Upgrade of Pacific Highway HW10, Ourimbah Street to Parsons Road, Lisarow

ROADS AND MARITIME SERVICES

Soil and Contamination Investigation Report | Rev2

8 September 2014
Upgrade of Pacific Highway HW10, Ourimbah Street to Parsons Road, Lisarow

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Upgrade of the Pacific Highway HW10, Ourimbah Street to Parsons Road Lisarow
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**Appendix A. Site Photographs**

**Appendix B. Historical Aerial Photographs**
Executive Summary

Jacobs Group (Australia) Pty Ltd (Jacobs) were commissioned by the NSW Roads and Maritime Services (RMS) to prepare a Review of Environmental Factors (REF) to obtain planning approval for the proposed upgrade of a 1.6 kilometre section of the Pacific Highway to a four-lane urban arterial road between Ourimbah Street and Parsons Road, Lisarow.

The Pacific Highway north of Gosford is the urban arterial road providing access to Gosford’s northern suburbs and the Pacific Motorway (M1) at Ourimbah. The NSW State Infrastructure Strategy outlines the progressive upgrading of the highway to a four-lane urban arterial road standard between North Gosford and the motorway. This proposal represents Stage 3 of the strategy, of which Stages 1 and 2 are now complete.

In order to complete the upgrade, RMS may be required to acquire additional properties to accommodate the Highway Upgrade. RMS will also be conducting ground-engaging and excavation works within the footprint of the properties within the upgrade alignment and for this reason it is necessary to understand the potential impacts associated with the local geology, soils, and contamination (if present).

The proposal appears to be underlain by quaternary alluvium, comprising gravel and sands. These geological layers overlay the Narrabeen Group (Gosford subgroup), comprising interbedded laminite, shale, and quartz to lithic-quartz sandstone, with minor red claystone (north of the Hawkesbury River). The study area appears to fall generally within the Yarramalong soil landscape that is characterised by gently undulating alluvial soils that may be prone to flooding, have foundation hazard issues, low fertility and be moderate to slightly acidic. Small areas of the alignment may also fall within areas of Erina soil landscape that are typified by low undulating hills composed of quartz sandstones, and siltstone, claystone and conglomerates. This landscape has typical limitations including a high soil erosion hazard, strongly acidic soils and low fertility.

The overall objective of this Phase 1 site investigation is to identify potential past contaminating activities, conduct a desk-top assessment of the presence of acid sulfate soils (ASS) within the proposal and assess the need for further investigations. The general scope of the investigation included desk-top historical investigations, a site visit and associated interpretive and reporting tasks.

In summary, the following conclusions are offered, based on the agreed scope of works and objectives of the investigation:

- Potential sources or causes of contamination identified at the site include:
  - Contamination associated with historical industrial practices may be present along the southern extent of the proposal. Prior to the use of the area for industrial purposes, land owners were typically growing orchards which may have also caused some contamination caused by agricultural practices.
  - The previous use of areas within the proposal as a rail corridor may have associated contaminants.
  - Areas of the proposal appear to have been back filled with unknown imported materials that may contain contaminants.
  - Historical commercial operations with workshops and associated infrastructure may cause contamination issues.

- The desktop investigation identified the presence of ASS/PASS within the proposal to be unlikely. However, the ASS/PASS investigation tools indicated that the area within the
proposal had a very low confidence level and low reliability, based on the limited ASS data available within the area.

The investigation recommended the completion of a Stage 2 Contamination Assessment to quantify the presence and concentrations (if any) of contaminants associated with the above potential contamination sources. The investigation should target the potential contaminants that have been identified for each source and confirm the nature and extent of any contamination (if present) and whether the contamination presents an actual risk to sensitive receptors. This investigation also recommends the completion of a targeted ASS investigation in low lying and saturated areas. The ASS investigation will provide added confidence for the site ASS/PASS management during the construction phase of the Pacific Highway upgrade works.
1. Introduction

1.1 Background

The Pacific Highway north of Gosford is the urban arterial road providing access to Gosford’s northern suburbs and the Pacific Motorway (M1) at Ourimbah. The highway is currently a single lane in each direction from Manns Road, Wyoming to Glen Road at Ourimbah, refer to Figure 1-1. This section of the Pacific Highway currently carries around 30,000 vehicles per day from regional and local areas. The study area is located between Ourimbah Street and Parsons Road within the Gosford local government area (LGA).

The NSW State Infrastructure Strategy outlines the progressive upgrading of the highway to four-lane urban arterial road standard between North Gosford and the motorway. The upgrade of the Pacific Highway between North Gosford and the motorway was broken down into three progressive stages by Roads and Maritime Services (Roads and Maritime). Stages 1 and 2 of the upgrade of the Pacific Highway between the M1 Pacific Motorway and Glen Road at Ourimbah are now complete. The first stage, which involved upgrading the Dog Trap Road intersection, was completed in July 2007. The second stage, which involved widening the highway between Glen Road and Burns Road at Ourimbah, was completed in January 2010. Stage 3 has been broken down into two sub-stages and includes stages 3a and 3b. The design for stage 3a between Glen Road and Ourimbah Street has been completed and is waiting for construction funding.

As part of stage 3b work Roads and Maritime Services (Roads and Maritime) are proposing to upgrade 1.6 kilometres of the Pacific Highway, between Ourimbah Street and Parsons Road, Lisarow (the proposal), refer to Figure 1-2a and Figure 1-2b. Key features of the proposal are outlined in Table 1-1.

