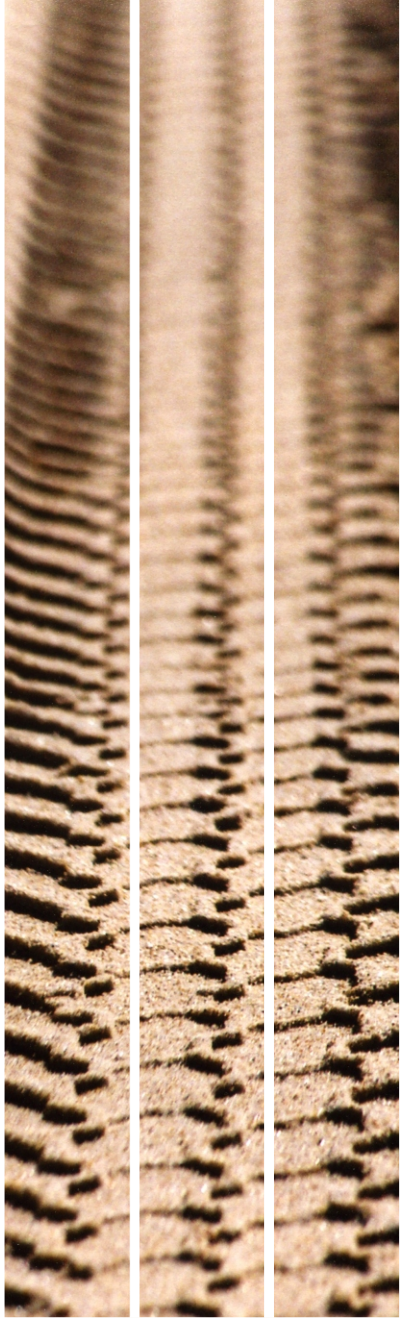
ENVIRONMENTAL ASSESSMENT

Modifications to Mackas Sand
Extraction Operations on Lot 218 & Lot 220
Salt Ash, NSW



MACKA'S SAND PTY LTD

OCTOBER 2012

ENVIRONMENTAL ASSESSMENT

Modifications to Mackas Sand Extraction Operations on Lot 218 and Lot 220 Salt Ash NSW

October 2012

Prepared by
Umwelt (Australia) Pty Limited

on behalf of
Mackas Sand Pty Ltd

Project Director:	**Peter Jamieson**
Project Manager:	**Andy Goodwin**
Report No:	**1646/R36/Final**
Date:	**October 2012**

Newcastle

PO Box 3024
75 York Street
Teralba, NSW 2284
Ph: 02 4950 5322
www.umwelt.com.au

Executive Summary

INTRODUCTION

This Environmental Assessment has been prepared to accompany an application to the Minister for Planning and Infrastructure under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to modify Major Project Approval 08_0142. Major Project Approval 08_0142 to extract up to 1 million tonnes of sand per year from each extraction area on Lot 218 in DP 1044608 (Lot 218) and Lot 220 in DP 1049608 (Lot 220) was granted on 20 September 2009 by the then Minister for Planning. Location of the approved extraction areas are shown on **Figure 1.1**. Details of the original proposal including the extractive operations are contained within the Environmental Assessment (EA) (Umwelt, 2009a) and subsequent approval.

Lot 218 and Lot 220 are owned by Worimi Local Aboriginal Land Council (LALC) and contain approximately 20 million tonnes of sand resource. The potential to extract sand from these lots to generate employment, training and economic development opportunities for Worimi LALC was part of the agreement between Worimi LALC and the New South Wales (NSW) Government that led to the establishment of the Worimi Conservation Lands on Stockton Bight in February 2007.

Worimi LALC has contracted Mackas Sand Pty Ltd (Mackas Sand) to obtain approval for and extract industrial grade and construction sand resources from the approved extraction areas on Lot 218 and Lot 220 on behalf of Worimi LALC.

Umwelt (Australia) Pty Limited (Umwelt) was engaged by Mackas Sand to undertake the necessary environmental assessments for this modification. The study area for this assessment consists of the proposed alternate haul route alignment from Lot 218 to Nelson Bay Road and approved extraction areas on Lot 218 and Lot 220. The study area is located approximately 20 to 25 kilometres north-east of Newcastle, NSW.

Consultation has been undertaken with officers from the Department of Planning and Infrastructure who have confirmed that the proposed modification can be determined under Section 75W of the EP&A Act.

To date sand extraction has been undertaken on Lot 220 by Mackas Sand. No extraction has been undertaken on Lot 218 due to issues in regard to access to the approved extraction area.

Part of the modification sought is to construct and utilise an alternate route to access the approved sand extraction area on Lot 218 in DP 1044608 (Lot 218), Salt Ash from Nelson Bay Road.

The approved access to Lot 218 extraction area is via a public road reserve (Stockton Bight Track) that passes through Pt 76 and part of Pt 101 from where it leaves Stockton Bight Track and traverses across Pt 101 and Pt 13 of DP 753192 to Lot 227 DP 1097995 (Lot 227) which provides access to Lot 218 (see **Figure 1.2**).

Mackas Sand has decided not to use this route due to difficulties in regard to access over Pt 101 and Pt 13 of DP 753192. In addition the approved route from Lot 227 onto Lot 218 would have resulted in a significant earthworks cutting being constructed through an elevated knoll within the mobile sand dunes. This knoll is now used as a viewing location as part of Worimi Sand Dune Adventures. As a result, access into western side of Lot 218 extraction area via Pt 101, Pt 13 and Lot 227 is no longer the preferred access.

The preferred alternate access to the Lot 218 extraction area is via a right of way from Nelson Bay Road to Lot 122 DP 753192 which adjoins the northern boundary of Lot 218.

The modification sought is to construct and utilise the proposed new route from Nelson Bay Road to access the approved sand extraction area on Lot 218 in DP 1044608 (Lot 218), Salt Ash. The route as shown on **Figure 1.2** is approximately 2 kilometres long and traverses Lot 4 DP 1121457, Lot 1 DP 177679, Lot 810 DP 1008279, Lot 58 DP 753192 and Lot 122 DP 753192. These land parcels are owned by B & R B Mackenzie FT Pty Ltd. Details of the proposed new intersection on Nelson Bay Road are shown on **Figure 1.3**.

To minimise potential impacts on flooding and disturbance to creek banks, the proposed road will utilise an existing culvert over Tilligerry Creek that is located approximately 240 metres south-east of Nelson Bay Road. Tilligerry Creek drains in a north-easterly direction to Port Stephens. The route will then traverse approximately 1760 metres south to the northern edge of the Lot 218 extraction area.

The route traverses approximately 1440 metres of low-lying land associated with the inter-barrier depression that is located between the Pleistocene inner barrier and Holocene outer barrier system. The inter-barrier depression has low potential to contain archaeological material.

Geotextile will be placed over the ground surface in areas with potential to contain archaeological material prior to sand fill and road base material being placed along the alignment of the road. This will minimise potential disturbance of any subsurface archaeological material that may exist along the road alignment. The most southern 540 metres of the proposed route traverses sand ridges associated with the Holocene dune system. This section of the route is known to contain archaeological material particularly in the vicinity of the ridge along the northern boundary of Lot 122. In addition the entire southern boundary of Lot 122 and the alignment of the proposed access across Lot 218 has been identified as Potential Archaeological Deposit (PAD). Geotextile will be used where the road crosses this PAD.

In total, the preferred alternate haul route would disturb an area of approximately 2.03 hectares of which approximately 0.48 hectares is unvegetated (existing track), 1.18 hectares is disturbed grassland and the remaining 0.37 hectares is Coastal Sand Apple – Blackbutt Forest.

As can be seen from **Figure 1.4**, Lot 218 adjoins the 4438 hectares of Worimi Conservation Lands to the south, east and north and is located adjacent to a significant tract of Coastal Sand Apple – Blackbutt Forest which includes pockets of Swamp Mahogany – Paperbark Forest. In total, construction of the preferred alignment of the alternate haul route would disturb approximately 0.37 hectares of these forest communities.

The alignment of the proposed road has been located to avoid disturbance of several clusters of ground orchids *Diuris praecox* and *Diuris arenaria* which have been identified along sections of the southern boundary of Lot 122 and northern boundary of Lot 218. These orchid species are listed as vulnerable under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Threatened Species Conservation Act 1995* (TSC Act) respectively. Trees and understorey along this alignment would be cleared and windrowed along the edge of the alignment.

Field surveys undertaken during the September 2011 flowering period indicate that there are in excess of 250 *Diuris praecox* and approximately 50 *Diuris arenaria* located on the verges of the existing sand track along the southern boundary of Lot 122 and adjacent cleared land with these orchids showing a preference for the cleared areas along and adjacent to existing tracks. None of these plants will be disturbed by the proposed route. Additional field surveys were undertaken in late August 2012, September 2012 and early October 2012 along the proposed alignment to confirm that no *Diuris praecox* or *Diuris arenaria* were located within the disturbance area that will be required for construction of the proposed alternate haul road.

There are no changes proposed to the method of extraction for operations on Lot 218 other than that extraction will commence approximately 600 metres to the east of the western boundary of the approved extraction area and will progress in easterly and westerly directions from the access point.

Approval is also sought to lower the minimum extraction level in both Lot 218 and Lot 220 to being 0.7 metres above the maximum predicted groundwater level during extraction with the final landform being at least 1 metre higher than the maximum predicted groundwater level as is currently required.

This minor change in extraction depth is sought to improve the efficiency of extraction operations particularly in dry periods when the water table is well below its maximum predicted level. Efficiency is improved through increased trafficability of the exposed sand surface due to the greater moisture content increasing the stability and bearing capacity of the sand. The greater bearing capacity means that travel times and the amount of energy required to operate front-end loaders and dump trucks on the sand are significantly reduced.

In previous consultation in regard to maximum depths of extraction, NSW Office of Water (NOW) representatives have indicated that extraction to a depth 0.7 metres above the maximum predicted groundwater level may be accepted provided that the final landform for the site was reshaped to provide a minimum of 1 metre of sand above the maximum predicted groundwater level.

There has been extensive consultation with representative Aboriginal groups and Port Stephens Council in regard to the proposed alignment and use of the alternate haul road. Consultation with neighbouring land holders has also been undertaken, including face to face visits and phone calls. The primary concern identified by neighbouring land holders was air quality. No other significant concerns were raised by the community during the consultation process.

APPROVAL PROCESS

The original proposal satisfied the definition of a Major Project under the then State Environmental Planning Policy (Major Development) 2005 and was approved by the Minister for Planning under Part 3A of the EP&A Act.

The then Department of Planning advised by email on 19 April 2010:

> The Department has decided not to issue specific Director-General's requirements for the proposed modification to the Mackas Sand project.
>
> Nevertheless, the EA for the proposed (modification) must address relevant matters from the DGRs issued in October 2008 for the project. The following matters are of particular interest to the Department:
>
> - Noise;
> - Air quality (dust emissions);
> - Road safety arising from the use of a previously unformed road;
> - Biodiversity issues (such as removal of vegetation to enable use of the proposed new access route); and
> - Any interactions with adjacent landowners.
>
> Please be aware that the *Environmental Planning and Assessment Amendment (Miscellaneous) Regulation 2010* commenced on 26 March 2010 and this may have application for the proposed modification, regarding landowner consent in particular.

KEY ENVIRONMENTAL ISSUES

Key environmental issues associated with the modified proposal were identified through risk assessment, consultation activities and requirements for the EA provided by the Director-General of the then Department of Planning (DoP).

Traffic Access and Public Safety

The approved access to Lot 218 extraction area from Lavis Lane is via Stockton Bight Track which is located within public road easement within Pt 76 and Pt 101 DP 753192 and then via Pt 101, Pt 13 DP 753192 and Lot 227.

The proposed haul road will require the construction of a new intersection on Nelson Bay Road as shown on **Figure 1.2**.

A concept design for the proposed new Nelson Bay Road intersection is shown on **Figure 1.3**. Roads and Maritime Services has indicated (see **Appendix 5**) that it has discussed the proposed intersection with Department of Planning and Infrastructure and Council and would be prepared to concur with the access subject to certain requirements.

Traffic assessment undertaken by TPK & Associates indicates that the Level of Service on Nelson Bay Road will not be adversely affected and construction and use of the proposed new intersection will not have an adverse impact on the road network and that the intersection can operate at acceptable levels of performance.

The proposed haul road will be constructed over private land that is either owned or is to be purchased by B & R B Mackenzie FT Pty Ltd. Prior to use for product haulage, this road will be constructed with an 8 metre wide formation. The most northern 200 metres of the proposed access adjacent to Nelson Bay Road will be sealed.

Lavis Lane will not be used for the transport of sand from Lot 218.

Aboriginal Heritage

A detailed Aboriginal Cultural Heritage Assessment was prepared in consultation with local Aboriginal representatives for the area. Archaeological survey identified four Loci close to the alignment of the proposed alternate haul route that contain Aboriginal artefacts. The low foredunes from the inter-barrier depression to the base of the transgressive dune on Lot 218 were identified as having moderate or high archaeological potential and were classified as PAD within the alignment of the proposed alternate haul route. This includes the large intersected PAD identified as A3 during previous assessments.

Where possible, potential impacts to this site have been mitigated by changes in proposed road construction method and location. It is intended that any artefactual material within areas designated as PAD will be collected from the surface in consultation with the Aboriginal Heritage Management Group. Following artefact collection and vegetation clearing, within the identified boundaries of these sites, a layer of geotextile will be placed on the ground surface prior to fill material and road base being placed as part of road construction.

This technique of road construction has been adopted to avoid disturbing below the current ground surface and therefore should avoid impacts to any artefacts that may also be present but not currently visible.

The following Aboriginal parties that were previously involved in the assessment of Lot 218 and Lot 220 were consulted in regard to the proposed alternate haul route:

- Worimi LALC;
- Nur-Run-Gee Pty Ltd (Nur-Run-Gee);
- Viola Brown;
- Mur-Roo-Ma Incorporated (Mur-Roo-Ma); and
- Carol Ridgeway-Bissett (previously Maaiangal Aboriginal Heritage Co-operative).

Following archaeological survey and review of the final draft archaeological assessment the Aboriginal parties made the following recommendations:

- Worimi LALC indicated that recommendations provided in the draft report do not, in any way, restrict or unfavourably effect this development.
- Nur-Run-Gee recommended that existing infrastructure on Lot 218 should be utilised and is hesitant to support any variation to Project Approval 08_0142.
- Mur-Roo-Ma recommended that the previously approved access to the sand extraction face should be utilised and the alternate haul route should not be approved.
- Both Carol Ridgeway-Bissett and Viola Brown recommended that the proposed modification is not approved because of its impacts on Aboriginal cultural heritage and the cultural landscape, including flora and fauna.

Ecology and Biodiversity

A detailed ecological assessment was undertaken for the proposed alternate haul route to determine the existing natural environment and likely impacts of the proposal on the biodiversity of the area, particularly on threatened species, populations and communities.
The proposed access will traverse approximate 1650 metres of existing track and improved pasture. The remaining 350 metres of the proposed access track will be located within Coastal Sand Apple – Blackbutt Forest and Swamp Mahogany – Paperbark Forest and will require selected removal of trees from approximately a 0.44 hectare area.

As can be seen from **Figure 1.4**, Lot 218 adjoins the 4438 hectares of Worimi Conservation Lands to the south, east and north and is located adjacent to a significant tract of Coastal Sand Apple – Blackbutt Forest which includes pockets of Swamp Mahogany – Paperbark Forest.

The loss of a small area of these forest communities will be offset by sand extraction reducing the rate at which the mobile sand dune system moves landward and smothers existing vegetation. Landward movement of the mobile dune system in this area is currently smothering approximately 0.4 hectares of vegetation per year per kilometre length of mobile dune.

Noise

The proposed modification to use the alternate haul route alignment will result in reduced noise impacts.

Quarry trucks will no longer drive past the closest residences to the approved haul route to Lot 218 along Lavis Lane (i.e. Ford residence (R4) and Towers residence (R3) as shown on **Figure 1.5**).

A Noise Management Plan (Umwelt, 2009b) has been prepared for sand extraction operations on Lot 218 and Lot 220 and associated product transport. Key operational features relevant to the Noise 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) (see **Figure 1.5**) 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 am and 10 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 Project Approval 08_0142 as Mackas Sand has an agreement with the owners of residences off Oakvale Drive. A copy of this agreement has been provided to the Department of Planning and Infrastructure (DP&I).

- Transportation of sand from Lot 218 along Lavis Lane in accordance with the provisions of Condition 9 of Schedule 3 of Project Approval 08_0142 between:

    - 6.00 am and 6.00 pm (EST) Monday to Friday;
    - 6.00 am and 7.00 pm (DST) Monday to Friday;
    - 7.00 am to 4.00 pm Saturdays; and
    - No transport on Sundays or public holidays.

As the transport of sand along Lavis Lane will no longer occur if the proposed modification is approved, this aspect of the Noise Management Plan will be updated to reflect the changes to traffic movements. The proposed new access road will provide direct access to Nelson Bay Road which is a Main Road.

Air Quality

The proposed modification to use the alternate haul route to Lot 218 will not increase air quality impacts from those set out in the EA (Umwelt, 2009a) and approved under Major Project Approval 08_0142 other than along the alignment of the alternate haul route which is either owned by or under agreement with B & R B Mackenzie FT Pty Ltd.

As stated in the EA (Umwelt, 2009a), the major source of potential dust generation is from traffic on unsealed access roads. The principal measure used to control dust will be sealing part of the access road closest to Nelson Bay Road and dust suppression on the gravel sections of haul road. Dust suppression will be achieved using a water cart to keep roads moist during periods of product transport.

In addition, dust control will be achieved by ongoing rehabilitation of parts of the extraction areas that were vegetated prior to extraction occurring.

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 and moisture content of the sand that is being quarried. Lot 220 is sheltered from prevailing winds by surrounding vegetation and as a result the likelihood of dust being transported off site is low. Additional dust controls for sand screening operations are not considered to be required at Lot 220.

Sand extraction operations at Lot 218 will be located within the mobile dune field and will initially be approximately 1700 metres from the nearest residence.

Two dust deposition gauges have been established to monitor dust deposition levels as shown on **Figure 1.5**. One gauge (DDG1) is located to the north of the access road and approved extraction area on Lot 220. The other dust deposition gauge is located adjacent to the alternate haul route to Lot 218 (DDG2). Baseline dust deposition monitoring levels (Umwelt, 2011a) indicate high levels of airborne sand being present due to the natural windblown movement of the dunes on Lot 218. Deposition levels at monitoring site DDG2 vary significantly and have on several occasions exceeded 4 g/m^2/month.

Interactions with Surrounding Land

The alternate access for which approval is sought will not increase impacts in terms of dust, noise, traffic movements and visual on surrounding non-project related properties beyond levels of impact approved as part of Major Project Approval 08_0142.

Approval for Worimi LALC's land dealings associated with the proposed modification to Major Project Approval 08_0142 was granted by NSW Aboriginal Land Council at its meeting on 28 September 2011.

Use of the alternate haul route and extraction area access site will increase the location of the initial quarry face from being approximately 1100 metres from the nearest non-project related residence (Towers residence R3 on **Figure 1.5**) to being approximately 1700 metres away reducing interaction between surrounding residences and extraction operations.

Unexploded Ordnance

An Unexploded Ordnance (UXO) assessment was undertaken as part of the EA (Umwelt, 2009a) and identified that there was potential for UXO to occur within the western part of the approved Lot 218 extraction area as a result of WWII use of the area as a bombing range and for explosives testing. This potential for UXO to occur is limited to the undisturbed sections of the landform that existed prior to approximately 1950.

The majority of the sand that will be removed from the approved Lot 218 extraction area will be windblown sand that has been deposited above the ground surface that existed prior to 1950. This material has negligible potential to contain UXO.

An Unexploded Ordnance Management Plan (UXOMP) (see **Appendix 6**) has been prepared for operations within Lot 218. The UXOMP has identified that there is a possibility of UXO and related debris existing within the Danger Zone which includes the western 1.5 kilometres of the approved extraction area in Lot 218 and the section of proposed haul road on Lot 218.

The UXOMP found that there is a low probability of UXO being encountered provided that any excavation within this area does not go below the stabilised ground surface as it existed prior to 1950. The UXOMP recommends that if excavation or works are likely to occur below the 1950 stabilised ground surface, an UXO survey should be undertaken by suitably qualified specialists.

Any extraction within the approved extraction area on Lot 218 that is within the Danger Zone will be restricted to being above the 1950 stabilised surface unless UXO surveys are undertaken by suitably qualified specialists and any identified UXO is cleared prior to extraction occurring.

An assessment of whether archaeological subsurface testing is required will also be undertaken once UXO survey and clearance is undertaken and prior to excavation below the 1950 stabilised ground surface occurring.

To minimise potential UXO impacts, it is proposed to construct that section of the alternate haul route that is within Danger Zone by filling above the 1950 stabilised landform. This can be readily achieved as the section of alternate haul route that is located within Danger Zone traverses a low-lying section of the terrain that is naturally prone to water logging. Along this section of the alternate haul route, vegetation will be cleared and windrowed along the edges of the haul road, geotextile will then be placed over the cleared ground surface and sand and road-base material will then be placed over the geotextile ensuring that excavation does not occur below the 1950 stabilised surface.

Alternatives and Justification for Proposed Modifications

A range of alternatives were considered in developing the proposed modifications to Major Project Approval 08_0142. These included:

- Not seek to establish an alternate haul route to the approved extraction area. This alternative is not preferred due to the uncertainty about obtaining access to the private section of the approved haul road and the ongoing ability to maintain access through the 30 metre high mobile dunes over time. The alternate haul route will access Lot 218 extraction area directly from Nelson Bay Road over land that is owned or has agreements in place with the Directors of Mackas Sand or related parties.

- The use of Stockton Bight Track and a section of road over Lot 2 DP 916061 and Lot 122 DP 753102 was considered. These lots are owned by B & R B Mackenzie FT Pty Ltd which is associated with Mackas Sand. Several alignments of the realigned section of Stockton Bight Track were considered prior to the road being gazetted on 1 September 2011 with the gazetted alignment being the alignment that was acceptable to the Towers family. Port Stephens Council subsequently rescinded the decision to realign a section of Stockton Bight Track meaning that this route was no longer available.

- The alternative of not seeking to temporarily reduce the maximum extraction depth to 0.7 metres above the maximum predicted groundwater level was also considered. This is not preferred as reducing the maximum extraction depth to 0.7 metres above the maximum predicted groundwater level allows sand to be extracted more efficiently through reducing travel times, fuel usage and wear and tear on the extraction and haulage equipment.

Approval of the alternate haul route and new intersection on Nelson Bay Road will provide certainty of access to the approved Lot 218 extraction area. By facilitating the extraction of sand from Lot 218, the current proposal enables the creation of a number of additional benefits for the local community as assessed for the approved project (Umwelt, 2009a) through direct means such as employment and wages, and indirect processes such as spending and use of services.

The alternate access to Lot 218 will create a number of benefits for Worimi LALC including direct income that will enable implementation of a cultural development programme, employment opportunities, training and university scholarships that will be provided as part of a commercial arrangement that has been established between Mackas Sand and Worimi LALC. It will also enable the Worimi Sand Dune Adventures to continue to use an elevated knoll at the western end of Lot 218 extraction area that would have been removed as part of haul route construction if the approved access to Lot 218 extraction area was utilised.

The extraction of sand from Lot 218 will also create benefits for local, state and national governments through land tax, rates, GST, fuel excise and other taxes.

The proposal will provide access to sand within Lot 218 and create a long term and potentially indefinite supply of construction sand and at least 20 years supply of industrial grade sand for the Sydney and Hunter regional markets. It is anticipated that these markets will require up to 3.0 million tonnes of sand per year by 2015, if additional resources do not become available.

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1.0 Introduction

1.1 Overview

1.1.1 Background to the Modified Proposal

Major Project Approval 08_0142 was granted on 20 September 2009 to Mackas Sand Pty Ltd (Mackas Sand) for the extraction of up to 2 million tonnes annually from Lot 218 DP 1044608 and Lot 220 DP 1049608 in Salt Ash, Port Stephens as shown in **Figure 1.1**. Sand extraction has commenced in Lot 220. The original development consent includes provision for Mackas Sand to access Lot 218 by an unsealed road located within the Crown Road reserve on Pt 76 and the western part of Pt 101 and on private land on the remainder of Pt 101 and Pt 13 in DP 753192, Salt Ash.

Mackas Sand is seeking approval for modification of Major Project Approval 08_0142 to establish an alternate access route to Lot 218. The route will pass via a right of way from Nelson Bay Road to Lot 122 DP 753192 which adjoins the northern boundary of Lot 218. The route as shown on **Figure 1.2** is approximately 2 kilometres long and traverses Lot 4 DP 1121457, Lot 1 DP 177679, Lot 810 DP 1008279, Lot 58 DP 753192, and Lot 122 DP 753192. These land parcels are owned by or under agreement to be purchased by B & R B Mackenzie FT Pty Ltd. Access to the extraction area will be via Lot 218. The proposal includes the construction of a new intersection on Nelson Bay Road. The proposed design of the intersection is depicted within **Figure 1.3**.

As can be seen from **Figure 1.4**, Lot 218 adjoins the 4438 hectares of Worimi Conservation Lands to the south, east and north and is located adjacent to a significant tract of Coastal Sand Apple – Blackbutt Forest which includes pockets of Swamp Mahogany – Paperbark Forest.

Umwelt (Australia) Pty Limited (Umwelt) has been engaged by Mackas Sand to undertake the necessary environmental assessments for the proposed modification. The modification proposal is being assessed under Part 3A of *Environmental Planning and Assessment Act 1979* (EP&A Act).

