groundwater).

The likelihood of environmental hazards occurring at Mackas Sand has been captured through an internal risk assessment undertaken by Umwelt (Australia) Pty Limited (Umwelt) (**Appendix 1**). The purpose of the risk assessment is to identify the environmental aspects and impacts resulting from operations at Mackas Sand. The risk assessment also identifies the potential hazards and the controls necessary to effectively manage. The hazards which have been identified with a moderate or higher risk ranking have been included in this PIRMP and are considered the main hazards for the operation.

2.3 Chemicals and Potential Pollutants

No chemicals or potential pollutants are stored at either Lot 220 or Lot 218.

Fuel is stored at the Mackas Sand and Soil administration and workshop facilities (refer to **Figure 2.1**) and is transported to the extraction sites when equipment requires refuelling. The fuel transport facilities have been designed and constructed to reduce the likelihood of potential pollution incidents. Spill kits are also available to all vehicles and operating equipment entering the extraction area.

The main chemicals likely to be stored at Mackas Sand and Soil administration and workshop facilities include:

- diesel (56,000 litre storage capacity);
- waste oil (up to 2,000 litres capacity with a total capacity of 2,500 litres); and
- hydraulic oil, greases and lubricants stored in containers with a capacity not exceeding 1,000 litres storage capacity.

The above are accompanied by the relevant Material Safety Data Sheets (MSDS) as required by work health and safety regulations.

The facilities that store fuel, oil and hazardous chemicals have been designed to reduce the likelihood of potential pollution incidents. The systems in place incorporate:

- roofed and bunded diesel storage area;
- bunding has sufficient capacity to maintain 110 per cent of the volume of the tank; and
- waste oil and hydraulic oil stored in the workshop and administration shed.

Refuelling of mobile equipment occurs off-site, including at the Mackas Sand and Soil administration and maintenance facility. Mackas Sand uses sieves and/or stockpilers at Lot 220 and Lot 218 that have limited mobility, being moved once or twice a year. Refuelling of plant with limited mobility off-site is not considered feasible. As such, refuelling of plant with limited mobility occurs within the extraction areas via

the usage of mobile refuelling equipment. In order to minimise the risk of fuel spills, and the impact of spills should they occur, refuelling equipment consists of a fuel tank, spill catch tray and spill kit. An additional mobile spill kit is located within the extraction area to enable prompt clean up in the event of a spill during refuelling activities. Any spills, should they occur, will be managed and contaminated material will be disposed of in accordance with relevant waste management requirements. Incidents that harm, or have potential to harm the environment will be managed in accordance with **Section 4.0**.

3.0 Management and Responsibilities

3.1 Legal Duty to Notify

All employees and contractors are responsible for alerting management personnel to all environmental incidents or hazards which may result in an environmental impact, regardless of the nature or scale.

Notification responsibilities are detailed in the POEO Act 1997 (Section 148), which encompasses all site personnel, including contractors and sub-contractors. These can be categorised broadly as:

- The duty of employee or any person undertaking an activity:

Any person engaged as an employee or undertaking an activity must, immediately after becoming aware of any potential incident that is believed to cause or threatens to cause material harm to the environment, notify the Quarry Manager of the incident and all relevant information about it. This is to be undertaken as per **Section 5.2**.

- The duty of the employer or occupier of a premises to notify:

An employer or occupier of the premises on which the incident occurs, who is notified (or otherwise becomes aware of) a potential pollution incident, must undertake notification to the appropriate regulatory authority of any 'material harm incidents', including relevant information. Notification shall be undertaken by the Quarry Manager.

3.2 PIRMP Management

The specific responsibilities associated with the management and implementation of the PIRMP is outlined in **Table 3.1**.

Table 3.1 PIRMP Management Responsibilities

Name	Contact Details	Position	Responsibility
Robert Mackenzie	0408 490 911	Quarry Manager	<ul style="list-style-type: none"> • Determination and notification of material harm incidents to relevant authorities/stakeholders. • Providing information as requested from relevant government agencies. • Undertaking testing/updating of the PIRMP. • Completing relevant training in regards to the implementation of the PIRMP, as required. • Authorising the PIRMP and subsequent amendments.

4.0 Incident Management

A pollution incident is defined in the POEO Act as an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which a substance has been placed or disposed of on premises, but it does not include an incident or set of circumstances involving only the emission of noise.

In the case of an environmental incident, prior to any other action, the site must contact Fire and Rescue New South Wales (NSW) (1300 729 579 or 000) if the incident presents an immediate threat to human health or property. Fire and Rescue NSW are the first responders, as they are responsible for controlling and containing incidents. Where there is no threat to human health or services, Fire and Rescue NSW must still be contacted for information purposes, but as the last point of contact as detailed in **Section 5.2**.

All possible actions should be taken to control the pollution incident in order to minimise health, safety and environmental consequences. These actions, to the maximum extent possible, aim to:

- provide for the safety of people at and within the vicinity of the site, and
- contain the pollution incident.

The following actions are to be implemented in the event of an incident including:

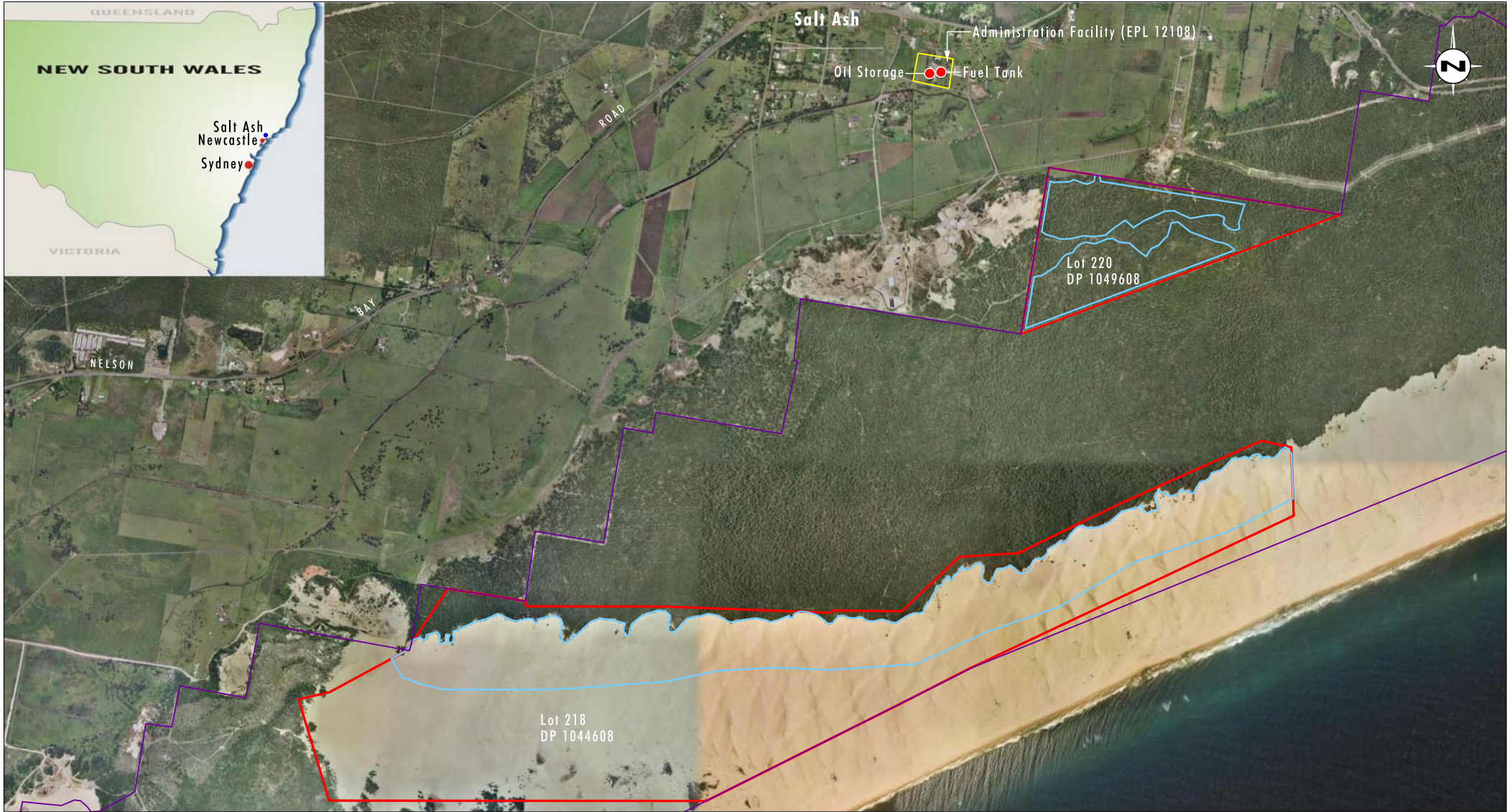
1. secure the scene and contain the incident;
2. undertake notification of material harm incident (as required);
3. gather information (i.e. environmental monitoring);
4. undertake investigation into the cause of the incident;
5. review and classify information from investigation and identify any ongoing actions; and
6. implement those actions identified.

Incident management at Mackas Sand focuses on actions to:

- provide and maintain response resources, including equipment and/or training to minimise the environmental impacts associated with the incident;
- establish that response operations are carried out in a safe, well-organised, legal and effective fashion;
- provide for the safety and welfare of all responders, employees, contractors and visitors (where applicable);
- continuously assess the incident to determine the adequacy of incident response operations;
- minimise effects on people, the environment, property, production, and company reputation; and
- where necessary, utilise environmental monitoring to quantify impacts as a result of the incident.

With regards to the main hazards identified in **Section 2.2**, the following actions shall be undertaken in the event of a spill (including hydrocarbons, greases, oils etc) resulting in land or water contamination:

1. Identify the substance and control the spill by isolating the source.
2. Contain and clean up the spill by utilising spill kits located on the site. If the spill is too large to clean up immediately, a temporary bund will be constructed around the immediate area of the spill in order to reduce the lateral spread of free hydrocarbon.
3. Dispose of the waste in accordance with the MSDS and if required, organise for the waste to be removed by a licensed waste contractor.



Source: Google Earth

0 0,5 1,0 1,5 km
1:30 000

- Legend**
- ▭ EPL 13218 Premises Boundary
 - ▭ EPL 12108 Premises Boundary
 - ▭ Approved Extraction Areas
 - ▭ North Stockton Catchment Area
 - Location of Potential Pollutants

FIGURE 4.1

Potential Impact Area and Location of Potential Pollutants

5.0 Notification Procedures

5.1 Definition of Material Harm

Following containment of the incident, immediate action must be taken to determine if the incident can be classified as a 'material harm incident'. As defined by Section 147 of the POEO Act, a material harm incident has occurred if the incident:

- involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial; or
- results in actual or potential loss (including all reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment) or property damage of an amount, or amounts in aggregate, exceeding \$10,000.00 (or such other amount as is prescribed by the regulations).

It is possible for a material harm incident to occur on land that is within the boundary of the EPL. The determination of a material harm incident will be made by the Quarry Manager at the time of the incident.

5.2 Internal and External Notification

As discussed in **Section 3.1**, notification of an environmental incident is the responsibility of all site and contractor personnel. In the event of a 'material harm incident', response and notification must be undertaken as per **Table 5.1**. Note the agencies listed in **Table 5.1** must be contacted immediately.

Table 5.1 PIRMP Notification Requirements

Agency	Contact Details
Fire and Rescue NSW	1300 729 579 or 000 (To be contacted first if the incident presents an immediate threat to human health or property and emergency services are required. Fire and rescue to be contacted last if emergency response is not required.)
Environment Protection Authority – Environment Line	131 555
Ministry of Health (ask to speak to the Environmental Health Officer)	Work Hours: (02) 6841 5569 After Hours: (02) 6885 8666 Mobile: 0418 866397
WorkCover	13 10 50
Port Stephens Council	Work Hours: (02) 4980 02255 After Hours: 0408 493 378

The Secretary and other relevant agencies are to be notified, as per 08_0142 Schedule 5, Condition 2 within 24 hrs after detecting the incident.

- Department of Planning and Environment - (02) 9228 6333 (Sydney Office) or via email.

On the identification of an environmental incident or hazard, personnel will report the issue immediately to their manager, who in turn shall report it to the Quarry Manager on site. Immediately is taken to mean 'promptly and without delay'. **The decision on whether to notify the incident in accordance with Part 5.7 of the POEO Act should not delay immediate actions to provide the safety of people or contain a pollution incident. However, incident notification will be made as soon as it is safe to do so¹.**

After initial notification of any 'material harm incident', it will be the responsibility of the Quarry Manager to liaise with any authority listed in **Table 5.1** that requests additional information, or is providing directions for management of the 'material harm incident'. This may include incident investigation reports and ongoing environmental monitoring results.

5.3 Notification to Local Landholders and Community

Community notification shall be undertaken at the determination of the Quarry Manager or Fire and Rescue (as relevant) and may be based on environmental monitoring results.

The following notification methodology is proposed to be utilised as required:

- early warnings: same day telephone notification to landholders whom may be affected by the incident over the subsequent 24 hour period; and
- updates: follow up phone calls to all landholders who received an early warning notification or now require notification will be undertaken by relevant personnel. Updates are to be provided, as considered necessary, to the broader local community in affected areas via information sheets or newsletters, Community Consultative Committee meetings, Mackas Sand website, media statements or any other strategy as determined appropriate by the Quarry Manager.

Information provided to the community will be relevant to the incident and may include the following details:

- type of incident that has occurred;
- potential impacts on the local landholders and the community;
- site contact details; and
- advice or recommendations based on the incident type and scale.

¹ EPA, *Frequently Asked Questions Regarding the Duty to Notify of a Pollution Incident* (March 2012) <<http://www.environment.nsw.gov.au/legislation/poefagsnotify.htm>>

6.0 Training, Testing and Communication

6.1 Training

The contents of this document will be included in site inductions. All site personnel and contractors shall be made aware of their reporting requirements with regards to environmental incidents.

6.2 Testing, Review and Maintenance

Testing of the PIRMP will be undertaken to check that the information is accurate and current and that the plan is capable of being implemented in a workable and effective manner. Testing shall be undertaken in the following ways:

1. The PIRMP will be tested by assessing and reviewing it and making any necessary changes as required. Testing is taken to be either a desktop review or an environmental emergency drill procedure. Testing will include all components of the plan, including training requirements.
2. A review of the PIRMP will occur every 12 months commencing from the date of authorisation by the Quarry Manager. Dates on which the plan has been tested are shown in **Table 6.1**.
3. The PIRMP will be reviewed within one month from the date of any pollution incident that occurs in the course of an activity to which the EPL relates. This review will be undertaken in light of the incident, to provide the information included in the plan is accurate and up to date and the plan is still capable of being implemented in a workable and effective manner.

Records of testing and review will be included in **Table 6.1** of this plan, including:

- the manner in which the test was undertaken;
- dates when the plan has been tested;
- the person who carried out the testing; and
- the date and description of any update of or amendment to the plan.

Table 6.1 PIRMP Testing Dates

Date of Test	Name of Personnel Undertaking Test/Review	Manner of Testing	Summary of Changes (include brief detail and section number)	Date of Document Update
17/01/2014	Andy Goodwin	Desktop Review	Section 2.1 – inclusion of MOD 1. Section 2.3 – updated refuelling procedure to reflect updated Soil & Water Management Plan	20/01/2014

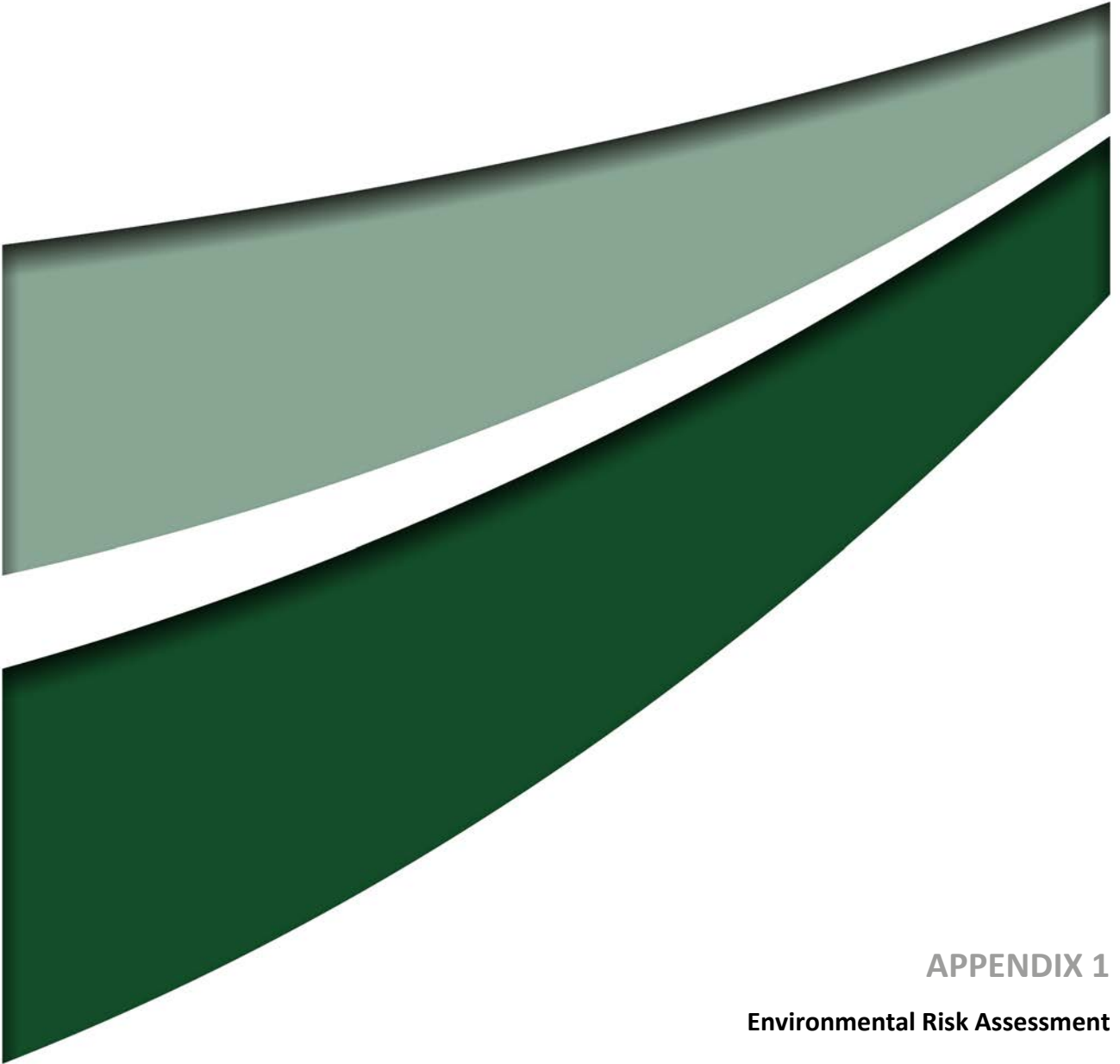
Date of Test	Name of Personnel Undertaking Test/Review	Manner of Testing	Summary of Changes (include brief detail and section number)	Date of Document Update
04/05/2016	Brendan Rice	Desktop Review	Section 2.1 – inclusion of MOD2. Inclusion of Appendix 1 (Environmental Risk Assessment). Section 5.2 – Agency contact details updated.	04/05/2016

6.3 Availability of the PIRMP

The PIRMP shall be kept in written form at each of the EPL premises and shall be made available to all personnel responsible for implementing the plan, and to an authorised officer (as defined in the POEO Act) on request.