Table 1-1 Key elements of the proposal

<table>
<thead>
<tr>
<th>Key element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design speed</td>
<td>• 60 km/h design speed and posted speed limit along the length of the proposal.</td>
</tr>
<tr>
<td>Road width</td>
<td>• An additional 3.3 metres wide lane in both directions on the Pacific Highway.</td>
</tr>
<tr>
<td></td>
<td>• Widened shoulders by up to 2.0 metres for consistent shoulder widths along the length of the proposal.</td>
</tr>
<tr>
<td></td>
<td>• Raised concrete median along the length of the proposal and traffic islands at the approaches to the Pacific Highway at Railway Crescent, Macdonalds Road and Chamberlain Road.</td>
</tr>
<tr>
<td>Lisarow Rail Overbridge</td>
<td>• Demolition of the of the existing bridge and replacement with a new rail overbridge over the Main Northern Railway Line immediately south of Railway Crescent on the Pacific Highway.</td>
</tr>
<tr>
<td>Intersection upgrades</td>
<td>• Chamberlain Road and Pacific Highway intersection: Line work and relocation of traffic lights.</td>
</tr>
<tr>
<td></td>
<td>• Rail maintenance access road and Pacific Highway intersection: Relocating the access road around 100 metres to the north-east, with all vehicle movements permitted at the intersection.</td>
</tr>
<tr>
<td></td>
<td>• Macdonalds Road and Pacific Highway intersection:</td>
</tr>
<tr>
<td>Key element</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Relocated around 25 metres</td>
<td>Tuggerah Street and Macdonalds Road intersection: Relocation and realignment of the intersection so that priority would be given to traffic on Tuggerah Street and traffic on Macdonalds Road is required to give way.</td>
</tr>
<tr>
<td>around 25 metres to the</td>
<td>Railway Crescent and Pacific Highway intersection: Providing a wider radius of the curve approaching the Pacific Highway, and traffic lights at the intersection.</td>
</tr>
<tr>
<td>south to align with</td>
<td>Dora Street and Railway Crescent intersection: Adjusting the intersection to the south-west by around 30 metres and enforcing a no right turn from Dora Street to Railway Crescent.</td>
</tr>
<tr>
<td>Tuggerah Street and new</td>
<td></td>
</tr>
<tr>
<td>traffic lights installed</td>
<td></td>
</tr>
<tr>
<td>at the intersection.</td>
<td></td>
</tr>
<tr>
<td>Retaining walls</td>
<td>Eight retaining walls between 0.3 metres and 10 metres in height would be constructed to reduce environmental and property impacts at:</td>
</tr>
<tr>
<td></td>
<td>Pacific Highway, south west of Chamberlain Road, next to the southbound lane.</td>
</tr>
<tr>
<td></td>
<td>Pacific Highway, south west of Macdonalds Road, next to the southbound lane.</td>
</tr>
<tr>
<td></td>
<td>Pacific Highway, south of the rail overbridge, on both sides of the road.</td>
</tr>
<tr>
<td></td>
<td>Corner Pacific Highway and Railway Crescent, directly north of the rail overbridge.</td>
</tr>
<tr>
<td></td>
<td>Pacific Highway, north of Railway Crescent, on both sides of the road.</td>
</tr>
<tr>
<td></td>
<td>Along the eastern boundary of the rail corridor between the maintenance access road at Lisarow Train Station and the new rail overbridge.</td>
</tr>
<tr>
<td>Property adjustments and</td>
<td>About 13 properties would be partially acquired.</td>
</tr>
<tr>
<td>acquisition</td>
<td>About 10 properties would be wholly acquired.</td>
</tr>
<tr>
<td></td>
<td>About 7 property accesses (residential and commercial) and the rail maintenance access road would be adjusted to fit in with the Pacific Highway. This would be determined during detail design.</td>
</tr>
<tr>
<td></td>
<td>All existing property accesses would be reinstated for retained properties.</td>
</tr>
<tr>
<td>Utility adjustments</td>
<td>Relocation/protection of any utilities impacted by the proposal in consultation with the utility authorities.</td>
</tr>
<tr>
<td>Compound and stockpile sites</td>
<td>Two sites are proposed including:</td>
</tr>
<tr>
<td></td>
<td>Site 1 at 980 Pacific Highway (Lot 1, DP 567438), Lisarow (compound site, storage of culverts, pipes and off-street parking only).</td>
</tr>
<tr>
<td></td>
<td>Site 2 at 962 and 964 Pacific Highway, Lisarow (Lot 23 DP 580016 and Lot 1 DP 560299 respectively).</td>
</tr>
<tr>
<td></td>
<td>In addition hard stands and temporary access roads will be constructed.</td>
</tr>
</tbody>
</table>
### Key element Description

| Water quality measures                                                                 | - Installation of two water quality basins:  
|                                                                                       |   - Basin A - At the southern end of Lot 1 and DP 2417 between the rail maintenance access road and the Pacific Highway in areas of Swamp Sclerophyll Forest.  
|                                                                                       |   - Basin B - Around 130 metres south of the Pacific Highway and Macdonalds Road intersection next to the northbound carriageway in areas of Lot 10 DP 838947 and Lot 1 DP 2417. This area is currently cleared but is next to areas of Swamp Sclerophyll Forest to the south and Freshwater Wetlands to the north.  
|                                                                                       |   - Kerb and guttering along the length of the proposal.  
| Pedestrian and cyclist facilities                                                     |   - Shared pedestrian cycleways and footpaths throughout the proposal area, with additional safety fencing for pedestrians in steep areas and along retaining walls.  
| Bus facilities                                                                       |   - Retain the existing bus bays, with the exception of unused bus bays on the Pacific Highway immediately north of the Railway Crescent intersection and both bus bays on Macdonalds Road.  
| Other activities                                                                     |   - New road surface for the length of the proposal and tie-ins to existing road.  
|                                                                                       |   - Safety furniture, including pedestrian fencing and guard rails, where required.  

