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Hydro Aluminium Kurri Kurri Pty Ltd

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ENVIRONMENTAL IMPACT STATEMENT FORMER HYDRO ALUMINIUM KURRI KURRI SMELTER DEMOLITION AND REMEDIATION



ENVIRONMENTAL IMPACT STATEMENT FORMER HYDRO ALUMINIUM KURRI KURRI SMELTER DEMOLITION AND REMEDIATION

Revision **Final Revision 2**
Date **14/07/2016**
Made by **S Taylor**
Checked by **F Robinson**
Approved by **F Robinson**
Description **Environmental Impact Statement (EIS) prepared to
support a Development Application for the completion
of demolition and remediation of the former
aluminium smelter at Hart Road, Loxford NSW.**

Ref AS130401
Hydro Remediation and Demolition EIS Final Rev 2 2016_07_14

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CERTIFICATION

Development Application Details:

Applicant name: Hydro Aluminium Kurri Kurri Pty Ltd

Applicant address: Hart Road Loxford NSW 2327

Land to be developed: Parts of Lot 3 of Deposited Plan (DP) 456769, Lot 16 DP1082775 Pt 1, Lot 318 DP755231, Lot 319 DP755231, Lot 411 DP755231, Lot 412 DP755231, Lot 413 DP755231, Lot 414 DP755231, Lot 420 DP755231, Lot 769 DP755231, Lot 1 DP456769 and Lot 2 DP456769 at Hart Road, Loxford.

Proposed development: The completion of demolition and remediation of the former Hydro Aluminium Kurri Kurri Pty Ltd aluminium smelter, including the construction and operation of a Containment Cell.

Responsible person: Richard Brown

Environmental impact statement prepared by:

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Qualifications: Bachelor of Applied Science (Environmental Assessment and Management) (Hons)

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In respect of: State Significant Development – Development Application

Declaration: I certify that I have prepared this environmental impact statement and to the best of my knowledge:

- It is in accordance with the Secretary's Environmental Assessment Requirements dated 18 November 2014.
- It is in accordance with Schedule 2 of the Environmental Planning and Assessment Regulation 2000.
- All available information that is relevant to the environmental assessment of the development to which the statement relates.
- The information contained in the environmental impact statement is neither false nor misleading.

Signature:



Name: Shaun Taylor

Date: 15 July 2016

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GLOSSARY OF TERMS

Council	Cessnock City Council
Hydro	Hydro Aluminium Kurri Kurri Pty Ltd
Hydro Land	The land owned by Hydro Aluminium Kurri Kurri Pty Ltd which includes the Smelter and surrounding land.
LAeq	The equivalent sound pressure level. The steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
LAeq(15mins)	The equivalent continuous A-weighted sound pressure level over a 15-minute period
LA90	The A-weighted sound pressure level exceeded for 90 per cent of the time over which a given sound is measured. It represents the background noise
The Project	The Project would be comprised of the following key elements: • The Works. The Works are the activities required to make the Project Site suitable for future use. The key element of the Works is the construction of a waste management facility, comprising a Containment Cell. Other ancillary elements of the Works are: • Demolition of the remaining Smelter buildings and structures. • Site remediation, including leachate and groundwater management. • Containment Cell Management. Following completion of the Works, the Containment Cell would be subject to a monitoring and management program.
The Project Site	The area containing the Project. It is located on parts of Lot 3 of Deposited Plan (DP) 456769, Lot 16 DP1082775 Pt 1, Lot 318 DP755231, Lot 319 DP755231, Lot 411 DP755231, Lot 412 DP755231, Lot 413 DP755231, Lot 414 DP755231, Lot 420 DP755231, Lot 769 DP755231, Lot 1 DP456769 and Lot 2 DP456769 at Hart Road, Loxford.
Rating Background Level	The median of the overall assessment background noise level calculated using NSW EPA Industrial Noise Policy methodology as defined in the glossary of acoustic terms.
The Smelter	The former Hydro Aluminium Kurri Kurri Pty Ltd aluminium smelter at Hart Road, Loxford
Stage 1 Demolition	Demolition of Smelter buildings addressed in a Development Application submitted to Cessnock City Council.
Stage 2 Demolition	Demolition of the remaining Smelter buildings not demolished in Stage 1 Demolition, and included in the Project.

ACRONYMS AND ABBREVIATIONS

CBD	Central Business District
CCO	Chemical Control Order
DA	Development Application
DECC	Department of Environment and Climate Change (now Office of Environment and Heritage)
DECCW	NSW Department of Environment, Climate Change and Water (now OEH)
DP&I	NSW Department of Planning and Infrastructure (now DPE)
DPE	NSW Department of Planning and Environment
DoE	Commonwealth Department of the Environment
DoP	NSW Department of Planning (now NSW Department of Planning and Environment)
EEC	Endangered Ecological Community
EHC Act	<i>Environmentally Hazardous Chemical Act 1985</i>
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	Environment Protection Licence
Hydro	Hydro Aluminium Kurri Kurri Pty Ltd
HDPE	High-density polyethylene
LEP	Local Environmental Plan
LGA	Local Government Area
LLDPE	Linear low-density polyethylene
LOS	Level of service
NOW	NSW Office of Water
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NSW	New South Wales
OEH	Office of Environment and Heritage
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
POEO Regulation	Protection of the Environment Operations (Waste) Regulation 2014
SEARs	Secretary's Environmental Assessment Requirements
SEE	Statement of Environmental Effects
SEPP	State Environmental Planning Policy
SSD	State Significant Development
TSC Act	<i>Threatened Species Conservation Act 1995</i>

EXECUTIVE SUMMARY

Hydro Aluminium Kurri Kurri Pty Ltd (Hydro) owns the former Hydro Aluminium Kurri Kurri Aluminium Smelter (the Smelter) located at Hart Road Loxford (Project Site). The Project Site comprises approximately 80 hectares, and is surrounded by approximately 1,940 hectares of buffer zone land that is owned and managed by Hydro (together the Hydro Land).

The Smelter commenced operations in 1969, however, smelting activities ceased in September 2012. In May 2014 Hydro formally announced the closure of the Smelter. Since this time Hydro has evaluated the future use of the Smelter and the Hydro Land. This has included development of a land use master plan and submission of a development application to Cessnock City Council for some demolition of the Smelter (described as Stage 1 Demolition).

It is Hydro's strategic vision for the Hydro Land to play a key role in allowing the Hunter Region to achieve the economic, employment and environmental objectives identified in the NSW Government *NSW State Plan 2021*, the *Hunter Regional Action Plan*, the *Draft Hunter Regional Plan* and the *Draft Plan for Growing Hunter City*. Hydro aims to achieve this strategic vision by facilitating the rezoning and development of the Project Site for employment purposes, with the remainder of the Hydro Land to be utilised for significant employment, residential, rural and biodiversity conservation purposes.

Hydro is seeking development consent for completion of demolition (described as Stage 2 Demolition) and remediation of the Smelter (together forming the Project), as one of the key approval pathways required to achieve the strategic vision for the Hydro Land. The Project's objectives are to: render the Project Site suitable for employment uses; achieve Hydro's commitment to meeting its corporate environmental and social responsibilities; and to allow for the significant social, environmental and economic benefits of the Project to be sustainably achieved.

Table ES.1 describes the key elements and activities of the Project.

Table ES.1: Outline of The Project

Element	Key Activities
The Works	
Project Site Establishment	- Establishment of environmental controls (erosion and sediment controls, water quality controls). - Construction of the Containment Cell haul road. - Continued use of Stage 1 Demolition compounds. - Continued use of Stage 1 Demolition stockpile and storage areas.
Stage 2 Demolition	- Completion of hazardous materials removal. - Establishment and implementation of environmental controls (dust mitigation and water quality management). - Demolition of three concrete stacks and a water tower using detonation. - Mechanical demolition of remaining buildings and structures. - Material collection, separation, processing and storage. - Transportation of recyclable metals off-site. - Transport non-recyclable demolition material to the Containment Cell. - Grading of former building footprints.
Demolition Material Management	- Operation of a concrete and refractory crushing plant. - Manage a large stockpile area in the west of the Smelter. - Ferrous (steel) and non-ferrous (predominantly aluminium and copper) metals would be sorted and sized before being transported off-site for recycling. It is anticipated that there would be up to 20 truck movements per day.

Table ES.1: Outline of The Project

Element	Key Activities
Containment Cell Construction	• Vegetation clearance. • Site preparatory works. • Establishment and implementation of environmental controls (erosion and sediment controls, water quality controls). • Construction of the Containment Cell base layers. • Transport and placement of remediation and demolition materials to the Containment Cell. • Leachate and stormwater management. • Construction of the final Containment Cell capping layers.
Contamination Remediation	• Removal of the Capped Waste Stockpile. • Excavation of the contaminated soils within the Smelter. • Transport of waste material removed from the Capped Waste Stockpile and excavated contaminated soils (including stockpiled soils sourced from other Hydro Land) to the Containment Cell. • Filling and grading following removal of contaminated materials.
Leachate and Groundwater Management	• Establish and operate (if required) water treatment plants (Capped Waste Stockpile and Containment Cell). • Groundwater monitoring. • Water treatment plant, pumping well network and dam decommissioning.
Containment Cell Management	
Monitoring	• Monitoring of leachate generation within the Containment Cell.
Maintenance	• Maintenance of the vegetation cover. • Maintenance (if required) of the capping layers.

The Project has been designed to minimise potential environmental impacts, and the comprehensive environmental impact assessment undertaken for the Project demonstrates that the Project Site is suitable for the proposed Project and that the environmental impacts of the Project can be effectively managed. The key findings of the consideration of potential environmental impacts in the EIS are summarised below:

Access and Traffic

A Traffic Impact Assessment was undertaken to calculate the traffic to be generated by the Project and the predicted distribution of traffic on the local road network. The assessment then considered the impact of this predicted traffic on this network, particularly intersections.

The number of daily truck movements would vary between five and 54 truck trips depending on the Project phase. The Project is also predicted to generate between 24 and 75 car trips depending on the Project phase period.

The assessment concluded that the predicted traffic generated by the Project would have minimal impact on the local road network, with the Level of Service of intersections, and the average delay for vehicles at these intersections predicted to have minimal change.

Hydro would implement a number of management measures that would further minimise the traffic impacts of the Project. These measures would be incorporated into a Traffic Management Plan developed in consultation with Cessnock City Council and Roads and Maritime Services.

Air Quality

An Air Quality Impact Assessment was undertaken to assess the existing air quality of the local area, identify the potential dust and other air emission sources from the Project, and the potential impact of these emissions on local air quality.

The assessment concluded that demolition, earthworks and truck movements have a high potential to generate dust that could impact on nearby residents. However, these impacts can be controlled to an acceptable level through the implementation of management measures. These measures would be incorporated into an Air Quality Management Plan.

Noise and Vibration

A Noise and Vibration Impact Assessment was undertaken to assess the existing noise of the local area, identify the potential noise and vibration sources from the Project, and predict the potential noise and vibration impact of the Project on sensitive receivers.

The assessment predicted that the proposed activities would comply with the *Interim Construction Noise Guideline* (DECC, 2009) during standard construction hours. It also concluded that, with implementation of restrictions on the type and number of equipment, activities could continue at the Project Site outside standard construction hours and comply with the *Interim Construction Noise Guideline*.

Due to the nature of the activities at the Project Site and the distance to the nearest sensitive receiver, vibration is not expected to adversely impact on human comfort or structures.

Hydro would implement a number of management measures that would manage potential noise and vibration impacts. These measures would be incorporated into a Noise and Vibration Management Plan.

Soil and Water

The Project includes a number of activities that could generate erosion and sediment loss. Demolition activities could also result in dust and other materials that could adversely affect water quality.

Contaminated soils are located in limited areas within the Smelter Site and are also stockpiled on the Smelter Site. Contaminated soils would be excavated and stockpiled in a manner that prevents erosion prior to disposal in the Containment Cell.

Remediation of the Project Site would be completed in accordance with a Remedial Action Plan that has been reviewed and accepted by a NSW EPA Auditor accredited under the *Contaminated Land Management Act 1997*.

Hydro would continue to operate the Smelter water management system, which would capture Project Site water runoff and manage it in accordance with its Environment Protection Licence. A Soil and Water Management Plan would be developed and implemented that includes erosion and sediment controls, water quality controls and chemical storage requirements.

Aboriginal Heritage

An Aboriginal Cultural Heritage Assessment was undertaken to assess the cultural and archaeological significance of the Project Site, and the potential impact of the Project on archaeological sites or areas of cultural significance. The Assessment was undertaken in consultation with Aboriginal stakeholders.

The majority of the Project Site has been significantly disturbed through development of the Smelter. However there are areas of minimally to moderately disturbed terrain in the northern and western portions of the Project Site. One new Aboriginal archaeological site (an isolated stone artefact) was identified during survey. An area of high archaeological sensitivity was identified in the northernmost portion of the Project Site.

The artefact would be collected and relocated in conjunction with the Aboriginal stakeholders. The area of high archaeological sensitivity would be avoided wherever possible. In the event that stockpiling in this area is required, geo-matting would be placed on the surface of the area prior to stockpiling. These measures would be implemented as part of an Aboriginal Cultural Heritage Management Plan.

Non-Indigenous Heritage

The Smelter played a significant role in the recent social and industrial history of the local area and the Hunter Region from the commencement of operations in 1969 until the cessation of production in 2012. It was a significant employer for over 40 years and played a key role in the local area. In recognition of this, Hydro would make photographs and drawings of the Smelter available to interested historical societies or community groups.

Flora and Fauna

An Ecological Assessment was undertaken to assess the ecological characteristics of the Project Site, and the potential impact of the Project on species and ecological communities listed under the *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Project would require clearance of approximately 2.5 hectares of endangered ecological communities, four individuals of *Eucalyptus parramattensis* subspecies *decadens* and a single clump of five stems of *Grevillea parviflora* subspecies *parviflora* (both listed as vulnerable under the TSC Act and EPBC Act). Threatened fauna species were recorded or considered likely to be found within the parts of the Project Site.

The assessment found that the Project was unlikely to have a significant impact on threatened biodiversity, primarily due to the impact being relatively small (less than five hectares), being quite disturbed given it includes the Smelter and that the Hydro Land provides a large area of suitable habitat for all the assessed species and Endangered Ecological Community (EEC). As such it was concluded that the Project would not have a significant impact as defined under Section 5A of the EP&A Act and the EPBC Act.

Hydro would implement a number of management measures that would manage ecological impacts. These measures would be incorporated into a Flora and Fauna Management Plan.

Waste

The Project would result in the generation of a number of waste streams. This includes: a large quantity of recyclable materials (concrete, bricks, refractory bricks and metals); hazardous materials (such as asbestos); non-recyclable materials; and small amount of green waste.

A Waste Management Plan would describe the waste management measures to be implemented as part of the Project. This would include: transporting metal to a licensed waste recycling facility; crushing concrete, bricks and refractory bricks and storage for reuse in the Works; and the safe and secure transport and placement of non-recyclable wastes in the Containment Cell.

The Containment Cell Environmental Management Plan would describe the ongoing management, maintenance and monitoring of the Containment Cell and the procedures for complying with regulatory and approval requirements.

Greenhouse and Energy

The Project would use energy derived from fuel (for equipment, machinery and generators) and power from the electricity network (for administration and amenity facilities, lighting and some small demolition equipment).

An Energy Efficiency Management Plan would be developed that identifies measures to reduce energy demands of the Project.

Visual Amenity

Views of the Smelter are available from a number of locations in the surrounding area. This ranges from distant views of the tall stacks, to clear views over most of the Smelter.

The demolition of structures and other activities within the Smelter would be visible from those locations that currently have views of the Smelter. However due to topography and the surrounding native vegetation, there would be limited views of the stockpile area and other ground level Project elements.

The stacks form the major visual element of the Smelter, and are a key element of the local visual environment. Their demolition would be visible from a large area surrounding the Project Site. Feedback received from the local community has indicated there would be significant interest in viewing the demolition of the stacks. In recognition of the likely community interest in the demolition of the stacks, Hydro would establish viewing areas including suitable parking and traffic control.

Due to the proposed height of the Containment Cell, part of it would potentially be visible above the native vegetation to the north, west and south of the Containment Cell, while it could be visible from the east (with varying degrees of visibility). The plant species used in the vegetation cover on the Containment Cell would mitigate potential visual impacts by complementing the adjoining native vegetation.

Community Impacts

The Hydro Stakeholder Engagement Plan would continue to be implemented prior to and during Project activities. The Plan would describe:

- How the community (nearby residents and the wider community) would be informed of the Project, including the activities program and key Project activities.
- The methods available for the community to make a complaint, comment or enquiry regarding the Project.
- The process for recording, responding to and addressing any community complaints, comments or enquiries.

The ongoing implementation of the Stakeholder Engagement Plan would continue the Community Consultation program that was initiated in 2013.

Environmental Management

A Works Environmental Management Plan would be developed that addresses the environmental management requirements for the Project.

It would incorporate the previously described specialist management plans and would define: the legislative and regulatory environmental management requirements (including development consent conditions); responsibilities for implementation of the management measures; and how environmental management performance would be monitored, recorded and, if required, improved.

A Containment Cell Environmental Management Plan would be developed with the Environment Protection Authority and the Department of Planning and Environment to address the monitoring, management and maintenance activities to be implemented at the completed Containment Cell. The plan would also detail the regulatory mechanisms that would enforce these activities occurring long term, and securing the funding of these activities.

Hydro proposes that the Environment Protection Licence would regulate the Containment Cell in the short term. There are a number of potential regulatory mechanisms that could be implemented to ensure the continuation of appropriate management and financing of the Containment Cell into the future, including the Environment Protection Licence, the Development Consent, a planning agreement and restrictive covenant. Which of these regulatory mechanisms would be implemented, and their composition, would be determined with the Environment Protection Authority and the Department of Planning and Environment.

Project Justification

In determining the best approach for the remediation of the Project Site, Hydro undertook a detailed options identification and assessment process for the management of demolition and remediation materials. Options were assessed against the following criteria:

- Regulatory and Statutory Compliance.
- Timeframe to complete.
- Risk.
- Social impacts.
- Environmental impacts.
- Climate change.
- Economic viability.
- Legacy, legal liability and required contingencies.

The assessment concluded that the Project (including the Containment Cell) was the preferred option.

Table ES-2 lists the assessment criteria and how the Containment Cell performed against these criteria.

Table ES-2: Options Evaluation Criteria and Containment Cell Benefits

Criteria	Description
Regulatory and Statutory Compliance	- The Project would comply with the statutory and regulatory requirements. - There are a number of examples of Containment Cells in New South Wales and throughout Australia. Therefore it is an accepted and previously approved technology.
Timeframe to complete	The Project would allow Hydro to meet its environmental and social obligations within an acceptable timeframe, expediting the redevelopment of the Hydro Land and the associated social, environmental and economic benefits for the local community.
Risk	- Best practice cell design would be implemented including state of the art quality control practices during all phases of design, construction and validation. The Containment Cell design would allow installation of leachate detection systems during and post construction. - Retention on-site reduces risks to the community from the transport of wastes through the local area. Wastes and contaminated soils would be consolidated in one location in the Containment Cell. - The Containment Cell location has geological, hydrogeological and hydrological conditions that further reduce risks.
Social impacts	- Removal of the Capped Waste Stockpile (and placement of the contents in the Containment Cell) allows remediation and redevelopment of its footprint and the adjoining impacted area. This would make an area more favourable for industrial redevelopment available for future use and removes the requirement for the ongoing management measures and infrastructure. The Containment Cell location is more suitable for the proposed re-use plans. - The on-site management of the material avoids off-site transport of significant quantities of materials and the associated local community impacts.
Environmental impacts	- The Containment Cell would be constructed within an area of the Project Site that is favourable from an environmental (minimal vegetation clearance) as well as site re-use perspective. - The Containment Cell design proposes the re-use of on-site materials (crushed concrete). - Removal of the Capped Waste Stockpile (and limited excavation) would allow the removal of leachate within this area. - The on-site management of the material would minimise materials being disposed of at the Cessnock Waste and Reuse Centre and other licensed waste management facilities, and avoids the associated landfill capacity demands.
Climate change	- The Containment Cell design would include a vegetation cover. This would offset the carbon footprint of the Containment Cell as well as reducing long term maintenance and monitoring requirements. - The on-site management of the material would avoid off-site transport of materials and the associated greenhouse gas emissions.
Economic viability	The Containment Cell provides a cost effective strategy for achieving site remediation objectives.

Table ES-2: Options Evaluation Criteria and Containment Cell Benefits

Criteria	Description
Legacy, legal liability and required contingencies	• The design and location of the Containment Cell would mitigate the potential risks. These design and management measures result in an acceptable liability provisioning under the management structure. • The Project includes ongoing management of the Containment Cell. • Monitoring would be undertaken to assess the performance of the Containment Cell.

Conclusion

The Project is fundamental to achieving the strategic vision for the Hydro Land and allowing for long term employment, residential, rural and biodiversity conservation land uses to be carried out. The Project would give rise to a number of material social, economic and environmental benefits including:

- Facilitating the Hunter Region achieving the economic, employment and environmental objectives identified in the NSW Government *NSW State Plan 2021*, the *Hunter Regional Action Plan*, the *Draft Hunter Regional Plan* and the *Draft Plan for Growing Hunter City*;
- Generating employment opportunities throughout the Works activities;
- Render the Project Site suitable for future long term employment uses; and
- Achieving Hydro's commitment to meeting its corporate environmental and social responsibilities.

The Project would produce some environmental impacts, however planning for the Project has considered minimising potential environment and social impacts throughout Project planning, from the options assessment process, the location and design of the Containment Cell through to the identification of appropriate and targeted environmental measures for the Works and Containment Cell Management phases. As a result, the potential impacts of the Project have been minimised through appropriate Project design and environmental safeguards which are identified in this EIS. It is considered that the Project has identified and mitigated potential environmental impacts to an acceptable level to allow for the significant benefits of the Project to be sustainably achieved.

The Project is a key component in Hydro managing its environmental and social obligations, and facilitating the proposed future employment, residential, and biodiversity conservation land uses. The Project would provide significant environmental, social and economic benefits for the local area, the Hunter Region, and the state of NSW.

PART A: PROJECT BACKGROUND

1. INTRODUCTION

1.1 Overview

The former Hydro Aluminium Kurri Kurri Smelter (the Smelter) is located on Hart Road, Loxford near Kurri Kurri in New South Wales, Australia. The area of land owned and managed by Hydro Aluminium Kurri Kurri Pty Ltd (Hydro) incorporates the former Smelter area and the surrounding buffer zone, comprising approximately 2,000 hectares (the Hydro Land).

Smelting activities ceased at the Project Site in September 2012 and in May 2014 Hydro formally announced the closure of the Smelter.

Hydro is committed to meeting its environmental and social commitments, and to managing environmental legacies within its landholdings. It is Hydro's strategic vision for the Hydro Land to play a key role in allowing the Hunter Region to achieve the economic, employment and environmental objectives identified in the NSW Government *NSW State Plan 2021*, the *Hunter Regional Action Plan*, the *Draft Hunter Regional Plan* and the *Draft Plan for Growing Hunter City*. Hydro aims to achieve this strategic vision by facilitating the rezoning and development of the Hydro Land Project Site for employment, residential, and biodiversity conservation purposes.

Hydro has already commenced the following material approval pathways under the EP&A Act to give effect to its strategic vision for the Hydro Land:

- The Planning Proposals under Part 3 of the EP&A Act that have been submitted by Hydro to Cessnock City Council and Maitland Council to rezone the Hydro Land for employment, residential and biodiversity conservation purposes.
- The Development Application that has been lodged by Hydro with Cessnock City Council (Cessnock Council) for the Stage 1 Demolition Project.

The Project subject of this EIS represents the final material approval pathway necessary to achieve the strategic vision for the Hydro Land. If approved, the Project would render the Project Site and the Hydro Land suitable for a new generation of employment, residential, rural and biodiversity conservation activities.

The Project would provide significant environmental, social and economic benefits to the local area, the Hunter Region, and the state of NSW.

1.2 Key Project Elements

Table 1.1 describes the key elements and activities of the Project.

Table 1.1: Outline of The Project

Element	Key Activities
The Works	
Project Site Establishment	• Establishment of environmental controls (erosion and sediment controls, water quality controls). • Construction of the Containment Cell haul road. • Continued use of Stage 1 Demolition compounds. • Continued use of Stage 1 Demolition stockpile and storage areas.
Stage 2 Demolition	• Completion of hazardous materials removal. • Establishment and implementation of environmental controls (dust mitigation and water quality management). • Demolition of three concrete stacks and a water tower using detonation. • Mechanical demolition of remaining buildings and structures. • Material collection, separation, processing and storage.

Table 1.1: Outline of The Project

Element	Key Activities
Stage 2 Demolition (continued)	• Transportation of recyclable metals off-site. • Transport non-recyclable demolition material to the Containment Cell. • Grading of former building footprints.
Demolition Material Management	• Operation of a concrete and refractory crushing plant. • Manage a large stockpile area in the west of the Smelter. • Ferrous (steel) and non-ferrous (predominantly aluminium and copper) metals would be sorted and sized before being transported off-site for recycling. It is anticipated that there would be up to 20 truck movements per day.
Containment Cell Construction	• Vegetation clearance. • Site preparatory works. • Establishment and implementation of environmental controls (erosion and sediment controls, water quality controls). • Construction of the Containment Cell base layers. • Transport and placement of remediation and demolition materials to the Containment Cell. • Leachate and stormwater management. • Construction of the final Containment Cell capping layers.
Contamination Remediation	• Removal of the Capped Waste Stockpile. • Excavation of the contaminated soils within the Smelter. • Transport of waste material removed from the Capped Waste Stockpile and excavated contaminated soils (including stockpiled soils sourced from other Hydro Land) to the Containment Cell. • Filling and grading following removal of contaminated materials.
Leachate and Groundwater Treatment	• Establish and operate water treatment plants (Capped Waste Stockpile and Containment Cell). • Groundwater monitoring. • Water treatment plant, pumping well network and dam decommissioning.
Containment Cell Management	
Monitoring	• Monitoring of leachate generation within the Containment Cell.
Maintenance	• Maintenance of the vegetation cover • Maintenance (if required) of the capping layers.

These activities are further discussed in **Section 7**, **Section 8** and **Section 9**.

The Preliminary Environmental Assessment (PEA) submitted on 28 August 2014 to the Department of Planning and Environment included the placement of spent pot lining that is stored within buildings at the Smelter into the Containment Cell as an element of the Project.

On 31 August 2015 Hydro notified the Department of Planning and Environment that the spent pot lining stored in buildings at the Smelter would not be placed in the Containment Cell, and would be transported to an off-site licensed facility for recycling.

Hydro is currently implementing an options identification and assessment process to identify the best option/s for spent pot lining recycling. This includes providing potential recyclers/ processors

with data on the chemical characteristics of the spent pot lining to allow those operators to determine if the material can be processed or reused at their facility.

This process includes the following steps:

- The Regrowth Kurri Kurri Community Reference Group developing the options assessment criteria. This includes a number of social, environmental, economic and regulatory factors.
- Contacting a number of local, intrastate, interstate and international facilities that could potentially process and/or recycle the spent pot lining and understanding their interest in receiving the material.
- Providing interested parties with details on the chemical and physical characteristics of the spent pot lining to allow the facility operators to assess the suitability of the material.
- If the facility operator/s determine they wish to proceed, Hydro and the operator/s would commence detailed commercial, technical and legal negotiations.

The transportation of the stored spent pot lining to an off-site licensed facility does not require Development Consent. As such it does not form part of the Project, and therefore is not assessed in this EIS.

1.3 Project Location

The Project Site is located approximately three kilometres north of the Kurri Kurri central business district (CBD), approximately 10 kilometres south of the Maitland CBD and approximately 33 kilometres to the northwest of the Newcastle CBD at Hart Road in Loxford, NSW within the Cessnock local government area.

The Hydro Land incorporates the Project Site and the surrounding buffer zone and covers approximately 2000 hectares. The Hydro Land surrounding the Smelter includes bushland, grazing land, rural residences and recreational facilities. The Hunter Expressway passes through the south-western corner of the Hydro Land, and the South Maitland Railway passes through the eastern section of the Hydro Land.

The established residential townships of Kurri Kurri, Weston and Heddon Greta are located to the south of the Hydro Land, while the growing residential areas of Gillieston Heights and Cliftleigh are located to the northeast and east respectively. Other areas to the north, east and west are predominantly rural and rural-residential land uses.

Further detail on the Project location is presented in **Section 3**.

1.4 Purpose of the Project

As discussed in **Section 1.1**, Hydro is committed to meeting its environmental and social commitments, and to managing environmental legacies within its landholdings.

The Project would render the Project Site suitable for the employment, residential, rural and biodiversity conservation land uses proposed by Hydro.

1.5 The Proponent

Hydro is the proponent for the Project. Hydro Aluminium Kurri Kurri Pty Ltd is a company fully owned by Norsk Hydro ASA (a global aluminium company).

1.6 Outline of the Environmental Impact Statement

1.6.1 Assessment Requirements

The Project is a type of 'waste and resource management facility' listed in clause 5 of Schedule 1 of State Environmental Planning Policy (State and Regional Development) 2011. As such the Project is declared as a State Significant Development for the purposes of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Under Division 4.1 of Part 4 of the EP&A Act the Minister for Planning (the Minister) is the approval authority for the Project.

An Environmental Impact Statement (EIS) that is prepared in accordance with the EP&A Act must accompany the lodgement of a development application for State Significant Development.

Further information on the assessment requirements for the Project, including the Secretary's Environmental Assessment Requirements, is provided in **Section 2**.

1.6.2 Contents

The EIS has the following structure:

Part A – Introduction and Context

- An introduction to the EIS. **Section 1**
- Information on the assessment requirements under relevant legislation and environmental planning instruments. **Section 2**
- A description of the Project location and setting. **Section 3**
- A summary of the consultation that occurred during preparation of the EIS. **Section 4**

Part B – The Project

- Information on the alternatives that were considered and assessed as part of the development of the Project. **Section 5**
- Details on the need for the Project and the objectives and benefits of the Project. **Section 6**
- An outline of the Project. **Section 7**
- A description of the Works element of the Project. **Section 8**
- A description of the Containment Cell Management element of the Project. **Section 9**

Part C – Environmental Assessment

- A description of the existing environmental features of the Project Site and the area potentially affected by the Project, a general environmental risk analysis and an assessment of potential environmental impacts of the Project, and mitigation measures to address the potential environmental impacts. **Section 10 - Section 23**

Part D – Environmental Management and Conclusion

- A summary of the environmental mitigation measures to be applied during the Project; an outline of the Construction Environmental Management Plan which would be prepared to manage potential impacts during the Works; and the Containment Cell Management Plan to manage the completed Containment Cell. **Section 24**
- The Project justification and conclusion to the EIS. **Section 25**

Appendices

The appendices to the EIS supplement the main document.

Appendix 1 to **Appendix 4** contain supporting documentation such as the Secretary's Environmental Assessment Requirements, the Department of the Environment referral decision notice, design plans and drawings of the Project, and the Quantity Surveyor's Report.

Appendix 5 to **Appendix 12** contain the specialist technical assessments/ background reports which have been prepared to assess the potential impacts of the Project in accordance with the Secretary's Environmental Assessment Requirements. These specialist reports are based on the description of the Project as set out in **Part B** of the EIS.

2. PLANNING AND STATUTORY SETTING

2.1 Introduction

The two key pieces of legislation relevant to the Project are the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The application of the EPBC Act and EP&A Act, as well as other relevant legislation and planning instruments is described in the following sections.

2.2 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the core piece of legislation protecting Matters of National Environmental Significance and Commonwealth land. The EPBC Act requires proponents attain approval from the Minister of the Environment if a project is considered a 'controlled activity' due to potential significant impacts on Matters of National Environmental Significance. A referral is submitted to the Department of the Environment for determination that an activity is a controlled activity.

The Commonwealth Government and the NSW Government signed a bilateral agreement in November 2013 that accredits the NSW planning system to undertake a single environmental assessment process for projects in NSW that require consideration under the EPBC Act. Approval would still be required for a controlled action from the Department of the Environment, which would be based on the assessment by the NSW Department of Planning and Environment.

There is the potential for species and communities listed under the EPBC Act to be impacted by the Project. As a result a referral was prepared and submitted to the Department of the Environment. The referral concluded that the Project would not have a significant impact on Matters of National Environmental Significance, and therefore would not be deemed a controlled action.

On 29 March 2016 the Department of the Environment advised Hydro that it decided that the Project is not a controlled action, and therefore does not require approval under the EPBC Act before it can proceed. A copy of the referral decision notice from 2016 the Department of the Environment is included in **Appendix 2**.

2.3 Environmental Planning and Assessment Act 1979

EP&A Act and Environmental Planning and Assessment Regulation 2000 (the EP&A Regulation) are the principal pieces of environmental legislation which provide for development planning and control in NSW.

State Environmental Planning Policy (State and Regional Development) 2011 (S&RD SEPP) declares certain development to be State Significant Development. State Significant Development is assessed and determined under Part 4 of the EP&A Act by the Minister or a delegate.

