

Prepared for Incitec Fertilizers Limited NOVEMBER 2008

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# Statement of validity

#### **Submission of environmental assessment**

Prepared under Part 3A of the Environmental Planning and Assessment Act 1979.

#### **Environmental assessment prepared by**

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In respect of:	Incitec Fertilizers Limited

#### **Applicant and land details**

Applicant name:	Incitec Fertilizers Limited
Applicant address:	70 Southbank Boulevard
	Southbank VIC 3006
Proposed development:	Incitec Fertilizers Limited proposed to undertake targeted groundwater remediation at their Site in Boolaroo, NSW.

#### Certification

Certification:	I/we certify that I/we have prepared the contents of the environmental assessment in accordance with the Director-General's requirements dated September 2008, and that to the best of my/our knowledge, the information contained in the environmental assessment is neither false nor misleading.
Signature:	VJJ1
Name:	Nick Johnson
Date:	19 November 2008

# **Executive summary**

Incitec Fertilizers Limited (IFL), a wholly owned subsidiary of the listed company, Incitec Pivot Limited, is seeking project approval under Part 3A of the *Environmental Planning and Assessment Act* 1979 (EP&A Act) to undertake Stage 1 of a four-stage contamination remediation program. These works are to be carried out at the Site (the Site). The Stage 1 works are urgent groundwater hotspot remediation works, including demolition of a disused timber gantry, aimed at addressing an existing 'significant risk of harm' to the environment, as determined by DECC, and commencing the overall remediation of the Site.

This project application is accordingly the first of two project applications to be submitted as part of the decommissioning and remediation of the Site. The project is being undertaken as a result of the decision by the Environment Protection Authority (EPA) to declare contamination of the Site a 'significant risk of harm'. This prompted IFL to offer a voluntary remediation proposal (VRP) to DECC which has resulted in a voluntary remediation agreement (VRA) being executed by the parties.

The works described in this application are referred to as the proposed project. They involve preparatory works to remove the timber gantry preventing access to groundwater hotspots, groundwater recovery and treatment along the northwest boundary of the Site, followed by the re-injection of the treated groundwater.

A number of treatment options have been considered in conjunction with DECC. Following review and analysis, it was determined that on-site treatment of affected groundwater is the quickest and most appropriate way to commence remediation.

Stages 2 to 4 of the project will be covered in a supplementary Part 3A application. These stages of the project incorporate the major remediation works, involving excavation, transport, and placement of significant quantities of contaminated soil material into a specially designed containment cell, to be constructed within the northern arm of the Site. Stages 2 to 4 will also include demolition of existing buildings and associated waste management.

The four-stage remediation project aims to rehabilitate the Site to a standard that will allow future residential development. The adjoining Pasminco lands are currently undergoing remediation, which has implications for the progress and impacts of the site remediation. Ongoing liaison with Pasminco will be undertaken in order to coordinate the remediation initiatives.

Stakeholders have been consulted throughout the project development phase and during preparation of this environmental assessment. A stakeholder and community consultation plan has been developed to promote continued and appropriate consultation throughout the project. This plan includes information on how stakeholders and the community can provide their feedback on the proposal. Consultation with stakeholders and the community will be ongoing.

An environmental risk assessment was undertaken to determine the potential impacts involved in the proposed project that include air quality, groundwater, soil, non-indigenous heritage, and waste and resource management. However, the assessment of these potential impacts shows that the actual environmental and community impacts associated with the Stage 1 works are relatively minor. The execution of the Stage 1 groundwater hotspot remediation works will make a considerable contribution

to addressing the significant risk of harm to the environment that currently exists on the Site. The objectives of the proposed project are strongly supported by DECC.

A draft statement of commitments is included in the environmental assessment and details the measures that will be undertaken to manage and/or mitigate the minor environmental impacts that could result from the proposed project.