The PIRMP will be made publicly available within 14 days of approval by the Quarry Manager and following any subsequent revisions.

No personal information (within the meaning of the Privacy and Personal Information Protection Act 1998) will be made publicly available as part of the PIRMP.



APPENDIX 1

Environmental Risk Assessment

Table 1. Qualitative Measures of Environmental Consequence

Severity Level	Natural Environment	Legal/Government	Heritage	Community/Reputation/ Media
(1) Insignificant	Limited damage to minimal area of low significance.	Low-level legal issue. On the spot fine. Technical non-compliance prosecution unlikely. Ongoing scrutiny/attention from regulator.	Low-level repairable damage to commonplace structures.	Low level social impacts. Public concern restricted to local complaints. Could not cause injury or disease to people.
(2) Minor	Minor effects on biological or physical environment. Minor short-medium term damage to small area of limited significance.	Minor legal issues, non-compliances and breaches of regulation. Minor prosecution or litigation possible. Significant hardship from regulator.	Minor damage to items of low cultural or heritage significance. Mostly repairable. Minor infringement of cultural heritage values.	Minor medium-term social impacts on local population. Could cause first aid injury to people. Minor, adverse local public or media attention and complaints.
(3) Moderate	Moderate effects on biological or physical environment (air, water) but not affecting ecosystem function. Moderate short-medium term widespread impacts (e.g. significant spills).	Serious breach of regulation with investigation or report to authority with prosecution or moderate fine possible. Significant difficulties in gaining approvals.	Substantial damage to items of moderate cultural or heritage significance. Infringement of cultural heritage/scared locations.	Ongoing social issues. Could cause injury to people, which requires medical treatment. Attention from regional media and/or heightened concern by local community. Criticism by Non Government Organisations. Environmental credentials moderately affected.

Severity Level	Natural Environment	Legal/Government	Heritage	Community/Reputation/ Media
<p>(4) Major</p>	<p>Serious environmental effects with some impairment of ecosystem function. Relatively widespread medium-long term impacts.</p>	<p>Major breach of regulation with potential major fine and/or investigation and prosecution by authority. Major litigation. Project approval seriously affected.</p>	<p>Major permanent damage to items of high cultural or heritage significance. Significant infringement and disregard of cultural heritage values.</p>	<p>On-going serious social issues. Could cause serious injury or disease to people. Significant adverse national media/public or NGO attention. Environment/management credentials significantly tarnished.</p>
<p>(5) Catastrophic</p>	<p>Very serious environmental effects with impairment of ecosystem function. Long term, widespread effects on significant environment (e.g. national park).</p>	<p>Investigation by authority with significant prosecution and fines. Very serious litigation, including class actions. License to operate threatened.</p>	<p>Total destruction of items of high cultural or heritage significance. Highly offensive infringement of cultural heritage.</p>	<p>Very serious widespread social impacts with potential to significantly affect the well being of the local community. Could kill or permanently disable people. Serious public or media outcry (international coverage). Damaging NGO campaign. Reputation severely tarnished. Share price may be affected.</p>

Table 2. Qualitative Measure of Likelihood

Level	Descriptor	Description	Guideline
A	Almost Certain	Consequence is expected to occur in most circumstances.	Occurs more than once per month.
B	Likely	Consequence will probably occur in most circumstances.	Occurs once every 1 month – 1 year.
C	Occasionally	Consequence should occur at some time.	Occurs once every 1 year – 10 years.
D	Unlikely	Consequence could occur at some time.	Occurs once every 10 years – 100 years.
E	Rare	Consequence may only occur in exceptional circumstances.	Occurs less than once every 100 years.

Source: AS/NZS 4360:2004 Risk Management.

Table 3. Qualitative Risk Matrix²

Likelihood of the Consequence	Maximum Reasonable Consequence				
	(1) Insignificant	(2) Minor	(3) Moderate	(4) Major	(5) Catastrophic
(A) Almost certain	High	High	Extreme	Extreme	Extreme
(B) Likely	Moderate	High	High	Extreme	Extreme
(C) Occasionally	Low	Moderate	High	Extreme	Extreme
(D) Unlikely	Low	Low	Moderate	High	Extreme
(E) Rare	Low	Low	Moderate	High	High

Source: AS/NZS 4360:2004 Risk Management

Table 4. Mackas Sand Environmental Risk Assessment

Activity	Aspect	Potential Impact	Status and Implemented Control	Risk Assessment with Controls Implemented			Further Assessment Requirements or Ongoing Actions
				C	L	R	
General Operations	Ground Disturbance	Loss of Native Flora and Fauna and/or impact to groundwater	<ul style="list-style-type: none"> No ground disturbance outside approved disturbance limits will be undertaken without appropriate regulatory approval. 	2	D	L	Should ground disturbance be required outside the current approved disturbance area, an environmental assessment will be undertaken as require by regulatory authorities for this activity.
		Sedimentation of water ways	<ul style="list-style-type: none"> Appropriate erosion and sediment control measures to be adhered to. Monitoring and maintenance of onsite sediment/ runoff dam to be ongoing. Erosion and sediment controls implemented and maintained as required. 	2	E	L	Erosion and sediment controls will be inspected as part of routine site activities.
	Water Quality	Contamination of groundwater quality.	<ul style="list-style-type: none"> Groundwater quality monitoring is undertaken both upstream and downstream of the quarry to assist in identification of potential impacts resulting from operations at the quarry. 	4	D	H	Groundwater monitoring data to be reviewed to identify any potential impacts from operations undertaken at Mackas Sand.

Activity	Aspect	Potential Impact	Status and Implemented Control	Risk Assessment with Controls Implemented			Further Assessment Requirements or Ongoing Actions
	Fire		<ul style="list-style-type: none"> Fire management equipment will be maintained on site and appropriate training will be made available to all staff. 	2	D	L	Fire equipment will be maintained on site. Ongoing training will be provided as necessary.
Equipment Refuelling and Maintenance	Hydrocarbon spills during equipment operation	Spill to land/water	<ul style="list-style-type: none"> Regular maintenance and inspections will be undertaken of all equipment in operation. Spill kits will be maintained on site. Training will be made available to all staff as required. Water diversions are installed and sedimentation ponds have been constructed to capture a 1 in 100 year storm event. 	2	B	H	Maintenance of equipment and inspections of controls including water diversions and sedimentation ponds will be ongoing throughout operations.
Hydrocarbon Storage (including Diesel, Hydraulic oil, Greases and other Oils)	Damage to storage tanks.	Spill to land/water	<ul style="list-style-type: none"> Storage tanks to be positioned on an impervious surface and within bunding of a capacity determined appropriate through relevant Australian Standards and other guidelines. Regular maintenance and inspections will be undertaken on storage tank integrity. 	3	E	M	As above

Activity	Aspect	Potential Impact	Status and Implemented Control	Risk Assessment with Controls Implemented			Further Assessment Requirements or Ongoing Actions
Quarry Operations	Explosion from unexploded ordnance	Release of dust into atmosphere.	<ul style="list-style-type: none"> Employees aware of hazard and trained in action of discovery. 	3	E	M	
		Inadvertent combustion.	<ul style="list-style-type: none"> As above. Fire management equipment will be maintained on site and appropriate training will be made available to all staff as necessary. 	1	E	L	Maintenance of equipment will be ongoing throughout operations.

Notes: C = Consequence, L = Likelihood, R = Risk.



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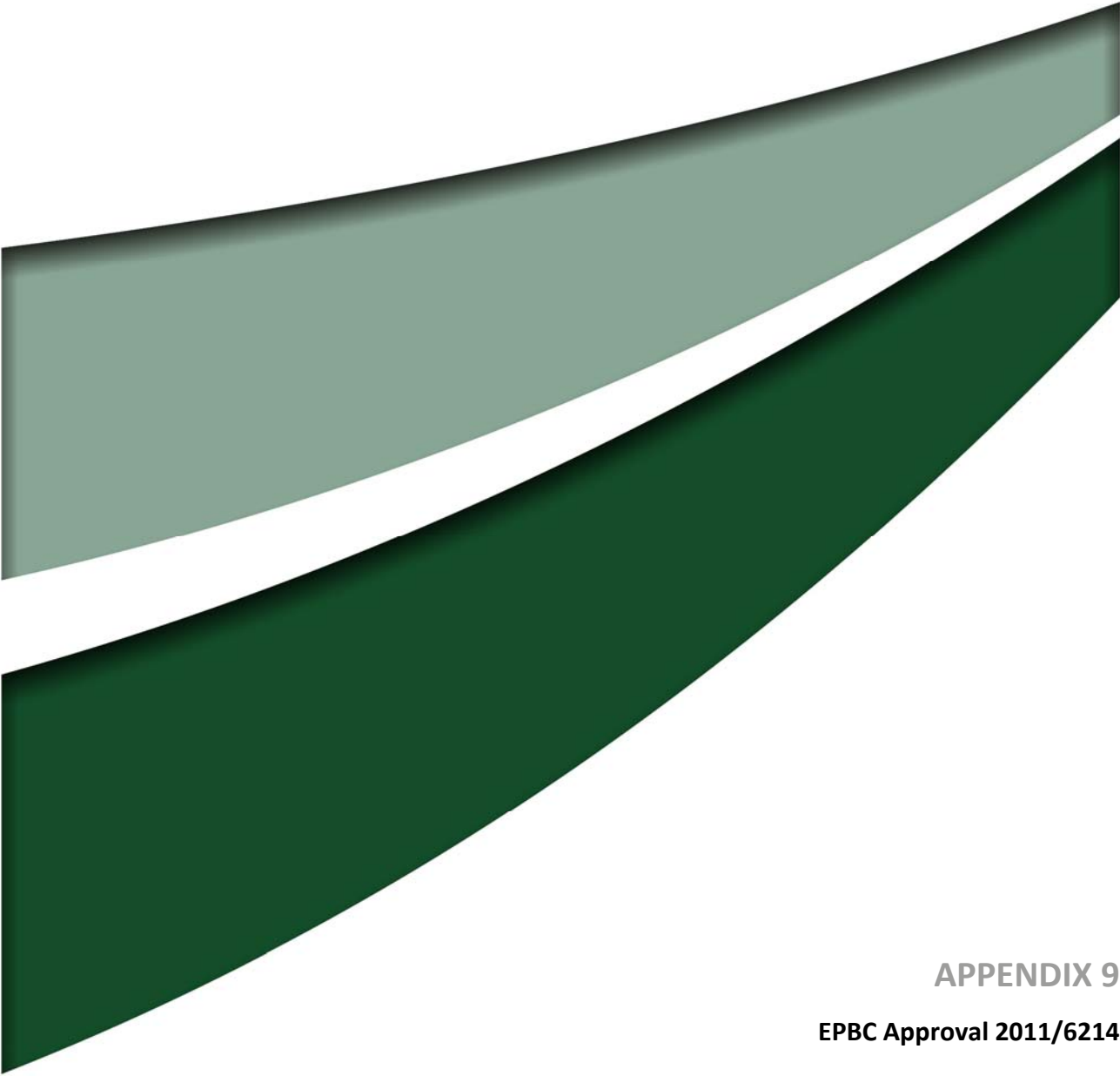
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APPENDIX 9

EPBC Approval 2011/6214



Approval

Construction of an alternate route to Lot 218 Salt Ash, NSW (EPBC 2011/6214)

This decision is made under sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*.

Action

person to whom the approval is granted Mackas Sand Pty Ltd

proponent's ACN ACN: 122 903 860

action To construct and utilise an alternate haul route from Nelson Bay Road to access the approved sand extraction area (Figure1) [see EPBC Act referral 2011/6214]

Approval decision

Controlling Provision	Decision
Listed threatened species and communities (sections 18 & 18A)	Approved

conditions of approval

This approval is subject to the conditions specified below.

expiry date of approval

This approval has effect until 31 December 2029.

Decision-maker

name and position Deb Callister
 Assistant Secretary
 Queensland and Sea Dumping Assessment Branch

signature

date of decision 29 November 2013

Conditions attached to the approval

1. The approval holder must not clear outside the approved alternate haul route area (as depicted at Figure 1 and coordinates). The approval holder must not clear more than 0.37 hectares of habitat for Newcastle Doubletail (*Diuris praecox*), Leafless Tongue-orchid (*Cryptostylis hunteriana*), New Holland Mouse (*Pseudomys novaehollandiae*), Long-nosed Potoroo (*Potorous tridactylus tridactylus*), Spot-tailed Quoll (*Dasyurus maculatus maculatus*), Grey-headed Flying-fox (*Pteropus poliocephalus*) and Large-eared Pied Bat (*Chalinolobus dwyeri*), Regent Honeyeater (*Anthochaera phrygia*) and Swift Parrot (*Lathamus discolor*).
2. The approval holder must submit a **Landscape Management Plan** for the alternate haul route area to the Minister within six months of the date of this approval or before any vegetation clearing of the alternate haul route area, whichever is sooner.
3. The **Landscape Management Plan** must specify:
 - (a) pre-clearance surveys that will be undertaken before any vegetation clearing of the alternate haul route area
 - (b) weed monitoring and management measures, including ongoing monitoring parameters, frequencies, triggers, corrective actions, timing and scope for the duration of the project approval; and
 - (c) rehabilitation measures with the objective of re-establishing the Coastal Sand Apple-Blackbutt Forest community.
4. Details of how the **Landscape Management Plan** will be monitored, reviewed and implemented must be provided to the Minister.

Note: The Minister may determine that a plan, strategy or program approved by the Director-General of the Department of Planning (NSW) satisfies a plan, strategy or program required by these conditions.
5. To aid safe movement of the following ground dwelling, gliding and arboreal species across the alternate haul road, the proponent must:
 - (a) ensure a speed limit of 40km/ph applies for all vehicles using the proposed alternate haul road; and
 - (b) limit night traffic, consistent with the requirements of the **Operating Conditions and Operating Hours** as specified in the **Environmental Assessment Modifications**.
5. Within 30 days after the **commencement of the action**, the person taking the action must advise the **Department** in writing of the actual date of commencement.
6. By 1 September of each year after the **commencement of the action**, the approval holder must publish a report on their website addressing compliance with the conditions of this approval over the previous 12 months, including implementation of any management plans as specified in the conditions. Non-compliance with any of the conditions of this approval must be reported to the **Department** at the same time as the compliance report is published.
7. Upon the direction of the **Minister**, the approval holder must ensure that an independent audit of compliance with the conditions of approval is conducted and a report is submitted to the **Minister**. The independent auditor must be approved by the **Minister** prior to the commencement of the audit. Audit criteria must be agreed to by the **Minister** and the audit report must address the criteria to the satisfaction of the **Minister**.

8. If at any time after five years from the date of this approval, the approval holder has not substantially **commenced the action**, then the approval holder must not commence the action without the written agreement of the Minister.
9. If the **Minister** believes that it is necessary or convenient for the better protection of threatened species and threatened ecological communities (s.18 & s.18A of the **EPBC Act**) to do so, the **Minister** may request that the approval holder make specified revisions to the plans approved pursuant to the above conditions and submit the revised plan for the **Minister's** written approval. The approval holder must comply with any such request. The revised approved plan must be implemented. Unless the Minister has approved the revised plan then the person taking the action must continue to implement the plan originally approved, as specified in the conditions.
10. The approval holder must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including those measures required by this approval, and make them available upon request to the **Department**. Such records may be subject to audit by the **Department** or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department's website. The results of audits may also be published through the general media.
11. If the approval holder wishes to carry out any activity otherwise than in accordance with the **Environmental Assessment** and the **Landscape Management Plan** referred to in the above Conditions, the person taking the action may submit a revised plan for the **Minister's** approval. If the **Minister** approves the revised plan submitted, the person taking the action must implement this plan instead of the plan originally approved.
12. Unless otherwise agreed to in writing by the **Minister**, the person taking the action must publish all management plans, referred to in these conditions of approval on their website. Each management plan must be published on the website within 1 month of being approved.

Definitions:

Commenced the action - includes any preparatory works required to be undertaken including clearing vegetation, the erection of any onsite structures whether temporary or permanent and the use of heavy duty equipment

Department – is the Commonwealth department responsible for administering the EPBC Act.

EPBC Act - is the *Environment Protection and Biodiversity Conservation Act 1999*.

Environmental Assessment- is the '*Environmental Assessment modification to Mackas Sand Extraction Operations of Alternate Haul route to Lot 218 DP 1044608, Salt Ash, October 2012*' Available from:

<https://majorprojects.affinitylive.com/public/72f18d862d889724ba263cd45bc00711/Mackas%20Sand%20Project%20MOD%201%20-%20EA.pdf>

Landscape Management Plan - will be based on the '*Mackas Sand Pty Ltd Landscape Management Plan (including Rehabilitation Management Plan and Long Term Management Plan)*'.

(available from: <http://www.mackassand.com.au/>)

Minister means the Minister responsible for the administration of the EPBC Act.