Construction of the proposal is anticipated to be undertaken in four stages to minimise impacts to road and rail traffic and property owners located adjacent to the proposal.

In order to complete the upgrade, RMS may be required to purchase additional properties to accommodate the proposal. RMS will also be conducting excavation works within the footprint of the surrounding properties and for this reason it is important to understand the potential liabilities associated with the local geology, soils, and contamination (if present).

Jacobs Group (Australia) Pty Ltd (Jacobs) was commissioned by RMS to provide background on the soils occurring within the footprint of the proposal, including an opinion on potential contamination as a result of past land use and an assessment of the presence of acid sulfate soils.

### 1.2 Purpose of this Report

The objectives of the soil assessment for the proposal include:

- Develop a general understanding of the geology and naturally occurring soils within the footprint of the proposal.
- Complete a preliminary site history review of available information for areas potentially impacted by the upgrade work so that contamination issues may be identified and management measures developed if required.
- Develop an understanding of acid sulfate soil (ASS) conditions in the area and in relation to the proposed construction activities.
1.3 Scope of Work

The scope of work involved the assessment of the general area of Lisarow, specifically the areas surrounding the proposal. Jacobs were guided by the following general scope of work:

- Review of relevant Soil Landscape and ASS Risk Maps for the Gosford area.
- Review of information supplied by the NSW RMS.
- Search of registered groundwater bores within a 1.5 kilometre radius of the extent of the proposal.
- Review of historical aerial photographs.
- Site visit.
- Environment Protection Licence (EPL) search and Contaminated Land Management (CLM) registered sites search through NSW Environment Protection Authority (EPA).

1.4 Report Structure

This report is structured as follows:

- Section 1: Introduction.
- Section 2: Study area description.
- Section 3: Assessment of potential contamination.
- Section 4: Qualitative risk assessment.
- Section 5. Conclusions and recommendations.
- Section 6. References.
- Appendix material.
Figure 1-2a | Proposed highway alignment
Figure 1-2b | Proposed highway alignment

Legend
- 80 percent concept design
- Retaining wall
- Water quality basin
- Watercourse
- Railway
- Cadastre

SOILS AND CONTAMINATION INVESTIGATION REPORT
Upgrade of the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow
2. **Study Area Description**

2.1 **Location**

The study area is located at Lisarow on the Central Coast of New South Wales (refer to Figure 1-1). The study area is bounded by Parsons Road to the south and Ourimbah Road to the north (refer to Figure 1-2). There are a number of properties that may be potentially impacted by the proposed development, mostly aligning the existing road network. The study area is wholly contained within Gosford City Council (GCC) Local Government Area (LGA).

2.2 **Land Use**

While the majority of the works will be within the existing road corridor, areas surrounding the proposal have a variety of land zones under the Gosford Local Environment Plan (LEP) 2014, which include the following LEP classifications:

- R1 – General Residential.
- R2 – Low Density Residential.
- SP2 – Infrastructure.
- B1 – Neighbourhood Centre.
- B2 – Local Centre.
- E3 – Environmental Management.
- RE1 – Public Recreation.
- RE2 – Private Recreation.
- IN1 – General Industrial.

2.3 **Study Area Description**

Jacobs completed a visual inspection of the proposal on 28 April 2014. The visual inspection identified a number of site activities and operations within the area, which include the following:

- A number of commercial/light industrial properties exist adjacent to the proposed alignment, including:
  - CSR Bricks and Roofing.
  - Subway restaurant.
  - Central Coast Shopfronts.
  - Metaland.
  - Core Gas.
  - Lisarow Takeaway (former).
  - Boats and Mowers.
  - Morris’ Signs.
  - Lisarow Auto Electrics.
- The Lisarow train station on the western side of the proposal, adjacent to Chamberlain Road. The Main Northern Railway Line is adjacent to the proposed Highway alignment for the extent of the upgrade. The Pacific Highway crosses Railway line between Macdonalds Road and Dora Street.
- A cemetery is located on the western side of the proposal, north of Dora Street.
- Undeveloped land lies on the eastern side of the proposal from just south of the Chamberlain Road intersection to the bridge across the Main Northern Railway Line. Further undeveloped land on the western side of proposal between the Chamberlain Road intersection and the bridge across the Main Northern Railway Line.
Soil and Contamination Investigation Report

- Residential properties are located south of Ourimbah Street to the cemetery; and on the western side of the Main Northern Railway Line south of Dora Street.
- A block of residential properties were also observed between the commercial premises north of Parsons Road and Chamberlain Road (south of the parcel of undeveloped land).

Photographs were taken during the study area inspection. Selected photographs are included in Appendix A.

2.4 Geology

The 100,000 geological sheet (2009) for Gosford-Lake Macquarie, shows that the study area is underlain by quaternary alluvium, comprising gravel and sands. These overlay the Triassic age (230 million years) sediments of the Terrigal Formation in the Narrabeen Group (Gosford subgroup), comprising interbedded laminite, shale, and quartz to lithic-quartz sandstone, with minor red claystone (north of the Hawkesbury River).

2.5 Soil Landscapes

The Gosford - Lake Macquarie 1:100,000 soil landscape sheet shows the proposal is generally within the Yarramalong soil landscape with some smaller areas encroaching on areas described as Erina soil landscapes, refer to Figure 2-1.

The Yarramalong soil landscapes are composed of Quaternary sediments including gravels, sands, silts and clays. The Yarramalong landscapes are described as level to gently undulating alluvial plains. Soils in this landscape were originally covered by tall open-forest that has since been cleared. Soils are generally prone to flooding, may have foundation hazards, low fertility and be moderate to slightly acidic.