# Glossary

Term	Definition
ANZECC	Australian and New Zealand Environment Conservation Council
Aquifer	An underground layer of water-bearing permeable rock or unconsolidated materials (e.g. gravel, sand, silt, or clay) from which groundwater can be extracted using a water well.
ASLP	Australian Standard Leaching Procedure
Bunded	A bunded area is an area surrounded by a wall, erected to prevent the escape of various emissions into the environment (liquids, noise) or the exposure of views.
CLM Act	Contaminated Land Management Act 1997 (NSW).
Containment cell	Area where contaminated materials are stockpiled and contained, generally by a capping system.
DECC	Department of Environment and Climate Change.
Dewatering	The process of separating solids from solution by sedimentation in tanks followed by filtering of the solids through a woven polypropylene membrane.
DGRs	Director-General requirements
DoH	Department of Health
DoP	Department of Planning
DWE	Department of Water and Energy
EA	Environmental Assessment
EIL	Ecological investigation level
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPA	Environment Protection Authority
ESD	Ecologically sustainable development
Fill	Material that has been historically used to alter surface contours.
Gantry	Supporting structure for railways, cranes etc.
Geotube®	Woven polypropylene bag of low permeability designed to retain solids whilst allowing free water to drain away.
Gradient	The steepness of a slope.
Groundwater	Water that is held underground, usually in an aquifer.

Term	Definition
HIL	Health investigation level
Hotspot	Area of high contamination
Hydraulic	Involves the movement by, or operation of fluid, especially water, under pressure
IFL	Incitec Fertilizers Limited
IPL	Incitec Pivot Limited
LEP	Local environmental plan
LGA	Local government area
LHRS	Lower Hunter Regional Strategy
Major Projects SEPP	State Environmental Planning Policy (Major Projects) 2005
Mg/L	Milligrams per litre
Mine subsidence	The caving or sinking of an area as a result of past mining activities
NEPM	National Environment Protection (Assessment of Site Contamination) Measure
NSW	New South Wales
PCCS	Pasminco Cockle Creek Smelter
рН	The measure of acidity or alkalinity of a solution
PPE	Personal protective equipment
Remediation	Removal of pollutants or contaminants from the localised environment.
RAP	Remediation action plan
SEPP	State Environmental Planning Policy
Site	The Site at 13 Main Road, Boolaroo, NSW which is Lot 1 on Deposited Plan (DP) 225720 located within the Lake Macquarie local government area about 12 km to the southwest of Newcastle. It should be distinguished from, and does not include, the Pasminco site which surrounds it.
Slag	The by-product of smelting ore to purify metals.
Surface water	Water that falls and/or collects on the surface of the ground.
TCLP	Toxicity Characteristic Leach Procedure
US EPA	United States Environmental Protection Agency
VRA	Voluntary remediation agreement
VRP	Voluntary remediation proposal

### 1 Introduction

#### 1.1 Proposal overview and background

In 2005, the IFL Cockle Creek Site (the Site) located in the township of Boolaroo, NSW, was declared a remediation site under Part 3, Division 3 of the CLM Act by the NSW EPA (referred to as *Declaration of Remediation Site*).

In response to the Site's remediation status, a commitment was made by IPL, the parent company of IFL, to remediate the Site, which was presented to the EPA in July 2008. The VRP has committed to remediating the land to a residential standard and was endorsed by the EPA as a voluntary remediation agreement on 7 August 2008. A copy of the VRA is provided in Appendix A.

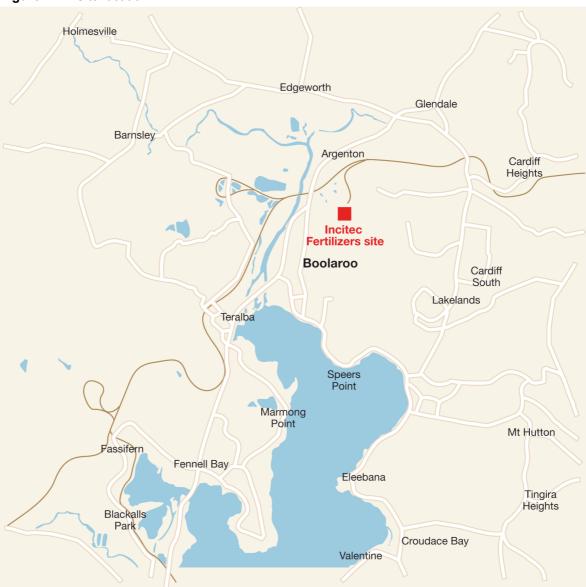
In order to facilitate the urgent groundwater remediation works indicated in the VRA, approval has been received from the NSW DoP for staged remediation works. An overview of the remediation proposed for the Site is provided in Chapter 3, with a more detailed plan contained in the conceptual RAP presented in Appendix B. Details of the project staging for remediation works is provided in Section 3.4.