Project means the construction of an alternate haul route to Lot 218, Salt Ash, NSW (EPBC 2011/6214)

Figure 1



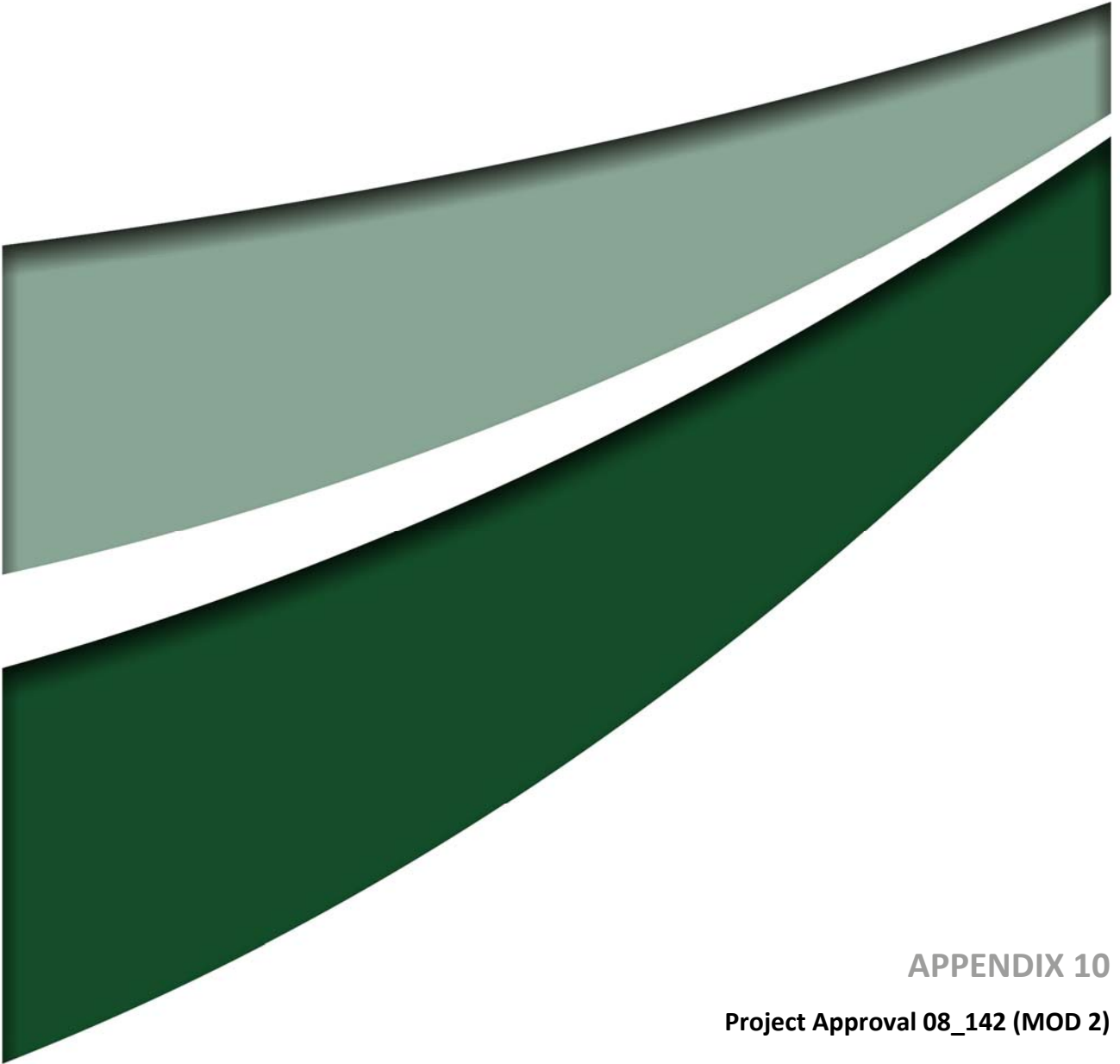
Source: Kiriakou, 2009

- Legend**
- Lot 211 Boundary
 - Lot 214 Approved Subdivision Area
 - Proposed Intermittent Location
 - Central Coast Apple - Blackbutt Forest
 - Disturbed Grassland
 - Lowland Forest/Grassland
 - Swamp Melaleuca Paperbark Forest
 - Argemone flammea/serotina*
 - Dioscorea*
 - Dioscorea*
 - Grey-tufted Mangrove
 - Little Heathcote
 - Greater Heathcote
 - Groundcover Bottlebrush

FIGURE 4.2
Alternate Haul Route Vegetation Communities
and Threatened Species Locations

Coordinates of the Nelson Bay Road alternate route

- 32.802787,151.885986
- 32.80358,151.887875
- 32.806033,151.88796
- 32.807981,151.888304
- 32.812454,151.887188
- 32.815772,151.886759
- 32.816349,151.886158
- 32.818224,151.885729
- 32.81909,151.886673



APPENDIX 10

Project Approval 08_142 (MOD 2)

Project Approval

Section 75J of the *Environmental Planning & Assessment Act 1979*

I approve the project referred to in schedule 1, subject to the conditions in schedules 2 to 5.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the on-going environmental management of the project.



The Hon Kristina Keneally MP
Minister for Planning

Sydney

20 Sept.

2009

SCHEDULE 1

Application No.:	08_0142
Proponent:	Mackas Sand Pty Limited
Approval Authority:	Minister for Planning
Land:	Extraction Areas Lot 218 DP 1044608 Lot 220 DP 1049608, Salt Ash
	Access Roads Lot 227 DP 1097995 Lot 13 DP 753192 Lot 101 DP 753192 Lot 3 DP 739188 Lot 8 DP 833768
Project:	Mackas Sand Project

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DEFINITIONS

AEMR	Annual Environmental Management Report
BCA	Building Code of Australia
CCC	Community Consultative Committee
Council	Port Stephens Council
Day	The period from 7am to 6pm on Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays
DECCW	Department of Environment, Climate Change and Water
Department	Department of Planning
DII	Department of Industry and Investment
Director-General	Director-General of Department of Planning, or delegate
DST	Daylight Saving Time
EA	Environmental Assessment titled <i>Environmental Assessment: Sand Extraction Operations from Lots 218 and 220, Salt Ash</i> (2 volumes), dated April 2009, including the response to submissions
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPL	Environment Protection Licence issued by DECCW under the <i>Protection of the Environment Operations Act 1997</i>
EST	Eastern Standard Time
Evening	The period from 6pm to 10pm
Heritage Branch	Heritage Branch of the Department
HWC	Hunter Water Corporation
Land	Land means the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this approval
Lot 218	Lot 218 DP 1044608, as shown in Appendix 1
Lot 220	Lot 220 DP 1049608, as shown in Appendix 1
Minister	Minister for Planning, or delegate
Night	The period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays
OOW	Office of Water of DECCW
PAD	Potential Archaeological Deposit
Privately-owned land	Land that is not owned by a public agency or a quarry company (or its subsidiary), other than the Hufnagl property (Lot 43 DP 247593)
Project	The development as described in the EA
Proponent	Mackas Sand Pty Limited, or its successors in title
Quarrying Operations	Includes all sand extraction, processing, and related transportation activities carried out on site
Reasonable and Feasible	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements. Feasible relates to engineering considerations and what is practical to build
Response to Submissions	The Proponent's response to issues raised in submissions titled <i>Response to Submissions, Environmental Assessment of Sand Extraction Operations from Lot 218 DP 1044608 and Lot 220 DP 1049608, Salt Ash</i> , dated July 2009
RTA	Roads and Traffic Authority
Site	The land referred to in schedule 1
Statement of Commitments	The Proponent's commitments in Appendix 2

SCHEDULE 2 ADMINISTRATIVE CONDITIONS

Obligation to Minimise Harm to the Environment

1. The Proponent shall implement all reasonable and feasible measures to prevent or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.

Terms of Approval

2. The Proponent shall carry out the project generally in accordance with the:
 - (a) EA;
 - (b) statement of commitments; and
 - (c) conditions of this approval.

Notes:

- *The general layout of the project is shown on the figures in Appendix 1;*
- *The statement of commitments is reproduced in Appendix 2.*

3. If there is any inconsistency between the above, the conditions of this approval shall prevail to the extent of the inconsistency.
4. The Proponent shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
 - (a) any reports, plans, programs or correspondence that are submitted in accordance with this approval; and
 - (b) the implementation of any actions or measures contained in these reports, plans, programs or correspondence.

Limits on Approval

5. Quarrying operations may take place on site until 31 December 2029.

Notes:

- *Under this approval, the Proponent is required to rehabilitate the site to the satisfaction of the Director-General. Consequently this approval will continue to apply in all other respects other than the right to conduct quarrying operations until the site has been rehabilitated to a satisfactory standard;*
- *The Department acknowledges that additional sand resources may exist on the site at the end of this period. Any extension of quarrying operations after this time will be subject to further approval.*

6. The Proponent shall not transport more than:
 - (a) 1,000,000 tonnes of product in a calendar year from Lot 218; and
 - (b) 1,000,000 tonnes of product in a calendar year from Lot 220.
7. The Proponent shall not undertake any extraction within:
 - (a) 2 metres of the average year groundwater level; and
 - (b) 1 metre of the highest predicted groundwater level.

Note: These groundwater levels shall be established in accordance with condition 2 of schedule 3.

Management Plans/Monitoring Programs

8. With the approval of the Director-General, the Proponent may submit any management plan or monitoring program required by this approval on a progressive basis.

Structural Adequacy

9. The Proponent shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.

Notes:

- *Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates for the proposed building works;*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the project.*

Demolition

10. The Proponent shall ensure that all demolition work is carried out in accordance with *AS 2601-2001: The Demolition of Structures*, or its latest version.

Protection of Public Infrastructure

11. The Proponent shall:
 - (a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the project; and
 - (b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the project.

Note: This condition does not apply to any road maintenance works which are covered by the Section 94 contributions described below in condition 13.

Operation of Plant and Equipment

12. The Proponent shall ensure that all plant and equipment used at the site is:
 - (a) maintained in a proper and efficient condition; and
 - (b) operated in a proper and efficient condition.

Section 94 Contributions

13. The Proponent shall pay Council contributions for roadworks in accordance with the *Port Stephens Section 94 Development Contributions Plan 2007*, as may be updated from time to time, to the satisfaction of the Director-General.

SCHEDULE 3 ENVIRONMENTAL PERFORMANCE CONDITIONS

GENERAL EXTRACTION AND PROCESSING PROVISIONS

Identification of Boundaries

1. Prior to carrying out any development on site, or as otherwise agreed by the Director-General, the Proponent shall:
 - (a) engage an independent registered surveyor to survey the boundaries of the approved limit of extraction;
 - (b) submit a survey plan of these boundaries to the Director-General; and
 - (c) ensure that these boundaries are:
 - clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits, for all boundaries other than the seaward edge of Lot 218; or
 - identifiable using an accurate Global Positioning System in a manner that allows operating staff and inspecting officers to readily identify those limits, for the seaward edge of Lot 218.

Notes:

- *The limit of extraction is shown on the figures in Appendix 1.*
- *The Department accepts that the seaward edge of the extraction area on Lot 218 may be surveyed via provision of Mapping Grid Australia 94 coordinates.*
- *The Department accepts that the boundary marking may be undertaken on a staged basis, as long as all areas subject to disturbance are appropriately marked.*

Maximum Extraction Depth Map

2. The Proponent shall:
 - (a) establish the average year and highest predicted groundwater levels for the site based on all available (and at least 12 months) site specific and HWC groundwater monitoring data;
 - (b) engage a suitably qualified and experienced expert to establish the maximum extraction depths to which extraction can be undertaken on site, to comply with condition 7 of schedule 2;
 - (c) submit a Maximum Extraction Depth Map (contour map or similar) for the project to the Director-General within 6 months of the date of this approval; and
 - (d) comply with the extraction depths specified in the map, to the satisfaction of the Director-General.
3. Within 3 months of the completion of the Independent Environmental Audit (see condition 5 of schedule 5), the Proponent shall review and update as required the Maximum Extraction Depth Map for the project to the satisfaction of the Director-General.

NOISE

Impact Assessment Criteria

4. The Proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 1.

Table 1: Noise impact assessment criteria dB(A) L_{Aeq} (15min)

Day	Evening	Night	Night (L_{A1} (1 min))	Location
39	39	40	45	R18 – 300 Nelson Bay Road
39	39	39	45	R1 – Lavis Lane residence
36	36	37	45	R19 – 316 Nelson Bay Road
36	36	35	45	R26 – Residence opp. Oakdale Farm
36	35	35	45	R27 – Hufnagl residence
35	35	36	45	R17 – 287 Nelson Bay Road
35	35	35	45	All other residences

Notes:

- *To interpret the locations referred to Table 1, see the figure in Appendix 3.*
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*
- *The noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.*

Land Acquisition Criteria

5. If the noise generated by the project exceeds the criteria in Table 2, the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 6-8 of schedule 4.

Table 2: Land acquisition criteria dB(A) L_{Aeq} (15min)

Night	Land
42	R1 to R4
41	R20 to R23
40	All other residences

Note: The notes under Table 1 apply equally to Table 2.

Cumulative Noise Criteria

6. The Proponent shall take all reasonable and feasible measures to ensure that the noise generated by the quarrying operations combined with the noise generated by other extractive industries does not exceed the following amenity criteria on any privately owned land, to the satisfaction of the Director-General:
- $L_{Aeq(11\text{ hour})}$ 50 dB(A) – Day;
 - $L_{Aeq(4\text{ hour})}$ 45 dB(A) – Evening; and
 - $L_{Aeq(9\text{ hour})}$ 40 dB(A) – Night.

Note: Cumulative noise is to be measured in accordance with the relevant procedures in the NSW Industrial Noise Policy.

Traffic Noise Impact Assessment Criteria

7. The Proponent shall take all reasonable and feasible measures to ensure that the traffic noise generated by the project does not exceed the traffic noise impact assessment criteria in Table 3.

Table 3: Traffic noise impact assessment criteria dB(A) L_{Aeq} (1 hour)

Road	Day/Evening	Night
Lavis Lane, Oakvale Road, Nelson Bay Road	60	55

Note: Traffic noise generated by the project is to be measured in accordance with the relevant procedures in DECCW's Environmental Criteria for Road Traffic Noise.

Additional Noise Mitigation Measures

8. Upon receiving a written request from:
- the owner of residence R1, if the residence is habitable in the opinion of the Director-General; or
 - the owner of any residence where operational noise monitoring shows the noise generated by the project at night is greater than or equal to:
 - 40 dB(A) $L_{Aeq(15\text{ minute})}$ for residences R1 to R4;
 - 39 dB(A) $L_{Aeq(15\text{ minute})}$ for residences R20 to R23; and
 - 38 dB(A) $L_{Aeq(15\text{ minute})}$ for all other privately-owned residences,
- the Proponent shall implement additional noise mitigation measures such as double glazing, insulation, and/or air conditioning at the residence in consultation with the landowner.

These additional mitigation measures must be reasonable and feasible.

If within 3 months of receiving this request from the landowner, the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.

Notes:

- To interpret the locations referred to in this condition, see the figure in Appendix 3.
- The noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Operating Hours

9. The Proponent shall comply with the operating hours in Table 4.

Table 4: Operating hours

Activity	Day	Time
Quarrying Operations (other than transportation)	Any day	Any time
Quarrying Operations on Lot 220 (other than transportation), when operating less than 250 metres from residence R27	Monday – Friday	7.00am to 6.00pm
	Weekends and Public Holidays	None
Transportation	Monday – Friday	6.00am to 6.00pm (EST)
		6.00am to 7.00pm (DST)
	Saturday	7.00am to 4.00pm
	Sunday and Public Holidays	None

However, the Proponent may undertake:

- (a) quarrying operations within 250 metres of residence R27 if the Proponent has an agreement with the owner of the residence to extend the hours of operation; and/or
- (b) transportation outside the hours in Table 4, to a maximum of 5.00am to 10.00pm Monday to Saturday, and 8.00am to 12.00pm on Sundays and public holidays, if the Proponent has agreements to extend the hours of transportation with all owners of privately-owned land with frontage to:
 - Lavis Lane (between the site and Nelson Bay Road), for operations on Lot 218; and/or
 - Oakvale Road (between the site and Nelson Bay Road), for operations on Lot 220, and the Proponent has advised the Department in writing of the terms of these agreements.

Notes:

- To interpret the residence location referred to in this condition, see the figure in Appendix 3.
- For the purposes of this condition, transportation includes all laden and unladen truck movements on site access roads, Lavis Lane and Oakvale Road.
- Transportation is further restricted under condition 32 below.
- Maintenance activities may be conducted outside the hours in Table 4 provided that the activities are not audible at any privately-owned residence.
- This condition does not apply to delivery of material if that delivery is required by police or other authorities for safety reasons, and/or the operation or personnel or equipment are endangered. In such circumstances, notification is to be provided to DECCW and the affected residents as soon as possible, or within a reasonable period in the case of emergency.

Noise Monitoring

10. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with DECCW, and be submitted to the Director-General for approval within 3 months of the date of this approval;
 - (b) include:
 - a description of the measures that would be implemented to minimise noise emissions from the project, with particular focus on:
 - quarrying operations within 250 metres of residences on privately-owned land;
 - transportation activities; and
 - continual improvement of noise performance;
 - a noise monitoring protocol for evaluating compliance with the relevant noise limits in this approval (including traffic noise);
 - a protocol for the investigation, notification and mitigation of identified exceedances of the relevant noise limits; and
 - a continual improvement program for investigating, implementing and reporting on reasonable and feasible measures to reduce noise generated by the project.

AIR QUALITY

Impact Assessment Criteria

11. The Proponent shall ensure that the dust emissions generated by the project do not cause additional exceedances of the air quality impact assessment criteria listed in Tables 5, 6 and 7 at any residence on privately owned land, or on more than 25 percent of any privately owned land.

Table 5: Long term impact assessment criteria for particulate matter

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	Annual	30 µg/m ³

Table 6: Short term impact assessment criterion for particulate matter

Pollutant	Averaging period	Criterion
Particulate matter < 10 µm (PM ₁₀)	24 hour	50 µg/m ³

Table 7: Long term impact assessment criteria for deposited dust

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

Operating Conditions

12. The Proponent shall ensure any visible air pollution generated by the project is assessed regularly, and that quarrying operations are relocated, modified, and/or stopped as required to minimise air quality impacts on privately-owned land, to the satisfaction of the Director-General.

Air Quality Monitoring

13. The Proponent shall prepare and implement an Air Quality Monitoring Program for the project to the satisfaction of the Director-General. This program must:
 - (a) be prepared in consultation with DECCW, and be submitted to the Director-General for approval within 3 months of the date of this approval; and
 - (b) include details of how the air quality performance of the project will be monitored, and include a protocol for evaluating compliance with the relevant air quality criteria in this approval.

Note: Initially, this program should concentrate on monitoring the dust deposition impacts of the project. However, in time, it may be expanded to include other pollutants.

METEOROLOGICAL MONITORING

14. During the life of the project, the Proponent shall ensure that there is a suitable meteorological station in the vicinity of the site that complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline.

SOIL AND WATER

Water Supply

15. The Proponent shall ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of operations to match its water supply.

Note: The Proponent is required to obtain necessary water licences for the project under the Water Management Act 2000.

Pollution of Waters

16. Except as may be expressly provided for by an EPL, the Proponent shall comply with section 120 of the *Protection of the Environment Operations Act 1997* during the carrying out of the project.

Wastewater Treatment

17. The Proponent shall manage on-site sewage to the satisfaction of Council and DECCW. The facility must comply with the requirements of the *Environment and Health Protection Guidelines – On-site Sewage Management for Single Households (1998)*.

Soil and Water Management

18. The Proponent shall prepare and implement a Soil and Water Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared in consultation with DECCW, OOW and HWC, and be submitted to the Director-General for approval within 3 months of the date of this approval; and
 - (b) include a:
 - Site Water Balance;
 - Erosion and Sediment Control Plan;

- Surface Water Monitoring Program; and
- Ground Water Monitoring Program.