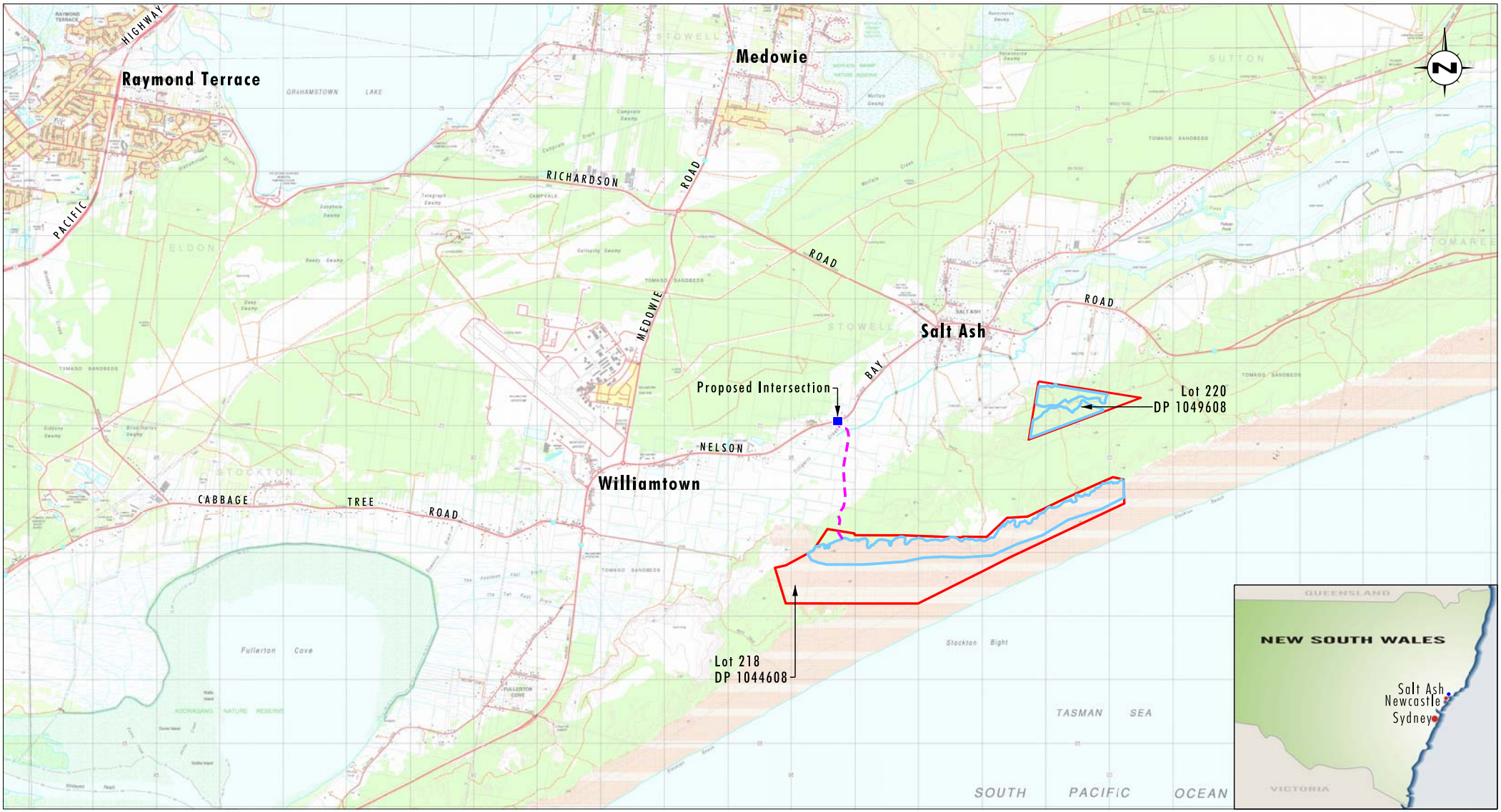
1.1.2 The Proponent

Mackas Sand currently has approval to undertake sand extraction operations on Lot 218 and Lot 220 under agreement with the landowners, Worimi Local Aboriginal Land Council (LALC). Worimi LALC was formed under the *Aboriginal Land Rights Act 1983*. The objectives of Worimi LALC are to improve, protect and foster the best interests of all Aboriginal people within the Worimi LALC area and other people who are members of the Council.

1.1.3 The Proposed Modification

The modification proposal relates to the modification of the access road to Lot 218 and the access point to the approved Lot 218 extraction area as shown on **Figure 1.2**.

The proposed modification seeks to construct a gravel road access from the existing Nelson Bay Road alignment approximately 2 kilometres southward through Lot 4 DP 1121457, Lot 1 DP 177679, Lot 810 DP 1008279, Lot 58 DP 753192 and Lot 122 DP 753192 to provide access to the approved extraction area on Lot 218. The proposed route will provide access to the mobile dunes in Lot 218 at an access point approximately



Source: Department of Lands, 2006

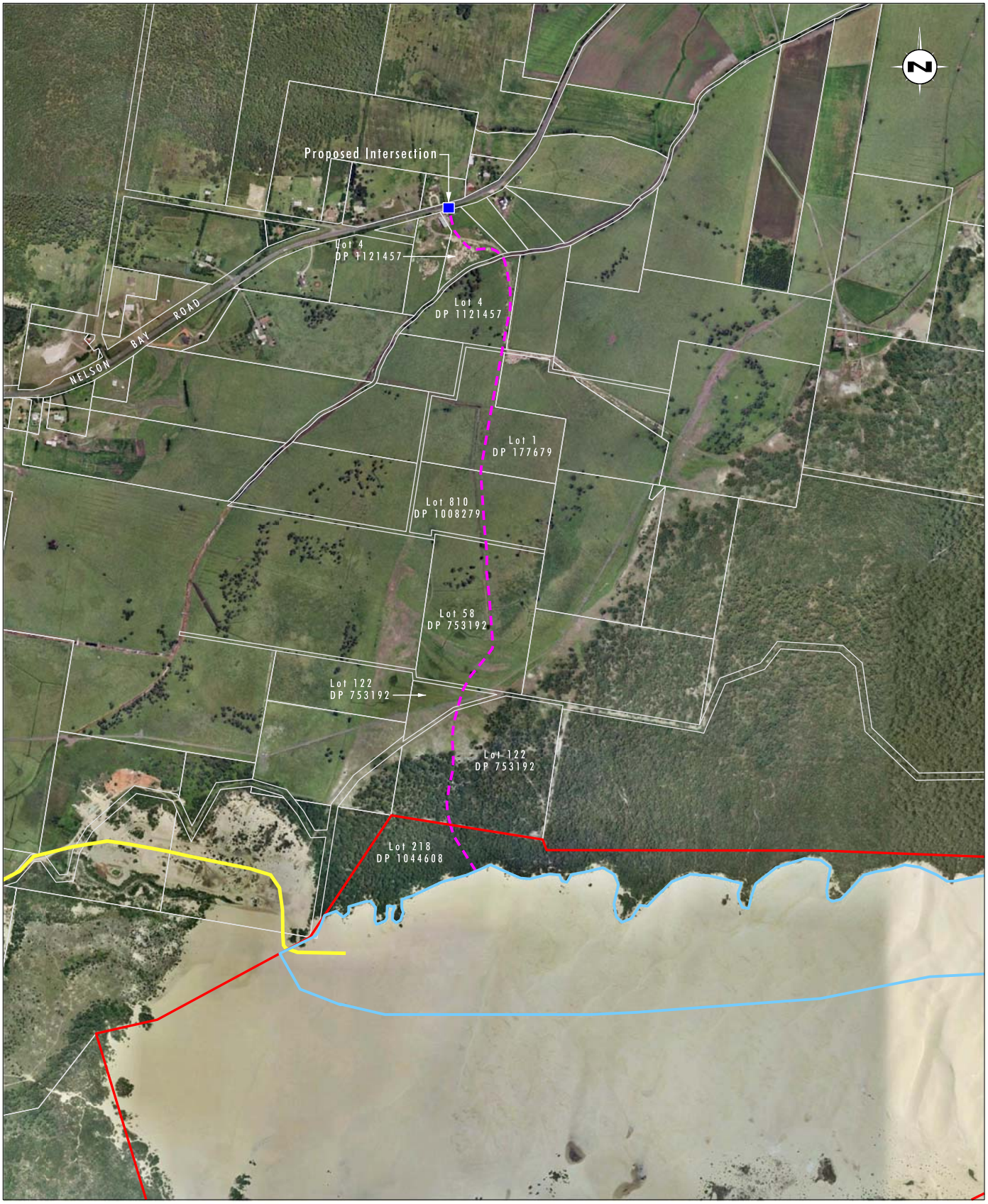
Legend

- Lot Boundaries
- Approval Areas
- Proposed Alternate Access Route
- Proposed Intersection Location

FIGURE 1.1

Locality Plan

File Name (A4): R36_V1/1646_348.dgn



Source: Google Earth (2009)

0 250 500 750m

1:15 000

Legend

- Lot Boundary (218)
- Approved Operational Area
- Proposed Alternate Access Route
- Approved Access Route
- Proposed Intersection Location

FIGURE 1.2

Proposed Alternate Access Route to Nelson Bay Road

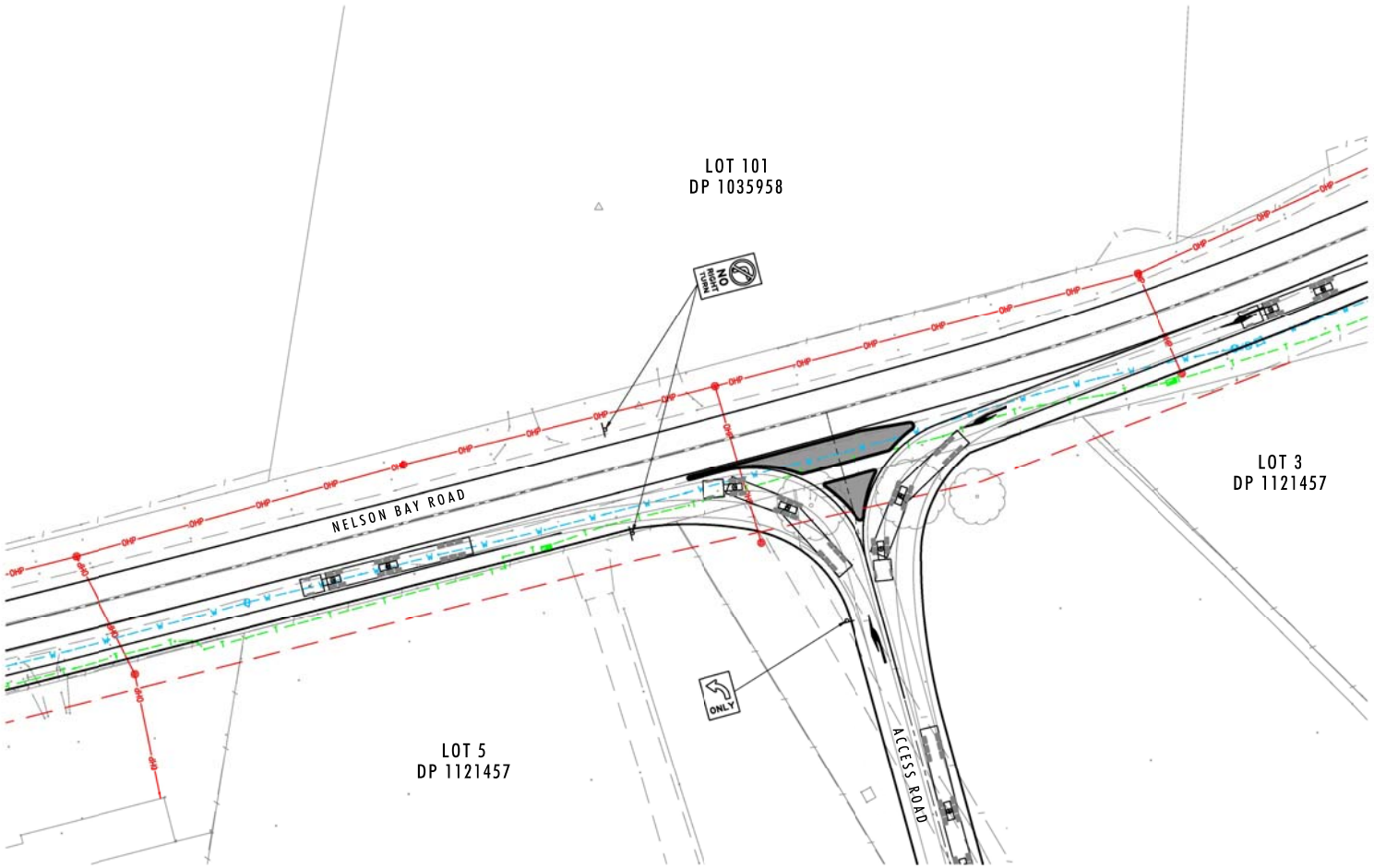
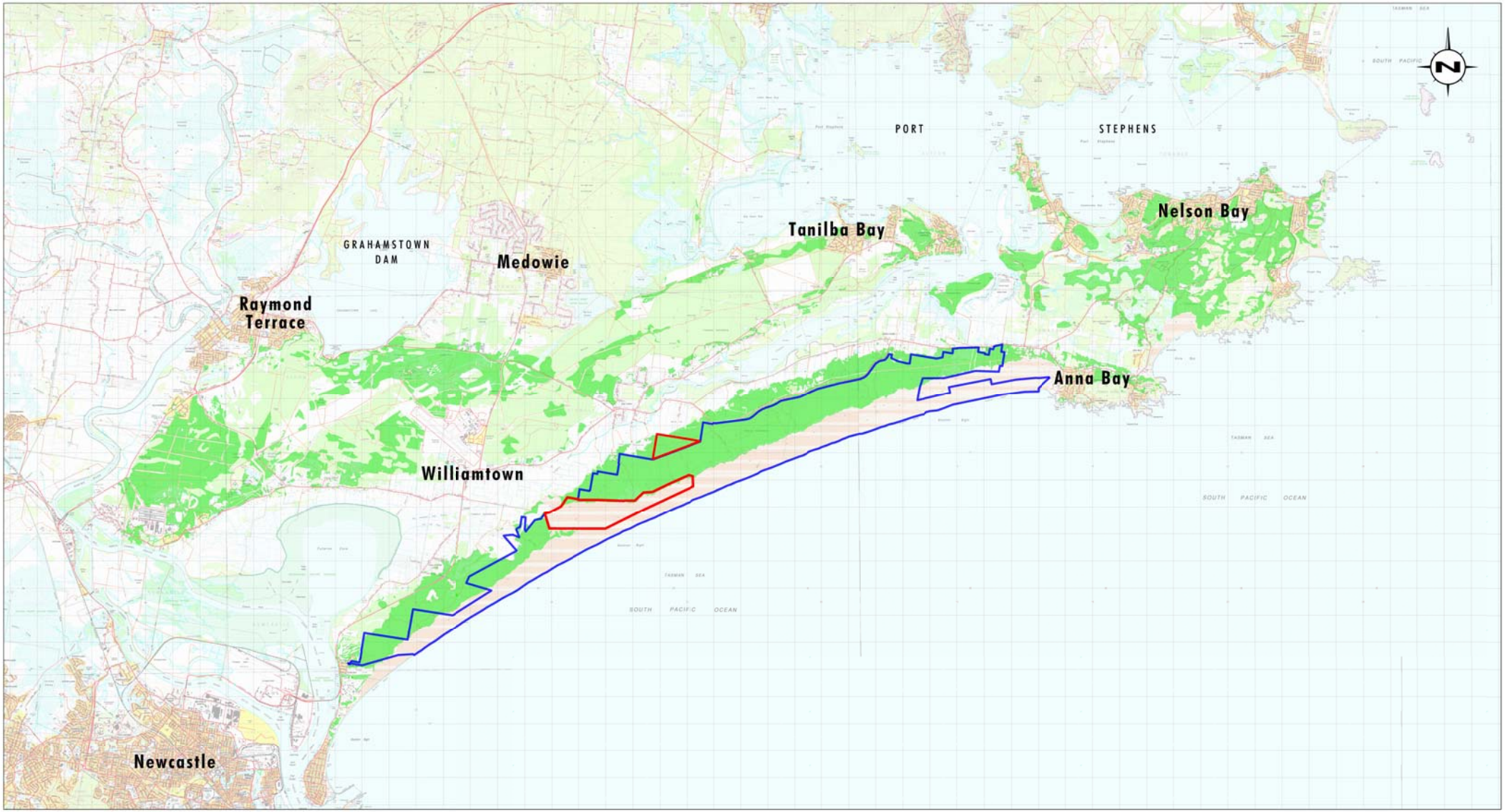


FIGURE 1.3

Proposed Nelson Bay Road Intersection Design

Source: Valley Civil Pty Ltd (2012)

File Name (A4): R36_V1/1646_350.dgn
20121015 13.58



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 1.4

Coastal Sand Apple Blackbutt Forest

600 metres east of the previously approved access point at the western end of the Lot 218 extraction area.

There are no proposed changes to the extraction areas, method of haulage or limits to extraction on Lot 218 other than seeking to temporarily enable the minimum extraction depth to be 0.7 metres above maximum predicted groundwater level with the final landform being at least 1 metre above the maximum predicted groundwater level. This is sought to improve efficiency of operations particularly during dry periods when the groundwater level is well below the maximum predicted level.

A network of groundwater monitoring bores has been established as shown on **Figure 1.5**. It is proposed to augment this monitoring bore network by establishing additional monitoring bores within the approved Lot 218 and Lot 220 extraction areas once sufficient sand has been extracted to enable bores to be established on the quarry floor in a location that does not adversely impede extraction and transport operations. These bores will be used to monitor groundwater level and quality within the extraction area.

Lot 218 has a total area of approximately 412 hectares with the approved extraction area being approximately 150 hectares in area. The approved extraction area consists of unvegetated mobile sand dunes. Vegetated dunes within Lot 218 and a Water Reserve adjoin the site to the north, while mobile dunes that form part of Stockton Sand Dunes adjoin the site to the south.

Quality Sands and Ceramics sand quarry adjoins the north-western corner of the Lot 218 extraction area.

1.2 Approval Requirements

The original proposal satisfied the definition of a Major Project under State Environmental Planning Policy (Major Development) 2005 and was approved under Part 3A of the EP&A Act by the Minister for Planning.

The then Department of Planning advised by email on 19 April 2010:

> The Department has decided not to issue specific Director-General's requirements for the proposed modification to the Mackas Sand project.
>
> Nevertheless, the EA for the proposed (development) must address relevant matters from the DGRs issued in October 2008 for the project. The following matters are of particular interest to the Department:
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> - Noise;
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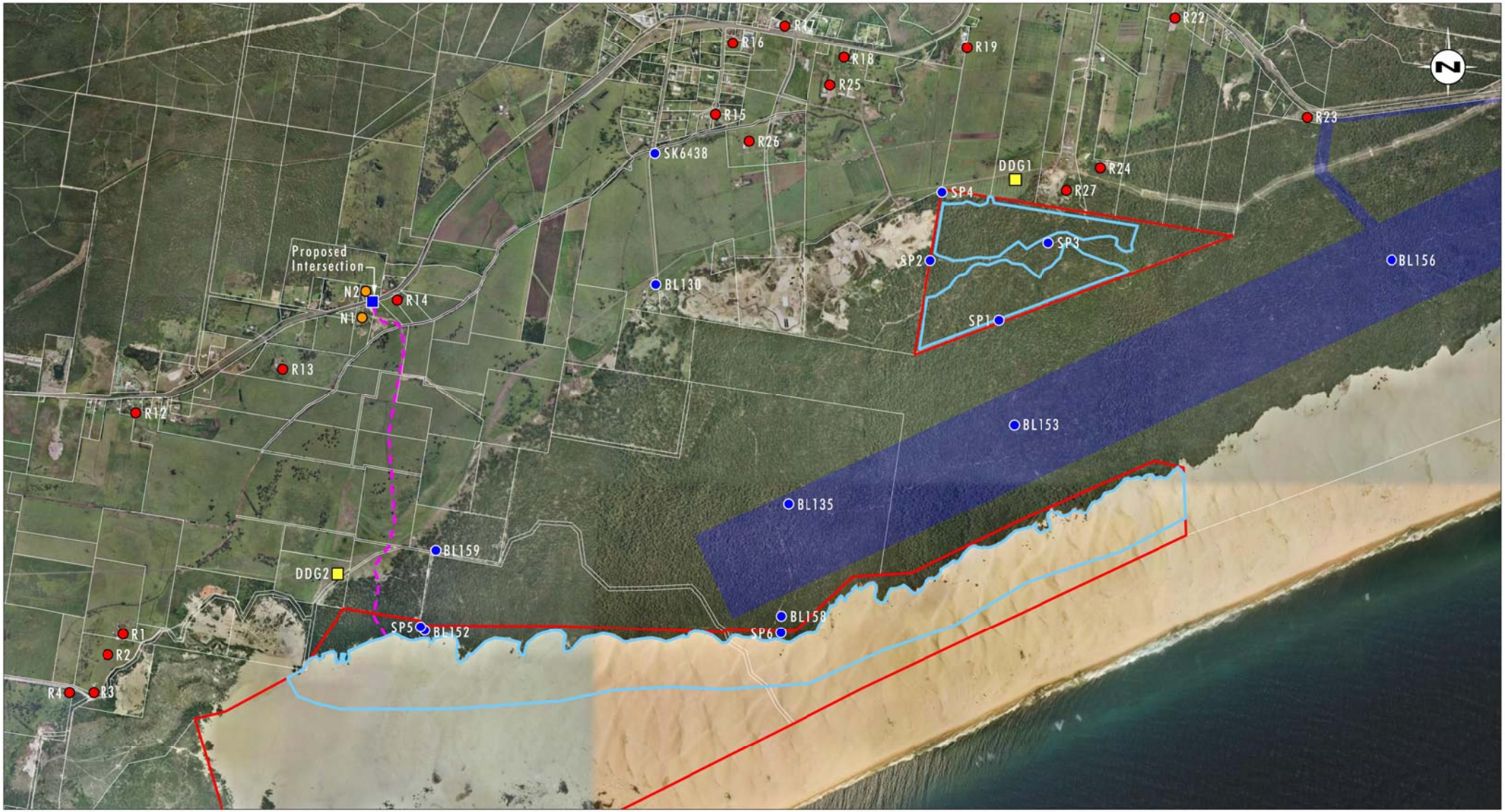
> - Any interactions with adjacent landowners.
>
> Please be aware that the *Environmental Planning and Assessment Amendment (Miscellaneous) Regulation 2010* commenced on 26 March 2010 and this may have application for the proposed modification, regarding landowner consent in particular.

This modification application has been prepared to address the requirements of Part 3A of the EP&A Act, the requirements of the Environmental Planning and Assessment Regulation 2000 and amendments as well as specific requirements issued by the Director-General of the Department of Planning and Infrastructure (DP&I) (provided in **Appendix 1**).



Source: Aerial: Google Earth 2008, Cadastral: Department of Lands, 2003
Note: Contour Interval 2m

0 0.5 1 1.5km
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Legend

- Lot Boundaries (218 & 220)
- Approved Extraction Areas
- Proposed Alternate Haul Route
- Proposed Intersection Location
- HWC Emergency Borefield Easement
- Dust Monitoring Location
- Residence
- Nearest Residence to Proposed Alternate Haul Route
- Groundwater Monitoring Bore Location

FIGURE 1.5

Monitoring Sites and Residences

File Name (A4): R36_V1/1646_352.dgn

Further details on the approvals process and legislation that applies to the proposal are provided in **Section 3**.

1.3 Consultation

1.3.1 Agency Consultation

Consultation with government agencies has been undertaken during preparation of the environmental assessment (EA), during and following preparation of the management plans required by Major Project Approval 08_0142 and during the EA undertaken during the modification process. This has included consultation with:

- DP&I;
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPC);
- Port Stephens Council (PSC);
- NSW Office of Water (NOW);
- Office of Environment and Heritage (OEH); and
- Hunter Water Corporation (HWC).

Specific issues raised during this consultation in regard to the proposed alternate haul route have related to dust suppression, noise and potential impacts on HWC use of the emergency groundwater borefield or areas proximate for groundwater extraction. No specific issues have been raised in regard to the proposed temporary increase to maximum extraction depth, however, there has been extensive discussion particularly in regard to determination of the maximum predicted groundwater level. The outcomes of this consultation have been taken into consideration and addressed in relevant sections of the document.

1.3.2 Community Consultation

In general all new extractive operations in NSW are required to establish a Community Consultative Committee (CCC). The main purpose of the CCC is to allow for the effective communication between the management of the project (including Environmental Managers employed by the company) and the local community.

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). Advertisements calling for expressions of interest to be on the CCC were placed in the Port Stephens Examiner in December 2009 and August 2010. The CCC was formed and had its first meeting on 15 September 2010 and met quarterly until March 2012 at which time it was decided to meet every six months. The CCC met most recently on 12 September 2012.

The CCC meets to discuss issues relating to the operation and standing of Mackas Sand within the community in regards to environmental management. It is generally accepted that community members of the CCC 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.

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

There have been no major issues brought to the CCC since it commenced and Mackas Sand has had no complaints in regard to its operations over this time.

There has been extensive consultation with representative Aboriginal groups, and Port Stephens Council in regard to the proposed alignment and use of the alternate haul road. Consultation with neighbouring land holders in the vicinity of the proposed new intersection on Nelson Bay Road has also been undertaken, including face to face visits and phone calls. The primary concern identified by neighbouring land holders was air quality, which is discussed further in **Section 4.8**. No other significant concerns were raised by the community during the consultation process.

1.4 Environmental Assessment Team

Umwelt has prepared this modification application. Statement of Authorship and a full listing of the project team members and their respective roles are provided in **Appendix 2**.

1.5 Structure of the Environmental Assessment

An overview of the structure of this EA is provided below:

- **Executive Summary** provides a brief overview of the modification proposal, the major outcomes of the environmental assessment, and an outline of key commitments that will be made to mitigate any potential impacts.
- **Section 1** introduces the modification proposal, outlines the background to the proposal, provides a summary of key details, and outlines the structure of the EA.
- **Section 2** contains a detailed description of the modification proposal, the study area and the consideration of alternative access routes.
- **Section 3** describes the planning context and environmental context for the proposal, including the applicability of Commonwealth and State legislation.
- **Section 4** contains a description of the existing environment and a comprehensive analysis and assessment of the key environmental issues relevant to the proposal, including direct and cumulative impacts.
- **Section 5** details the draft Statement of Commitments proposed to be adopted throughout the life of the proposal in order to mitigate any potential impacts.
- **Section 6** contains a conclusion as required by the Environmental Assessment Requirements (EARs).
- **Section 7** provides a checklist of how the EARs have been addressed in the EA.
- **Section 8** provides a list of abbreviations referred to in the EA.
- **Section 9** provides a list of references referred to in the EA.

2.0 Description of the Proposed Modifications

2.1 Alternate Haul Route to Lot 218

The modification sought is to construct and utilise an alternate route to access the approved sand extraction area on Lot 218 in DP 1044608 (Lot 218), Salt Ash. Lot 218 has a total area of approximately 412 hectares with the approved extraction area occupying approximately 150 hectares. Lot 218 primarily consists of unvegetated mobile sand dunes. Vegetated dunes within a Water Reserve adjoin the lot to the north, while mobile dunes within Crown Reserve 91676 adjoin the site to the south. Quality Sands and Ceramics sand quarry adjoins the site to the north-west on Pt 13 DP 753192.