Erina soil landscapes are characterised by undulating to rolling rises and low hills on the Terrigal Formation of the Narrabeen Group which is typically composed of quartz sandstones and siltstone, claystone and conglomerates. Original vegetation was composed of tall open forest that has been extensively cleared. Soils in this landscape often have a high soil erosion hazard, strongly acid soils and low fertility.

2.6 Hydrogeology

A search of registered groundwater bores with approximately 1.5 kilometre of the proposal identified 16 bores within the surrounding area. Details of the sixteen wells are summarised in Table 2-1.

<table>
<thead>
<tr>
<th>Borehole ID</th>
<th>Licence No</th>
<th>Easting</th>
<th>Northing</th>
<th>Screened Depth (m)</th>
<th>Screened Lithology</th>
<th>Total Depth (m)</th>
<th>Bore Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>GW023748</td>
<td>20BL017401</td>
<td>348208</td>
<td>6305047</td>
<td>1.5 – 21.3 m</td>
<td>Sandy Clay</td>
<td>21.3 m</td>
<td>Domestic Irrigation</td>
</tr>
<tr>
<td>GW037483</td>
<td>20BL132534</td>
<td>349651</td>
<td>6305316</td>
<td>No Detail</td>
<td>No Detail</td>
<td>30.4 m</td>
<td>Domestic Stock</td>
</tr>
<tr>
<td>GW051716</td>
<td>20BL113606</td>
<td>347532</td>
<td>6305314</td>
<td>No Detail</td>
<td>Sandstone</td>
<td>45 m</td>
<td>Commercial</td>
</tr>
<tr>
<td>GW052936</td>
<td>20BL112260</td>
<td>349321</td>
<td>6306635</td>
<td>No Detail</td>
<td>Gravel</td>
<td>46 m</td>
<td>Domestic Stock</td>
</tr>
<tr>
<td>GW063944</td>
<td>20BL135708</td>
<td>348113</td>
<td>6306154</td>
<td>No Detail</td>
<td>Sandstone</td>
<td>97 m</td>
<td>Domestic Stock</td>
</tr>
<tr>
<td>GW064082</td>
<td>20BL136078</td>
<td>348167</td>
<td>6306001</td>
<td>No Detail</td>
<td>No Detail</td>
<td>100 m</td>
<td>Domestic</td>
</tr>
<tr>
<td>GW064385</td>
<td>20BL135864</td>
<td>348090</td>
<td>6306000</td>
<td>No Detail</td>
<td>No Detail</td>
<td>80 m</td>
<td>Domestic Stock</td>
</tr>
<tr>
<td>GW070271</td>
<td>20BL150366</td>
<td>349457</td>
<td>6304481</td>
<td>No Detail</td>
<td>No Detail</td>
<td>43 m</td>
<td>Domestic</td>
</tr>
<tr>
<td>GW072927</td>
<td>20BL150700</td>
<td>349623</td>
<td>6305185</td>
<td>No Detail</td>
<td>No Detail</td>
<td>210.5 m</td>
<td>Domestic Stock</td>
</tr>
<tr>
<td>GW100132</td>
<td>20BL144478</td>
<td>349517</td>
<td>6304620</td>
<td>18 – 28 m</td>
<td>Sandstone</td>
<td>28 m</td>
<td>Domestic Stock</td>
</tr>
<tr>
<td>GW100990</td>
<td>20BL156954</td>
<td>348187</td>
<td>6306017</td>
<td>No Detail</td>
<td>Sandstone</td>
<td>101 m</td>
<td>Domestic Stock</td>
</tr>
</tbody>
</table>
It is understood that some parts of the Central Coast utilise groundwater from sandstone aquifers for local water supply. Extraction of groundwater for human consumption is understood to take place in Somersby to the west of the proposal; however it is not considered likely that residents would draw upon groundwater for drinking purposes in the West Gosford area.

Hydrogeological gradients are expected to be towards the south to southwest in accordance with the local and regional topography.

### 2.7 Acid Sulfate Soil Risk

The NSW Acid Sulfate Soils (ASS) Risk Maps (NSW Department of Land and Water Conservation 1997) provides a visual representation of areas of risk within NSW. The ASS risk map (refer to Figure 2-2) indicated that the extents of the proposal are outside of the identified ASS risk areas. Other interactive tools including the CSIRO Australian Soil Resource Information System (ASRIS) and the GCC Gosford Electronic Mapping System (GEMS) were also reviewed to assess land constraints associated with the presence of ASS in the proposal footprint. The closest “low” risk ASS area in all of the ASS risk tools was located approximately 1.5 kilometres southwest of the proposed construction area extents. The likelihood of ASS/PASS within the proposal footprint is therefore considered unlikely. However, the ASRIS and GEMS tools indicated that the area within the proposal had a very low confidence level, based on the limited ASS data available within the area.

