

INCITEC PIVOT, COCKLE CREEK DEMOLITION AND REMEDIATION

Part 3A project application and preliminary
environmental assessment
February 2007



Prepared by

MANIDIS ROBERTS CONSULTANTS

Locked Bag 2740, Strawberry Hills 2012
Level 4, 23-33 Mary Street
Surry Hills NSW 2010 Australia

Tel (+612) 9281 5199
Fax (+612) 9281 9406

Email info@manidisroberts.com.au
Web www.manidisroberts.com.au

Quality Control

Our reference	06040
Version number	1.1
Date	2 February 2007



CONTENTS

1	EXECUTIVE SUMMARY	1
2	INTRODUCTION	2
2.1	Aim and objective of the report	2
2.2	Background	2
2.3	Project context	2
2.4	The proponent	3
3	PROJECT DESCRIPTION	4
3.1	Overview of project objectives	4
3.2	Site location and description	4
3.3	Site history	8
3.4	Surrounding uses	8
3.5	Proposed works	8
3.6	Project cost estimate	10
3.7	Project timetable	10
4	STATUTORY PLANNING	11
4.1	State planning	11
4.2	Regional planning	12
4.3	Local planning	12
5	STAKEHOLDER ENGAGEMENT	13
5.1	Introduction	13
5.2	Consultation activities to date	13
5.3	Pasminco Cockle Creek Smelter consultations	14
5.4	Proposed communications strategy and consultation activities	14
6	PRELIMINARY ENVIRONMENTAL ASSESSMENT	15
6.1	Overview	15
7	PREVIOUS ENVIRONMENTAL STUDIES	23
8	REFERENCES	24

1 EXECUTIVE SUMMARY

The site

- 15 ha site under single ownership.
- Located in Lake Macquarie LGA, in the township of Boolaroo.
- Currently used for industry.
- Zoned for industrial uses.

Proposal

- Demolition of existing manufacturing and distribution centre and associated facilities at the site.
- Remediation of soil through the excavation and storage of all contaminated waste from the site in an onsite containment cell.
- Remediation of groundwater through the use of extraction wells and the treatment of groundwater at an on-site heavy metal treatment facility.

Significance

- Site declared a remediation site by the NSW Environmental Protection Authority (EPA) on 22 July 2005.
- Site located in close proximity to residential land.
- Will improve the site's options for future use, reduce adverse risks to human health and create significant improvements to the environmental quality of the site and its surrounds.

Approvals

- Seeking consideration for Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979*.

2 INTRODUCTION

2.1 Aim and objective of the report

The aim of this report is to seek consideration for Project Approval from the Department of Planning to carry out remediation and demolition works at the Incitec Pivot Cockle Creek Site under Part 3A of the *Environmental Planning and Assessment Act 1979*.

The objective of the report is to provide the Department of Planning with a high-level understanding of the key environmental issues associated with the site, in particular its soil and groundwater, as well as the proposed demolition and remediation.

2.2 Background

The proposed project relates to the Incitec Pivot Cockle Creek lands located within the township of Boolaroo in the Lake Macquarie local government area (LGA).

The Incitec Pivot Cockle Creek (IPLCC) site has been used by heavy industry since the late 19th Century. In 1913 a superphosphate plant was established at the site to utilise the by-products produced by the neighbouring Pasminco Cockle Creek Smelter (PCCS). In 2003 the PCCS ceased operations and demolition of the former smelter works has since commenced. It is currently anticipated that Incitec Pivot will decommission operations at Cockle Creek in 2009.

On 22 July 2005 the IPLCC site was declared a remediation site under Part 3, Division 3 of the *Contaminated Land Management Act 1997* by the NSW Environmental Protection Authority (EPA). Following this declaration, Incitec Pivot committed to preparing a voluntary remediation plan for the site.

Recent studies conducted at the site have confirmed the presence of contaminants in both soil and groundwater. Soil contaminants include heavy metals, phosphorous and sulphate, while groundwater contaminants include lead, zinc and arsenic.

2.3 Project context

Since being declared a remediation site, Incitec Pivot Limited (IPL) as owner, has voluntarily agreed to remediate their Cockle Creek lands so as to reduce risks to human health, improve the land use functionality and improve the environmental quality of the site and surrounding areas following the anticipated winding down of operations at the site in 2009.

In accordance with the site being declared a remediation site in July 2005, the *State Environmental Planning Policy (Major Projects)* (Major Projects SEPP) applies to the IPLCC site.

Incitec Pivot is accordingly seeking consideration for Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* to undertake demolition and remediation works.

2.4 The proponent

Incitec Pivot Limited (IPL) is the proponent seeking consideration for Project Approval to undertake demolition and remediation works at the IPLCC site. IPL is a relatively new company founded from the merger of Incitec Fertiliser Limited and Pivot Group in 2003.

Today IPL is Australia's largest fertiliser manufacturer, with operations encompassing the manufacturing, distribution and sale of fertilisers. IPL's Cockle Creek site is one of the company's manufacturing and distribution plants.

3 PROJECT DESCRIPTION

3.1 Overview of project objectives

The objectives underpinning the proposed demolition and remediation works at the IPLCC site are;

- To successfully remove all existing structures from the site.
- If encountered, to ensure all asbestos from the site is safely removed and disposed of.
- To contain all contaminated soil and fill within an on-site containment cell.
- To minimise ongoing impacts to groundwater and human health from contaminated soil at the site.
- To reduce the concentration of contaminants in treated groundwater to below ANZECC 2000 marine ecosystem protection guidelines.
- To ensure that the site is remediated to a standard suitable for a range of land use options.
- To improve the water quality of Cockle Creek through the removal of contaminants from the site.