The approved access to Lot 218 extraction area is via a public road reserve (Stockton Bight Track) that passes through Pt 76 and part of Pt 101 from where it leaves Stockton Bight Track and traverses across Pt 101 and Pt 13 of DP 753192 to Lot 227 DP 1097995 (Lot 227) which provides access to Lot 218. Pt 101 and Pt 13 in DP 753192 are owned by members of the Towers family and Lot 227 is owned Worimi LALC. The approved route from Lot 227 onto Lot 218 would have resulted in a significant earthworks cutting through an elevated knoll within the mobile sand dunes that is now used as a viewing location as part of Worimi Sand Dune Adventures. Access into western side of Lot 218 extraction area via Pt 101, Pt 13 and Lot 227 is no longer the preferred access.

The preferred alternate access to the Lot 218 extraction area is via Lot 4 DP 1121457, Lot 1 DP 177679, Lot 810 DP 1008279, Lot 58 DP 753192 and Lot 122 DP 753192. All lots are owned or under contract to purchase by B & R B Mackenzie FT Pty Ltd.

The alternate access will be constructed with an 8 metre wide combination sealed and gravel pavement that will be constructed along the 20 metre wide easement within **Figure 1.2**, via Lot 4 DP 1121457, Lot 1 DP 177679, Lot 810 DP 1008279, Lot 58 DP 753192 and Lot 122 DP 753192 and Lot 218. The width of the easement will be decreased to 10 metres where required to avoid impact to areas of ecological, heritage or other values along the alignment as appropriate.

A truck turning bay and loading area approximately 30 metres by 30 metres in area will be constructed adjacent to the advancing face of the mobile dune system. Construction of the proposed access road (including the turning bay) will involve establishing a level surface that can sustain traffic by heavy vehicles. The level of activity required to do this will vary along the proposed access road depending on factors such as the type of vegetation present, previous disturbance (including the level of existing vegetation clearance), landform and slope angle. In general terms, these activities may include vegetation clearance, and filling of areas to create a level surface, and the introduction of road base (or similar) materials.

Vegetation along the 270 metre section between the face of the dune and the northern edge of the forested area on Lot 122 comprises Coastal Sand Apple – Blackbutt forest ecological community and will result in the removal of approximately 0.37 hectares of this vegetation community to provide for the access route and a small turning area for trucks adjacent to the mobile dune field. The alternate route will avoid disturbance of *Diuris praecox* or *Diuris arenaria* which are listed as vulnerable under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Threatened Species Conservation Act 1995* (TSC Act) respectively were identified along or adjacent to the proposed alternate access route.

Trees and understorey along the alignment as specified within **Section 4.4** will be cleared and windrowed along the edge of the alignment. Geotextile will then be placed over the ground surface prior to sand fill and road base material being placed over the geotextile in order to minimise potential for impact to surface artefacts that may be present within the road alignment.

The chosen route avoids several clusters of ground orchids *Diuris praecox* and *Diuris arenaria*. The route veers slightly to the west to pass through a localised depression in consideration of the highly significant Aboriginal Cultural Heritage values present within the landscape (see **Section 4.4**). From Lot 122, the alternate haul route then traverses across approximately 1150 metres of previously disturbed grassland and 500 metres of existing track to Nelson Bay Road through the inter-barrier depression. This area has low potential for archaeological material and will not require the use of geotextile other than if warranted for pavement construction purposes.

The 200 metres closest to Nelson Bay Road will be sealed to minimise potential air quality and noise impacts to nearby residents. It is anticipated that the proposed alternate access road will take three months to construct.

2.1.1 Land Use and Tenure of Alternate Haul Route

Lot 4 DP 1121457, Lot 1 DP 177679, Lot 810 DP 1008279, and Lot 58 DP 753192, are all zoned 1(a) Rural Agriculture.

The alignment of the proposed access road and surrounding land parcels is shown on **Figure 1.2**.

Lot 218 is currently vacant, however is currently used for recreational purposes including off-road and four-wheel driving, horse riding, walking, sand tours, etc. Parts of the site have also previously been used as a bombing range and for weapons testing. Lot 218 is zoned 7(c) Environmental Protection – Water Catchment under the Port Stephens Local Environmental Plan (LEP).

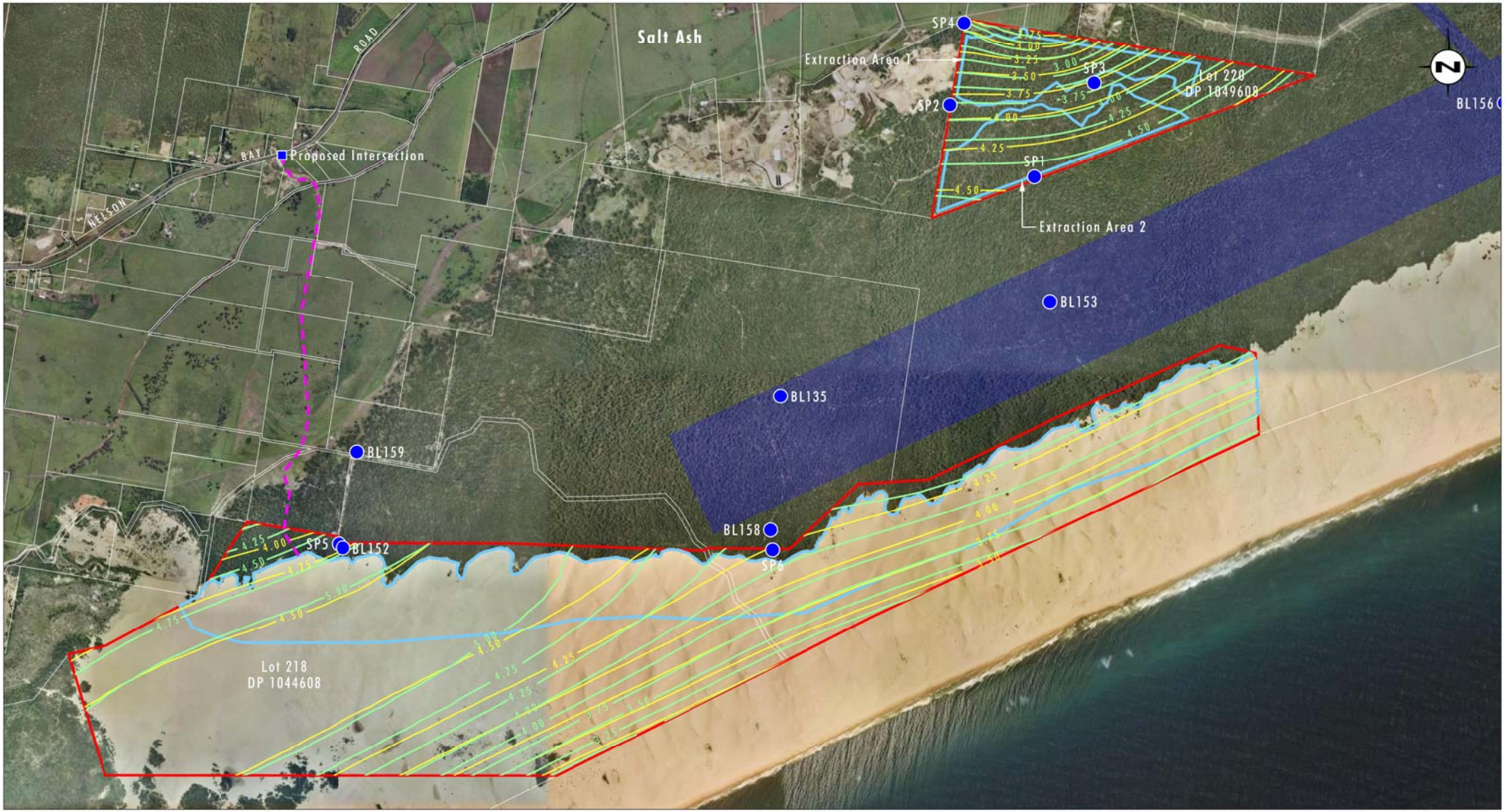
The land capability and agricultural suitability of the study area has been mapped by Department of Environment and Climate Change (DECC) Scientific Services Division (2009) and was found to be very low. Lot 218 and the lots through which the proposed road will pass were classified as having a land capability of VII to VIII and an agricultural suitability classification of 5.

2.1.2 Services

An electricity transmission line easement will be crossed by the proposed alternate route. There are no other services known to occur within the alternate haul route alignment.

2.2 Modification to Maximum Depth of Extraction

A detailed groundwater model (Umwelt, 2011b) has been developed for Lot 218 and Lot 220 and the surrounding areas of North Stockton Sand Beds. This model has been used to determine maximum permitted extraction depths for Lot 218 and Lot 220 as shown on **Figure 2.1**.



Source: Aerial: Google Earth 2008, Cadastral: Department of Lands, 2003

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Legend

- Lot Boundaries (218 & 220)
- Approved Extraction Area
- Proposed Alternate Haul Route
- Proposed Intersection Location
- HWC Emergency Borefield Easement
- 2 metres above Average Groundwater Level
- 1 metre above Maximum Predicted Groundwater Level
- Groundwater Monitoring Bore Location

FIGURE 2.1

Maximum Extraction Depth Map showing Minimum Final Landform Elevation for Lot 218 and Lot 220

File Name (A4): R36_V1/1646_353.dgn

Major Project Approval 08_0142 permits extraction to a maximum depth not less than 1 metre above the highest predicted groundwater level and 2 metres above the average groundwater level. As can be seen from **Figure 2.1**, extraction depths across Lot 218 and Lot 220 permitted by these two criteria are similar, with the maximum predicted groundwater level determining the maximum extraction depth in most locations.

Approval is sought to lower the permitted extraction level in both Lot 218 and Lot 220 to be 0.7 metres above the maximum predicted groundwater level during extraction with the final landform being at least 1 metre higher than the maximum predicted groundwater level as is currently required.

This minor change in extraction depth is sought to improve the efficiency of extraction operations particularly in dry periods when the water table is well below its maximum predicted level. Efficiency is improved through increased trafficability of the exposed sand surface due to the greater moisture content increasing the stability and bearing capacity of the sand. The greater bearing capacity means that travel times, the amount of energy required to operate front-end loaders and dump trucks on the sand, and wear and tear, are significantly reduced.

In previous consultation in regard to maximum depths of extraction, NOW representatives have indicated that extraction to a depth 0.7 metre above the maximum predicted groundwater level may be accepted provided that the final landform for the site was reshaped to provide a minimum of 1 metre of sand above the maximum predicted groundwater level.

3.0 Planning Context

3.1 Commonwealth Legislation

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth EPBC Act requires any action that has, or is likely to have, a significant impact on Commonwealth land or Matters of National Environmental Significance to obtain approval of the Commonwealth Minister for the Environment.

A search of the Commonwealth Government's Protected Matters Search Tool was undertaken on 10 October 2012 and did not identify any Matters of National Environmental Significance in relation to the proposal. The proposal will not affect any Commonwealth lands.

A discussion of impacts to actual and potential EPBC listed flora and fauna is included in **Section 4.3**. The proposed modification has been referred under the EPBC Act to DSEWPC.

3.1.2 Native Title Act 1993

The Commonwealth *Native Title Act 1993* provides for determinations of native title in Australia. The main objects of the Act are:

- to provide for the recognition and protection of Native Title;
- to establish ways in which future dealings affecting Native Title may proceed and to set standards for those dealings;
- to establish a mechanism for determining claims to Native Title; and
- to provide for, or permit that validation of past acts, and intermediate period acts, invalidated because of the existence of Native Title.

Native Title claims are investigated by the National Native Title Tribunal and determined by the Federal Court of Australia.

On 28 November 2005, it was determined that Native Title did not exist for an area that included Lots 218 and 220.

3.2 New South Wales Legislation

3.2.1 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 is the determining authority for modifications under Section 75W of the EP&A Act.

3.2.2 Aboriginal Land Rights Act 1983

Ownership of Lots 218, 220 and 227 and what is now the Worimi Conservation Lands have been transferred to Worimi LALC in accordance with the provisions of Section 36 of the *Aboriginal Land Rights Act 1983*. Clause 45(2) of the *Aboriginal Land Rights Act 1983* states:

> 45(2) Not withstanding 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.

Under the *Aboriginal Land Rights Act 1983*, consent is required from NSW Aboriginal Land Council for land dealings associated with the development. NSW Aboriginal Land Council issued a Dealing Approval Certificate on 11 October 2011 under Division 4 of Part 2 of the *Aboriginal Land Rights Act 1983* for Worimi LALC providing their consent to the proposed amendment to the access road for Major Project Approval 08_0142 for the purpose of sand extraction at Lot 218 in DP 1044608.

3.2.3 Other Legislation

Table 3.1 discusses the application of other NSW legislation to the proposal.

Table 3.1 – NSW Legislation

Legislation	Key Requirements	Relevance to the Proposal
Heritage Act 1977	Approval is required from the Heritage Council of NSW to disturb or excavate land where this will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed.	No approval is required under this legislation for projects assessed under Part 3A of the EP&A Act.
National Parks and Wildlife Act 1974	Approval is required from DECC to destroy, deface or damage; or cause or permit the destruction of or damage to an Aboriginal object or Aboriginal Place.	No approval is required under this legislation for projects assessed under Part 3A of the EP&A Act.
Native Vegetation Act 2003	Approval is required under this Act from the relevant Catchment Management Authority to clear native vegetation in certain circumstances.	No approval is required under this legislation for projects assessed under Part 3A of the EP&A Act.
Protection of the Environment Operations Act 1997	Environment Protection Licences are required from OEH for 'scheduled activities' and 'scheduled development work'.	The sand extractive activities approved under Major Project Approval 08_0142 are subject to EPL 13218. No additional EPL will be required for the proposed modification to the approved project.
Roads Act 1993	Development that affects a public road, Crown road, highway, main road, freeway or tollway requires approval from the NSW Roads and Traffic Authority (now Roads and Maritime Services (RMS)) or the local Council under this Act.	Approval under the Roads Act will be sought for the proposed new intersection with Nelson Bay Road before the commencement of construction of the intersection.

Table 3.1 – NSW Legislation (cont)

Legislation	Key Requirements	Relevance to the Proposal
Threatened Species Conservation Act 1995	Approval is required to: (a) harm any animal that is of, or is part of, a threatened species, population or ecological community; (b) pick any plant that is of, or is part of, a threatened species, population or ecological community; (c) damage critical habitat; or (d) damage habitat of a threatened species, population or ecological community.	A comprehensive ecological assessment has been prepared for the proposed modification and is presented in **Appendix 3**. Impact assessments prepared for the proposal in accordance with this Act concluded that approval is not required under this legislation.
Water Management Act 2003	Approval is required to interfere with any groundwater sources contained in the Tomago, Tomaree and Stockton aquifers in accordance with the Water Sharing Plan for the Tomago-Tomaree-Stockton Groundwater Sources 2003, which was made in accordance with this legislation.	No approvals under the *Water Management Act 2003* are sought at this time. A water access licence may be sought in the future but will be the subject of a separate application.

3.2.3.1 Hunter Water Regulations 2010

The Hunter Water Regulations 2010 are a regulation under the *Hunter Water Act 1991* that applies to the Chichester, Grahamstown, Nelson Bay, North Stockton and Tomago Catchment Areas. The proposal lies within the North Stockton Catchment. Under Clause 10 (1) of the Regulation a person can only engage in an extractive industry with an approval given by the Director-General of the Department of Trade and Investment, Regional Infrastructure and Services.

A permit under the Hunter Water Regulations 2010 for sand extraction operations on Lot 218 and Lot 220 was granted on 7 June 2012.

3.3 Local Planning Instruments

3.3.1 Port Stephens Local Environment Plan 2000

The proposal has been considered in accordance with the provisions of the Port Stephens LEP 2000. This plan sets the broad planning framework for development in Port Stephens. The proposed haul road modification is located within Zone 1(a) Rural Agriculture. The objective of this zone is to maintain the rural character of the area and to promote the efficient and sustainable utilisation of rural land and resources and regulate development for purposes other than agriculture, so that the development is compatible with rural land uses, the environment and the amenity of the locality.

The construction and use of the proposed alternate road is considered to be consistent with the objectives of the zone 1(a) Rural Agriculture.

The Draft Port Stephens LEP 2012 is scheduled to be exhibited publicly towards the end of 2012. The proposed haul route is within land zoned RU2 – Rural Landscape within the draft LEP and is consistent within the approved land uses with consent for that zone.

3.3.2 Port Stephens Development Control Plan 2007

The Port Stephens Development Control Plan 2007 (the DCP) provides guidelines for development within the Port Stephens Local Government Area (LGA). Under Section 75R of the EP&A Act, the DCP does not apply to projects being assessed under Part 3A of that Act. However, Port Stephens Council has requested that consideration is given to the DCP in the EA. **Table 3.2** outlines relevant elements of the DCP and their relevance to the proposal.

Table 3.2 – Port Stephens Development Control Plan 2007

Section	Relevant Requirement	Relevance to Proposal
B2.3	*Development must comply with the provisions of Council's Urban Stormwater and Rural Water Quality Management Plan.*	The proposal is consistent with Port Stephens Council's Urban Stormwater and Rural Water Quality Management Plan.
B2.4	*Development Applicants should refer to Port Stephens Local Environmental Plan 2000 section 51 A – Development of Land Identified on Acid Sulphate Soils for relevant development standards.*	The proposed alternate haul route will not involve any excavation or disturbance of potentially acid generating soils or lower the groundwater table in areas where potentially acid generating soils may occur.
B2.C14	*Clearing must not be carried out as an activity in itself for an unspecified end-use. Clearing must only be considered where it is necessary to enable a land use permitted on the land.*	Clearing will be necessary to enable the proposed alternate haul route to be constructed. This is addressed in **Section 4.3**.
B2.C15	*Development must provide filter and protection strip to natural drainage lines, watercourses, streams, foreshores of constructed drainage corridors, riparian habitat strips and exclusion zones for preserving vulnerable and/or significant remnant vegetation and species.*	A detailed Soil and Water Management Plan has been prepared setting out sediment and erosion controls that are to be implemented and maintained along the alternate haul route as discussed in **Section 4.9**. Potential impacts to biodiversity are discussed in **Section 4.3**.
B2.C16	*Development near watercourses must provide riparian buffer up to 40 metres.*	Development will not be undertaken within 40 metres of Tilligerry Creek or other natural watercourse.
B2.C18	*Development must contain nutrient and sediment flows and minimise weed dispersal in non-urban zones or on sites adjoining remnant bushland or semi-natural open spaces using permanent mitigation measures (such as bund walls, catch drains, swales and settling ponds).*	Measures to prevent erosion and sediment transport are outlined in **Section 4.9**.
B2.C19	*The proposed means of clearing must be appropriate to soil type, species of understorey or tree to be retained. Details must be provided with the development application.*	Clearing methods are detailed in **Sections 4.3** and **4.4**.
B2.20	*Erosion and sediment controls during and after construction should have minimal impact on watercourses and remnant bushland*.	The proposed erosion and sediment controls will not cause additional environmental impacts (refer to **Section 4.9**).
B2.C21	*Development should reuse cleared material where possible.*	Cleared material will be re-used along the proposed alternate haul route and for rehabilitation of the site (refer to **Sections 4.9** and **4.10**).

Table 3.2 – Port Stephens Development Control Plan 2007 (cont)

Section	Relevant Requirement	Relevance to Proposal
B2.C23	*Development must provide buffer zones as screening to roads for the protection of identified core habitats, koala habitat buffer area and Endangered Ecological Communities.*	The study area does not contain core koala habitat areas or any Endangered Ecological Communities (refer to **Section 4.3**).
B2.C25	*Development must provide temporary tree/vegetation protection measures prior to any clearing works.*	Clearing methods have been developed to minimise disturbance to fauna species (refer to **Section 4.3**).
B2.C26	*All millable timber must be retrieved. Waste vegetation must be recycled as chip, tub grindings or mulch. The use of woodchip, topsoil and tub grindings for on site mulching or seedbank regeneration is preferred.*	All cleared timber will be retained for use along the proposed alternate haul route and in rehabilitation (refer to **Sections 4.3** and **4.10**).
B2.C27	*Development must provide full time supervision of clearing works to protect environmental values.*	A Mackas Sand representative, and ecologist, and representatives of the Aboriginal Heritage Management Group will inspect areas proposed for clearing activities as described in **Sections 4.3** and **4.4**.
B2.C28	*Development must include rehabilitation or revegetation works for any areas adversely affected by clearing or construction works.*	The alternate haul route will be maintained as an access throughout and beyond the life of the quarry. Vegetated sections of the extraction areas will be rehabilitated in accordance with the approved Landscape Management Plan (refer to **Sections 4.3** and **4.10**).
B2.C29	*Development must include effective measures to mitigate any potential adverse impacts from soil erosion, siltation of watercourses and alteration to drainage patterns, the spread of weeds, rubbish dumping and incursion by domestic or feral animals.*	Measures to mitigate potential erosion and sediment impacts are detailed in **Section 4.9.** Measures to mitigate potential biodiversity issues are detailed in **Section 4.2**.
B2.C30	*A separate approval for vegetation clearance may be required from the Catchment Management Authority (CMA) in accordance with the Native Vegetation Act 2003. The applicant should consult with the CMA prior to lodging an application with Council.*	Approval is not required under the *Native Vegetation Act 2003* for projects being assessed under Section 75 W of the EP&A Act.

Table 3.2 – Port Stephens Development Control Plan 2007 (cont)

Section	Relevant Requirement	Relevance to Proposal
B2.C34	*An application for development on sites that contain Preferred or Supplementary Habitat, Habitat Buffers and Habitat Linking Areas as identified in Port Stephens Comprehensive Koala Plan of Management must include:* • *An assessment of koala habitat, by a suitably qualified person, in accordance with the Guidelines for Koala Habitat Assessment (Appendix 6 of the CKPoM);* • *Clear details concerning which vegetation is to be cleared or disturbed and which is to be retained;* • *Details of proposed building envelopes and fire fuel reduction zones and how they will be enforced;* • *Proposed measures to restore koala habitat that will result in a net gain of habitat;* • *Proposed measures to allow safe movement of koalas and measures to mitigate the impact from dogs that occupy the adjacent habitat;* • *Details of any proposed program to monitor koalas and their habitat during and following construction; and* • *Proposed measures to mitigate the impact of motor vehicles on koalas.*	An assessment of koala habitat was made during the ecological assessment of the study area (refer to **Section 4.3**). **Section 4.3** provides details of vegetation clearing and measures to mitigate impacts to fauna such as koalas.
B2.C44	*During the construction phase development must provide:* • *Controls to prevent the spread of weeds on machinery including a disposal and wash down area;* • *An area for storage of contaminated spoil that is separate from clean material;* • *Certification that any soil, mulch and plants brought onto the site is free of weeds and weed seeds; and* • *Site inductions for all personnel and visitors that includes weed management practices as required by Council.*	The alignment of the alternate haul route is not substantially affected by weeds. No soil, mulch or plants will be imported to the site as part of the proposed alternate haul route modification other than road-base and sub-base that will be free of weeds.
B2.C45	*Tree removal must be in accordance with the provisions of the Port Stephens Tree Preservation Policy (1998).*	As the proposal is being considered under Part 3A of the EP&A Act, the policy does not apply.
B2.C46	*Tree and vegetation removal must comply with the provisions of the Native Vegetation Act 2003.*	As the proposal is being considered under Part 3A of the EP&A Act, the Act does not apply.
B2.C51	*Control run-off from site must comply with Hunter Water Corporation's Special Areas Regulation 1989.*	The proposal is consistent with the Hunter Water Regulations 2010 (refer to **Section 3.2.3.1**).

Table 3.2 – Port Stephens Development Control Plan 2007 (cont)

Section	Relevant Requirement	Relevance to Proposal
B2.C71	*Figure B2.3 Building Site Acceptability Based on ANEF* (Australian Noise Exposure Forecast) *Zones shows the acceptability of different types of development and their acceptability based on Australian Standard 2021-2000. It specifies the detail required to be submitted with development applications for each type of development. When a development application is received for a type of development that is not listed Council will exercise its discretion as to whether an acoustic report is required.* *Where Figure B2.3 specifies that a development application is 'Conditionally Acceptable' an acoustic report must be submitted that is signed and endorsed by an acoustic engineer. The report must demonstrate that Australian Standard 2021-2000 has been considered in the design of the building and any proposed attenuation measures must be incorporated into the design and conditions of the consent.*	Small sections of Lot 218 are located in zones marked 20-25 ANEF and 25-30 ANEF on Figure B2.3 of the DCP. The proposal does not involve any development for residential or accommodation purposes. The proposal is not consistent with any of the development types listed in Section B2 of the DCP, which relate to these types of development. It is considered unlikely that the proposal will be adversely affected by aircraft noise.
B2.C73	*Erosion and sediment control measures for development works must be prepared in accordance with the Erosion and Sediment Control Regional Policy and Code of Practice for Managing Urban Stormwater – Soils and Construction (Landcom 2004).*	Any erosion and sediment controls will be prepared in accordance with the Erosion and Sediment Control Regional Policy (Port Stephens Council 2002) and Code of Practice for Managing Urban Stormwater – Soils and Construction (Landcom 2004) (refer to **Section 4.9**).
B3.C2	*New development proposals, including the change of use or intensification of existing businesses, must provide the required number of parking spaces in accordance with* ***Schedule of Car Parking Requirements****. In the case of a combination of uses on a single site, the car parking requirements must be added together.*	The proposal is not consistent with any of the development types listed in the Schedule of Car Parking Requirements provided in the DCP.
B3.C4	*Where the proposed development is not listed within the Schedule of Car Parking Requirements, Council must determine the required number of car parking spaces, by either:* • *The applicant submitting a traffic report prepared by either a suitably qualified consultant to determine the required number of car parking spaces; or* • *Council staff establishing a rationale to calculate the required number of car parking spaces.*	An assessment of traffic impacts was undertaken for the proposal (refer to **Section 4.6**). External car parking has not been considered in the EA as the proposal will not affect existing car parking areas or require the construction of additional car parking spaces.

4.0 Environmental Assessment

4.1 Relevant Previous Work and Conditions

Potential environmental impacts of extractive operations on Lot 218 were addressed as part of the EA (Umwelt, 2009a) that accompanied Major Project Approval application 08_0142 to the Minister for Planning. Through the review and submission process, appropriate environmental controls were refined with these controls set out in approval conditions granted on 20 September 2009, licence conditions and Statement of Commitments from the proponent, Mackas Sand.