This proposed project for the urgent groundwater remediation works is Stage 1 of the remediation strategy described in Chapter 4 and detailed in Appendix B to be undertaken at the Site. These works are necessary to reduce the contamination present in the groundwater and abate the significant risk of harm.

#### 1.2 Proposal location

The proposed project Site is located at 13 Main Road, Boolaroo, NSW (the Site). It is Lot 1 on Deposited Plan (DP) 225720 and is located within the Lake Macquarie local government area, about 12km to the southwest of Newcastle. The geographical context of the Site is shown in Figure 1. The Site is surrounded by a parcel of land owned by Pasminco, 'the Pasminco site', as shown in Figure 2. Cockle Creek is located approximately one kilometre to the west, with Lake Macquarie being approximately two kilometres to the south.

Figure 1 Site location



#### 1.3 The proponent

IFL is the proponent seeking project approval under Part 3A of the EP&A Act to undertake Stage 1 of the four-stage remediation strategy agreed to with DECC and the EPA.

IFL is a wholly owned subsidiary of IPL, which commenced operation in 2003, founded from the merger of IFL and Pivot Group. This environmental assessment is prepared on behalf of IFL.

IPL is currently Australia's largest fertiliser manufacturer, with operations encompassing the manufacturing, distribution and sale of fertilisers. The Site is one of the company's manufacturing and distribution plants. As a result of a recent rationalisation of sites, the Site is due to cease its manufacturing operations around September 2009.

#### 1.4 Structure of this environmental assessment

Broadly, the structure of this EA is as follows:

- **Introduction** provides a broad overview of the proposed project and a general description of the Site (Chapter 1).
- Planning framework provides an overview of the legislative framework, approvals process, environmental planning instruments and strategic planning context for the proposed project (Chapter 2).
- **Remediation strategy** outlines the overall remediation strategy for the Site and the relationship of this proposed project to that strategy (Chapter 3).
- **Project description** identifies the need for the proposed project, the alternatives considered and provides a detailed description of the proposed project (Chapter 4).
- Stakeholder consultation outlines stakeholder consultation undertaken for the environmental assessment (Chapter 5).
- **Environmental risk analysis** provides details of a risk assessment for the potential environmental impacts of the proposed project (Chapter 6).
- **Environmental assessment** outlines the assessment and analysis of environmental issues and impacts (chapters 7 and 8).
- **Draft statement of commitments** describes proposed management and monitoring measures identified by the environmental assessment (Chapter 9).
- **Project justification and conclusion** justifies the proposed project and summarises the environmental issues (Chapter 10).

The proponent is required to prepare an EA for the project in accordance with the DGRs issued by the DoP on 29 September 2008. The DGR requirements and their location in this report where each has been addressed are shown in Table 1. A complete copy of the DGRs can be found at Appendix C.

Table 1DGRs checklist

Director-General's requirements	Location in report
General requirements	
An executive summary.	Start of document
<ul> <li>A description of the overall remediation strategy for the Site, including the:</li> <li>Objectives of the remediation strategy.</li> <li>Proposed staging of the strategy.</li> <li>Relationship between the various stages.</li> </ul>	Chapter 3
A detailed description of the project, including the:     Need for the project.     Alternatives considered.	Chapter 4
<ul> <li>Remedial Action Plan for the project, which includes:</li> <li>Characterisation of the nature and extent of contaminated material.</li> <li>Details of the proposed remediation process including on-site treatment processes.</li> <li>Details of proposed remediation management measures, including justification of the remediation criteria and proposed disposal of</li> </ul>	
<ul> <li>treated groundwater.</li> <li>A site validation plan.</li> <li>Plans of the proposed extraction and treatment system.</li> </ul>	
A risk assessment of the potential environmental impacts of the project, identifying the key issues for further assessment.	Chapter 6
<ul> <li>A detailed assessment of the key issues specified below, and any other significant issues identified in the risk assessment, which include:</li> <li>A description of the existing environment, using sufficient baseline data.</li> <li>An assessment of the potential impacts of all stages of the project, including any cumulative impacts, taking into consideration any relevant guidelines, policies, plans and statutory provisions (see below).</li> <li>A description of the measures that will be implemented to avoid, minimise, mitigate, rehabilitate/remediate, monitor and/or offset the potential impacts of the project, including detailed contingency plans for managing any potentially significant risks to the environment.</li> </ul>	Chapter 7
A statement of commitments, outlining all the proposed environmental management and monitoring measures.	Chapter 9
A conclusion justifying the project on economic, social and environmental grounds, taking into consideration whether the project is consistent with the objects of the <i>Environmental Planning &amp; Assessment Act 1979</i> .	Chapter 10
A signed statement from the author of the Environmental Assessment, certifying that the information contained within the document is neither false nor misleading.	To be provided prior to lodgement.