3.2 Site location and description

The details of the IPLCC site are outlined in **Table 1**.

Table 1 IPLCC site characteristics

Site characteristics	Description
Site owner	Incitec Pivot Limited
Lot Number	1
Deposited Plan	225720
Address	13 Main Road, Boolaroo, NSW 2284.
LGA	Lake Macquarie City Council
Zoning	4(1) Industrial (core)
Size	15 Hectares

The site is in the Lake Macquarie LGA, and forms part of the Cardiff/Glendale area. It is located within the Lower Hunter region, approximately two hours north of Sydney, and half an hour west of the regional centre of Newcastle. The town centre of Boolaroo is located 0.5 km from the site, while Maitland, Raymond Terrace and Toronto are in relatively close proximity to the site (see Figures 1, 2 & 3).

Figure 1 Location of the Incitec Pivot Limited Cockle Creek site at a regional context

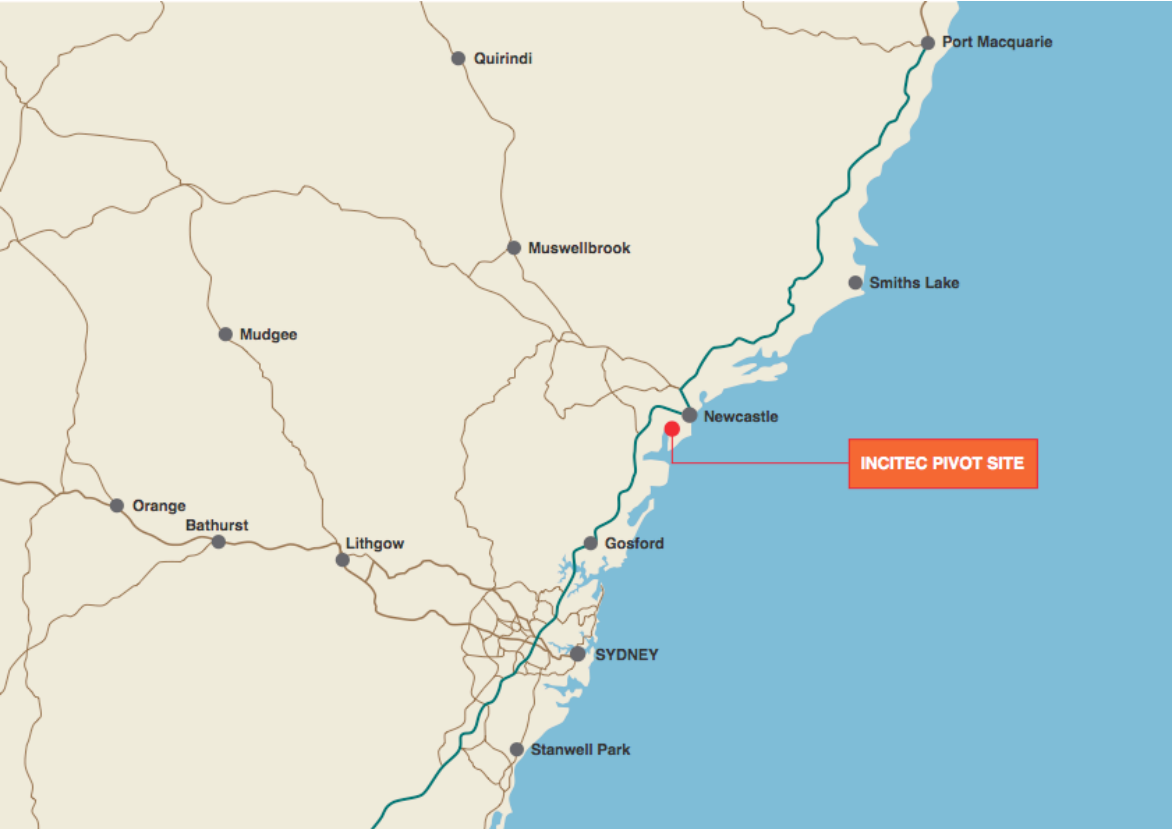


Figure 2 Location of the Incitec Pivot Limited Cockle Creek site at a local context