Since that time an Environmental Management Strategy (Umwelt, 2011a) and a number of reports, management plans and monitoring programs have been prepared and submitted to relevant government agencies. These include:

- Maximum Extraction Depth Map;
- Groundwater Monitoring Report;
- Soil and Water Management Plan;
- Landscape Management Plan;
    - Biodiversity Monitoring program;
    - Weed Management Plan; and
    - Rehabilitation and Decommissioning Plan.
- Archaeology and Cultural Heritage Management Plan;
- Non-Indigenous Heritage Management Plan;
- Noise Management Plan;
- Summer 2011, Winter 2011, June 2012 and September 2012 Noise Monitoring Programs;
- Air Quality Monitoring Program;
- Unexploded Ordnance Management Plan;
- Operational Management Procedure;
- Hydrocarbon Spill Procedure; and
- Annual Environmental Management Reports for 2009-2011 and 2011-2012.

Extraction operations at Lot 220 and environmental performance are discussed in detail in the Annual Environmental Management Report (AEMR) (Umwelt, 2012). The AEMR includes:

- details of production levels since operations commenced;
- description of operations that have been undertaken and are proposed for the next 12 months;
- results and analysis of dust, noise and groundwater monitoring undertaken;
- records of complaints (none received); and
- environmental performance of Mackas Sand Lot 220 operations against relevant approval and licence conditions.

Each of the above reports, management plans and monitoring programs are available on Mackas Sand website (www.mackassand.com.au.com). These reports detail the current status of sand extraction operations under Major Project Approval 08_0142.

Prior to lodging this modification application, there had been no extractive operations undertaken at Lot 218. Mobile sand within the approved extraction area has continued to move landward since 2009 with groundwater monitoring bore SP6 which was located approximately 20 metres north of the advancing edge of the mobile dune being buried by several metres of windblown sand between February and March 2011. The rate of sand advancement means that surveying and pegging the landward boundary of the approved extraction area as required by approval conditions is not feasible. An alternative is to delineate the approved landward boundary of the mobile dunes using GPS as is approved for delineating the seaward boundary of the approved Lot 218 extraction area. The boundary and survey co-ordinates of the approved extraction area on Lot 218 are shown on **Figure 4.1**.

4.2 Environmental Risk Analysis

During the planning and consultation process for the proposed alternate haul route modification a preliminary risk analysis was undertaken. The following potential environmental impacts of constructing and using the alternate haul route were considered and have been addressed as part of the EA as noted:

- Ecology – This is assessed further in **Section 4.3**.
- Aboriginal Cultural Heritage – This is assessed further in **Section 4.4**.
- Historic Heritage – This is further assessed in **Section 4.5**.
- Traffic and Access – This is assessed further in **Section 4.6**.
- Noise – This is assessed further in **Section 4.7**.
- Air Quality – This is assessed further in **Section 4.8**.
- Water Resources – This is assessed further in **Section 4.9**.
- Rehabilitation – This is assessed further in **Section 4.10**.
- Surrounding Land Use – This is assessed further in **Section 4.11**.

TABLE OF MGA 94 GRID COORDINATES

MGA 94 COORDINATES ADOPTED FROM PM 16461 (EASTING 391 733.038 NORTHING 6 368 336.068 ZONE 56 CLASS A ORDER 1 CSF=0.999744)

CADASTRAL BOUNDARY CORNERS			EXTRACTION AREA			EXTRACTION AREA			EXTRACTION AREA			EXTRACTION AREA			EXTRACTION AREA			EXTRACTION AREA			EXTRACTION AREA		
POINT	EASTING	NORTHING	POINT	EASTING	NORTHING	POINT	EASTING	NORTHING	POINT	EASTING	NORTHING	POINT	EASTING	NORTHING	POINT	EASTING	NORTHING	POINT	EASTING	NORTHING	POINT	EASTING	NORTHING
1	394734.195	6367764.842	EA1	395357.758	6368032.789	EA35	396054.561	6368176.92	EA69	396844.275	6368153.814	EA103	398015.323	6368178.9	EA137	398626.906	6368475.976	EA171	399447.629	6368789.556	EA205	400096.159	6369094.554
2	394905.168	6367803.93	EA2	395377.434	6368084.454	EA36	396067.755	6368198.705	EA70	396885.18	6368197.385	EA104	398041.713	6368176.92	EA138	398656.595	6368485.879	EA172	399483.915	6368803.42	EA206	400115.291	6369085.972
3	395331.375	6368035.128	EA3	395409.99	6368096.379	EA37	396106.021	6368205.967	EA71	396917.507	6368206.627	EA105	398093.173	6368209.928	EA139	398669.79	6368495.121	EA173	399481.936	6368827.846	EA207	400123.308	6369085.972
4	395351.264	6368032.141	EA4	395429.782	6368079.875	EA38	396155.502	6368217.85	EA72	396957.751	6368213.229	EA106	398136.056	6368229.073	EA140	398692.881	6368478.617	EA174	399479.297	6368835.768	EA208	400133.764	6369091.254
5	395357.291	6368072.028	EA5	395444.956	6368091.758	EA39	396186.51	6368199.365	EA73	396998.656	6368225.772	EA107	398171.682	6368228.413	EA141	398721.25	6368446.929	EA175	399474.784	6368849.488	EA209	400165.432	6369124.262
6	395564.838	6368367.582	EA6	395444.956	6368108.922	EA40	396199.045	6368170.978	EA74	397040.879	6368219.17	EA108	398191.475	6368236.995	EA142	398736.424	6368450.89	EA176	399476.691	6368869.608	EA210	400167.744	6369126.714
7	395990.106	6368296.734	EA7	395490.479	6368122.786	EA41	396186.51	6368116.184	EA75	397089.7	6368197.385	EA109	398202.031	6368268.023	EA143	398765.453	6368460.792	EA177	399492.638	6368884.177	EA211	400191.021	6369126.615
8	396001.207	6368266.911	EA8	395506.312	6368124.106	EA42	396193.107	6368080.535	EA76	397118.07	6368179.56	EA110	398227.101	6368299.711	EA144	398777.328	6368476.636	EA178	399516.038	6368890.942	EA212	400213.505	6369119.875
9	396762.072	6368270.795	EA9	395510.167	6368106.942	EA43	396208.281	6368065.351	EA77	397141.161	6368180.881	EA111	398258.109	6368357.146	EA145	398793.162	6368511.625	EA179	399544.612	6368879.339	EA213	400224.292	6369110.771
10	396873.034	6368280.482	EA10	395517.528	6368071.292	EA44	396234.011	6368075.914	EA78	397197.289	6368192.764	EA112	398266.688	6368378.171	EA146	398810.975	6368530.77	EA180	399564.404	6368875.378	EA214	400280.133	6368956.578
11	398396.648	6368524.676	EA11	395522.806	6368059.409	EA45	396240.609	6368084.496	EA79	397269.151	6368201.346	EA113	398293.075	6368385.533	EA147	398828.129	6368531.43	EA181	399594.752	6368887.261	EA215	400233.725	6368861.722
12	398723.349	6368539.25	EA12	395547.217	6368069.312	EA46	396259.082	6368112.883	EA80	397317.972	6368191.443	EA114	398309.569	6368416.561	EA148	398851.22	6368532.09	EA182	399611.906	6368911.688	EA216	400233.725	6368861.722
13	400080.553	6369157.962	EA13	395551.835	6368078.554	EA47	396279.534	6368110.242	EA81	397346.341	6368180.22	EA115	398324.743	6368435.046	EA149	398878.269	6368563.779	EA183	399624.441	6368901.785	EA217	399875.417	6368679.276
14	400244.775	6369118.973	EA14	395551.175	6368089.777	EA48	396304.604	6368136.649	EA82	397376.03	6368187.482	EA116	398335.959	6368423.163	EA150	398876.95	6368579.623	EA184	399648.192	6368905.086	EA218	399353.09	6368509.332
15	400251.921	6368741.12	EA15	395552.495	6368100.34	EA49	396348.807	6368178.9	EA83	397450.581	6368215.869	EA117	398343.216	6368407.318	EA151	398919.173	6368605.369	EA185	399661.387	6368893.203	EA219	398946.124	6368265.639
16	398447.046	6367932.082	EA16	395552.495	6368110.903	EA50	396400.267	6368199.365	EA84	397449.921	6368203.986	EA118	398350.473	6368407.979	EA152	398947.542	6368628.475	EA186	399685.137	6368893.203	EA220	398555.181	6368130.967
17	396989.191	6367205.222	EA17	395573.606	6368109.582	EA51	396451.727	6368195.404	EA85	397470.373	6368205.967	EA119	398357.071	6368434.385	EA153	398959.418	6368616.592	EA187	399694.374	6368914.328	EA221	398151.419	6367948.198
18	394903.865	6367205.222	EA18	395567.009	6368091.758	EA52	396505.826	6368183.521	EA86	397480.27	6368227.753	EA120	398385.44	6368456.331	EA154	398975.252	6368626.495	EA188	399717.465	6368951.958	EA222	397673.956	6367916.133
19	397693.495	6368242.102	EA19	395567.009	6368072.613	EA53	396542.772	6368173.619	EA87	397509.594	6368237.91	EA121	398387.419	6368470.095	EA155	398991.745	6368644.979	EA189	399743.195	6368958.56	EA223	397379.146	6367928.959
20	397693.943	6368241.678	EA20	395577.565	6368064.031	EA54	396532.876	6368145.892	EA88	397533.407	6368237.019	EA122	398405.232	6368489.179	EA156	399006.659	6368657.365	EA190	399768.265	6368973.743	EA224	397068.313	6367912.926
21	397719.056	6368184.56	EA21	395590.1	6368071.292	EA55	396534.855	6368130.048	EA89	397562.078	6368233.034	EA123	398413.809	6368473.996	EA157	399034.263	6368672.238	EA191	399782.78	6369004.111	EA225	396763.89	6367852.003
22	397800.631	6368135.319	EA22	395597.357	6368093.078	EA56	396545.411	6368106.942	EA90	397607.6	6368216.53	EA124	398437.56	6368468.714	EA158	399060.956	6368684.987	EA192	399801.912	6369008.732	EA226	396251.177	6367813.525
23	397832.11	6368024.689	EA23	395593.399	6368105.621	EA57	396562.564	6368103.641	EA91	397636.629	6368194.084	EA125	398477.144	6368501.062	EA159	399085.526	6368693.486	EA193	399836.879	6369019.295	EA227	396119.794	6367807.112
24	397930.131	6367938.475	EA24	395593.399	6368128.727	EA58	396570.481	6368136.649	EA92	397664.998	6368170.978	EA126	398499.576	6368506.344	EA160	399105.221	6368699.113	EA194	399872.505	6369054.944	EA228	395661.557	6367807.112
25	397978.512	6367849.305	EA25	395627.706	6368141.27	EA59	396582.357	6368172.958	EA93	397691.388	6368175.599	EA127	398513.43	6368498.422	EA161	399150.744	6368701.754	EA195	399884.639	6369063.994	EA229	395546.197	6367807.112
26	398064.416	6367741.31	EA26	395705.555	6368178.24	EA60	396639.754	6368218.51	EA94	397720.417	6368212.569	EA128	398518.708	6368471.355	EA162	399192.308	6368718.258	EA196	399914.279	6369077.349	EA230	395421.428	6367836.365
27	398046.015	6367732.135	EA27	395773.509	6368196.725	EA61	396718.924	6368243.597	EA95	397744.168	6368216.53	EA129	398511.451	6368443.528	EA163	399226.615	6368736.083	EA197	399933.201	6369082.671	EA231	395422.087	6367834.566
28	397961.675	6367838.165	EA28	395841.463	6368225.772	EA62	396763.786	6368238.975	EA96	397779.134	6368203.986	EA130	398511.451	6368421.182	EA164	399258.282	6368767.771	EA198	399966.848	6369093.234	EA232	395308.986	6367878.268
29	397914.161	6367925.737	EA29	395888.305	6368204.647	EA63	396791.496	6368218.51	EA97	397816.739	6368201.346	EA131	398527.945	6368404.578	EA165	399287.971	6368790.877	EA199	399990.599	6369083.332	EA233	395252.115	6367978.088
30	397814.385	6368013.495	EA30	395915.251	6368188.803	EA64	396786.878	6368192.764	EA98	397837.192	6368208.608	EA132	398546.417	6368396.096	EA166	399329.535	6368803.42	EA200	400009.732	6369101.156	EA234	395345.625	6368023.379
31	397783.455	6368122.195	EA31	395950.981	6368186.822	EA65	396780.94	6368153.153	EA99	397855.664	6368203.326	EA133	398560.932	6368400.717	EA167	399373.078	6368812.002	EA201	400033.483	6369107.758			
32	397703.208	6368170.634	EA32	396007.059	6368200.025	EA66	396784.239	6368132.028	EA100	397878.756	6368186.822	EA134	398575.446	6368414.58	EA168	399400.787	6368830.487	EA202	400053.935	6369097.855			
33	397677.17	6368229.857	EA33	396034.108	6368197.385	EA67	396796.114	6368123.446	EA101	397915.701	6368184.181	EA135	398584.023	6368448.309	EA169	399403.426	6368801.439	EA203	400056.574	6369082.671			
34	397663.227	6368243.034	EA34	396040.706	6368180.881	EA68	396819.865	6368129.387	EA102	397959.904	6368196.064	EA136	398598.537	6368473.996	EA170	399423.878	6368782.955	EA204	400077.026	6369089.933			

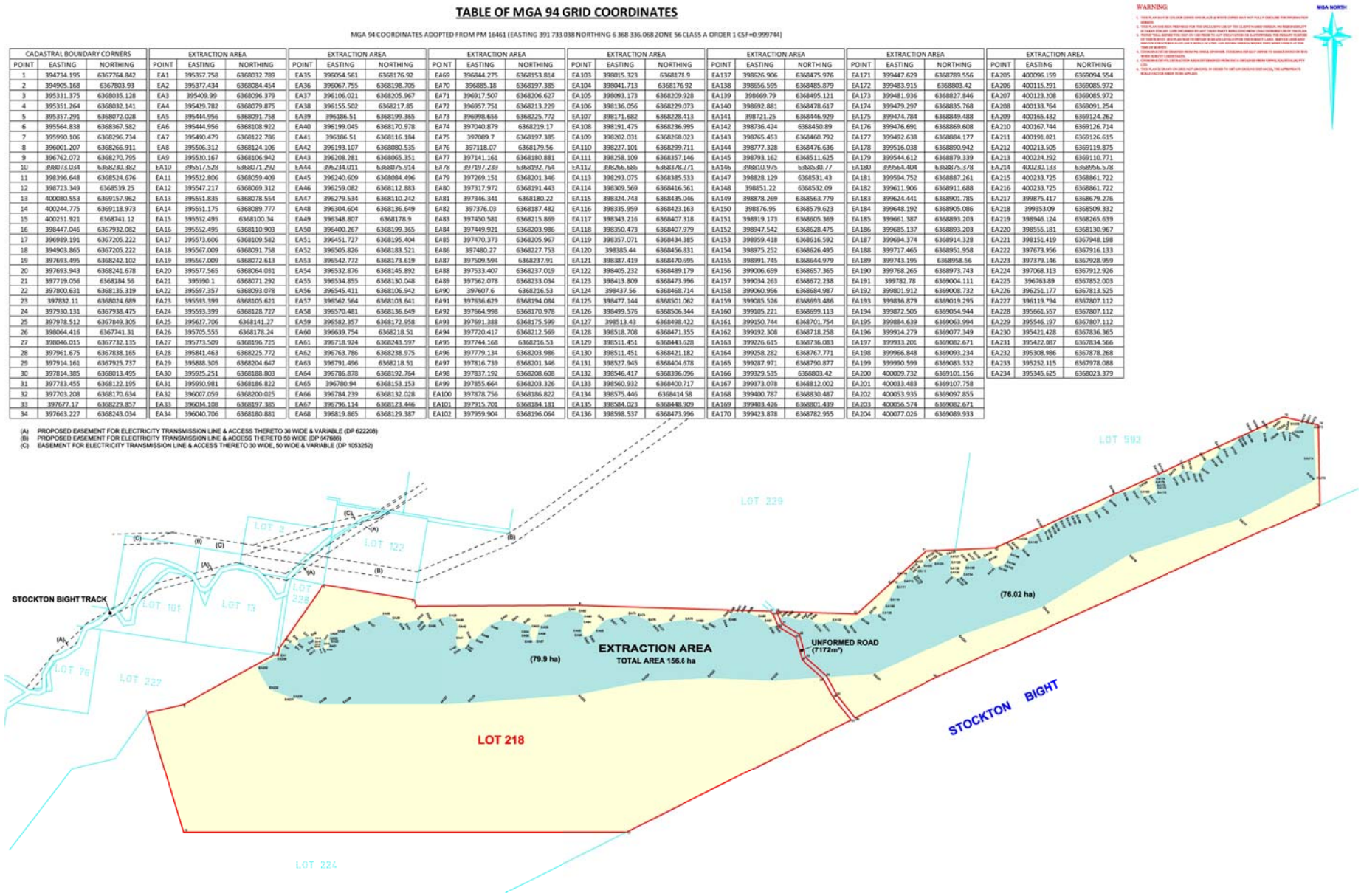


FIGURE 4.1

Lot 218 Extraction Area Boundary

Source: LE MOTTEE Group

File Name (A4): R36_V1/1646_354.dgn

- Unexploded Ordinances – This is assessed further in **Section 4.12**.
- Greenhouse Gas and Energy – This is assessed further in **Section 4.13**.
- Visual – No further assessment as there is no significant change to visual aspects of the development.
- Cumulative Impacts – This is assessed further in **Section 4.14**.

4.3 Ecology

A detailed ecological assessment of the study area was prepared by Umwelt and is presented in **Appendix 3**.

The purpose of the assessment was to determine the existing natural environment and likely impacts of the proposal on the biodiversity of the area, in particular threatened species, populations and communities listed under the TSC Act and the EPBC Act.

As shown on **Figure 1.4**, the proposed development is located adjacent to the 4438 hectares of Worimi Conservation Lands and Worimi National Park, which contain similar and higher quality vegetation communities to those of the project area.

4.3.1 Flora

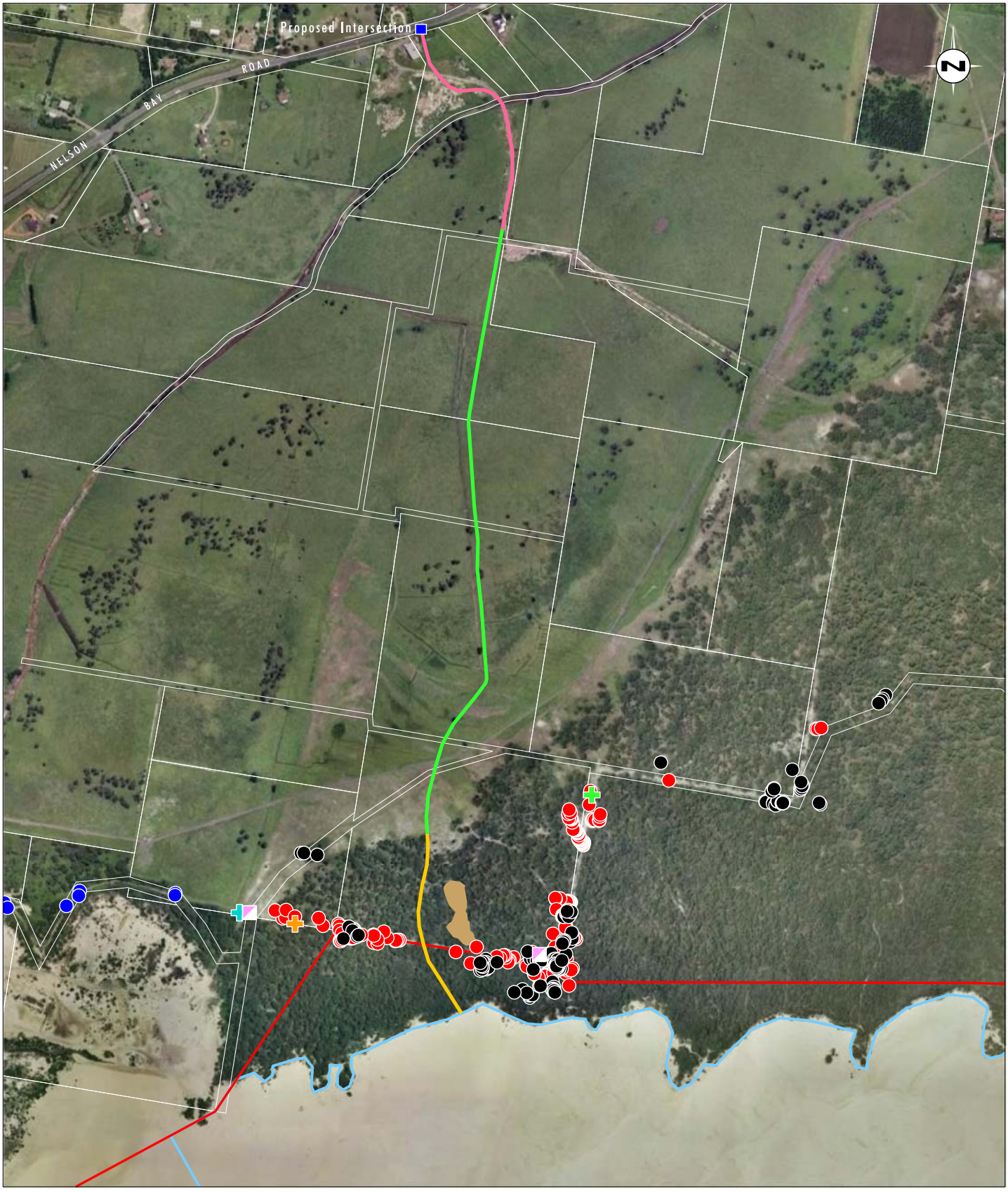
Three vegetation communities were recorded within the project area: Coastal Sand Apple – Blackbutt Forest, Swamp Mahogany – Paperbark Forest and Previously Disturbed Grassland. The distribution of these communities within the project area is shown in **Figure 4.2**. No vegetation occurs in the Lot 218 operational area.

In addition to the quadrat and rapid assessment plots that were completed and surveys undertaken in spring 2011, targeted orchid surveys were undertaken on 6, 20 September 2012 and 12 October 2012. These surveys consisted of meander transects undertaken on-foot targeting the threatened orchid species sand doubletail (*Diuris arenaria*) and rough doubletail (*Diuris praecox*). Any of these threatened orchid species identified in the field were way-pointed with a GPS in order to identify locations to be avoided and for mapping purposes.

Targeted orchid surveys identified sand doubletail (*Diuris arenaria*) occurring in a previously recorded location near the alternate haul route but not within the alternate haul route. The other orchid species, Newcastle doubletail (*Diuris praecox*) was not detected during the targeted orchid surveys. Additional inspection undertaken on 20 September 2012 and 12 October 2012 also failed to locate any Newcastle doubletail (*Diuris praecox*) flowering.

4.3.1.1 Coastal Sand Apple – Blackbutt Forest

The Coastal Sand Apple – Blackbutt Forest (nomenclature following Lower Hunter Central Coast Regional Environmental Management Strategy (LHCCREMS) vegetation classification (NPWS, 2000)), occurs in the southern part of the proposed alternate haul route and covers approximately 0.37 hectares within the proposed alternate haul road alignment, and extends into the adjoining Worimi Conservation Lands. This community is characterised by a canopy stratum to 30 per cent cover, up to 16 metres in height that is dominated by blackbutt (*Eucalyptus pilularis*) and smooth-barked apple (*Angophora costata*). A sub-canopy layer is present and is dominated by old man banksia (*Banksia serrata*) and broom-heath (*Monotoca elliptica*). The sub-canopy typically has a canopy cover of 10 per cent and a height of up to 10 metres.



Source: Aerial: Google Earth (2008)

0 100 250 500m
1:10 000

Legend

- Lot 218 Boundary
- Lot 218 Approved Extraction Area
- Proposed Intersection Location
- Coastal Sand Apple - Blackbutt Forest
- Disturbed Grassland
- Existing Tracks/Disturbed Grassland
- Swamp Mahogany Paperbark Forest
- *Angophora floribunda/inopina*
- *Diuris arenaria*
- *Diuris praecox*
- Grey-headed Flying-fox
- Little Bentwing-bat
- Greater Broad-nosed Bat
- Grey-crowned Babbler

FIGURE 4.2

Alternate Haul Route Vegetation Communities and Threatened Species Locations

File Name (A4): R36_V1/1646_355.dgn

The understorey stratum is mostly open (5 per cent canopy cover) and dominated by Sydney golden wattle (*Acacia longifolia*), prickly Moses (*Acacia ulicifolia*), bossiaea (*Bossiaea rhombifolia*) and *Platysace lanceolata*. The ground cover is generally dense (to 50 per cent canopy cover) consisting of common bracken fern (*Pteridium esculentum*), kangaroo grass (*Themeda australis*), blady grass (*Imperata cylindrica* var. *major*), raspwort (*Gonocarpus teucrioides*) and flax lily (*Dianella caerulea* var. *producta*). This community generally consists of a good succession of species in all strata.

4.3.1.2 Swamp Mahogany – Paperbark Forest

Swamp Mahogany – Paperbark Forest (nomenclature following LHCCREMS vegetation classification), occurs in a moist depression along the eastern border of the alternate haul route, adjacent to Coastal Sand Apple – Blackbutt Forest and occupies an area of approximately 0.42 hectares. This vegetation community is characterised by a canopy stratum to 30 per cent cover and 15 metres in height that is dominated by swamp mahogany (*Eucalyptus robusta*), broad-leaved paperbark (*Melaleuca quinquenervia*) and blackbutt (*Eucalyptus pilularis*) and will not be disturbed by the proposed alternate haul route.

The understorey is open (10-15 per cent cover), to 8 metres in height, consisting of prickly tea-tree (*Leptospermum juniperinum*) and lemon-scented tea-tree (*Leptospermum polygalifolium*). The groundcover stratum is typically dense (60 per cent canopy cover), and is dominated by *Juncus* spp., saw-sedge (*Gahnia clarkei*) and swamp water fern (*Blechnum indicum*).

4.3.1.3 Previously Disturbed Grassland

As shown on **Figure 4.2**, a significant proportion of the northern section of the alternate haul route comprises previously disturbed areas such as existing dirt roads and 1.18 hectares of previously disturbed grassland. In the disturbed grassland, vegetation has been cleared for agricultural purposes, leaving only ground cover vegetation, typically less than 0.5 metres in height.