Note: The Department accepts that the initial Soil and Water Management Plan may not include a detailed Site Water Balance. However, the detailed Site Water Balance must be approved prior to the commencement of any sand washing or groundwater extraction activities for the project.

19. The Site Water Balance must:
- include details of:
 - sources and security of water supply;
 - water use on site;
 - water management on site;
 - any off-site water transfers;
 - reporting procedures; and
 - investigate and describe measures to minimise water use by the project.
20. The Erosion and Sediment Control Plan must:
- be consistent with the requirements of *Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition, 2004* (Landcom);
 - identify activities that could cause soil erosion and generate sediment;
 - describe measures to minimise soil erosion and the potential for the transport of sediment off site;
 - describe the location, function, and capacity of erosion and sediment control structures; and
 - describe what measures would be implemented to maintain the structures over time.
21. The Surface Water Monitoring Program must include:
- baseline data on surface water quality, where available;
 - surface water impact assessment criteria;
 - a program to monitor surface water quality (particularly in project sediment basins); and
 - a protocol for the investigation, notification and mitigation of identified exceedances of the surface water impact assessment criteria.
22. The Ground Water Monitoring Program must include:
- detailed baseline data on ground water levels and quality, based on statistical analysis (including available HWC data);
 - groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts;
 - a program to monitor groundwater levels and quality;
 - a protocol for further groundwater modelling to confirm the limits to excavation depth across the site permitted in accordance with condition 7 of schedule 2; and
 - a protocol for the investigation, notification and mitigation of identified exceedances of the ground water impact assessment criteria.

Unexploded Ordnance

23. The Proponent shall prepare and implement an Unexploded Ordnance Management Plan for the project to the satisfaction of the Director-General. This plan must:
- be prepared by a suitable qualified ordnance expert whose appointment has been approved by the Director-General, and be submitted to the Director-General for approval prior to the commencement of quarrying operations on Lot 218; and
 - include:
 - a protocol for managing unexploded ordnance risk on Lot 218 during quarrying operations; and
 - a description of the measures that would be undertaken if any unexploded ordnance is discovered during the project.

REHABILITATION AND LANDSCAPE MANAGEMENT

Rehabilitation

24. The Proponent shall progressively rehabilitate the site in a manner that is generally consistent with the final landform in the EA (as reproduced in Appendix 4), to the satisfaction of the Director-General.

Note: The Department acknowledges that rehabilitation activities on Lot 218 may be limited given the planned ongoing extraction on this lot. However, the long-term/final landform for Lot 218 must be addressed as part of the Landscape Management Plan (see below).

Landscape Management Plan

25. The Proponent shall prepare and implement a Landscape Management Plan for the project to the satisfaction of the Director-General. This plan must:
- (a) be prepared in consultation with DECCW, OOW and Council, and be submitted to the Director-General within 6 months of the date of this approval, or prior to any vegetation clearing on Lot 220, whichever is sooner;
 - (b) include a:
 - Rehabilitation Management Plan; and
 - Long Term Management Strategy.

Note: The Department accepts that the initial Landscape Management Plan may not include the detailed Long Term Management Strategy. However, a conceptual strategy must be included in the initial plan, along with a timetable for augmentation of the strategy with each subsequent review of the plan.

26. The Rehabilitation Management Plan must include:
- (a) the objectives for the site rehabilitation and site landscaping;
 - (b) a description of the short, medium, and long term measures that would be implemented to rehabilitate and landscape the site;
 - (c) detailed performance and completion criteria for the site rehabilitation and site landscaping;
 - (d) a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:
 - progressively rehabilitating disturbed areas;
 - landscaping the site to minimise visual impacts;
 - protecting vegetation and soil outside the disturbance areas;
 - preventing and/or minimising the accretion of sand dunes outside the project disturbance areas;
 - undertaking pre-clearance surveys;
 - salvaging and reusing material from the site for habitat enhancement;
 - managing impacts on fauna;
 - maintaining koala habitat linkages;
 - conserving and reusing topsoil;
 - collecting and propagating seed for rehabilitation works;
 - salvaging and reusing material from the site for habitat enhancement;
 - controlling weeds and feral pests;
 - controlling access; and
 - bushfire management;
 - (e) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;
 - (f) a description of the potential risks to successful rehabilitation, and a description of the contingency measures that would be implemented to mitigate these risks; and
 - (g) details of who would be responsible for monitoring, reviewing, and implementing the plan.
27. The Long Term Management Strategy must:
- define the objectives and criteria for quarry closure and post-extraction management;
 - investigate and/or describe options for the future use of the site;
 - describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and
 - describe how the performance of these measures would be monitored over time.

Rehabilitation Bond

28. Within 3 months of the approval of the Landscape Management Plan, the Proponent shall lodge a rehabilitation bond for the project with the Director-General to ensure that the site rehabilitation is implemented in accordance with the performance and completion criteria of the Landscape Management Plan. The sum of the bond shall be determined by:
- (a) calculating the full cost of rehabilitating the site in each 3 year review period (see condition 7 of schedule 5); and
 - (b) employing a suitably qualified expert to verify the calculated costs, to the satisfaction of the Director-General.

Notes:

- *If the rehabilitation is completed to the satisfaction of the Director-General, the Director-General will release the bond.*
- *If the rehabilitation is not completed to the satisfaction of the Director-General, the Director-General will call in all or part of the bond, and arrange for the satisfactory completion of the relevant works.*

HERITAGE

Aboriginal Cultural Heritage Management Plan

29. The Proponent shall prepare and implement an Aboriginal Cultural Heritage Management Plan for the project to the satisfaction of the Director-General. This plan must:
- (a) be prepared in consultation with DECCW and the Aboriginal community, and be submitted to the Director-General for approval prior to the disturbance of any Aboriginal object or site; and
 - (b) include a:
 - detailed salvage program and management plan for all identified Aboriginal sites within the project disturbance area;
 - detailed description of the measures that would be implemented to protect Aboriginal sites and PAD outside the project disturbance area;
 - protocol for monitoring operations and vegetation removal on the site;
 - protocol for undertaking additional archaeological investigation, and where warranted excavation and/or salvage, on:
 - any identified stabilised soil surfaces on Lot 218 that are proposed to be disturbed; or
 - any area of the identified PAD on Lot 220 that is proposed to be disturbed;
 - protocol for monitoring of reject material;
 - description of the measures that would be implemented if any new Aboriginal objects or skeletal remains are discovered during the project; and
 - protocol for the ongoing consultation and involvement of the Aboriginal community in the conservation and management of Aboriginal cultural heritage on the site, including the establishment of a management group comprising Aboriginal stakeholders and a suitably qualified archaeologist.

Non-Indigenous Heritage Management Plan

30. The Proponent shall prepare and implement a non-indigenous Heritage Management Plan for the project to the satisfaction of the Director-General. This plan must:
- (a) be prepared in consultation with the Heritage Branch and Council, and be submitted to the Director-General for approval prior to the disturbance of any heritage item, including the identified tank traps;
 - (b) include:
 - archival recording of the tank traps, in accordance with the requirements and guidelines of the Heritage Branch;
 - a protocol for the investigation, removal and storage of the tank traps, and for their reinstallation following quarrying operations; and
 - a description of the measures that would be implemented if any new heritage objects or items are discovered during the project.

TRAFFIC AND TRANSPORT

Road Upgrades

31. The Proponent shall upgrade Lavis Lane (including the eastern section leading to the private haul road) to provide a minimum 6 metre sealed carriageway, to the satisfaction of Council, within 6 months of the commencement of quarrying operations on Lot 218, unless otherwise agreed by the Director-General.

Traffic Restrictions

32. The Proponent shall restrict truck movements (in plus out) on Lavis Lane and Oakvale Road to a maximum of 10 per hour during the night time period and on Sundays and public holidays, unless otherwise approved by the Director-General.

Note: The Director-General may consider allowing additional truck movements if the Proponent has agreements with residents on Lavis Lane and Oakvale Road, as described in condition 9 above.

Road Haulage

33. The Proponent shall ensure that:
- (a) all loaded vehicles entering or leaving the site are covered; and
 - (b) all loaded vehicles leaving the site are cleaned of materials that may fall on the road, before they leave the site.

Parking

34. The Proponent shall provide sufficient parking on-site for all project-related traffic, in accordance with Council's parking codes, and to the satisfaction of the Director-General.

VISUAL

Visual Amenity

35. The Proponent shall minimise the visual impacts of the project to the satisfaction of the Director-General.

Lighting Emissions

36. The Proponent shall:
- (a) take all practicable measures to mitigate off-site lighting impacts from the project; and
 - (b) ensure that all external lighting associated with the project complies with *Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting*, to the satisfaction of the Director-General.

Advertising

37. The Proponent shall not erect or display any advertising structure(s) or signs on the site without the written approval of the Director-General.

Note: This does not include traffic management and safety or environmental signs.

WASTE MANAGEMENT

Waste Minimisation

38. The Proponent shall minimise the amount of waste generated by the project to the satisfaction of the Director-General.

EMERGENCY AND HAZARDS MANAGEMENT

Dangerous Goods

39. The Proponent shall ensure that the storage, handling, and transport of fuels and dangerous goods are conducted in accordance with the relevant *Australian Standards*, particularly AS1940 and AS1596, and the *Dangerous Goods Code*.

Safety

40. The Proponent shall secure the project to ensure public safety to the satisfaction of the Director-General.

Bushfire Management

41. The Proponent shall:
- (a) ensure that the project is suitably equipped to respond to any fires on-site; and
 - (b) assist the rural fire service and emergency services as much as possible if there is a fire on-site.

PRODUCTION DATA

42. The Proponent shall:
- (a) provide annual production data to the DII using the standard form for that purpose; and
 - (b) include a copy of this data in the AEMR.
-

SCHEDULE 4 ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. Within 1 month of the date of this approval, the Proponent shall notify the landowner of residence R1 in writing that they have the right to require the Proponent to undertake additional noise mitigation measures on their residence in accordance with condition 8 of schedule 3 at any stage during the project, if the residence is habitable in the opinion of the Director-General.
2. If the results of the monitoring required in schedule 3 identify that impacts generated by the project are greater than the relevant impact assessment criteria, except where a negotiated agreement has been entered into in relation to that impact, then the Proponent shall, within 2 weeks of obtaining the monitoring results, notify the Director-General, the affected landowners and tenants (including tenants of quarry-owned properties) accordingly, and provide quarterly monitoring results to each of these parties until the results show that the project is complying with the criteria in schedule 3.

INDEPENDENT REVIEW

3. If a landowner of privately-owned land considers the project to be exceeding the impact assessment criteria in schedule 3, then he/she may ask the Director-General in writing for an independent review of the impacts of the project on his/her land.
4. If the Director-General is satisfied that an independent review is warranted, the Proponent shall within 2 months of the Director-General's decision:
 - (a) consult with the landowner to determine his/her concerns;
 - (b) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to conduct monitoring on the land, to:
 - determine whether the project is complying with the relevant impact assessment criteria in schedule 3; and
 - identify the source(s) and scale of any impact on the land, and the project's contribution to this impact; and
 - (c) give the Director-General and landowner a copy of the independent review.
5. If the independent review determines that the project is complying with the relevant impact assessment criteria in schedule 3, then the Proponent may discontinue the independent review with the approval of the Director-General.

If the independent review determines that the project is not complying with the relevant impact assessment criteria in schedule 3, then the Proponent shall:

- (a) implement all reasonable and feasible measures, in consultation with the landowner, to ensure that the project complies with the relevant criteria, and conduct further monitoring to determine whether these measures ensure compliance; or
 - (b) secure a written agreement with the landowner to allow exceedances of the relevant impact assessment criteria,
- to the satisfaction of the Director-General.

If the further monitoring referred to under paragraph (a) above determines that the project is complying with the relevant impact assessment criteria, then the Proponent may discontinue the independent review with the approval of the Director-General.

LAND ACQUISITION

6. Within 3 months of receiving a written request from a landowner with acquisition rights, the Proponent shall make a binding written offer to the landowner based on:
 - (a) the current market value of the landowner's interest in the property at the date of this written request, as if the property was unaffected by the project the subject of the project application, having regard to the:
 - existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and
 - presence of improvements on the property and/or any approved building or structure which has been physically commenced at the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of the 'additional noise mitigation measures' in condition 8 of schedule 3;
 - (b) the reasonable costs associated with:
 - relocating within the Port Stephens local government area, or to any other local government area determined by the Director-General;
 - obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is to be acquired; and

- (c) reasonable compensation for any disturbance caused by the land acquisition process.

However, if following this period, the Proponent and landowner cannot agree on the acquisition price of the land and/or the terms upon which the land is to be acquired, then either party may refer the matter to the Director-General for resolution.

Upon receiving such a request, the Director-General shall request the President of the NSW Division of the Australian Property Institute (the API) to appoint a qualified independent valuer to:

- (a) consider submissions from both parties;
- (b) determine a fair and reasonable acquisition price for the land and/or the terms upon which the land is to be acquired, having regard to the matters referred to in paragraphs (a)-(c) above;
- (c) prepare a detailed report setting out the reasons for any determination; and
- (d) provide a copy of the report to both parties.

Within 14 days of receiving the independent valuer's report, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the independent valuer's determination.

However, if either party disputes the independent valuer's determination, then within 14 days of receiving the independent valuer's report, they may refer the matter to the Director-General for review. Any request for a review must be accompanied by a detailed report setting out the reasons why the party disputes the independent valuer's determination. Following consultation with the independent valuer and both parties, the Director-General shall determine a fair and reasonable acquisition price for the land, having regard to the matters referred to in paragraphs (a)-(c) above and the independent valuer's report. Within 14 days of this determination, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the Director-General's determination.

If the landowner refuses to accept the Proponent's binding written offer under this condition within 6 months of the offer being made, then the Proponent's obligations to acquire the land shall cease, unless the Director-General determines otherwise.

- 7. The Proponent shall pay all reasonable costs associated with the land acquisition process described in condition 6 above.
- 8. If the Proponent and landowner agree that only part of the land shall be acquired, then the Proponent shall also pay all reasonable costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of the plan at the Office of the Registrar-General.

SCHEDULE 5

ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS

ENVIRONMENTAL MANAGEMENT STRATEGY

1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Director-General. This strategy must:
 - (a) be submitted to the Director-General for approval within 3 months of the date of this approval;
 - (b) provide the strategic framework for environmental management of the project;
 - (c) identify the statutory approvals that apply to the project;
 - (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;
 - (e) describe the procedures that would be implemented to:
 - keep the local community and relevant agencies informed about the operation and environmental performance of the project;
 - receive, handle, respond to, and record complaints;
 - resolve any disputes that may arise during the course of the project;
 - respond to any non-compliance; and
 - respond to emergencies; and
 - (f) include:
 - copies of the various strategies, plans and programs that are required under the conditions of this approval once they have been approved; and
 - a clear plan depicting all the monitoring currently being carried out within the project area.

INCIDENT REPORTING

2. Within 24 hours of detecting an exceedance of the limits/performance criteria in this approval or the occurrence of an incident that causes (or may cause) material harm to the environment, the Proponent shall notify the Department and other relevant agencies of the exceedance/incident.
3. Within 6 days of notifying the Department and other relevant agencies of an exceedance/incident, the Proponent shall provide the Department and these agencies with a written report that must:
 - (a) describe the date, time, and nature of the exceedance/incident;
 - (b) identify the cause (or likely cause) of the exceedance/incident;
 - (c) describe what action has been taken to date; and
 - (d) describe the proposed measures to address the exceedance/incident.

ANNUAL REPORTING

4. Within 12 months of the date of this approval, and annually thereafter, the Proponent shall submit an AEMR to the Director-General and relevant agencies. This report must:
 - (a) identify the standards and performance measures that apply to the project;
 - (b) describe the works carried out in the last 12 months, and the works that will be carried out in the next 12 months;
 - (c) include a summary of the complaints received during the past year, and compare this to the complaints received in previous years;
 - (d) include a summary of the monitoring results for the project during the past year;
 - (e) include an analysis of these monitoring results against the relevant:
 - impact assessment criteria/limits;
 - monitoring results from previous years; and
 - predictions in the EA;
 - (f) identify any trends in the monitoring results over the life of the project;
 - (g) identify any non-compliance during the previous year; and
 - (h) describe what actions were, or are being, taken to ensure compliance.

INDEPENDENT ENVIRONMENTAL AUDIT

5. Within 2 years of the date of the commencement of quarrying operations, and every 3 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit must:
 - (a) be conducted by a suitably qualified, experienced, and independent team of experts whose appointment has been approved by the Director-General;
 - (b) assess the environmental performance of the project, and its effects on the surrounding environment;
 - (c) assess whether the project is complying with the relevant standards, performance measures and statutory requirements;
 - (d) review the adequacy of any strategy/plan/program required under this approval; and, if necessary,

- (e) recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval.
6. Within 1 month of completion of each Independent Environmental Audit, the Proponent shall submit a copy of the audit report to the Director-General and relevant agencies, with a response to any of the recommendations in the audit report.
 7. Within 3 months of submitting a copy of the audit report to the Director-General, the Proponent shall review and if necessary revise the:
 - (a) strategies/plans/programs required under this approval; and
 - (b) rehabilitation bond, to consider the:
 - effects of inflation;
 - changes to the total area of disturbance; and
 - performance of the rehabilitation against the completion criteria of the Landscape Management Plan,to the satisfaction of the Director-General.