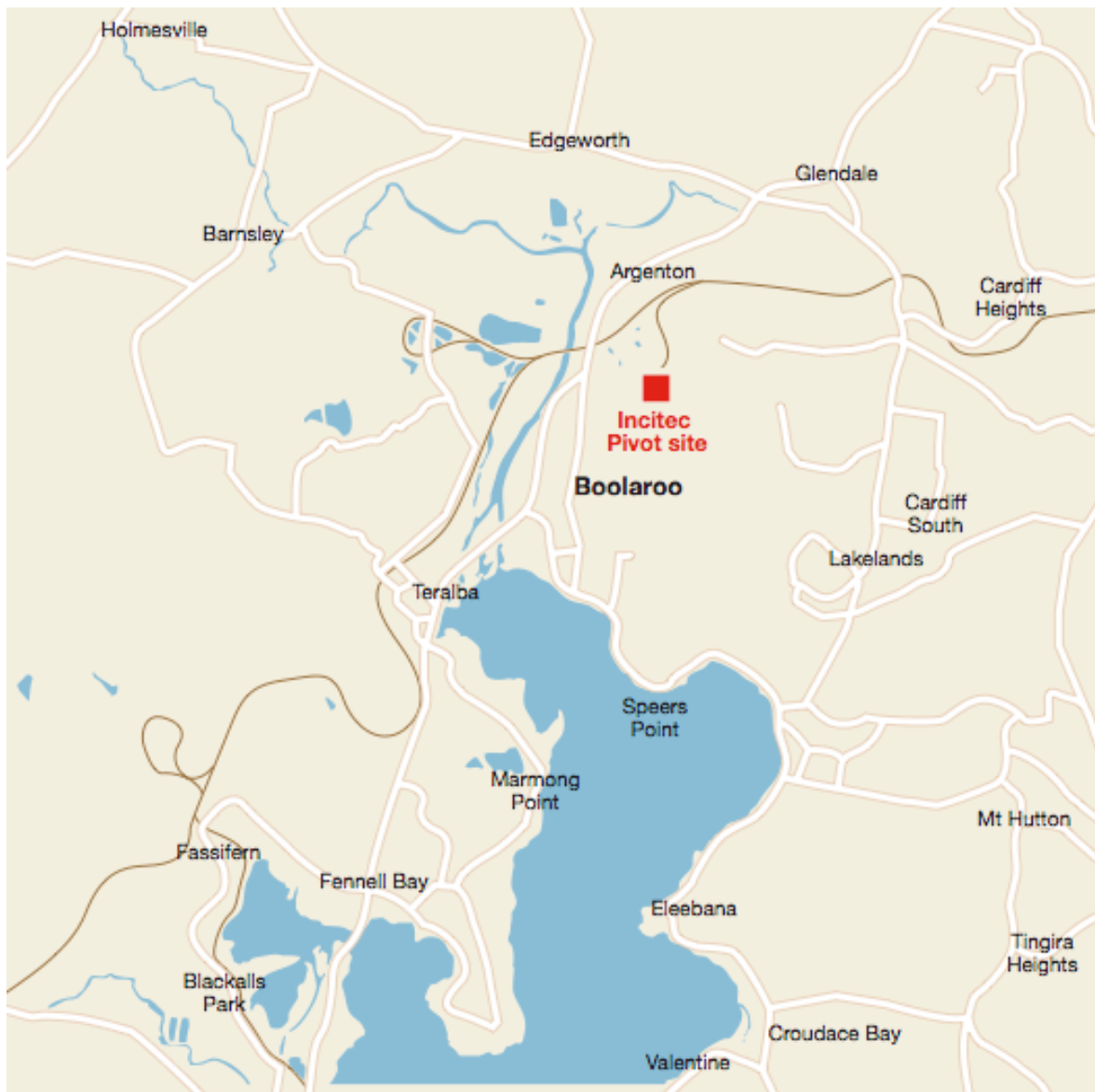


Figure 3 Aerial photograph of Incitec Pivot Cockle Creek site



— Incitec Pivot Limited Cockle Creek Site

Existing land use

The site is zoned 4(1) Industrial (Core) under the *Lake Macquarie LEP 2004*. The site is currently used for manufacturing fertiliser.

Site contaminants

Recent studies conducted at the site confirm the presence of contaminants in the site's soil and groundwater.

Soil studies have identified high concentrations of heavy metals, phosphorous and sulphate at the site. Heavy metals include cadmium, copper, lead, nickel and zinc, all of which have potential for leaching.

Soil contaminants are found across the site. The highest concentrations of soil contaminants are located within the south-west and north-east.

Groundwater studies have identified heavy metals as being the main contaminant. The heavy metals most prevalent include zinc and mercury, with concentration levels well in excess of the ANZECC 2000 criteria for marine waters.

High levels of groundwater contamination are concentrated in areas where large volumes of slag material are located hydraulically upgradient.

3.3 Site history

The subject site has been used for heavy industry since 1890. In 1913 a superphosphate plant was established to utilise by-products of the neighbouring Pasminco zinc-lead smelter facility.

The site and superphosphate plant were sold to IPL around 1969. Prior to this period the IPLCC site formed part of the PCCS lands.

In 2003 PCCS ceased operations and the demolition of the former smelter works has since commenced. Since its closure, sulphuric acid required for the fertiliser manufacturing process is transported by truck to the IPLCC site from Incitec Pivot's Kooragang Island facility.

It is anticipated that Incitec Pivot will decommission operations at the Cockle Creek in 2009.

3.4 Surrounding uses

Uses surrounding the IPLCC site include industrial and residential uses.

The site is bound to the north, west and east by the PCCS lands. The PCCS lands to the west of the site have recently undergone demolition in preparation for site remediation. The PCCS lands located to the north and east are currently open space.

South of the IPLCC site is a telecommunications substation that borders the site, open space and low density detached dwellings.

3.5 Proposed works

Overview of proposal

The project would involve the demolition of the existing IPLCC Manufacturing and Distribution Centre and associated facilities, and the remediation of the site's soil and groundwater.

The demolition works would involve the removal of all buildings, removal of asbestos and the clean up of the site.

It is proposed that the soil remediation works would involve the excavation of all contaminated soil from the site. Contaminated soil would then be placed within a specifically designed and constructed, lined containment cell located on-site.

Groundwater remediation works would involve the extraction of groundwater through the construction of a number of wells along the site's north-west boundary. Groundwater would then be treated at an on-site heavy metal treatment facility. There are currently two options being considered for groundwater treatment, these being the adoption of precipitation technology and ion exchange.