The disturbed grassland in most cases is dominated by introduced grasses such as paspalum (*Paspalum dilatatum*), kikuyu (*Pennisetum clandestinum*) and red Natal grass (*Melinis repens*). Introduced herbs were also common, including fireweed (*Senecio madagascariensis*), white clover (*Trifolium repens*), Paddy's lucerne (*Sida rhombifolia*) and cobbler's pegs (*Bidens pilosa*).

Native species were also recorded in the grassland however these make up approximately 5 per cent of the groundcover species within this community. The native species recorded in the grassland include common couch (*Cynodon dactylon*) and slender rat's tail grass (*Sporobolus creber*). In areas subject to inundation native species included *Juncus* sp., common reed (*Phragmites australis*) and broadleaf cumbungi (*Typha orientalis*) were recorded.

4.3.1.4 Threatened Flora Species and Endangered Populations

No threatened flora species or endangered flora populations were recorded along the proposed haul route during this assessment.

Previous surveys have identified three threatened species or hybrids of threatened species occurring within the vicinity of the proposed haul route including Charmhaven apple (*Angophora inopina*) which is listed as vulnerable under the TSC and EPBC Acts and two cryptic orchid species, sand doubletail (*Diuris arenaria*) which is listed as endangered

under the TSC Act and Newcastle doubletail (*Diuris praecox*) which is listed as vulnerable under the TSC and EPBC Acts (refer to **Figure 4.2**).

Although it was not identified during surveys of the Project Area, potential habitat was identified for the threatened leafless tongue-orchid (*Cryptostylis hunteriana*). Despite the absence of records, it should be noted that surveys were not undertaken during the flowering season of this orchid (November to January) and that despite the rarity of this species there was considered to be potential for this species to occur. The leafless tongue orchid (*Cryptostylis hunteriana*) is listed as a vulnerable species under the TSC Act and the EPBC Act.

No other threatened flora species or endangered flora populations were recorded along the alternate haul route.

A list of all threatened flora species recorded or regarded to have potential to occur within a 10 kilometre radius of the Project Area (based on database searches and literature review) is presented in **Appendix 3**.

4.3.2 Fauna

4.3.2.1 Fauna Habitat

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

The canopy in the open forest habitat is dominated by smooth-barked apple (*Angophora costata*) and blackbutt (*Eucalyptus pilularis*) which support a moderate abundance of tree hollows providing important habitat for hollow-dependent fauna. A total of two habitat trees were recorded and marked within a 20 metre buffer of the proposed alternate haul route.

The canopy trees also provide foraging resources such as insects, nectar and foliage, for a wide variety of fauna including small and medium sized arboreal mammals, birds and reptiles. Swamp mahogany (*Eucalyptus robusta*) provides an important winter foraging resource for a wide range of species, in particular migratory birds.

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.

Narrow artificial drainage channels occur throughout the disturbed grassland and these, in conjunction with slow draining depressions, provide the only local surface water resources for fauna species.

4.3.2.2 Koala Habitat

The proposed alternate haul route will pass through a small area of Coastal Sand Apple – Blackbutt Forest which is classified as Supplementary Koala Habitat (SKH). However given its proximity to the Swamp Mahogany – Paperbark Forest (less than 50 metres away) which is identified as Preferred Koala Habitat (PKH) some is reclassified as Habitat Buffer over SKH as described within **Appendix 3**.

4.3.2.3 Animal Species

A total of 36 fauna species were recorded during fauna surveys of the alternate haul route, including 30 bird species, one mammal species, two reptile species and three amphibian species.

4.3.2.4 Threatened and Endangered Animal Species

One threatened species was recorded during the 2012 surveys; being the grey-crowned babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*) which is listed as vulnerable under the TSC Act. A group of seven of these birds were identified to the east of the alternate haul route. Previous surveys have identified three threatened species adjacent to the alternate haul route (refer to **Figure 4.2**) and a further seven species are known to occur in the vicinity. Other threatened fauna species known or expected to occur in the study area include:

- little bentwing-bat (*Miniopterus australis*);
- grey-headed flying-fox (*Pteropus poliocephalus*);
- long-nosed potoroo (*Potorous tridactylus*);
- varied sittella (*Daphoenositta chrysoptera*);
- glossy black-cockatoo (*Calyptorhynchus lathami*);
- swift parrot (*Lathamus discolor*);
- regent honeyeater (*Anthochaera phrygia*);
- masked owl (*Tyto novaehollandiae*);
- powerful owl (*Ninox strenua*);
- brush-tailed phascogale (*Phascogale tapoatafa*);
- koala (*Phascolarctos cinereus*);
- eastern pygmy possum (*Cercatetus nanus*);
- squirrel glider (*Petaurus norfolcensis*);
- eastern freetail-bat (*Mormopterus norfolkensis*);
- eastern bentwing-bat (*Miniopterus schreibersii oceanensis*);
- greater broad-nosed bat (*Scoteanax rueppellii*);
- yellow-bellied sheathtail-bat (*Saccolaimus flaviventris*);
- large-eared pied-bat (*Chalinolobus dwyeri*); and
- spotted-tail quoll (*Dasyurus maculatus*).

A total of 12 migratory and/or marine fauna species were identified as occurring or having the potential to occur in the area surrounding the alternate haul route based on the results of an EPBC Protected Matters search and habitat availability within these areas.

4.3.3 Potential Impacts

4.3.3.1 Flora

Development of Lot 218 extraction area will not remove any vegetation or create any ecological impacts beyond the boundary of the operational area. The development of the proposed alternate haul route involves the disturbance of approximately 0.37 hectares of native vegetation and approximately 1.18 hectares of previously disturbed grassland. As shown on **Figure 1.4**, there is similar and higher quality vegetation in the large expanse of vegetation extending along the Stockton dune system, which is contiguous with the project area. This includes the Worimi Conservation Lands and Worimi National Park.

Although the natural vegetation within the project disturbance area is of ecological significance (approximately 0.37 hectares), the small area of impact will not significantly reduce the area of any vegetation communities or affect floristic diversity on a local or regional scale.

Assessments of significance (in accordance with the EP&A Act and EPBC Act) are included within **Appendix 3**. The proposal has been discussed with a DSEWPC representative and has been referred under the EPBC Act.

4.3.3.2 Fauna

No threatened fauna species have been recorded within the alternate haul route, however 11 threatened species are known to occur in adjacent, contiguous habitats and the alternate haul route provides potential habitat for a further nine threatened fauna species.

Assessments of significance (in accordance with the EP&A Act) prepared for the threatened fauna species previously recorded within the vicinity and those deemed to have the potential to occur within the alternate haul route (see **Appendix 3**) determined that the proposed development would not have a significant impact on any threatened fauna species based on the small area of impact to potential fauna habitat (0.37 hectares) and the large areas of similar and contiguous habitat in the vicinity of the alternate haul route.

4.3.4 Proposed Management and Mitigation Measures

4.3.4.1 Vegetation Clearance

The following mitigation measures are based on those developed for the EA Umwelt (2009a) for approved sand extraction operation (Major Project Approval 08_0142). The following sections describe the relevant mitigation measures, how they relate to the proposed development and how they should be integrated with the ecological management of the approved sand extraction operations.

Trees will be cleared in accordance with the procedure described below. The identification of tree hollows is to be undertaken by an appropriately qualified and experienced ecologist during pre-clearance inspections.

- Within the area of clearing, hollow-bearing trees and other habitat structures such as stags, logs and stumps will be clearly marked by an appropriately qualified and experienced ecologist to prevent accidental clearing.
- Vegetation surrounding the 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 each of the identified hollows will be examined for fauna by a suitably qualified and experienced ecologist.
- 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.
- 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 within the same vegetation community from which it was captured at night.
- Captured nocturnal animals will be released on the evening of capture and will not be held for extended periods of time.
- In the event that injured fauna are identified, species will be immediately taken to the nearest veterinarian or certified wildlife carer for treatment.

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.

Salvaged tree hollows and logs will be stockpiled and used in site rehabilitation. Once rehabilitation is structurally mature, salvaged tree hollows will be replaced in similar densities to those in unaffected vegetation on the site. Salvaged logs and branches will be spread following topsoil spreading to enhance ground fauna characteristics.

Nest boxes will be used in lieu of salvaged tree hollows if appropriate, as determined as part of the rehabilitation management of the site.

4.3.4.2 Road Usage Rules for the Protection of Ecological Values

A number of threatened fauna species have potential to be injured or killed as a result of traffic on the proposed alternate haul route. The koala (*Phascolarctos cinereus*), brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*) and the eastern pygmy possum (*Cercartetus nanus*) are examples of species that have potential to pass over the alternate haul route on the ground. Other fauna species such as kangaroos, wallabies and possums also have potential to be injured crossing this road.

Due to the potential risk of injury/death to fauna crossing the alternate haul route, it is appropriate to have road usage rules to minimise potential impacts on native fauna. The following road usage rules are proposed:

- enforce a 40 kilometre per hour maximum speed limit on the alternate haul route for all quarry traffic;
- minimise night traffic where possible (most fauna collisions are likely to occur at night time, in particular dusk and dawn);
- erect signage at either end of the alternate haul route to inform drivers of the ecological values of the habitats through which it passes and therefore the need to drive with caution; and
- leave tree canopies overhanging the track where safe and appropriate as this will allow some gliding species to cross without coming to the ground.

4.3.4.3 Rehabilitation

On completion of sand extraction works, if the alternate haul route is no longer required for other purposes such as fire fighting, rehabilitation of the road should be integrated with that of the quarry, in accordance with the rehabilitation principles outlined in the Landscape Management Plan (Umwelt, 2009d).

Broadly, rehabilitation of the alternate haul route will aim to re-establish the native vegetation communities that existed prior to clearing for its construction. Revegetation of disturbed areas will utilise locally-occurring plant species in a composition that closely resembles that of the pre-development vegetation communities. Monitoring of any revegetated areas along the road access should be integrated with any monitoring program for the sand extraction areas as described in the Landscape Management Plan (Umwelt, 2009d).

4.3.4.4 Biodiversity Offsetting Considerations

The vegetation present in the alternate haul route supports known and potential habitat for a number of threatened flora and fauna species. Although there are threatened species habitats present, the area of impact of the proposed development is small (0.37 hectares of native vegetation and fauna habitat) and it adjoins a very large remnant of vegetation which offers similar or higher quality habitats for the same threatened species, which is conserved in Worimi Conservation Lands and National Park. The alternate haul route does not comprise unique values or areas that are dissimilar to the surrounding coastal dune system. The alternate haul route will have very little impact on threatened species habitats in the locality.

The Worimi LALC owns a significant area (4438 hectares) of native vegetation along the Stockton dune system which is managed for its conservation values. The Worimi Conservation Land includes the 524 hectare Worimi National Park. The dedication of the Conservation Land was part of an agreement to allow some parts of the Stockton sand dune system to be developed (including for sand extraction) while dedicating other areas to conservation. As set out in the original EA (Umwelt, 2009), the establishment of Worimi Conservation Land has previously been accepted as an adequate biodiversity offset for the development.

4.4 Aboriginal Cultural Heritage

An Aboriginal Cultural Heritage Management Plan (ACHMP) for the extraction areas was completed in consultation with the relevant Aboriginal stakeholders and in accordance with Condition 29 of Major Project Approval 08_0142 (Umwelt, 2009c). The ACHMP was approved by the then Department of Planning on 9 November 2009. An Aboriginal Heritage Management Group (AHMG) was subsequently established in accordance with the ACHMP.

A comprehensive Aboriginal Cultural Heritage Assessment was undertaken for the proposal and is presented in **Appendix 4**. The assessment included:

- undertaking detailed consultation with relevant Aboriginal stakeholders in accordance with the DECCW *Interim Community Consultation Requirements for Applicants*;
- reviewing the environmental and archaeological context of the Stockton Bight region and the alternate haul route in order to develop a model with which to predict the likelihood of archaeological material existing;
- undertaking a survey of the alternate haul route in consultation with the relevant Aboriginal stakeholders;
- assessing the cultural heritage significance of the alternate haul route primarily based upon the scientific and Aboriginal cultural heritage;
- reviewing the impacts of the alternate haul route in relation to the archaeological assessment; and
- providing appropriate recommendations to manage and mitigate impacts to cultural heritage associated with the alternate haul route.

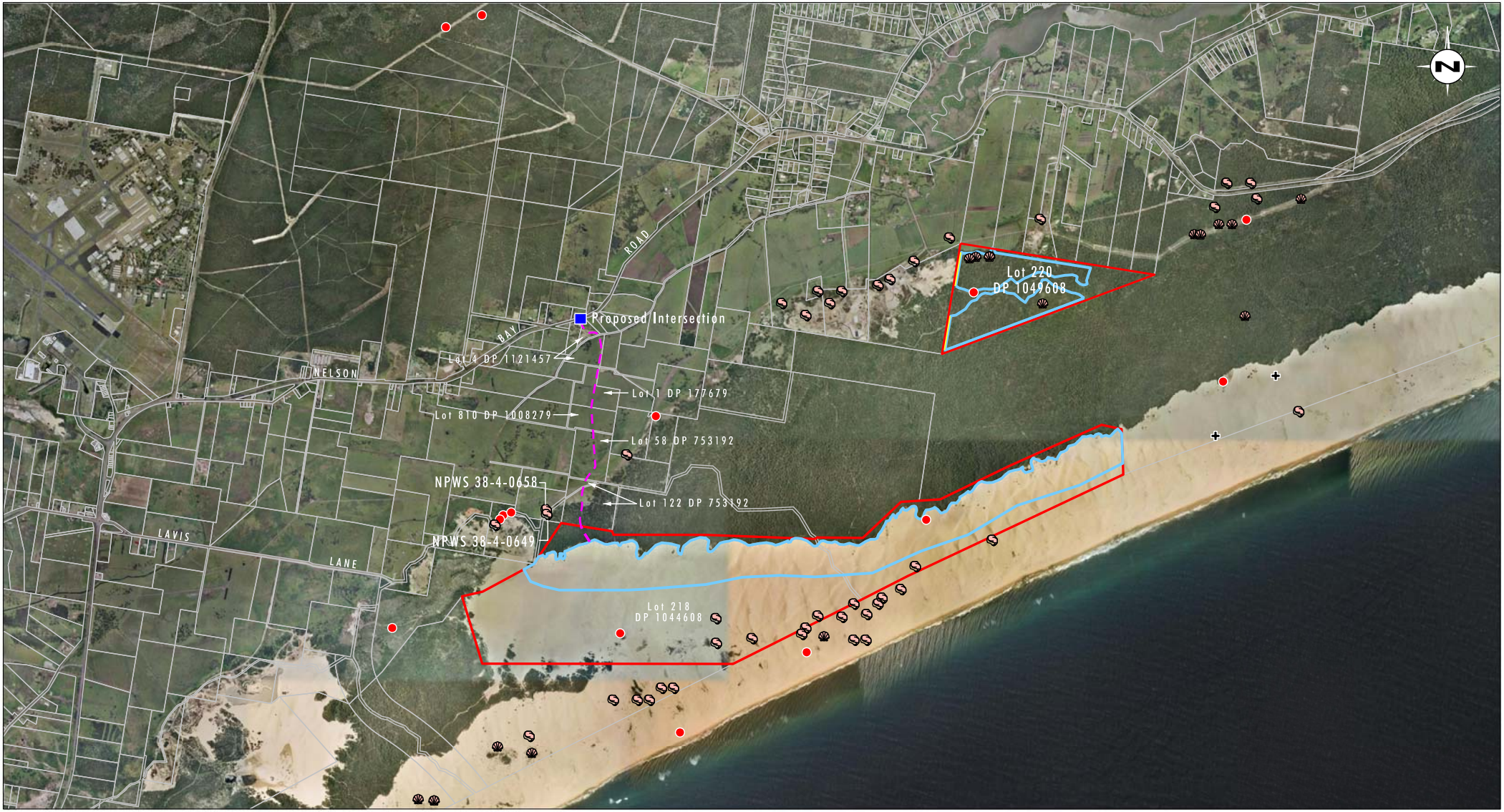
4.4.1 Environmental and Archaeological Context

Environmental factors such as the availability of fresh water and other resources influence the choices people make about how they use the landscape and also affect the likelihood that archaeological evidence will be present and detectible. The alternate haul route is located across the interface between stabilised dunes of Holocene age and the inter-barrier depression. The stabilised dunes would have provided direct access to the swamp resources of the inter-barrier depression whilst also being within 2 kilometres of the current beachfront and marine resources. Furthermore, the Coastal Sand Apple – Blackbutt vegetation community that populated the dunes would have provided a very broad variety of animal and plant resources.

A total of 75 AHIMS registered sites have been recorded within the search area. These sites are shown in **Figure 4.3**. Middens (AFT and SHL) are the most common site type, followed by artefact scatters/isolated artefacts (ART) and sites with shell only (SHL).

4.4.2 Archaeological Surveys and Identified Sites

Previous archaeological field surveys were undertaken along transects of the alternate haul route in Lot 218 and within the general vicinity of the alternate haul route as described within **Appendix 4**. Further survey of the alternate haul route was conducted on 30 July 2012. In addition on-site discussion in regard to proposed management measures was undertaken at that time. The survey team included representatives of Worimi LALC, Mur-Roo-Ma Inc and Nur-Run-Gee Pty Limited. The alternate haul route was surveyed on foot with the exception of the sections of the alternate haul route that are located within the inter-barrier depression.



Source: Department of Lands (2003)

0 0.5 1 2km
1:45 000

Legend

- Lot Boundaries (218 & 220)
- Approved Operational Area
- Proposed Alternate Access Route
- Proposed Intersection Location
- Artefact
- Shell
- Artefact and Shell
- Burial

FIGURE 4.3

Location of AHIMS Registered Sites

The level of effective coverage within the area surveyed for the proposed alternate haul route was 1.6 per cent of the total area subject to pedestrian survey. It is noted that only approximately 20 per cent (380 metres) of the proposed route could be subject to pedestrian survey as the remaining 80 per cent of the proposed route was located in the swamplands of the inter-barrier depression and was considered to have no archaeological potential.

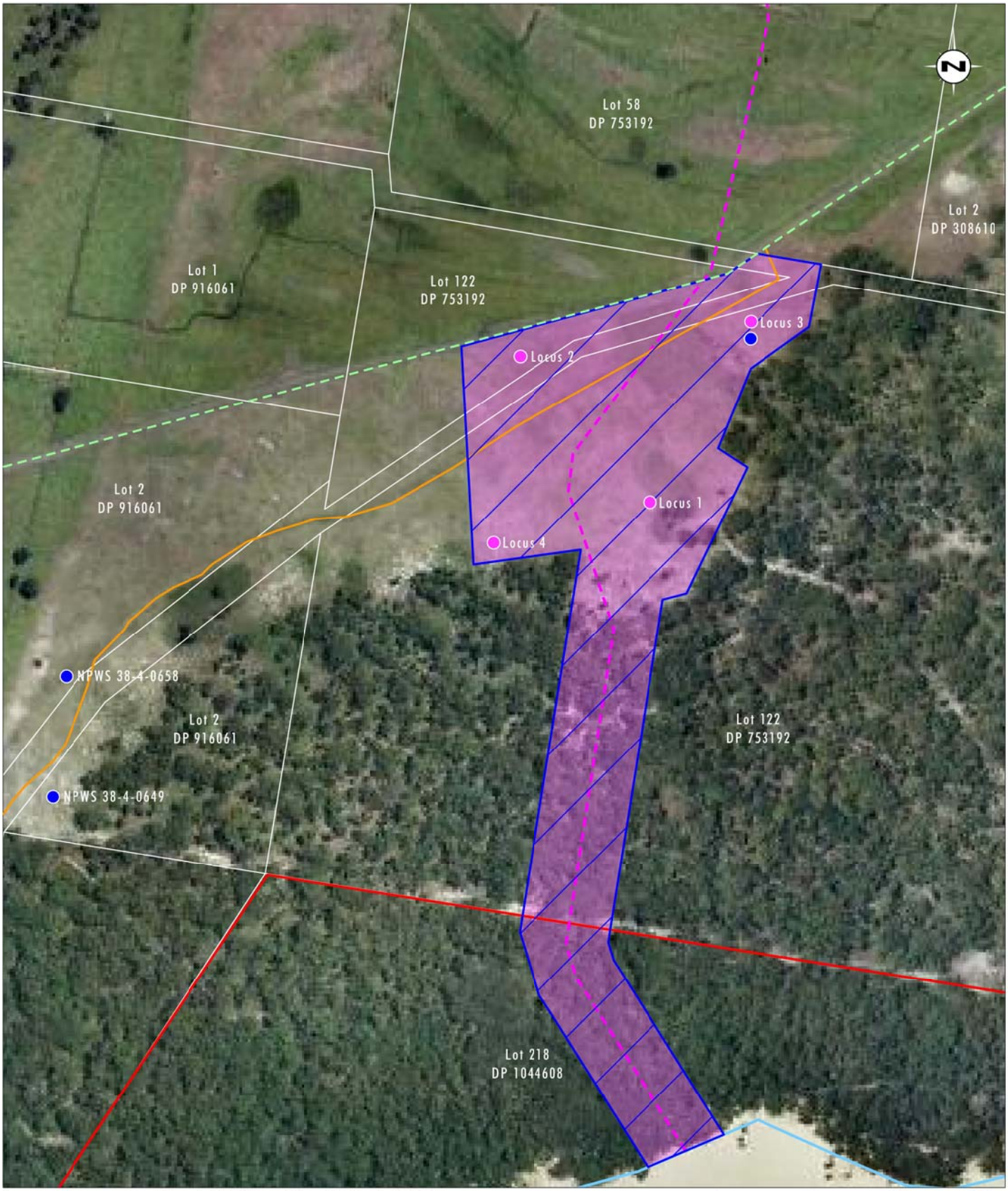
Previously recorded site A3 is present within the alternate haul route and was identified during the survey. Previous archaeological excavations have identified high densities of stone and shell, as well as a dated hearth feature as discussed within **Appendix 4**.

Four fragmented shell loci (one containing a tuff flake) were identified during the survey and are shown in **Figure 4.4**. Loci 1 to 4 are located within a 150 metre by 150 metre area on the crests of four discrete, low elevation dunes bordering the inter-barrier depression. Based on the results of the survey and previous archaeological investigations undertaken in this area, A3 extends right along this landform, with visible aspects of the site separated by areas of low visibility or disturbance.

Locus 1 is located on the crest of a low elevation dune adjacent to woodland. The surface distribution of shell at Locus 1 extends over an area of approximately 25 metres by 15 metres. The locus contains fragmented and weathered pipi shell, with the highest density ($12/m^2$) of shell fragments being confined to an area of approximately 125 centimetres by 75 centimetres. More sparsely distributed pipi fragments are present across the crest of the low elevation dune. Exposed soils within the locus consist of mid grey fine sand with frequent charcoal flecks and fragments. Visibility within the site area was good as grasses were very low. No stone artefacts were present.

Locus 2 is located approximately 10 metres from the inter-barrier depression adjacent to a vehicle track and electricity easement on a very gently inclined low elevation dune. The track and easement cuts into the toe of the dune slope and Locus 2 is exposed approximately 13 metres from the track. Surface distribution of shell extends over an area of approximately 5 metres by 5 metres. The site contains fragmented and weathered pipi shell, with the highest density of shell fragments ($5/m^2$) being confined to an area of approximately 75 centimetres by 50 centimetres. More sparsely distributed pipi fragments are present across the crest of the low elevation dune. Exposed soils within this locus consist of mid grey fine sand with frequent charcoal flecks and fragments. Visibility within the site area was good as grasses were very low. No stone artefacts were observed.

Locus 3 is located immediately adjacent to a vehicle track and electricity easement on a very gently inclined low elevation dune spur the crest of which is located 25 metres from the inter-barrier depression. The track and easement cuts into the toe of the dune slope and Locus 3 is exposed between the track and dune crest. Surface distribution of shell extends over an area of approximately 25 metres by 25 metres. The site contains fragmented and weathered pipi shell, with the highest density of shell fragments ($5/m^2$) being confined to an area of approximately 125 centimetres by 125 centimetres. More sparsely distributed pipi fragments are present across the crest of the low elevation dune spur. Exposed soils within this locus consist of mid grey fine sand with frequent charcoal flecks and fragments. A tuff flake was present within Locus 3. In addition, a fragment of very heavily weathered mammalian long bone was also present. As with Loci 1 and 2, visibility within the site area was good as grasses were very low.



Source: Department of Lands (2003) and Google Earth (2006)

0 50 100 150m
1:3000

Legend

- Lot Boundary
- Approved Operational Area
- Survey Area
- PAD Area
- Proposed Alternate Access Route
- Existing Track
- Electricity Easement
- Artefact
- Loci

FIGURE 4.4

Surveyed Area of Alternate Haul Route with Identified Sites and Features

File Name (A4): R36_V1/1646_357.dgn

Locus 4 is located on a very gently inclined low elevation dune approximately 100 metres from the inter-barrier depression. Surface distribution of shell extends over an area of approximately 25 metres by 20 metres. The site contains fragmented and weathered pipi shell, with the highest density of shell fragments ($8/m^2$) being confined to an area of approximately 150 centimetres by 150 centimetres. More sparsely distributed pipi fragments are present across the crest of the low elevation dune. Exposed soils within this locus consist of mid grey fine sand with frequent charcoal flecks and fragments. As with other loci in the survey area visibility within the site area was good as grasses were very low.

4.4.3 Aboriginal Cultural Significance

In assessing Aboriginal heritage, social significance is primarily equated with the significance placed on cultural (and sometimes natural) heritage by Aboriginal people and is often referred to as Aboriginal cultural significance. Aboriginal people value their heritage for a range of reasons, some of which are unique and some of which may be shared with non-Aboriginal people. Thus, Aboriginal people may consider a site containing archaeological material important for reasons related to its archaeological value but may also see the site as a tangible aspect of their culture that provides a direct link to Aboriginal people in the past. In contrast, sites, places or landscapes may also be of significance to Aboriginal people for reasons not linked to the presence of tangible archaeological materials such as the presence of places of spiritual importance, significant resources or important natural features.

As Aboriginal cultural significance relates to the values of a site, place or landscape to Aboriginal people, it must be determined by Aboriginal people.