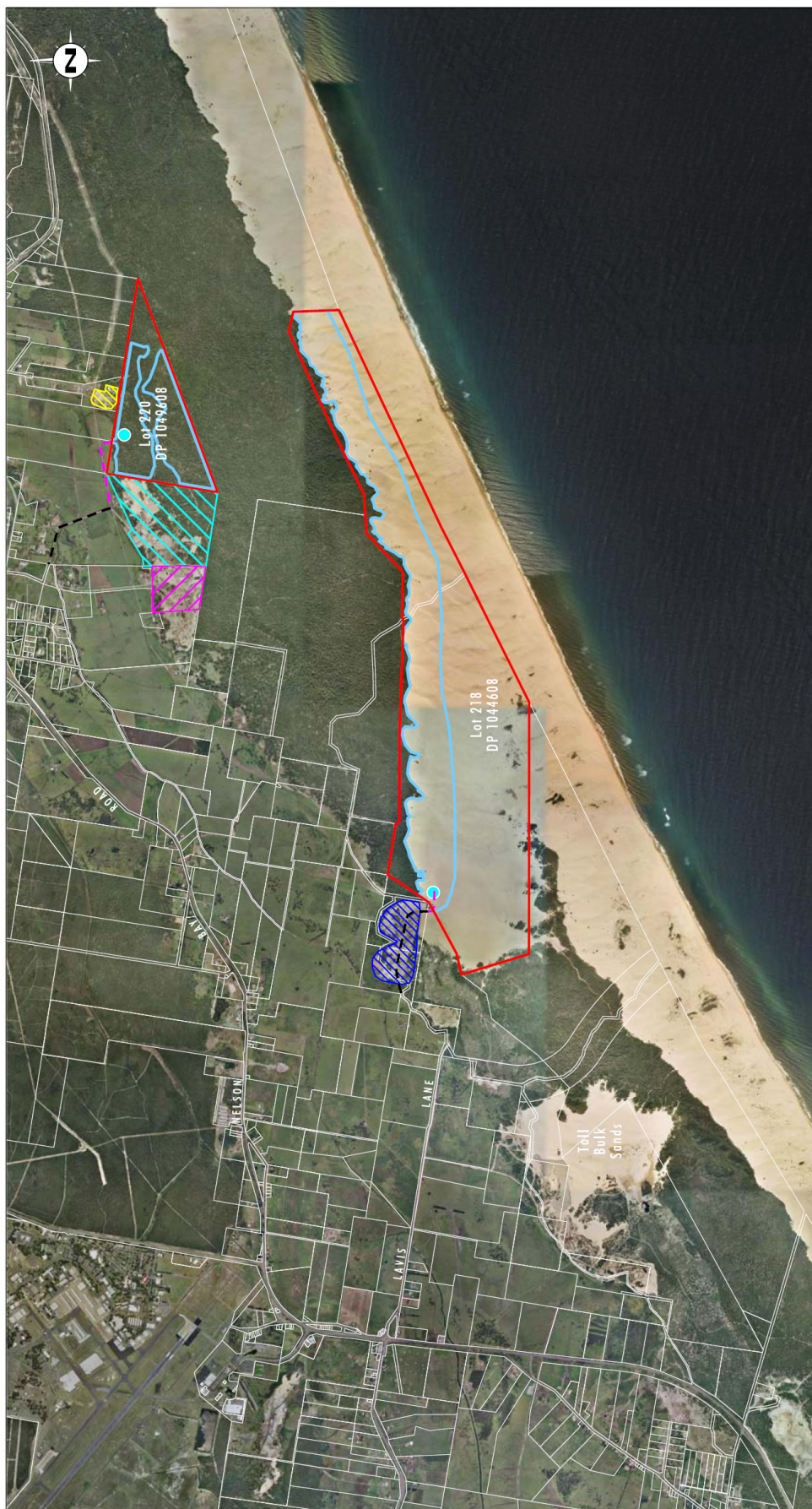
COMMUNITY CONSULTATIVE COMMITTEE

8. Within 3 months of the commencement of quarrying operations, the Proponent shall establish a Community Consultative Committee (CCC) for the project to the satisfaction of the Director-General, in accordance with the Department's *Guideline for Establishing and Operating Community Consultative Committees for Mining Projects*.

ACCESS TO INFORMATION

9. Within 1 month of the approval of any strategies/plans/programs required under this approval (or any subsequent revision of these strategies/plans/programs), or the completion of the audits or AEMR required under this approval, the Proponent shall:
 - (a) provide a copy of the relevant document/s to the relevant agencies and to members of the general public upon request; and
 - (b) ensure that a copy of the relevant document/s is made publicly available on its website and at the site.
 10. During the project, the Proponent shall:
 - (a) make a summary of monitoring results required under this approval publicly available on its website and at the site; and
 - (b) update these results on a regular basis (at least every 3 months).
-

APPENDIX 1 PROJECT LAYOUT PLANS



Source: Department of Lands (2003)

FIGURE 2.1
The Study Area

Legend

- Lot Boundaries (218 & 220)
- Mackas Sand (existing operations)
- Unimin
- Hunter Quarries
- Quality Sands and Ceramics
- Proposed Operational Area
- Proposed Weighbridge
- Site Access
- Proposed Site Access

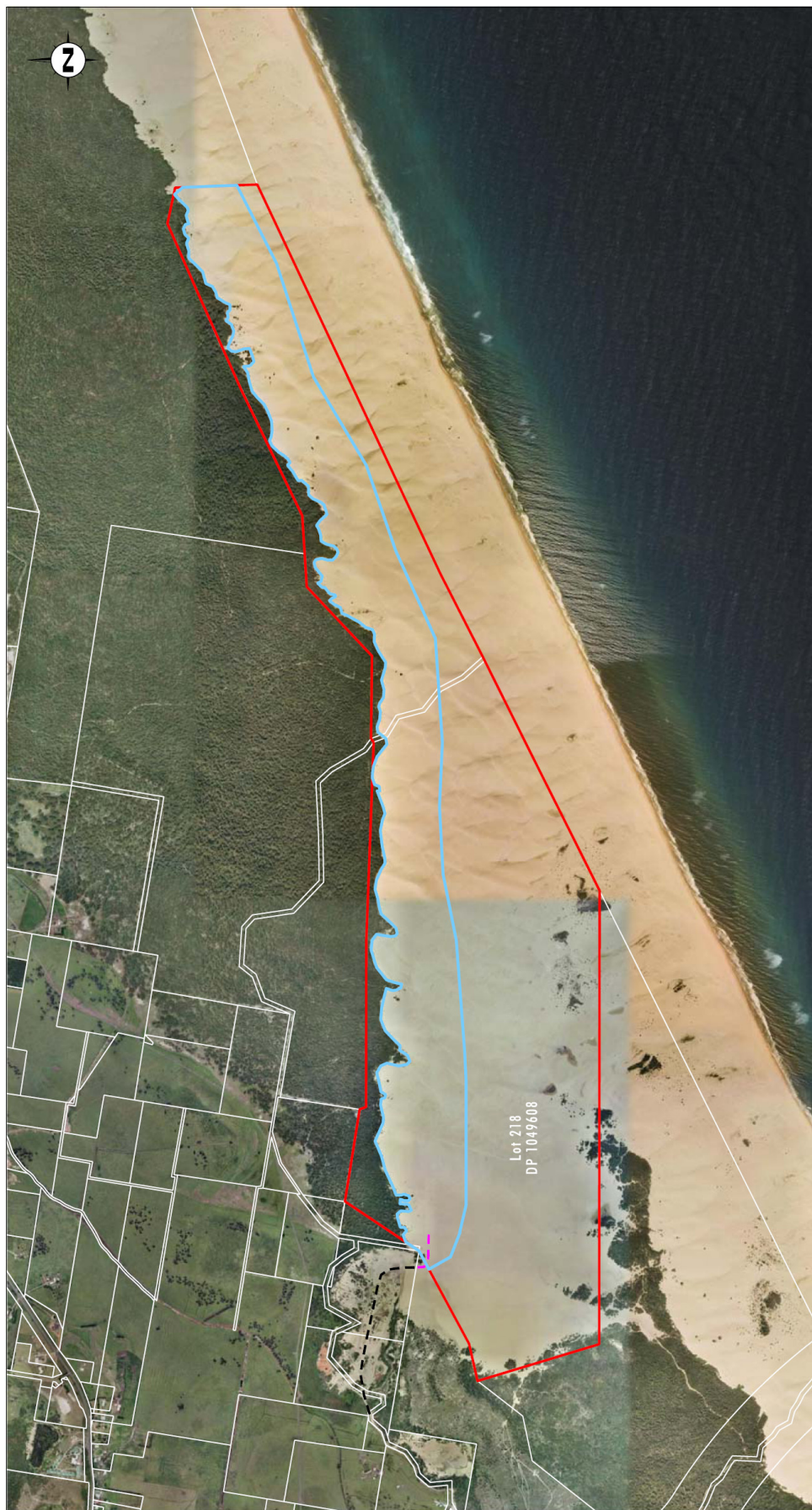


FIGURE 1.2
Proposed Disturbance Area Lot 218

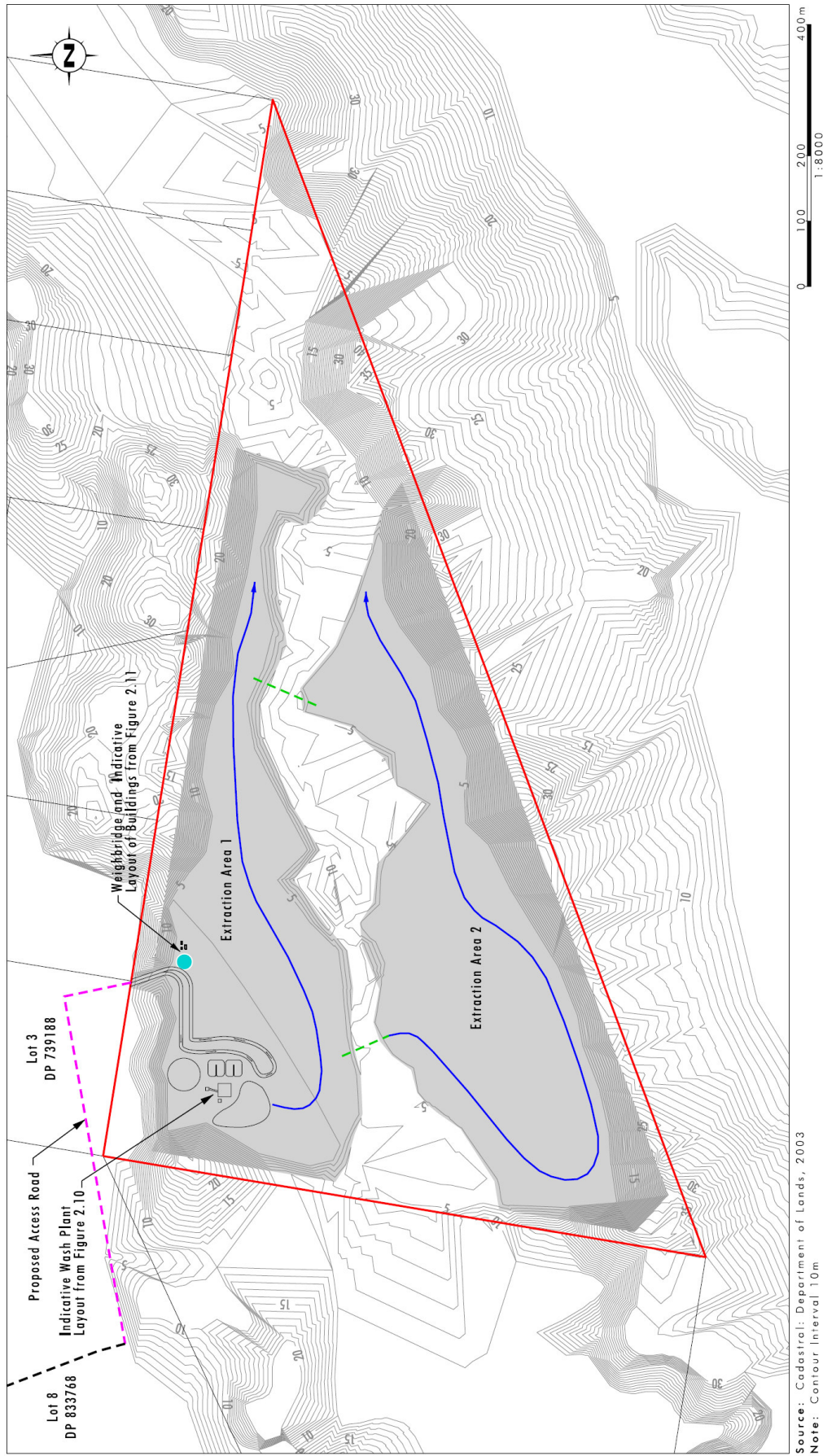


FIGURE 2.9
Extraction Plan for Lot 220

- Legend**
- Lot 220 Boundary
 - Internal Access Roads
 - Proposed Access Road
 - Existing Access Road
 - Direction of Extraction

APPENDIX 2 STATEMENT OF COMMITMENTS

1.1 Operational Controls

- 1.1.1 All activities will be undertaken generally in accordance with the EA.
- 1.1.2 Sand extraction and processing activities at Lot 218 and Lot 220 may be undertaken 24 hours per day, seven days per week. No sand extraction operations will be undertaken within 250 metres of R27 (Hufnagl residence) between the hours of 6.00 pm and 7.00 am unless an agreement with the owner of R27 for extraction activities within these hours is obtained.
- 1.1.3 Transport activities will be undertaken between 5.00 am and 10.00 pm, seven days per week for transport associated with operations at Lot 220 and between 6.00 am and 10.00 pm for transport associated with operations at Lot 218.
- 1.1.4 A maximum of 1,000,000 tonnes per year of sand products will be extracted from Lot 218 and a maximum of 1,000,000 tonnes per year will be extracted from Lot 220. Annual sand production information will be provided to the Department and DII.
- 1.1.5 The final landform for Lot 220 will be at least 1 metre above the maximum predicted groundwater level as shown on Figure 4.9 of the EA. The height of the final landform will be verified by topographic survey.

1.2 Ecology

- 1.2.1 A Vegetation Clearance Management Plan will be developed prior to any vegetation clearing occurring for the proposal. This plan will be implemented for all vegetation clearing required as part of the proposal.
- 1.2.2 A comprehensive Biodiversity Monitoring Program will be developed prior to any vegetation clearing being undertaken for the proposal.
- 1.2.3 Clearing operations will be timed so that potential impacts on breeding species, particularly the squirrel glider and threatened micro-bats are avoided. Where possible, clearing will be avoided in winter months when micro-bats and the eastern pygmy possum are in a state of torpor and squirrel gliders begin to breed.
- 1.2.4 A Feral Animal Control Management Plan will be developed and implemented prior to any clearing activities being undertaken for the proposal.
- 1.2.5 A Weed Management Plan will be developed and implemented prior to any clearing activities being undertaken for the proposal.
- 1.2.6 A comprehensive Rehabilitation and Decommissioning Plan will be prepared to ensure rehabilitation objectives are achieved to a reasonable extent. The Plan will include:
 - the rehabilitation program;
 - native vegetation and fauna habitat management including provision of artificial hollows and nest boxes and fauna translocation procedures;
 - feral animal control;
 - fire management;
 - weed management;
 - minimisation of edge effects;
 - stormwater control;
 - fauna displacement measures including nest boxes and tree hollows;
 - control of public access;
 - monitoring; and
 - funding.
- 1.2.7 The feasibility of establishing native vegetation at the western end of Lot 218 to create a link between adjoining vegetated areas following the completion of sand extraction in this area will be investigated within 5 years of operations and if feasible the Rehabilitation and Decommissioning Plan will be revised to include vegetation of this area.

1.3 Aboriginal Heritage

- 1.3.1 An Aboriginal Cultural Heritage Management Plan (ACHMP) will be developed in consultation with the relevant Aboriginal stakeholders and DECCW prior to the commencement of any clearing activities. The ACHMP will include:
 - a protocol to assess significance of Aboriginal objects;
 - appropriate remedial actions etc. at end of life of operations. These will be drawn from the Rehabilitation and Decommissioning Plan;
 - identification of an 'in perpetuity' a keeping place with the requirement for 'in perpetuity' being resolved with the Aboriginal community;

- establishment of a Management Group that includes an invitation to all stakeholders and an archaeologist;
 - a commitment to lodging site cards for any Aboriginal objects identified;
 - a skeletal material protocol. Relevant legislation requires that if Aboriginal skeletal material is found, the proponent will need to obtain an OK in writing from DECCW and Police before work resumes;
 - development of an Aboriginal Cultural Education program for use as part of the induction for workers; and
 - protocols for extraction of sand on Lot 218 from below the 1945 land surface including test pitting procedures as set out in the EA and survey and clearance of unexploded ordnance (UXO) should UXO be identified in the extraction area.
- 1.3.2 An Aboriginal Cultural Heritage Management Group will be established prior to commencement of the proposal to managed matters relating to Aboriginal cultural heritage within the study area.
- 1.3.3 The Aboriginal Cultural Heritage Management Group will conduct a monitoring visit to the Lot 218 proposal area on a monthly basis for the first 12 months of operation, with subsequent inspection intervals to be determined as part of the ACHMP.
- 1.3.4 The Aboriginal Cultural Heritage Management Group will conduct a monitoring visit to the Lot 220 operational area on a biannual basis for 12 months, with subsequent inspection intervals to be determined as part of the ACHMP.
- 1.3.5 A sample of reject material from the screening operations on Lot 220 will be taken each day, where sufficient material is present. The samples will be provided to the Aboriginal Cultural Heritage Management Group on a monthly basis.
- 1.4 Historic Heritage**
- 1.4.1 Prior to disturbance of any tanks traps at either Lot 218 or Lot 220, the location of the tank traps will be surveyed and a photographic record made in accordance with Heritage Council of NSW requirements for archival recording. The survey data and photographic recording will be forwarded to the Heritage Branch of the Department of Planning.
- 1.4.2 Any disturbed tank traps will be replaced along the original alignment of the Northern Defence Line.
- 1.5 Traffic and Access**
- 1.5.1 In accordance with the requirements of Section 4.5 of the Port Stephens Section 94 Development Contributions Plan 2007, Mackas Sand will make a road maintenance contribution of 1.20 cents per tonne.kilometre for product transported on Port Stephens Council roads.
- 1.5.2 Within 6 months of the commencement of haulage of product from Lot 218 along Lavis Lane, the proponent will contribute to the sealing of the 700 metre unsealed section of Lavis Lane.
- 1.6 Noise**
- 1.6.1 An Operational Noise Management Plan will be developed for the proposal and implemented prior to sand extraction commencing. The plan will incorporate a noise monitoring program to monitor noise emissions and determine compliance with the project specific noise goals. The plan will include specific measures to monitor and address potential noise impacts at residential receiver R27 (Hufnagl Residence).
- 1.6.2 No sand extraction will be undertaken within 250 metres of receiver R27 during evening and night periods unless agreement is reached with the landholder.
- 1.6.3 A Traffic Noise Management Plan will be developed and implemented for truck movements on the private haul road from Lot 220. The Plan will focus on but not be limited to truck movements between the hours of 5.00 am and 7.00 pm.
- 1.7 Air Quality**
- 1.7.1 Dust suppression activities, such as spraying a suitable dust suppressant, will be undertaken on all unsealed access roads used to transport product from Lot 218 and Lot 220 so that at least a 75 percent reduction in dust generation is achieved.
- 1.8 Groundwater**
- 1.8.1 A Groundwater Management Plan will be developed prior to any sand extraction activities to the satisfaction of the Department in consultation with DECCW. The Plan will include a groundwater monitoring program that includes quarterly monitoring of groundwater level and quality (electrical conductivity, pH, turbidity, arsenic, manganese and iron) at groundwater monitoring bores SP 1 to SP 6 as shown on Figure 4.7 of the EA. The results of the monitoring are to be commented on and compiled into an annual report.
- 1.8.2 Any refuelling of equipment used for the proposal will be undertaken by a registered contractor to remove the need for on-site storage of fuels. No maintenance of equipment or storage of chemicals will occur at either site.