The following section further details the demolition and remediation works proposed for the IPLCC site.

Site preparation

Prior to works commencing, appropriate site management and traffic plans would be developed. Signage at main access points would include after-hours contact details.

Perimeter fencing would be erected. Fencing would be inspected and repaired as required throughout demolition and remediation works at the site. Work areas and exclusion zones would be fenced off as required.

The following facilities would be established prior to the commencement of demolition works:

- Temporary site office and portable amenity blocks.
- Bins for domestic rubbish.
- Decontamination areas for plant and equipment (e.g. shakedown area).

Silt traps, run-off drains, sediment and stormwater collection basins would then be used to mitigate erosion and sedimentation impacts.

Demolition works

Before demolition works commence, appropriate fencing surrounding key work areas would be erected. Once the fences are in place, a building clean up would be carried out.

Licensed personnel would remove asbestos from the structure and dispose of it at an approved facility. Asbestos would be removed from roof areas using cranes, boom lifts and scissor lifts.

Once all asbestos bearing material has been removed, all buildings would be demolished.

Soil remediation works

All contaminated fill from the site would be placed in a purpose built lined cell on site. Areas where contaminated fill was removed would then be backfilled using clean soil and rock excavated from the site.

One containment cell would be constructed in the north-east of the site to accommodate approximately 200,000m³ of contaminated fill.

Above the cell overlay, protection in the form of a bright marker fabric would indicate the presence of the cell. Location of the cell on the site, and the future development of land above the cell will be completed in accordance with the agreement of the appointed Environmental Auditor for the site.

Groundwater remediation works

Groundwater remediation would involve the extraction and treatment of groundwater on-site at a heavy metal treatment facility to remove dissolved heavy metal concentrations.

Groundwater extraction would require the construction of a series of wells along the north-western boundary of the site. Following its extraction, groundwater would be treated using an appropriate treatment facility.

It is anticipated that the proposed treatment facility would treat approximately 20,000L of groundwater per day to remove dissolved contaminants from the groundwater. Treated groundwater will be disposed of in an approved manner.

The methodology to be used for the treatment of groundwater contaminants has yet to be determined. Currently there are two options being considered although other options may be considered.

Heavy metal precipitation technology

The heavy metal precipitation technology method requires adjusting the pH levels of the site's groundwater by dosing the contaminated groundwater in a reactor tank.

Ion exchange

Ion exchange resins are highly selective and are suitable for the removal of zinc and other metals from the groundwater.

3.6 Project cost estimate

Preliminary project cost estimates for the proposed works detailed in Section 2.3 indicate that the proposed works would cost approximately \$18 million (GST exclusive) (**see Table 2 below**).

Table 2 Project cost estimates

Task	Approximate cost (GST exclusive)
Demolition of existing structures <ul style="list-style-type: none">▪ Asbestos removal▪ Demolition works▪ Ground slabs and footings	\$2.5 million
Containment cell (Double composite liner) for residential end land use	\$14.5 million
Groundwater remediation	\$1.6 million
Total	\$18.6 million

3.7 Project timetable

- The demolition works would take approximately 6-8 months to complete.
- The soil and groundwater remediation would take approximately 1.5 years to complete.

4 STATUTORY PLANNING

4.1 State planning

Contaminated Land Management Act 1997 (CLMA 1997)

The *CLMA 1997* aims to establish a process for investigating and remediating land where contamination presents significant risk of harm to human health and other aspects of the environment.

On 22 July 2005 the IPLCC site was issued with a declaration of remediation site under Part 3, Division 3 of the Act. Under s21 of the *CLMA 1997*:

‘The EPA may declare land to be a remediation site if the land has...been found to be contaminated in such a way as to present a significant risk of harm.’

Following the EPA’s declaration of the IPLCC site as a remediation site, IPL in 2005 committed to preparing a voluntary remediation plan for the site.

State Environmental Planning Policy Major Projects 2005 (Major Projects SEPP)

The *Major Projects SEPP* aims to identify developments of economic, environmental and social significance either at a regional or state scale within NSW. The policy provides consistency in the assessment and approvals process for developments identified as being of state or regional significance. As outlined in clause 28 of the policy, developments for which the *Major Projects SEPP* applies for remediation projects include:

- ‘(a) premises subject to a notice requiring prescribed remedial action to be taken under section 35 or section 36 of the Environmentally Hazardous Chemicals Act 1985 (as continued in force by the Contaminated Land Management Act 1997), or
- (b) land declared as a remediation site under Division 3 of Part 3 of the Contaminated Land Management Act 1997.’

In light of the site being declared a remediation site in 2005, remediation action is thus subject to assessment and approval under Part 3A of the *Environmental Planning and Assessment Act 1979*.

Environmental Planning and Assessment Act 1979 (EPAA 1979)

Part 3A of the *EPAA 1979* consolidates the assessment and approvals process for all major projects that require Ministerial approval. The new Part 3A applies to projects deemed to be critical infrastructure, major projects and other projects declared by the Minister.

In light of the IPLCC site’s inclusion under the *Major Projects SEPP*, the site is subject to assessment under Part 3A of the *EPAA 1979*. As outlined under section 75B of the Act, Part 3A Major Infrastructure and other projects applies to developments that are either declared;

- ‘(a) by a State environmental planning policy, or
- (b) by order of the Minister published in the Gazette.’

This means that IPL must seek approval from the Minister to carry out remediation action at the IPLCC site.