Due to the limited confidence and reliability of information within the mapping tools, a targeted investigation of ASS in targeted areas is recommended and has been approved to be completed as part of the Geotechnical investigation. The investigation should target low lying and saturated areas for ASS/PASS sampling and analysis to provide increased confidence relating to requirements to manage ASS/PASS during the construction of the proposal.
Figure 2-1 | Soil landscape map

Legend

- 80 percent concept design
- Retaining wall
- Water quality basin
- Railway

Soil landscape name

- Erina
- Watagan
- Yarramalong

Ref_Design7D.dwg
Roads and Maritime Services 2014
AUSIMAGE 2014
LPI 2014

SOILS AND CONTAMINATION INVESTIGATION REPORT
Upgrade of the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow
Figure 2.2 | Acid sulphate soil risk map

Legend

- 80 percent concept design
- Acid sulfate soil risk
  - High Risk 1-2m
  - High Risk Sediments
  - Low Risk 2-4m
  - Low Risk above 4m
  - No Risk
  - Disturbed Terrain

Ref_Design7D.dwg
Roads and Maritime Services 2014
AUSIMAGE 2014
LPI 2014, OEH 2011

SOILS AND CONTAMINATION INVESTIGATION REPORT
Upgrade of the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow
3. **Assessment of Potential Contamination**

### 3.1 Introduction

Most information pertaining to the history of the properties within the proposal to date has come from review of historical aerial photographs and searches of online databases including the NSW EPA Contaminated Sites Register and EPLs. In addition to the desktop study of the above sources, Jacobs conducted a site visit of the proposal on 28 April 2014. The site inspection was undertaken to confirm information gained from the desktop study and to identify other potential contamination areas.

### 3.2 Legislative Framework

Soils disturbed during construction works will require management in accordance with a variety of NSW legislation, including the following:

- **Protection of the Environment (Operations) (POEO) Act 1997.** All disturbed soils will need to be managed during construction so as not to cause pollution to the surrounding environment. Pollution may take the form of the release of sediments into waterways, the movement of contaminants offsite via water flows or release of acid from acid sulphate soils. Any wastes generated during the construction activities that are to be disposed of offsite, must also comply with the requirements of the POEO Act, requiring classification in accordance with the **NSW EPA, Waste Classification Guidelines (2008)**.

- **Contaminated Land Management (CLM) Act 1997.** The CLM Act establishes a process for investigating, managing and remediating contaminated land and allows the NSW EPA to regulate any site contamination that poses a significant risk of harm, to ensure the contamination is managed or remediated appropriately. Any contamination investigation completed within the proposal must comply with the requirements of the CLM Act. The NSW EPA has endorsed the investigation procedures described within the **National Environmental Protection Measure 1999 (as amended in 2013)**. Any wastes generated during the construction activities that are to be disposed of onsite, must also comply with the requirements of the CLM Act.

- **State Environmental Planning Policy No. 55 – Remediation of Land (SEPP No. 55) 1998.** SEPP 55 provides a state wide planning approach to the remediation of contaminated land in NSW. If significant contamination is identified during the construction activities, any remediation works will need to be completed in accordance with the requirements of SEPP 55.

### 3.3 Contaminated Sites Register

A search for registered contaminated sites was conducted in the GCC LGA. No registered contaminated sites were identified within the boundary of the proposal. The two closest sites to the proposal were included:

- **Metro Meats at 356 Manns Road, West Gosford who received two notices in 1989 and 1997 regarding contamination associated with a pond system which treated stockyard, slaughtering, rendering and fat extraction wastes. Remediation works were completed in 1994 and the notice was revoked by the EPA. This site is located approximately 6.5 kilometres south west of the proposal.**

- **A Mobil Service Station in East Gosford at 42-44 Victoria Road, Gosford was served with a declaration of significant contamination in 2010 associated with the storage of petroleum hydrocarbons at the site. A Voluntary Management Plan has been approved by the EPA for the site, involving the engagement of an accredited site auditor and ongoing monitoring of the site to develop a remedial action plan. This site is located 6.5 kilometres south of the proposal and is therefore not considered likely to impact upon the upgrade of the Highway.**

Contamination associated with the above two registered contaminated sites are unlikely to affect the proposed Pacific Highway upgrade construction activities, due to the distance from the site and the nature of the reported contaminants.
3.4 Environment Protection Licence Register

A search was undertaken for EPL’s within the Lisarow area. One result was found for Ingham’s Lisarow (EPL12009), which is associated with general animal products production at 1 Cutrock Road, located approximately 1 kilometre north east of the proposal. EPL12009 imposes restrictions on the pollution of waters (in accordance with section 120 of the Protection of the Environment (Operations) Act 1997 (POEO Act)) and on potentially offensive odours (in accordance with section 129 of the POEO Act). The EPL also requires the development of a Pollution Reduction Program (PRP) to reduce potential odours associated with the site. Based on the requirements of the EPL and the distance of the property from the proposal, the operations at Ingham’s Lisarow are considered unlikely to cause contamination concerns for the proposed Pacific Highway upgrade works.

3.5 Aerial Photographs

Historical aerial photographs of the proposal, held at the Department of Finance Services, Land and Property Information Division NSW were sourced as part of the investigation. The photographs were from 1954, 1965, 1975, 1985, 1994 and 2006. The aerial photographs are presented in Appendix B.

Table 3-1 identifies the historical activities conducted along the proposal and includes disturbances and terrain changes across the identified area since 1954.
### Table 3-1: Historical Aerial Photograph