- 1.8.3 Prior to sand washing being undertaken on-site access to a suitable water supply will be obtained and evidence of this will be provided to the Department. Prior to sand washing commencing a detailed Water Management Plan for the sand washing operation will be prepared and provided to the Department.

1.9 Surface Water

- 1.9.1 Table drains and flow dissipation structures will be installed along on-site access roads as required in accordance with the Erosion and Sediment Control Regional Policy (Port Stephens Council 2002) and the Code of Practice for Managing Urban Stormwater – Soils and Construction (Landcom 2004).
- 1.9.2 Site Water Management Plans for operations on Lot 218 and Lot 220 will be submitted for approval to the Department in consultation with DECCW prior to the commencement of sand extraction activities. The Plan will include details on the storage and handling of chemicals on the sites including refuelling of mobile equipment.

1.10 Public Safety

- 1.10.1 High visibility fencing with appropriate set back from the extraction face and signage will be erected on the seaward side of the Lot 218 operational area.
- 1.10.2 Any access tracks leading into either Lot 218 or Lot 220 other than those used for product haulage will be blocked from recreational vehicle use with boulders or other suitable methods.
- 1.10.3 Inspections of high visibility fencing and any structures built to control public access to the sites will be undertaken every week. Maintenance or repair of any fences and structures will occur within this timeframe, as required.

1.11 Visual

- 1.11.1 A 30 metre vegetated buffer will be maintained along the northern boundary of Lot 220, except where the proposed access road will be constructed into the site. Buffer areas of 20 metres will be maintained along the other boundaries of the site. In-fill planting will be undertaken in buffer areas as required to ensure a sufficient visual screening is in place around the site.
- 1.11.2 Extensive supplementary planting of suitable screening species will be undertaken in the Lot 220 northern boundary buffer area within 50 metres of the Hufnagl residence.

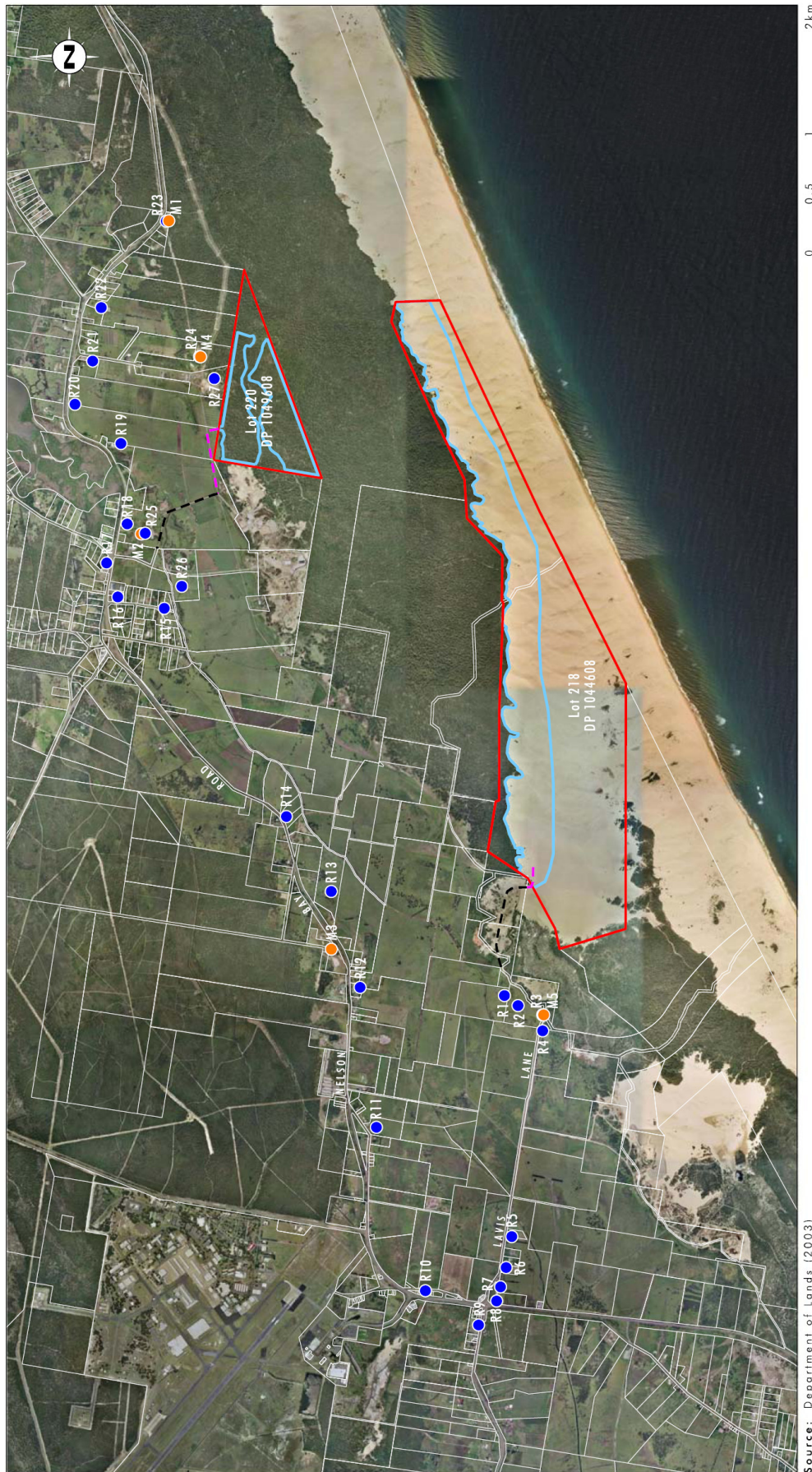
1.12 Greenhouse Gases

- 1.12.1 Mackas Sand will seek to achieve continuous improvement in energy efficiency in sand extraction and processing operations.

1.13 Environmental Management, Monitoring and Auditing

- 1.13.1 Mackas Sand will obtain an Environmental Protection Licence for the proposal in accordance with the *Protection of the Environment Operations Act 1997*.
- 1.13.2 Three years after the commencement of the proposal, and every four years thereafter, Mackas Sand will commission and pay the full cost of an Independent Environmental Audit of the proposal.
- 1.13.3 Within 7 days of detecting an exceedance of the limits/performance criteria in this approval or an incident causing (or threatening to cause) material harm to the environment, Mackas Sand shall report the exceedance/incident to DECCW and any relevant agency. The report will:
- describe the date, time and nature of the exceedance/incident;
 - identify the cause (or likely cause) of the exceedance/incident;
 - describe what action has been taken to date; and
 - describe the proposed measures to address the exceedance/incident.
- 1.13.4 Prior to the commencement of any operations, Mackas Sand will implement, publicise and list with a telephone company a contact phone number, which will enable the general public to reach a person who can arrange appropriate response action to the enquiry. Mackas Sand will maintain a register to record details of all enquiries received and actions undertaken in response. Mackas Sand will supply the DECCW with a copy of the enquiries register on an annual basis.

APPENDIX 3 RECEIVER LOCATION PLAN



Source: Department of Lands (2003)

- Legend**
- Lot Boundaries (218 & 220)
 - Site Access
 - Proposed Operational Area
 - Proposed Site Access
 - Residential Receivers
 - Noise Logger Location

FIGURE 4.4
Residential Receivers and
Noise Logger Locations

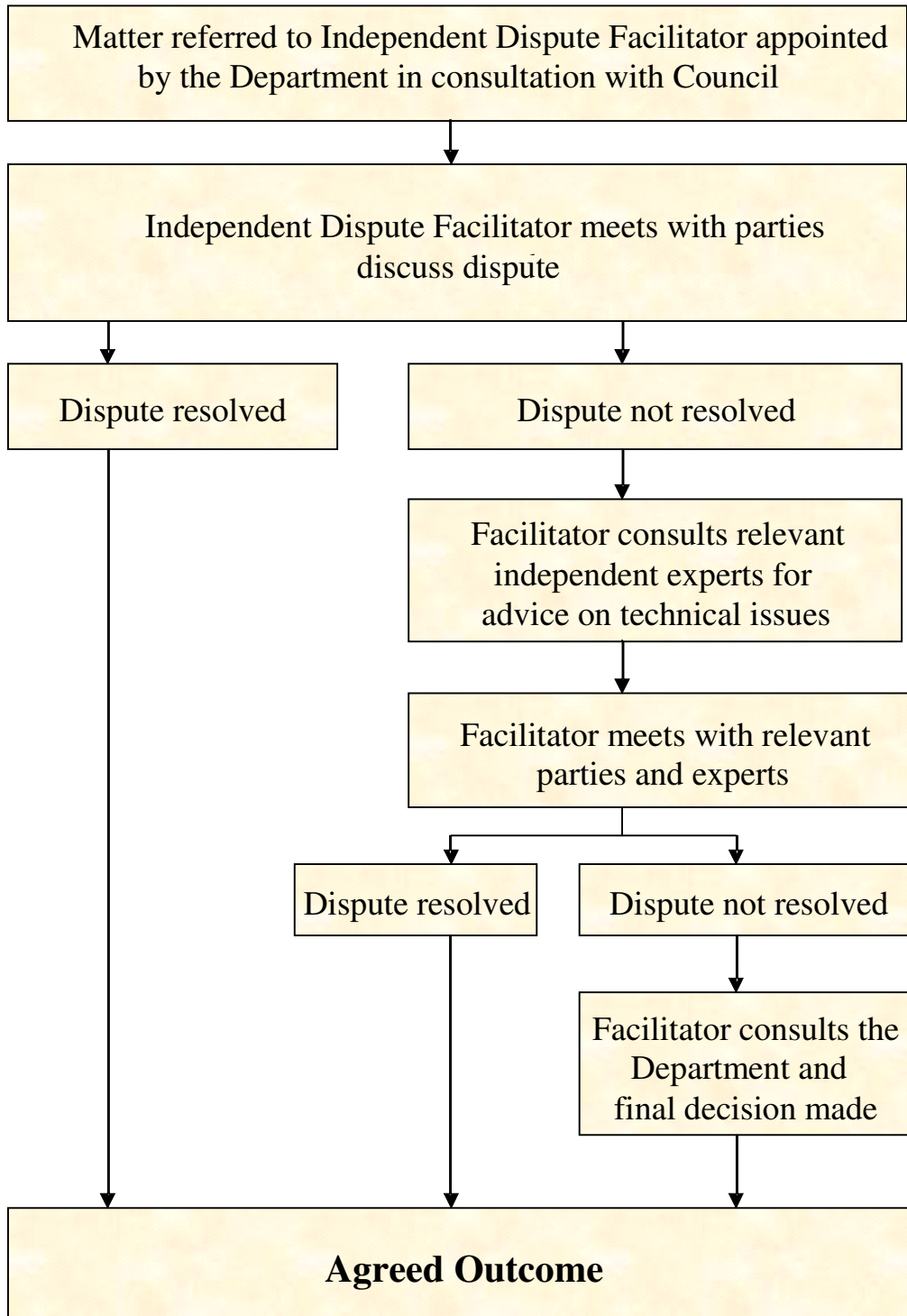
**APPENDIX 4
FINAL LANDFORM PLAN – LOT 220**

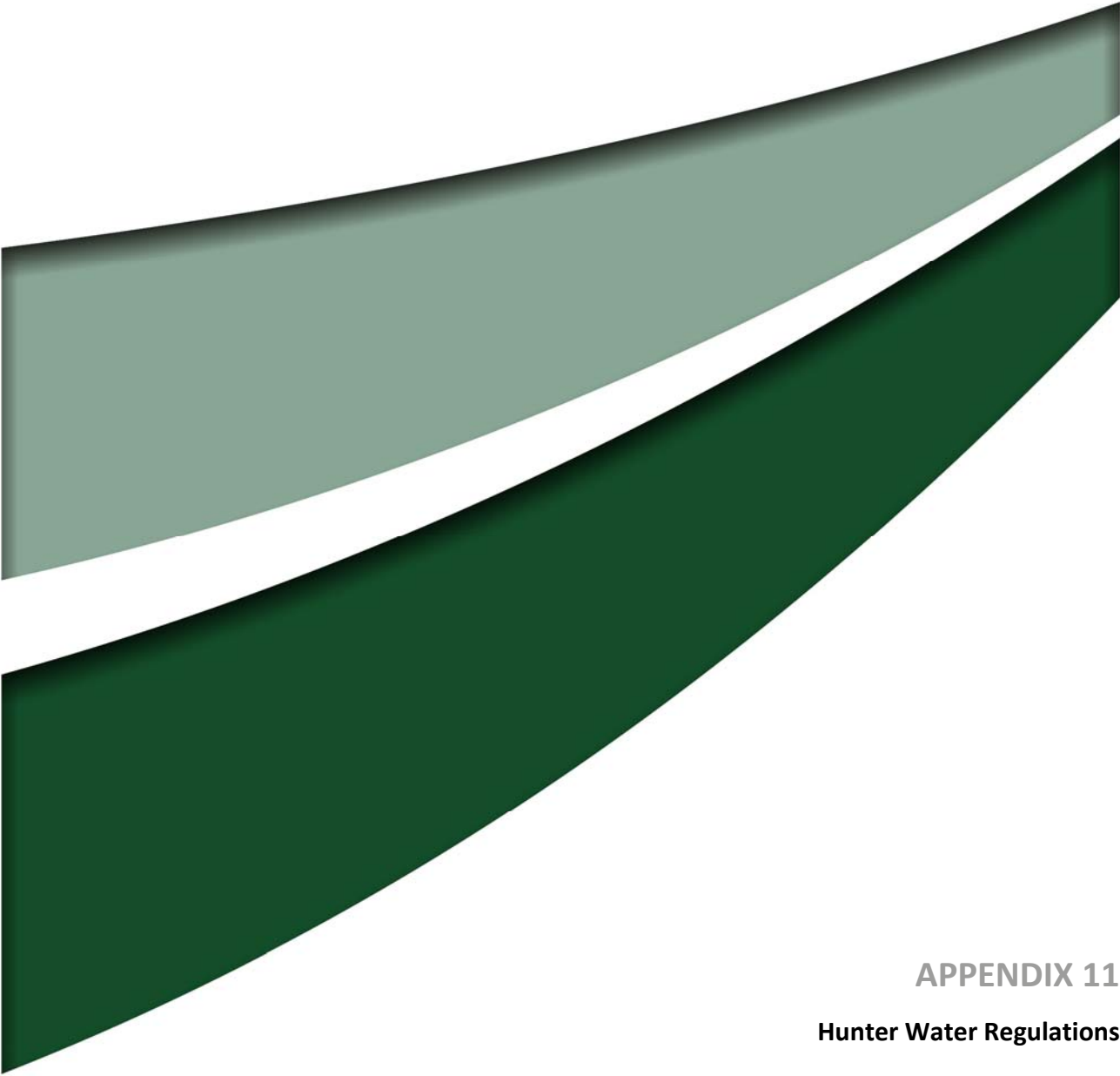


FIGURE 2.12
Rehabilitation Plan for Lot 220

APPENDIX 5
INDEPENDENT DISPUTE RESOLUTION PROCESS

**Independent Dispute Resolution Process
(Indicative only)**





APPENDIX 11
Hunter Water Regulations



Office of the Director General

DGTO12/215
WS12/162

Mr Peter Jamieson
Director
Umwelt (Australia) Pty Limited
PO Box 838
TORONTO NSW 2283

Dear Mr Jamieson

Approval for Mackas Sand Pty Ltd to engage in extractive industry in the North Stockton Catchment Area

Thank you for your letter of 19 November 2010 seeking renewal of the interim Permit for Mackas Sand Pty Ltd under clause 13(1) of the former *Hunter Water (Special Areas) Regulations 2003* for engaging in extractive industry in the North Stockton Catchment Area.

I have granted a new approval to Mackas Sand Pty Ltd for engaging in extractive industry in the North Stockton Catchment Area under clause 10(1) of the remade *Hunter Water Regulations 2010*. A copy of this Approval is attached.

I draw your attention to clause 4 and 5 of the Schedule to the Approval which require the preparation and lodgement of specified documents within 3 months of the date of issue of the Approval.

Should you have any further enquiries about this matter, I have arranged for Mr Mark Mignanelli, Manager Major Projects, Mines and Assessments to assist you. Mr Mignanelli may be contacted at the NSW Office of Water's Newcastle Office on (02) 4904 2549.

Yours sincerely

Mark I Paterson AO
Director General

7/6/12

Approval under clause 10(1) of the *Hunter Water Regulation 2010* for engaging in extractive industry in the North Stockton Catchment Area.

A. Date of Issue.

The 7th day of June 2012.

B. Approval.

For the term of this Approval the Director General hereby permits the Approval Holder to undertake the Extractive Operations within that part of the North Stockton Catchment Area described in this Approval, subject to the terms and conditions set out below.

C. Term of Approval.

This Approval shall commence on the Date of Issue.

The Extractive Industry authorised by this Approval may continue until 31 December 2029, unless revoked earlier.

D. Approval Holder.

Mackas Sand Pty Ltd.

E. Extractive Industry.

Sand Extraction.

F. Extraction Area.

The Approval Holder is permitted to undertake the Extractive Industry in such parts of the Land shown as "Extraction Zone Lot 218" and "Extraction Zone Lot 220" in Figures 1 and 2 of Appendix 1.

G. Terms and Conditions of Approval.

The Definitions, Schedule and Appendices have effect and form part of this Approval.

H. Approval not Transferable.

This Approval may not be transferred or assigned by the Approval Holder (including, without limitation, assigned by way of security).



Director General

Department of Trade and Investment, Regional Infrastructure and Services

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DEFINITIONS

In this Approval:

Annual Environmental Management Report (AEMR) has the same meaning as in clause 4 of Schedule 5 of the Project Approval.

Approval Holder has the same meaning as in clause D.

Completion criteria means the completion criteria for the site rehabilitation and site landscaping provided in the Rehabilitation Management Plan.

Criteria for quarry closure means the criteria for quarry closure provided in the Long Term Management Strategy.

Director General means the Director General, Department of Trade and Investment, Regional Infrastructure and Services and his or her authorised delegates.

Environmental Management Plans means the Soil and Water Management Plan, the Landscape Management Plan, the Operations Management Procedure and the Hydrocarbon Spill Procedure.

Extraction Area has the same meaning as in clause F.

Extraction Buffer has the same meaning as in clause 1(2) of the Schedule.

Extraction Depth Limit means the limit on the depth of extraction from the highest predicted groundwater level provided in condition 7(b) of Schedule 2 of the Project Approval.

Extraction Zone Lot 218 means the part of the Land shown as “Extraction Zone Lot 218” in Figure 1 in the Appendix.

Extraction Zone Lot 220 means the part of the Land shown as “Extraction Zone Lot 220” in Figure 2 in the Appendix.

Extractive Industry has the same meaning as in clause E.