A draft copy of the Aboriginal Cultural Heritage Assessment prepared for the proposal (refer to **Appendix 4**) was provided to all relevant Aboriginal stakeholders and it was requested that comment be provided regarding the Aboriginal cultural significance of the sites and areas of PAD within the study area, and on the significance of the proposal areas as a whole. Aboriginal stakeholders have previously indicated that Stockton Bight is of very high Aboriginal cultural significance due to its social, spiritual, aesthetic and educational value to the Aboriginal community (see **Appendix 4**). The cultural significance of the foredunes adjacent to the inter-barrier depression was reaffirmed by Aboriginal stakeholders during the consultation process. The study area is therefore considered to have high Aboriginal cultural significance.

4.4.4 Archaeological Significance

In relation to the alternate haul route, the assessment of archaeological significance has two components: the archaeological significance of sites and PADs (if any) associated with the alternate haul route; and the archaeological significance of the landscape encompassed by the alternate haul route as a whole. The application of the archaeological significance criteria to sites and PADs is relatively straightforward however the assessment of the significance of the alternate haul route as a landscape warrants further discussion. A cultural landscape can be defined as the connection between Aboriginal heritage (including sites and features and their relationships) and the natural elements of the landscape such as landscape history, topography and flora and fauna. Using this approach, archaeological material comprises one element of a cultural landscape and the significance of this landscape may be separate from that of the sites or features that it contains (ERM, 2006:101).

4.4.4.1 Alternate Haul Route

The landscape associated with the alternate haul route is located at the interface between stabilised dunes of Holocene age and the inter-barrier depression. The stabilised dunes would have been an area that was regularly utilised by Aboriginal people to access the rich resource base provided by the inter-barrier depression. Sections of the proposed alternate haul route outside areas that have previously been disturbed by easement or track construction and vegetation clearance have vegetation communities and associated resources very similar to those that would have been present during periods associated with the deposition of cultural materials. Sections of the alternate haul route therefore have high archaeological landscape significance because they provide a cultural landscape within which the landscape history, flora, fauna and archaeological material associated with this portion of Stockton Bight can be experienced as a whole.

4.4.5 Potential Impacts

The construction of the alternate haul route will require the establishment of a suitable 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 extraction area and an overall potential construction width of 10 metres. This will involve widening of the existing vehicle tracks (where present) to create a road that can sustain heavy traffic and vegetation clearance from approximately a 30 metre by 30 metre area to create the turning bay.

Where feasible (with reference to environmental constraints and construction requirements) it is proposed that the alternate haul route will be constructed by the filling of areas to create a level surface. This will require clearance of native vegetation in woodland areas between an existing perimeter trail in low dunes and the grassland that borders the inter-barrier depression. It may then be necessary to introduce road base (or similar) materials to create a stable surface.

Given that A3 has a moderate to high level of archaeological significance based on the previously demonstrated occurrence of sub-surface artefactual material in this area and its potential for deposits with some degree of integrity and a low to moderate significance as a cultural landscape, Mackas Sand has indicated that the alternate haul route will be constructed using a low ground disturbance method in order to mitigate impacts to this site. Consequently, Mackas Sand has indicated that the alternate haul route within the site/PAD will be constructed by laying geotextile material over the natural ground surface and introducing additional fill material (i.e. not sand excavated 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. Consequently, it will not be necessary to undertake significant ground disturbance works within A3 and sub-surface deposits will be protected from impacts associated with construction and use of the alternate haul route.

4.4.6 Proposed Management and Mitigation Measures

4.4.6.1 General Recommendations

1. Mackas Sand will ensure that its employees and contractors are aware that it is an offence under Section 86 of the *National Parks and Wildlife Act 1974* to harm an Aboriginal object without the consent of the Director-General of OEH or unless otherwise approved under Part 3A of the *Environmental Planning and Assessment Act 1979*.

2. If Project Approval 08_0142 is modified to incorporate the alternate haul route, the Mackas Sand ACHMP should also be modified to include the alternate haul route, with all recommendations included in this assessment to be incorporated into the revised ACHMP. All provisions of the ACHMP will then apply to the alternate haul route.

3. Any Aboriginal objects (such as stone artefacts or shell fragments) salvaged in relation to the recommendations provided (see Section 9 of **Appendix 4**) will be subject to analysis and interpretation in accordance with the methodology provided in Section 5.10 of the Mackas Sand ACHMP (Umwelt, 2009c).

4. The arrangements for care and control of any salvaged Aboriginal objects will be as specified in Section 5.11 of the Mackas Sand ACHMP.

5. Should any unexpected sub-surface deposits (other than human skeletal material) be identified during construction and use of the alternate haul route, they will be managed in accordance with Section 5.8 of the Mackas Sand ACHMP (Umwelt, 2009c).

6. Should any further investigations be necessary (surface collection, test excavation or salvage excavation) will be conducted in accordance with the approved methodologies provided in the Mackas Sand ACHMP (Umwelt, 2009c: Appendix 2 as revised).

7. Should human/possible human skeletal material be identified during construction and use of the alternate haul route, it will be managed in accordance with Section 5.9 of the Mackas Sand ACHMP (Umwelt, 2009c).

4.4.6.2 A3 and PAD within Section of the Currently Proposed Alternate Haul Route that Extends from the Northern Boundary of Lot 122 to the Lot 218 Approval Area

1. In consultation with the AHMG (as established under the Mackas Sand ACHMP), Mackas Sand should 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 demarcated area should be collected in consultation with the AHMG.

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:

    - 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; 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 incorporated in the ACHMP (Umwelt, 2009c: Appendix 2, Attachment 3).

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 in accordance with the description provided in Section 8 of **Appendix 4** (i.e. road construction could commence 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 extraction area and an overall potential construction width of 10 metres).

4. It is noted that the additional recommendations regarding this activity were provided by Aboriginal party representatives as described in **Section 4.4.7**.

4.4.7 Aboriginal Party Consultation

The following Aboriginal parties that were previously involved in the assessment of Lot 218 and Lot 220 were consulted in regard to the proposed alternate haul route:

- Worimi LALC;

- Nur-Run-Gee Pty Ltd (Nur-Run-Gee);

- Viola Brown;

- Mur-Roo-Ma Incorporated (Mur-Roo-Ma); and

- Carol Ridgeway-Bissett (previously Maaiangal Aboriginal Heritage Co-operative).

Following archaeological survey and review of the final draft archaeological assessment the Aboriginal parties made the following recommendations:

1. Worimi LALC indicated that recommendations provided in the draft report (which are consistent with those provided above), ‘do not, in any way, restrict or unfavourably effect this development’.

2. Nur-Run-Gee recommended that existing infrastructure on Lot 218 should be utilised and is hesitant to support any variation to Project Approval 08_0142.

3. Mur-Roo-Ma recommended that the previously approved access to the sand extraction face should be utilised and the alternate haul route should not be approved.

4. Both Carol Ridgeway-Bissett and Viola Brown recommended that the proposed modification is not approved because of its impacts on Aboriginal cultural heritage and the cultural landscape, including flora and fauna.

4.5 Historical Heritage

A review of the Australian Heritage Database maintained by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPC), the State Heritage Register (SHR) and State Heritage Inventory maintained by the NSW Heritage Council, the Register of the National Trust (NSW) and the Port Stephens LEP was undertaken in May 2011. There are no items of European heritage listed along the alignment of the alternate access road.

A Non-Indigenous Heritage Management Plan has been prepared and approved for sand extraction operations on Lot 218 and Lot 220. A copy of this plan can be found on the Mackas Sand website www.mackassand.com.au.

4.6 Traffic and Access

A detailed traffic assessment was undertaken as part of the EA for the approved development (Umwelt, 2009a).

The proposed modification seeks to change the location of the access to Lot 218 extraction area and involves the establishment of a new access road between Lot 218 and Nelson Bay Road and a new intersection on Nelson Bay Road as shown on **Figure 1.2**. This proposed modification does not change current access and haulage arrangements for sand extraction operations at Lot 220.

As set out in Section 4.5.2 of the original EA (Umwelt, 2009a), up to 1 million tonnes of sand per year will be transported from Lot 218 to surrounding markets. It is anticipated that the maximum rate of laden truck movements hauling sand from Lot 218 will be eight trucks per hour (i.e. 16 movements per hour) with a maximum of approximately 3150 tonnes of sand transported from the site per day.

The proposed new private access road as shown on **Figure 1.2,** is approximately 2 kilometres long and traverses Lot 4 DP 1121457, Lot 1 DP 177679, Lot 810 DP 1008279, Lot 58 DP 753192, Lot 122 DP 753192 and Lot 218 in DP 1044608 (Lot 218), Salt Ash. Mackas Sand or related parties have acquired Right of Ways over these land parcels and have subsequently either purchased the subject land parcels or are in the process of purchasing the subject land parcels except for Lot 218 which is owned by WLALC.

The private access road will be an 8 metre wide gravel construction for the majority of its length. A 200 metre section adjacent to Nelson Bay Road will be sealed to minimise dust generation and the potential for air quality impacts on adjoining residences and on Nelson Bay Road.

Construction of the new Nelson Bay Road intersection and the associated haul route to Lot 218 will remove the need for quarry traffic from Lot 218 to travel along Lavis Lane and will provide direct access to Nelson Bay Road. Lavis Lane is a local street under the care and control of Port Stephens Council and Nelson Bay Road (Main Road 108) is a classified State Road and is the responsibility of Roads and Maritime Services (RMS). Construction of the proposed new intersection on Nelson Bay Road will enable quarry traffic resulting from operations on Lot 218 to be diverted away from a local street (Lavis Lane) to directly access a State Road which will significantly reduce potential heavy traffic impacts on Lavis Lane and adjoining residences. This will provide for the continued safety for recreational and residential users of Lavis Lane.

The proposed construction of the new intersection was discussed with Port Stephens Council and RMS. RMS advised on 13 July 2012:

> RMS has reviewed the information provided and has discussed this matter with the Department of Planning and Infrastructure and Council. RMS would be prepared to concur with the vehicular access to / from the approved sand extraction area through your property provided certain requirements are met at full cost to the developer. The following preliminary comments apply:
>
> - The proposed intersection/access driveway on Nelson Bay Road shall be designed and constructed to accommodate left in/left out movements only and the design vehicle. The left in movement will require a deceleration lane (Austroads AUL) and the left out movement will be a give-way arrangement. The intersection shall be designed in accordance with the *Austroads Guide to Road Design 2009* (with RMS supplements) and relevant Australian Standards, to RMS/Council satisfaction. The intersection shall include the provision of a raised concrete median to physically prevent right in and right out movements. Appropriate signage should also be provided to reinforce these restrictions.
>
> - The intersection/access driveway should be sealed to the returns, as a minimum, and designed/constructed in accordance with Council requirements.
>
> - The proponent should engage a traffic consultant to undertake a traffic analysis in accordance with the *RMS Guide to Traffic Generating Developments* as supporting information to be submitted with the development application.

Subsequent to this advice, a concept plan for the proposed new intersection was prepared and submitted to RMS for review. On 14 September 2012, RMS advised:

> RMS has reviewed the concept plan and would concur with and left in / left out vehicular access onto Nelson Bay Road to/from Lot 4. The following preliminary comments apply to the concept design layout:
>
> - The left turn deceleration lane shall be designed for 80kph design speed, refer to Austroads Guide to Road Design Part 4A section 5.3. Truck turning speeds also need to be considered.
>
> - A raised island shall be provided to physically deny right turn movements in and out of the property – reference RMS letter dated 13 July 2011.
>
> - Carriageway widths on Nelson Bay Road and the access road are required to determine land configurations for vehicles and cycles. Adjacent sealed shoulders are required.
>
> - The provision for cyclists as shown travelling between the southbound through vehicles and a decelerating left turning truck is considered to be in appropriate in this high speed environment. Cyclists should be brought along a 2 m shoulder up to and through the intersection, crossing on the road carriageway side of the proposed raised island.
>
> Additionally, as loaded trucks pulling out onto Nelson Bay Road for the access road will not have sufficient sight to enter and accelerate up to 80% of the posted speed in accordance with standard design criteria, the requirement for an acceleration lane should be included in the Traffic Impact Assessment for the proposal. Other matters raised in my letter dated 13 July 2011 still apply.

A conceptual layout of the proposed intersection is shown on **Figure 1.5** and further detail is provided in **Appendix 5**. The final layout will be subject to the requirements of RMS.

It is envisaged that to meet market requirements, transport of sand may occur 24 hours per day seven days a week. Ability to transport sand 24 hours per day seven days per week will be important to enable orders for large projects to be met and to meet loading requirements should in the future sand be transported by ship from the Port of Newcastle.

Condition 31 of Schedule 3 of Major Project Approval 08_0142 states:

> **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.

As discussed, the proposed modification to access to Lot 218 will not utilise Lavis Lane. Consequently, Mackas Sand seeks to have the requirement to seal the remaining unsealed section of Lavis Lane and the eastern section of the approved haul road deleted.

As stated in the 13 July 2012 response from RMS, the full cost of constructing the proposed new access on Nelson Bay Road is to be met by Mackas Sand.

4.7 Noise

The proposed modification to use the alternate haul road alignment will not result in any additional noise impacts from those set out in the EA (Umwelt, 2009a) other than for residences immediately adjacent to the proposed new intersection on Nelson Bay Road. It will however result in no traffic noise impacts on residences adjacent to Lavis Lane and Towers residence (R3).

In addition, received noise levels at the closest residences to extraction operations on Lot 218 (Ford residence (R4) and Towers residence (R3) as shown on **Figure 1.5**), will be lower than previously predicted due to the initial extraction face being approximately 600 metres further to the east and shielded by the mobile sand dunes which are elevated to over 30 metres above the extraction floor. There will be no change to residences proximate to Lot 220 extraction and haulage operations.

Analysis undertaken within the original EA (2009a) indicated that truck traffic noise levels at the Towers (R3) and Ford (R4) residences which are 20 metres and 26 metres distant from the approved Lavis Lane haul route, would remain within acceptable levels provided truck movements do not exceed 7 laden trucks (i.e. 14 trucks movements) per hour before 7.00 am (night time) and 19 laden trucks (i.e. 38 trucks movements) per hour after 7.00 am (daytime and evening).

Given that the nearest residences to the alternate haul road of the proposed new Nelson Bay Road intersection are in excess of 50 metres away, predicted road traffic noise levels at a maximum of 8 laden truck movements per hour will remain at acceptable levels.

A Noise Management Plan (Umwelt, 2009b) has been prepared for sand extraction operations on Lot 218 and Lot 220 and associated product transport. Key operational features relevant to the Noise Management Plan are:

- The approved hours of extraction being 24 hours a day seven days a week except for operations within 250 metres of the Hufnagl Residence (R27) (see **Figure 1.5**) 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 am and 10 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 Project Approval 08_0142 as Mackas Sand has an agreement with the owners of residences off Oakvale Drive. A copy of this agreement has been provided to DP&I and occupiers.

- Transportation of sand from Lot 218 along Lavis Lane in accordance with the provisions of Condition 9 of Schedule 3 of Project Approval 08_0142 between:

    - 6.00 am and 6.00 pm (EST) Monday to Friday;
    - 6.00 am and 7.00 pm (DST) Monday to Friday;
    - 7.00 am to 4.00 pm Saturdays; and
    - No transport on Sundays or public holidays.

It is proposed to expand the provisions for the transportation of sand from Lot 218 to include the proposed alternate access route. The Noise Management Plan will be updated to reflect the change in approved haulage arrangements before the commencement of extraction from Lot 218. Mackas Sand is seeking approval to be able to transport sand 24 hours a day seven days a week from Lot 218.

4.8 Air Quality

The proposed modification to use the alternate haul route to Lot 218 will not increase air quality impacts on non-project related residential properties from those set out in the EA (Umwelt, 2009a) and approved under Major Project Approval 08_0142.

As stated in the EA (Umwelt, 2009a), the major source of potential dust generation is from the use of unsealed access roads. The principal measure used to control dust will be dust suppression on the gravel sections of haul road. This will be achieved using a water cart to keep roads moist during periods of product transport.

Furthermore the 200 metres of access route southward from Nelson Bay Road will be sealed to minimise potential dust impacts to nearby residences, and provide a suitable surface for vehicles braking as they approach the intersection before the commencement of sand extraction at Lot 218.

In addition, dust control will be achieved by ongoing rehabilitation of parts of the extraction areas that were vegetated prior to extraction occurring.

Sand extraction operations at Lot 218 will be located within the mobile dune field and will initially be approximately 1700 metres from the nearest residence.

An Air Quality Monitoring Program (Umwelt, 2011a) has been developed for operations on Lot 218 and Lot 220. Two dust deposition gauges have been established to monitor dust deposition levels as shown on **Figure 1.5**. One gauge (DDG1) is located to the north of the access road and approved extraction area on Lot 220. The other dust deposition gauge is located adjacent to the alternate haul route to Lot 218 (DDG2).

Baseline dust deposition monitoring levels (Umwelt, 2011a) indicate on occasions high levels of airborne sand being present due to the natural windblown movement of the dunes on Lot 218. Deposition levels at monitoring site DDG2 vary significantly and have on several occasions exceeded 4 g/m^2/month.

Dust emissions as a result of the use of haulage of sand product from Lot 218 will be monitored using dust deposition gauges and regular visual inspection.

If monitoring or visual inspection indicates that the use of a water cart as proposed for the alternate haul route is not adequately controlling dust emission levels at DDG2 the rate of water application will be increased and consideration will be given to sealing further sections of the alternate haul route.

4.9 Water Resources

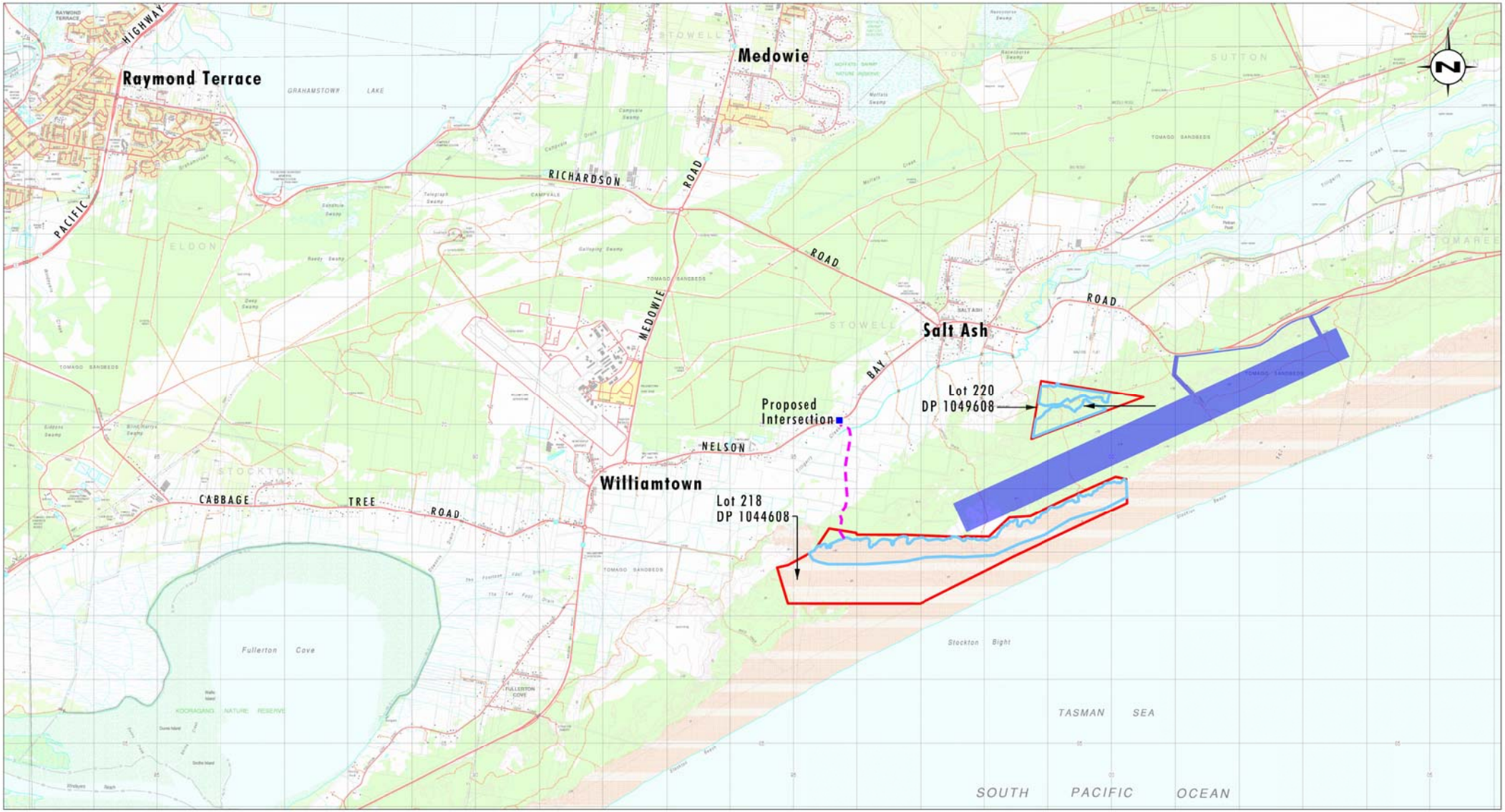
4.9.1 Surface Water Resources

The alternate haul route for which modification is sought is predominantly within the inter-barrier depression which separates the Inner Barrier Pleistocene dune system from the Outer Barrier Holocene dune system. Due to the high infiltration capacity of the underlying dunes and the relatively flat topography of the inter-barrier depression, the only natural surface drainage feature in the area of the alternate haul route is Tilligerry Creek. There are however several man-made drains that have been constructed across the inter-barrier depression that drain westward to the Tilligerry Creek system and south-westward to the 14 Foot Drain and Fullerton Cove. The proposed alternate haul route will cross Tilligerry Creek at an existing culvert and will not impact on the flow or flooding regime of Tilligerry Creek.

4.9.2 Groundwater Resources

The alternate haul route and Lot 218 and Lot 220 approved extraction areas are located on the Stockton Sandbeds which form part of the Tomago-Tomaree-Stockton groundwater resource (shown in **Figure 4.5**). The groundwater resource is managed in accordance with the Hunter Water Regulations 2010, Tomago-Tomaree-Stockton Groundwater Management Plan 1996 and Water Sharing Plan for the Tomago-Tomaree-Stockton Groundwater Source 2003 (refer to **Sections 3.2.3.1**).

The Tomago-Tomaree-Stockton Sandbeds cover an area of approximately 275 square kilometres along a coastal strip 10 to 15 kilometres wide, extending from the Hunter estuary in the south to Port Stephens in the north and Raymond Terrace to the west. The sandbeds occur on porous sandy soils lying over deep porous sands. The porosity of the sand allows for significant infiltration of rainfall and storage of large quantities of water.



Source: Department of Lands, 2006

0 1 2 4 km
1:85 000

Legend

- Lot Boundaries (218 & 220)
- Approved Areas
- Proposed Alternate Haul Route
- Proposed Intersection Location
- HWC Emergency Borefield Easement

FIGURE 4.5

Water Reserves and Easements

File Name (A4): R36_V1/1646_358.dgn

The Tomago-Tomaree-Stockton Sandbeds form an integral part of HWC's bulk water supply by augmenting surface water supplies and providing a backup water supply during periods of drought. The sandbeds consist of three main zones which contain distinct groundwater systems:

- The Tomago Sandbeds cover an area of approximately 150 square kilometres and occur between the outer dune barrier and a Palaeozoic rock outcrop on the landward side of Stockton Bight. This aquifer has been used to supply Newcastle with potable water since the 1930s and currently supplies approximately 20 per cent of the water provided by HWC. The total capacity of this aquifer is estimated to be 100,000 mega litres (ML), of which approximately 60,000 ML can be accessed with existing infrastructure. The Tomago Sandbeds are located to the west of the approved extraction areas and alternate haul route.

- The Tomaree Sandbeds include the Anna Bay, Glovers Hill and Nelson Bay Sandbeds and occupy an area of approximately 70 square kilometres at the northern tip of the Tomaree Peninsula. These aquifers are used to supply water to townships along the Tomaree and Tilligerry Peninsulas, and Karuah. The Tomaree Sandbeds are located to the north of the approved extraction areas and alternate haul route.

- The Stockton Sandbeds on which the approved extraction areas and alternate haul route are located cover an area of approximately 80 square kilometres along the coastline between Newcastle and Port Stephens. The Stockton Sandbeds occur in the outer dune barrier of Stockton Bight and overlie the eastern extremity of the Tomago Sandbeds. This aquifer has not been developed for groundwater use, although it has been identified by HWC as a potential water reserve that may be used in drought conditions.

The Tomago Sandbeds are much older than the Stockton Sandbeds, with sand deposits accumulating during the Pleistocene period, approximately 250,000 to 10,000 years ago. In contrast, the Stockton Sandbeds accumulated during the Holocene, in the last 10,000 years.

HWC has obtained an easement over part of WR 57573, extending in a north-east to south-west direction to the north-east of Lot 218 on land owned by Worimi LALC (refer to **Figure 4.5**). It is understood (Rhys Blackmore HWC pers comm. October 2011) that a borefield may be developed in this easement in the future for use during periods of drought however is more likely that this borefield may be developed in a location immediately to the west of the easement shown on **Figure 4.5**.

The HWC easement is located entirely within vegetated sand dunes and is approximately 200 metres north of the approved extraction area on Lot 218. The alternate haul route to Lot 218 is located approximately 1.6 kilometres west of the HWC easement.

The Water Sharing Plan for the Tomago-Tomaree-Stockton Groundwater Source 2003 indicates that long term average extraction limit for Stockton aquifer as 14,000 ML/year of which 2000 ML/year can be extracted under domestic and stock rights with an additional 3100 ML/year being identified in 2003 as required for extraction under existing access licences.

There is currently an embargo on granting new licences to utilise the groundwater in the Stockton aquifer and as a result it is not possible to use this groundwater resource at this time as a source of water for dust suppression.

4.9.3 Soil and Water Management

A detailed Soil and Water Management Plan (SWMP) (Umwelt, 2011a) has been prepared for operations on Lot 218 and Lot 220 in accordance with the requirements of Condition 18 Schedule 3 of Project Approval 08_0142:

> 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
> - Groundwater Monitoring Program; and
> - Surface Water Monitoring Program.

The SWMP will be revised to take into account the construction and use of the alternate haul route before the commencement of sand extraction at Lot 218. Key aspects of the SWMP are outlined in **Sections 4.9.3.1** to **4.9.3.4**.

4.9.3.1 Site Water Balance

There are no proposed changes to the site water balance for operations on Lot 220.