State Environmental Planning Policy 55 Remediation of Land (SEPP 55)

The proposed remediation works on the IPLCC land are in alignment with the aims of SEPP 55. The objective of this policy is to provide a statewide planning approach for the remediation of contaminated land.

The aims of the SEPP include remediation of contaminated land for the purpose of reducing risk of harm to human health and the environment. Remediation of the IPLCC site is consistent with the provisions of this policy.

As the remediation of the IPLCC site has potentially significant environmental impacts, the proposed remediation would be defined as Category 1 work under clause 9 of the SEPP. Under SEPP 55, Category 1 work requires consent.

4.2 Regional planning

Lower Hunter Regional Strategy 2006–31

The NSW Government's *Lower Hunter Regional Strategy 2006-31 (LHRS)* is a land use planning document that outlines provisions for ensuring sustainable development over the next 25 years throughout the Lower Hunter region. The strategy makes provisions for ensuring sufficient housing and employment land, the protection of high quality agricultural land and natural resources, as well as the delivery of services and infrastructure.

The strategy is based upon population projections, which estimate that by 2031 an additional 160,000 people will live in the Lower Hunter region. The *LHRS* applies to five local government areas (LGAs) across the Lower Hunter region. The LGAs to which the strategy applies includes Newcastle, Lake Macquarie, Port Stephens, Maitland and Cessnock.

The *LHRS* is relevant to Incitec Pivot as it provides a framework for the future use of the Cockle Creek site and surrounding lands.

4.3 Local planning

Lake Macquarie Local Environmental Plan 2004

The IPLCC site is currently zoned 4(1) Industrial (core) zone. The proposed structure demolition and remediation of the IPLCC lands is consistent with the objectives of the current site zoning. These objectives include:

- Ensuring that industries are designed and located so as not to cause unacceptable environmental harm or adversely affect the amenity of the environment, including residential neighbourhoods.
- Providing for sustainable water cycle management.

The remediation of the IPLCC site will ensure improvements to amenity and groundwater quality. This would contribute to the establishment of sustainable water cycle management practices.

5 STAKEHOLDER ENGAGEMENT

5.1 Introduction

Appropriate and effective communications and consultation with relevant stakeholders is important to the success of the remediation works proposed for Cockle Creek. Preliminary communications and consultation with some of these stakeholders has already commenced.

The following provides an overview of the consultation activities carried out to date for the project as well as the consultation activities proposed to occur during the preparation of the Part 3A environmental assessment.

5.2 Consultation activities to date

Stakeholder meetings

Introductory meetings with some of the relevant project stakeholders including the NSW Department of Planning, NSW Department of Environment and Conservation and Lake Macquarie City Council have already been undertaken. The purpose of these meetings was to provide some of these stakeholders with a broad overview of the remediation works planned for the Cockle Creek site, and to gain initial feedback from them regarding the key issues to be addressed in the environmental assessment report.

While the feedback and information gained from the meetings undertaken has been valuable, further engagement with these stakeholders and others, such as the Department of Health and Department of Natural Resources, is envisaged once the environmental assessment requirements have been received from the Director General.

Stakeholder scan

A comprehensive stakeholder scan has been prepared to support this application for demolition and remediation works at Cockle Creek. The stakeholder scan was prepared for internal use only and its key objectives were to identify the various stakeholders holding an interest in the project and their likely views. The results of the scan reveal a number of government and non-government groups, local environment and other community groups who may hold an interest in the remediation project.

The purpose of the stakeholder scan was also to inform the development of a communications and consultation strategy. The communications and consultation strategy would be devised and implemented in conjunction with the preparation of the detailed environmental assessment and it would ensure that stakeholders at all levels are consulted with appropriately.

Community consultation

Incitec Pivot has a commitment to the community to communicate openly about its activities and report progress on its safety, health and environmental performance. Incitec Pivot would maintain this commitment throughout the preparation and implementation of the remediation project and the communications and consultation strategy previously mentioned would be used to ensure that the community is provided with opportunities to raise issues or access information regarding the project.

There is currently a broad level of awareness within the local communities of Boolaroo, Speers Point and Argenton regarding the proposed remediation works at the Incitec Pivot site. In April 2006, Incitec Pivot issued a media release that informed stakeholders of its decision to close the Cockle Creek manufacturing plant to allow for remediation and development of the site for alternative use. The article received coverage in the local media including The Newcastle Herald.

5.3 Pasminco Cockle Creek Smelter consultations

A number of stakeholder and community groups relevant to this remediation project have been contacted as a result of consultation activities undertaken in relation to the remediation program at the neighbouring Pasminco Cockle Creek Smelter (PCCS) site. The environmental assessment report prepared for the remediation of the PCCS site states that meetings with various government departments were held, newsletters prepared and distributed to the local community and a press release issued to the local media. The report also stated that limited feedback was received from the community regarding the PCCS project.

While some of the issues involved in the remediation of the Incitec Pivot site are similar to those involved at the PCCS, Incitec Pivot is committed to undertaking its own communications and consultation program, tailored to the specific details of the project and building on its existing relationship with stakeholders.

5.4 Proposed communications strategy and consultation activities

As stated above, in conjunction with the preparation of the environmental assessment, a communications and consultation strategy would be developed to ensure that stakeholders at all levels are consulted and appropriately informed about the proposed remediation works.