As discussed in **Section 2.4.1**, the Project is State Significant Development because it comes within the category of 'waste and resource management facility' described in clause 23(5) of Schedule 1 to the S&RD SEPP.

The Minister (or delegate) is therefore the consent authority for the Project. An EIS that is prepared in accordance with the EP&A Act and EP&A Regulations must accompany the lodgement of a development application for State Significant Development.

2.3.1 Environmental Planning and Assessment 2000

Clause 6 and clause 7 of Schedule 2 to the Environmental Planning and Assessment Regulation (the Regulation) lists the required contents of an EIS. **Table 2.1** lists these requirements and where addressed in the EIS.

Table 2.1: EP&A Regulation EIS Requirements

Content	Part and Section
A summary of the environmental impact statement	Executive Summary
A statement of the objectives of the development	Section 6.2
An analysis of any feasible alternatives to the carrying out of the development, having regard to its objectives, including the consequences of not carrying out the development	Section 5 and Section 6
An analysis of the development, including a full description of the development	Section 7, Section 8 and Section 9
An analysis of the development, including a general description of the environment likely to be affected by the development, together with a detailed description of those aspects of the environment that are likely to be significantly affected	Part C
An analysis of the development, including the likely impact on the environment of the development	Part C
An analysis of the development, including a full description of the measures proposed to mitigate any adverse effects of the development on the environment	Part C and Section 24
An analysis of the development, including a list of any approvals that must be obtained under any other Act or law before the development may lawfully be carried out	Section 2
A compilation (in a single section of the EIS) of the measures proposed to mitigate any adverse effects of the development on the environment	Section 24
The reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development	Section 6 and Section 25

2.4 Environmental Planning Instruments

2.4.1 State Environmental Planning Policy (State and Regional Development) 2011

Clause 8(1)(b) of the State Environmental Planning Policy (State and Regional Development) 2011 (S&RD SEPP) provides that development is declared to be State Significant Development for the purposes of the EP&A Act if the development is specified in Schedule 1 or 2 to the S&RD SEPP.

Schedule 1 to the S&RD SEPP identifies 'waste and resource management facilities' as a category of State Significant Development, including:

“(5) Development for the purpose of hazardous waste facilities that transfer, store or dispose of solid or liquid waste classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste that handles more than 1,000 tonnes per year of waste.”

The dominant feature of the Project is the construction and ongoing management of the Containment Cell. The Containment Cell would be an engineered facility for the purpose of disposing and managing various waste streams generated by the demolition and remediation of the Smelter.

The waste materials to be disposed of and managed in the Containment Cell include waste materials classified in the Australian Dangerous Goods Code (*'Australian Code for the Transport of Dangerous Goods by Road & Rail'*, Seventh Edition prepared by the National Transport Commission, 2011). Such waste materials include "Aluminium smelting by-product".

In relation to "Aluminium smelting by-product", this term is defined in the Dangerous Goods Code to mean:

"Substances which in contact with water emit flammable gases. Substances which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities".

The types of "Aluminium smelting by-product" that come within the above definition are listed in the Dangerous Goods Code to include "aluminium dross, aluminium skimmings, spent cathodes, spent pot lining, and aluminium salt slags."

The Project includes the disposal of "Aluminium smelting by-product" that is currently located within the Capped Waste Stockpile in the Containment Cell. As such, the Containment Cell would be a 'waste and resource management facility' under clause 23(5) of Schedule 1 to the S&RD SEPP because it would be a facility specifically designed for the disposal and ongoing management of waste classified in the Australian Dangerous Goods Code, and it would handle more than 1,000 tonnes per year of waste (refer to **Section 8** for details).

The demolition and remediation elements of the Project are ancillary, incidental and directly related to the Containment Cell because such works are necessary to recover the waste that would be disposed of and managed in the Containment Cell. In light of this, clause 8(2) of the S&RD SEPP operates to declare the demolition and remediation elements of the Project to be State Significant Development.

2.4.2 Cessnock Local Environmental Plan 2011

2.4.2.1 Existing Land Use Zoning

The Project Site is zoned 'RU2 Rural Landscape' under Cessnock Local Environmental Plan 2011 (the LEP).

The objectives of the RU2 Rural Landscape zone are:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To maintain the rural landscape character of the land.*
- *To provide for a range of compatible land uses, including extensive agriculture.*
- *To enable other forms of development that are associated with rural activity and require an isolated location or support tourism and recreation.*
- *To ensure that the type and intensity of development is appropriate in relation to the rural capability and suitability of the land, the preservation of the agricultural, mineral and extractive production potential of the land, the rural environment (including scenic resources) and the costs of providing services and amenities.*

The purpose of the RU2 Rural Landscape zone is to protect rural land and facilitate rural and agricultural activities. The entire Project Site (including the Smelter) was zoned RU2 Rural Landscape under the LEP. This zoning did not reflect the industrial land uses that had occurred at the location since 1969, and the Smelter has relied on existing use rights under the EP&A Act to carry out its operations (including obtaining development consent to expand the Smelter in 1993 and 2002).

As explained in **Section 2.3**, the dominant purpose of the Project is for 'waste disposal facility', which comes within the parent definition of a 'waste and resource management facility' under the LEP. The LEP defines a 'waste disposal facility' as:

"a building or place used for the disposal of waste by landfill, incineration or other means, including such works or activities as recycling, resource recovery and other resource management activities, energy generation from gases, leachate management, odour control and the winning of extractive material to generate a void for disposal of waste or to cover waste after its disposal".

Development for the purposes of 'waste disposal facility' is permissible with consent in the RU2 Rural Landscape zone. While the Containment Cell is technically not consistent with the objectives of the RU2 Rural Landscape zone, it is consistent with the industrial activities that have occurred at the Project Site since 1969 and which are authorised by a combination of 'existing use' rights and development consents granted under the EP&A Act.

2.4.2.2 Proposed Land Use Zoning

To facilitate future land uses, Hydro is seeking to rezone the Hydro Land for conservation, residential, industrial and rural activities. Planning Proposals were submitted to Cessnock City Council (covering the Project Site and the majority of the Hydro Land) and Maitland City Council (the northeast section of the Hydro Land

The Gateway Determinations for the Planning Proposals were made on 23 March 2016. The Gateway Determination for the Cessnock LEP Amendment states that the future zoning of the land containing the proposed Containment Cell would be resolved when the Development Application (the subject of this EIS) is determined.

The proposed LEP Amendment includes the following zones within the Project Site:

- IN1 General Industrial for the Smelter Site.
- IN3 Heavy Industrial for the Containment Cell.

Figure 2-1 shows an extract from the proposed LEP Amendment for the Hydro Land, covering the Project Site.

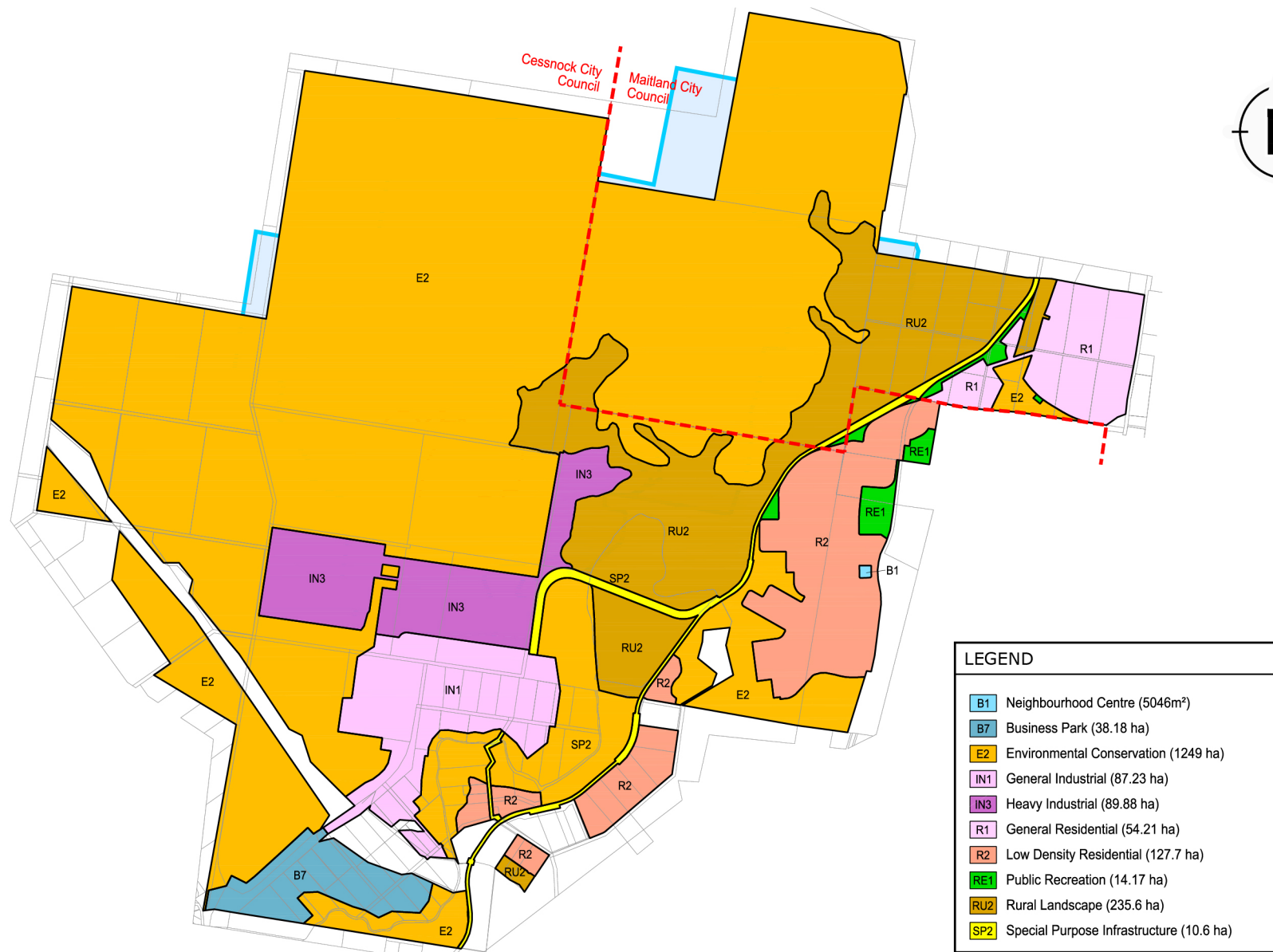
The objectives of the IN1 General Industrial zone are:

- *To provide a wide range of industrial and warehouse land uses.*
- *To encourage employment opportunities.*
- *To minimise any adverse effect of industry on other land uses.*
- *To support and protect industrial land for industrial uses.*
- *To encourage sustainable major industrial development and major employment generating development.*

The Project is proposed to accommodate the future development permissible within the IN1 General Industrial zone and is consistent with the objectives of that zone.

The objectives of the IN3 Heavy Industrial zone are:

- *To provide suitable areas for those industries that need to be separated from other land uses.*
- *To encourage employment opportunities.*
- *To minimise any adverse effect of heavy industry on other land uses.*
- *To support and protect industrial land for industrial uses.*



The Project is proposed to accommodate the Containment Cell and other development permissible within the IN3 Heavy Industrial zone and is consistent with the objectives of the zone.

The 'waste disposal facility' would be permitted with consent in the IN3 Heavy Industrial zone and the demolition and remediation activities of the Project would be permissible under both the IN1 General Industrial zone and the IN3 Heavy Industrial zone.

2.4.3 Other Environmental Planning Instruments

In addition to the key environmental planning instruments, the relevance of those listed and described in **Table 2.2** to the Project was considered.

Table 2.2: Other Relevant Environmental Planning Instruments

Instrument	Relevance
State Environmental Planning Policy No 33—Hazardous and Offensive Development (SEPP 33)	SEPP 33 defines potentially hazardous and hazardous development, and potentially offensive and offensive development. It also identifies the need for preparation of a preliminary hazard analysis to support a development application for a potentially hazardous development, and the matters a consent authority is to consider in determining a development application for a development to which SEPP 33 applies. A Preliminary Hazard Analysis prepared in accordance with <i>Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis</i> (DoP, 2011), and <i>Multi-Level Risk Assessment</i> (DoP, 2011) is included in Section 14 .
State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44)	The objective of SEPP 44 is to promote the conservation and management of areas of koala habitat to provide a permanent free-living population over their present range and reverse the current trend of koala population decline. The biodiversity assessment described in Section 18 includes consideration of koala habitat in accordance with SEPP 44.
State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55)	The objective of SEPP 55 is to encourage the remediation of contaminated land for the purpose of reducing the risk of harm to human health and the environment. This includes specifying remediation activities that require development consent. The remediation elements of the Project are deemed a Category 1 remediation works under SEPP 55, requiring development consent. The remediation is included as an element of the State Significant Development under the S&RD SEPP (refer to Section 2.4.1).

2.5 Other NSW Legislation

2.5.1 Key Legislation

2.5.1.1 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) requires any person carrying out scheduled activities to obtain an Environment Protection Licence (EPL) that authorises work to be carried out at the premises. Scheduled activities are defined in Schedule 1 to the POEO Act.

As discussed in **Section 3.3** Hydro has an existing EPL (EPL 1548) which applies to the premises, permitting the storage of hazardous, restricted solid, liquid, clinical and related waste, asbestos, and other wastes.

A review of Schedule 1 of the POEO Act concluded that in addition to the existing scheduled activity, the Project would also include the "contaminated soil treatment" scheduled activity. Clause 15 of Schedule 1 defines "contaminated soil treatment" as:

- "(1) This clause applies to contaminated soil treatment, meaning the on-site or off-site treatment of contaminated soil (including, in either case, incineration or storage of contaminated soil but excluding excavation for treatment at another site).*
- (2) The activity to which this clause applies is declared to be a scheduled activity if:*
- (b) where it treats contaminated soil originating exclusively on-site, it has a capacity:*
- (ii) to treat (otherwise than by incineration) and store more than 30,000 cubic metres of contaminated soil".*

The Project involves the treatment and storage of more than 30,000 cubic metres of contaminated soil. As such, an EPL is required to undertake the removal of the Capped Waste Stockpile and the remediation of residual soils, including placement in the Containment Cell.

It is proposed to amend the existing EPL covering the Project Site to reflect the new scheduled activity.

2.5.1.2 Protection of the Environment Operations (Waste) Regulation 2014

The Protection of the Environment Operations (Waste) Regulation 2014 (POEO Regulation) describes the regulatory processes for waste management in accordance with the POEO Act.

Under Clause 98 of the POEO Regulation, the EPA can grant an immobilised contaminants approval. An immobilised contaminants approval permits reassessment and reclassification of a waste to enable its placement in a Containment Cell or landfill appropriate to its reclassification.

In granting an immobilised contaminants approval for a given waste, the EPA may attach special conditions and/or disposal restrictions to the Approval in accordance with the hazardous and/or toxic properties of the waste.

Hydro has presented information regarding the Capped Waste Stockpile and the issues associated with its ongoing management (refer to **Section 5.3.3.2**) and the conclusion that encapsulation of the Capped Waste Stockpile in the Containment Cell is the preferred option. To allow the placement of the Capped Waste Stockpile material in the Containment Cell, an immobilised contaminants approval is required.

A general immobilised contaminants approval does not currently apply to the Capped Waste Stockpile material; as such a specific immobilised contaminants approval would be required.

Hydro has consulted with the EPA on the immobilised contaminants approval process. An application for an immobilised contaminants approval is currently under preparation for submission to the EPA.

The immobilised contaminants approval application is required to include the following:

- Details of the proposed immobilisation methodology.
- Evidence that it is not possible to reprocess the waste in order to reuse or recycle it.
- Details on quantity, form, background information and chemical composition of the waste.
- The equipment to be used and evidence of quality assurance/quality control.
- A description of the nature of the physical barrier to be established between the waste and the surrounding environment.
- Demonstration that the means by which the contaminants are immobilised will be maintained over time.

The information presented in the immobilised contaminants approval application would be consistent with the information provided in **Section 8** and **Section 9**.

The immobilised contaminants approval application would be assessed in parallel with the assessment and determination of Hydro's Development Application, including this EIS. The immobilised contaminants approval would only be granted following granting of Development Consent.

Material from the Capped Waste Stockpile would not be placed within the Containment Cell until the specific immobilised contaminants approval has been granted by the EPA.

2.5.1.3 Environmentally Hazardous Chemicals Act 1985

The *Environmentally Hazardous Chemicals Act 1985* (EHC Act) establishes the procedure for the declaration and management of environmentally hazardous chemicals and chemical wastes. The EPA can make and implement a Chemical Control Order for such declared chemicals or wastes.

A Chemical Control Order has been issued under the EHC Act that is applicable to aluminium smelter waste containing fluoride and/ or cyanide. The Order requires a licence for the processing of aluminium smelter wastes containing fluoride and/or cyanide, and the disposal of aluminium smelter wastes (not containing leachable fluoride and/or leachable cyanide).

The key requirements of the Chemical Control Order are:

- Materials kept on-site must be: secured so that no waste and/ or leachate can escape from the site; in a facility that is maintained in good condition; and in a secure manner that prevents unauthorized access.
- Materials can be processed: to research environmentally acceptable methods that reduce levels of leachable fluoride and/or cyanide; at the Smelter for the recovery of components, the making of other products, or to reduce levels of leachable fluoride and/or cyanide; at the Smelter with waste, water or other materials (except those with leachable fluoride and/or cyanide) to facilitate disposal.
- Materials can be conveyed (following EPA approval) to another location for treatment to reduce levels of leachable fluoride and/or cyanide.
- Materials can be disposed: if certified as approved aluminium smelter waste (which is smelter waste that does not contain leachable fluoride or leachable cyanide); and in accordance with POEO Act.

Hydro manages the applicable aluminium smelter waste at the Smelter (including that within the Capped Waste Stockpile) in accordance with a Licence (Licence Number 05) issued under the EHC Act.

As discussed in **Section 3.4.2.2** the spent pot lining stored in buildings at the Smelter would be transported to a licensed recycling facility (as a separate activity to the Project). This complies with the conditions of Licence Number 05.

Spent pot lining contained within the Capped Waste Stockpile would be disposed to the Containment Cell as approved aluminium smelter waste (immobilisation within the Containment Cell addresses the leachable fluoride and leachable cyanide). As discussed in **Section 2.5.1.2** an application for a specific immobilised contaminants approval has been prepared for submission to the EPA. Spent pot lining within the Capped Waste Stockpile would not be placed within the Containment Cell until the specific immobilised contaminants approval has been granted by the EPA. It is noted that the spent pot lining capped within the Capped Waste Stockpile is not separable from other wastes contained therein.

2.5.2 Other Relevant Legislation

Table 2.3 identifies the key requirements of other NSW environmental legislation and its relevance to the Project.

Pursuant to section 89J of the EP&A Act, approval under a number of these acts is not required for a State Significant Development that is granted development consent.

Table 2.3: Other Relevant NSW Legislation

Legislation	Key Requirements	Relevance
<i>Contaminated Land Management Act 1997</i>	Section 60 of the CLM Act requires landowners to notify the EPA if their activities have resulted in contamination of the land.	Hydro has previously consulted with the EPA and the EPA has determined that the Project Site does not warrant regulation under the Act. Relevant issues associated with management of contaminated soils are addressed in Section 8 , Section 9 and Section 13 .
<i>Fisheries Management Act 1994</i>	Permits are required under section 201 (for dredging or reclamation works), 205 (harm to marine vegetation) or 219 (blockage of fish passageway) of the act.	Approval under the Act is not required for State Significant Development. Relevant issues associated with ecology and hydrology are addressed in Section 13 and Section 18 .
<i>National Parks and Wildlife Act 1974</i>	An Aboriginal Heritage Impact Permit under section 90 of the act for works that would disturb Aboriginal sites or relics.	Approval under the Act is not required for State Significant Development. Aboriginal heritage management is addressed in Section 16 .
<i>Native Vegetation Act 2003</i>	An authorisation referred to in section 12 of the act to clear native vegetation.	Approval under the Act is not required for State Significant Development. Potential impacts on native vegetation are addressed in Section 18 .
<i>Roads Act 1993</i>	Section 138 of the act requires that a person obtain the consent of the appropriate roads authority for the erection of a structure, or the carrying out of a work in, on or over a public road, or the digging up or disturbance of the surface of a public road.	Section 15 assesses the potential traffic impacts of the Project, including determination if activities requiring consent under Section 138 of the act are required.
<i>Waste Avoidance and Resource Recovery Act 2001</i>	This Act establishes a hierarchy of waste management (avoid, recover, dispose) encouraging efficient use of resources and minimising waste.	Waste materials generated during the Project would be managed in accordance with the principles of the waste management hierarchy referred to in the WARR Act. Waste management is addressed in Section 8 , Section 9 and Section 22 .

Table 2.3: Other Relevant NSW Legislation

Legislation	Key Requirements	Relevance
<i>Water Management Act 2000</i>	A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the act.	Approval under the Act is not required for State Significant Development. Potential impacts on groundwater and watercourses are addressed in Section 13 .

2.6 Assessment Requirements

2.6.1 Project Application

A request for the Secretary's Environmental Assessment Requirements for the Project was submitted on 28 August 2014. The request was supported by a Preliminary Environmental Assessment (PEA) that provided an outline of the Project, a preliminary assessment of the potential environmental issues, and an outline of the proposed assessment methodology. The PEA was circulated to relevant government authorities to assist them in preparing a submission to the Department of Planning and Environment on issues to be addressed in the EIS.

2.6.2 Planning Focus Meeting

A Planning Focus Meeting was convened by the Department of Planning and Environment on 10 September 2014 with relevant government authorities. The meeting provided a forum for participants to obtain information on the Project, and discuss key issues and potential environmental impacts.

The meeting was attended by representatives from the following government organisations:

- Department of Planning and Environment.
- Environment Protection Authority.
- Cessnock City Council.
- Roads and Maritime Services.
- WorkSafe NSW (formerly NSW Workcover).
- Department of Primary Industries (Crown Lands and Office of Water).
- NSW Health: Hunter New England Local Health District.
- Rural Fire Service.
- Maitland City Council.

As part of the Planning Focus Meeting, a walkover of the Smelter Site was undertaken.

Following the meeting, the Department of Planning and Environment sought written comments from agencies on issues that should be addressed in the EIS.

2.6.3 Secretary's Environmental Assessment Requirements

Under clause 89G of the EP&A Act, the Secretary of the Department of Planning and Environment is required to prepare and issue Hydro with requirements for undertaking the environmental assessment including the issues to be addressed in the EIS and the level of assessment required.

The Secretary's Environmental Assessment Requirements for the Project were issued on 18 November 2014. A copy of the Secretary's Environmental Assessment Requirements is attached in **Appendix 1**.

The matters raised by the Secretary for consideration are summarised in **Table 2.4** together with the Section of this EIS that addresses the matter. More details on each of the summarised requirements are provided in the referenced section of the EIS.

The Secretary's Environmental Assessment Requirements also requires the EIS to consider the issues raised in public authority responses to key issues for the Project. **Section 4.3** identifies the key issues raised in public authority responses, and where those issues are considered in the EIS.

Table 2.4: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed in the EIS
Previous/existing operations carried out on the site	Section 3.3 and Section 3.4
Detailed description of the development, including need and justification for the proposed development	Sections 5 and 6
Consideration of all relevant guidelines and environmental planning instruments	Section 2
Consideration of public authority responses to key issues	Section 4.3
Risk assessment of any potential environmental impacts	Section 10
Detailed assessment of the key issues including: - Description of the existing environment - Assessment of the potential impacts - Management and monitoring measures	Part C
Summary of all the proposed environmental management and monitoring measures	Section 24
Qualified quantity surveyor report	Section 7.3 and Appendix 3
Strategic and Statutory Context	Sections 2 and 6
Waste Containment Cell	Section 8.4, Section 8.8 and Section 9
Contamination and Remediation including: a comprehensive assessment for the management of spent pot lining	The stored spent pot lining is proposed to be transported from the Smelter for off-site recycling as a separate activity to the Project. Assessment of management options for spent pot lining no longer required.
a Remediation Action Plan	Appendix 5
Occupational Health and Safety.	Section 8.1.2
Demolition Management	Section 8.1
Waste	Section 8
Air and Odour	Section 11
Noise and Vibration	Section 12
Soil and Water	Section 13
Hazards and Risks	Section 14
Transport and Access	Section 15
Heritage - Aboriginal Cultural Heritage Assessment - Non-Indigenous Heritage Assessment	Section 16 Section 17
Biodiversity	Section 18
Fire and Incident Management	Section 8.1

Table 2.4: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed in the EIS
Visual	Section 19
Ecologically Sustainable Development	Section 25.4
Greenhouse Gas Emissions	Section 20
Plans and Documents	Appendix 3
Agency and Stakeholder Consultation	Section 4

3. LOCATION AND SETTING

3.1 Project Location

3.1.1 Regional Setting

The Project Site is located approximately three kilometres north of the Kurri Kurri central business district (CBD), approximately 10 kilometres south of the Maitland CBD and approximately 33 kilometres to the northwest of the Newcastle CBD. It is located on Hart Road in Loxford, NSW within the Cessnock local government area.

Figure 3-1 shows the regional setting of the Project Site.

3.1.1.1 Transport

The Hunter Expressway is part of the National Highway Network and is a major road in the Lower Hunter Region. It connects with the Pacific Motorway and the Newcastle Link Road in the south with the New England Highway at Branxton in the north. The Hunter Expressway passes through the south-western corner of the Hydro Land, with an interchange located on Hart Road.

John Renshaw Drive is a state road that connects with the Hunter Expressway south of the Project Site and forms part of the primary route (along with the New England Highway, Pacific Highway and Industrial Drive) to the Port of Newcastle and associated industrial areas.

The South Maitland Railway is a private rail line that commences at the Main Northern Railway at Maitland and passes through Weston, Kurri Kurri and Cessnock. The line previously serviced a number of coal mines, and previously provided a passenger service. The line now services only one coal mine and train movements on the line are now limited. The South Maitland Railway passes through the eastern section of the Hydro Land.

3.1.1.2 Topography

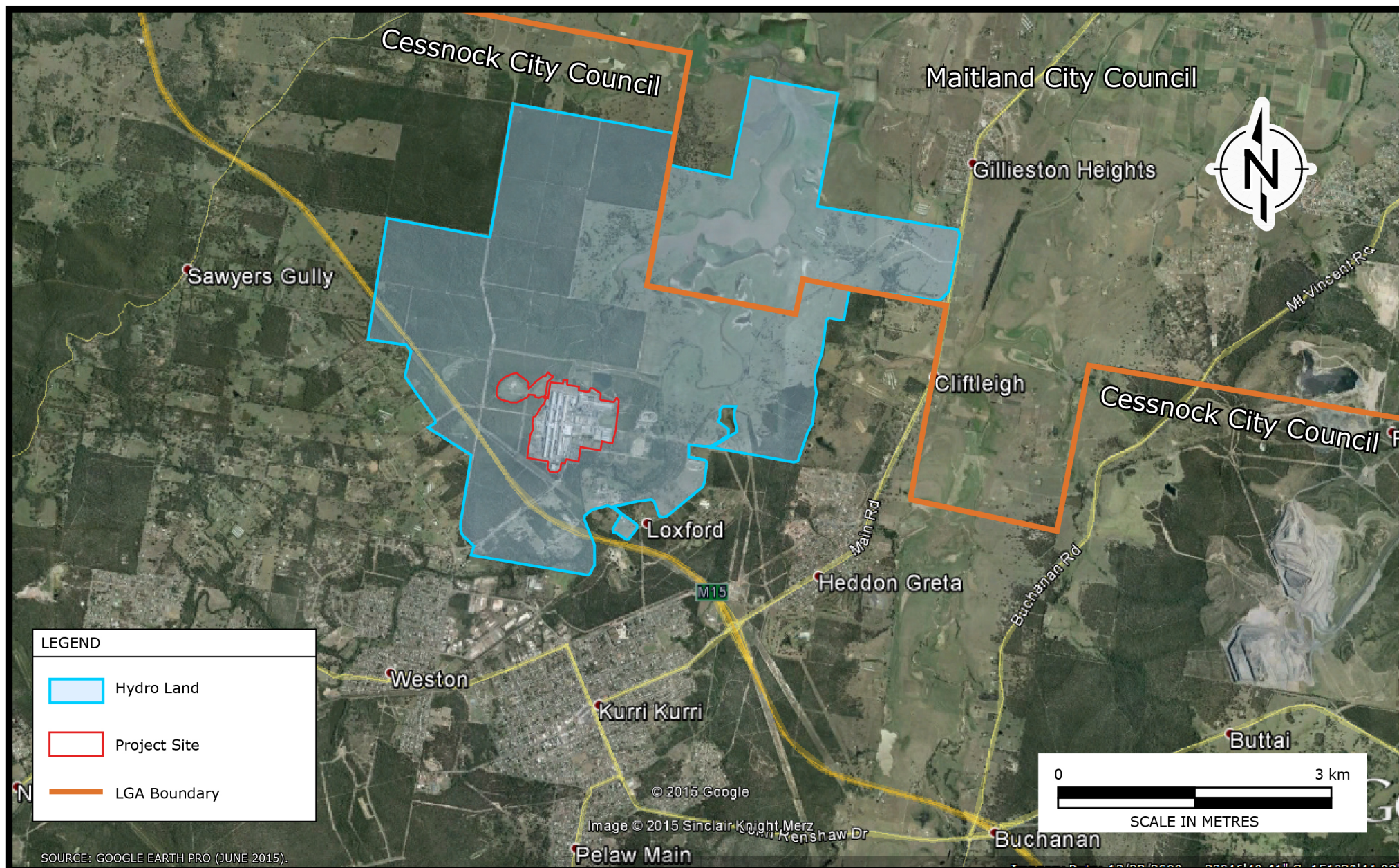
The Project Site is located between low residual hills to the west and low lying swampy land to the north and east. Low lying areas of the Project Site were filled to create a flat, elevated platform at approximately 16m Australian Height Datum (AHD) for construction of the Smelter. The Project Site is relatively flat with a gentle slope from west to east and south to north. The Project Site increases in elevation to the west in the vicinity of the Clay Borrow Pit (the proposed location for the Containment Cell), which is at an elevation of 25m AHD.

3.1.1.3 Watercourses

The Project is located in the Hunter catchment. The Hunter catchment is the largest coastal catchment in NSW, covering approximately 22,000 square kilometres (DECCW, 2009a).

The Hunter River flows in a south-westerly direction from Glenbawn Dam in the north of the catchment to meet the Goulburn River near Denman. From Denman, it flows in a south-easterly direction through Singleton and Maitland to the north of the Project before entering the Pacific Ocean at Newcastle (Hunter-Central Rivers CMA, 2009).

Swamp Creek flows through Weston and Loxford before flowing through Wentworth Swamp, which is a network of low lying areas between Maitland and Loxford connected by Swamp Creek. Swamp Creek flows into Wallis Creek, which then flows into the Hunter River.



LOCATION PLAN

FORMER HYDRO ALUMINIUM KURRI KURRI SMELTER
DEMOLITION AND REMEDIATION

FIGURE
3-1

AS130401

RAMBOLL ENVIRON

DRAFTED BY: KK

DATE: July 2016

3.1.2 Local Setting

The Hydro Land incorporates the Project Site and covers approximately 2000 hectares. The Hydro Land surrounding the Project Site is predominantly native vegetation to the northwest and south; rural land to the northeast; and rural residential land holdings to the southeast. The Kurri Kurri Speedway and the Kurri Kurri Junior Motorcycle Club operate on Hydro Land approximately 200 metres from the Smelter Site.

The established residential townships of Kurri Kurri, Weston and Heddon Greta are located approximately two to three kilometres to the south and southeast of the Hydro Land, while the growing residential areas of Gillieston Heights and Cliftleigh are located approximately four to five kilometres to the northeast and east respectively. Other areas to the north, east and west are predominantly rural and rural-residential land uses.

The Kurri Kurri TAFE is located approximately 1500 metres to the southeast of the Project Site and Kurri Kurri High School is approximately 1900 metres to the southeast of the Project Site.

Immediately south of the Hydro Land in the northern area of Kurri Kurri is an industrial estate that includes a number of small to medium industrial operations.

Swamp Creek, Black Waterholes Creek and several smaller creeks are tributaries of Wentworth Swamp. Swamp Creek flows in a northerly direction in the east of the Hydro Land, while Black Waterholes Creek flows in a northerly direction in the northwest of the Hydro Land. Swamp Creek is approximately 180 metres to the east of the southeast corner of the Project Site.

An unnamed watercourse is located approximately 45 metres to the west of the Smelter Site, and approximately 170 metres east of the proposed Containment Cell location. This unnamed watercourse is a tributary to Black Waterholes Creek. Other small ephemeral watercourses and low lying areas are located to the east of the Smelter and drain to Swamp Creek.

3.2 Project Site

The Project Site is shown in **Figure 3-2** and comprises an area of approximately 80 hectares and currently contains the following land uses.