<table>
<thead>
<tr>
<th>Date of Aerial Photograph</th>
<th>Subject Site</th>
<th>Surrounding Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1954</strong></td>
<td>The Pacific Highway alignment follows the pathway of the Main Northern Railway Line, there also appears to be two level crossings. The main Pacific Highway crossing over the railway line appears to be immediately north of the Railway Station, the other crossing appears to be a T-intersection with the just south of Dora Street (across from the heritage Post Office), that appears to connect with Macdonalds Road.</td>
<td>The area surrounding the Project Alignment is typified by farmlands, with a variety of orchards. The cemetery appears to have been developed at the time of the photograph. Wetland areas on the eastern side of the railway line are evident within the photograph. A large building (possibly industrial) south of the railway station adjacent to the railway line has been well established.</td>
</tr>
<tr>
<td><strong>1965</strong></td>
<td>The Highway has been upgraded to the current alignment, including a bridge over the Main Northern Railway Line adjacent to Dora Street. The two level crossings appear to have been decommissioned. An area of apparent fill has been placed on the western side of the new Highway between Macdonalds Road and Chamberlain Road.</td>
<td>Further development of the industrial building south of the railway station appears to have been further developed with additional buildings. Wetland areas remain in place, with the exception of areas within the footprint of the proposal. Strong presence of farmlands growing orchards throughout the area remains.</td>
</tr>
<tr>
<td><strong>1975</strong></td>
<td>There appears to be no significant change to the alignment of the Pacific Highway.</td>
<td>Some of the farmlands/orchards at the southern end of the proposal have been removed and replaced with large warehouses. The road system connecting to the Pacific Highway also appears to have been improved. There appears to have been an increase in the number of residential properties on the western side of the Highway, between the cemetery and Ourimbah Street.</td>
</tr>
<tr>
<td><strong>1985</strong></td>
<td>There appears to be no significant change to the alignment of the Pacific Highway.</td>
<td>Continued removal of farmlands and replacement with industrial and residential businesses.</td>
</tr>
<tr>
<td><strong>1994</strong></td>
<td>There appears to be no significant change to the alignment of the Pacific Highway.</td>
<td>The majority of the area surrounding the proposal appears to no longer be used for the growing of orchards. Open areas remain, but largely appear to be grassland or fields. Additional industrial properties have been developed on the southern portion of the Highway, near Parsons Road. There also appears to be increased residential development both east and west of the Highway.</td>
</tr>
<tr>
<td><strong>2006</strong></td>
<td>The Parsons Road roundabout has been installed and a commercial shopping centre has also been developed on the eastern side of the Highway. A residential community/retirement village has been constructed immediately north of the shopping centre adjacent to the Highway.</td>
<td>Continued development of the area for residential properties. There appears to have been a further reduction in the number of properties growing orchard crops.</td>
</tr>
</tbody>
</table>
3.6 Potential Contamination Areas of Concern

Based upon a review of the broad, general history (aerial photographs and public documents) and current site usage (site inspection), four potential contamination areas of concern were identified and are described further in Section 4.1. The potential contamination areas of concern are illustrated in Figure 3-1a and Figure 3-1b. The respective contaminants of concern are summarised in Table 3-2. These contaminants represent those compounds that may have impacted the local environment from the suspected and known activities undertaken in the past or from current site use. The list is not exhaustive and does not take into account all past historical activities undertaken on surrounding properties.

Table 3-2: Potential Contaminants of Concern

<table>
<thead>
<tr>
<th>Areas of Concern</th>
<th>Potential Contaminants of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Properties</td>
<td>Total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene, xylenes (BTEX); heavy metals (arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn), mercury (Hg)); polycyclic aromatic hydrocarbons (PAHs); organochlorine pesticides and organophosphorus pesticides (OCP’s/OPP’s).</td>
</tr>
<tr>
<td>Rail Corridor</td>
<td>Asbestos, TRH, BTEX, heavy metals, PAH’s and OCP’s/OPP’s.</td>
</tr>
<tr>
<td>Fill Areas</td>
<td>Asbestos, TRH, BTEX, heavy metals and PAH’s.</td>
</tr>
<tr>
<td>Workshop Areas</td>
<td>Asbestos, TRH, BTEX, heavy metals and PAH’s.</td>
</tr>
</tbody>
</table>

Based on the assumptions associated with information contained in Table 3-2 above, potential sources of contamination from the identified activities is generally associated with the storage and usage of oils, lubricants and fuels, and areas containing fill material.
Legend

- 80 percent concept design
- Retaining wall
- Water quality basin
- Railway
- Watercourse
- Cadastre

Contamination areas of concern

- Fill
- Rail
- Industrial
- Workshop

Figure 3-1a | Potential contamination areas of concern

SOILS AND CONTAMINATION INVESTIGATION REPORT
Upgrade of the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow
Legend

- 80 percent concept design
- Retaining wall
- Water quality basin
- Railway
- Watercourse
- Cadastre
- Contamination areas of concern

Contamination areas of concern:
- Fill
- Rail
- Industrial
- Workshop

Figure 3-1b | Potential contamination areas of concern

SOILS AND CONTAMINATION INVESTIGATION REPORT
Upgrade of the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow
4. Qualitative Risk Assessment

For a particular contaminant to present a risk to receptors, three components must be present:

- **Source** An entity or action which releases contaminants into the environment.
- **Pathway** A mechanism by which receptors can become exposed to contaminants.
- **Receptors** The human or ecological component at risk of experiencing an adverse response following exposure to a contaminant.

If one of these three components is missing from an exposure scenario, then there can be no risk.

The following section outlines the potential sources, pathways and receptors relevant to this site and assesses the risks associated with the most likely exposure scenarios.

### 4.1 Source

The potential sources of contamination or areas of concern that were identified during the phase 1 contamination investigation are described in Table 4-1 and can be identified in Figure 3-1.