Director-General's requirements	Location in report
Key issues	
Soil and Water – including:	Section 7.1
An assessment of the potential groundwater and surface water impacts.	
<ul> <li>Demonstration that the groundwater extraction system will prevent contaminated groundwater from migrating to adjacent properties.</li> </ul>	
<ul> <li>Where re-injection of groundwater is proposed, an assessment of the mobilisation of contamination off-site as a result of the re-injection.</li> </ul>	
Construction – including:	Section 7.2
Details of the construction methodology/activities and scheduling.	
Erosion and sediment control.	
Surface water/groundwater management.	
Noise and air quality management.	
Traffic management.	
• Waste.	
Operation – including:	Section 7.3
<ul> <li>Details of maintenance requirements and ongoing management and monitoring during operation of the treatment plant.</li> </ul>	
<ul> <li>Waste including a classification of all potential sources of liquid and non-liquid wastes, quantities, storage, treatment and disposal or re-use of waste generated.</li> </ul>	
Heritage	Section 7.4
Consultation	
During the preparation of the environmental assessment, you should consult with the relevant local, state or commonwealth government authorities, service providers, community groups or affected landowners. In particular, you must consult with the:	Chapter 5
Department of Environment and Climate Change.	
Department of Water and Energy.	
NSW Department of Health.	
Mines Subsidence Board.	
Lake Macquarie City Council.	
The administrators of the Pasminco Cockle Creek Smelter Site.	
The consultation process and the issues raised must be described in the environmental assessment.	

# 2 Planning framework

The legislative framework for this proposed project and the relevant environmental planning instruments are discussed below.

#### 2.1 Declaration of remediation site

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

On 22 July 2005 the Site was declared to be a remediation site under Part 3, Division 3 of the CLM Act. Under Section 21 of the CLM Act:

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 Site as a remediation site, IFL prepared a VRA to remediate the Site to a residential standard. This was endorsed by the EPA on 7 August 2008. A copy of the VRA is provided in Appendix A.

#### 2.2 Approval requirements under Part 3A

The EP&A Act provides a framework for environmental planning and assessment in NSW. Part 3A of the EP&A Act provides an assessment and approval process for major infrastructure projects. As outlined under section 75B of the Act, Part 3A 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.'

As outlined in clause 28 of the *State Environmental Planning Policy (Major Projects) 2005* (SEPP Major Projects), developments for which the policy applies to a remediation project 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 under Division 3, Part 3 of the CLM Act, it was subsequently included under SEPP Major Projects. This legislation has since been amended and now does not include all declared remediation sites. However, based on transitional provisions provided under the gazettal of the legislative amendment stating that 'The amendments made to this Policy... do not extend to project applications under Part 3A of the Act, and development applications under Part 4 of the Act, made but not finally determined before the commencement of those amendments', approval for the proposed project remains subject to assessment under Part 3A of the EP&A Act.

#### 2.3 Strategic planning context

The Site is subject to various regional and local planning strategies. The relevance of these to the proposed project is discussed below.

#### Lower Hunter Regional Strategy 2006-31

The NSW Government's *Lower Hunter Regional Strategy 2006–31* (DoP, 2006) is a land use planning strategy which outlines provisions for ensuring sustainable development within the Lower Hunter region over the next 25 years.

The strategy applies to five LGAs located within the Lower Hunter region, these being Newcastle, Lake Macquarie, Port Stephens, Maitland and Cessnock. The strategy identifies Glendale/Cardiff as the nearest emerging major regional centre.

Furthermore, the strategy includes provisions for ensuring sufficient land for housing and employment, the protection of high quality agricultural land and natural resources, as well as the delivery of services and infrastructure across the lower Hunter region.