3.2.1 The Smelter

This area contains the production, administration, laboratory and maintenance facilities of the former smelting operations. It also includes the adjoining car parks and sporting fields developed for smelter employees. The Smelter commenced operations in 1969 and underwent a number of expansions and upgrades. Production ceased in 2012 and the Smelter was closed in May 2014.

3.2.2 Capped Waste Stockpile

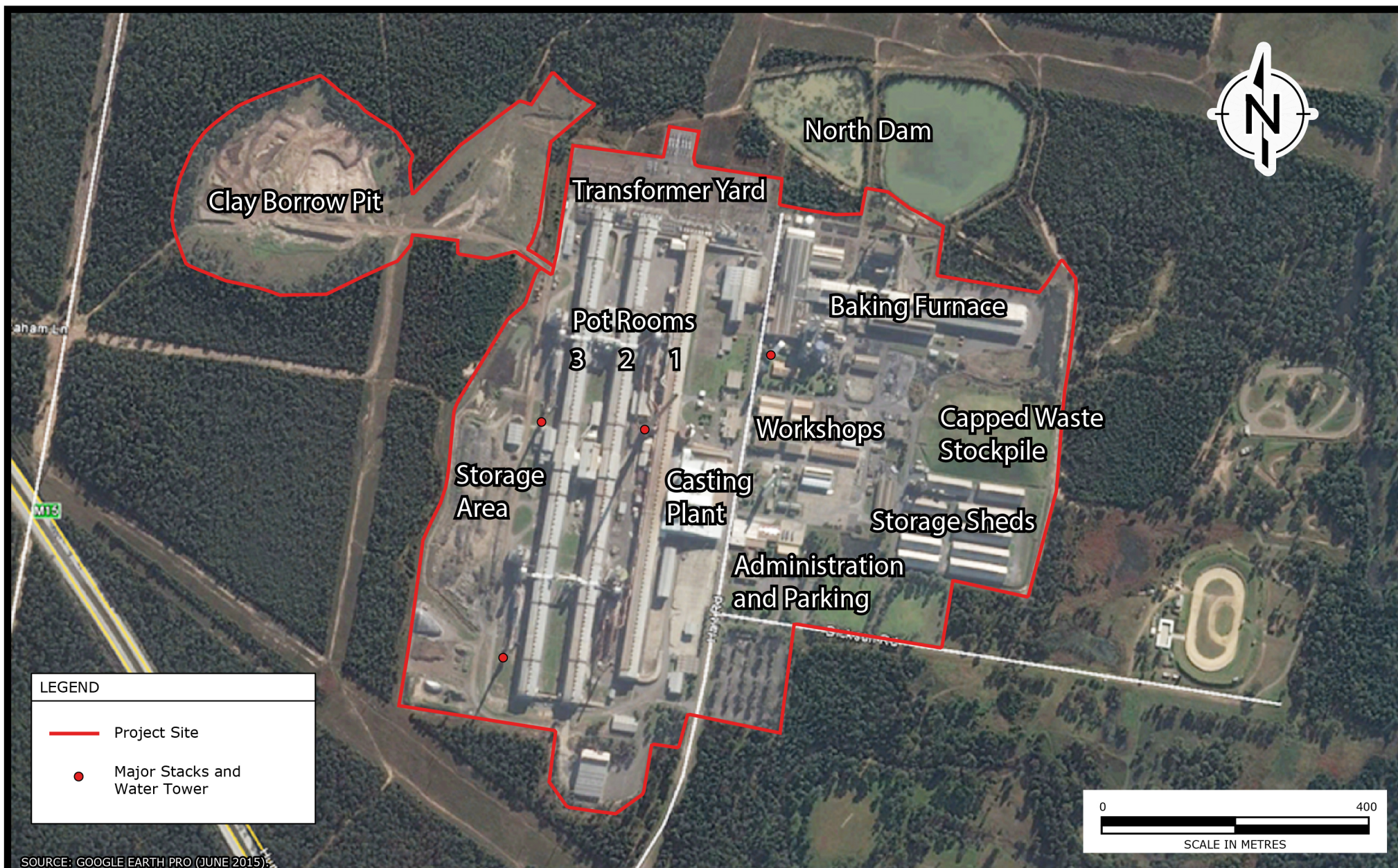
The Capped Waste Stockpile is located in the eastern section of the Smelter Site. This stockpile contains mixed smelter waste originating from the early 1970's up until the early 1990's. The Capped Waste Stockpile is known to contain spent pot lining, cryolite, alumina, floor sweepings (alumina, cryolite, carbon), shot blast dust (carbon, steel shot), cement, pot lining mix, asbestos containing materials, coal tar pitch and small amounts of other materials including plastic, wood and steel.

3.2.3 Clay Borrow Pit

Immediately to the west of the Smelter Site is an area that was used to source clay use as capping for the Capped Waste Stockpile.

3.2.4 Bushland

Native vegetation is located immediately north, south and west of the Clay Borrow Pit.



PROJECT SITE EXISTING CONDITIONS
FORMER HYDRO ALUMINIUM KURRI KURRI SMELTER
DEMOLITION AND REMEDIATION

**FIGURE
3-2**

AS130401

3.2.5 Water Management

The Smelter has an existing water management system. This includes:

- Subsurface and open surface water drainage throughout the Smelter.
- One dam in the west of the Smelter, one in the east of the Smelter and one in the south of the Smelter. These are the initial collection and treatment settling points for the Smelter stormwater.
- Two dams located to immediately north of the Smelter (known collectively as the North Dam). These have previously been used as part of the water collection and treatment system for the Smelter. These continue to capture surface water runoff from the Smelter Site, receiving water that has passed through the east, south and west dams.

3.3 Existing Approvals and Licences

3.3.1 Planning Approvals

The Project Site has relied on 'existing use' rights under the EP&A Act, and has a number of existing approvals granted under the EP&A Act. These relate both to the former smelting activities and recent post-operation activities that have required development consent.

As the Smelter commenced operation in 1969, construction of much of the Smelter and the associated operational and management activities are not the subject of an approval under the EP&A Act. However, there were upgrades and changes to the Smelter after 1980 that were subject to approval under the EP&A Act.

Table 3.1 identifies the key planning approvals under the EP&A Act that apply to the Project Site and the key elements of those approvals.

Table 3.1: Key Planning Approvals Applying to the Project Site

Consent Authority and Year	Key Elements
Department of Environment and Planning, 1981	• Smelter expansion (construction of Potline 3 and increased production capacity). • (Modification 1) Amendment to environmental monitoring reporting requirements.
Cessnock City Council, 1993	• Capping of the spent cathode pile (now the Capped Waste Stockpile). • Construction and operation of the spent pot lining storage sheds. • Rehabilitation of the Clay Borrow Pit. • (Modification 1) Temporary storage of spent pot lining in the former anode baking furnace (refer to Section 3.4.3.1).
Department of Planning, 2002	• Structural floor repairs to buildings and installation of Green mix scrubber. • Construction and operation of a new Anode Baking Furnace and upgrades of Potlines 2 and 3. • Upgrade of Potline 1 and an increase in anodes size across all potlines. • (Modification 1) Construction and operation of a mechanised crucible cleaning plant. • (Modification 2) Increase in the size of the crucible cleaning plant footprint.
Cessnock City Council, 2016	• Stage 1 Demolition (refer to Section 3.4.3.2)

3.3.2 Environment Protection Licence

As discussed in **Section 3.3** Hydro holds EPL No. 1548 which applies to the premises, permitting the storage of hazardous, restricted solid, liquid, clinical and related waste, asbestos, and other wastes.

The EPL includes the following key elements:

- Authorises the following scheduled activities:
 - Waste storage (hazardous, restricted solid, liquid, clinical and related waste and asbestos waste) of unlimited quantity.
 - Waste storage (other types of waste) of unlimited quantity.
- The requirement for construction and operation of a groundwater interception trench at the Capped Waste Stockpile.
- Surface water and ground water monitoring requirements.
- Management requirements for effluent irrigation and waste handling.

3.3.3 Chemical Control Order Licence

As discussed in **Section 2.5.1.3** Hydro manages the spent pot lining in accordance with a Licence (Licence Number 05) issued under the EHC Act. The licence was issued for the appropriate management of the aluminium smelter wastes.

The key requirements of the Chemical Control Order are:

- Materials kept on-site must be: secured so that no waste and/ or leachate can escape from the site; in a facility that is maintained in good condition; and in a secure manner that prevents unauthorized access.
- Materials can be processed: to research environmentally acceptable methods that reduce levels of leachable fluoride and/or cyanide; at the Smelter for the recovery of components, the making of other products, or to reduce levels of leachable fluoride and/or cyanide; at the Smelter with waste, water or other materials (except those with leachable fluoride and/or cyanide) to facilitate disposal.
- Materials can be conveyed (following EPA approval) to another location for treatment to reduce levels of leachable fluoride and/or cyanide.
- Materials can be disposed: if certified as approved aluminium smelter waste (which is smelter waste that does not contain leachable fluoride or leachable cyanide); and in accordance with POEO Act.

3.4 Existing and Scheduled Smelter Activities

3.4.1 Land and Buildings Management

Since production ceased at the Smelter at October 2012, Hydro has continued to undertake a number of management activities at the Smelter and throughout the Hydro Land. This includes:

- Continuation of environmental monitoring and reporting. This includes implementation of the requirements of Hydro's EPL No. 1548.
- As noted in **Section 3.3.2**, EPL No. 1548 includes surface water and ground water monitoring requirements. The results of this monitoring, and other environmental management activities, are required under the licence to be reported to the Environment Protection Authority.
- Inspections of the Hydro Land to monitor for illegal dumping and other unauthorised activities.

The Hydro Land covers approximately 2,000 hectares, with the majority of it being rural land and native vegetation. While the Hydro Land is fenced with signage warning against unauthorised access, such access does occur. Such unauthorised access has often resulted in illegal dumping. Hydro personnel regularly inspect the Hydro Land to check the condition of boundary fencing and to inspect for illegal dumping and evidence of other unauthorised activities.

- Contaminated site assessment throughout the Hydro Land and commencement of associated remediation.

Remediation activities within the Hydro Land deemed Category 2 remediation works under State Environmental Planning Policy No. 55 – Remediation of Land. Removed contaminated material has been and would be transported for stockpiling and environmental management at the Smelter prior to placement in the Containment Cell (refer to **Section 8.6**).

- Vegetation management within the Project site.
Hydro undertakes a range of vegetation management activities within the Project site, including maintenance of landscaped areas, mowing of grasses along Hart Road, weed removal and management.
- Building maintenance.
A number of Smelter buildings remain occupied by administration and maintenance personnel. These are maintained for functionality. In addition, redundant Smelter buildings are maintained as required to protect personnel and contractors from damaged structures (such as fixing or removal of loose metal sheeting).

3.4.2 Decommissioning Activities

As discussed in **Section 3.4.2.1** to **Section 3.4.2.3** Hydro has undertaken a number of activities associated with the decommissioning of the Smelter since the announcement of the Smelter closure in May 2014.

3.4.2.1 Hazardous Materials Management

Hydro has commenced a program for the removal of asbestos and other hazardous materials from Smelter buildings. A hazardous materials audit was undertaken of all Smelter buildings in 2014. A Hazardous Materials Register was subsequently developed identifying the type, location, condition and quantity of the hazardous materials, and an outline of the environmental, health and safety requirements to be implemented in their removal and handling.

Hydro has commissioned removal contractors licensed with SafeWork NSW to undertake the removal. Contractors are required to develop and implement detailed Hazardous Materials Removal and Handling Protocols in accordance with the Work Health and Safety Regulation 2011 and associated SafeWork NSW guidelines. Hydro would have most known and accessible hazardous materials removed by licensed contractors prior to the commencement of demolition. In some circumstances (due to safety issues or access restrictions) hazardous materials removal would need to be undertaken as part of the demolition activities. Such hazardous material removal would only be undertaken by contractors appropriately licensed with SafeWork NSW.

3.4.2.2 Removal and Sale of Non-Structural and Salvageable Recyclable Materials and Reusable Machinery

One of Hydro's aims is to maximise the recycling and reuse of materials generated by the decommissioning and demolition of the Smelter.

Hydro has undertaken an inventory of the Smelter buildings to identify recyclable materials (such as aluminium busbars and other metals) that can be removed prior to demolition and transported to recycling facilities.

There is a range of equipment and machinery (ranging from computers and hand tools, to cranes and generators) that have been offered for purchase for reuse. There is a large amount of machinery at the Smelter that is specific to aluminium production. Hydro has consulted with aluminium smelters to identify opportunities for their reuse. Any equipment or machinery that is not acquired for reuse would be made available for metal recyclers.

There are a number of recyclable smelting process by-products that Hydro has previously transported, and continues to transport, from the Smelter for recycling and reuse. This includes:

- Spent pot lining stored in buildings.
- Ahead of Schedule (AOS) and baked anodes.

- Crushed cathode blocks.
- Packing coke.
- Pot shutdown butts.

Hydro would continue to identify and employ reasonable and feasible recycling opportunities for these materials. Hydro would only transport these materials to facilities that comply with legislative and regulatory requirements that apply to the recycling of such materials.

3.4.2.3 Disconnection of Unnecessary Services

There is a large network of electricity, telecommunications, water, sewer and gas infrastructure throughout the Smelter. The majority of this infrastructure is now redundant.

To allow for the safe removal of salvageable recyclable materials and reusable machinery, and the subsequent demolition activities, Hydro has commenced a services disconnection program. This program also provides environmental benefits, as it reduces the potential for uncontrolled and unnecessary electricity usage and leaks from taps, toilets and other water using units.

Hydro has developed a servicing strategy for the Smelter, including these disconnection activities. The strategy also includes the retention of services for buildings to be occupied during the Project, as well as maintaining and protecting services required for decommissioning and subsequent demolition activities.

3.4.3 Other Activities

3.4.3.1 Temporary Spent Pot Lining Storage

In August 2015 Cessnock City Council approved a Modification Application for modification of a development consent granted in 1993, which included requirements for the storage of spent pot lining. The Modification Application addressed temporary storage of spent pot lining removed from the former pot rooms in the former anode baking furnace (as modified to facilitate storage).

The alterations to the former anode baking furnace commenced in October 2015. The spent pot lining relocation commenced in February 2016.

3.4.3.2 Stage 1 Demolition

In March 2016 Cessnock City Council granted Development Consent of the following:

- Demolition of designated buildings at the Smelter, excluding:
 - Buildings used for the storage of materials.
 - Three concrete stacks, and one concrete water tower (structures requiring the use of explosives).
 - The transformer yard and major power supply infrastructure in the north of the Smelter.
 - Designated workshops, storage sheds, offices, electrical substations and water supply buildings.

The excluded buildings would be demolished as part of the Project as outlined in **Section 8.7**.

- A contractor's compound within an existing building located in the south of the Smelter (the former Pot Rebuild building), which may be used by the demolition contractor.
- Additional areas for contractor ancillary facilities in the southeast of the Smelter (car park areas and former sporting fields). This would include Project personnel parking, demountable offices and amenity facilities.
- A concrete and brick crushing plant processing up to 28,000 tonnes per year or 140 tonnes per day.
- A demolition materials stockpile area. This would be required to stockpile approximately 35,000 tonnes of scrap metal, approximately 36,000 tonnes of crushed and uncrushed concrete and brick and small amounts of green waste and non-recyclable demolition wastes.

- The sorting of recyclable metallic demolition materials and transportation to a metal recycling facility.

The works addressed by the Development Consent granted by Cessnock City Council are known as the Stage 1 Demolition.

It is proposed that the contractor's compound, the demolition materials stockpile area and the concrete and refractory crushing plant included in the Stage 1 Demolition would continue to be used for the Works (refer to **Section 8**).

It is anticipated that some Stage 1 Demolition activities would occur concurrently with the early stage of the Works. So that the potential cumulative impacts of Stage 1 Demolition activities are considered when assessing the Works, these activities have been included as appropriate in **Part C** (Environmental Assessment) of this EIS.

4. STAKEHOLDER ENGAGEMENT

4.1 Introduction

The Secretary's Environment Assessment Requirements identify consultation as a key issue for the EIS and require consultation to be undertaken and documented in the EIS.

This section details the consultation activities undertaken for the Project. **Table 4.1** outlines the Secretary's Environmental Assessment Requirements relating to consultation and where they have been addressed.

Table 4.1: Secretary's Environmental Assessment Requirements - Consultation

Requirement	Where Addressed
During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular you must consult with: • Cessnock City Council; • Maitland City Council; • Environment Protection Authority; • WorkCover NSW; • NSW Health; • Rural Fire Service; • Department of Primary Industries, including NSW Office of Water and Crown Lands; • Office of Environment and Heritage; and • Roads and Maritime Services. The EIS must describe the consultation process and the issues raised, and identify where the design of the development has been amended in response to those issues. Where amendments have not been made to address an issue, a short explanation should be provided.	Section 4

4.2 Community Engagement

Keeping the community informed about activities at the Smelter and the future of the Hydro Land has been an integral activity in the development of the future of the Hydro Land.

Hydro has implemented a number of community engagement activities to inform the community about the Project and to identify the community's concerns and issues.

Table 4.2 describes the community engagement activities undertaken by Hydro in planning for the Project, including development of this Environmental Impact Statement.

Table 4.2: Hydro Community Engagement Activities

Engagement Format	Details
Information and Feedback Mechanisms	The following communication methods have been and will continue to be available throughout the Project development and environmental assessment to provide the community with a range of ways to contact the Project team, gain access to information and provide comment. Website: http://www.hydro.com/en/Press-room/Kurri-Kurri/Community-input/ Email: community.kurri@hydro.com Phone: 1800 066 243 Mailing Address: PO Box 1, Kurri Kurri NSW 2327

Table 4.2: Hydro Community Engagement Activities

Engagement Format	Details
	Information about the Project continues to be uploaded onto the Project website to provide the community ready access to information about the Project.
Community Reference Group	Hydro established the Community Reference Group in 2014. The group is comprised of local community representatives with the following aims: 1. Create a forum for discussion and exchange of information on topics related to the Project. 2. Assist Hydro to understand the values, aspirations and preferences that the community has for the Smelter Site, and identify related local issues that will need to be taken into consideration in the development, environmental assessment and management, construction/demolition and rezoning/divestment phases of the project. 3. Act as a communication link between Hydro, the community and other stakeholders. The first meeting of the Community Reference Group was held in July 2014 and it continues to meet on a bi-monthly basis. Minutes of the Community Reference Group meetings are posted on the Hydro Aluminium Kurri Kurri website.
Community Drop-In Sessions	Community drop in sessions were held on 23 April 2015 (the Project Site), 28 May 2015 (Weston), 2 June 2015 (Gillieston Height) and 10 June 2015 (Kurri Kurri). The drop-in sessions were held to allow interested parties to ask questions about the Project and raise any concerns.
Community Information Notices and Fact Sheets	Hydro has developed a number of Community Information Notices and Information Newsletters on the various aspects of the future of the Hydro Land, including the Project. This has included: • Information Notices in the Cessnock Advertiser and Maitland Mercury providing information on demolition activities, contamination and remediation, and the future land uses at the Smelter and the Hydro Land. • Information Newsletters on these elements were placed on the Hydro Aluminium Kurri Kurri website.
Issues Database	Through the activities described above, Hydro has received a number of community submissions, raising various issues. Table 4.3 consolidates and summarises the issues raised by the community in such submissions relating to the Project and where they are addressed in this EIS.

Table 4.3: Community Issues and Response

Community Issue	Where Addressed in this EIS
Safety – congestion surrounding the Project Site. Will a traffic study be done in the EIS?	Section 15
What are Containment Cells?	Section 5.3.4 and Section 8
Containment Cell risks (such as earthquakes and tsunamis)	Section 5.3.6 and Section 9.1.1
Recycling of waste materials	Section 3.4 and 8.7.6
Flora and fauna - conservation	Section 18

4.3 Agency Consultation

4.3.1 Planning Focus Meeting and Secretary's Environmental Assessment Requirements

Several government agencies were consulted as part of the Planning Focus Meeting for the Project and by the Department of Planning and Environment during preparation of the Secretary's Environmental Assessment Requirements (refer to **Section 2.6**). Submissions were made by the following agencies for consideration by the Department of Planning and Environment in the development of the Secretary's Environmental Assessment Requirements:

- Cessnock City Council.
- Maitland City Council.
- Environment Protection Authority.
- SafeWork NSW.
- NSW Health.
- Rural Fire Service.
- Department of Primary Industries, including NSW Office of Water and Crown Lands.
- Office of Environment and Heritage.
- Roads and Maritime Services.

Table 4.4 to **Table 4.12** summarises the issues raised in the submissions from the government agencies and details where the issues are addressed in the EIS.

To assist in clarifying and addressing these issues, Hydro contacted agencies to request and arrange further consultation and to identify any other issues.

Table 4.4: Summary of EPA Issues and Response

Issue	Where Addressed
General	
Provide details on the Project and the Project Site, including layout, equipment and chemicals to be used, and mitigation measures.	Section 8 and Section 9
Location and details of potentially affected residences and other land uses.	Section 11.2.2 and Section 12.2
Consideration of Environment Protection Licence requirements.	Section 3.3.2
Air Quality	
Preparation of a detailed Air Quality Impact Assessment in accordance with the <i>Approved Methods for the Modelling and Assessment of Air Pollutants in NSW</i> (EPA, 2005) that addresses:	Section 11 and Appendix 6
The existing environment (climatic, topographic, land uses and air quality).	Section 11.2

Table 4.4: Summary of EPA Issues and Response

Issue	Where Addressed
Detailed project description, in particular identification and location of all fixed and mobile sources of dust/air emissions from the development, and estimate the emissions.	Section 11.3
Consideration of worst case emission scenarios and cumulative impacts with existing and approved developments.	Section 11.3
Identification of the pollutants of concern and the relevant fugitive and point source emissions during all phases and aspects of the Project.	Section 11.3
Proposed air quality management and monitoring procedures (including emission control techniques/practices) so that the Project complies with the relevant regulatory framework.	Section 11.4
Greenhouse Gas	
A comprehensive assessment of the Project's predicted greenhouse gas emissions (tCO _{2e}). Emissions should be reported broken down by: a) Direct emissions (scope 1 as defined by the Greenhouse Gas Protocol). b) Indirect emissions from electricity (scope 2). c) Upstream and downstream emissions (scope 3)	Section 20 and Appendix 11
Noise and Vibration	
Construction noise assessed using the <i>Interim Construction Noise Guideline</i> (DECC, 2009).	Section 12.3 and Appendix 7
Vibration from all activities assessed using the <i>Assessing Vibration: A Technical Guideline</i> (DEC, 2006).	Section 12.3 and Appendix 7
Operational noise assessed using the <i>NSW Industrial Noise Policy</i> (EPA, 2000) and <i>Industrial Noise Policy Application Notes</i> .	Section 12.3 and Appendix 7
Noise on public roads from increased road traffic generated by land use developments should be assessed using the Environmental Criteria for Road Traffic Noise (EPA, 1999).	Section 12.3 and Appendix 7
Contaminated Site Assessment, Waste, Chemicals and Hazardous Materials	
A contaminated site assessment in accordance with the guidelines made or approved under the <i>Contaminated Land Management Act 1997</i> and in accordance with the <i>Guidelines for Consultants Reporting on Contaminated Sites</i> (EPA, 2000).	Section 13.2 and Appendix 4
Describe how the site contamination will be remediated and/or managed so that the site is, or can be, made suitable for the proposed use.	Section 8
Include a comprehensive options assessment for the management of the spent pot lining (first cut and second cut) including treatment, export and/or disposal. This should include: review and assessment of Australian and international precedents in comparable jurisdictions; a robust defence of the preferred strategy; and an independent review of options by an expert nominated by the EPA.	Spent pot lining is being transported from the Smelter for recycling as a separate activity to the Project. Assessment of management options for spent pot lining no longer required as part of the Project.

Table 4.4: Summary of EPA Issues and Response

Issue	Where Addressed
A Site Auditor accredited under the <i>Contaminated Land Management Act 1997</i> will verify the adequacy of the investigations, the proposed remedial strategy, the effectiveness of the remedial works in preventing the migration of contamination from the site, and the suitability of the site for the proposed land use.	Appendix 4
Include a detailed design for all containment material cell construction designed according to best available national and/or international design and technology.	Section 8.4, Section 8.8.3 and Appendix 3
Identify, characterise and classify all waste that will be generated on-site, a detailed plan for in-situ classification of waste material and details on how materials would be transported within the site.	Section 21.2
Identify, characterise and classify all waste (including recyclable/ reusable) that is proposed to be disposed of to an off-site location, and describe how it would be transported.	Section 21.2
Include a commitment to retaining all sampling and classification results for the life of the project to demonstrate compliance with EPA's Waste Classification Guidelines.	Section 9.1
Provide details of how waste will be handled and managed on-site to minimise pollution, including: stockpile location and management; and erosion.	Sections 8.2, 0 and Section 21
Demonstrate awareness of EPA's requirements with respect to notification and tracking of waste and the relevant legislative requirements for disposal of the waste.	Section 21
Outline contingency plans for any event that affects operations at the site that may result in environmental harm.	Section 8.1.1
Soils	
An assessment of potential impacts on soil and land resources, including erosion, mass movement (landslides) and urban and regional salinity.	Section 13
A description of the mitigation and management options that will be used to prevent, control, abate or minimise identified soil and land resource impacts.	Section 13
Water	
Describe the water intake, use and discharge elements of the Project.	Section 8.2.7
Demonstrate that all practical options to avoid discharge have been implemented and environmental impact minimised where discharge is necessary.	Section 8.2.7
Where relevant include a water balance for the Project.	Section 8.2.7
Describe existing surface and groundwater quality.	Section 13
State the Water Quality Objectives for the receiving waters relevant to the proposal.	Section 13.1
State the indicators and associated trigger values or criteria for the identified environmental values, including any locally specific objectives, criteria or targets which have been endorsed by the NSW Government.	Section 13.1

Table 4.4: Summary of EPA Issues and Response

Issue	Where Addressed
Describe the nature and degree of impact that any proposed discharges will have on the receiving environment and assess against the relevant ambient water quality outcomes.	Section 9.2
Assess impacts on groundwater and groundwater dependent ecosystems.	Sections 13.3
Describe how stormwater will be managed both during and after construction, including any water storage ponds or basins, and the circumstances under which discharges would occur.	Section 8.2.7, Section 8.8.4 and Section 13.4
Monitoring	
Describe noise, air quality, water quality and waste monitoring during the construction and development phase and on-going operation of the site. The evaluation should include a detailed description of the monitoring locations, sample analysis methods, the level of reporting proposed and a Trigger Action Response Plan, or similar, that will be implemented in response to any adverse impacts identified from the activity.	Section 8.2.1
Long Term Management Strategies	
Include detailed management strategies that address: a. Funding b. Ownership c. Liability d. Financial security/assurances/guarantee	Section 9.2

Table 4.5: Summary of Cessnock City Council Issues and Response

Issue	Where Addressed
Consideration of alternatives (to be independently reviewed).	Section 5
Permissibility of the Project under the Cessnock Local Environmental Plan 2011 and compatibility with objectives of the land use zone.	Section 2.4.2
Environmental issues of key concern to Council:	
• Ecological impacts	Section 18
• Noise and vibration	Section 12
• Air	Section 11
• Soil and Water Quality	Section 13
• Traffic Impacts	Section 15
• Non-indigenous Heritage	Section 17
• Cumulative Impacts and Synergies	Section 23
• Assessment to consider both on-site and off-site impacts	Part C
Contamination: remediation to achieve the standard required for the future land uses.	Section 8

Table 4.5: Summary of Cessnock City Council Issues and Response

Issue	Where Addressed
Concern regarding the Containment Cell on the Smelter Site, and requests reprocessing of toxic material at a government regulated facility.	Sections 5 and 6
Prepare an acoustic assessment that identifies the range of potential noise sources (including outside standard construction hours) that could occur concurrently, and how potential impacts on sensitive receivers would be addressed.	Section 12 and Appendix 7
Non-indigenous heritage: examine the heritage significance of the Smelter and discuss how its social significance would be acknowledged.	Section 17
Community Consultation: undertake additional pre-lodgement community consultation to enable comments to be considered in the preparation of the documents associated with the development.	Section 4.2

Table 4.6: Summary of Department of Planning and Environment (Hazards and Risks) Issues and Response

Issue	Where Addressed
Prepare a Preliminary Hazard Analysis (PHA). The PHA must be prepared in accordance with <i>Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis</i> (DoP, 2011), and <i>Multi-Level Risk Assessment</i> (DoP, 2011).	Section 14
An evaluation of the impacts of the transport of Dangerous Goods to and from the site in the surrounding area.	Section 14.2

Table 4.7: Summary of Office of Environment and Heritage Issues and Response

Issue	Where Addressed
Flooding	
Assessment of existing flood behaviour and impact of sea level rise and climate change.	Section 13.2
Assessment of potential impacts of the proposed development.	Section 13.3
Emergency management measures and evacuation.	Section 8.1.2
Sea level rise and ecosystem migration.	Given the Project Site location, sea level rise and ecosystem migration is not considered a potential issue or impact.
Consistency with any floodplain risk management plans, compatible with the flood hazard of the land, and whether the proposal will significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.	Section 13.3

Table 4.7: Summary of Office of Environment and Heritage Issues and Response

Issue	Where Addressed
Aboriginal Cultural Heritage	
Existing Aboriginal cultural heritage values.	Section 16.2 and Appendix 9
Potential impacts of the project on Aboriginal cultural heritage values (in accordance with OEH requirements).	Section 16.3 and Appendix 9
Prepared in consultation with Aboriginal stakeholders.	Sections 4.4 and 16.1
Biodiversity	
A biodiversity impact assessment using either the BioBanking Assessment Methodology (scenario 1) or a detailed biodiversity assessment (scenario 2).	Section 18 and Appendix 10

Table 4.8: Summary of Office of NSW Health: Hunter New England Local Health District Issues and Response

Issue	Where Addressed
Preparation of a human health risk assessment that considers the potential adverse effects from human exposure to project related environmental hazards. The assessment should be conducted in accordance with the enHealth document <i>Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risk from Environmental Hazards</i> (2012). The assessment should include, but not be limited to:	Section 22 and Appendix 12
Assessment of the risks with human exposure to acute and cumulative impact of noise.	Section 22.2.1.2
Air quality (particulates and cumulative impact of particulates).	Section 22.2.1.2
The risk of contamination of drinking water including ground water, surface water and rain water tanks.	Section 22.2.1.2
The assessment should address additional issues identified during community consultation.	Section 4.2
Consideration of cumulative impacts, exposure of most affected receptors and other sensitive receptors (such as childcare centres, hospitals and aged care facilities) and the size of the population exposed to environmental hazards.	Section 23

Table 4.9: Summary of Office of Roads and Maritime Services Issues and Response

Issue	Where Addressed
The Hunter Expressway (M15) is a classified State road and part of the National Land Transport Network, while Hart Road is an unclassified (local) road. Roads and Maritime concurrence is required for connections to this road with Council consent, under Section 138 of the <i>Roads Act 1993</i> . Cessnock City Council is the roads authority for this road, while Roads and Maritime Services is the roads authority for the Hunter Expressway.	Section 2.5.2
Preparation of a comprehensive traffic impact assessment in accordance with the <i>RMS Guide to Traffic Generating Developments</i> .	Section 15 and Appendix 8

Table 4.9: Summary of Office of Roads and Maritime Services Issues and Response

Issue	Where Addressed
Identify all relevant vehicular traffic routes and intersections for any accesses to / from the sites for each stage of the construction process.	Section 15
Current traffic counts for the above traffic routes and intersections.	Section 15.2
Traffic analysis of any major / relevant intersections impacted, using SIDRA or similar traffic model.	Section 15.3
Any other impacts upon the regional and state road network and bridges, including consideration of pedestrian, cyclist and public transport facilities.	Section 15.3
A comprehensive Construction Traffic Management Plan (CTMP).	Section 15.4

Table 4.10: Summary of Department of Primary Industries Issues and Response

Issue	Where Addressed
Crown Lands	
Identify all Crown Lands within the Project Site.	None impacted
Consideration of long term management of any Crown Land, including reference to the <i>Roads Act 1993</i> for roads, and closure and purchase by Hydro of land not required for public access.	Not applicable
Lot 15 DP 1082775, situated within the Hydro Land, held by Hydro Aluminium Pty Ltd as a perpetual lease but is currently subject to freehold conversion following the purchase of this land by Hydro Aluminium. Prior to development approval, Hydro Aluminium should finalise this matter.	Lot 15 DP 1082775 is not in the Project Site
NSW Office of Water	
Details of water to be taken from surface water and groundwater.	Sections 8.2.6 and 8.11
Assessment of any water licensing requirements.	Section 2.5.2
The identification of an adequate and secure water supply for the life of the project.	Section 8.2.7
Assessment of impacts on surface and ground water sources and associated infrastructure, watercourses, land uses and ecosystems.	Sections 8.2.7, Section 13.3 and 13.3 18.3
Proposed surface and groundwater monitoring activities and methodologies.	Section 13
Full technical details and data of all surface and groundwater modelling.	Section 13
A detailed and consolidated site water balance.	Section 8.2.7
Assessment of any potential cumulative impacts on water resources.	Section 13.3
Assessments to be undertaken with reference to the <i>Water Management Act 2000</i> , <i>Water Act 1912</i> , Water Management (General) Regulation 2011 and the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources.	Section 2.5.2

Table 4.11: Summary of Maitland City Council Issues and Response

Issue	Where Addressed
Protection of the adjoining wetland system and ongoing monitoring of leachates would be expected.	Section 8.1.1 and Section 9.1
Council requests to be kept fully informed of the EIS preparation process including notification of the public consultation period.	Section 4.3

Table 4.12: Summary of SafeWork NSW Issues and Response

Issue	Where Addressed
Demonstrate how Work Health and Safety (WHS) will be systematically managed in the Works and address requirements under the Work Health and Safety Regulation 2011 (WHS Regulation).	Section 8.1.2
Identify practicable control measures to prevent exposure of workers to key pollutants that have been identified in contaminated material streams. These include asbestos, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), cyanide and fluorides.	Sections 3.4.2, 8.1.2 and 22.4
Prepare a Human Health Risk Assessment that assesses the potential health risks to workers undertaking remediation activity due to identified hazardous materials.	Section 22.2.1.2

4.3.2 Additional Consultation

During preparation of the EIS Hydro undertook additional consultation with a number of government agencies to:

- Clarify (where required) the issues identified in the Secretary's Environmental Assessment Requirements and agency submissions.
- Request relevant information to complete the EIS.
- Identify how amendments to the Project could avoid or minimise potential the agencies' issues.