Use of the alternate haul route to Lot 218 will slightly decrease the length of haul route requiring watering for dust suppression from approximately 2.2 kilometres to 1.8 kilometres.

Estimated annual water demand for dust suppression on the approved Lot 218 haul route is provided in **Table 4.1**. In determining annual water demand for Lot 218 it has been assumed that 70 per cent of operation days are fine and that 80 per cent of daily evaporation occurs during the period when product is transported on the haul route.

Table 4.1 – Estimated Water Demand for Dust Suppression for Lot 218 Product Haulage

	Road Length (m)	Watered Road Width (m)	Days of Product Haulage per year	Average Daily Evaporation (mm/day)	Annual Water Demand for Dust Suppression (ML)
Approved Haul Route					
Lavis Lane	700	8	295	3.8	3.5
Stockton Bight Track 1	650	6	295	3.8	2.4
Approved Access	850	6	295	3.8	3.2
Total	**2200**				**9.2**
Alternate Haul Route	1800	8	340	3.8	10.4

As can be seen from **Table 4.1**, it is estimated that annual water demand for dust suppression will increase from approximately 9.2 ML/year to 10.4 ML/year principally due to produce haulage occurring 24 hours a day 7 days a week with resultant increase in water demand for dust suppression.

Further reductions in water usage at Lot 218 could be achieved through sealing sections of the alternate haul road between Lot 218 and Nelson Bay Road.

4.9.3.2 Sediment and Erosion Control

The extraction area on Lot 218 comprises highly permeable sand. There are no surface drainage features within the extraction area and no specific requirements for sediment and erosion control.

Both the approved and alternate haul routes to the Lot 218 extraction area traverse relatively flat land that has high infiltration capacity. As a result, surface run-off is not generated in significant quantities, even during significant rainfall events. This is demonstrated by the lack of natural surface drainage paths within and surrounding the study area and the artificial drains within the inter-barrier depression that drain to Tilligerry Creek. Establishment of the alternate haul route will create additional localised areas of low permeability along the road surface. Small quantities of surface run-off will be generated from these areas and will be readily managed through the use of silt fences that will be established along the edge of the haul route (see **Figure 4.6**). During the construction phase silt fences will be maintained and remain in position until a suitable vegetative cover is established adjacent to the alternate haul route.

Construction of haul routes require no special water management controls as the underlying sand and adjoining landform has sufficient infiltration and detention capacity to adequately dissipate runoff from the flat haul road. Sections of the alternate haul route traverse low-lying areas that will initially be built up with windblown sand prior to placement of road base material. In areas where vegetation is to be cleared along the alignment of the alternate haul route, it will be windrowed along the edge of the cleared area. Silt fence will be erected between the windrowed areas and the road construction area as shown on **Figure 4.6**.

4.9.3.3 Groundwater Monitoring

Condition 22 of Major Project Approval 08_0142 states that the Groundwater Monitoring program shall include:

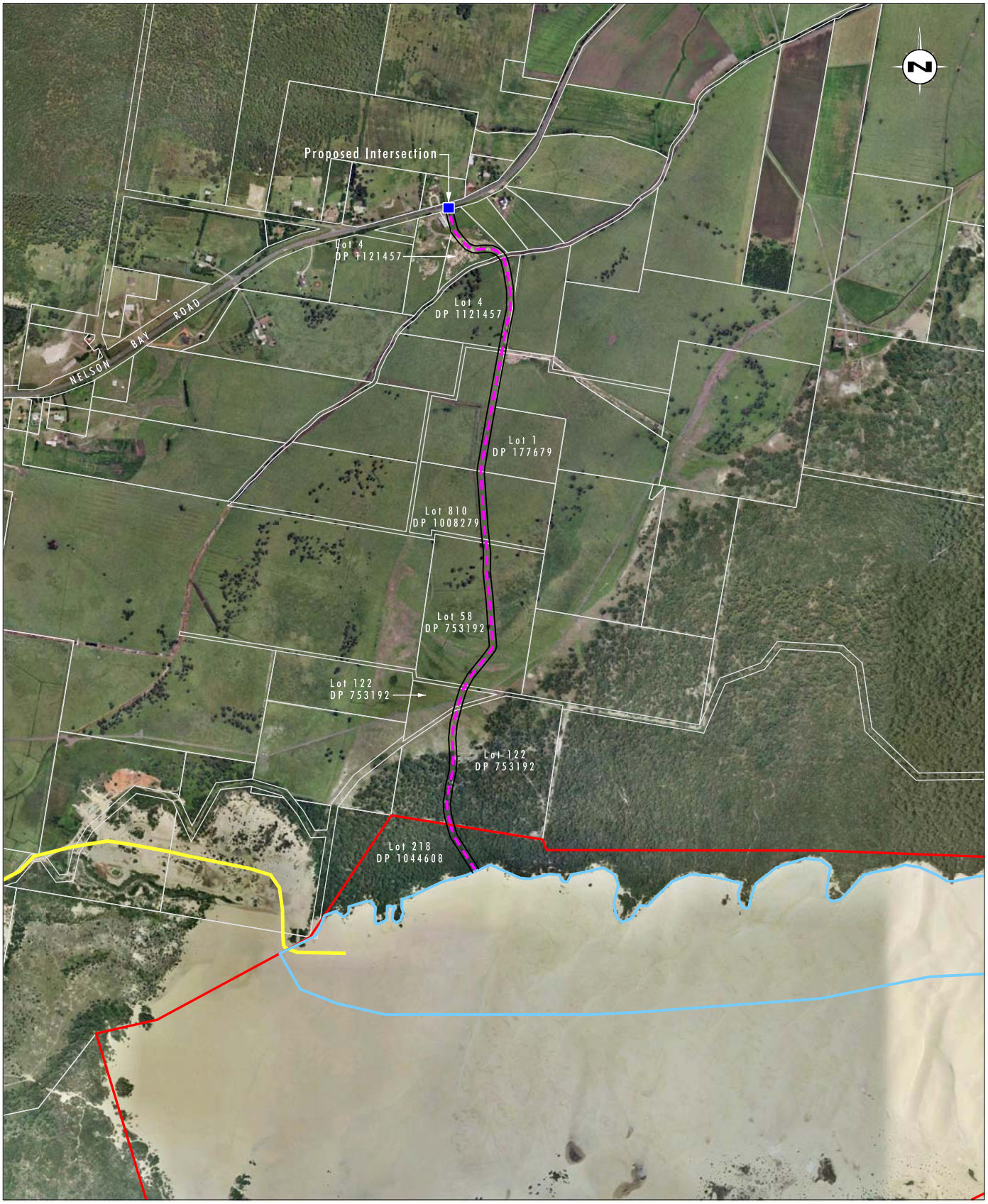
(a) detailed baseline data on groundwater levels and quality, based on statistical analysis (including available HWC data)

(b) groundwater impact assessment criteria; including trigger levels for investigating any potentially adverse groundwater impacts;

(c) a program to monitor groundwater levels and quality;

(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

(e) a protocol for the investigation, notification and mitigation of identified exceedances of the groundwater impact assessment criteria.



Source: Google Earth (2009)

0 250 500 750m
1:15 000

Legend

- Lot Boundary (218)
- Approved Operational Area
- Proposed Alternate Access Route
- Approved Access Route
- Proposed Intersection Location
- Silt Fence

FIGURE 4.6

Sediment and Erosion Controls

In accordance with the Groundwater Monitoring Program (Umwelt, 2011a) groundwater levels are monitored monthly and groundwater quality is monitored quarterly at the six monitoring bore locations (SP1 to SP6/BL158) shown on **Figure 1.5**. It is proposed to install additional groundwater monitoring bores within the Lot 218 and Lot 220 extraction areas to enable groundwater level and quality to be monitored with monitoring to be undertaken at the same time as for bores SP1 to SP6/BL158.

Groundwater quality is monitored quarterly for the life of the operation for the following groundwater quality parameters:

- pH (Lab);
- conductivity (µS/cm);
- arsenic;
- iron;
- manganese; and
- turbidity.

Quarterly results will be compiled and analysed to check for unforeseen impacts or unacceptable trends in groundwater quality. 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 quality results will be analysed quarterly and reported annually. If any unexpected trends in groundwater quality are observed, 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 DP&I, NOW and Environment Protection Authority (EPA).

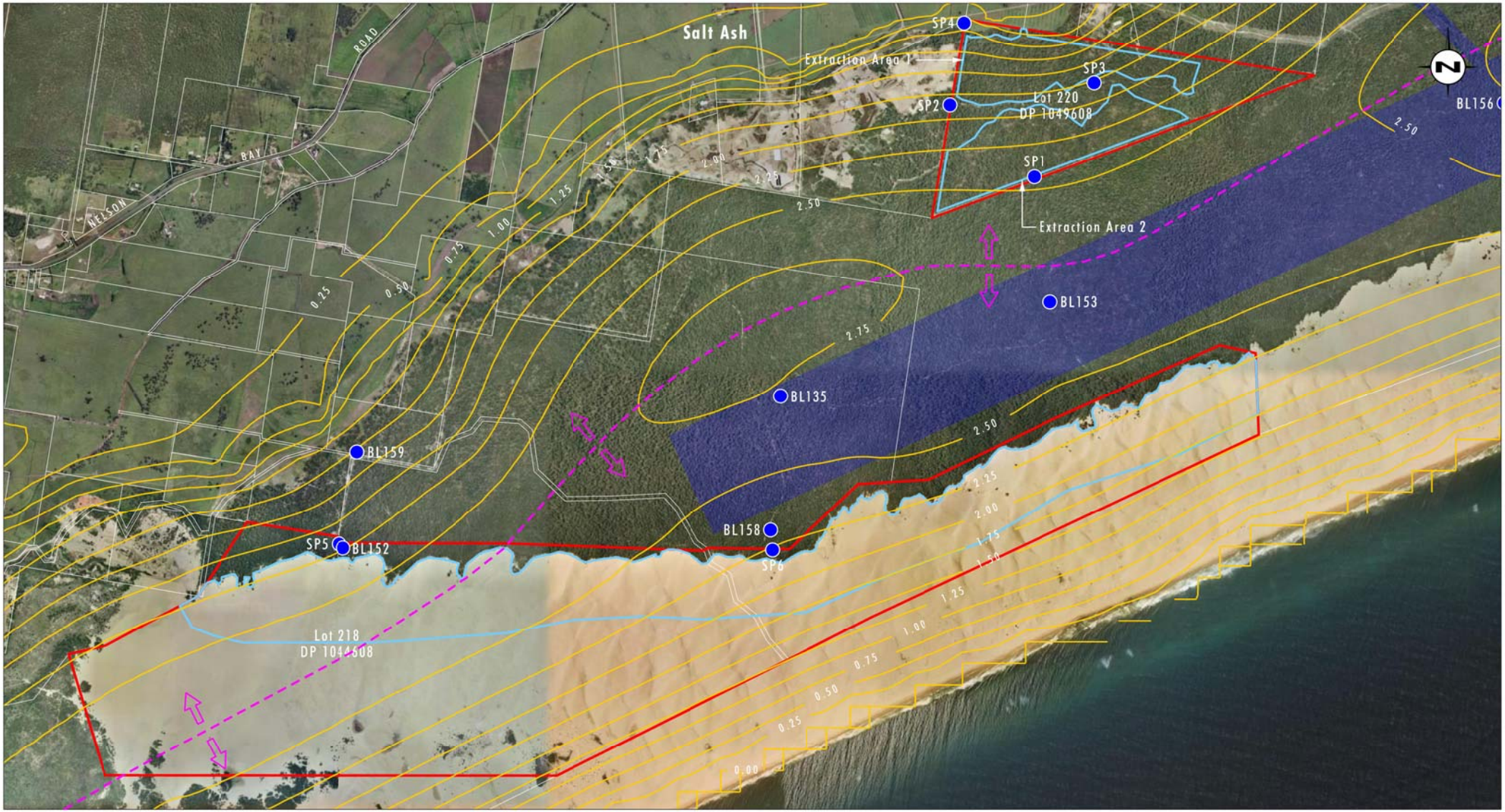
4.9.3.4 Surface Water Monitoring

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 channels that drain groundwater in an east to west direction along the northern boundary of Lot 220 and to the north and north-west of Lot 218.

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 4.9.3.3**.

4.9.4 Groundwater Modelling

A detailed groundwater model (Umwelt, 2011a) has been developed for the project and includes the surrounding area of Stockton Sandbeds. The groundwater modelling has been undertaken to determine average (see **Figure 4.7**) and maximum predicted (see **Figure 4.8**) groundwater levels within the extraction area to enable the maximum extraction depth to be determined in accordance with the requirements of Conditions 7a and 7b of Major Project Approval 08_0142.



Source: Aerial: Google Earth 2008, Cadastral: Department of Lands, 2003

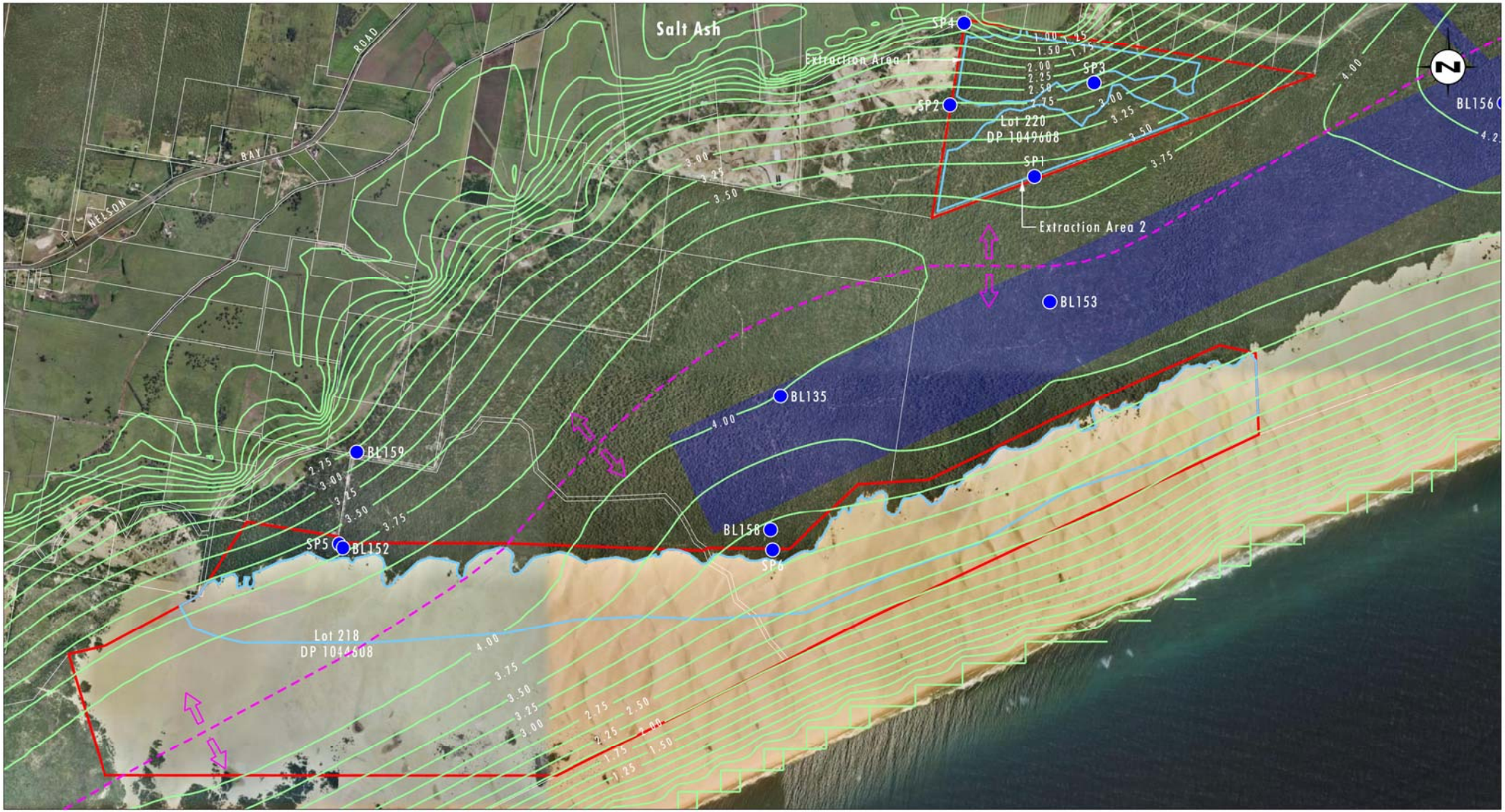
0 0.5 1 1.25km
1:25 000

Legend

- Lot Boundaries (218 & 220)
- Approved Extraction Area
- HWC Emergency Borefield Easement
- Modelled Groundwater Level - Average
- Groundwater Monitoring Bore Location
- Groundwater Divide

FIGURE 4.7

Predicted Average Groundwater Levels for Lot 218 and Lot 220



Source: Aerial: Google Earth 2008, Cadastral: Department of Lands, 2003

0 0.5 1 1.25km
1:25 000

Legend

- Lot Boundaries (218 & 220)
- Approved Extraction Area
- HWC Emergency Borefield Easement
- Modelled Groundwater Level - Maximum Predicted
- Groundwater Monitoring Bore Location
- Groundwater Divide

FIGURE 4.8

Predicted Maximum Groundwater Levels for Lot 218 and Lot 220

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As shown on **Figure 4.7**, modelled average groundwater levels within the approved extraction area on Lot 218 range from approximately 1.75 mAHD along the south-eastern edge of the extraction area to 2.50 mAHD in the south-western edge of the extraction area.

As shown on **Figure 4.8**, maximum predicted groundwater levels in the approved extraction area on Lot 218 range from approximately 2.75 mAHD along the south-eastern edge of the extraction area and 3.5 mAHD along the north-western edge of the extraction area to approximately 4.0 mAHD in the south-western edge of the extraction area.

As shown on **Figure 4.7**, modelled average groundwater levels within Extraction Area 1 on Lot 220 range from 0.75 mAHD in the north-western corner to approximately 2.25 mAHD at the south-eastern boundary of Extraction Area 1. Modelled average groundwater levels within Extraction Area 2 on Lot 220 range from approximately 2.0 mAHD along the northern edge to approximately 2.50 mAHD at the southern edge of Extraction Area 2.

As shown on **Figure 4.8**, maximum predicted groundwater levels within Extraction Area 1 on Lot 220 range from approximately 1.25 mAHD in the north-western corner of the land parcel to approximately 3.4 mAHD at the south-eastern edge of Extraction Area 1. Maximum predicted groundwater levels in Extraction Area 2 on Lot 220 range from approximately 2.75 mAHD at the northern edge to approximately 3.8 mAHD at the southern corner of Extraction Area 2.

As shown on **Figures 4.7** and **4.8**, modelling indicates that groundwater from the Stockton Sandbeds generally drains in a south-easterly direction to the Pacific Ocean and in a north-westerly direction towards Tilligerry Creek and Fullerton Cove with the groundwater divide being approximately parallel to the coast and located approximately 1.3 to 2.0 kilometres inland from the coast.

As shown on **Figure 4.8**, groundwater from approximately the most western 1 kilometre of Lot 218 extraction area drains in a north-westerly direction towards Fullerton Cove and away from HWC groundwater easement. Groundwater from the remainder of the Lot 218 extraction area also drains away from the HWC groundwater easement towards the Pacific Ocean. Groundwater from Lot 220 also drains away from HWC groundwater easement towards Tilligerry Creek. As a result, operations on Lot 218 and Lot 220 have negligible potential to adversely impact on groundwater within or adjacent to the HWC groundwater easement.

4.9.5 Maximum Extraction Depth

The maximum extraction depth for operations on Lot 218 and Lot 220 has been determined in accordance with the requirements of Conditions 7a and 7b of Major Project Approval 08_0142 and are shown on **Figure 2.1**.

As can be seen from **Figure 2.1**, the maximum depth to which extraction can occur on Lot 218 varies from approximately 3.75 mAHD along the south-eastern boundary of the approved extraction area to approximately 5.0 mAHD at the south-western end of the approved extraction area.

As can be seen from **Figure 2.1**, the maximum depth to which extraction can occur on Lot 220 in accordance with current approval conditions varies from approximately 2.75 mAHD at the north-western edge of Extraction Area 1 to approximately 4.25 mAHD at the south-eastern boundary of Extraction Area 1.

The maximum depth to which extraction can currently take place in Extraction Area 2 on Lot 220 ranges from approximately 4.0 mAHD along the northern boundary of the area to approximately 5.0 mAHD along the southern boundary and is reasonably consistent for both the 2 metres above average groundwater level and 1 metre above maximum predicted criteria set out in Conditions 7a and 7b of Major Project Approval 08_0142.

4.9.6 Temporary Variation to Extraction Depth

In previous consultation in regard to maximum depths of extraction, NOW representatives have indicated that extraction to a depth 0.7 metres above the maximum predicted groundwater level may be accepted provided that the final landform for the site was reshaped to provide a minimum of 1 metre of sand above the maximum predicted groundwater level. This requirement has been approved for Sibelco sand extraction operations which are located immediately to the west of Mackas Sand operations on Lot 220.

Operations at the Sibelco site adjacent to Lot 220 have shown that the ability to extract to within 0.7 metres of the maximum predicted groundwater level improves the efficiency of extraction operations significantly. Efficiency is improved through increased trafficability of the exposed sand surface due to the greater moisture content increasing the stability and bearing capacity of the sand. The greater bearing capacity means that the amount of energy required to operate front-end loaders and dump trucks on the sand, travel times and wear and tear on equipment are significantly reduced.

Mackas Sand has requested that similar provisions allowing extraction to within 0.7 metres of the maximum predicted groundwater level provided that at least 1 metre depth of sand above maximum predicted groundwater level is achieved as part of the final landform be considered for sand extraction on Lot 218 and Lot 220.

4.10 Rehabilitation

Rehabilitation of Lot 218 and 220 extraction areas will be undertaken in accordance with the approved Landscape Management Plan (Umwelt, 2009d). The proposal to temporarily allow extraction to within 0.7 metre of the maximum predicted groundwater level will not alter the final landform for Lot 218 and Lot 220. The final landform for the extraction areas within Lot 218 and Lot 220 will be at least 2 metres above the average groundwater level, and 1 metre above the maximum predicted groundwater level shown on **Figure 4.8**, as discussed within the Mackas Sand Environmental Management Strategy and associated management plans (Umwelt, 2011a). The height of the final landform will be verified by topographic survey.

On completion of sand extraction works, if the proposed access track is no longer functional, its rehabilitation should be integrated with that of the quarry, in accordance with the rehabilitation principles outlined in the approved Landscape Management Plan (Umwelt, 2009d).

Broadly, rehabilitation of the alternate haul route if required will aim to re-establish the native vegetation communities that existed prior to clearing for its construction. Revegetation of disturbed areas will utilise locally-occurring plant species in a composition that closely resembles that of the pre-development vegetation communities. Monitoring of any revegetated areas along the alternate haul route will be integrated with any monitoring program for the sand extraction areas as described in the approved Landscape Management Plan (Umwelt, 2009d).

4.11 Surrounding Land Use

The alternate access for which approval is sought will not increase impacts in terms of dust, noise, traffic movements and visual on surrounding non-project related properties beyond levels of impact approved as part of Major Project Approval 08_0142.

The alternate haul route will pass through lands owned by or under agreement with B & R B Mackenzie FT Pty Ltd. Surrounding lands within the inter-barrier depression are used for stock grazing. Lot 122 DP 753192 is used for stock grazing and is otherwise undeveloped.

Approval for Worimi LALC's land dealings associated with the proposed modification to Major Project Approval 08_0142 was granted by NSW Aboriginal Land Council at its meeting on 28 September 2011.

Use of the alternate haul route and extraction area access site will increase the location of the initial quarry face from being approximately 1100 metres from the nearest residence (Towers residence R3 on **Figure 1.5**) to being approximately 1700 metres away reducing interaction between surrounding residences and extraction operations.

4.12 Unexploded Ordinance

An Unexploded Ordnance (UXO) assessment was undertaken as part of the EA (Umwelt, 2009a) and identified that there was potential for UXO to occur within the western part of the approved Lot 218 extraction area as result of WWII use of the area as a bombing range and for explosives testing. This potential for UXO to occur is limited to the undisturbed sections of the landform that existed prior to approximately 1950.

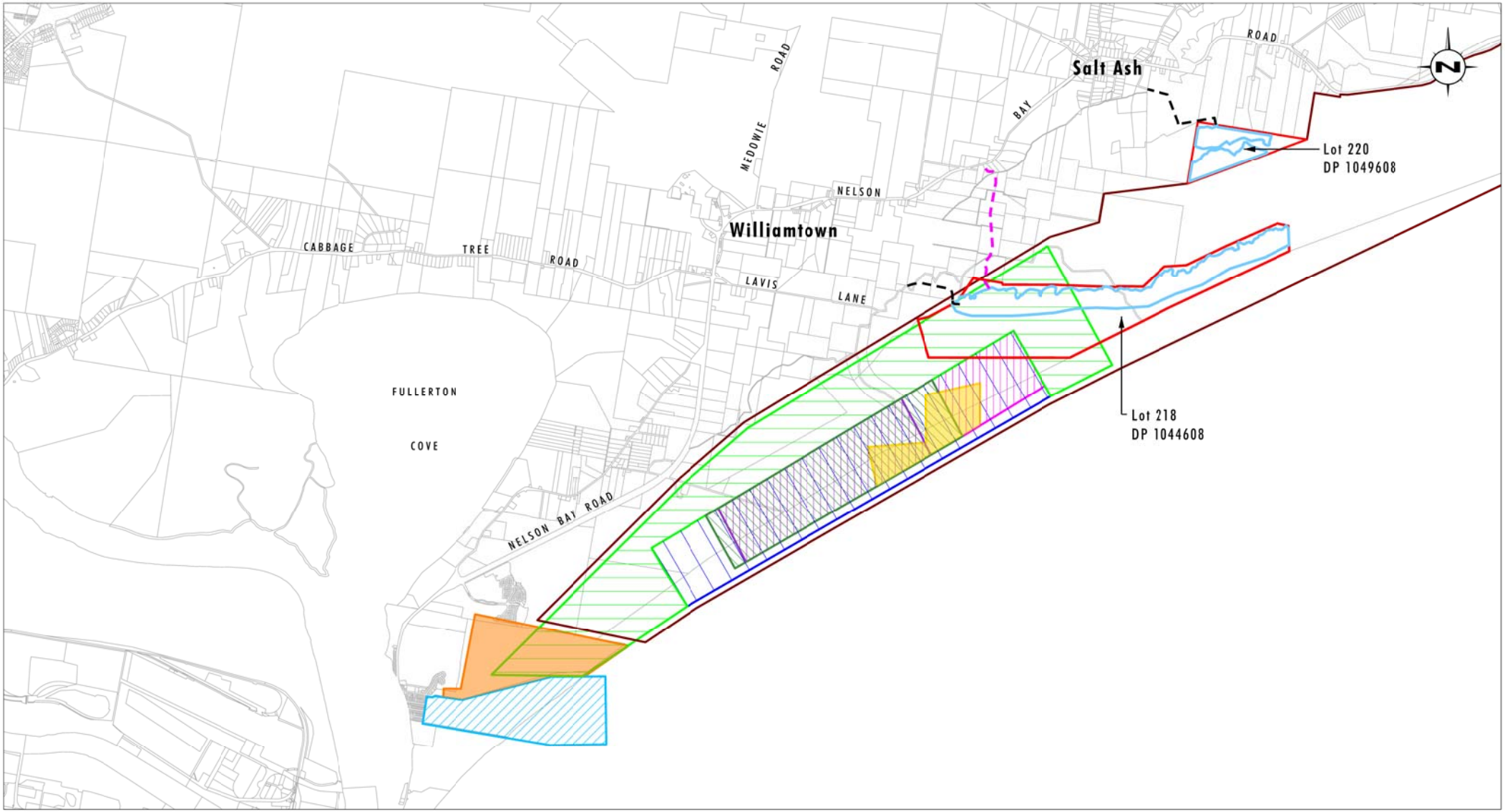
The majority of the sand that will be removed from the approved Lot 218 extraction area will be windblown sand that has been deposited above the ground surface that existed prior to 1950. This material has negligible potential to contain UXO.