The Lower Hunter Regional Strategy is significant to the Site as it provides a framework for future use of the Site and its surrounding lands. The strategy aims to provide for up to 115,000 new dwellings by 2031, to meet the demand for an additional 160,000 people. Remediation and decommissioning of the Site to a level that is suitable for potential future residential development supports this aim of the strategy.

#### Draft land use strategy - Munibung Hill

Lake Macquarie City Council commissioned Dickson Rothschild to prepare the *Draft land use strategy – Munibung Hill* (September 2005). The draft strategy applies to the Munibung Hill area, including the townships of Boolaroo, Argenton and large landholdings within the area, such as the Pasminco lands and the Site.

This draft strategy reviews the opportunities and constraints facing the Munibung Hill area, identifies areas where changes in land use may occur and also gives consideration to the area's future infrastructure requirements.

This draft strategy was prepared prior to the emergence of IFL's decision to close their Cockle Creek operations and remediate the Site. As such the applicability of the strategy is limited. However, this draft strategy remains significant to the Site in so far as its suggestions for the future land use of the Site and the surrounding Pasminco lands as well as its comments on the areas' future infrastructure requirements.

#### 2.4 Environmental planning instruments

Various SEPPs and LEPs are relevant to this proposed project. There are no regional environmental plans (REPs) relevant to the proposed project.

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

SEPP Major Projects aims to identify developments of economic, environmental and social significance either at a regional or state level within NSW. The policy provides consistency in the assessment and approvals process for developments identified as being of state or regional significance.

The declaration of the Site as a remediation site in 2005 under Division 3, Part 3 of the CLM Act means that the remediation of the Site is subject to inclusion under SEPP Major Projects and is therefore subject to assessment under Part 3A of the EP&A Act. As mentioned in Section 2.2, this legislation has been amended. However, due to the savings and transitional provisions accompanying that amendment, this project remains under Part 3A of the EP&A Act.

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

The proposed project at the Site is aligned with the aims of SEPP 55 Remediation of Land (SEPP 55). The objective of this policy is to provide a statewide planning approach for the remediation of contaminated land, for the purpose of reducing the risk of harm to human health and the environment. Given that the Site presents a significant risk of harm as determined by to DECC, the remediation of the Site is consistent.

#### Lake Macquarie Local Environmental Plan 2004

The Site is currently in a 4(1) Industrial (core) zone. The proposed demolition of structures and remediation of the Site 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 Site will facilitate improvements to amenity and groundwater quality and contribute to sustainable water cycle management practices. The remediation will be carried out in accordance with the VRA entered with the EPA as well as other EPA regulatory requirements to ensure that the significant risk of harm is abated.

#### Lake Macquarie Development Control Plan No 1 (Revision 02)

Part 2.1 – Environmental responsibility and land capability of Lake Macquarie Council's Development Control Plan (DCP) aims to provide initial project guidance to all projects to ensure the retention of Lake Macquarie's environmental values.

The Council aims to ensure there is no unacceptable risk to human health or the environment from land that may have been previously contaminated. The remediation strategy for the Site will support this aim.

#### 2.5 Heritage

A heritage assessment has been prepared for this EA and is provided at Appendix D. The heritage assessment determined that no previously recorded historic heritage sites existed within the study area and no items of state significance have been identified. However, items of local significance do exist within the study area and these are further detailed in Section 7.4.

Given that the proposal will be assessed under Part 3A of the EP&A Act an excavation permit under section 139 of the *Heritage Act 1997* is not required. However, notification will still be required under section 146 if any archaeological relics are found during construction or operation of the project.

# 3 Site description and overall remediation strategy

#### 3.1 Site description and history

#### Site and surrounds history

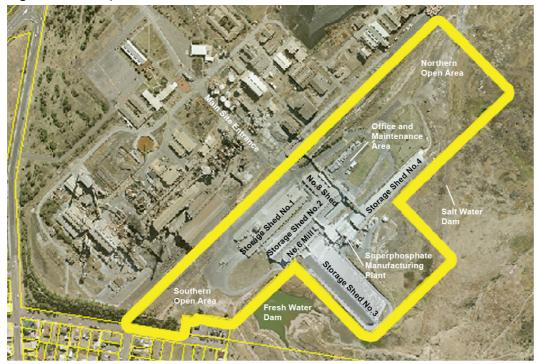
The proposed project Site is located immediately east of the former Pasminco zinc and lead smelter, as shown on Figure 2 and the study area for Stage 1 of the remediation strategy is the northern portion of the Site. Prior to 1969, the Site was part of the Pasminco facility, but was subsequently sold to a predecessor of IFL. Pasminco provided sulphuric acid to IFL for the manufacture of superphosphate until 2003, when the smelter operations shutdown. A combination of the current Site use and the surrounding historical operations has resulted in heavy metal contamination of the soil and groundwater on and under the Site.