Hydro has been consulting with government agencies for almost three years regarding the Project Site and Hydro Land. This consultation has assisted in identifying and assessing the options for the Project, as well as developing the planning proposal for the Hydro Land (as described in **Section 2.4.2.2**).

Table 4.13 identifies the government agencies and the forms of consultation during the EIS preparation.

Table 4.13: Government Agencies and Additional Consultation

Government Agency	Forms of Consultation	Date
Department of Planning and Environment	Meetings	13 November 2014
		6 March 2015
		2 July 2015
		20 August 2015
		5 November 2015
		1 June 2016
	Letters	5 August 2015
		31 August 2015
		8 October 2015
		28 October 2015
		1 March 2016
		11 March 2016
Environment Protection Authority	Meetings	5 December 2014
		6 February 2015
		6 March 2015
		2 July 2015
		20 August 2015
		29 October 2015
		5 November 2015
		15 March 2016
		2 May 2016
		1 June 2016
	Letters	2 March 2015
		5 August 2015
Cessnock City Council	Meetings (Council Staff)	7 November 2014
		29 January 2015
		31 March 2015
		21 September 2015
	Presentations (Councillors and Council Staff)	11 November 2014
		22 April 2015
		28 October 2015
	Letters	14 January 2015
	Council Officer Attendance at the Community Reference Group	Ongoing
Office of Environment and Heritage (Biodiversity)	Site Meeting	24 September 2014
	Email	8 December 2014
	Email/ Telephone	28 April 2015

Table 4.13: Government Agencies and Additional Consultation

Government Agency	Forms of Consultation	Date
Office of Environment and Heritage (Aboriginal Heritage)	Letter	14 January 2015
Federal Department of the Environment	Submission of Referral	1 June 2015
	Letters	9 July 2015 13 January 2016
	Email	15 February 2016
SafeWork NSW	Meetings	17 October 2014
		26 November 2014
		23 February 2015
		8 September 2015
Hunter New England Local Health District (NSW Health)	Email	23 October 2015
Rural Fire Service	Email	22 October 2015
Department of Primary Industries (Crown Lands and NSW Office of Water)	Email	26 October 2015
Maitland City Council	Council Officer Attendance at the Community Reference Group	Ongoing

Following this additional consultation (and the community engagement described in **Section 4.2**) the Project assessed in this EIS has the following key changes to that described in the Preliminary Environmental Assessment:

- As discussed in **Section 1.2**, the spent pot lining stored in buildings at the Smelter would not be placed in the Containment Cell, and would be transported to an off-site licensed facility for recycling (as a separate activity to the Project).
- The Project footprint and associated native vegetation clearance has significantly reduced. The Preliminary Environmental Assessment proposed the clearance of approximately seven hectares of native vegetation clearance. As described in **Section 18.3** the Project would now require the clearance of approximately 2.5 hectares of native vegetation, minimising impacts on endangered ecological communities and threatened species.

In addition, as a result of the consultation with OEH it was concluded that the Biobanking Assessment approach was to be implemented for the Biodiversity Assessment.

4.4 Indigenous Stakeholder Consultation

Section 16 addresses the Aboriginal Heritage Impact Assessment that was prepared in accordance with the Secretary's Environmental Assessment Requirements and the submission from the Office of Environment and Heritage. This included consultation to identify interested Aboriginal stakeholders, an invitation for their comment and input to the proposed assessment methodology, stakeholder involvement in the fieldwork, and an invitation to review the draft Aboriginal Heritage Impact Assessment (as finalised following this review in **Appendix 9**).

Further details on the consultation and the issues raised during indigenous stakeholder consultation are presented in **Appendix 9**.

PART B: THE PROJECT

5. CONSIDERATION OF ALTERNATIVES

5.1 Introduction

This section assesses alternative options for the Project as required by the Secretary's Environmental Assessment Requirements.

Table 5.1 outlines the Secretary's Environmental Assessment Requirements relating to the assessment of alternatives for the Project, and where those requirements are addressed in the EIS. Assessing and comparing the Project against alternatives is integral to the Project justification.

Table 5.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
General Requirements. The EIS must include detailed description of the development, including: need and justification for the proposed development.	Section 5.2, Section 6, Section 7, Section 8 and Section 9
Waste Containment Cell including: clearly explain and provide detailed justification for the preferred treatment technology.	Section 5.3 and Section 6.4

5.2 Project Outline

5.2.1 The Works

The demolition, remediation and waste management activities (the Works) are the required to make the Project Site suitable for future use. The key element of the Works is the construction of a waste management facility, comprising a Containment Cell (the Containment Cell).

Other ancillary elements of the Works are:

- Demolition of the remaining Smelter buildings and structures.
- Site remediation, including leachate and groundwater treatment.

5.2.2 Containment Cell Management

Following completion of the Works, the Containment Cell would be subject to a monitoring and management program.

These activities are further discussed in **Section 7, Section 8 and Section 9**.

5.3 Assessment of Alternatives to the Project

In determining the preferred approach for the Project, Hydro assessed alternative options for each the following key elements:

Future Land Use:	The future land use for the Hydro Land would be the key driver for determining the objective of the Project, and the criteria to be applied and achieved. As part of this, the options available for the former smelter buildings and remediation of the Project Site were considered.
Smelter Buildings and Demolition:	Demolition of Smelter infrastructure.
Remediation, including Waste Management:	An options evaluation for remediation of all material streams was undertaken. Each material stream was evaluated in isolation against relevant criteria and then considered together to develop a whole of site remediation strategy.

Containment Cell Location: When the materials stream management options were considered and it was determined that an on-site Containment Cell was the preferred option, the best location for the Containment Cell was examined.

5.3.1 Future Land Use

As discussed in **Section 1.1** Hydro is committed to meeting its corporate environmental and social responsibilities, managing its environmental legacies and leaving a positive social and environmental legacy for the local community.

As such, doing the minimum required for compliance with existing approvals and licences would not meet Hydro's commitment and therefore was not considered an option.

To fulfil its commitment, Hydro aims to facilitate the rezoning of the Hydro Land to allow for development of significant employment, residential, rural and biodiversity conservation purposes. The Project would render the Hydro Land suitable for these future uses.

A land use master plan has been prepared for the Hydro Land. The master plan was developed to inform the proposed rezoning for the Hydro Land, based on a consideration of a number of aspects, including environmental, social, economic, engineering and regulatory requirements. These investigations concluded that the Project Site was best suited for use as employment land.

5.3.2 Smelter Buildings and Demolition

In examining the market demand for the proposed employment land, the master plan process also reviewed the opportunities for retaining Smelter buildings. The review concluded that due to the specific purpose of the majority of buildings at the Smelter, there would be limited demand and opportunity for their viable refitting and retention for an alternative use. Therefore, Hydro has determined that Smelter buildings would be demolished. As discussed in **Section 3.4.3.2** Development Consent has been granted by Cessnock City Council for the demolition of the majority of the Smelter buildings.

In addition, the retention of many of the buildings and structures, especially the stacks, would present a safety risk and would not be economically viable for future developers of the Project Site. Retention of such structures would involve significant maintenance costs, and could impose restrictions on future development. Demolition of these structures once redevelopment of the Project Site has commenced would pose significant difficulties. As described in **Section 3.4.3.2** the demolition of the stacks and remaining Smelter buildings and structures not included in the Development Consent granted by Cessnock City Council forms part of the Project.

The majority of demolition material from the Smelter buildings would be recyclable and reusable. This includes metal (steel, aluminium and copper), concrete, bricks and refractory bricks. Recycling and reuse are the only options considered for these materials.

Section 5.3.3.4 describes the options considered for management of non-recyclable demolition material.

5.3.3 Remediation and Waste Management

The Capped Waste Stockpile and areas of soils within the Project Site require remediation so that the site can be made suitable for use as employment land. This section describes the remediation and waste management options considered.

5.3.3.1 Outline of Demolition and Remediation Material Streams

Hydro undertook a detailed assessment of alternative management options for demolition materials, aluminium smelter production wastes and contaminated soils at the Smelter.

The objective of the assessment was to identify the most appropriate option (based on social, environmental and economic grounds) to achieve the objectives of the Project. The primary objective of the Project is to render the Hydro Land suitable for the future land use described in **Section 5.3.1**.

The key material streams that would be generated by the Project are described in **Table 5.2**. The assessment of alternative options for management of these material streams is contained in the following sections.

Table 5.2: Material Streams Description

Material type	Description
Capped Waste Stockpile	Mixed smelter wastes were stockpiled in the eastern portion of the Smelter for the period 1969 to 1995. These mixed wastes comprised spent pot lining and to an equal extent amounts of other solid wastes generated at the smelter including cryolite, alumina, floor sweepings (alumina, cryolite, carbon), shot blast dust (carbon, steel shot), cement, pot lining mix and small amounts of other materials including plastic, wood, steel and asbestos including friable and bonded. The Capped Waste Stockpile is expected to include a wide range of unwanted site materials that are differing in size and composition. Cross contamination is likely to have occurred between material types which restricts the possibility of recycling and would require special handling. The contents of the Capped Waste Stockpile are non-putrescible. The stockpile is currently capped but is situated on sandy strata in a low lying area of the Smelter and within close proximity of the groundwater table.
Contaminated soils, smelter wastes and other municipal wastes derived from other Hydro owned land	Contaminated soils and materials within the buffer zone that have arisen during the operations of the Smelter. This includes soil contamination and wastes (including asbestos). Municipal wastes are sourced from non-smelter related activities and are able to be sorted from mixed wastes.
Contaminated soils on the smelter site	Soils within the Smelter footprint that have been impacted by contaminants during site operations. This includes soil and sediments impacted with fluoride and polycyclic aromatic hydrocarbons.
Smelter demolition wastes	These are non-recyclable/ non-reusable wastes generated during the Smelter demolition and include asbestos containing materials, contaminated sludge and dusts and contaminated building materials. Recyclable materials (such as metals, concrete and bricks) would be separated for recycling.

Each material stream was evaluated against the criteria described in **Table 5.3**.

Table 5.3: Remedial Option Evaluation Criteria

Criteria	Description
Regulatory and Statutory Compliance	Regulatory and statutory compliance is evaluated following a review of key legislation, regulations and policies. In the event that any element of an option is not permissible or has a low likelihood of approval, this option was ruled out of further investigation.
Timeframe to complete	The evaluation of timeframe is quantitative and incorporates estimates of times based on professional experiences for each section of the project.

Table 5.3: Remedial Option Evaluation Criteria

Criteria	Description
Risk	The evaluation considered the risk of events occurring in the future post-remediation stage that may require investigation, and possibly restoration or upgrading of controls or management measures. Risk is evaluated in terms of technological, environmental and financial consequence and the likelihood of the consequence occurring.
Social impacts	The potential social impacts associated with undertaking the waste management option and the ongoing operations of the option were evaluated.
Environmental impacts	The potential environmental impacts associated with constructing/ undertaking the material management option (including ecological and heritage disturbance; noise and vibration; air quality; and waste management principles) and the ongoing operations of the option were evaluated.
Climate change	The energy usage and greenhouse gas emissions associated with undertaking the waste management option and the ongoing operations of the option were evaluated.
Economic viability	Remediation costs were determined for each option on the basis of the option description and a set of assumptions made about the option.
Legacy, legal liability and required contingencies	Legacy is defined as the potential long term liability that may be incurred by Hydro for the life of the project. Legacy relates to both future management costs and liability provisioning represented by occurrence of a future event. Future management and monitoring costs and the likelihood of these occurring can reasonably be evaluated for most remediation strategies.

Options were considered by comparing the actual value of each of the criteria for each option. However, this makes it difficult to identify a preferred option, as the significance of each of the criteria is not considered.

To provide a comparison between the criteria, data was normalized on a scale where increasing numbers reflected worsening performance.

To develop the relationship between the data for each criteria, the data was weighted using weightings which were then used to rate the options. Where a number of options performed similarly the same methodology was used to allow comparison of this smaller number of options to provide a more accurate comparison.

5.3.3.2 Capped Waste Stockpile

The options considered for remediation and management of the Capped Waste Stockpile are presented in **Table 5.4**.

Table 5.4: Capped Waste Stockpile Options

Management Option	Option Description	Options Assessment
Retention of the existing Capped Waste Stockpile	This would be the retention of the existing Capped Waste Stockpile with implementation of the existing management measures.	This option is cost effective and represents the lowest health and environmental risks during the remedial works program. The Ecological Risk Assessment indicated that leachate migration from the Capped Waste Stockpile has not and is not likely to impact off-site receivers including Swamp Creek and Wentworth Swamp. The stockpile is currently capped in accordance with a planning approval and environment protection licence, with testing showing that the cap is performing and reducing infiltration. However, localised impact to vegetation is evident within the Hydro Land that is unacceptable to Hydro and steps to intercept and treat leachate in groundwater were considered. Retention of the existing Capped Waste Stockpile would limit the extent to which capture of leachate impacted groundwater could be achieved due to the presence of the stockpile itself and the ongoing generation of leachate. Additionally, long term management requirements and uncertainty of the long term performance were considered to be unacceptable due to the absence of a base liner and the unconsolidated nature of the stockpile potentially resulting in a reduction in cap performance over time.
Upgrade of the existing Capped Waste Stockpile	Low permeability residual clay is present at depths of around 10 metres beneath the current Capped Waste Stockpile. The migration of leachate could be reduced through the placement of a vertical subsurface low permeability wall constructed and keyed into the underlying clays. Cap upgrades to key into the wall would then create an effective barrier to leachate migration.	This option was cost effective and represented low health and environmental risks. An Ecological Risk Assessment indicated that leachate migration from the Capped Waste Stockpile has not and is not likely to impact off-site receivers including Swamp Creek and Wentworth Swamp. The stockpile is currently capped in accordance with a planning approval and environment protection licence, with testing showing that the cap is performing and reducing infiltration.

Table 5.4: Capped Waste Stockpile Options

Management Option	Option Description	Options Assessment
		Barrier wall construction has inherent risk due to the subsurface method of emplacement. It was also recognised that, in the event of failure, the stockpile remains in close proximity to the groundwater system and could result in ongoing environmental harm.
Sorting of the Capped Waste Stockpile for reuse	Investigations were undertaken to evaluate the ability to segregate all of the materials for reuse, or treatment and reuse.	While examples of mechanical and optical sorting of the Capped Waste Stockpile materials into various streams were considered, this evaluation identified the significant risk of the resultant material streams being contaminated by the presence of the spent pot lining (sodium, fluoride and cyanide) and asbestos, and therefore would be unsuitable for reuse including recycling without treatment.
	Coarser level sorting by mechanical means was also considered for the purpose of recycling metal, concrete, bake furnace refractory bricks, anodes, spent pot lining and possibly other materials.	The risk of contamination of material streams as described previously and the potential environmental and human health risk posed by the potential presence of unknown hazardous materials (such as asbestos containing materials) meant that it would require significant time and effort to sort uncontaminated recyclable material, and that hand sorting would likely be required. The limitation with any sorting approach is the cross contamination of these materials that has likely occurred during the period of time when the stockpile was uncapped. It was therefore considered that only metals may be effectively recycled due to the ability to clean these materials. Where practical metals would be removed and made available for recycling. However due to stringent requirements that exist for recycling of other materials, these materials could not be recycled. Additionally, if recycling is possible, a suitable end market or end use has not currently been identified.

Table 5.4: Capped Waste Stockpile Options

Management Option	Option Description	Options Assessment
	Sorting of spent pot lining.	As noted in the consideration of sorting all materials within the Capped Waste Stockpile, due to cross contamination, the specific requirements of the processing facilities required for spent pot lining and end product quality requirements, this option was considered to have a high risk of failure. In addition, the potential environmental and human health risk posed by the potential presence of unknown hazardous materials meant that it would require significant time and effort to sort uncontaminated recyclable material, and that hand sorting would likely be required. In the event that portions of spent pot lining are encountered in the Capped Waste Stockpile and can be feasibly and safely separated these would be removed and made available for recycling at a licensed off-site recycling facility.
Off-site disposal	This would involve the excavation of the Capped Waste Stockpile material and transportation to a licensed waste management facility or facilities. Some of this material could be transported to the Cessnock Waste and Reuse Centre, while other materials would be transported to a licensed facility in Sydney.	Environmental impacts would be transferred from the Project Site to the receiving location rather than being managed at the Project Site. It could also adversely impact on the landfilling capacity at the receiving waste management facilities. This option also has significantly higher costs. In addition, this option has a significant carbon footprint due to the transportation requirements and has an adverse impact on the local community (there would be a significant number of trucks travelling between the Project Site and the disposal location).

Table 5.4: Capped Waste Stockpile Options

Management Option	Option Description	Options Assessment
High temperature treatment	Processing of the Capped Waste Stockpile materials to remove fluorides and cyanides, in conjunction with carbon value capitalisation in a waste to energy process.	The risk associated with this option is a technological risk from the unproven technology and the possibility that an alternate remediation solution would require implementation. There is high potential for this technology not being able to treat the mixed materials in the Capped Waste Stockpile economically or technically into a condition that can be re-used without additional treatment (and therefore needing to landfill). The material generated from previous trials is currently not qualified as inert and therefore it cannot be used without limitation as fill material. Also, no technical specification of material strength has been determined. If it cannot be utilised as inert fill material, an alternative management measure would still be required. In addition, there are no known estimates of the difference between input volume / weight, and volume / weight of the vitrified material (it is unknown how much of the processed material would be generated).
Encapsulation in a purpose built Containment Cell	This is the option that forms part of the Project.	A Containment Cell would be designed and constructed to incorporate best practice technology specifically designed to macro-encapsulate the expected contents of the Capped Waste Stockpile and to mitigate and manage risks. It also allows remediation of the contaminated groundwater below the Capped Waste Stockpile. The Capped Waste Stockpile is a large area of land identified within an area proposed for future employment land. Its removal and relocation to a Containment Cell would allow this area to be remediated and made available for employment land. Justification of the option is described in Section 6.4.

5.3.3.3 Contaminated Soils

The options considered for remediation and management of contaminated soils are presented in **Table 5.5**.

Table 5.5: Contaminated Soils Management Options

Management Option	Option Description	Option Assessment
Cap and contain in-situ	This would involve contaminated soils remaining in their current location and being capped. This would require ongoing management so that future activities (such as excavations for building construction or services installation) do not intercept the contaminated soils.	As the Hydro Land would potentially be owned and / or occupied by numerous parties, the management of multiple capped contaminated sites imposes development restrictions and management requirements on a larger land holding. This is considered to have a greater likelihood of inefficient or inappropriate management and a greater potential for environmental or human health risk.
Off-site disposal	This would involve the excavation of contaminated soils and transportation to a licensed waste management facility. This could include the Cessnock Waste and Reuse Centre.	Environmental impacts would be transferred from the Project Site to the receiving location rather than being managed. It could also adversely impact on the landfilling capacity at the Cessnock Waste and Reuse Centre. This option also has significantly higher costs. In addition, this option has a significant carbon footprint due to the transportation requirements and has an adverse impact on the local community (there would be a significant number of trucks travelling between the Project Site and the disposal location).
High temperature treatment	Processing of the contaminated soils to remove fluorides and polycyclic aromatic hydrocarbons.	The risk associated with this option is a technological risk from the unproven technology with the particular contaminants and the possibility that an alternate remediation solution would require implementation. There is high potential for this technology not being able to treat the mixed materials economically or technically into a condition that can be re-used without additional treatment (and therefore needing to landfill).

Table 5.5: Contaminated Soils Management Options

Management Option	Option Description	Option Assessment
Encapsulation in purpose built Containment Cell	This is the option that forms part of the Project.	A Containment Cell would be designed and constructed to incorporate best practice technology specifically designed to macro-encapsulate contaminated soils and to mitigate and manage risks. Placement of the contaminated soils in a Containment Cell provides Hydro with a definitive timeframe, allowing Hydro to achieve its objective for the Smelter and Hydro Land. Placement of the contaminated soils in the Containment Cell provides a cost effective strategy for achieving site remediation objectives that avoids the potential environmental and social impacts associated with capping and containing in-situ and off-site disposal. Justification of the option is described in Section 6.4.

5.3.3.4 Non-Recyclable Demolition Waste

As discussed in **Table 5.2** this refers to non-recyclable/ non-reusable wastes generated during the Smelter demolition and include asbestos containing materials, contaminated sludge and dusts and contaminated building materials.

Recyclable demolition waste has been excluded from the options evaluation. Recyclable demolition waste (such as concrete, refractory bricks and metal) would either be reused on-site or made available for reuse and recycling at a licensed waste management facility.

The disposal options for the non-recyclable demolition materials are presented in **Table 5.6**.

Table 5.6: Non-Recyclable Demolition Waste Management Options

Management Option	Option Description	Option Assessment
Disposal off-site	This would involve the transportation of non-recyclable demolition wastes to a licensed waste management facility. This could include the Cessnock Waste and Reuse Centre.	This option has a significant carbon footprint due to the transportation requirements and has an adverse impact on the local community (there would be a significant number of trucks travelling between the Project Site and the disposal location). Environmental impacts would be transferred from the Project Site to the receiving location rather than being managed. It could also adversely impact on the landfilling capacity at the Cessnock Waste and Reuse Centre. This option also has significantly higher costs than any other option.
High temperature treatment	Processing of the non-recyclable demolition wastes through establishment of a high temperature incinerator or similar	This option is technologically sound, however was neither cost nor time effective when compared to off-site landfill disposal. The option was not considered further.
Encapsulation in purpose built Containment Cell	This is the option that forms part of the Project.	A Containment Cell would be designed and constructed to incorporate best practice technology specifically designed to macro-encapsulate demolition wastes and to mitigate and manage risks. Placement of the contaminated soils in a Containment Cell provides Hydro with a definitive timeframe, allowing Hydro to achieve its objective for the Smelter and Hydro Land. Placement of the demolition wastes in the Containment Cell provides a cost effective strategy for achieving site remediation objectives that avoids the potential environmental and social impacts associated with off-site disposal, such as the adverse impact on the landfilling capacity Cessnock Waste and Reuse Centre. Justification of the option is described in Section 6.4.

5.3.3.5 Integrated Waste Management

Following examination of the individual material streams, an evaluation against the criteria in **Table 5.2** was undertaken of a range of integrated in-situ and ex-situ management and remediation options for all site materials.

These options are presented and discussed in **Table 5.7**.

Table 5.7: Integrated Waste Management Options

Management Option	Option Description	Option Assessment
Upgrading the Capped Waste Stockpile and combining this with a new Containment Cell	Several options were considered with the variations including a new Containment Cell located either adjacent to or separated from the Capped Waste Stockpile; and a new Containment Cell containing all remaining material streams.	This option is cost effective and represented low health and environmental risks. The Capped Waste Stockpile would remain and could be upgraded with a low permeability wall constructed and keyed into the underlying clays. Cap upgrades to key into the wall would then create an effective barrier to leachate migration. However, retention of the existing Capped Waste Stockpile would limit the extent to which capture of leachate impacted groundwater could be achieved due to the presence of the stockpile itself and the ongoing generation of leachate. Additionally, long term management requirements and uncertainty of the long term performance of the Capped Waste Stockpile were considered to be unacceptable due to the absence of a landfill base and the unconsolidated nature of the stockpile potentially resulting in a reduction in cap performance over time. When considered in combination with a Containment Cell in a second location, it was recognised that long term management and monitoring requirements were increased and a larger land footprint would require development restrictions. The ongoing management requirements and the risk of failure (relating to the Capped Waste Stockpile) were not acceptable and this option was not further considered.

Table 5.7: Integrated Waste Management Options

Management Option	Option Description	Option Assessment
Off-site disposal	This option would require all material to be transported from the Project Site. Some of the materials could be disposed of to the Cessnock Waste and Reuse Centre or another local licensed waste management facility. The remainder of the material streams would be transported to an appropriately licensed landfill facility in Sydney, interstate or internationally.	This option has a significant carbon footprint due to the transportation requirements and has an adverse impact on the local community (there would be a significant number of trucks travelling between the Project Site and the disposal location). Environmental impacts would be transferred from the Project Site to the receiving location rather than being managed. It could also adversely impact on the landfilling capacity at the Cessnock Waste and Reuse Centre and other licensed facilities. This option also has significantly higher costs than any other option.
High temperature treatment	Potential treatment technologies applicable for the all material streams were assessed. This assessment identified high temperature (such as plasma arc treatment) as a potential alternative to achieve removal of hazardous components including fluorides, cyanides, hydrocarbons and asbestos from all material streams.	The risk associated with this option is a technological risk from the unproven technology and the possibility that an alternate remediation solution would require implementation. There is high potential for this technology not being able to treat the mixed materials economically or technically into a condition that can be re-used without additional treatment (and therefore needing to landfill).
Construction of a purpose built Containment Cell	This is the option that forms part of the Project.	A Containment Cell would be designed and constructed to incorporate best practice technology specifically designed to macro-encapsulate all the material streams and to mitigate and manage risks. Managing the material streams at the Smelter does not transfer the potential environmental impacts and risks to another location: the responsibility for management of the materials remains with Hydro. Placement of the material streams in the Containment Cell provides a cost effective strategy for achieving site remediation objectives that avoids the potential environmental and social impacts associated with off-site management options.

Table 5.7: Integrated Waste Management Options

Management Option	Option Description	Option Assessment
		All material streams generated by demolition and remediation would be managed in one location, minimising potential environmental impacts and allowing for more efficient and effective management. It also maximises the area available for the employment land proposed for the Smelter. Justification of this option is described in Section 6.4

5.3.4 Containment Cell Characteristics

The key characteristics of a Containment Cell are:

- It is a facility that is built in an appropriate geological and environmental location.
- It is designed and built to contain its contents, specifically addressing the known characteristics of those contents.
- It is designed and built to minimise leachate generation: leachate management is only provided as a contingency.

Table 5.8 provides a comparison of the type of Containment Cell proposed as part of the Project with a typical traditional landfill and a typical modern landfill (such as those operated by a local council or private operator).

Table 5.8: Comparison Between Containment Cell and Landfills

Criteria	Typical Historic Landfill (+20 years old)	Typical Modern Landfill (less than 20 years old)	Hydro Containment Cell
Cell location/siting	Typically constructed on low value land, for example swampy low lying areas and therefore either within the groundwater table or in very close proximity.	Modern landfills are built in areas of stable geology that are at an acceptable distance (typically around three metres or more) above the permanent groundwater table.	The proposed Containment Cell site: - Is considered to be geotechnically stable. - Has a depth to groundwater in excess of three metres. - Is at a suitable distance from a surface water body. - Is in an area not prone to flooding or containing erosive or unstable soils. The Containment Cell site selection process is described in Section 5.3.6. Key difference: the cell would be appropriately located to minimise human health and environmental risk.
Cell construction	Typically historical landfills do not have a leachate barrier system or leachate collection/control capability. Historical landfills do not have base liners and often not properly constructed capping liners. Landfills had no gas venting capability.	The NSW EPA <i>Solid Waste Landfill Guidelines</i> (1996) recommended a single liner system comprising a 90cm compacted clay layer achieving a permeability of less than 10^{-9} m/s. Modern landfills generally adopt a dual layer system with one layer comprising compacted clay and a second layer comprising a geocomposite clay layer (GCL) or high density polyethylene layer (HDPE). Where compacted clay is not locally available the dual layer system can be achieved by using a GCL in combination with a HDPE. An example is the Newcastle City Council Summerhill waste management facility.	The Hydro Containment Cell liner system concept design has been developed in accordance with the EPA <i>Environmental Guidelines: Solid Waste landfills</i> (2016). This is a multiple layer system comprising a one metre compacted clay layer of permeability less than 1×10^{-9} m/s, overlain by a composite geomembrane/geosynthetic clay liner. Drainage layers and protection layers separate the liners. The Containment Cell would be constructed to allow segregation of the materials and allow enhanced monitoring precision. A gas collection layer and venting system would be implemented for the spent pot lining. Though testing shows flammable gas generation to be lower than typical municipal landfills. All materials proposed to be used in the cell liner system would be subject to compatibility testing. Due to the purpose built nature of this cell, it is possible to undertake compatibility testing.

Table 5.8: Comparison Between Containment Cell and Landfills

Criteria	Typical Historic Landfill (+20 years old)	Typical Modern Landfill (less than 20 years old)	Hydro Containment Cell
		Monocells (discrete cells within the overall cell) are generally constructed to minimize the exposed/uncapped surface area but not to segregate waste.	Key difference: materials to be contained are known and quantified and therefore specific testing for compatibility and design for purpose would be achieved.
Leachate management	Typically no leachate control or collection. High volumes of leachate are generated from both the breakdown of the wastes themselves and rainfall to the landfill prior to closure. Due to the absence of a base liner, groundwater can be permanently or periodically in contact with wastes creating an ongoing source of leachate. Inadequate final capping layers can also contribute to increased infiltration and leachate generation.	The base liners include a leachate detection and capture system where leachate can be collected and treated. Putrescible landfills typically have a leachate treatment system. Leachate in these systems can be increased from organic matter breakdown and infiltration both during and following operations.	The design objective is for the Containment Cell to not generate any leachate. The capping layer is designed to minimise the infiltration to the Containment Cell. Leachate generation from the waste itself is not expected as no breakdown of the wastes would occur. However, as a contingency, systems would be implemented for leachate monitoring and collection in the event that leachate is identified. Where leachate does occur, a contingent leachate treatment system is proposed (refer to Section 8.8.2 of the EIS). Key difference: avoidance of leachate generation is a key design objective: any leachate generated would be very small volumes. A leachate contingency system is proposed.
Operation	In regular use, usually permanently open or with daily cover for a long period of time. Require operational controls to minimise infiltration, surface water management, vermin, dust, odour and litter.	In regularly use, open or with daily cover for a long period of time. Require operational controls to minimize infiltration, surface water management, vermin, dust, odour and litter.	Constructed and operational for a short period whilst receiving the designated materials. Therefore infiltration and dust can be carefully controlled and minimised. The materials would not result in issues regarding litter and vermin. Key difference: Controlled and short duration of filling. Reduces environmental management requirements and leachate.

Table 5.8: Comparison Between Containment Cell and Landfills

Criteria	Typical Historic Landfill (+20 years old)	Typical Modern Landfill (less than 20 years old)	Hydro Containment Cell
Materials deposited	Municipal landfills include putrescible (degradable) wastes along with mixed wastes.	Municipal landfills include putrescible (degradable) wastes along with mixed wastes. Licensed industrial waste landfills are privately operated (e.g. SITA) and can receive a range of industrial wastes.	Materials placed in the Containment Cell would be limited to: non-recyclable and non-reusable site demolition wastes, soils impacted by asbestos containing materials, other contaminated soils and dried sludges, mixed smelter wastes from the Capped Waste Stockpile including mixed and degraded first and second cut spent pot lining, contaminated bricks and concrete, contaminated anode wastes. Hydro would divert recyclable materials (concrete, bricks and metals) for recycling and reuse. Organic matter would not be deposited in the Containment Cell. Key difference: Materials would only be generated from the Smelter. All materials are known. Compatibility with each other and with cell construction materials form part of the design.
Capping layer construction	Minimum 0.9m of compacted clay with overlying protection and vegetation layers.	The NSW EPA <i>Solid Waste Landfill Guidelines</i> (1996) capping system comprises a seal bearing surface (trafficable layer to minimize waste consolidation); gas collection layer; sealing layer comprising a 0.5m of compacted clay to achieve a permeability less than 1×10^{-8} m/s; a drainage layer; and a 1m thick vegetation layer. Surface slopes are to be 5% following consolidation.	The proposed capping concept design has been developed in accordance with the EPA <i>Environmental Guidelines: Solid Waste landfills</i> (2016). The cap design would be comprised of a 0.6m compacted clay of permeability less than 1×10^{-9} m/s; overlain by a HDPE or LLDPE liner; drainage layer; fauna barrier; and the revegetation layer (including the vegetation cover). Site slopes would be sufficient to promote surface water runoff as determined by modelling. Waste consolidation would not occur due to the absence of organic matter. Materials would be placed to an engineered specification.