An Unexploded Ordnance Management Plan (UXOMP) (see **Appendix 6**) has been prepared for operations within Lot 218. The UXOMP has identified that there is a possibility of UXO and related debris existing within the Danger Zone (see **Figure 4.9**) which includes the western 1.5 kilometres of the approved extraction area in Lot 218 and the southern sections of Route A and Route B as shown on **Figure 4.9**.

The UXOMP found that there is a low probability of UXO being encountered provided that any excavation within this area does not go below the stabilised ground surface as it existed prior to 1950. The UXOMP recommends that if excavation or works are likely to occur below the 1950 stabilised ground surface an UXO survey should be undertaken by suitably qualified specialists.

Any extraction within the approved extraction area on Lot 218 that is within Danger Zone will be restricted to being above the 1950 stabilised surface unless UXO surveys are undertaken by suitably qualified specialists and any identified UXO is cleared prior to extraction occurring.

An assessment of whether archaeological subsurface testing may be required within the Danger Zone (see **Figure 4.9**) will also be undertaken once UXO survey and clearance is undertaken and prior to excavation below the 1950 stabilised ground surface occurring.



Source: Department of Lands (2003)

0 1.0 2.0 4.0km
1:80 000

Legend

- Lot Boundary
- Approval Extraction Areas
- Approved Access Roads
- Proposed Alternate Haul Route
- 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 manouevre area - Infantry (20 Garrison Bn) and supporting elements

FIGURE 4.9

Unexploded Ordnance Plan
Mackas Sand

File Name (A4): R36_V1/1646_362.dgn

To minimise potential UXO impacts, it is proposed to construct that section of the alternate haul route that is within Danger Zone by filling above the 1950 stabilised landform. This can be readily achieved as the section of alternate haul route that is located within Danger Zone traverses a low-lying section of the terrain that is naturally prone to waterlogging. Along this section of the alternate haul route, vegetation will be cleared and windrowed along the edges of the haul road, geotextile with then be placed over the cleared ground surface and sand and road-base material will then be placed over the geotextile ensuring that excavation does not occur below the 1950 stabilised surface.

All personnel working on Lot 218 will be informed on the dangers of UXO and given training in identification of UXO and procedures to be followed should any UXO be located as part of the inductions.

4.13 Greenhouse Gas and Energy

A detailed greenhouse gas assessment was prepared for the development (Umwelt, 2009a) to determine its predicted greenhouse emissions and potential areas for energy efficiency.

It was estimated that the development would contribute an estimated 0.016 per cent to yearly national greenhouse emissions and an estimated 0.000219 per cent to yearly international greenhouse gas emissions.

The proposed modification to the sand extraction to enable extraction to occur within 0.7 metres of the predicted maximum groundwater level will reduce energy requirements and greenhouse gas emissions from those estimated in the original EA (Umwelt, 2009a).

4.14 Cumulative Impacts

The development and proposed modifications will have very limited cumulative interaction with surrounding developments and activities.

The development and proposed modifications will not result in a substantial overall increase in sand production in the Stockton Bight area, due to the diminishing capacity of most existing sand mining operations. There are no known proposed or approved developments within the vicinity of the alternate haul route to Lot 218 and a large proportion of the surrounding land is managed for conservation, thereby limiting the potential for future development in the area.

The development and proposed modification through providing access to the approved Lot 218 extraction area will act to off-set a significant decline in construction and industrial grade sand supplies for Sydney and Hunter regional markets which is being caused by diminishing availability to sand resources in the Newcastle and Sydney Regions.

5.0 Consolidated Statement of Commitments for Operations on Lot 218 and Lot 220

5.1 Operational Controls

5.1.1 All activities will be undertaken generally in accordance with the EA (Umwelt, 2009a) and the Modification EA (Umwelt, October 2012).

5.1.2 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 is obtained for extraction activities within these hours.

5.1.3 Transport of product from Lot 220 will be undertaken between 5.00 am and 10.00 pm, Monday to Saturday and 8.00 am to 12.00 pm on Sundays and Public Holidays.

5.1.4 Transport of product from Lot 218 will be undertaken 24 hours a day, seven days per week.

5.1.5 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 of Planning and Infrastructure and the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS).

5.1.6 The final landform for the extraction areas within Lot 218 and Lot 220 will be at least 1 metre above the maximum predicted groundwater level as shown on **Figure 2.1** of the Modification EA. The height of the final landform will be verified by topographic survey.

5.2 Ecology

5.2.1 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.

5.2.2 A comprehensive Biodiversity Monitoring Program will be developed prior to any vegetation clearing being undertaken for the proposal.

5.2.3 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.

5.2.4 A Feral Animal Control Management Plan will be developed and implemented prior to any clearing activities being undertaken for the proposal.

5.2.5 A Weed Management Plan will be developed and implemented prior to any clearing activities being undertaken for the proposal.

5.2.6 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.

5.2.7 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 five years of operations commencing on Lot 218 and, if feasible, the Rehabilitation and Decommissioning Plan will be revised to include vegetation of this area.

5.3 Aboriginal Heritage

5.3.1 An ACHMP will be developed in consultation with the relevant Aboriginal stakeholders and OEH 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' 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 approval in writing from OEH 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 1950 land surface including test pitting procedures as set out in the EA and survey and clearance of UXO should UXO be identified in the extraction area.

5.3.2 An Aboriginal Cultural Heritage Management Group will be established prior to commencement of the proposal to manage matters relating to Aboriginal cultural heritage within the study area.

5.3.3 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.

5.3.4 The Aboriginal Cultural Heritage Management Group will conduct a monitoring visit to the Lot 220 operational area on a twice yearly basis for 12 months, with subsequent inspection intervals to be determined as part of the ACHMP.

5.3.5 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.

5.4 Historic Heritage

5.4.1 Prior to disturbance of any tank 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 DP&I.

5.4.2 Any disturbed tank traps will be replaced along the original alignment of the Northern Defence Line once extraction and rehabilitation works along this alignment have been completed.

5.5 Traffic and Access

5.5.1 Mackas Sand will make a contribution to Council for maintenance of Oakvale Drive 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.

5.6 Noise

5.6.1 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 quarterly monitoring for a 12 month period and specific measures to monitor and address potential noise impacts at residential receiver R27 (Hufnagl Residence).

5.6.2 No sand extraction will be undertaken within 250 metres of receiver R27 during evening and night periods unless agreement is reached with the landholder.

5.6.3 A Traffic Noise Management Plan will be developed and implemented for truck movements on the private haul road from Lot 220 unless a written agreement exists between Mackas Sand and occupiers of residences adjacent to the private haul road and Oakvale Drive. The Plan will focus on but not be limited to truck movements between the hours of 5.00 am and 7.00 pm. (Note: Mackas Sand has a written agreement with occupiers of residences adjacent to Oakvale Drive and copies of these have been provided to DP&I).

5.7 Air Quality

5.7.1 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.

5.7.2 Air quality monitoring will be undertaken in accordance with the Air Quality Monitoring Program and will include monthly monitoring of dust deposition levels at DDG1 and DDG2. Air quality monitoring will be undertaken in accordance with the requirements of Environment Protection Licence for the operation as may be changed from time to time.

5.8 Groundwater

5.8.1 A Groundwater Management Plan will be developed prior to any sand extraction activities to the satisfaction of the DP&I in consultation with OEH. 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 SP1 to SP6 (BL158) as shown on **Figure 1.5** of the Modification EA. The results of the monitoring are to be commented on and compiled into an annual report.

5.8.2 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.

5.8.3 Prior to sand washing being undertaken on Lot 220, access to a suitable water supply will be obtained and evidence of this will be provided to the Department of Planning and Infrastructure. Prior to sand washing commencing, a detailed Water Management Plan for the sand washing operation will be prepared and provided to the Department of Planning and Infrastructure.

5.8.4 Additional groundwater monitoring bores will be established on the quarry floor of Lot 218 and Lot 220 once sufficient sand has been extracted to achieve quarry floor level and provide adequate space so that the bores do not impact on the movement of extraction equipment and haulage vehicles. Monitoring of these bores will be undertaken at the same time and in the same manner as monitoring bores SP1 to SP6/BL158.

5.9 Surface Water

5.9.1 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).

5.9.2 Site Water Management Plans for operations on Lot 218 and Lot 220 will be submitted for approval to the DP&I in consultation with OEH 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.

5.9.3 Access road will be constructed so as to not impede flood flows on Tilligerry Creek floodplain.

5.10 Public Safety

5.10.1 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 prior to extraction commencing.

5.10.2 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.

5.11 Visual

5.11.1 A 30 metre vegetated buffer will be maintained along the northern boundary of Lot 220, except where the 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.

5.11.2 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, within 2 months of receiving a written request for trees to be planted from the property owner.

5.12 Greenhouse Gases

5.12.1 Mackas Sand will seek to achieve continuous improvement in energy efficiency in sand extraction and processing operations.

5.13 Environmental Management, Monitoring and Auditing

5.13.1 Mackas Sand will obtain an Environmental Protection Licence for the proposal in accordance with the *Protection of the Environment Operations Act 1997*.

5.13.2 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.

5.13.3 Within seven 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 OEH 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.

5.13.4 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 OEH with a copy of the enquiries register on an annual basis.

6.0 Conclusion and Justification

6.1 Overview of Environmental Impacts

As detailed in **Section 4**, the environmental impacts of the proposed modifications to Major Project Approval 08_0142 have been identified and the subject of a detailed environmental assessment that has been based on:

- environmental risk assessment of proposed modifications;
- assessment of site characteristics (existing environment);
- consultation with government agencies;
- consultation with community and other stakeholders; and
- detailed environmental assessment.

The key issues identified, including those specified in the Director-General's Requirements (DGRs) for the original EA, were the subject of comprehensive specialist assessments and review, which are detailed in **Section 4** and the appendices to this document.

Whilst there are many complex aspects which must be read in their entirety to fully understand these assessments, **Table 6.1** provides a broad overview of the key outcomes of the EA.

Table 6.1 - Overview of Environmental and Social Impacts

Environmental/Social Issue	Overview of Key Outcomes (After proposed Management and Mitigation)
Temporarily Increasing Maximum Extraction Depth	• The temporary increase in maximum extraction depth to be 0.7 metre above the maximum predicted groundwater level will enable sand to be extracted more efficiently reducing energy usage, travel times and wear and tear on excavation equipment. The final landform will be shaped to ensure that there is at least 1 metre of sand and soil above the maximum predicted extraction level. The temporary lowering of the maximum extraction depth can be undertaken in a manner that has no adverse social or environmental consequences and has been permitted at similar sand extraction operations previously.
Surface Water and Flooding	• The proposed access road will utilise an existing road and culvert in the vicinity of Tilligerry Creek and will be constructed to have negligible impact on surface flow regime of Tilligerry Creek.
Water Usage	• Adoption of the proposed alternate haul route will decrease the travel length outside Lot 218 extraction area by approximately 300 metres and will require additional water for dust suppression on this route due to extended period of product haulage.
Public Safety	• The proposed new intersection on Nelson Bay Road will be constructed in accordance with RMS requirements. High visibility fencing will be erected on the seaward side of where extraction is taking place on Lot 218.
Noise	• Noise assessment indicates that, with appropriate controls including limiting truck speed and truck movements per hour, activities on the proposed alternate haul route can be undertaken without having a significant adverse impact on the surrounding area or nearby residences.

Table 6.1 - Overview of Environmental and Social Impacts (cont)

Environmental/Social Issue	Overview of Key Outcomes (After proposed Management and Mitigation)
Air Quality	• There are no non-project related residences that could be subject to adverse air quality impacts as a result of the use of the alternate haul route given that the 200 metres of road from Nelson Bay Road will be sealed, and that the unsealed portion of the access road will be watered as necessary.
Bio-Diversity	• The construction of the alternate haul route is not expected to significantly impact on *Diuris praecox* and *Diuris arenaria*. The alignment of the alternate haul route minimises impact on these species. • Construction of the access road across Lot 122 and Lot 218 will require the removal of approximately 0.37 hectares of Coastal Sand Apple – Blackbutt forest vegetation community. The loss of this small area of forest community will be offset by sand extraction reducing the rate at which the mobile sand dune system moves landward and smothers existing vegetation.
Aboriginal Archaeology	• The majority of the alternate haul route is within the inter-barrier depression, which was identified as having negligible archaeological significance. • The remainder of the alternate haul route between Lot 218 and the inter-barrier depression was identified as site A3 and associated PAD and has high archaeological potential. • The remainder of the alternate haul route between Lot 218 and the inter-barrier depression was identified by Aboriginal stakeholders as having high Cultural Heritage value. • Four fragmented shell loci have been identified in the proximity of the alternate haul route. • Surface artefacts from these sites will be collected in consultation with the Aboriginal Heritage Management Group prior to commencing construction of the alternate haul route at these sites. Following collection of the artefacts, geotextile will be placed over site A3 and associated PAD along the haul route to prevent further disturbance of subsurface material. • Road construction has been designed to utilise natural sand fill material as far as possible to minimise disturbance to subsurface materials. A series of procedures have been developed should any archaeological material be found during excavation.
Interaction with surrounding landholders	• The alternate haul route will be sealed for the 200 metres closest to Nelson Bay Road. • The alternate access for which approval is sought will not increase impacts in terms of dust, noise, traffic movements and visual on surrounding non-project related properties beyond levels of impact approved as part of Major Project Approval 08_0142.

The impacts of the proposal have been minimised through:

- obtaining a detailed understanding of the issues and impacts by scientific evaluation;
- developing proactive and appropriate strategies to avoid, minimise and mitigate or manage; and

- implementation of commitments as set out in the Consolidated Statement of Commitments (refer to **Section 5**).

6.2 Suitability of the Site

The proposed alternate haul route will allow for efficient transportation of sand from Lot 218. The proposed minor changes to maximum extraction depth at Lot 218 and Lot 220 will also facilitate improved extraction efficiency and reduced energy usage with minimal environmental impact.

6.3 Benefits of the Proposed Modifications

Approval of the alternate haul route will provide certainty of access to the approved Lot 218 extraction area and minimise potential impacts on residences adjacent to Lavis Lane and recreational users of Lavis Lane. By facilitating the extraction of sand from Lot 218, the current proposal enables the creation of a number of additional benefits for the local community as assessed for the approved project (Umwelt, 2009a) through direct means such as employment and wages, and indirect processes such as spending and use of services.

The alternate access to Lot 218 will create a number of benefits for Worimi LALC including direct income that will enable implementation of a cultural development programme, employment opportunities, training and university scholarships that will be provided as part of a commercial arrangement that has been established between Mackas Sand and Worimi LALC. It will also enable the Worimi Sand Dune Adventures to continue to use an elevated knoll at the western end of Lot 218 extraction area that would have been removed as part of haul route construction if the approved access to Lot 218 extraction area was utilised.

The extraction of sand from Lot 218 will also create benefits for local, state and national governments through land tax, rates, GST, fuel excise and other taxes.

The proposal will provide access to sand within Lot 218 and create a long term and potentially indefinite supply of construction sand and at least 20 years supply of industrial grade sand for the Sydney and Hunter regional markets. It is anticipated that these markets will require up to 3.0 million tonnes of sand per year by 2015, if additional resources do not become available (refer to Umwelt, 2009a for further detail).

6.4 Alternatives to the Proposed Modifications

A range of alternatives were considered in developing the proposed modifications to Major Project Approval 08_0142. These included:

- Not seek to establish an alternate haul route to the approved extraction area. This alternative is not preferred due to concerns about the ongoing ability to establish and maintain access over the approved alignment over time and the associated physical constraints that establishing and maintaining this access presents.
- Several alignments of alternate haul route were considered. The final route was chosen due to:
  - minimised impacts to biodiversity;
  - minimised impacts to Aboriginal cultural heritage values along the alignment; and
  - greatest certainty for ongoing access to Lot 218.

- The alternative of not seeking to temporarily reduce the maximum extraction depth to 0.7 metres above the maximum predicted groundwater level was also considered. This is not preferred as reducing the maximum extraction depth to 0.7 metres above the maximum predicted groundwater level allows sand to be extracted more efficiently through reducing travel times, fuel usage and wear and tear on the extraction and haulage equipment.

6.5 Ecologically Sustainable Development

One of the objectives of the EP&A Act is *'To encourage ecologically sustainable development'*. The definition of Ecologically Sustainable Development (ESD) adopted by the EP&A Act is detailed in Section 6(2) of the *Protection of the Environment Administration Act 1991*. The four principles of ESD defined under this Act are:

- the precautionary principle – if there are any threats of serious or irreversible environmental damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

- inter-generational equity – the present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations;

- conservation of biological diversity and ecological integrity – this is a fundamental consideration; and

- improved valuation, pricing and incentive mechanisms – environmental factors should be included in the valuation of assets and services.

Table 6.2 outlines the ways these principles have been considered for the proposal.

Table 6.2 – Incorporation of the Principles of Ecologically Sustainable Development

ESD Principle	Relationship to the proposal
Precautionary principle	• a detailed analysis of available scientific information has been undertaken for the EA and consideration has been given to the extent of scientific certainty relating to any potential impacts; • an assessment of alternatives that could be used to replace or supplement the proposal has been undertaken; • potential threats of serious or irreversible environmental damage were identified by a risk assessment undertaken for the initial stages of the EA process. This risk analysis was revised as a greater understanding of the proposal and its potential impacts was developed through the EA. Any potential impacts are identified and assessed through the EA (refer to **Section 4**); and • measures to mitigate potential impacts associated with the proposal have been developed and are discussed in **Section 4**.
Inter-generational equity	• a number of mitigation measures will be implemented to minimise any potential impacts to the local community (refer to **Section 4**); • the proposal will not sterilise any land from any potential future land uses; and • the proposal will assist in addressing industrial and construction grade sand supply limitations to the Hunter and Sydney regional markets.

Table 6.2 – Incorporation of the Principles of Ecologically Sustainable Development (cont)

ESD Principle	Relationship to the proposal
Inter-generational equity (cont)	• the proposal will create a potentially indefinite source of construction grade sand supplies for future generations through utilisation of naturally replenishing sand resources at Lot 218; • the utilisation of sand resources at Lots 218 and 220 were key elements in the dedication of the Worimi Conservation Lands by Worimi LALC. These lands will preserve a 4438 hectare section of Stockton Bight for future generations; and • the proposal will create a number of ongoing benefits for Worimi people, local and wider communities.
Conservation of biological diversity and ecological integrity	• potential impacts to flora and fauna species and vegetation communities of local, regional, state and national significance were identified and mitigation measures developed to minimise any potential impacts as discussed in **Section 4.3**; • the species, communities and habitats present in the proposed operational areas of the proposal are extensively represented and conserved in the surrounding area (refer to **Section 4.3**); • the extraction of sand resources at Lot 218 will prevent sand dunes encroaching on and smothering on average approximately 2.6 hectares of native forest per year; and • the utilisation of sand resources as part of the proposal was a key element in the dedication of the Worimi Conservation Lands by Worimi LALC. These lands preserve a 4438 hectare part of Stockton Bight, including approximately 2180 hectares of Coastal Sand Apple – Blackbutt Forest.
Improved valuation, pricing and incentive mechanisms	• providing access to Lot 218 will allow for the extraction of fine grade natural sand. Such sand is an essential resource for many construction and industrial products and processes. Currently, no man-made products are available as supplements to this type of sand. Alternative products are available to medium and coarse grade construction sand, although the use of these products is currently constrained by high processing and transport costs and limited availability.

7.0 Checklist of EA Requirements

The DGRs from the original EA are included in full in **Appendix 1** and a checklist of where each requirement is addressed in the current EA, is provided in **Table 7.1**.

Table 7.1 – Checklist of Environmental Assessment Requirements

Requirement	Section of EA
General Requirements	
The Environmental Assessment must include:	
• an executive summary;	**Executive Summary**
• a detailed description of the project including the:	
▪ need for the project;	**Section 2**
▪ various components and stages of the project;	**Section 2.1 Section 2.2**
▪ alternatives considered;	**Section 6.4**
▪ likely inter-relationship between the proposed operations and existing sand extraction operations; and	**Original EA**
▪ plans of any proposed building works.	**Original EA**
• a risk assessment of the potential environmental impacts of the project, identifying the key issues for further assessment;	**Section 4.2**
• a detailed assessment of the key issues specified below, and any other significant issues identified in the risk assessment (see above), which includes:	**Section 4**
▪ a description of the existing environment, using sufficient baseline data;	**Original EA Section 4**
▪ an assessment of the potential impacts of all stages of the project including any cumulative impacts, taking into consideration any relevant guidelines, policies, plans and statutory provisions (see below); and	**Original EA Section 4**
▪ a description of the measures that would be implemented to avoid, minimise, mitigate, rehabilitate/remediate, monitor and/or offset the potential impacts of the project, including detailed contingency plans for managing any significant risks to the environment;	**Original EA Section 4**
• a statement of commitments, outlining all the proposed environmental management and monitoring measures;	**Section 5**
• a conclusion justifying the project on economic, social and environmental grounds, taking into consideration whether the project is consistent with the objects of the *Environmental Planning and Assessment Act 1979*; and	**Section 6**
• a signed statement from the author of the Environmental Assessment certifying that the information contained in the report is neither false nor misleading.	**Appendix 2**
Key Issues	
• **Biodiversity** – including: ▪ accurate estimates of any vegetation clearing associated with the project; ▪ a detailed assessment of the potential impacts of the project on threatened species, populations, ecological communities or their habitat, and the surrounding National Park Estate and Worimi Conservation Lands; and ▪ a description of any measures that would be implemented to maintain or improve biodiversity values in the region;	**Section 4.3**

Table 7.1 – Checklist of Environmental Assessment Requirements (cont)

Requirement	Section of EA
• **Soil and Water –** paying particular attention to: ▪ any potential impacts due to acid-sulphate soils; and ▪ the requirements of the *Hunter Water Regulations 2010* and *Tomago-Tomaree-Stockton Groundwater Sharing Plan;*	**Original EA Section 4.9**
• **Noise;**	**Section 4.7**
• **Air Quality;**	**Section 4.8**
• **Heritage** – both Aboriginal and non-Aboriginal heritage;	**Section 4.4, Section 4.5**
• **Visual**; and	**Original EA**
• **Rehabilitation and Final Land Form** – including a detailed description of the: ▪ proposed rehabilitation strategy for the project (including detailed plans of the proposed final landform), taking into consideration any relevant strategic land use planning or resource management plans or policies; and ▪ financial assurances that would be put in place to ensure that this strategy is implemented properly; and	**Section 4.10**
• **Social & Economic**	**Section 6**
References The environmental assessment of key issues listed above must take into account relevant guidelines, policies, and plans. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this project.	**Section 9**
Consultation During the preparation of the Environmental Assessment, you should consult with the relevant local, State or Commonwealth government authorities, service providers, community groups or affected landowners. In particular, you should consult with: • Department of Environment and Climate Change (now Office of Environment and Heritage); • Department of Water and Energy (now NSW Office of Water); • Hunter Water Corporation; • Department of Primary Industries (Minerals)(now Department of Trade Investment Regional Infrastructure and Services); • Roads and Traffic Authority; and • Port Stephen's Council. The consultation process and the issues raised must be described in the Environmental Assessment.	**Section 1.3**

8.0 Abbreviations

ACHMP	Aboriginal Cultural Heritage Management Plan
AEMR	Annual Environmental Management Report
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHMG	Aboriginal Heritage Management Group
ANEF	Australian Noise Exposure Forecast
CCC	Community Consultative Committee
CKPoM	Comprehensive Koala Plan of Management
CMA	Catchment Management Authority
DCP	Development Control Plan
DECC	Department of Environmental and Climate Change
DGRs	Director-General's Requirements
DoP	Department of Planning (now Department of Planning & Infrastructure)
DP&I	Department of Planning and Infrastructure
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities
DST	Daylight Savings Time
DTIRIS	Department of Trade and Investment, Regional Infrastructure and Services
EA	Environmental Assessment
EARs	Environmental Assessment Requirements
EP&A Act	Environment Planning and Assessment Act 1979
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESD	Ecological Sustainable Development
EST	Eastern Standard Time
HWC	Hunter Water Corporation
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
LHCCREMS	Lower Hunter Central Coast Regional Environmental Management Strategy

LGA	Local Government Area
Mackas Sand	Mackas Sand Pty Ltd
ML	Megalitres
NOW	NSW Office of Water
OEH	Office of Environment and Heritage
PAD	Potential Archaeological Deposits
PKH	Preferred Koala Habitat
PSC	Port Stephens Council
RMS	Roads and Maritime Services
SHR	State Heritage Register
SKH	Supplementary Koala Habitat
SWMP	Soil and Water Management Plan
TSC Act	Threatened Species Conservation Act 1995
Umwelt	Umwelt (Australia) Pty Limited
UXO	Unexploded Ordnance
UXOMP	Unexploded Ordnance Management Plan
WR	Water Reserve

9.0 References

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