Figure 2 Study area



Figure 3 also illustrates the site plan for the Site.

Figure 3 Site plan



The main entrance to the Site occurs at the western boundary. The access road passes through Pasminco land and connects the Site to Main Road.

A fertiliser manufacturing plant and storage facility is currently operated on the Site by IPL. This Site contains numerous buildings for administration, maintenance, dispatch, manufacture and storage of fertiliser products. The Site is to be progressively decommissioned following rationalisation of IPL's manufacturing facilities, with the Site buildings and infrastructure to be removed as part of the overall remediation project. The internal roadways are either concrete or bitumen and are in good condition.

The central part of the Site includes a superphosphate manufacturing area with a large number of adjacent storage sheds. These sheds are used for phosphate rock and superphosphate while other buildings in the area house crushers and other infrastructure. The sheds and buildings are largely constructed from corrugated steel and cement sheeting containing asbestos fibre with concrete floors.

#### **Topography**

The Site is located on a sloping section of Munibung Hill, overlooking the Cockle Creek valley. The peak of Munibung Hill occurs to the east of the Site, with the topography sloping steeply to the west.

The naturally westerly sloping topography of the Site has been altered to allow the construction of the existing Site facility and infrastructure. The slag material used to alter the topography is typically fine grained, black and contains elevated heavy metal concentrations, making it the primary source of contamination at the Site. Other parts of the Site have been filled with reworked surface materials and inert wastes, such as old plant machinery from the Pasminco land.

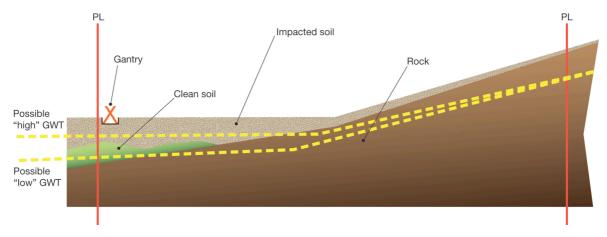
A freshwater dam is located immediately outside the south-eastern area of the Site, and falls predominantly on the Pasminco land. The spillway occurs within the Site.

The nearest surface water body is Cockle Creek, which is located approximately one kilometre to the west of the Site, with Lake Macquarie approximately two kilometres to the south.

#### Hydrogeology

Off-site hydrogeology assessments have not been conducted as part of the investigations of the Site. However, previous investigations have been undertaken at the adjacent Pasminco lands which form the basis of this proposed project. These investigations identified a shallow groundwater system within fill materials and a deeper natural groundwater aquifer. This appears consistent with the groundwater encountered at the Site and is illustrated in Figure 4.

Figure 4 Indicative groundwater system



The investigations at the Site indicated that groundwater is present in both the fill and natural materials, at a depth of between approximately one and 12 metres, although slightly artesian conditions have been identified in one portion of the north-eastern area. Groundwater flow is typically in a westerly direction, towards Cockle Creek. However, there are local variations to flow due to the ongoing dewatering activities occurring at the Teralba Colliery, to the west of the Creek. When the colliery is closed or dewatering activities cease, the regional groundwater environment will be expected to return to its natural flow pattern, with discharge to Cockle Creek or Lake Macquarie. For further detail regarding the hydrogeology at the Site see the conceptual RAP in Appendix B.

#### 3.2 Remediation strategy description

#### **Preliminary studies**

The extent of contamination in soil and groundwater has been identified and described following detailed soil and groundwater investigations across the Site over a number of years. Most recently these studies have included a remediation cost estimate by Thiess Services, a conceptual hydro geological model and preliminary numerical modeling report, an environmental site assessment, and further environmental investigations (all undertaken by Soil and Groundwater Consulting).

A full summary of environmental investigation reports conducted at the Site and the Pasminco land is provided in Appendix B.