<table>
<thead>
<tr>
<th>Areas of Concern</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Properties</td>
<td>Several industrial properties were identified on the southern portion of the proposal. Some industry had been observed present in the area since at least 1954. The type of industry present is currently a metal distributor, but appears to have previously had a rail siding and stockpiles of unknown materials. Minor excavation is expected in this area during construction to allow for the installation of the new pavement. Areas may also appear to have been previously used for agricultural purposes as orchards and may have historically used pesticides at the site.</td>
</tr>
<tr>
<td>Rail Corridor</td>
<td>The proposal runs parallel to the Main Northern Railway Line and crosses over the railway between Macdonalds Road and Dora Street. Excavation in close proximity to the railway line is expected near the train station (north of Chamberlain Rd intersection a sediment pond is expected to be installed) and on either side of the bridge across the railway (footings for the abutment and the toe of the batters on either side of the railway line may have been impacted by historical rail activities).</td>
</tr>
<tr>
<td>Fill Areas</td>
<td>Two areas of fill were identified in the proposal. One area (Fill 1) was observed on Chamberlain Rd (eastbound side of the road) and the other area (Fill 2) was on between the Chamberlain Rd and Macdonalds Rd intersections (on the northbound side of the road). Fill 1 appears to be a more recent operation associated with a new pathway and viewing platform into the wetland area, however illegal flytipped waste was also observed in the area and could potentially cause contamination. Fill 2 appears to have been used as a lay down area during the upgrade of the Pacific Highway in the 1960’s. The type of fill material used in both areas is unknown and could potentially present a contamination risk.</td>
</tr>
<tr>
<td>Workshop Areas</td>
<td>A workshop type operation (Boats and Mowers) was identified on Railway Crescent and is beneath the footprint of the proposal. Commercial operations have the potential for spillage of hazardous materials onto the ground and to hold waste oil tanks that may potentially contaminate other areas. An auto-electrician and sign writer was also identified north of the expected project work areas (on the corner of Ourimbah St); however, based on the current estimated work zone and excavation area, this site is considered unlikely to pose a risk to the surrounding area.</td>
</tr>
</tbody>
</table>

### 4.2 Pathways

The pathways by which the potential contamination discussed above could reach potential receptors are described in Section 4.2.1 to Section 4.2.4.
4.2.1 Human Contact

Dermal contact, inhalation and ingestion of contaminants may occur when contaminated ground is disturbed.

4.2.2 Migration via Groundwater

The groundwater flow direction has not been confirmed as part of this investigation; however contaminants originating from the site may have the capacity to migrate down-gradient via groundwater flows.

4.2.3 Migration via Airborne Dust

Disturbance of impacted materials could potentially produce dust containing elevated levels of contaminants that may be transported offsite by winds.

4.2.4 Migration via Surface Water Flow

Contaminants that were spilled or leaked onto sites have the potential to be transported via surface water flows. Any surface water flows are likely to flow toward the wetland areas of the proposal or into anthropogenic drainage systems.

4.3 Receptors

The potential receptors of contamination arising from the potential sources described in Section 4.1 are considered to be:

- Personnel disturbing the site during excavation and construction activities.
- Receiving surface water bodies.
- Groundwater system.
- The surrounding area including residential and commercial properties.

4.4 Evaluation of Exposure Scenarios

This section evaluates risks under the current proposed site usage (construction and upgrade of the Pacific Highway, Lisarow). The assessment incorporates:

- Off-site migration of contaminants.
- Receptors at risk.
- Reasonable protection of the general public from on-site hazards.
- Protection of the workers onsite to undertake required demolition/excavation activities.

The important exposure scenarios are summarised in Table 4-2.
<table>
<thead>
<tr>
<th>Source</th>
<th>Pathway</th>
<th>Receptor</th>
<th>Comment</th>
<th>Relative Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Properties</td>
<td>Dermal contact / ingestion</td>
<td>Demolition/excavation workers</td>
<td>Contamination associated with historical industrial practices may be present along the southern extent of the proposal. Excavation and/or disturbance of soils within these areas may expose workers to the contaminants. The contamination risk to workers is currently unconfirmed and the risk to workers has been classified as moderate.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Dust inhalation</td>
<td></td>
<td>Demolition/excavation workers; Residents</td>
<td>Contamination associated with historical industrial practices may be present along the southern extent of the proposal. During construction works, the contamination may be exposed. Winds may generate dust from areas of contamination (if present) and exposure the workers at the site and surrounding residential properties to potentially contaminated dust. The contamination risk to workers and residents is currently unconfirmed and the risk to workers has been classified as moderate.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Groundwater &amp; surface water flow</td>
<td></td>
<td>Off-site water bodies; Groundwater bores</td>
<td>Contamination associated with historical industrial practices may be present along the southern extent of the proposal. Any contamination may have infiltrated to the groundwater table, and may be potentially migrating with the groundwater flows. Any surface contamination may also enter stormwater drainage system and be transported offsite; however during the site inspection no visual signs of contamination (eg surface staining, stressed vegetation) were identified. The contamination risk to the groundwater system is currently unconfirmed, however as there is no known contamination at the site based on current information, the risk to groundwater and surface water bodies is considered to be low.</td>
<td>Low</td>
</tr>
<tr>
<td>Rail Corridor</td>
<td>Dermal contact / ingestion</td>
<td>Demolition/excavation workers</td>
<td>The use of areas within the proposal as a rail corridor may have associated contamination. Excavation and/or disturbance of soils within these areas may expose workers to the contaminants. The contamination risk to workers is currently unconfirmed and the risk to workers has been classified as moderate.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Dust inhalation</td>
<td></td>
<td>Demolition/excavation workers; Residents</td>
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</tr>
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<td>---------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
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<td></td>
<td></td>
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<td></td>
<td>Off-site water bodies; Groundwater bores</td>
<td>The use of areas within the proposal as a rail corridor may have associated contamination. Any contamination may have infiltrated to the groundwater table, and may be potentially migrating with the groundwater flows. Any surface contamination may also enter stormwater drainage system and be transported offsite; however during the site inspection no visual signs of contamination (eg surface staining, stressed vegetation) were identified.</td>
<td>Low</td>
</tr>
<tr>
<td>water flow</td>
<td></td>
<td></td>
<td>The contamination risk to the groundwater system is currently unconfirmed, however as there is no known contamination at the site based on current information, the risk to groundwater and surface water bodies is considered to be low.</td>
<td></td>
</tr>
<tr>
<td>Fill Areas</td>
<td>Dermal contact / ingestion</td>
<td>Demolition/excavation workers</td>
<td>Areas of the proposal appear to have been back filled with unknown imported materials that may contain contaminants. Excavation and/or disturbance of soils within these areas may expose workers to the contaminants.</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The contamination risk to workers is currently unconfirmed and the risk to workers has been classified as moderate.</td>
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<td></td>
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<td>Off-site water bodies; Groundwater bores</td>
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</tr>
<tr>
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<td>Pathway</td>
<td>Receptor</td>
<td>Comment</td>
<td>Relative Risk</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------------------</td>
<td>---------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Workshop Areas</td>
<td>Dermal contact / ingestion</td>
<td>Demolition/excavation workers</td>
<td>Commercial workshop operations have the potential for contamination. Excavation and/or disturbance of soils within these areas may expose workers to the contamination. The contamination risk to workers is currently unconfirmed and the risk to workers has been classified as moderate.</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Dust inhalation</td>
<td>Demolition/excavation workers; Residents</td>
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<tr>
<td></td>
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<td>Low</td>
</tr>
</tbody>
</table>
5. Conclusions and Recommendations