Table 5.8: Comparison Between Containment Cell and Landfills

Criteria	Typical Historic Landfill (+20 years old)	Typical Modern Landfill (less than 20 years old)	Hydro Containment Cell
		Industrial waste landfills (NSW <i>Draft Environmental Guidelines for Industrial Waste Landfilling</i> 1998) recommended a dual capping system of a 0.6m compacted clay of permeability less than 1×10^{-9} m/s; overlain by a HDPE liner; drainage layer and 1m thick vegetation layer. Site slopes are to be 3 to 5% following consolidation.	Key difference: fauna barrier included. Vegetation layer/ vegetation cover includes plant species with high water demands to further reduce infiltration. Settlement not likely due to non-degradable nature of waste materials therefore surface slope and water shedding can be maintained in the long term.
Gas management	Methane generated from the breakdown of organic components.	Due to the breakdown of organics, landfills containing organics produce gases that must be captured and treated.	Methane, hydrogen and ammonia generation from spent pot lining in contact with water can occur. Concentrations from the existing capped wastes stockpile are low and below the NSW EPA trigger for capture of methane (1.25%v/v) and are lower than typical municipal landfills. Key difference: fugitive gas emissions would be controlled by installing gas collection within the necessary cell, with controlled venting to the atmosphere.

5.3.5 Examples of Containment Cells in Australia

Containment Cells have been, and continue to be, used in Australia for a number of industrial wastes and contaminated soils.

5.3.5.1 Former Pasminco Smelter, Boolaroo NSW

Remediation of the former Pasminco Smelter at Boolaroo, New South Wales has included consolidation of soils impacted with lead and other contaminants within an on-site containment cell. The cell is situated on natural soils including clay strata and features a leachate collection and treatment system. The cell contains approximately 1.8 million cubic metres of contaminated soils that are capped with a low permeability material.

5.3.5.2 Former BHP Steelworks, Newcastle NSW

Containment of subsurface hydrocarbon impacted soils and fill by a containment cell formed an integral part of the remediation design for the former steelworks site. The cell comprised excavation to underlying sediments or residual clays and construction of a vertical barrier wall comprising low permeability slurry on three sides. The wall effected a hydraulic barrier to groundwater, and therefore contaminant migration, with the Hunter River comprising a fourth side. The site was then capped with a low permeability surface. The site is now proposed for redevelopment and managed under a long term management plan.

In parallel with the Mayfield site remediation was the remediation of 800,000 cubic metres of contaminated sediment dredged from the Hunter River. Sediments were treated prior to placement within a purpose built Containment Cell at Kooragang Island. The cell was situated above the highest groundwater level and fully lined with a leachate collection system. The cell was capped with low permeability materials and is now considered compatible with industrial land use.

5.3.5.3 Sydney Olympic Park

Remediation of Sydney Olympic Park included excavation and consolidation of wastes. Treatment by thermal desorption of approximately 400 tonnes of waste was undertaken, followed by consolidation of all wastes in containment mounds. Approximately nine million cubic metres of waste has been contained on-site and has been capped, landscaped and turned in to parklands. Leachate collection systems have been installed on the site to prevent leachate escape.

5.3.5.4 Evaluation

Most of these options cap and partially contain the contaminated materials: while the design for these options includes engineered, low permeability capping systems, they do not include an engineered containment cell base (the exception being the containment cell on Kooragang Island) and therefore are not fully contained. These facilities are required to include a leachate collection and management system as a key element of the design, rather than as a contingency to be triggered in the event that leachate is generated.

In addition, the location of the cells at the former BHP Steelworks and the Sydney Olympic Park were not able to be built in locations with preferable geological and hydrogeological conditions.

The benefit of the Smelter Site is that a containment cell can be constructed in a location with preferable geological and hydrogeological conditions, with an engineered base. It would also include leachate management as a contingency rather than as a key element of the containment cell.

5.3.6 Containment Cell Location

Following determination that a purpose built Containment Cell was the preferred materials management approach, Hydro undertook investigations to identify the best location for a Containment Cell.

Locating the Containment Cell outside of the Hydro Land was not consistent with Hydro's commitment to corporate responsibility: it would have a significant carbon footprint due to the transportation requirements and the significant number of trucks travelling between the Project Site and the disposal location may present an adverse impact on the local community; and it

would have transferred the environmental legacies to another property. Locating it on land owned by Hydro allows for mechanisms to be implemented to ensure the long term ongoing management of the Containment Cell, and its integration into the land use master planning for the Hydro Land.

The key criteria in determining the preferred location were:

Geological:	An area underlain by suitable soils comprising low permeability residual clays and bedrock, and avoiding alluvial soils. Bedrock to be massive with minimal defects and fractures.
Hydrogeological:	An acceptable distance above the highest observed groundwater level.
Environmental:	Avoids/ minimises vegetation clearance.
Hydrological:	It is located: • Above the 1% Annual Exceedence Probability (AEP) flood level. • More than 100 metres from a watercourse.
Existing Land Uses:	It is located: • A minimum of 500 metres from the nearest residence. • Within 500 metres of the Smelter and on the northern side of the Hunter Expressway. • A minimum of 20 metres from power line easements.

Using the above criteria Hydro commissioned a study of the 2,000 hectares of Hydro Land to identify suitable sites. Whilst a number of sites were identified, the proposed Containment Cell location (currently known as the Clay Borrow Pit) best addresses these criteria and was preferred as the site was already cleared and within proximity of the Smelter.

6. STRATEGIC AND PROJECT JUSTIFICATION

6.1 Introduction

This section presents the strategic and project justification for the Project, as required by the Secretary's Environmental Assessment Requirements.

Table 6.1 outlines the Secretary's Environmental Assessment Requirements relating to the justification of the Project.

Table 6.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
General Requirements The EIS must include detailed description of the development, including • need and justification for the proposed development.	Section 6.2, Section 6.3 and Section 6.4
Strategic and Statutory Context including: detailed justification for the proposal and suitability of the site for the proposed future land use.	Section 6.3
Waste Containment Cell including: clearly explain and provide detailed justification for the preferred treatment technology.	Section 5.3, Section 6.4.1, Section 8.8 and Section 9

6.2 The Project Objectives

The objectives of the Project are to:

- Comply with a number of statutory and corporate requirements by:
 - Addressing a number of environmental legacies on the Project Site and Hydro Land, addressing their potential impacts, and complying with regulatory requirements for the proposed future land use activities.
 - Mitigating the potential health and safety aspects associated with the former Smelter facilities, allowing the Smelter to be redeveloped in a safe and cost-effective approach, and maximise redevelopment opportunities.
 - Addressing Hydro's corporate social responsibility commitments, with a positive social legacy by providing ongoing social, employment and economic opportunities.
- Generate a number of significant environmental, social and economic benefits such as:
 - Remediating the Smelter and other land to make it suitable for redevelopment for employment and industrial land uses, facilitating employment and economic growth.
 - Employment generation through the demolition, remediation and waste management activities during the Project.
- Comply with the *Environmental Planning and Assessment Act 1979*, the *Protection of the Environment Operations Act 1997*, the *Environmentally Hazardous Chemical Act 1985*, the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* and other applicable legislation, regulations and guidelines.
- Have environmental, health and safety and community impact management as an inherent part of all activities, with mitigation measures developed and implemented to address potential impacts identified in this EIS. This includes a Containment Cell that would be designed, constructed and managed in accordance with international best practice.
- Allow environmental and social obligations to be met within an acceptable timeframe, expediting the redevelopment of the Hydro Land and the associated social, environmental and economic benefits for the local community.

6.3 Strategic Justification

Smelting activities ceased at the Smelter in September 2012 and in May 2014 Hydro formally announced the closure of the Smelter.

Hydro is committed to meeting its environmental and social commitments, and to managing environmental legacies within its landholdings. As part of this, Hydro is committed to managing waste on the Project Site and undertaking demolition and remediation works to render the Project Site suitable for future use.

Hydro also acknowledges the social and economic importance that the Smelter had to the local and regional community. Hydro is committed to providing a positive social legacy by providing ongoing social, employment and economic opportunities.

The remediation and building demolition that forms part of the Project represent the final stage of works that would render the Project Site suitable for future use, generating these economic and social benefits, while also providing environmental and ecological benefits.

6.3.1 Future Land Use

It is Hydro's strategic vision for the Hydro Land to play a key role in allowing the Hunter Region to achieve the economic, employment and environmental objectives identified in the NSW State Plan 2021, the Hunter Regional Action Plan, the Draft *Hunter Regional Plan* and the Draft *Plan for Growing Hunter City*.

Hydro aims to achieve this strategic vision by facilitating the rezoning of the Hydro Land for employment, residential, and biodiversity conservation purposes.

The Project facilitates the proposed future land uses that would provide environmental, social and economic benefits to the local area, the Hunter Region, and the state of NSW.

As discussed in **Section 2.4.2** a Planning Proposal for the land within the Cessnock local government area, which includes the Project Site, received Gateway Determination in March 2016. The Planning Proposal nominates the Smelter to be rezoned as employment land, while the proposed Containment Cell would be located in an area nominated for rezoning as industrial land.

The Planning Proposal nominated over 1300 hectares for rezoning as ecological land. In conjunction with the planning proposal, a bio-certification agreement for the Hydro Land is being developed in conjunction with the Office of Environment and Heritage (OEH). This would result in part of the ecological land being conserved in perpetuity offsetting the native vegetation to be cleared for the future development. The native vegetation proposed for clearance in the Project is included in, and proposed to be offset by, the bio-certification agreement. This is further discussed in **Section 18** of the EIS.

6.4 Project Justification

As discussed in **Section 6.2**, the Project Site presents a number of environmental legacies that Hydro needs to address to achieve its corporate social responsibility commitments, as well as complying with its statutory and regulatory obligations.

As discussed in **Section 5.3**, the demolition of all Smelter buildings presents the best option to facilitate the employment and economic benefits that redevelopment of the Project Site would provide. It also minimises the potential safety and maintenance imposition that retention of the buildings would present.

The Project would comply with applicable legislative and regulatory requirements (as described in **Section 2** of the EIS) and would be managed so that environmental and social impacts are mitigated to an acceptable level (as addressed in **Part C** of the EIS).

6.4.1 Containment Cell

Section 5 describes the outcomes of the options assessment process that determined that the Containment Cell was the preferred option.

Table 6.2 summarises the benefits of the Containment Cell against the assessment criteria described in **Table 5.3**.

Table 6.2: Options Evaluation Criteria and Containment Cell Benefits

Criteria	Description
Regulatory and Statutory Compliance	- The Project would comply with the statutory and regulatory requirements (refer to Section 2 of the EIS). - There are a number of examples of containment cells in New South Wales and throughout Australia (refer to Section 5.3.3). Therefore it is an accepted and previously approved technology.
Timeframe to complete	The Project would allow Hydro to meet its environmental and social obligations within an acceptable timeframe, expediting the redevelopment of the Hydro Land and the associated social, environmental and economic benefits for the local community. The Project program is described in Section 8.13.
Risk	- Best practice cell design would be implemented including state of the art quality control practices during all phases of design, construction and validation. A new design would allow installation of early warning systems during and post construction including leachate detection systems. This is discussed further in Section 8.8. - Retention on-site reduces risks to the community from the transport of wastes through the local area. - Wastes and contaminated soils would be consolidated in one location in the Containment Cell. - The Containment Cell location has geological, hydrogeological and hydrological conditions that further reduce risks.
Social impacts	- Removal of the Capped Waste Stockpile (and placement of the contents in the Containment Cell) allows remediation and redevelopment of its footprint and the adjoining impacted area. This would make an area more favourable for industrial redevelopment available for future use. It also removes the requirement for ongoing management measures and infrastructure. The Containment Cell location is more suitable for the overall Project site redevelopment plan. - The on-site management of the material avoids off-site transport of significant quantities of materials and the associated local community impacts.
Environmental impacts	- The Containment Cell would be constructed within an area of the Project Site that is favourable from an environmental (minimal vegetation clearance) as well as site re-use perspective. - The Containment Cell design proposes the re-use of on-site materials (crushed concrete). - Removal of the Capped Waste Stockpile (and limited excavation) would allow the removal of leachate within this area. - The on-site management of the material would minimise materials being disposed of at the Cessnock Waste and Reuse Centre and other licensed waste management facilities, and avoids the associated landfill capacity demands.
Climate change	- The Containment Cell design would include a vegetation cover. This would offset the carbon footprint of the Containment Cell as well as reducing long term maintenance and monitoring requirements. - The on-site management of the material would avoid off-site transport of materials and the associated greenhouse gas emissions.

Table 6.2: Options Evaluation Criteria and Containment Cell Benefits

Criteria	Description
Economic viability	The Containment Cell provides a cost effective strategy for achieving site remediation objectives.
Legacy, legal liability and required contingencies	- The design and location of the Containment Cell would mitigate the potential risks. These design and management measures result in an acceptable liability provisioning under the management structure described in Section 9.4. - The Project includes ongoing management of the Containment Cell as described in Section 9. - Monitoring would be undertaken to assess the performance of the Containment Cell as described in Section 9.1.1.

7. PROJECT OUTLINE

7.1 Introduction

This section provides an outline of the two major parts of the Project.

7.1.1 The Works

The demolition, remediation and waste management activities (the Works) are the required to make the Project Site suitable for future use. The key element of the Works is the construction of a waste management facility, comprising a state of the art, modern and purpose built containment cell (the Containment Cell).

Other ancillary elements of the Works are:

- Demolition of the remaining Smelter buildings and structures.
- Site remediation, including leachate and groundwater treatment and management.

The Works are detailed in **Section 8**.

7.1.2 Containment Cell Management

Following completion of the Works, the Containment Cell would be subject to a monitoring and management program.

Containment Cell Management is detailed in **Section 9**.

7.1.3 Secretary's Environmental Assessment Requirements

A requirement of the Secretary's Environmental Assessment Requirements is that the Environmental Assessment includes a detailed description of the Project. The Secretary's Environmental Assessment Requirements also identify general impacts as a key issue for consideration.

Section 8 and **Section 9** provide a detailed description of the Works and the Containment Cell Management. **Table 7.1** outlines the Secretary's Environmental Assessment Requirements relating to the description of the Project and where each of these items is addressed.

Table 7.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
The EIS must include a detailed description of the development, including likely staging of the development.	Section 8 and Section 9
Waste Containment Cell including:	
• clearly explain and provide detailed justification for the preferred treatment technology;	Section 6.4 and Section 8.8
• demonstrate that the containment technology is capable of achieving the desired remediation and environmental outcomes;	Section 8.8
• clear details of the layout, design and technology of the cell, and proposed contents (including quantity of waste) and physio-chemical parameters of the proposed material;	Section 8.8
• detail the types of materials and management of those materials in the containment cell and consider any potential material incompatibilities and management measures to address any such incompatibilities;	Section 8.8
• detail how contaminated material from the existing containment cell (the Capped Waste Stockpile) will be transported to the new proposed cell (the Containment Cell) including management measures to reduce groundwater, surface water, air quality and human health impacts;	Section 8.5

Table 7.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
detail the long term monitoring program for the contaminant cell (the Containment Cell) and should the contaminant cell show signs of failure how this will be appropriately managed including any emergency procedures;	Section 9
detail the long term strategy for funding the maintenance of the contaminant cell (the Containment Cell), and identify measures for ensuring appropriate security and access arrangements over the life of the project.	Section 9.4
Occupational Health and Safety including: - detail the measures to monitor and manage the exposure of workers to contaminants including the use of appropriate personal protective equipment, education and engineering controls at the facility to reduce exposure to contaminants; and - detail how the requirements of the Work Health and Safety Regulation 2011 would be implemented.	Section 8.1 and Section 22.4
Demolition Management including: - A description of the demolition activities during each stage of the demolition. This must: - provide details of the proposed demolition process and techniques, structures to be demolished, a program for the sequencing of demolition, and details of materials handling and management; - provide confirmation that the demolition will be carried by a qualified and experienced demolition contractor; - detail any hazardous materials or contaminants of concern contained within the structures to be demolished and how these materials will be appropriately managed; - provide details of the exclusion zone to be applied during the demolition of any stacks and/or the water tower including clear plans, maps and aerial photographs of this zone; - identify any sensitive receivers that may occur within the exclusion zone and the proposed process and procedures for evacuation of any private residence; - address contamination, human health, air quality, noise and vibration, traffic management, heritage, soil and water and waste impacts and how these impacts will be mitigated and managed; and - include a community consultation strategy.	Section 8.1 and Section 8.7
Waste including:	
detail the quantity and type of liquid and non-liquid waste generated, handled, stockpiled, processed or disposed of on and off-site for all phases of the proposal;	Sections 21.2
proposed controls for managing environmental impacts of these activities;	Section 21.2, Section 21.4 and throughout Part C
provide details of spoil disposal including the quantity, tracking, handling, stockpiling, reuse/recycling and proposed strategies for confirming that waste treatment and/or disposal facilities can lawfully accept waste generated; and	Section 8.2.5, Section 8.8 and Section 21.4
provide details of any spoil to be imported to the site including the quantity and its waste classification.	Section 8

Table 7.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
Soil and Water including:	
details of water supply;	Section 8.2.7
a detailed water balance (including quantity, quality and source(s)) for the development, outlining the measures to minimise water use and any potential for a sustainable water supply;	Section 8.2.7
erosion, sediment, stormwater and wastewater management and controls during all phases of the proposal;	Section 8.2
wastewater predictions, and the measures that would be implemented to treat, reuse and/or dispose of this water.	Section 8.2.7
Fire and Incident Management including technical information on the environmental protection equipment to be installed on the premises such as air, water and noise controls, spill cleanup equipment and fire management and containment measures.	Section 8.1 and Part C

7.2 Summary of Project Activities

7.2.1 The Works

Table 7.2 identifies the elements of the Works stage of the Project and the key tasks.

Table 7.2: Project Outline: The Works

Work Element	Key Tasks
Project Site Establishment	- Establishment of environmental controls. - Construction of the Containment Cell haul road. - Continued use of Stage 1 Demolition compounds. - Continued use of Stage 1 Demolition stockpile and storage areas.
Containment Cell Construction	- Vegetation clearance. - Site preparatory works. - Construction of the Containment Cell base layers. - Construction of internal cell walls within the Containment Cell. - Transport and placement of remediation and demolition materials to the Containment Cell. - Leachate and stormwater management. - Construction of the final Containment Cell capping layers.
Stage 2 Demolition	- Completion of hazardous materials removal. - Demolition of three concrete stacks and a water tower using detonation. - Mechanical demolition of remaining buildings and structures. - Material collection, separation, processing and storage. - Transportation of recyclable metals off-site. - Transport non-recyclable demolition material to the Containment Cell. - Grading of former building footprints.

Table 7.2: Project Outline: The Works

Work Element	Key Tasks
Contamination Remediation	• Removal of the Capped Waste Stockpile. • Excavation of the contaminated soils within the Smelter (including stockpiled soils sourced from other Hydro Land). • Transport to the Containment Cell. • Filling and grading following removal of contaminated materials.
Leachate and Groundwater Treatment	• Establish and operate water treatment plants (Capped Waste Stockpile and Containment Cell). • Groundwater monitoring. • Water treatment plant, pumping well network and dam decommissioning.

7.2.2 Containment Cell Management

Table 7.3 identifies the elements of the Containment Cell Management stage of the Project and the key tasks.

Table 7.3: Project Outline: Containment Cell Management

Element	Key Tasks
Management	• Inspection. • Weed control. • Operation of infrastructure comprising power supply and (if required) leachate management. • Reporting in accordance with regulatory requirements.
Monitoring	• Cap integrity. • Gas emissions. • Leachate generation. • Groundwater.

7.3 Project Value and Employment Creation

The Capital Investment Value of the Project (as defined in clause 3 of the EP&A Regulation) has been calculated by a qualified quantity surveyor to be \$40,819,580 (excluding GST).

It is estimated that the Project would create 50 additional jobs at the peak of the Work activities. It is estimated that there would be two jobs during Containment Cell Management.

Appendix 3 includes a report prepared by a qualified quantity surveyor including detailed calculations on Capital Investment Value and job creation. The report has been certified by the qualified quantity surveyor noting that the information provided is accurate at the date of preparation.

8. THE WORKS

8.1 Works Management

Prior to commencement of the Works, Hydro and its contractors would develop management documentation that outlines how the elements of the Works would be undertaken. Hydro would ensure that environmental management and protection, personnel and contractors' human health and safety protection, quality control and stakeholder communications form integral parts of the Works.

8.1.1 Environmental Management

Hydro has developed and implemented an Environmental Management Plan (EMP) that outlines the environmental management requirements for the current activities at the Smelter and Hydro Land as described in **Section 3.4**. The EMP has been prepared in accordance with the *Guideline for the Preparation of Environmental Management Plans* (DIPNR, 2004).

The EMP addresses:

- The environmental management objectives for the Works.
- The basis for environmental management (including approval, licence and legislative requirements; and identification of environmental aspects, impacts and risks).
- Environmental management structure (key responsibilities, including subcontractors).
- Environmental management activities (including Project Site induction and training, communications, reporting and incident management).
- Implementation (environmental management measures, including incorporation of environmental management into standard procedures).
- Monitoring and review (how success of the EMP implementation is assessed).

Prior to the commencement of any Works activities, the EMP would be updated to reflect the Works. This would include incorporation of the findings of this EIS in identification of: the environmental aspects, impacts and risks; and the required environmental management measures.

Inductions for all Works personnel would include information on the environmental management requirements from the EMP applicable to their activities and work areas.

8.1.1.1 Fire and Incident Management

Incident Management

The description of the Works includes activities to be implemented to minimise the potential for environmental incidents. In addition, the assessments undertaken in **Part C** identifies additional mitigation measures (collated in **Section 24.1**) that would be implemented to further mitigate potential environmental impacts and minimise the potential for environmental incidents. The system for implementation of these measures would be detailed in the EMP.

However, there is the potential that the EMP is not adequately implemented and the Works activities are not implemented as described. This could result in an environmental incident.

As noted in **Section 8.1.1** the EMP would include procedures for incident management. This would include the following:

- The process for identifying the source of the environmental incident and implementing initial measures to stop or limit the potential environmental impact.
- The process for identifying the cause of the environmental incident, and the measures required to be implemented to stop it from occurring again. This may include amendment of the EMP.
- The reporting requirements for the environmental incident (including internal and external reporting requirements).

It is acknowledged that incidents could potentially have both environmental and health and safety impacts. The Works would have an integrated incident reporting and response system that would consider all potential impacts of an incident. This system would be reflected in the EMP, the Work Health and Safety Plan (refer to **Section 8.1.2.1**) and the Quality Management Plan (refer to **Section 8.1.3**).

A number of incident response procedures are discussed in the EIS. This includes:

- Fire management (refer to the following section).
- A spill kit to be available at all times and any spillage is to be immediately cleaned up. In the event of a large or hazardous spill, the fire brigade, police, ambulance and OEH would be contacted as appropriate (refer to **Section 13.4**).
- A respirator appropriate for ammonia, methane, hydrogen, hydrogen cyanide and hydrogen sulfide would be available and ready to be used for all workers at the Capped Waste Stockpile in the event that gas monitoring record such gases exceeding safety trigger levels (refer to **Section 22.4**).
- As discussed in **Section 13.3.2.1** there are a number of measures to be implemented in the event that heavy rain events are predicted for the Project Site:
 - Weather warnings and local weather conditions would be continually observed to determine the likelihood the Project Site would be impacted.
 - Preparations would be made for appropriate protective measures (such as placement of wet weather covers over exposed materials at the Containment Cell and the Capped Waste Stockpile).
 - Works would cease and protective measures implemented.
 - The stormwater management system would be inspected during (when safe to do so) and immediately after the heavy rain event to assess performance and if maintenance is required.
- The Stakeholder Engagement Plan (refer to **Section 8.1.4**) includes a procedures for investigating and responding to potential incidents that have been reported by residents or other external stakeholders.

Section 14 assesses the potential risk (based on consequence and likelihood) associated with hazardous materials to be handled during the Works and identifies the procedures and management measures to be implemented to minimise the potential for incidents associated with these materials to occur.

Fire Management

Fire poses a risk to the Project through the following:

- Bushfire within the adjoining native vegetation. The Cessnock City Council Bushfire Prone Land Map identifies the Project Site (including the Containment Cell) as including and/ or being surrounded by "Vegetation Buffer". The area adjoining the Project Site is predominantly "Vegetation Category 1", with small areas of "Vegetation Category 2" also present.
- Fire occurring within the Works site (as a result of machinery malfunction, incorrect handling of waste materials or incorrect implementation of demolition procedures).

Fire breaks and access (shown as "Vegetation Buffer" as described above) for fire fighting vehicles (including Crown Roads) were maintained throughout the operation of the Smelter, and have continued to be maintained since its closure. These fire breaks and accesses would be maintained throughout the Works.

The vegetation clearance required for construction of the Containment Cell includes allowance for construction of a service road around the Containment Cell. This would provide a sufficient buffer between the Containment Cell construction, as well as access for fire fighting vehicles if required.

The Smelter Access Plan (refer to **Section 15.4**) would include provision for safe egress from the Project Site (particularly the Containment Cell) in the event that bushfire presents a risk to the Works site and personnel. It would also include provision for emergency vehicle access to the Project Site.

Hydro has commenced implementation of services decommissioning through the Smelter Site. This would minimise the potential for demolition to cause fire.

As discussed in **Section 14.2.1** there are several materials that are present within the Smelter, or to be stored at the Project Site for use in the Works, that pose a fire risk if not correctly stored, handled and managed. However these materials would be managed in accordance with Safety Data Sheets and handling procedures to minimise the potential for fire ignition.

Firefighting equipment would be provided and maintained where these materials would be stored and handled. The type and capacity of the firefighting equipment would be in accordance with the materials' Safety Data Sheet.

8.1.2 Personnel and Contractors Human Health, Safety and Security

8.1.2.1 Work Health and Safety

Hydro has developed and implemented A Work Health and Safety Plan (WHSP) that outlines the human health and safety management requirements for the current activities at the Smelter and Hydro Land (the activities described in **Section 3.4**). The WHSP has been prepared in accordance with the *Work Health and Safety Act 2011* (NSW) and Work Health and Safety Regulation 2011.

Hydro has maintained regular consultation with SafeWork NSW in planning the existing activities at the Smelter, and in development of the WHSP.

The WHSP addresses:

- The work health and safety objectives.
- Work health and safety management structure (key responsibilities, including subcontractors).
- Work health and safety management activities (including training, communications, reporting and incident management).
- Implementation (management measures, including incorporation of work health and safety into standard procedures).
- Monitoring and review (how success of the WHSP implementation is assessed).

The Works would be incorporated in the existing WHSP prior to the commencement of the Works.

8.1.2.2 Security

Project Site security would be an important safety management measure, as well as protecting the work site from illegal access.

The Hydro Land is surrounded by rural wire fencing with warning signage stating that access to Hydro Land is not permitted. The Smelter Site is surrounded by security fencing that would be maintained throughout the Works.

The rural wire fencing to the Hydro Land does not provide adequate access restriction to the Containment Cell which is remote from the secured Smelter Site. Security at the Containment Cell would be managed by installation of security fencing around the Containment Cell construction footprint.

8.1.3 Quality Management

An integral part of the Works is implementation of strict quality control procedures.

The Principal Contractor would be required to develop and implement a Quality Management Plan (QMP). The QMP would include procedures for ensuring that the Works have been completed in accordance with the detailed design.

The QMP would include:

- The quality management objectives of the Works.
- Quality management structure (key responsibilities, including subcontractors).
- Quality management activities (including training, communications, reporting and documentation).
- Implementation (quality measures implemented in key activities, documentation requirements).
- Monitoring and review (identification of quality issues, rectification procedures).

Third party independent quality assurance / control inspections would be undertaken throughout the Containment Cell construction and material placement activities to audit the performance of the contractor against the QMP.

8.1.4 Stakeholder Consultation

As described in **Part C** of this EIS, there are a number of elements of the Works that are of interest to the community.

Hydro would build on the stakeholder consultation undertaken to date (as described in **Section 4.2**) through amendment to and continued implementation of the existing Stakeholder Engagement Plan.

The Stakeholder Engagement Plan would be amended to identify:

- The proposed program for the Works, including those that would have potential impacts or interest to the local community.
- The proposed program for community consultation activities, including the form of consultation (such as a website, newsletters, letters and advertisements in local newspapers) and the extent of notification (such as the extent of a letterbox drop).
- The procedures for receiving and addressing community enquiries, and preparation and issuing of responses.

8.2 Project Site Establishment

8.2.1 Establishment of Environmental and Safety Controls

One of the initial activities at the Project Site would be the establishment of environmental and safety controls. This section describes these activities.

8.2.1.1 Aboriginal Heritage Management

As discussed in **Section 16**, one known Aboriginal relic is located within the footprint of the Containment Cell, and one area of high subsurface potential/sensitivity is located in the far northern section of the temporary capping storage area adjacent to the Containment Cell.

Prior to the commencement of construction, in the vicinity of this relic and area, the following would be undertaken:

- The known Aboriginal heritage relic would be salvaged by a qualified archaeologist. The relic would be made available to the Mindaribba Local Aboriginal Land Council.
- The area of high subsurface potential/sensitivity is located in the far northern section of the temporary capping storage, to the north of a power line easement. The boundary of the area would be flagged and access not permitted. It is not anticipated that this area would need to be used.

In the event that this area of high subsurface potential/sensitivity needs to be used for temporary material stockpiling, one of the following would be undertaken:

- Geotextile fabric would be placed over the area to be used for stockpiling. Excavation techniques would be implemented that avoid disturbance of the existing surface below the fabric; or
- A thin layer of the placed material would remain in-situ to avoid disturbance of the existing surface.

The Works induction program would include information on Aboriginal heritage and the management of these locations, as well as the measures to be implemented if a potential Aboriginal heritage item is unearthed.

8.2.1.2 Soil and Water Management Controls

In addition to the continued operation of the existing Smelter water management system, additional initial and long term soil and water management controls would be installed. This would include installation of sediment fencing and hay bales downstream of the Containment Cell, the Capped Waste Stockpile, haul road footprint and other earthworks areas, as well as surface water diversion drains for the Containment Cell and other earthworks areas.

These controls would be documented in a Soil and Water Management Plan (SWMP), which would form a sub-plan of the EMP. The SWMP would include continued revision of the controls to reflect the varying stages of the Works.

8.2.1.3 Project Site Boundary Security

The Smelter is surrounded by security fencing. Internal restrictions would be installed and enforced to protect the safety of personnel.

A formal induction and communications process would be developed and implemented to control entry to Works areas (for example, personnel would need to be inducted and authorised to access demolition areas or the Containment Cell area). This would also include establishing alternative vehicular and pedestrian access controls.

The Containment Cell would be beyond the Smelter security fencing. As discussed in **Section 8.1.2.2** security fencing would be installed around the Containment Cell construction footprint. This would also form a boundary for the vegetation to be excluded from clearance. This temporary fencing would be installed following completion of the permissible vegetation clearance (refer to **Section 8.2.2**).

8.2.1.4 Establishment of Water Cart Refill Locations

Water carts would be required to operate from a very early stage in the Project to suppress dust generation.

A water cart refill location would have been established in the south of the Project Site to service the Stage 1 Demolition. A new refill location would be established adjacent to the North Dam to utilise the water stored in the dam.

8.2.1.5 Surface Water System Modifications and Management

The Smelter has a water management system that includes a network of open drains and pipes that drains surface water and process waters to the East, West, South and North Dams. The water management system infrastructure would be retained and operated wherever possible to capture and manage surface water (including stormwater and dust suppression water runoff) and utilise the existing water detention systems to maintain water quality, either reused for dust suppression or irrigated in an area to the north of the Project Site (in accordance with Hydro's EPL). The water management system may require modifications to facilitate the Works activities. Any modifications however would maintain the system's ability to minimise environmental impacts and comply with the requirements of the Hydro EPL.

Part of this system could be directly (through demolition) or indirectly (due to proximity to demolition and earthworks activities) impacted during the Works. The SWMP to be developed as part of the Environmental Management Plan would include erosion and sediment control staging plans (as required) for protection of the system and to avoid impacts to its efficient operation.

8.2.2 Vegetation Clearance

Figure 8-1 identifies the area of native vegetation to be cleared for the Project. Native vegetation clearance is limited to the perimeter of the existing Clay Borrow Pit (to facilitate the construction of the Containment Cell and associated infrastructure).

A Vegetation Clearing Protocol would be included in the EMP. It would include the following key steps:

- The boundary of the area of vegetation approved for clearance would be surveyed and delineated with flagging every 20 metres.
- A pre-clearance inspection (within 48 hours of vegetation clearance) to identify any potentially inhabited hollow bearing trees.
- Clearance of remaining vegetation around the trees.
- Gentle shaking of potentially inhabited hollow bearing trees.
- Removal of potentially inhabited hollow bearing trees 24 hours later in the presence of an ecological/ animal handler.
- Appropriate handling and management of any native fauna encountered during tree clearing.