Extractive Operations means the operations done under this Approval or works done as part of or associated with those operations, including without limitation the clearing of land, the stripping of topsoil, road-building, undertaking the Extractive Industry, the stockpiling and storage of extracted sand, the loading of vehicles and transportation away of sand, and the rehabilitation of the landform and vegetation on the land.

Highest predicted groundwater level means the approved highest predicted groundwater level for the purposes of condition 2(a) of Schedule 3 of the Project Approval.

HWC means Hunter Water Corporation (ABN 46 228 513 446) and where the context permits its servants, employees and agents.

Hydrocarbon Spill Procedure has the same meaning as in clause 5 of the Schedule.

Land means the land to which this Approval applies, described as Lot 218 DP 1044608 and Lot 220 DP1049608, Salt Ash.

Landscape Management Plan means the approved Landscape Management Plan for the purposes of condition 25 of Schedule 3 of the Project Approval.

Long Term Management Strategy means the Long Term Management Strategy prepared as part of the Landscape Management Plan for the purposes of condition 25 of Schedule 3 of the Project Approval

North Stockton Catchment Area has the same meaning as in the Regulation.

Office of Water means the NSW Office of Water (ABN: 47 661 556 763) and where the context permits its servants, employees and agents.

Operations Management Procedure has the same meaning as in clause 4 of the Schedule.

Operations Report has the same meaning as in clause 9(3)(b) of the Schedule.

Project Approval means the Project Approval for the Mackas Sand Project (08_0142) granted by the Minister for Planning on 20 September 2009.

Regulation means the *Hunter Water Regulation 2010* (NSW).

Rehabilitation Management Plan means the Rehabilitation Management Plan prepared as part of the Landscape Management Plan for the purposes of condition 25 of Schedule 3 of the Project Approval.

Soil and Water Management Plan means the approved Soil and Water Management Plan for the purposes of condition 18 of Schedule 3 of the Project Approval.

SCHEDULE

PART 1 EXTRACTIVE OPERATIONS

CLAUSE 1 LIMIT ON EXTRACTIVE OPERATIONS

Extraction Area

- (1) The Approval Holder may not undertake Extractive Operations outside of the boundary of the Extraction Area, excepting that the Approval Holder may utilise any road for the purposes of access to the Extraction Area and for associated purposes, including without limitation for the purpose of transportation away of sand from the Extraction Area, and the performance of any obligation under the Environmental Management Plans.

Extraction Buffer

- (2) Extractive Operations including the removal of vegetation and displacement of topsoil must not remove any material from within the Extraction Depth Limit for that point (*Extraction Buffer*).

PART 2 ENVIRONMENTAL CONTROLS

CLAUSE 2 MANNER OF PERFORMING EXTRACTIVE OPERATIONS

To ensure that there is no adverse impact on the supply or quality of groundwater located within the North Stockton Catchment Area, the Approval Holder must operate and manage the Extractive Operations:

- (a) in accordance with the terms and conditions of this Approval and the Environmental Management Plans; and
- (b) having regard to the importance of the groundwater and its surrounding environment for potable water supply purposes.

CLAUSE 3 METHOD OF EXTRACTIVE OPERATIONS

Laser level monitoring

- (1) During Extractive Operations, the Approval Holder must engage a suitably qualified and trained professional to monitor the height of the land from which sand is being extracted, including by taking regular measurements using a laser level in accordance with industry standard procedure.

Machinery and Equipment

- (2) The Approval Holder must remove all machinery used in the Extractive Operations from the Land at the end of each day's operation and park all machinery in the area specified in the Operations Management Procedure.
- (3) The Approval Holder must operate, manage and maintain all plant and equipment used in connection with the Extractive Operations in a proper and efficient condition, including any equipment used for the purposes of monitoring and rehabilitation.

No storage of contaminants

- (4) The Approval Holder must not store fuel, oil, grease or other groundwater contaminant within the North Stockton Catchment Area.

Refuelling

- (5) The Approval Holder must ensure that any refuelling of equipment will be undertaken by a registered contractor.
- (6) Refuelling of vehicles must not occur within the North Stockton Catchment Area, unless on a bunded hard stand area with spill control and containment equipment available in the immediate vicinity of the refuelling area.

CLAUSE 4 OPERATIONS MANAGEMENT PROCEDURE

(1) The Approval Holder must develop a procedure, to the satisfaction of HWC and the Office of Water, to address the management of operations at the site (*Operations Management Procedure*).

- (1) The Operations Management Procedure must:
 - (a) be submitted to HWC and the Office of Water for approval within 3 months of the Date of Issue of this Approval,

- (b) be consistent with the requirements for the method of Extractive Operations in clause 3, and
 - (c) include, but is not limited to, procedures for the following:
 - (i) management of the plant, equipment and vehicles,
 - (ii) site operations,
 - (iii) environmental inductions, and
 - (iv) environmental training,
- in order to prevent and minimise any adverse impact on the supply or quality of groundwater within the North Stockton Catchment Area.

CLAUSE 5 HYDROCARBON SPILL PROCEDURE

- (1) The Approval Holder must develop a procedure, to the satisfaction of HWC and the Office of Water, to manage a hydrocarbon spill on the Land (*Hydrocarbon Spill Procedure*).
- (2) The Hydrocarbon Spill Procedure must:
 - (a) be submitted to HWC and the Office of Water for approval within 3 months of the Date of Issue of this Approval,
 - (b) include, but is not limited to, a plan for the remediation of the Land in order to prevent or minimise any adverse impact on the supply or quality of groundwater within the North Stockton Catchment Area.
- (3) The Director General may require that the Approval Holder vary any part of the Hydrocarbon Spill Procedure as a result of any incident or event which adversely impacted upon or had the potential to adversely impact upon the groundwater in the North Stockton Catchment Area.

CLAUSE 6 REHABILITATION

Requirement to rehabilitate the Land

- (1) The Approval Holder must rehabilitate disturbed areas of the Land in accordance with the Landscape Management Plan and the Extraction Buffer.

Progressive replacement of topsoil

- (2) For the purposes of rehabilitation of Extraction Zone Lot 220, the topsoil must be replaced after the extraction of sand has occurred to a minimum depth of 0.3 metres.

CLAUSE 7 INCIDENT REPORTING

- (1) For the purpose of clauses 2 and 3 (Incident Reporting) of Schedule 5 of the Project Approval, HWC and the Office of Water are “relevant agencies” which are to be notified if there is an incident that requires reporting under those sections.
- (2) For clarification, “material harm to the environment” in clause 2 (Incident Reporting) of Schedule 5 of the Project Approval, includes harm to groundwater sources.

CLAUSE 8 REVOCATION OF APPROVAL

If, in the opinion of the Director General, the groundwater located within the North Stockton Catchment Area is becoming polluted or contaminated, or is at risk of becoming polluted or

contaminated, as a result of the Extractive Operations, the Director General may revoke this Approval by notice in writing to the Approval Holder (*Revocation Notice*).

PART 3 ENVIRONMENTAL REPORTING

CLAUSE 9 ANNUAL ENVIRONMENTAL REPORTING

Annual Environmental Management Report (AEMR)

- (1) For the purposes of clause 4 (Annual Reporting) of Schedule 5 of the Project Approval, HWC and the Office of Water are “relevant agencies” to which a copy of the AEMR must be submitted.
- (2) If HWC or the Office of Water considers that the AEMR does not adequately address the matters specified in condition 4(a)-(h) of Schedule 5 to the Project Approval, HWC or the Office of Water may require the Approval Holder to submit a supplementary report addressing the matters notified to the Approval Holder.

Additional Reporting

- (3) On the date on which the AEMR is submitted in accordance with subclause (1), the Approval Holder must also submit the following to HWC and the Office of Water:
 - (a) an electronic copy of the monitoring results for groundwater levels and quality during the past year collected in accordance with the Soil and Water Management Plan, and
 - (b) a written report (*Operations Report*) addressing whether the Approval Holder has achieved compliance with:
 - (i) the requirements for the method of Extractive Operations in clause 3 of the Schedule;
 - (ii) the Operations Management Procedure;
 - (iii) the Hydrocarbon Spill Procedure; and
 - (iv) the requirement for the progressive replacement of topsoil provided in clause 6(3) of the Schedule.
- (4) The Operations Report must:
 - (a) identify any non-compliance during the previous year; and
 - (b) identify what actions were, or are being, taken to ensure compliance.
- (5) If HWC or the Office of Water considers that the Operations Report does not adequately address the matters specified in subclause (3)(b)(i)-(iv) or subclause (4), HWC or the Office of Water may require the Approval Holder to submit a supplementary report addressing the matters notified to the Approval Holder.

Annual inspection

- (6) Within 3 months of the date on which the AEMR is submitted to HWC and the Office of Water, the Approval Holder must arrange an annual inspection of the Extraction Area to be attended by HWC and the Office of Water.
- (7) The Director General may direct that the Approval Holder notify other relevant agencies, including but not limited to Port Stephens Council, of the date and time of the inspection and be given the opportunity to attend. Such notice is to be provided by the Approval Holder to those agencies at least 14 days prior to the scheduled inspection date.
- (8) The Approval Holder must not arrange an annual inspection within four weeks of the date on which the AEMR is submitted to HWC and the Office of Water.

CLAUSE 10 INDEPENDENT ENVIRONMENTAL AUDITS

For the purpose of clause 6 (Independent Environmental Audit) of Schedule 5 of the Project Approval, HWC and the Office of Water are “relevant agencies” to which a copy of the audit report and the response to any of the recommendations in the audit report must be submitted.

PART 4 OBLIGATIONS AND RIGHTS

CLAUSE 11 APPROVAL HOLDER'S RIGHTS AND OBLIGATIONS

Notification of breach

- (1) Within 3 days of becoming aware of any act by the Approval Holder that, in the opinion of the Approval Holder, may be in breach of the terms and conditions of this Approval, the Approval Holder must notify HWC and the Office of Water of the breach.

Investigation of performance under Approval

- (2) The Director General may require an investigation of the performance of any of the Approval Holder's obligations under this Approval during the conduct of the Extractive Operations and following the cessation of the Extractive Operations.

Obligations at the cessation of the Extractive Industry

- (3) Within 12 months prior to the expiry of this Approval, the Approval Holder must commission and pay the full cost of an Independent Environmental Audit of the Extractive Operations.
- (4) The Independent Environmental Audit referred to in subclause (3) must:
 - (a) be conducted by a suitably qualified, experienced, and independent team of experts whose appointment has been approved by the Director General;
 - (b) assess the environmental performance of the Extractive Operations, and its effects on the surrounding environment;
 - (c) assess whether the Approval Holder has achieved compliance with the terms and conditions of this Approval and the Environmental Management Plans; and,
 - (d) assess the Land in terms of the completion criteria and criteria for quarry closure.
- (5) The Independent Environmental Audit referred to in subclause (3) may include recommendations as to works that could be performed or additional obligations that could be imposed in order to rectify any of the matters assessed in subclause (4).
- (6) Within 1 month of the completion of the Independent Environmental Audit referred to in subclause (3), the Approval Holder must submit a copy of the audit report to the Director General and HWC, with a response to any of the recommendations in the audit report.
- (7) If the Approval Holder performs further work or satisfies additional obligations based on the recommendations made in the Independent Environmental Audit, the Approval Holder may cause a further Independent Environmental Audit to be carried out in relation to those further works or obligations (*Supplementary Independent Environmental Audit*).
- (8) Within 1 month of the completion of the Supplementary Independent Environmental Audit referred to in subclause (7), the Approval Holder must submit a copy of the audit report to the Director General and HWC.

Note. The results of the Independent Environmental Audit and, where relevant, the Supplementary Independent Environmental Audit, may be a relevant consideration when the Director General assesses applications for further approvals or amendments to an approval.

CLAUSE 12 OPERATION OF HWC

Interference with HWC functions

- (1) Nothing in this Approval allows the Approval Holder to interfere with or prevent HWC from performing its statutory functions in relation to the North Stockton Catchment Area.

HWC access and infrastructure

- (2) In carrying out Extractive Operations the Approval Holder must not, unless with written consent of HWC:
 - (a) damage or interfere with any improvements, monitoring bores, water supply infrastructure or portable operating assets of HWC situated in the Land;
 - (b) limit or impede HWC's access to any improvements, monitoring bores, water supply infrastructure or portable operating assets of HWC situated in the Land; or
 - (c) limit or impede the manner or timing of HWC in the performance of its statutory functions including installation and operation of any new improvements, monitoring bores, water supply infrastructure or portable operating assets of HWC within the North Stockton Catchment Area.

APPENDIX 1 EXTRACTION AREA

Note. The figures in this Appendix show the Extraction Area, depicted as “Extraction Zone Lot 218” and “Extraction Zone Lot 220”.

Figure 1 Extraction Zone Lot 218

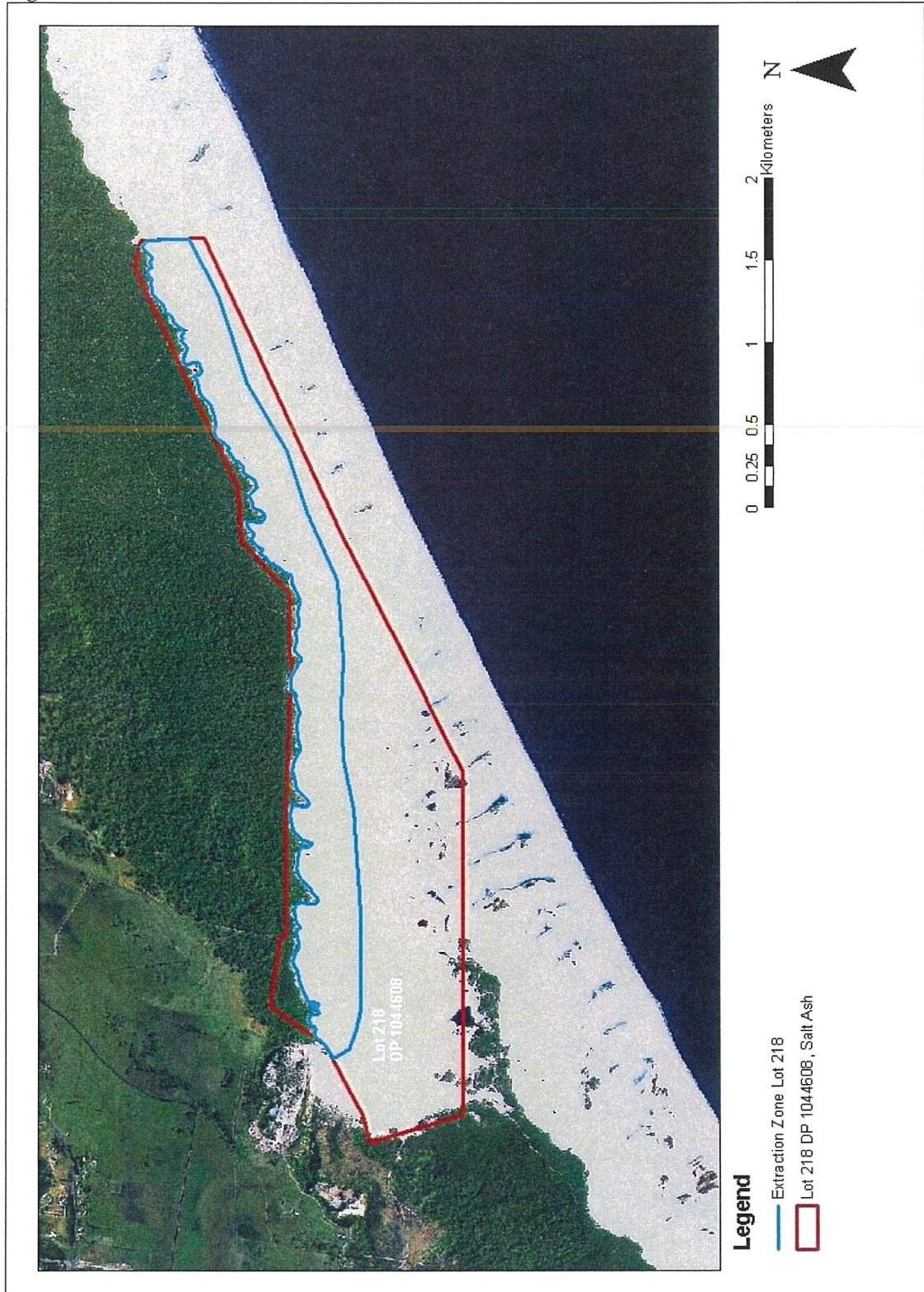
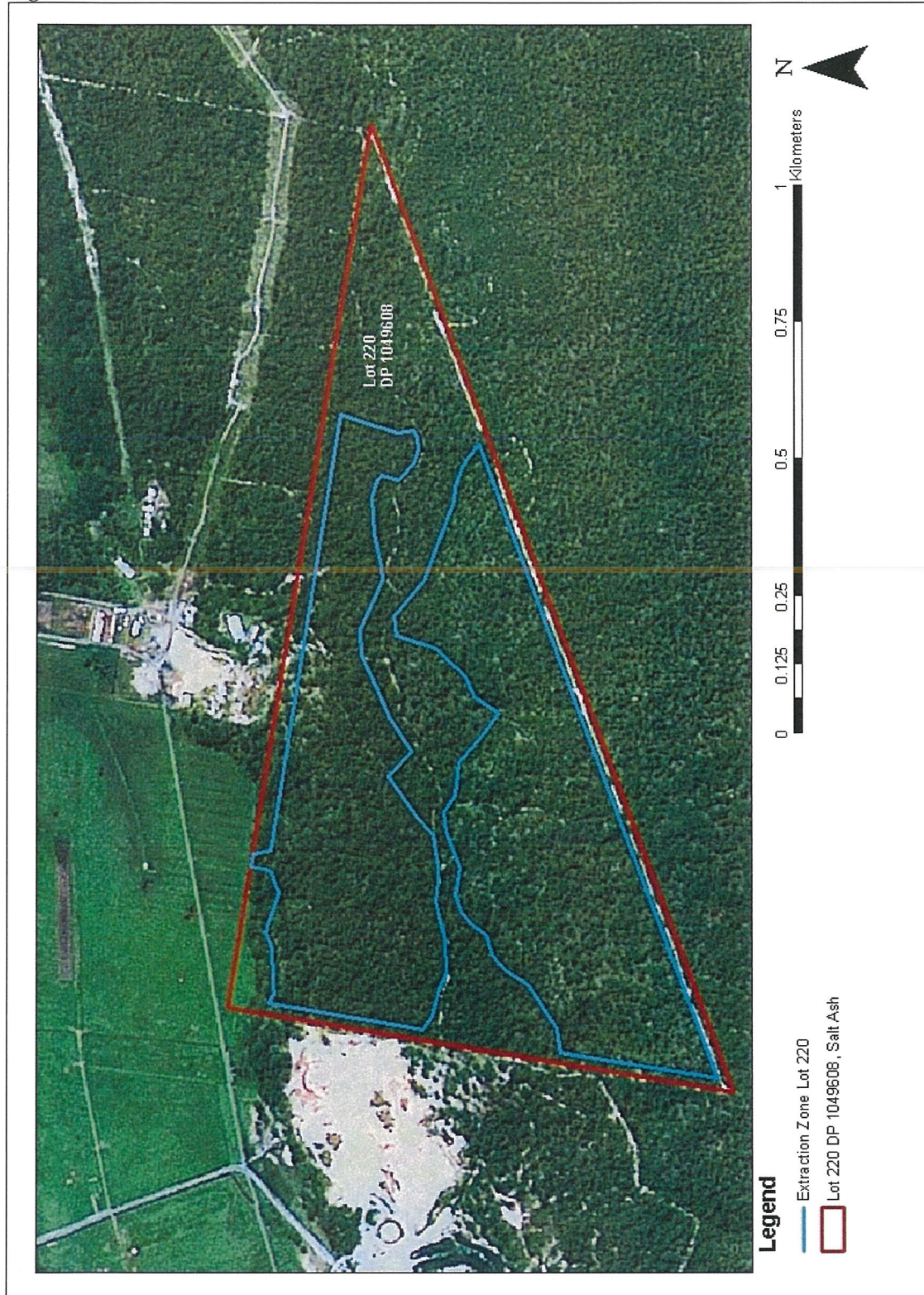