The literature review and subsequent field investigations found that both the soil and groundwater on-site had been heavily contaminated and that remediation was required. Major aspects of the soil investigations include:

- Elevated concentrations of heavy metals for a large number of fill soil samples with many exceeding the National Environment Protection (Assessment of Site Contamination) Measure (1999) health based investigation levels (HIL) for commercial industrial land use (HIL F).
- Concentrations of total phosphorus were generally elevated in surface and fill samples.
   The maximum concentration detected was 102,000 mg/kg, which significantly exceeds the NEPM ecological investigation level (EIL) of 2,000 mg/kg.
- Concentrations of sulphate were generally elevated with the maximum concentration detected of 14,000 mg/kg.
- Concentrations of calcium were generally elevated with the maximum concentration detected of 241,000 mg/kg.
- US EPA Toxicity Characteristic Leach Procedure (TCLP) and Australian Standard Leaching Procedure (ASLP) leach testing indicates that the metals in fill materials at the Site are highly leachable.

A similar literature review and field investigations were conducted to characterise the extent and nature of the groundwater contamination. The major aspects of these investigations were:

- The primary metal contaminant of concern is zinc, with a maximum concentration detected in the 2006 investigation of 28 mg/L compared with the ANZECC (2000) freshwater ecosystem protection criterion 0.015 mg/L. More recent results from the northern investigation have reported zinc concentrations up to 7,000 mg/L in the shallow natural aquifer.
- A range of other heavy metals including cadmium, copper, lead, mercury and nickel occur at concentrations exceeding the ANZECC (2000) ecosystem protection criteria. Elevated metal results are typically associated with relatively low pH groundwater.
- Whilst the southern area (in the infilled gully area) was the initial concern and the reason for the EPA's issue of the *Declaration of Remediation Site*, recent investigations have indicated that the groundwater in the northern area of the Site is more heavily impacted. This may be due to the increased potential for recharge and leaching in this area due to the lack of any hardstand surface cover.
- The distribution of groundwater contamination generally indicates that the highest groundwater concentrations are in areas where relatively large volumes of slag material are located directly hydraulically up gradient. This also tends to correspond with the highest soil concentrations and leachability results.
- The highest groundwater contaminant concentrations generally occur in the fill or shallow natural groundwaters.
- Low pH groundwater was encountered across the Site, with results ranging from 2.9 to 7.2. Almost all results were found to be below pH 7. The average groundwater pH was approximately 5.1.
- Nitrate was detected at concentrations up to 11 mg/L. This is considered to be an elevated level of
  nitrate although unlikely to require targeted remedial activity given potential for dispersion, dilution or
  utilisation prior to discharge. The highest nitrate results exceed the ANZECC (2000) trigger value for
  freshwater ecosystems (95% level of protection) of 0.7 mg/L.

A detailed analysis of the contamination can be found in Appendix B.

#### Options for remediation

An assessment of a number of remedial options was undertaken. The remediation option selected for the Site included the excavation of the metal contaminated soils, which are the primary source of the identified groundwater contamination, and disposal into a fully lined and sealed containment cell. Removing the contaminated soil will also remove the primary ongoing source of groundwater contamination at the Site. Further detailed information is provided in Appendix B and the VRA provided in Appendix A.

As part of the remediation works covered by this application, targeted and short-term groundwater remediation is proposed. These works are Stage 1 of the broader four-stage site remediation strategy and the subject of this EA. The groundwater remediation will be undertaken in the northern area of the Site, which is located in the proposed containment cell area. The groundwater remediation is proposed prior to commencing the remediation works associated with the containment cell to reduce the contaminant mass present in the groundwater system.

To ensure ongoing environmental management of the containment cell and a suitable buffer zone, IFL will retain the ownership and responsibility for this area, including the groundwater environment. This will ensure accessibility to the area for any future management requirements and provide a viable entity for future implementation of the environmental management plan.

The Site will be remediated to a standard that is suitable for residential development. Remediation criteria will be defined in the detailed RAP, completed in accordance with the conceptual RAP and the VRA entered with EPA (and endorsed by DECC). The detailed RAP will also be audited by a NSW EPA accredited site auditor.

It is noted that the groundwater in various parts of the divested area may contain contaminant concentrations that preclude extraction and use. However, it is difficult to remediate groundwater across the entire Site and there is a low potential for groundwater use in any future residential setting given the presence of a reticulated potable water supply system. As such, it is anticipated that a condition may be imposed as part of the audit outcome that restricts use of the shallow groundwater at the Site to minimise any potential risk to future residents.