The proposed strategy would include specific communications objectives and outcomes and would guide the consultation methods used for the project. Overall, the objectives of the strategy would include ensuring that stakeholders are informed of the remediation project, and ensuring that any areas of stakeholder concern are identified and addressed. It is anticipated that a variety of communications and consultation methods would be employed and these methods are expected to include written correspondence to stakeholders, media releases, information flyers and newspaper advertisements, website information, community information sessions and letter box drops where appropriate.

Implementation of the communications strategy and appropriate consultation is expected to assist in achieving a remediation proposal that is both environmentally sound and acceptable to the stakeholders concerned.

6 PRELIMINARY ENVIRONMENTAL ASSESSMENT

6.1 Overview

A number of environmental studies have been conducted for the IPLCC site. These studies have generally focussed upon examining the contaminants present at the site. There have also been several studies conducted for the neighbouring PCCS lands which surround the IPLCC site that are relevant to the subject site. These studies cover a broad range of environmental issues.

As previously outlined, contaminants located at the site include heavy metals (zinc, mercury, cadmium, copper, lead, nickel), asbestos, phosphorous and sulphate. Contaminants have been found across the site in soil, groundwater and several of the existing buildings at the site.

The proposed works would be undertaken over a period of approximately two years. Impacts associated with construction works would therefore be temporary and solely related to the demolition and remediation activities.

Environmental impacts of the demolition and remediation works proposed for the site relate to the impacts on surrounding residential development, the PCCS lands and Cockle Creek. Human health risks associated with exposure to contaminated materials are considered relatively low due to the nature of these materials and the management procedures proposed for the demolition and remediation works.

A preliminary environmental assessment and proposed mitigation measures to minimise potential impacts on the site and its surrounding areas have been outlined in **Table 3**.

Table 3 Assessment of environmental issues

Issue	Impacts	Proposed mitigation measures
Air quality	<p>During the proposed demolition and remediation works, there exists potential for air pollutants. Air pollutants may include:</p> <ul style="list-style-type: none"> ▪ Dust produced from demolition and excavation works, site traffic movements and high winds events at the site. Dust from the site may include soil contaminants such as heavy metals, sulphur and phosphorous. ▪ Vehicle emissions from remediation equipment and machinery. 	<p>An Air Quality Management Plan would be prepared as part of the project's Construction Environmental Management Plan (CEMP). Measures would include:</p> <ul style="list-style-type: none"> ▪ Use of bunding to prevent excavated material and clean fill becoming airborne. ▪ Dampening soil to minimise soil becoming airborne. ▪ Erecting dust screens during dry periods. ▪ Covering truckloads during movements to and from the site. ▪ Early stabilisation of the site following site disturbances.
Soil and water	<p><i>Soils</i></p> <p>The proposed remediation works would significantly improve the soil quality of the site through the removal of contaminants from the site.</p> <p>Previous site investigations have identified that contaminated soil is located between surface level to a maximum depth of 8 metres below ground level across the site. As previously outlined, soil contaminants include heavy metals, sulphur and phosphorous. Soil contaminants identified at the site have potential for leaching.</p> <p>According to Lake Macquarie City Council's Acid Sulphate Soil Planning Map, there exists potential for the IPLCC site to be affected by Acid Sulphate Soils.</p> <p>The excavation works and the site's topography mean that the site will be highly susceptible to erosional impacts.</p>	<p>A soil and water management plan would be prepared to address potential soil water impacts. This plan would be included in the CEMP.</p> <p>Key components of the plan would address soil, water & groundwater testing, site stabilisation and management techniques for acid sulphate soils.</p> <p>The plan would also include contingency measures should an unexpected event be encountered during the proposed works.</p> <p>Mitigation measures would include:</p> <ul style="list-style-type: none"> ▪ Adoption of silt fencing to prevent excavated materials contaminating the site's dam and nearby Cockle Creek. ▪ Use of geotextile on exposed surfaces to minimise erosional impacts and stabilise the site.

Issue	Impacts	Proposed mitigation measures
	<p><i>Surface water</i></p> <p>The proposed excavation works during the remediation process may expose significant proportions of the site. This is particularly relevant to the area surrounding the small dam, which is on the PCCS lands adjacent to the IPL site in the south.</p> <p>Excess water attributed to dust suppression and rainfall events at the site may produce surface flows. The site's existing soil contaminants and pollutants from vehicles and machinery may contribute to the contamination of surface water, which could potentially impact the water quality of the dam located in the south-east of the site and Cockle Creek.</p> <p><i>Groundwater</i></p> <p>The proposed remediation works will significantly improve groundwater. The remediation works will ensure that contaminant concentrations are significantly reduced, which will have positive implications for the IPLCC & PCCS site's and nearby Cockle Creek.</p> <p>Groundwater contaminants at the site include heavy metals such as dissolved zinc and mercury. The extraction and treatment of groundwater onsite at a heavy metal treatment facility will create improvements to the site's groundwater.</p>	<ul style="list-style-type: none"> ▪ Coordination with the owners of the PCCS site to install an overflow pipe within the dam, to feed below the IPLCC site. ▪ Storage and handling of fuels and liquids in bunded storage areas in accordance with relevant EPA standards and legislation. ▪ Provisions for an onsite shakedown area for the removal of soil and material from vehicle tyres and machinery. ▪ Sediment and erosion controls on slopes where works are near the dam. Controls are to be removed once the area is stabilised. ▪ Use of a double barrier HDPE/GCL lining system for the cell membrane and cell capping to minimise the potential for leachate.