Figure 2 Extraction Zone Lot 220

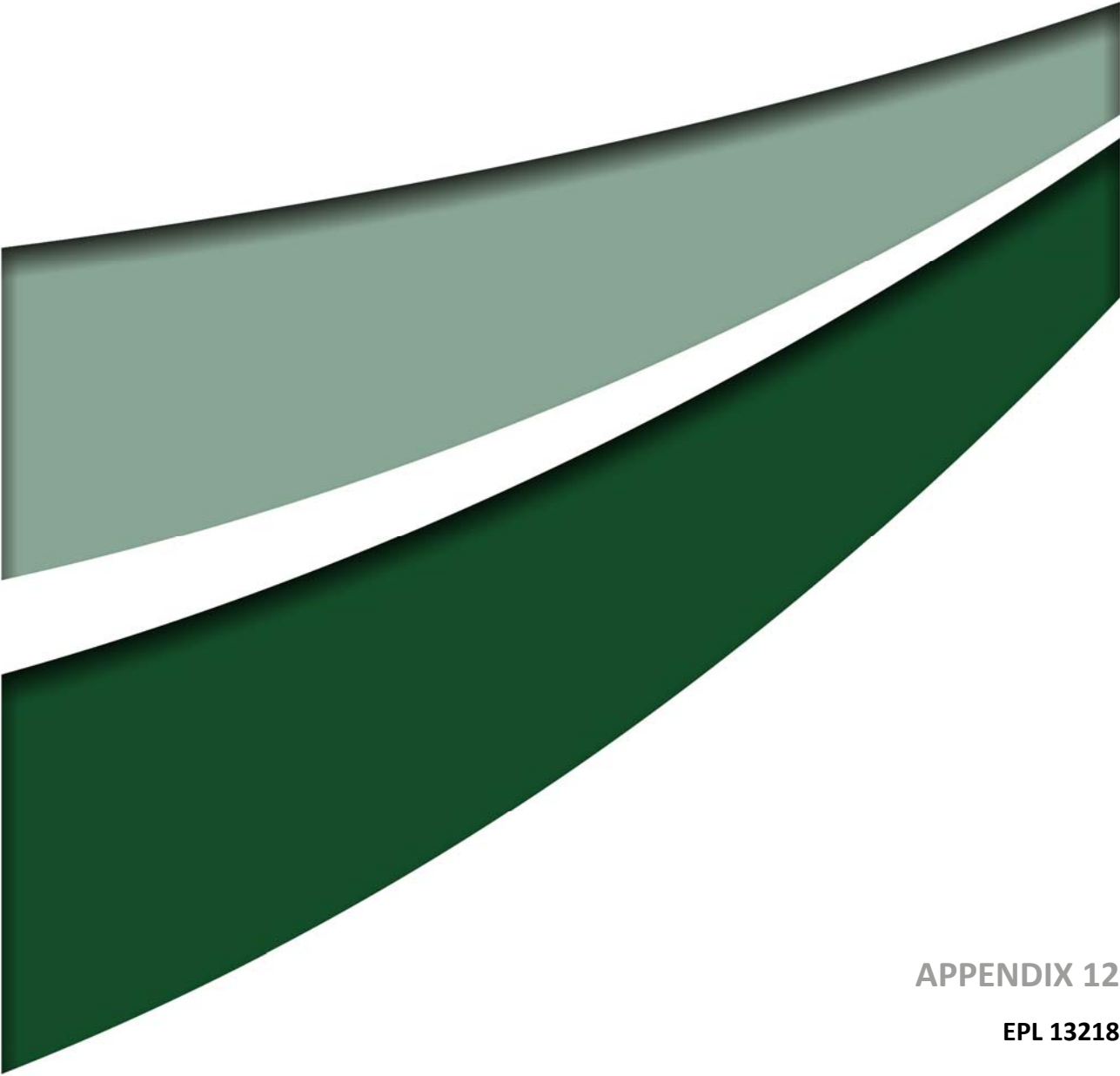


APPENDIX 2 CONTACT DETAILS

- (1) For the purpose of notifying the Director General and the Office of Water under this Approval, the contact details are:
 - The NSW Office of Water
 - Attn: Manager Major Projects, Mines and Assessment
 - PO Box 2213
 - DANGAR NSW 2309

- (2) For the purpose of notifying the, HWC under this Approval, the contact details are:
 - Hunter Water Corporation
 - Attn: Manager Water Resources
 - PO Box 5171
 - HRMC NSW 2310

- (3) The contact details in (1) and (2) may be amended from time to time by notice in writing to the Approval Holder.



APPENDIX 12

EPL 13218

Environment Protection Licence



Licence - 13218

Licence Details

Number:	13218
Anniversary Date:	30-November

Licensee

MACKA'S SAND PTY LTD

2684 NELSON BAY ROAD

SALT ASH NSW 2318

Premises

MACKA'S SAND EXTRACTION AND PROCESSING FACILITY

OFF NELSON BAY ROAD

SALT ASH NSW 2318

Scheduled Activity

Extractive Activities

Fee Based Activity

Scale

Land-based extractive activity

> 500000-2000000 T extracted, processed or stored

Region

North - Hunter

Ground Floor, NSW Govt Offices, 117 Bull Street

NEWCASTLE WEST NSW 2302

Phone: (02) 4908 6800

Fax: (02) 4908 6810

PO Box 488G NEWCASTLE

NSW 2300

Environment Protection Licence



Licence - 13218

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Environment Protection Licence



Licence - 13218

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Environment Protection Licence

Licence - 13218



Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act); and
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

Licence - 13218



The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

MACKA'S SAND PTY LTD
2684 NELSON BAY ROAD
SALT ASH NSW 2318

subject to the conditions which follow.

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1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Extractive Activities	Land-based extractive activity	> 500000 - 2000000 T extracted, processed or stored

A1.2 Development Consent 08_0142 allows extraction of up to 1,000,000 t/a from Lot 218 and 1,000,000 t/a from Lot 220.

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
MACKA'S SAND EXTRACTION AND PROCESSING FACILITY
OFF NELSON BAY ROAD
SALT ASH
NSW 2318
LOT 218 DP 1044608, LOT 220 DP 1049608

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:

- the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
- the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

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2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

- P1.1 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.
- P1.2 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Groundwater monitoring		Groundwater Monitoring Bore "SP1" as shown on Figure 4.10 in the Environmental Assessment "Sand Extraction Operations from lots 218 and 220, Salt Ash", dated April 2009. A copy of this figure has been filed on DECCW file LIC08/1532
2	Ground water monitoring		Groundwater Monitoring Bore "SP2" as shown on Figure 4.10 in Environmental Assessment "Sand Extraction Operations from Lots 218 and 220, Salt Ash", dated April 2009. A copy of this figure has been filed on DECCW file LIC08/1532
3	Groundwater monitoring		Groundwater Monitoring Bore "SP3" as shown on Figure 4.10 of Environmental Assessment "Sand Extraction Operations from Lots 218 and 220, Salt Ash", dated April 2009. A copy of this figure has been filed on DECCW file LIC08/1532
4	Groundwater monitoring		Groundwater Monitoring Bore "SP4" as shown on Figure 4.10 in Environmental Assessment "Sand Extraction Operations from Lots 218 and 220, Salt Ash", dated April 2009. A copy of this figure has been filed on DECCW file LIC08/1532

3 Limit Conditions

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L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Waste

L2.1 The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.

L2.2 This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the premises if it requires an environment protection licence.

L2.3 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled "Waste" and meeting the definition, if any, in the column titled "Description" in the table below.

Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled "Activity" in the table below.

Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below.

This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource recovery exemption under Clause 51A of the Protection of the Environment Operations (Waste) Regulation 2005	As specified in each particular resource recovery exemption	NA
NA	Waste	Any waste received on site that is below licensing thresholds in Schedule 1 of the POEO Act, as in force from time to time	-	NA

L3 Noise limits

L3.1 Noise from the premises must not exceed the limits specified in the following table:

Location	Limit dBA LAeq(15 minute) Day	Limit dBA LAeq(15 minute) Evening	Limit dBA LAeq(15 minute) Night	Limit dBA LA1(1 minute) Night
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Residences north of the private haul road servicing the premises		40	40	45
Residence R27	36	36	35	45
Residences R1, R2, R3, R4, R5, R6, R7 and R8	39	39	39	45
All other residences		36	35	45

- L3.2 For the purposes of the table above:
- where LAeq means the equivalent noise level - the level of noise equivalent to the energy average of noise levels occurring over a measurement period.
 - Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and Public Holidays.
 - Evening is defined as the period 6pm to 10pm.
 - Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and Public Holidays.
 - Residence locations are shown in Figure 4.4 of the report "Environmental Assessment - Sand Extraction Operations from Lot 218 and Lot 220, Salt Ash". A copy of which has been filed on EPA file LIC08/1532.
- L3.3 The noise limits set out in this licence apply under all meteorological conditions except for the following:
- Wind speeds greater than 3 metres/second at 10 metres above ground level; or
 - Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
 - Stability category G temperature inversion conditions.
- L3.4 For the purposes of determining meteorological conditions:
- data recorded by the meteorological station identified as Bureau of Meteorology (BoM) Williamtown Weather Station (station 061078) must be used; and
 - temperature inversion conditions (stability category) are to be determined by the sigma theta method referred to in Part E2 of Appendix E to the NSW Industrial Noise Policy.
- L3.5 To determine compliance:
- with the Leq(15 minute) noise limits detailed in this licence, the noise measurement equipment must be located:
 - approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or
 - within 30 metres of a dwelling facade, but not closer than 3 metres, where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable
 - within approximately 50 metres of the boundary of a National Park or a Nature Reserve.
 - with the LA1(1 minute) noise limits detailed in this licence, the noise measurement equipment must be located within 1 metre of a dwelling facade.
 - with the noise limits detailed in this licence, the noise measurement equipment must be located:
 - at the most affected point at a location where there is no dwelling at the location; or
 - at the most affected point within an area at a location prescribed by conditions (a) or (b) of this licence

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condition.

- L3.6 For the purpose of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy, January 2000, must be applied as appropriate, to the noise levels measured by the noise monitoring equipment.

Note: Development Consent 08_0142 requires additional noise mitigation measures and land acquisition where certain noise criteria cannot be met.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

- O1.1 Licensed activities must be carried out in a competent manner.

This includes:

- a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
- b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

- O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:

- a) must be maintained in a proper and efficient condition; and
- b) must be operated in a proper and efficient manner.

O3 Dust

- O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

- O3.2 Activities occurring in or on the premises must be carried out in a manner that will minimise the generation, or emission from the premises, of wind-blown or traffic generated dust.

O4 Other operating conditions

- O4.1 There must be no extraction equipment operated within 250 metres of residence R27, as shown in "Figure 4.4 Residential Receivers and Noise Logger Locations" of the Environmental Assessment, during evening and night periods unless agreement is reached with the landholder.

- O4.2 Prior to sand extraction occurring within 250 metres of residence R27, as shown in "Figure 4.4 Residential Receivers and Noise Logger Locations" of the Environmental Assessment, a Noise Management Plan

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that specifically addresses noise controls to achieve compliance with the noise limits for R27, must be prepared and approved by the EPA.

Note: Specific controls were detailed in the Environmental Assessment when extraction works are conducted within 250 metres of residence R27.

- O4.3 Prior to activities commencing on site the proponent must develop and implement a Traffic Noise Management Plan. The Traffic Noise Management Plan (NMP) must include, but need not be limited to, particular focus on truck movements on the private access road between the hours of 5am and 7am to ensure that the licence noise limit is not exceeded:
- Truck speed limits;
 - Maintenance of the road in good conditions free of potholes, corrugations and other features causing generation of excessive noise;
 - Use of quietest available trucks that meet operational requirements;
 - Driver training;
 - Conditions in driver's contracts of employment requiring them to minimise noise generation; abide by the speed limits and other reasonable instructions to minimise noise, together with a system of sanctions for non-compliance.
- O4.4 Any dedicated refuelling area must be hardstand and suitably bunded in accordance with EPA bunding guidance.

Note:

Development Consent 08_0142 prohibits on-site maintenance of equipment or storage of fuels and chemicals on the premises. This development consent notes refuelling of equipment will be undertaken by a registered contractor to remove the need for on-site storage of fuels.

5 Monitoring and Recording Conditions

M1 Monitoring records

- M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.
- M1.2 All records required to be kept by this licence must be:
- in a legible form, or in a form that can readily be reduced to a legible form;
 - kept for at least 4 years after the monitoring or event to which they relate took place; and
 - produced in a legible form to any authorised officer of the EPA who asks to see them.
- M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
- the date(s) on which the sample was taken;
 - the time(s) at which the sample was collected;
 - the point at which the sample was taken; and
 - the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

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M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Water and/ or Land Monitoring Requirements

POINT 1,2,3,4

Pollutant	Units of measure	Frequency	Sampling Method
Arsenic	micrograms per litre	Quarterly	Grab sample
Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Depth	metres	Quarterly	Probe
Iron	milligrams per litre	Quarterly	Grab sample
Manganese	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample
Turbidity	nephelometric turbidity units	Quarterly	Grab sample

M3 Testing methods - concentration limits

M3.1 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M4 Recording of pollution complaints

M4.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M4.2 The record must include details of the following:

- a) the date and time of the complaint;
- b) the method by which the complaint was made;
- c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- d) the nature of the complaint;
- e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
- f) if no action was taken by the licensee, the reasons why no action was taken.

M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

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M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

M5.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M5.3 The preceding two conditions do not apply until 3 months after:

- a) the date of the issue of this licence or
- b) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.

M6 Other monitoring and recording conditions

M6.1 To assess compliance with the noise limits of this licence, attended noise monitoring must be undertaken in accordance with limit requirements of this licence:

- a) at the locations listed in the noise limit conditions of this licence;
- b) occur annually in a reporting period;
- c) occur during the time of year when noise propagation from the premises is likely to be at its worst, that is, generally winter conditions; and
- d) occur during each day, evening and night period as defined in the NSW Industrial Noise Policy.

Note: It is the intention of the EPA to review the noise monitoring results required under this condition after a period of three (3) years to assess the suitability of the required noise monitoring.

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

- a) a Statement of Compliance; and
- b) a Monitoring and Complaints Summary.

At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

R1.3 Where this licence is transferred from the licensee to a new licensee:

- a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new

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licensee is granted; and

b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:

a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or

b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:

a) the licence holder; or

b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R1.8 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.9 A report must be compiled annually showing the results of all groundwater monitoring conducted on the premises. This report must graphically present the results of all groundwater results since monitoring began and note on the graph when any groundwater extraction and/or recharge began. There must be a separate graph prepared for each parameters monitored and results must be compared to relevant criteria, such as that developed by ANZECC. The report must also provide a commentary on the results that have been obtained, highlighting any changes observed over time, and make recommendations where adverse effects are observed. The report must be submitted to the EPA annually with the Environment Protection Licence Annual Return.

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening

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material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R3 Written report

- R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
- where this licence applies to premises, an event has occurred at the premises; or
 - where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence, and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.
- R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.
- R3.3 The request may require a report which includes any or all of the following information:
- the cause, time and duration of the event;
 - the type, volume and concentration of every pollutant discharged as a result of the event;
 - the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
 - the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
 - action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
 - details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
 - any other relevant matters.
- R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Other reporting conditions

- R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the yearly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:
- an assessment of compliance with the noise limits detailed in this licence; and
 - an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in this licence.

7 General Conditions

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G1 Copy of licence kept at the premises or plant

- G1.1 A copy of this licence must be kept at the premises to which the licence applies.
- G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.
- G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

8 Pollution Studies and Reduction Programs

U1 Pollution Reduction Program 1 - Ambient Air Quality Monitoring

- U1.1 The licensee must implement ambient air quality monitoring via High Volume Air Sampler (HVAS) or Tapered Element Oscillating Microbalance (TEOM) units, to monitor particulate matter emissions from site operations at the nearest or most affected residential receiver/s for the following allotments
 - a) Lot 218 DP 1044608; and
 - b) Lot 220 DP 1049608.

The need for implementation and operation of ambient air quality monitoring for Lot 218 will be considered upon the determination of the modification application (08_0142 MOD 1) that is currently (February 2013) with the NSW Department of Planning and Infrastructure.

An ambient air quality monitor must be installed at a suitable location within the vicinity of residence "R27" within 6 months of the owner of R27 requesting in writing that the unit be installed. EPA must grant approval to the proposed location of the monitor. Residence R27 is shown on Figure 4.4 of the Environmental Assessment "Sand Extraction Operations from Lots 218 and 220. Salt Ash" dated April 2009. A copy of this figure is filed on EPA file LIC08/1532.

The licensee must advise the EPA within seven days of commissioning of any ambient air quality monitor.

Note: It is the intention of the EPA to require on-going particulate matter monitoring at the premises at the implementation of the ambient air quality monitor(s) required by this licence.

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Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .

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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non - putrescible), special waste or hazardous waste

Mr Peter Jamieson

Environment Protection Authority

(By Delegation)

Date of this edition: 30-November-2009

End Notes

- 1 Licence varied by notice 1110241, issued on 24-Dec-2009, which came into effect on 24-Dec-2009.
- 2 Licence varied by notice 1500413 issued on 14-Sep-2011
- 3 Licence varied by notice 1502830 issued on 19-Jan-2012
- 4 Licence varied by notice 1509957 issued on 01-Feb-2013
- 5 Licence varied by notice 1514548 issued on 29-May-2013



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