Green waste generated during vegetation clearance would be mulched for reuse on-site as temporary soil and stockpile coverage (for erosion control).

As discussed in **Section 8.1.2.2** Project Site security fencing would also exclude construction vehicles from entering and disturbing areas of native vegetation not approved for clearance.

It is anticipated that the following machinery would be used in vegetation clearance:

- Bull dozers.
- Excavators.
- Mulching/ composting machinery.
- Refuelling vehicle travelling to and from the Smelter as required.
- Thirty tonne articulated truck (if required to transport to the stockpile area or its reuse area).

8.2.3 Compounds

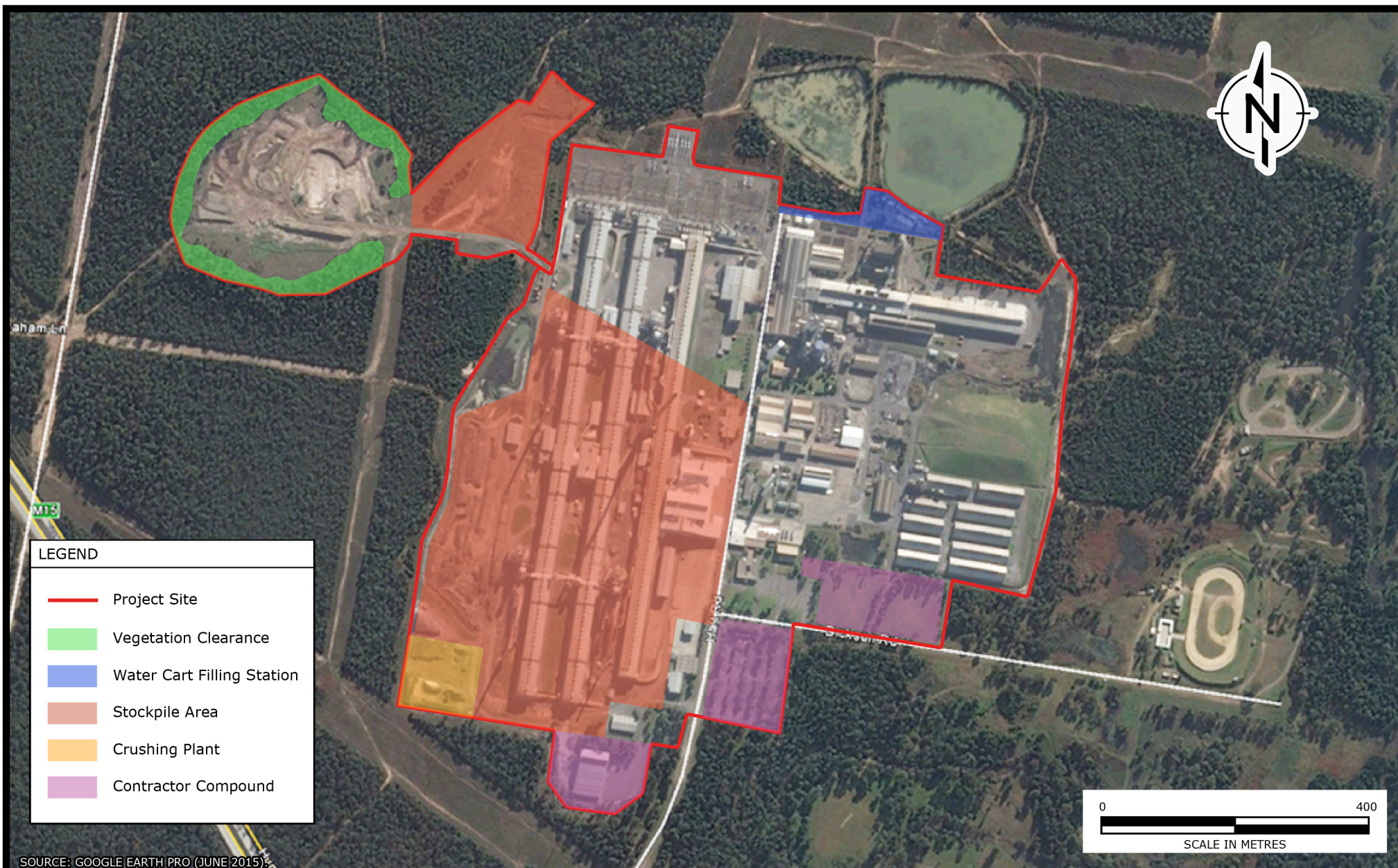
Figure 8-1 shows the proposed compound locations.

The compound would include:

- Demountable office buildings.
- Hardstand car parking areas.
- Hardstand storage areas.
- Explosives store (temporary as required for stacks and water tower).
- Contained chemical storage area.
- Security lighting.
- Water storage tanks.
- First aid room and eyewash.
- Ablution facilities.

The compound would be provided electrical, water, sewer and mobile telecommunication services. The outcomes of a servicing strategy would confirm if this would be via connection to permanent infrastructure or temporary facilities (such as portable toilets, power generators and tank water).

A second smaller compound would be located adjacent to the Containment Cell. This would include a demountable office building, lunch room and ablution facilities. This compound would be provided electrical, water, and telecommunication services. Portable toilet facilities would be provided at the compound, which would be serviced by a licensed contractor.



Waste disposal facilities would be provided at both compounds, including recyclable waste collection where practical. These wastes would be collected by a contractor and transported to a licensed waste management facility.

8.2.4 Car Parking

The existing Smelter car parking immediately south of the existing Administration Buildings (at the north eastern corner of the intersection of Hart Road and Dickson Road) would continue to be available throughout the Works. Sufficient parking (over 130 parking spaces) would be available for the predicted peak personnel on-site during the Works..

8.2.5 Stockpile and Storage Areas

The Stage 1 Demolition activities discussed in **Section 3.4.3** includes the establishment of a stockpile area. This stockpile area would be used for the storage of the following demolition material during the Works:

- Unprocessed concrete and bake furnace refractory bricks.
- Processed concrete and bake furnace refractory bricks: the Stage 1 Demolition includes processing of concrete and refractory bricks through a crushing plant. Operation of the crushing plant would continue as part of the Works.
- Scrap metal (prior to transportation to a licensed recycling facility).

This area would also be used for the temporary storage of contaminated soils generated by Category 2 remediation works in the Hydro Land (as described in **Section 3.4.1**).

Additional stockpile and storage areas would be established for the Works:

- A soil storage area would be established in the north of the Smelter, immediately north of the haul road (refer to **Section 8.2.6**).
- A temporary storage area would be established adjacent to the Capped Waste Stockpile to facilitate sorting of removed material prior to transportation to the Containment Cell.

The following environmental controls would be implemented at the stockpile and storage areas:

- Installation of erosion and sediment controls to minimise erosion and capture sediment runoff. This would include sediment fencing, hay bales and surface water diversion.
- Materials would be segregated and delineated as required.
- Material tracking would record the truckloads of materials placed at and removed from each location.
- Water spraying would be used on appropriate stockpiles for dust suppression.
- Long term soil stockpiles would be hybrid grass seeded.

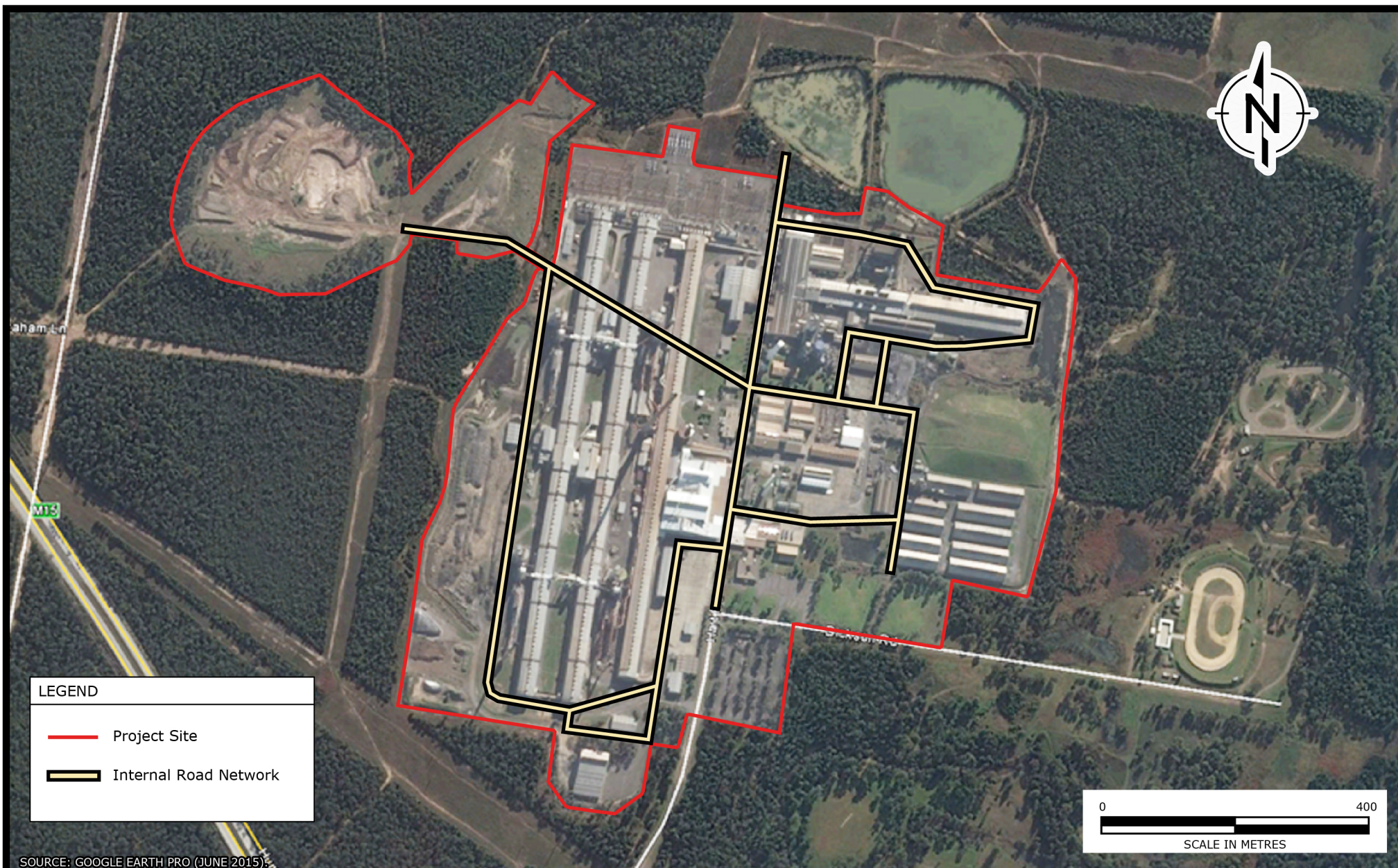
Figure 8-1 shows the location of the storage and stockpile areas.

8.2.6 Access Roads and Haul Road Construction

8.2.6.1 Access Roads

As shown in **Figure 8-2** there is an existing road network throughout the Smelter. These roads would be maintained throughout the Works.

A Traffic Management Plan would define the traffic controls that would be implemented throughout the Project. This would identify: the various phases of traffic controls and access restrictions (including permanent road closure) required to facilitate demolition; and the controls and traffic routes to be implemented to minimise interaction between general traffic and trucks transporting materials to the Containment Cell.



PROJECT SITE ACCESS ROADS FORMER HYDRO ALUMINIUM KURRI KURRI SMELTER DEMOLITION AND REMEDIATION

8.2.6.2 Haul Road

Figure 8-2 shows the proposed alignment of a haul road connecting the Capped Waste Stockpile to the Containment Cell. The road would be constructed to allow two 40 tonne articulated dump trucks to pass in each direction.

Construction of the haul road would involve the following key steps:

- Installation of erosion and sediment controls. This would include installation of sediment fencing and hay bales. These would be inspected and maintained throughout construction.
- Pre-fill earthworks and preparatory works (topsoil scraping).
- Fill placement and compaction along the haul road alignment. Crushed concrete (as discussed in **Section 8.2.5**) would be used for the fill material.
- Installation of dish drains along the haul road between the Smelter and the Containment Cell to collect and divert stormwater to the Smelter water management system (refer to **Section 8.2.7**).
- A service conduit would be included within the road corridor connecting the Smelter Site to the Containment Cell. The conduit would facilitate the provision of water, electricity and other services to the Containment Cell compound, the water treatment plant and other associated facilities.
- Dust control measures would be implemented throughout the construction process. This would include the use of a water cart.
- Installation of a culvert or small bridge construction at the crossing of the unnamed watercourse. The crossing on the existing access track to the Clay Borrow Pit would not be sufficient to allow two 40 tonne articulated dump trucks to pass. As such a new crossing would be constructed. The key elements of the crossing would be:
 - A culvert design that minimises impacts on the existing hydrology. This would include maintaining the existing flows in the watercourse and minimising changes in the downstream 1% AEP flood levels.
 - Drainage (such as a dish drain) that captures and diverts surface drainage to the Smelter water management system (refer to **Section 8.2.1.5**).

The detailed design of the unnamed watercourse crossing would be submitted for review by the Department of Planning and Environment prior to the commencement of construction.

- The unnamed watercourse is an ephemeral watercourse. Construction would require temporary blockage of the unnamed watercourse. In the event that a rain event occurs during the temporary blockage, flows would be diverted around the construction works.
- At completion of the Works soils within the watercourse floor and banks would be stabilised consistent with pre-construction conditions.

It is anticipated that construction of the haul road would utilise the following machinery:

- Excavators.
- Graders.
- Forty tonne articulated trucks.
- Dozers.
- Vibrating drum roller.
- Water truck.
- Machinery service vehicle.
- Refuelling vehicle travelling to and from the Smelter as required.
- Various hand operated equipment.

The following measures would be implemented during use of the haul road:

- A speed limit of 20km/ hour on the haul road. This would minimise the potential for material spills and traffic safety risks.

- Cleaning of any materials spilled on the haul road. The spill response would be dependent on the type and quantity of material spilled.
- A water cart would be used for dust suppression along the haul road.

8.2.7 Water Management

8.2.7.1 Water Supply

The Smelter is currently connected to the Hunter Water Corporation potable water supply system. Hydro proposes to maintain connection to the system for as long as possible during the Works. In addition, new water supply infrastructure (either via pipes connected to the existing potable water supply system or tanks filled with water delivered by tankers) would be provided to service the compound and other facilities at the Containment Cell.

Water from the North Dam is currently irrigated on an area of pasture to the north of the Smelter, in accordance with EPL No. 1548. It is proposed that this water would be used for dust suppression throughout the Project Site. As discussed in **Section 8.2.1** a water cart refilling station would be installed on the southern side of the North Dam.

8.2.7.2 Water Demands

Water would be required for the following:

- Dust suppression for areas such as:
 - Unsealed access roads.
 - Soil, concrete and other dust generating stockpiles.
 - Crushing plants.
 - Building demolition. It is anticipated that water spraying would be undertaken to minimise dust generated during Stage 2 Demolition (refer to **Section 8.7**).
 - Demolished building footprints and exposed soils.

As discussed in **Section 8.2.7.1** water for dust suppression would be extracted from the North Dam and supplemented as required from the potable water supply.

- Containment Cell construction. Water would be used in creating various layers for the base of the Containment Cell (refer to **Section 8.4.3**).

Water for Containment Cell construction would be sourced from the potable water supply via tanker delivery.

- Grass cover establishment. Water would be required to promote establishment of grass cover over exposed surfaces following demolition and remediation, and the vegetation layer on the Containment Cell.

Water for grass cover establishment would be extracted from the North Dam and supplemented as required from the potable water supply.

- Toilets and amenities.

Water for toilets and amenities (such as kitchen/ lunch room facilities) would be sourced from the potable water supply.

The following measures would be implemented where possible to minimise water use requirements:

- Long term soil stockpiles would be covered or grass seeded to minimise or avoid the requirement for water spraying.
- Surfaces would be grass seeded as soon as practicable following completion of remediation and demolition activities. The grass cover would minimise dust generation and the requirement for water spraying.
- Demolition activities would be managed and undertaken using measures that minimise dust generation. This would include removal of readily accessible accumulated dust within the

structures, and undertaking major demolition activities (particularly those requiring explosives) during minimal wind conditions.

- The toilets and amenities would include water saving devices.
- The Project Site surface water management system would be managed to maximise capture of water for diversion to the North Dam and reuse.
- Best practice dust suppression water spraying would be implemented so that dust is suppressed but avoids excessive water use.
- Where practicable water supplies would be metered so that water use can be recorded.

8.2.7.3 Soil and Water Management

As discussed in **Section 8.2.1** the establishment of soil and water management measures, including protection of the existing surface water management system, would be one of the first activities undertaken at the Project Site. This would include installation of sediment fencing and hay bales downstream of the Containment Cell, the Capped Waste Stockpile, haul road footprint and other earthworks areas, as well as surface water diversion drains for the Containment Cell and other earthworks areas. These controls would be documented in the Soil and Water Management Plan described in **Section 8.2.1**.

The Soil and Water Management Plan would reflect the varying stages of the Works, and the need to update the controls accordingly. The Plan would also describe the maintenance requirements for the controls.

As discussed in **Section 3.4.3**, Hydro has submitted a development application to Cessnock City Council to undertake Stage 1 Demolition activities. This development would require the installation and management of erosion controls around and within the demolition area. These measures would continue to be managed and maintained as appropriate for the Works.

8.2.7.4 Wastewater Management

The predominant wastewater source would be water used for dust suppression. This water would be managed in accordance with the Soil and Water Management Plan described in **Section 8.2.1**.

Wastewater would also be generated during:

- Amenity facilities for Project personnel
- Construction of and placement of material within the Containment Cell.
- Removal of material from the Capped Waste Stockpile.
- Extraction of leachate from the footprint of the Capped Waste Stockpile.

Section 8.2.3 (amenity facilities), **Section 8.4.4** (Containment Cell), **Section 8.5.2** (Capped Waste Stockpile removal) and **Section 8.10** (leachate management) describe how wastewater from these locations would be captured and managed.

The majority of wastewater (used dust suppression water, stormwater runoff from the Works areas, water from the Containment Cell and water from the Capped Waste Stockpile) is primarily dependent on weather conditions. The majority of wastewater generation from the Works areas, Containment Cell and the Capped Waste Stockpile would be generated during and following rain events. Dust suppression water would only be used as required during dry and warm conditions.

This wastewater would be managed as part of the existing Smelter storm water and surface water management system. The water would eventually be stored in the North Dam where it would be available for reuse or if required due to capacity issues) irrigated on land to the north of the Project Site in accordance with the Hydro EPL. As noted in **Section 13.2.2.1** the existing management system includes a series of dams with an overall capacity of approximately 166,000m³. Due to this capacity and the expected demands for water reuse during the Works, the need to irrigate water from the North Dam is expected to be low.

The only wastewater to be discharged from the Project site is that generated at amenities facilities for Project personnel. This wastewater would either be discharged via the existing Hunter Water sewerage system or collected by licensed contractors from portable amenities.

8.3 Public Road Traffic Management

As discussed in **Section 3.1** the Project Site is located at Hart Road, Loxford. The entrance to the Project Site is immediately north of the northern end of Hart Road, where it intersects with Dickson Road. Dickson Road continues to the east and provides access to the Kurri Kurri Speedway and Kurri Kurri Junior Motorcycle Club (located on Hydro Land).

Approximately 620 metres southwest of the Project Site is the Hunter Expressway. The Hart Road interchange allows vehicles on Hart Road (both directions) to travel southeast on the expressway, and vehicles travelling northwest on the expressway to exit onto Hart Road (both directions).

Hart Road continues to the southwest to an intersection with Sawyers Gully Road (north of the intersection)/ Government Road (south of the intersection). Gingers Lane is the fourth road at this intersection, continuing to the west.

The majority of vehicles during the Works would access and egress the Project Site via Hart Road and the Hunter Expressway. A small number (predominantly small vehicles driven by employees and contractors that live in the local area) would continue along Hart Road to the Sawyers Gully Road/ Government Road intersection.

A Traffic Impact Assessment has been prepared to calculate the predicted traffic generation by the Works. The assessment concluded that the Works would generate a peak of 75 additional vehicle movements per day.

Based on these worst case traffic levels, no traffic controls are required at the Hart Road interchange on the Hunter Expressway.

An estimated maximum of 50 personnel would be on-site during the Works. Adequate parking facility is available at the Smelter.

Activities at the Kurri Kurri Speedway and Kurri Kurri Junior Motorcycle Club predominantly occur on the weekend, predominantly in the afternoon and evening. During events at these facilities, large Works vehicle movements (primarily for transporting scrap metals) would cease. Hydro would work with the Kurri Kurri Speedway and Kurri Kurri Junior Motorcycle Club to develop and implement appropriate traffic and parking controls to protect motorist safety and maintain access.

A Traffic Management Plan would be developed and implemented for the Works. This would document and define the traffic controls to be implemented during events at the Kurri Kurri Speedway and Kurri Kurri Junior Motorcycle Club.

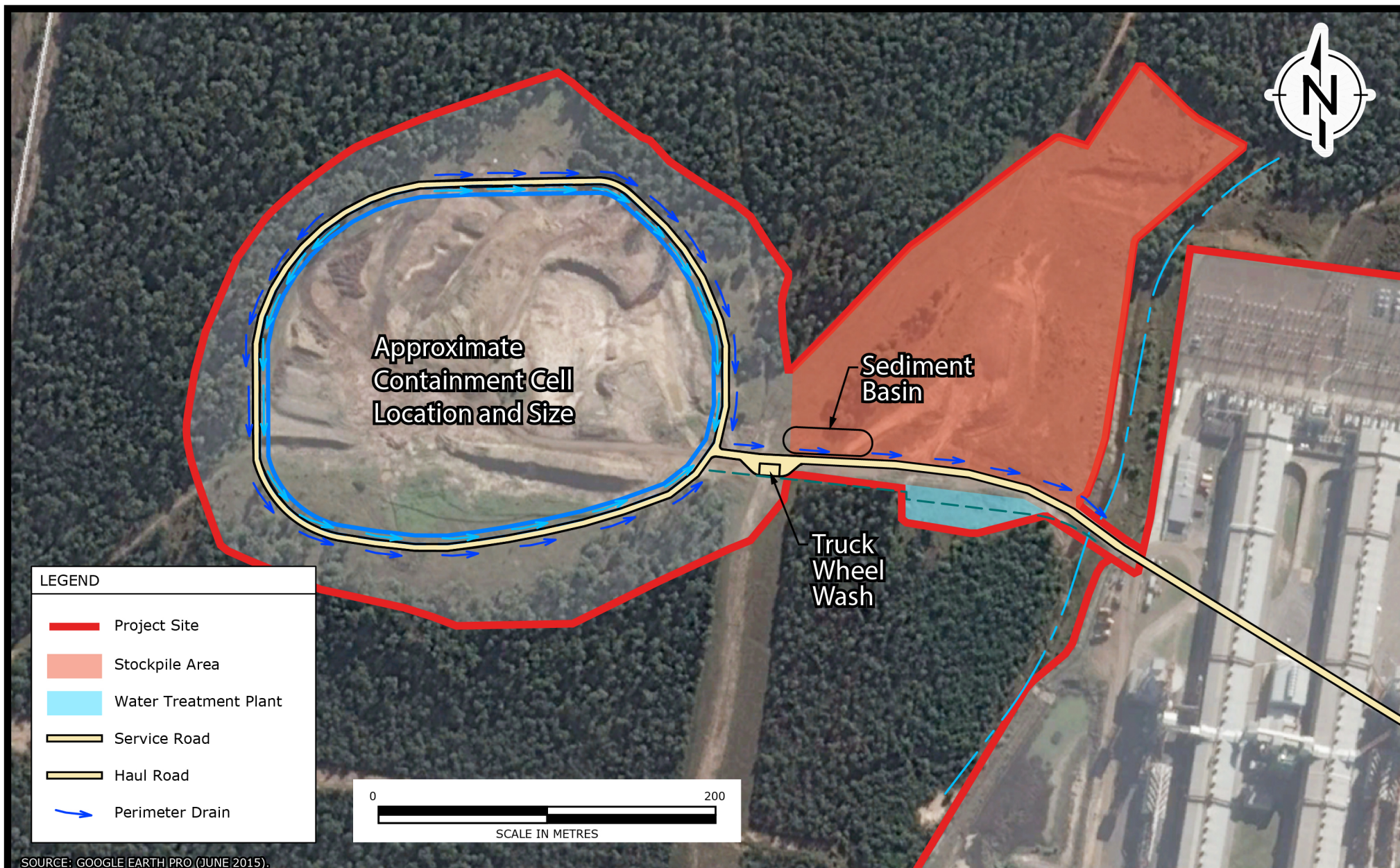
8.4 Containment Cell Establishment

The following section describes the overall design of the Containment Cell, and the establishment of the cell. **Section 8.8.1** describes how material would be placed in the Containment Cell, and the final cap would be constructed.

8.4.1 Location and Design

Figure 8-3 shows the proposed location of the Containment Cell. It would be located at the existing Clay Borrow Pit. As discussed in **Section 5.3.4** the Clay Borrow Pit was selected for the Containment Cell location as it is:

- An area underlain by suitable strata comprising low permeability residual clays and bedrock, and avoiding alluvial soils. The bedrock is massive with minimal defects and fractures.
- An acceptable distance above the highest observed groundwater level.
- In an area that minimises vegetation clearance.



CONCEPTUAL CONTAINMENT CELL LAYOUT PLAN FORMER HYDRO ALUMINIUM KURRI KURRI SMELTER DEMOLITION AND REMEDIATION

**FIGURE
8-3**

- In a location:
 - Above the 1% Annual Exceedence Probability (AEP) flood level.
 - More than 100 metres from a watercourse.
 - More than 500 metres from the nearest residence, within 500 metres of the Smelter and on the northern side of the Hunter Expressway.
 - A minimum of 20 metres from power line easements.

Figure 8-4, Figure 8-5 and Figure 8-6 present a layout plan and cross sections of the proposed Containment Cell. Concept design drawings are included in **Appendix 3**.

The concept design for the Containment Cell includes the following elements:

- Containment Cell base. This is further discussed in **Section 8.4.3**.
- Containment Cell contents placed in the following categories:
 - Asbestos waste.
 - Contaminated soils.
 - Non-recyclable demolition materials.
 - Capped Waste Stockpile contents.
- The capping layer. This is further discussed in **Section 8.8.3**.

A detailed design is currently being prepared for the Containment Cell. The final type and quantity of the materials described above may change, but would be required to provide the same performance as the described material and be consistent with the recommendations of the EPA *Environmental Guidelines: Solid Waste landfills* (2016). The detailed design would be developed in consultation with the EPA.

Additional Containment Cell components include:

- Leachate contingency collection system.
- Water treatment plant (if required for treatment of collected leachate).
- Perimeter service road. A service road and associated drainage would be constructed around the perimeter of the Containment Cell.

8.4.2 Site Preparation

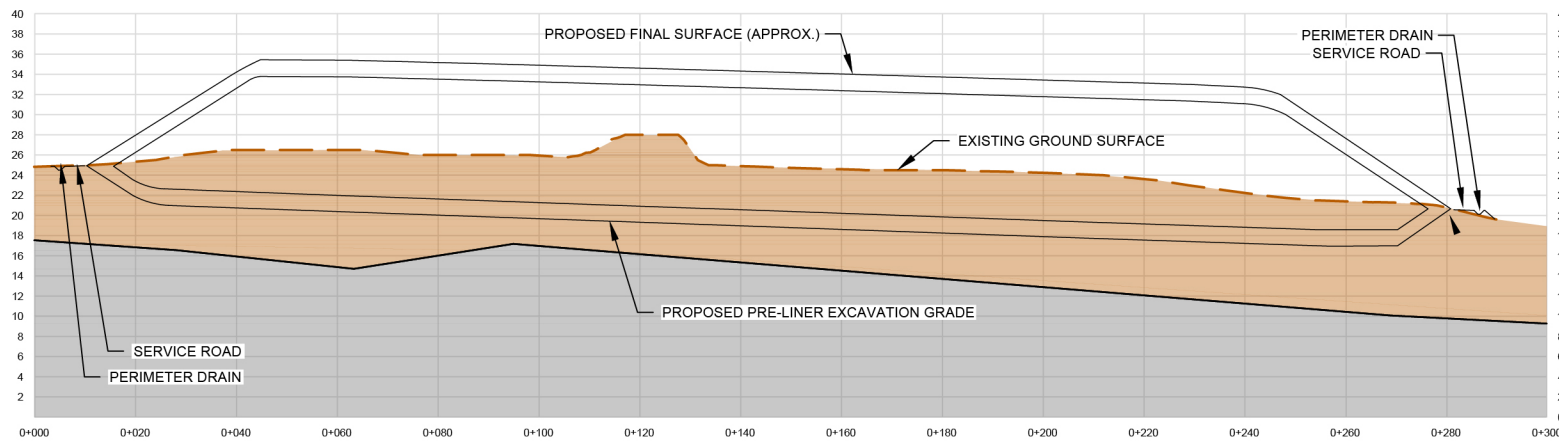
Prior to the commencement of construction of the Containment Cell, the following activities would be undertaken:

- Clearance of native vegetation (refer to **Section 8.2.2**), and installation of security fencing and environmental controls (refer to **Section 8.2.1**).
- Topsoil would be scraped and transported to the long term soil stockpile area (refer to **Section 8.2.5**) and saved for reuse in the Containment Cell capping.
- Excavation of subsurface materials not to be used in Containment Cell construction. These would be stockpiled at the adjacent stockpile area.
- Construction of a perimeter access track. This would be constructed in the alignment of the long term service road.

These site preparation activities would require the use of the following machinery:

- The vegetation clearance equipment described in **Section 8.2.2**.
- Excavators.
- Scrapers/ dozers.
- Forty tonne articulated trucks.
- Water cart.
- Refuelling vehicle travelling to and from the Smelter as required.
- Various hand operated equipment.