Issue	Impacts	Proposed mitigation measures
Mine subsidence	<p>The IPLCC site has been identified as being located within a mine subsidence district. During the 1940s the Sulphide Corporation undertook shallow underground mining at the PCCS site.</p> <p>The location of the site within a mine subsidence district means that there exists potential for subsidence events during the proposed works.</p>	<ul style="list-style-type: none"> Obtain approval from the Mine Subsidence Board. Conduct preliminary geotechnical investigations to determine the likelihood of subsidence events across the IPLCC site. As part of these investigations, the mine working plans used by the Sulphide Corporation in the 1940s will be reviewed to identify any fault structures encountered during mining operations at the neighbouring site. Following further investigations, a Mine Subsidence Management Plan would be prepared and included in the project CEMP.
Noise and vibration	<p>The proposed demolition and remediation works are likely to create noise and vibrational impacts. These impacts may affect nearby residents to the south of the site and the PCCS lands to the north, east and west of the site.</p> <p>Noise associated with the demolition works would be caused by building demolition, disassembling equipment as well as vehicle and machinery operations. It is anticipated that there would be minor vibrational impacts during demolition works that would be associated with the removal of existing structures.</p> <p>Noise associated with the remediation works is likely to be associated with vehicle and machinery operations and the operation of the on-site groundwater heavy metal treatment facility.</p> <p>It is expected that remediation works would also have minor vibrational impacts. These impacts would be associated with the construction of the extraction wells and the operation of the treatment facility.</p>	<p>A Noise and Vibration Management Plan would be prepared and included in the CEMP. Mitigation measures would include:</p> <ul style="list-style-type: none"> Restrictions on construction hours to those prescribed in the Director-General requirements. Fitting residential-type silencers on stationary and mobile equipment where possible. Notifying local residents of scheduled works and providing contact names and numbers for the site office. Making sure that machinery and vehicle engines are not left running when not in use. Undertaking noise monitoring where required. Completing noisy construction activities in the minimum time practicable. Erecting temporary noise barriers (i.e. trucks, shipping containers) near residential receivers.

Issue	Impacts	Proposed mitigation measures
	Predicted noise levels are unlikely to exceed the EPA noise criteria during proposed restricted work hours. It is also unlikely that the vibrational impacts will cause any structural damage.	
Heritage	<p>The IPLCC plant operations were established during the early twentieth century. Preliminary investigations have revealed that the IPLCC site does not have local or state heritage status.</p> <p>Due to the extent of site's contamination it is unlikely that the proposed works would retain any of the site's existing buildings.</p>	<ul style="list-style-type: none"> ▪ A heritage impact assessment would be undertaken to identify heritage significant site's prior to the commencement of works. ▪ Should significant site's be identified as being heritage significant, measures would be taken to record the heritage items. ▪ A heritage action plan would be prepared to ensure adequate provisions to prevent impacts on the disused railway line.
Indigenous heritage	Preliminary examination of relevant reports and discussions with stakeholders indicate that the site is not believed to be of indigenous heritage significance.	<ul style="list-style-type: none"> ▪ Review the Lake Macquarie Heritage Study Report. ▪ Prepare an indigenous heritage impact assessment. ▪ Prepare an indigenous heritage action plan that details the process for dealing with the discovery of indigenous artefacts at the site, should this occur.

Issue	Impacts	Proposed mitigation measures
Flora and fauna	<p>Preliminary site observations have identified that the IPLCC site appears to be relatively devoid of any significant flora and fauna.</p> <p>It is therefore unlikely that the proposed demolition and remediation works will have significant impact on flora and fauna.</p>	<p>Flora and fauna investigations would be conducted to identify whether the proposed works will have any detrimental impacts on the site's flora & fauna.</p> <p>A flora and fauna management plan would be prepared and included as part of the CEMP. Measures would include:</p> <ul style="list-style-type: none"> ▪ The avoidance of all unnecessary clearing and disturbance of native vegetation at the site. ▪ Provisions for monitoring and controlling weeds at the site during the proposed works.
Hazards and risk	<p>The demolition works will require transportation and the disposal of hazardous construction materials such as asbestos and chemical residue.</p> <p>It is expected that the remediation works would involve limited transportation and the use and disposal of hazardous materials.</p> <p>Potential hazards associated with the proposal include:</p> <ul style="list-style-type: none"> ▪ Physical hazards associated with construction works that may result in injury to personnel and/or damage to equipment. ▪ Damage to asbestos sheeting during demolition works and/or transportation to the landfill. ▪ Inhalation of contaminated dust. ▪ Release of contaminants into the environment. ▪ Erosion of topsoil and sedimentation of local waterways. ▪ Contaminated soil potentially spilling from a truck in the event of an accident. 	<p>A health and safety plan would be prepared. The measures would include:</p> <ul style="list-style-type: none"> ▪ The storage, handling and transportation of hazardous materials and liquids in accordance with relevant legislation, guidelines and standards. ▪ Erection of temporary fencing to prevent the public from accessing the site. ▪ Provisions for undertaking risk assessments on site to identify and manage potential environmental and safety risks.