The most relevant beneficial use (or environmental value) of groundwater at the Site, as defined in the DECC (2007) *Guidelines for the Assessment and Management of Groundwater Contamination, 2007*) is that of aquatic ecosystems. It is expected that any residual site groundwater contamination, once the complete remediation strategy has been implemented, will not preclude this environmental value. If this cannot be achieved then appropriate remediation or management measures will be put in place to ensure this environmental value is protected and the outcome of the audit with respect to this matter is suitably addressed.

#### 3.3 Objectives

#### Objectives regarding future land use

The Site will be remediated to a condition suitable for residential development, with the proposed containment cell and surrounding land area being remediated to a standard suitable for public open space (see Appendix B).

The cell landform will be planted with low-maintenance vegetation to ensure that erosion and sediment control measures will not be required. Engineering measures will be required for storm water, erosion and sediment management during site remediation works.

#### Compatibility with remediation of adjacent Pasminco lands

The remediation of the Site is programmed to occur in conjunction with the remediation of the adjacent former Pasminco smelter and industrial complex. While most aspects of the Pasminco and IFL remediation programs can progress independently, it is recognised that there are certain cross-boundary issues that must be coordinated between the projects. The primary cross-boundary issues include:

- Communication and scheduling of planned remediation activities along the common property boundaries.
- · Control of discharge of potentially contaminated media (surface water, groundwater and soil/sediment) across the common property boundaries.
- Coordination of remediation activities in the buried southern gully, where large retaining walls currently support a significant topographic difference between ground levels along the common property boundary. There is a potential risk that excavation close to the foot of the retaining structures on Pasminco property could destabilise the walls. As such, close coordination will be required for the remediation of this area to ensure that slope stability along the common property boundary in this area is not compromised.
- Coordination regarding management of the freshwater dam adjacent to the southern end of the property. The dam wall is currently on the Site, while the dam itself is on Pasminco land. Remediation of fill material in the buried gully on the Site will require removal of the current dam wall, and as such control measures for water entering the dam must be coordinated between IFL and Pasminco.
- · Agreement regarding provision or reinstatement of basic services (water, sewer, gas and power) as required throughout the remediation program.
- · Agreement regarding easement requirements for discharge of various water streams such as manufacturing effluents, surface water runoff, and treated groundwater.
- Establishing consistent and compatible post-remediation ground levels and land use across the common property boundaries.

Remediation activities with cross-boundary implications will be openly discussed between IFL and the Pasminco administrators and project managers during the course of remediation to ensure that the relevant issues are identified in advance and managed appropriately. The specific communication methods will include mutual attendance at regular project status and cross-boundary coordination meetings.

#### 3.4 Proposed staging

Operational constraints affect certain portions of the Site and as such a staged approach to remediation is required. This will also address urgent environmental control requirements to accommodate the early stages of the Pasminco remediation program. The proposed staging of the remediation process is presented below and illustrated in Figure 5:

- Stage 1 Establishment of groundwater recovery and treatment facilities to remediate local areas of highly impacted groundwater along the northwestern site boundary and removal of gantry structures.
- Stage 2 Establishment of a containment cell and associated environmental controls in the northern portion of the Site as a repository for contaminated soils.
- Stage 3 Decommissioning the majority of site infrastructure, once site operations are completed (including demolition of most structures), and remediation of underlying fill material across the central portion of the Site.
- Stage 4 Remediation of the filled gully in the southern portion of the Site, including any final
  landform rehabilitation required to ensure the Site is suitable for its proposed future land
  use (residential).



Figure 5 Proposed staging

Incitec Fertilizers Limited Cockle Creek Site

Note that this EA only addresses Stage 1 of the remediation program. Stages 2 to 4 will be assessed under a separate application.

#### 3.5 Relationship between various stages

The northern portion of the Site will be the focus of Stage 1 (covered by this EA) and Stage 2 remediation activities as it is relatively unaffected by current commercial operations. It is then anticipated that Stage 3 and 4 remedial activities will progress in that order, but the implementation of Stage 4 will require careful coordination with Pasminco in regard to slope stability along the southwestern site boundary. The current freshwater dam wall will need to be removed during remediation, the majority of which falls on the IFL Site.