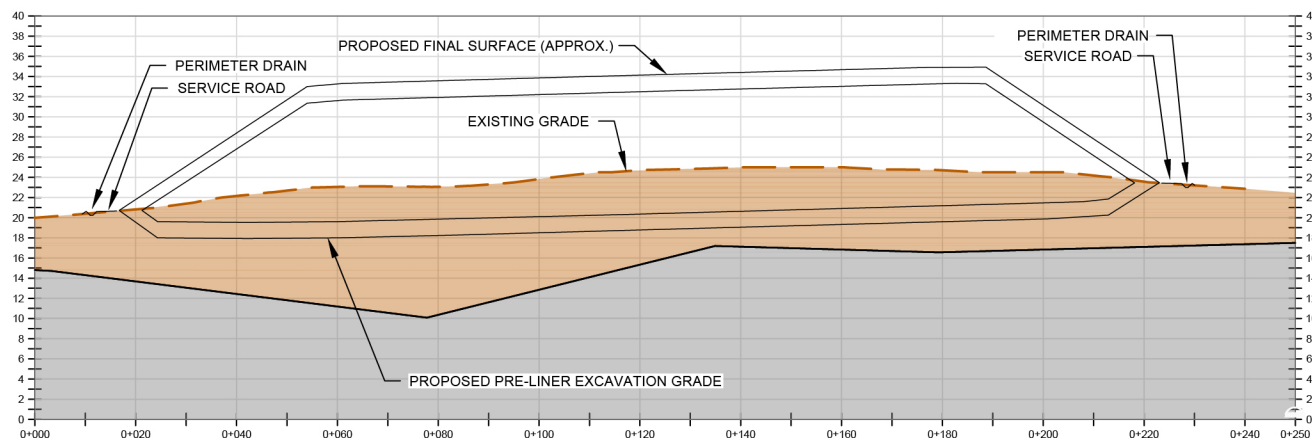




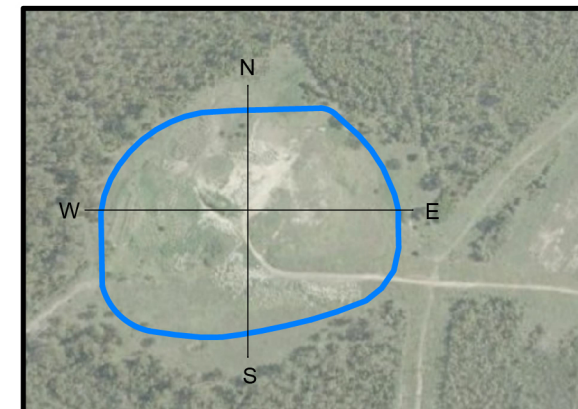
CROSS SECTION WEST-EAST



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SCALE IN METRES
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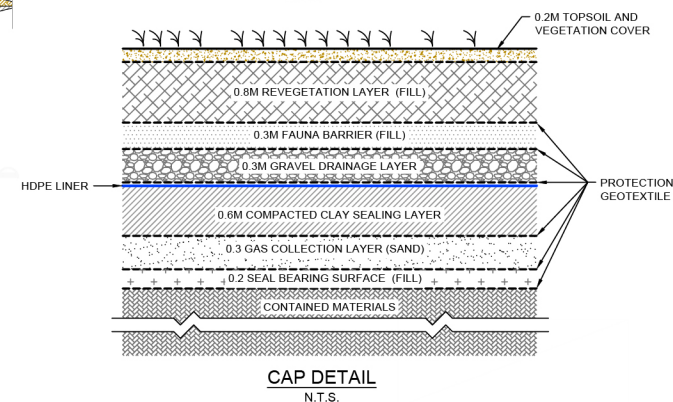
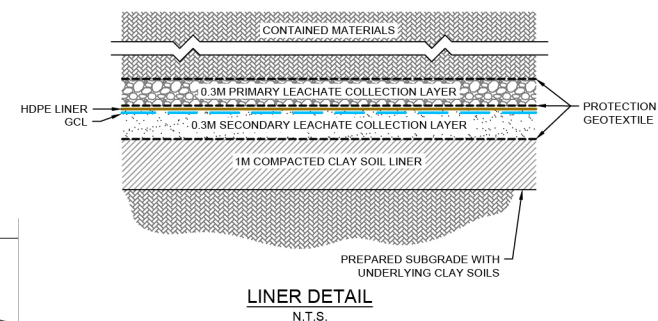
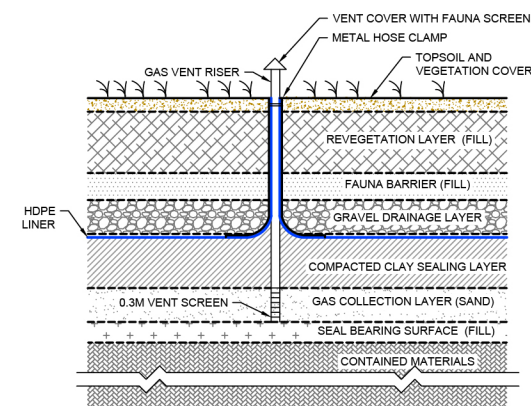
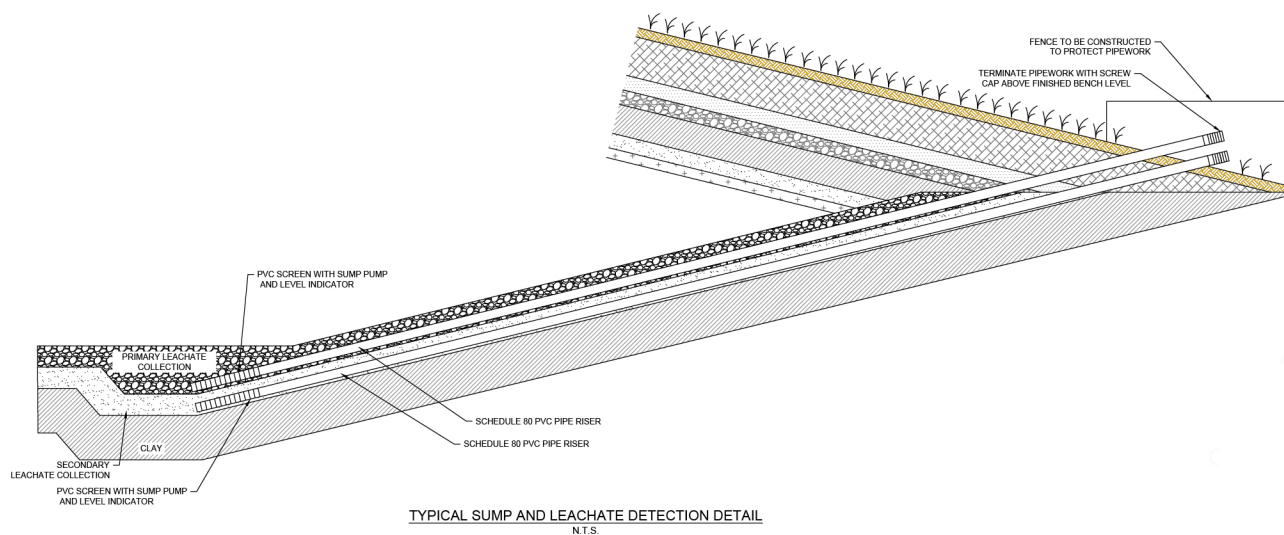
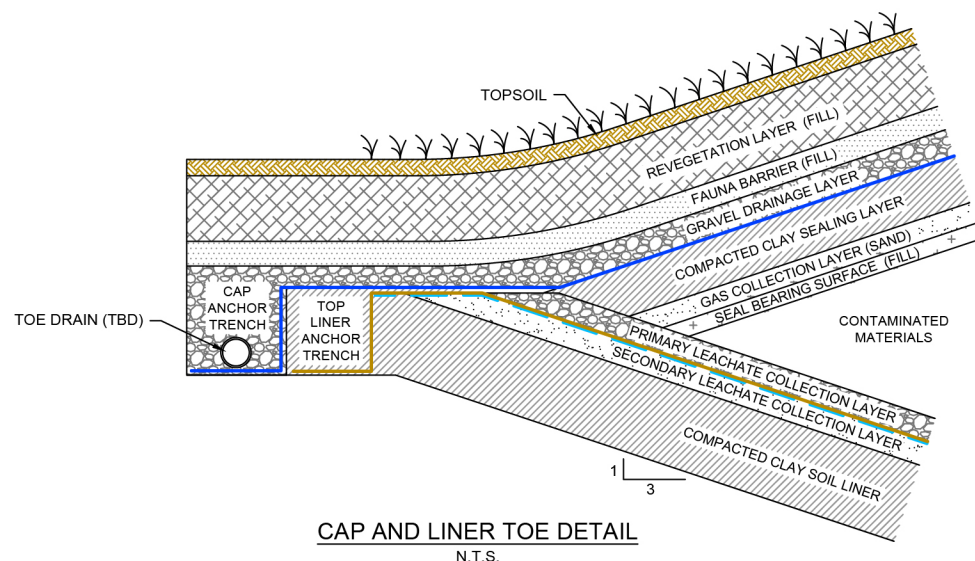
CROSS SECTION SOUTH-NORTH



KEY MAP
1:5,000

LEGEND

- Containment Cell Boundary
- Siltstone
- Residual Clay (Sandy/Silty)



NOTE: NOT TO SCALE

8.4.3 Containment Cell Base Construction

Following completion of the site preparation activities, construction of the Containment Cell would commence. Based on the Containment Cell concept design, construction would include the following activities:

- Excavation of the required base of the Containment Cell. This would include removal of the clay within the Containment Cell footprint, and stockpiling for reuse.
- A 200mm compacted sub-base to provide a firm, stable and even surface of high bearing strength to facilitate installation of the actual Containment Cell base.
- The processed clay would be placed and compacted to form a 1000mm thick clay liner.
- A protection geotextile would then be placed.
- Placement of a 300mm gravel drainage layer. The gravel layer would be placed by importing gravel from off-site as Virgin Excavated Natural Material (VENM) and transporting using 40 tonne articulated trucks. This would be spread through the use of machinery such as dozers, scrapers and excavators. Light weight equipment with rubberised tracks may be adopted.
- Placement of a protection geotextile above the gravel layer.
- Placement of a geosynthetic clay liner.
- Placement of a geomembrane (high-density polyethylene (HDPE)) liner.
- Placement of a protection geotextile.
- Placement of a 300mm gravel (or other suitable material) drainage detection layer. The gravel layer would be placed by importing sand from off-site as virgin excavated natural material (VENM) and transporting using 40 tonne articulated trucks. This would be spread through the use of machinery such as dozers, scrapers and excavators. Light weight equipment with rubberised tracks may be adopted.
- Placement of a protection geotextile.
- Placement of wastes.

The geotextiles would be placed as follows:

- Laying of geotextiles using spreader bars.
- Geomembranes and geosynthetic liners would be placed and welded or joined by certified installers and in accordance with strict quality assurance controls.

As discussed in **Section 8.4.1** the detailed design is currently being prepared for the Containment Cell, including the cell lining. The final type and quantity of the cell lining materials may change, but would be required to provide the same performance as the described material and consistent with the recommendations of the EPA *Environmental Guidelines: Solid Waste landfills* (2016). The detailed design would be developed in consultation with the EPA.

It is anticipated that the construction of the Containment Cell base would require the following machinery:

- Wheeled dozer or light weight equipment with rubberised tracks.
- Tracked excavators.
- Compactors/ rollers.
- Four 30 tonne articulated trucks.
- Water carts.
- Machinery service vehicle.
- Refuelling vehicle travelling to and from the Smelter as required.
- Various hand operated equipment.

8.4.4 Wastewater and Stormwater Management

In conjunction with the commencement of construction of the Containment Cell, the wastewater infrastructure to be installed would include the following:

- *Installation of the water treatment plant.* The plant would be installed on a concrete slab and contained within a shed. It is anticipated that the water treatment plant would be a modular unit and would only operate if required (due to wastewater generation). It is expected the plant would be powered by either a diesel generator or power supply from the Smelter Site (as described in **Section 8.2.6.2**). In the event that wastewater treatment is required, the water would be treated to a standard to allow discharge to the North Dam.
- *Installation of the water collection/ sump system and connection to the water treatment plant.* It is anticipated that the water collection/ sump system would be portable to accommodate the dynamic nature of activities through all stages of activity at the Containment Cell.
- *Operation and maintenance of water collection / sump system and water treatment plant.* The water treatment plant would operate throughout Containment Cell base construction, material placement and capping of the Containment Cell (refer to **Section 8.8**). It is expected that the water treatment plant would primarily be in operation only during and following rain events.

A stormwater diversion drain would be installed around the perimeter of the Containment Cell (including the perimeter access track). This would divert clean surface water around the Containment Cell and would reduce the amount of water that would require treatment through the water treatment plant. This drain would be installed along the alignment of the dish drain that would be maintained upon completion of the Containment Cell.

8.5 Capped Waste Stockpile Removal and Management

8.5.1 Site Establishment

8.5.1.1 Establishment of Ancillary Stockpile and Processing Areas

The Capped Waste Stockpile is located in the east of the Smelter. **Figure 8-7** shows the location of the Capped Waste Stockpile and the associated Works facilities.

Materials from the Capped Waste Stockpile are proposed to be directly loaded into trucks and transported to the Containment Cell, or temporary stockpile areas.

There would be two temporary stockpile areas established. The first stockpile would be located north of the haul road and would be for the temporary stockpiling of clean capping materials won for later reuse in the Containment Cell cap.

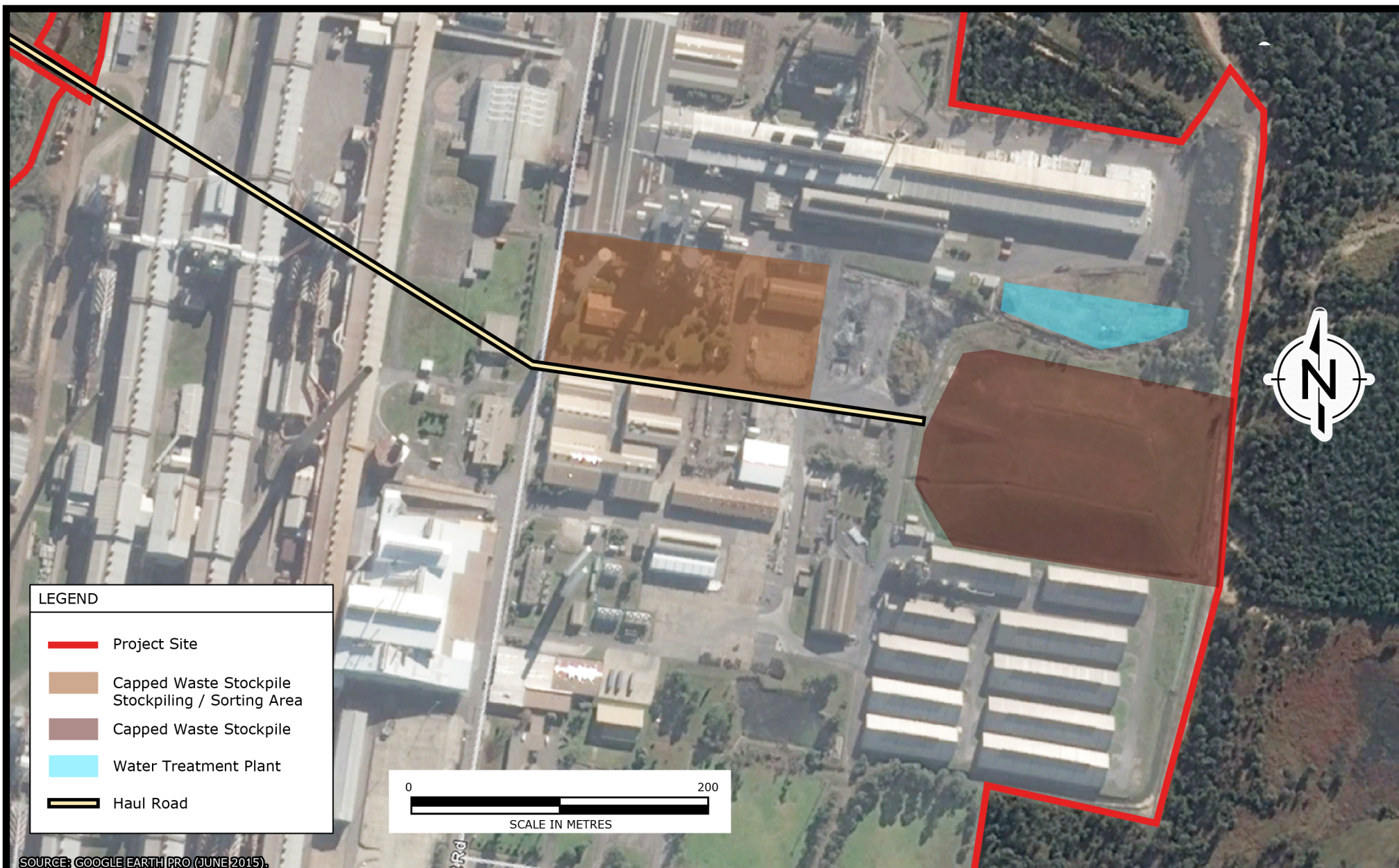
The second stockpile area would be located immediately west of the Capped Waste Stockpile and be used for temporary stockpiling of any recyclable materials. Recyclable materials would be managed following a recycling program outlined in the EMP.

8.5.2 Soil and Water Management

8.5.2.1 Water Treatment Plant

A modular water treatment plant would be installed with the capacity to treat existing leachate from within the Capped Waste Stockpile and any stormwater collected within the exposed stockpile.

The Capped Waste Stockpile would be managed so that stormwater and sediment runoff would be contained within the stockpile and collected for treatment at the water treatment plant. As material removal progresses, a temporary basin would be established within the Capped Waste Stockpile footprint to capture this water prior to it being pumped to the treatment plant.



The water would be treated to a standard to allow for discharge to the North Dam. It is expected the water treatment plant would be powered by a diesel generator.

It is anticipated that the water collection and pumping system would be modular to accommodate the dynamic nature of activities at the Capped Waste Stockpile.

8.5.2.2 Erosion and Sediment Controls

Erosion and sediment controls would be established at the adjacent stockpiling/ processing area. Runoff collected from this area would also be pumped to the treatment plant.

Stormwater diversion would be established around the Capped Waste Stockpile and the stockpile/ processing area. This clean water would be diverted to the existing surface water management system.

8.5.3 Cap Removal and Management

The Capped Waste Stockpile has a cap with the following layers:

- 150mm topsoil and grass layer.
- 450mm sand drainage layer.
- 900mm compacted clay layer.
- 150mm gas collection layer.

There are also a number of gas vents that pass from the gas collection layer to the surface.

The cap would be gradually removed and small sections of the stockpile would be opened and removed to minimise the area exposed at one time.

The cap removal would be undertaken so as to maximise segregation of the varying material types to allow for appropriate reuse. This would also be done to minimise contamination of clean capping material with contaminated stockpile contents, which would then need to be transported to the temporary stockpile area to await reuse in the Containment Cell. Removal would be undertaken as follows:

- Removal of the grass and topsoil layer. A scraper or excavator would remove this material and it would be transported to the long term soil stockpile area (refer to **Section 8.2.5**).
- Removal of the clay layer. An excavator and scraper would remove this material and it would be transported to the adjacent storage area (refer to **Figure 8-4**) for reuse at the Containment Cell.
- Removal of the gas collection layer. Due to the thickness of this layer, the gas collection layer is likely to contain contaminants that would make it unsuitable for long term reuse. A scraper would remove the material and it would be stockpiled adjacent to the exposed area of the Capped Waste Stockpile for reuse as wet weather cover.

It is anticipated that the Capped Waste Stockpile capping layers would be removed using the following:

- Tracked dozers.
- Excavators.
- Scraper.
- Water cart.
- Forty tonne articulated trucks.
- Refuelling vehicle travelling to and from the Smelter as required.
- Various hand operated equipment.

8.5.4 Material Removal and Processing

Once the required section of the capping has been removed, the contents of the Capped Waste Stockpile would be removed. This would involve the following steps:

- An excavator would remove the waste materials and load directly into trucks.

- Potentially recyclable (scrap metals) materials would be removed from materials by excavator (where possible) and transported to the Capped Waste Stockpile recyclable materials storage area. Materials that can be recycled would be stockpiled for cleaning (to the standard agreed with the off-site recycling facility). Cleaned materials would then be transported to the main stockpile area.
- Material that cannot be recycled would be loaded into articulated trucks for transportation to the Containment Cell.

Removal of waste materials would cease in rain events and the exposed stockpile materials covered. The exposed area would be covered either with the stockpiled wet weather cover material or an alternative cover (such as plastic sheeting).

Material removal would continue until an inspection concludes that waste materials have been removed and natural soils are exposed and validated as meeting the remediation criteria. The investigations and remediation activities described in **Section 8.5** would be undertaken to complete remediation of the Capped Waste Stockpile area.

It is anticipated that removal of material from the Capped Waste Stockpile would utilise the following:

- Tracked dozers.
- Excavators.
- Scraper.
- Water cart.
- Refuelling vehicle travelling to and from the Smelter as required.
- Forty tonne articulated trucks.

8.5.5 Material Transportation

Following removal of the material from the Capped Waste Stockpile, it would be placed into 40 tonne articulated trucks for transportation to the Containment Cell. Up to eight trucks an hour would be loaded with material for transportation.

The following would be undertaken for material transported to the Containment Cell:

- Loading of the trucks within the stockpiling and processing area. The loading area would be maintained so that any material spilled during truck loading would be regularly cleaned from the ground.
- Trucks would travel along the haul road to the Containment Cell. Trucks transporting Capped Waste Stockpile materials would have priority on haul road.
- All truck loads are to be covered.
- Transportation of the material would cease during rain events.

A material tracking system would be implemented throughout the removal process. This would include the following:

- Maintaining a record of when trucks transporting material to the Containment Cell left the Capped Waste Stockpile and arrived at the Containment Cell.
- Maintaining a record of when trucks transporting recyclable material left the Capped Waste Stockpile and arrived at the stockpile area, and what materials were deposited at the stockpile area.

8.5.6 Footprint Remediation

As noted in **Section 8.5.4** Capped Waste Stockpile material removal would continue until an inspection concludes that waste materials have been removed and natural soils are exposed and validated to meet the remediation criteria.

The natural soils within the footprint of the Capped Waste Stockpile are likely to be contaminated and require removal for disposal within the Containment Cell. Due to the nature of the Capped Waste Stockpile, investigations have not been possible to allow the depth and quantity of soils requiring removal to be determined.

As soon as safely accessible, investigations would be undertaken to determine the depth, extent and quantity of soils requiring removal. The results of these investigations would be discussed with the EPA and the Site Auditor, and removal works would commence once parties are satisfied with the conclusion of the assessment.

The following activities would be undertaken to remediate the Capped Waste Stockpile (including the stockpiling and processing area):

- Excavation of contaminated natural materials from the Capped Waste Stockpile footprint and transportation to the Containment Cell in 40 tonne articulated trucks. Trucks would continue to be loaded within the stockpiling and processing area.
- The surface of the stockpiling and processing area would be excavated and transported to the Containment Cell in 40 tonne articulated trucks.
- Following removal of materials from the Capped Waste Stockpile footprint and the stockpiling and processing area, remaining soils would be sampled and analysed to validate that the location is suitably remediated.
- Suitable (environmentally and geotechnically) material (such as crushed concrete and/ or soils) would be placed in the area in accordance with the overall final approved Landform Plan.
- Leachate and groundwater within the footprint of the former Capped Waste Stockpile would continue to be treated as described in **Section 8.10**.

It is anticipated that remediation of the Capped Waste Stockpile footprint would utilise the following:

- Excavators.
- Graders.
- Refuelling vehicle travelling to and from the Smelter as required.
- Thirty tonne articulated trucks.

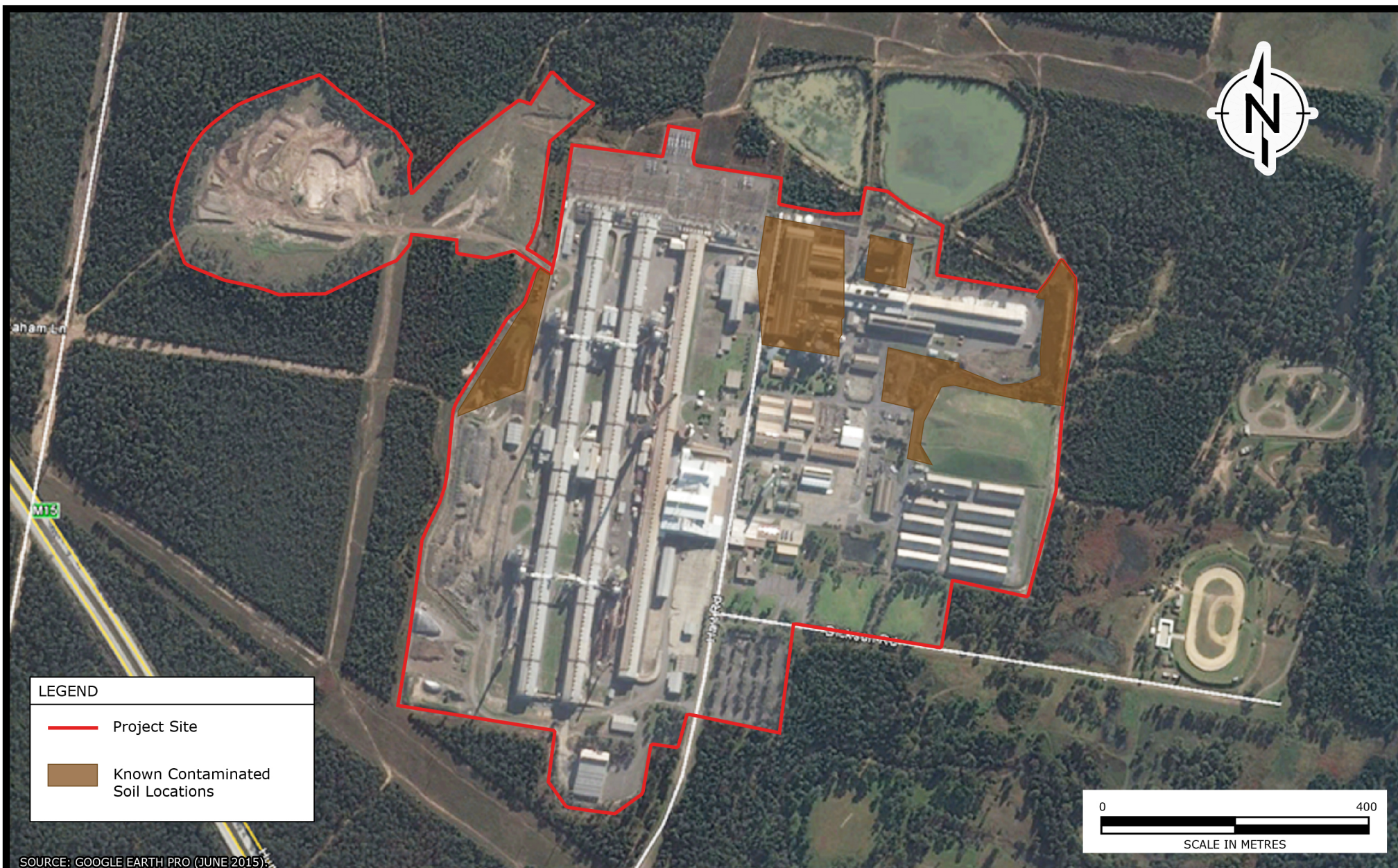
8.6 Contamination Remediation

Figure 8-8 identifies the locations of contaminated soils within the Project Site. These include soils at or below surface that have been contaminated by Smelter activities, and stockpiled soils derived from Category 2 remediation works within the Hydro Land (refer to **Section 3.4.2**). These soils would be excavated and placed in the Containment Cell.

8.6.1 Material Removal and Transportation

8.6.1.1 Contaminated Soil Stockpiles

The stockpiled contaminated soils would be the first removed and transported to the Containment Cell, as this would allow these areas to be used for material stockpiling. These soils would be loaded into 40 tonne trucks with an excavator before being transported to the Containment Cell.



Some of these soils are contaminated by asbestos containing materials. These materials would be handled in accordance with applicable SafeWork NSW requirements to protect site personnel health and safety, while environmental controls would be implemented to avoid spillage of materials. Trucks transporting asbestos contaminated soils would have their loads covered. A material tracking system would be implemented throughout the contaminated soils transportation process.

8.6.1.2 Smelter Contaminated Soils

Due to their location, some soils would only be safely accessed following completion of demolition of adjacent buildings. Soils would be removed as soon as it is safe and convenient (that it does not impinge on other Works activities) to do so.

This would include the following:

- Excavation of identified contaminated soils within the Smelter.
- Transportation either to the stockpile area or directly to the Containment Cell within 40 tonne articulated trucks.
- Following removal of contaminated soils, remaining soils would be sampled and analysed to validate that the location is suitably remediated.

Contaminated soil investigations undertaken at the Smelter (ENVIRON, 2015) have identified the potential for soils below some buildings to be contaminated. Following completion of demolition of these buildings, soils would be investigated and it would be determined if remediation comprising excavation and placement in the Containment Cell is required. If these investigations conclude that remediation is required, the actions listed above would be implemented.

There is potential that the sediments within the southern, eastern and western dams would require disposal within the Containment Cell due to contaminant levels. Due to their role in water quality management, these dams would be retained for as long as possible into the Works program. The contents of the dams would be excavated as described above, and the voids filled with suitable material (as described). These sediments would be sampled and analysed following completion of the majority of the Works to determine if they require management as contaminated soils.

A material tracking system would be implemented throughout the contaminated soils removal process. This would include the following:

- Maintaining a record of when trucks transporting material to the Containment Cell left the contaminated site and arrived at the Containment Cell.
- Maintaining a record of when trucks transporting recyclable material left the contaminated site and arrived at stockpile area, and what materials were deposited at the stockpile area.

It is anticipated that remediation of these contaminated soils would utilise the following:

- Excavators.
- Graders.
- Refuelling vehicle travelling to and from the Smelter as required.
- Forty tonne articulated trucks.

8.6.2 Material Placement

Where required to facilitate the final landform, suitable (environmentally and geotechnically) material (such as crushed concrete and/ or soils) from the stockpile area would be used to fill the resulting void from the removal of the contaminated soils.

8.7 Stage 2 Demolition

8.7.1 Introduction

Hydro acknowledges that the Secretary's Environmental Assessment Requirements requires that *"evidence that the demolition will be carried by a qualified and experienced demolition contractor"* be provided.

As discussed in **Section 3.4.3** Hydro has received Development Consent from Cessnock City Council to undertake demolition of the majority of the Smelter (Stage 1 Demolition). A tender process is currently underway inviting reputable, experienced and qualified demolition contractors to provide Hydro with a scope and fee for undertaking demolition.

Hydro is to determine if the demolition contractor selected from this tender process for Stage 1 Demolition would also undertake Stage 2 Demolition. In any event, Hydro would provide the Department of Planning and Environment and SafeWork NSW with details on the proposed demolition contractor's experience and qualifications.

Due to the nature of the activities, specialist contractors would be invited to tender on the demolition activities that require blasting (use of explosives). Hydro would provide the Department of Planning and Environment and SafeWork NSW with details on the proposed blasting contractor's experience and qualifications.

8.7.2 Hazardous Materials Management

A Hazardous Materials Audit was undertaken of the Smelter structures (ENVIRON, 2014). The purpose of the audit was to register the location, approximate quantity and condition of safely accessible and visible hazardous materials, including:

- Asbestos containing materials.
- Polychlorinated biphenyls, mercury and sodium in lighting and transformers.
- Ozone depleting substances and greenhouse gases.
- Lead based paints.
- Synthetic mineral fibres.
- Contents of pits, tanks and bunds.

Hydro has commenced removal of hazardous materials from buildings throughout the Smelter. Hydro's intent is that known hazardous materials (except for those as described below) would be removed (by qualified contractors) prior to the commencement of the Works. This program has been developed in consultation with SafeWork NSW.

There would potentially be hazardous materials remaining within the buildings that cannot be accessed without undertaking some demolition activities. Where such materials remain, they would be registered and the required demolition activities undertaken in accordance with a protocol that would minimise potential for damage to the hazardous material and with appropriate health and safety management. A qualified contractor would then remove the material in accordance with SafeWork requirements.

There is the potential for previously unrecorded or inaccessible hazardous materials to be present within the buildings. An Unexpected Hazardous Materials Protocol would be developed as an appendix to the EMP and implemented where such material is encountered. This would include the cessation of activities that could adversely impact the potentially hazardous material until:

- An occupational hygienist or environmental scientist confirms if it is a hazardous material; and
- If it is a hazardous material, a qualified contractor removes the material.

Removed hazardous material would be contained and stored in accordance with SafeWork NSW requirements prior to transportation for placement within the Containment Cell. A material tracking system would be developed and implemented to record the source of hazardous materials, when it has been placed in the storage area, and removed for placement in the Containment Cell.

8.7.3 Stacks and Water Tower Demolition

Blasting (explosives) would be required for the demolition of four structures:

- Main Stack (immediately west of the central section of Potline 1).
- Stack No. 2 (immediately west of the central section of Potline 3).
- Stack No. 3 (immediately west of the southern end of Potline 3).
- Water Tower (immediately south of the Rodding Building).

The locations of these structures are shown in **Figure 8-9**.

The blasting would be designed and undertaken by an experienced and qualified specialist. The blasting of the stacks would be designed so that they collapse to avoid impacts on remaining buildings and structures, and the haul road. The blasting of the Water Tower would be designed so that it collapses to avoid impacts on remaining buildings and structures, and internal access roads.

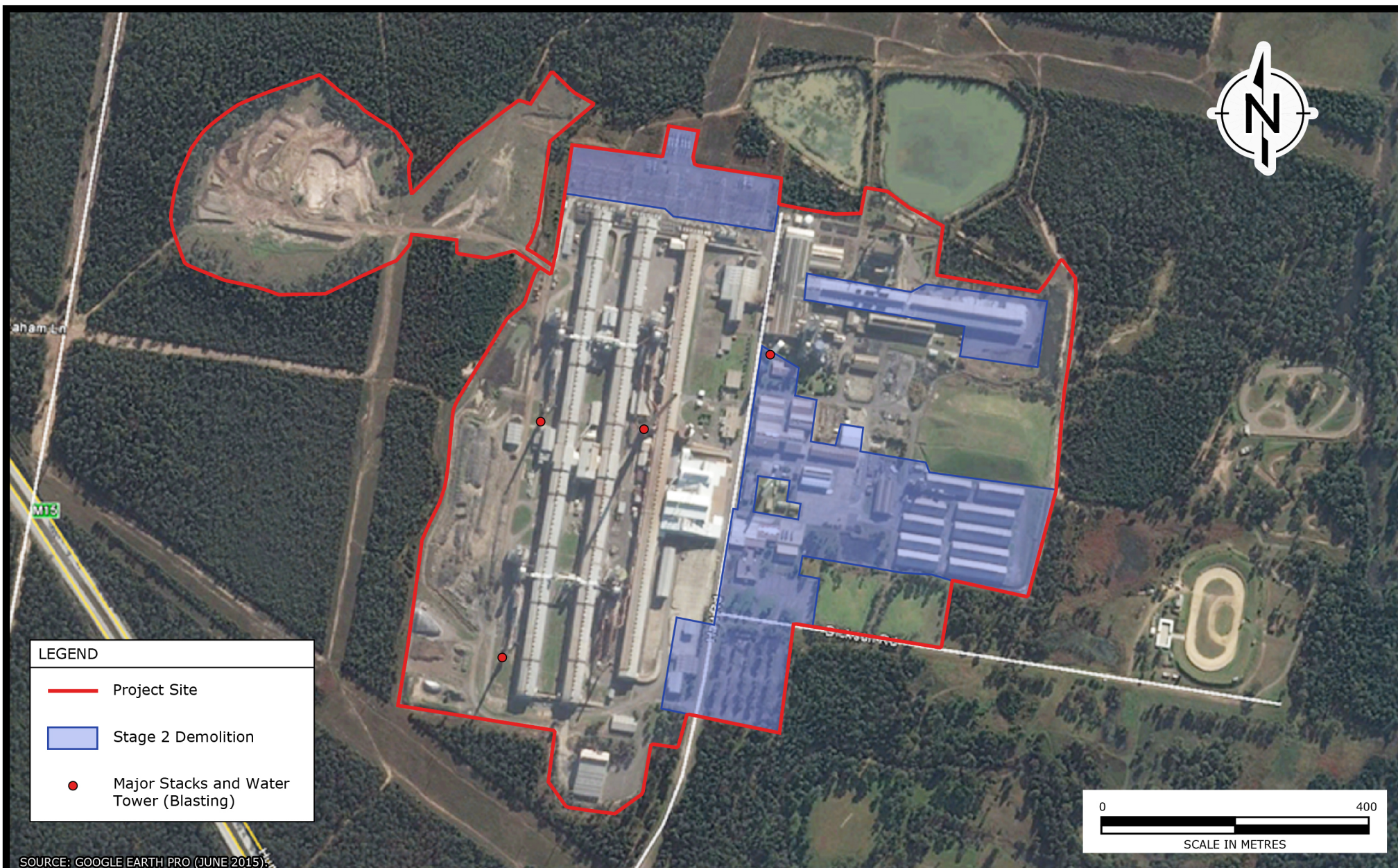
The stacks are located within the stockpile area. Stockpiling in this area would be managed so that the required exclusion zone is clear of stockpiled material at the time of blasting.