Issue	Impacts	Proposed mitigation measures
Visual amenity	<p>It is likely that the proposed works will have a visual impact. These impacts will be associated with the demolition of existing structures, the erection of a heavy metal treatment facility, excavation works and associated equipment.</p> <p>The greatest visual impacts during the proposed works will be on the PCCS lands. It is expected that visual impacts on nearby residences will be minimal.</p> <p>Visual impacts associated with the proposed works will be temporary. The removal of the existing structures and the remediation of the site will provide scope for significant improvements to the site's visual amenity.</p>	<p>Mitigation measures for minimising visual impacts during the works may include:</p> <ul style="list-style-type: none"> ▪ Erecting perimeter fencing around the site. ▪ Ensuring that the site and surrounding areas are kept tidy at all times. ▪ Keeping visible equipment onsite for the shortest period possible.
Land use impacts	<p>The proposed works will have positive implications for the site by improving the future use options for the site. It is anticipated that the demolition and remediation works will be carried out to a standard that will allow for a variety of future uses.</p> <p>The proposed works will also create significant improvements to the surrounding areas through improvements to the local environment.</p>	<p>Mitigation measures include:</p> <ul style="list-style-type: none"> ▪ Remediate the site to optimal land use standards to ensure future land use options are maximised.
Socio-economic impacts	<p>The works will create improvements to the local environment and local citizens quality of life.</p> <p>It is likely that the proposed works will have a positive impact on the regions employment by generating employment opportunities.</p>	No mitigation measures proposed.

Issue	Impacts	Proposed mitigation measures
Traffic	<p>The proposed demolition and remediation works are likely to have impacts on local traffic flows.</p> <p>It is anticipated that the proposed works will generate increases in local traffic flow throughout the areas surrounding the site.</p>	<p>A traffic management plan would be prepared and included within the CEMP. Mitigation measures would include:</p> <ul style="list-style-type: none"> ▪ Notifying affected residents of expected traffic impacts. ▪ Carrying out construction traffic outside peak periods when possible.
Waste and resources	<p>The proposed works will have waste and resource implications.</p> <p>It is anticipated that the works will create increased demand on local and regional resources through the use of energy, water and waste generation.</p> <p>However it is expected that the works will also facilitate improvements to local and regional resources by creating land use and environmental improvements to the site and surrounding areas.</p> <p>Construction workers employed to carryout the proposed works will generate domestic waste. If not managed properly this waste has the potential to impact the site and its surrounding areas.</p> <p>It is unlikely the proposed works will create significant strain on local and regional resources.</p>	<p>A waste management plan would be prepared and included within the CEMP. Mitigation measures include:</p> <ul style="list-style-type: none"> ▪ Provisions for portable amenities onsite. ▪ Providing onsite waste disposal facilities. ▪ Storing waste onsite in bunded stockpiles.

The following studies on the site form background to the Preliminary Application:

- November 1992 – Preliminary and Supplementary Investigations into Groundwater in the vicinity of the Boolaroo Refinery, for Pasminco Metals-Sulphide Pty Ltd (Technical Report No. 4). Environmental and Earth Sciences Pty Ltd.
- December 1992 – Preliminary Hazard Analysis of the Proposed Upgrade of Smelter Facilities, Boolaroo, NSW (Technical Report No. 11). Industrial Risk Management.
- September 1993 – Preliminary Site Contamination Assessment, Main Road, Boolaroo, for Incitec Limited. Resource Planning Pty Limited.
- April 1994 – Review and Summary of Available Data, Soil Lead Distribution around Boolaroo Smelter (Technical Report No. 9). Dames & Moore.
- June 1995 – Groundwater Discharge Study of the Sulphide Corporation Refinery, Boolaroo, NSW, June 1995. Environmental and Earth Sciences Pty Ltd.
- July 1996 – *Hydrochemistry of the Munibung Catchment Boolaroo, New South Wales, Australia*. Andrew P. Dawkins, UNSW Groundwater Centre, Dept. of Applied Geol. UNSW.
- 17 Feb. 1999 – *Investigation of Water Trends 1992–1999*. Howard Bridgman, Pasminco Cockle Creek Smelter Pty Ltd.
- 22 June 2003 – *Detailed Environmental Assessment, for Incitec Fertilizers, Cockle Creek Plant, Main Road, Boolaroo*. URS Australia Pty Ltd.
- 18 July 2003 – *Interpretive Environmental Assessment, for Incitec Fertilizers, Cockle Creek Plant, Main Road, Boolaroo*. URS Australia Pty Ltd.
- December 2004 – *Overall Soil and Groundwater Assessment, Incitec Pivot Limited Cockle Creek Plant, Main Road, Boolaroo*. URS Australia Pty Ltd.
- March 2006 – *Draft – Remediation Cost Estimate Incitec Pivot Cockle Creek Site*. Thiess Services.
- September 2006 – *Draft – Environmental Site Assessment: Cockle Creek Manufacturing & Distribution Facility, Boolaroo, New South Wales*. Soil and Groundwater Consulting.

8 REFERENCES

- Incitec Pivot (2006) Fertiliser plant site to be closed by 2009 [online] Available at: <http://www.incitecpivot.com.au/> [Accessed 4.12.06].
- NSW EPA (2005) Declaration of remediation site [online] Available at: <http://www.epa.nsw.gov.au/clm/docs/html/N21077.htm> [Accessed 12.12.06].
- Soil & Groundwater Consulting (2006) Environmental Site Assessment: Cockle Creek Manufacturing & Distribution Facility, Boolaroo, New South Wales (Draft).
- (a) Soil & Groundwater Consulting (2006) Soil & Groundwater Remediation Cost Estimates: IPL Cockle Creek, Boolaroo, New South Wales (Draft).
- Surveyor Generals Department (1999) City of Lake Macquarie: Acid Sulphate Soil Planning Map – Sheet 1 [online] Available At: http://www.lakemac.com.au/files/acid_sulphate/Map1.pdf [Accessed 22.1.07].