5.1 Conclusions

The proposed upgrade of the Pacific Highway to a four-lane urban arterial road between Ourimbah Street and Parsons Road, Lisarow, would potentially impact a variety land uses (including commercial, industrial and residential) as well as existing roads. While the above Qualitative Risk Assessment (QRA) does indicate the potential for contamination to be present and likely exposure risks to also be present for a variety of receptors, the presence of contamination at the source is currently unconfirmed.

On the basis of the contamination investigative works described in this report, Jacobs concludes that:

- Potential contamination risks are associated with following historical and current site activities are currently unconfirmed:
  - Industrial properties.
  - Use of the rail corridor.
  - Imported fill materials.
  - Potential workshop areas associated with commercial properties.

- Properties holding an elevated risk of site contamination are recommended for additional contamination assessment works.

On the basis of the ASS assessment works described in this report, Jacobs concludes that:

- The Gosford Acid Sulphate Soil Risk Map (1997) indicates that there is no known occurrence of ASS across the majority of the study area.
- There is limited confidence and reliability in the available ASS/PASS information, due to a lack of relevant data. Further investigations are recommended to confirm the presence of ASS/PASS at the site.

5.2 Recommendations

In consideration of the conclusions above, Jacobs recommends that:

- Stage 2 Contamination Assessment (CA) is completed to quantify risk at the properties identified to hold increased contamination risk.
- Any Stage 2 CA works be designed and undertaken in accordance with NSW RTA Contaminated Land Management Guideline (2005).
- A limited investigation of ASS/PASS targeting low lying and saturated areas.
- The ASS/PASS investigation should be designed and undertaken in accordance with the NSW Guidelines for the Management of Acid Sulfate Materials (2005).
6. References

Australian and New Zealand Environment and Conservation Council (ANZECC, 2000), *Australian Guidelines for Water Quality Monitoring and Reporting*.


Murphy, C.L. (1993), *Soil Landscape of the Gosford – Lake Macquarie 1:100,000 Sheet (Redhead, Wyong, Gosford, Spencer, Laguna)*.


NSW Department of Urban Affairs and Planning (1998), *State Environmental Planning Policy No. 55: Remediation of Land (SEPP 55)*.


NSW Government (1997), *Contaminated Land Management Act*.


Appendix A. Site Photographs
Photo 1: Looking north from Parsons Rd roundabout. Industry properties are present on the left (west side) of Highway, residential and wetland areas on eastern side of the Highway.

Photo 2: Looking south from Chamberlain Rd intersection. Rail line is present on far right of image, industry on western side of the Highway and wetland area east of the Highway.
Photo 3: Looking south. Lisarow railway station is present on the western side of the Highway, Chamberlain intersection.

Photo 4: Looking west along Chamberlain Rd. Wetland areas on both side of the Chamberlain Rd.
Photo 5: Looking north along Highway from train station. Wetland area on both sides of the Highway.

Photo 6: Filled area on western side of Highway between Chamberlain Rd and Macdonalds Rd.
Photo 7: Looking north along Highway at Macdonalds Rd intersection. Wetland areas are evident on both sides of the Highway.

Photo 8: Looking south along the Highway towards Macdonalds Rd intersection. The bridge across the Main Northern Railway Line is evident in the photograph.
Photo 9: Looking north along Railway Crescent towards Dora St intersection. A heritage building (former post office) and boat &mowers commercial property located on western side of the road; Main Northern Railway Line located east of the road.

Photo 10: Looking north from the Dora St intersection. The cemetery is located on the western side of the Highway; the Main Northern Railway Line is on the eastern side of the Highway.
Photo 11: Looking south from Ourimbah St intersection. Residential properties are located on the western side of the Highway; the Main Northern Railway Line is on the eastern side of the Highway.
Appendix B. Historical Aerial Photographs
Pacific Highway, Lisarow, NSW, 1954

(Photo: Courtesy of NSW Land and Property Information Division)
Pacific Highway, Lisarow, NSW, 1965

(Photo: Courtesy of NSW Land and Property Information Division)
Pacific Highway, Lisarow, NSW, 1975

(Photo: Courtesy of NSW Land and Property Information Division)
Pacific Highway, Lisarow, NSW, 1985
(Photo: Courtesy of NSW Land and Property Information Division)
Soil and Contamination Investigation Report

Pacific Highway, Lisarow, NSW, 1994
(Photo: Courtesy of NSW Land and Property Information Division)
Pacific Highway, Lisarow, NSW, 2006

(Photo: Courtesy of NSW Land and Property Information Division)