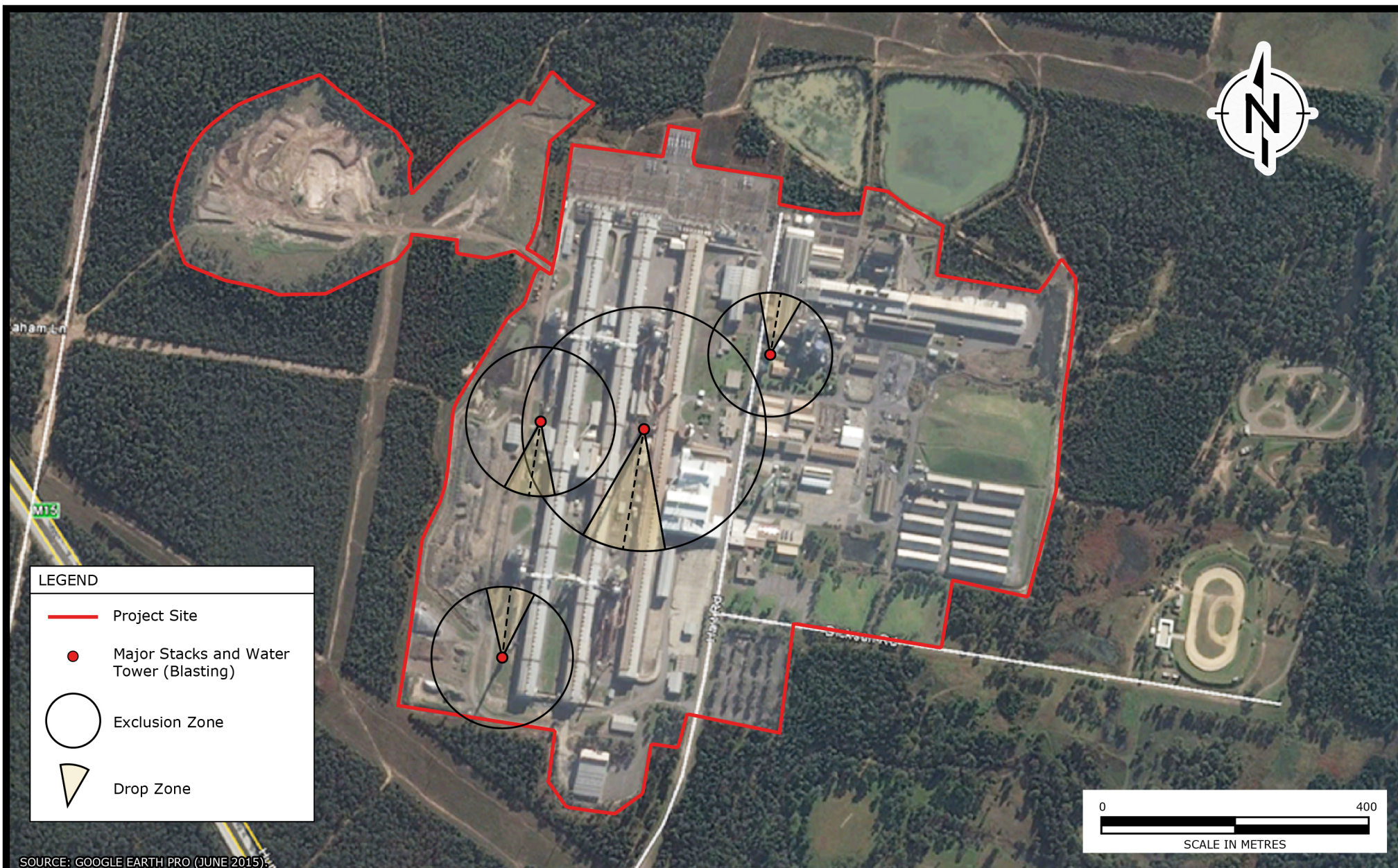
To minimise the duration of access restrictions within the stockpile area, and to minimise community impacts, multiple blasting events would occur on the one day if possible. To minimise the potential environmental and community impacts of the blasting of structures, the following measures would be implemented:

- Prior to demolition, any safely accessible dusts and residues remaining in the stacks would be removed.
- Prior to demolition, internal structures, machinery and services within the Water Tower would be removed.
- The community would be advised of the proposed blasting program via notices in the local newspaper and the Project website.
- Sensitive receivers within two kilometres of the Project Site would be notified 48 hours prior to each blast.
- Blasting would only occur between the hours of 7:00am and 6:00pm Monday to Friday and 8:00am and 1:00pm Saturday.
- Blasting would occur when the wind is less than eight metres per second and blowing from the south to southeast. Weather conditions would be assessed prior to the blasts, and the blast halted if conditions are considered unfavourable.
- Water carts with sprays would be available if required for dust suppression of the collapsed structure materials.
- An exclusion zone around the blasting location (a minimum of 1.5 times the height of the structure) would be established around each structure. The preliminary exclusion zone required for each blasting location is shown in **Figure 8-10**. The final exclusion zone would be confirmed within the blasting plan developed by the experienced and qualified specialist commissioned to undertake the blasting.

As shown in **Figure 8-10** no residences (privately owned or on Hydro Land) are located within the exclusion zone. The nearest private residence is approximately 820 metres from the nearest structure subject to blasting, and the nearest occupied residence on Hydro Land is approximately 650 metres from the nearest structure subject to blasting.

- Blasted materials would be removed to the relevant stockpiles for recycling or disposal in the Containment Cell.





BLASTING DROP ZONES AND EXCLUSION ZONES FORMER HYDRO ALUMINIUM KURRI KURRI SMELTER DEMOLITION AND REMEDIATION

**FIGURE
8-10**

AS130401

RAMBOLL ENVIRON

DRAFTED BY: KK

DATE: July 2016

8.7.4 Demolition of Other Structures

Demolition would typically involve the following steps (where applicable and safe to do so):

- Undertake preparatory works to the structure to facilitate the safe induced collapse.
- Removal of remaining hazardous materials by approved licensed contractors. As discussed in **Section 8.7.2** Hydro has been removing known and accessible hazardous materials since closure. There is the potential that some identified hazardous materials can only be removed following demolition of part of the structure. If such situations arise, demolition and hazardous material removal would occur in controlled conditions by licensed removal contractors.

There is potential for previously unidentified hazardous materials to be encountered (only becoming visible after removal of structural elements). The Unexpected Hazardous Materials Protocol described in **Section 8.7.2** would be implemented if such materials are identified.

- Demolition of concrete structures with large excavators implementing induced collapse techniques, demolishing the structure to ground level in a safe and controlled manner.
- Where it is not safe to use controlled induced collapse techniques, systematic dismantling would be undertaken.
- Steel structures and building frames would be demolished either with large excavators implementing induced collapse techniques, or removed in sections. Sections would be cut and removed from the building and transported to the stockpile area.
- Excavators with shear, hammer and pulveriser attachments would be used to separate metals from concrete. Hand held tools may also be required to assist.
- Demolition materials (concrete, bricks and refractory; ferrous and non-ferrous metals; non-recyclable wastes) would be transported to the stockpile area (refer to **Section 8.2.5**).

It is anticipated that the following machinery would be used and operated concurrently during demolition:

- Excavators of varying sizes. These would use various attachments, such as grabs, buckets, shears, hammers and pulverisers.
- Boom lifts to allow safe access at heights.
- Telehandler for material loading and handling.
- Water truck.
- Machinery service vehicle.
- Refuelling vehicle travelling to and from the Smelter as required.

Dust control and water management measures would be implemented throughout these activities. These would include:

- As discussed, accumulated fines from within the buildings would be removed where safe, reasonable and feasible to do so.
- Pre-wetting of buildings prior to undertaking the induced collapse and use of water sprays for dust suppression (as required due to wind conditions) during induced collapse.
- Ceasing activities that have the potential to generate significant dust that could have adverse impacts on sensitive receivers.
- Watering of the demolition areas and unsealed access roads.
- Vehicles would use (where possible) existing sealed roads.
- Erosion and sediment controls (as discussed in **Section 8.2.1**) would be installed, monitored and managed to reduce demolition sediment run off entering the existing drainage system.
- The existing site water management system would capture runoff from the demolition areas.

8.7.5 Subsurface Structure Demolition

Demolition of subsurface structures would typically involve the following steps (where applicable and safe to do so):

- Undertake preparatory works to the structure to facilitate safe demolition.
- Removal of remaining hazardous materials by approved licensed contractors. As discussed in **Section 8.7.2** Hydro has been removing known and accessible hazardous materials since closure. There is the potential that some identified hazardous materials in subsurface structures and service conduits can only be removed following demolition of the above ground structures. If such situations arise, demolition and hazardous material removal would occur in controlled conditions by licensed removal contractors.
- There is potential for previously unidentified hazardous materials to be encountered (only becoming visible after removal of surface structures). The Unexpected Hazardous Materials Protocol described in **Section 8.7.2** would be implemented if such materials are identified.
- Demolition of concrete structures with large excavators. This would include the use of:
 - Grab and bucket attachments to lift concrete slabs and other large elements where suitable.
 - Hammer attachments to hammer the structure where lifting is not available. The hammered material would then be removed using the bucket attachment.
- Excavators with shear, hammer and pulveriser attachments would be used to separate metals from concrete. Hand held tools may also be required to assist.
- Demolition materials (concrete, bricks and refractory; ferrous and non-ferrous metals; non-recyclable wastes) would be transported to the stockpile area (refer to **Section 8.2.5**).

Hydro proposes to remove subsurface structures and services to a maximum depth of 1.5 metres below the ground level.

It is anticipated that the following machinery would be used and operated concurrently during demolition of subsurface structures:

- Excavators of varying sizes. These would use various attachments, such as grabs, buckets, shears, hammers and pulverisers.
- Telehandler for material loading and handling.
- Water truck.
- Machinery service vehicle.
- Refuelling vehicle travelling to and from the Smelter as required.

8.7.6 Demolition Waste Streams and Management

Demolition waste would be sorted at the demolition location where possible prior to transportation to the stockpile area (refer to **Section 8.2.5**).

Material tracking would be implemented to record the type of material and the number of trucks transporting that material to the stockpile area. The material tracking system would also record when materials have been removed from the stockpile area.

An internal material tracking system would be implemented for the transportation of the demolition material to the stockpile area. This would include the following:

- Maintaining a record of when trucks transporting material to the stockpile area left the demolition area and arrived at the stockpile area.
- Implementation of waste tracking (in accordance with the POEO Act and described below) for the recyclable metals being transported off-site to a licensed facility.
- Maintaining a record of when trucks transporting concrete, bricks and refractory bricks for crushing and/or reuse on site, including the reuse locations.

The demolition material would be managed as follows:

- Concrete, bricks and refractory bricks: These would either be temporarily stockpiled before being processed at the crushing plant, or transported directly to the crushing plant. The processed materials would be stockpiled prior to reuse within the Project Site.

It is estimated that approximately 50,000 tonnes of concrete, brick and refractory brick would be generated during demolition of the Smelter (including Stage 1 and Stage 2). It is anticipated that concrete, brick and refractory brick generated during demolition would be reused on-site, including: construction of the haul road and the Containment Cell; filling of subsurface voids remaining after demolition of subsurface structures (refer to **Section 8.7.5**); and in final landforming.

- Ferrous and non-ferrous metals would be transported to the stockpile area prior to transporting off-site for recycling at a licensed recycling facility. Where required, the metals would be processed so that it is an appropriate size for transporting.

It is estimated that approximately 35,000 tonnes of ferrous (steel) and non-ferrous (predominantly aluminium and copper) would be generated during demolition of the Smelter (including Stage 1 and Stage 2).

- Non-recyclable demolition material (removed wherever possible prior to induced collapse or blasting) would be stockpiled prior to disposal in Containment Cell.

8.8 Containment Cell Materials Emplacement and Capping

8.8.1 Materials Emplacement

Table 8.1 lists the types and the estimated quantities of materials to be placed in the Containment Cell.

As noted in **Table 8.1** the current estimate of material to be placed in the Containment Cell is 266,000 m³. However to accommodate for additional material that may need to be placed in the cell (such as contaminated soils from beneath the Capped Waste Stockpile) the Containment Cell concept design showed that a cell capacity of up to 410,000 m³ can be accommodated in the proposed footprint.

Table 8.1: Containment Cell Material Streams

Material Stream	Volume (m ³)	Quantity (tonnes)
Non-recyclable demolition material including hazardous materials	30,000	20,000
Contaminated soils	77,000	137,000
Capped Waste Stockpile material	159,000	320,000
Estimated total for containment	266,000	477,000

Figure 8.4 provides a layout and cross section of how the materials would be placed in the Containment Cell.

Material transportation (as discussed in **Section 8.5.5**, **Section 8.6**, **Section 8.7.2**, and **Section 8.7.5**) would be scheduled to facilitate placement of material as shown in **Figure 8.4**. As discussed in **Section 8.5.5**, **Section 8.6**, **Section 8.7.2**, and **Section 8.7.6** a materials tracking system would be implemented to confirm that all wastes destined for the Containment Cell have been appropriately managed and delivered to the Containment Cell.

Existing capping layers from the Capped Waste Stockpile will be removed in stages to minimise the surface area of waste exposed to rainfall. Once the capping layer is removed from a stage, the waste will be excavated directly to truck and removed to the Containment Cell. This removal will be undertaken following an excavation plan developed by the Contractor. The excavation plan would include details on:

- Opportunistic recycling of spent pot lining. Where spent pot lining is identified to be reactive by visible emission of gas, the Contractor will segregate this material to a treatment area. Treatment will be completed following a predetermined and EPA approved methodology prior to placement within the Containment Cell;
- Potentially recyclable (scrap metals) materials would be removed from materials by excavator (where possible) and transported to the Capped Waste Stockpile recyclable materials storage area. Materials that can be recycled would be stockpiled for cleaning (to the standard agreed with the off-site recycling facility). Cleaned materials would then be transported to the main stockpile area prior to transportation for recycling at an off-site facility.
- Material that cannot be recycled would be loaded into articulated trucks for transportation to the Containment Cell.

The material streams would be placed in discreet sections of the Containment Cell. Due to the nature of the materials there is no potential for adverse reactions between materials. As such the material streams do not need to be physically separated during material placement and the Containment Cell Management.

The area of material being placed and exposed at one time would be minimised to reduce the areas requiring coverage during wet weather and minimise the area susceptible to dust generation. Upon completion of placement of a sector of material, it would be covered with clean soil prior to commencing construction of the Containment Cell cap.

In the event of predicted rainfall, temporary wet weather material (such as plastic sheeting or similar) would be placed over uncapped placed material.

The following machinery would be used at the Containment Cell in the placement and management of materials:

- Excavators.
- Compactors.
- Forty tonne articulated trucks.
- Water carts.
- Refuelling vehicle travelling to and from the Smelter as required.

8.8.2 Leachate and Stormwater Management

The water treatment plant and stormwater diversion drain described in **Section 8.2.7.4** would continue to operate throughout the material placement.

8.8.3 Containment Cell Cap Construction

Following completion of the material placement the Containment Cell capping would be constructed.

The concept design for the Containment Cell contains the following elements:

- Excavation of cap anchor trench and placement of toe drain and gravel in trench.
- Placement of protection geotextile on top of waste material.
- Placement of 300mm sand gas collection layer.
- Installation of gas vents (from sand gas collection layer and through the following overlying layers).
- Placement of a protection geotextile using excavator and spreader bars.
- Placement of 600mm compacted clay sealing layer. This layer would have a permeability of less than 1×10^{-9} m/s.
- Placement of geomembrane (HDPE or linear low-density polyethylene (LLDPE)) liner and protection geotextile.
- Placement of 300mm gravel layer or other suitable material for a drainage layer.
- Placement of a protection geotextile using excavator and spreader bars.
- Placement of 300mm fauna barrier of crushed concrete.
- Placement of 800mm revegetation layer comprising of soil suitable to sustain plant growth.

- Placement of 200mm topsoil and vegetation.

The geotextiles would be placed as follows:

- Laying of geotextiles using spreader bars.
- Geomembranes and geosynthetic liners would be placed and welded or joined by certified installers and in accordance with strict quality assurance controls.

Detailed design is currently being prepared for the Containment Cell, including the cell cap. The final type and quantity of the cell cap materials may change, but would be required to provide the same performance as the described material and be consistent with the recommendations of the EPA *Environmental Guidelines: Solid Waste landfills* (2016). The detailed design would be developed in consultation with the EPA.

As discussed in **Section 8.4** preliminary investigations indicate that there is sufficient clay of the required quality on-site for the Containment Cell (including the capping). The concept design for the Containment Cell reflects this. In the event that further investigations determine that there is not sufficient suitable clay available for use in the Containment Cell, the detailed design would include the use of other suitable materials (such as geotextile) that achieve the same performance as the clay.

As noted the vegetation cover is to be comprised of shallow rooted native grasses. The shallow roots are required to minimise potential for adverse impacts to the capping layers, and the use of native grass species is to provide ecological benefits (by avoiding the use of potentially invasive grass species, and use of native species). The species to be used would be dependent on seed availability and compatibility with the detailed design.

Due to the nature of the material to be placed in the Containment Cell, and the cell design, the potential for the generation of gases in sufficient quantities to cause odour impacts is low. Gas well monitoring at the existing Capped Waste Stockpile has shown that gas generation has significantly reduced since the cap was installed, and there are no odour issues associated with the Capped Waste Stockpile. As such the gas collection layer and gas vents are a contingency rather than an inherent part of the Containment Cell.

Cell cap construction would require the use of the following machinery:

- Excavators.
- Tracked dozers.
- Graders.
- Compactors or rollers.
- Forty tonne articulated trucks.
- Water carts. Refuelling vehicle travelling to and from the Smelter as required.
- Various hand operated equipment.

8.8.4 Containment Cell Completion

Upon completion of construction of the Containment Cell cap, the following would be undertaken:

- Construction of a service road (including drainage and safety structures) around the perimeter of the Containment Cell. This would formalise the construction access road described in **Section 8.4**. Safety barrier fencing/ bollards would be provided between the service road and the Containment Cell, and a secured gate would limit access to authorized vehicles to undertake the maintenance (such as mowing) and monitoring activities described in **Section 9**.
- Upgrade of the Containment Cell diversion drain. The diversion drain used during construction of the Containment Cell would be reconstructed to be a permanent structure.

The management measures and activities described in **Section 9** would commence following completion of these actions.

8.9 Rehabilitation and Stabilisation

Rehabilitation and stabilisation would be a progressive activity, undertaken as soon as practical following completion of demolition and fill placement within an area, and once it is no longer required for vehicle access or material storage and stockpiling.

A number of Smelter buildings include subsurface structures that would result in a void following demolition of surface structures. These voids would be filled with crushed concrete and refractory bricks, which would be compacted so that it would be suitable for construction of new buildings in the future.

As discussed in **Section 8.5** and **Section 8.6** contaminated soils within the Smelter would be excavated for disposal within the Containment Cell. The void would be replaced with crushed concrete and refractory bricks or soils.

Following completion of demolition, material removal and filling, surfaces would be graded consistent with the final approved Landform Plan for the Project Site. The Landform Plan would be developed to maintain adequate surface drainage and to provide a generally level surface within the Smelter that would benefit future employment land development.

Immediately following completion of grading, areas would be grass seeded. This would assist in dust and erosion control.

The existing surface water drainage system would be retained with modification. This would include the removal of the southern, western and eastern dams (as described in **Section 8.6**) with appropriate alterations and additions to complement the landform.

The haul road and selected sealed internal roads would remain as part of the final landform.

8.10 Decommissioning

Plant, machinery, equipment and portable buildings would be removed from the Project Site immediately once they are no longer required. As such decommissioning would be progressive throughout the Works.

Former stockpile and storage areas and compounds would be subject to validation as suitable for industrial land use in accordance with the Remedial Action Plan, and regrading activities described in **Section 8.9**.

8.11 Groundwater and Leachate Removal and Treatment

Leachate and contaminated groundwater within the footprint of the Capped Waste Stockpile would be pumped out and treated following completion of soil remediation. The water treatment plant described in **Section 8.5.2.1** would continue operating.

The groundwater and leachate pumping would continue to be treated to a level suitable for disposal to the North Dam and irrigation under the existing Hydro EPL.

Hydro has established a groundwater monitoring network adjacent to and down gradient of the Capped Waste Stockpile. Monitoring would continue at these monitoring wells during the Works and following completion of remediation of the Capped Waste Stockpile.

The monitoring would continue throughout the groundwater and leachate removal and treatment process. The groundwater and leachate removal, treatment and monitoring would cease when monitoring indicates compliance with the site remediation criteria outlined in the Remedial Action Plan.

8.12 Works Hours

Hydro acknowledges that the standard construction hours are 7:00am to 6:00pm Monday to Friday, and 8:00am to 1:00pm Saturday. No works are typically undertaken on Sunday or public holidays.

The Noise and Vibration Impact Assessment (refer to **Section 12**) found that there are a number of activities that could be undertaken outside of these hours that would allow the Works to

continue in accordance with the *Interim Construction Noise Guideline* (DECC, 2009). The Noise and Vibration Impact Assessment (refer to **Appendix 7**) identifies machinery that could be operated outside of standard construction hours and allow the Works to comply with the criteria.

The ability to undertake Works activities outside of standard construction hours would present a number of social, environmental and economic benefits:

- Due to the nature of some of the materials to be placed in the Containment Cell, they cannot be removed, transported and placed into the Containment Cell during wet weather periods. Periods of excessive rain could adversely impact on the program. Being able to move material outside standard construction hours would assist in minimising delays to the completion of the Works.
- Transportation of scrap metal outside of standard construction hours allows these vehicles to avoid peak traffic periods, minimising local traffic impacts.
- Extending the hours that the Works can occur in a day would help to reduce the overall program, and therefore reduce the timeframe that nearby sensitive receivers may be affected by the Works.
- Such a reduction in the program would assist in expediting the availability of the Project Site and surrounding Hydro Land for employment, industrial and residential land.

A Noise and Vibration Management Plan would include a procedure for determining if any activities proposed to occur outside of standard construction hours (different to that identified by the Noise and Vibration Impact Assessment) would result in a discernible noise at the nearest sensitive receiver, and if mitigation and management measure could be implemented to address adverse impacts.

8.13 Works Program

Table 8.2 outlines the key Works activities and the anticipated program.

Table 8.2: Outline of the Works Program

Key Works Task	Task Duration
Project Site Establishment	2 months
Containment Cell Base Establishment and Construction	18 months
Concurrent Activities:	
Capped Waste Stockpile Material Removal and Placement in Containment Cell	12 months
Completion of Demolition and Placement of Non-Recyclable Material in Containment Cell	22 months
Contaminated Soils Removal and Placement in Containment Cell	12 months
Containment Cell Capping	6 months
Capped Waste Stockpile Footprint Restoration	12 months
Completion of Surface Restoration and Regrading	12 months
Completion of Project Site Decommissioning	6 months
Groundwater and Leachate Treatment	24 months

Hydro is currently developing a detailed Works Methodology, including a Works Environmental Management Plan. This would be finalised following the granting of development consent for the Project.

The Works Methodology would include a detailed Works Schedule.

9. CONTAINMENT CELL MANAGEMENT AND MONITORING

9.1 Management and Monitoring

The management and monitoring requirements for the Containment Cell would be described in a Containment Cell Environmental Management Plan (EMP).

The EMP would address the following:

- Introduction: discussing the activities covered by the EMP, the objectives of the EMP and Hydro's commitment to environmental management.
- Regulatory Mechanisms: describing the regulatory mechanisms (as discussed in **Section 9.4**) that would apply to the long term management of the Containment Cell.
- Activities: the activities covered by the EMP. This would also include plans showing the location of key activities. An outline of the proposed management activities are described in **Section 9.1.2**.
- Management Structure: the environmental management structure for the Containment Cell Management, including identification of the key environmental management personnel.
- Environmental Management: the procedures to be implemented and who is to be contacted in the event of a potential environmental incident. An outline of the proposed response to a potential environmental incident is described in **Section 9.1.2.2**.
- Monitoring: the monitoring, auditing and review procedures to assess compliance with, and performance of, the EMP. This would include any ongoing monitoring requirements to comply with the regulatory framework for the long term environmental management of the Containment Cell.
- Reporting: how the monitoring results would be reported; and the reporting procedures for environmental incidents and complaints.

Hydro would submit the EMP to the Department of Planning and Environment and the EPA for review and approval. The EMP is also reviewed and approved as part of the site suitability evaluation completed by the NSW EPA Accredited Site Auditor.

The EMP would also address the management, monitoring and reporting requirements of the approvals and licences for the long term environmental management of the Containment Cell.

9.1.1 Monitoring and Inspections

Monitoring of the Containment Cell is anticipated to include the following:

9.1.1.1 Visual

The Containment Cell would be visually inspected to confirm:

- The capping layer is stable.
- The vegetation cover is established; that appropriate coverage is maintained; and that inappropriate plants (such as deep rooted tree species) have not propagated on the capping layer.
- The safety barrier fencing/ bollards or other infrastructure (as described in **Section 9.3**) do not require maintenance.
- The gas vents do not require maintenance.
- Whether leachate has been generated and, if so, requires management.

Visual inspections would be undertaken:

- Of the leachate collection system on a quarterly basis.
- Immediately following a significant storm event (a 5% Annual Exceedence Probability event or greater).
- Immediately following an earthquake event of a magnitude of five or greater recorded within a 20km radius of the Containment Cell.

- Of general conditions on an annual basis (concurrent with the maintenance activities described in **Section 9.1.2.1**).

As discussed in **Section 2.4.2.2** the Containment Cell is within an area proposed to be zoned IN3 Heavy Industrial under the Cessnock Local Environmental Plan 2011. If the land is rezoned it is anticipated that the area surrounding the Containment Cell would contain industrial development. Mechanisms would be implemented to ensure that future owners/occupiers of such land comply with the EMP.

9.1.1.2 Leachate

Leachate generation would be monitored at the leachate collection sump on a quarterly basis or after a significant storm event or immediately following an earthquake as defined in **Section 9.1.1.1**.

The EMP would outline the level at which leachate would be pumped out and treated through the water treatment plant. Depending on the volumes of leachate, a periodic pump out of the leachate collection sump by a licensed liquid waste contractor for treatment at a licensed facility may be preferred.

9.1.1.3 Gas

As discussed in **Section 8.8**, as a result of the Containment Cell design and contents, gas generation is expected to be minimal.

Gas monitoring would be completed from the gas monitoring vents on a quarterly basis. Gas monitoring would be completed for ammonia and methane.

The EMP would outline trigger levels that would initiate implementation of a contingency response. The EMP would also include a process (developed in consultation with the EPA) where this gas monitoring could cease based on results indicating that gas generation is not an issue.

The response would initially comprise an evaluation of risks to human health and the environment, if these prove unacceptable, then additional management measures would be implemented. This could include increased height of air vents, capture and treatment of emissions.

Further detail on the proposed monitoring is described in the Remediation Action Plan presented in **Appendix 5** and would be described in the EMP.

9.1.2 Management and Maintenance

9.1.2.1 Ongoing Management and Maintenance

In addition to monitoring the condition and performance of the Containment Cell, there would be a number of regular management activities. This would include:

- Maintenance of the vegetation cover as determined to be required based on the plant species selected. This would be undertaken to protect the capping layer and minimise bushfire risks associated with long grasses.
- The water treatment plant would be inspected and serviced as recommended by the manufacturer. In the event that the inspection identified potential operational issues, the plant would be immediately maintained.
- In the event that the visual inspection described in **Section 9.1.1.1** identified damage to the capping layer:
 - The damage would be repaired.
 - The source of the damage would be identified and measures developed and implemented to avoid a recurrence of the damage.

9.1.2.2 Potential Incident Response

The potential for an incident to occur at the Containment Cell would be minimised due to:

- The design of the Containment Cell (as described in **Section 8.4** and **Section 8.8**).
- The inclusion of a Containment Cell leachate collection and treatment system (as described in **Section 9.2**) in the event that leachate is generated within the Containment Cell.

- The low reactivity of the material to be placed within the Containment Cell.
- The quality controls to be implemented during construction and filling of the Containment Cell (as described in **Section 8.1.3**).
- The procedures that would be implemented through the EMP (as outlined in **Section 9.1**).
- Occupants of future industrial development adjacent to the Containment Cell reporting any observations of potential concern to the Containment Cell manager (as discussed in **Section 9.1.1.1**).

It is anticipated that in the unlikely event that an incident did occur, such incidents would be limited to:

- Generation of leachate: this would be managed by operation of the leachate collection and treatment system (as described in **Section 9.2**).
- Leachate is generated and the water treatment plant is inoperable:
 - The water treatment plant inspection, service and maintenance program described in **Section 9.1.2.1** would minimise the potential for this to occur.
 - In the unlikely event it did occur, retention of leachate within the leachate detection layers for a short period (less than three weeks) is acceptable allowing time for the treatment plant to be repaired.
- Slippage/ damage to the capping layer: it is anticipated that evidence of any such damage would be identified with an acceptable timeframe and repairs made. The design of the capping layer allows for repairs to be made in a manner that restores the cap integrity.
- Leakage of the base liner allowing impacts to groundwater. As discussed in **Section 8.8** the cell contents would not be putrescible and would not generate leachate due to decomposition. Leachate generation would therefore be related to rainfall infiltration which is minimal. Should leakage to the underlying aquifers occur, the Containment Cell is situated such that the natural clay and bedrock strata provide additional attenuation of contaminant migration.

9.2 Leachate Treatment

As discussed in **Section 8.8** the Containment Cell is designed to minimise the potential for water to contact the contents of the cell and thereby not generate leachate. In addition as only non-putrescible waste would be placed in the Containment Cell the material would not decompose or break down and produce leachate.

However there is a low potential for a small quantity of leachate to be generated. This could be due to the following:

- Residual moisture in wastes (such as soils and non-recyclable demolition wastes) could drain to the low point of the Containment Cell.
- Rain could have fallen onto areas of uncovered waste during placement of material in the Containment Cell and not evaporated or removed prior to capping of the waste material.

As such the Containment Cell does include a leachate collection and treatment system (as described in **Section 8.8.2**). However, as discussed in **Section 9.1.1.2** a periodic pump out of the leachate collection sump by a licensed liquid waste contractor for treatment at a licensed facility may be preferred.

9.3 Security and Access

As discussed in **Section 2.5.1** the Containment Cell is located within an area that a Local Environmental Plan Amendment proposes to rezone to zone IN3 Heavy Industrial. Preliminary layouts propose that the Containment Cell would be centrally located in the land zoned IN3 Heavy Industrial. A perimeter road would encircle the Containment Cell, and employment land lots would surround the cell.

Vehicle access to the Containment Cell would be restricted. Safety barrier fencing/ bollards would be provided along the perimeter road, and a secured gate would limit access to authorized vehicles to undertake maintenance (such as mowing) and monitoring activities.

9.4 Regulatory Framework - Funding, Liability and Financial Security

9.4.1 Regulatory Framework

The key potential regulatory mechanisms available to ensure the long term environmental management of the Containment Cell are the:

- Development Consent – EMP, Restrictive Covenant, Positive Covenant and Planning Agreement;
- EPL; and
- Specific immobilised contaminants approval (SIC Approval).

Which of these mechanisms would be used, when their implementation would commence and cease, and the specific conditions of these mechanisms would be determined in consultation with the Department of Planning and Environment and the EPA.

The regulatory mechanisms to apply to the construction of, and material placement within, the Containment Cell would be determined prior to commencement of construction of the Containment Cell. As described for the EMP in **Section 9.1**

An example of when these potential regulatory mechanisms could apply during the life span of the Containment Cell is illustrated in **Figure 9-1**.

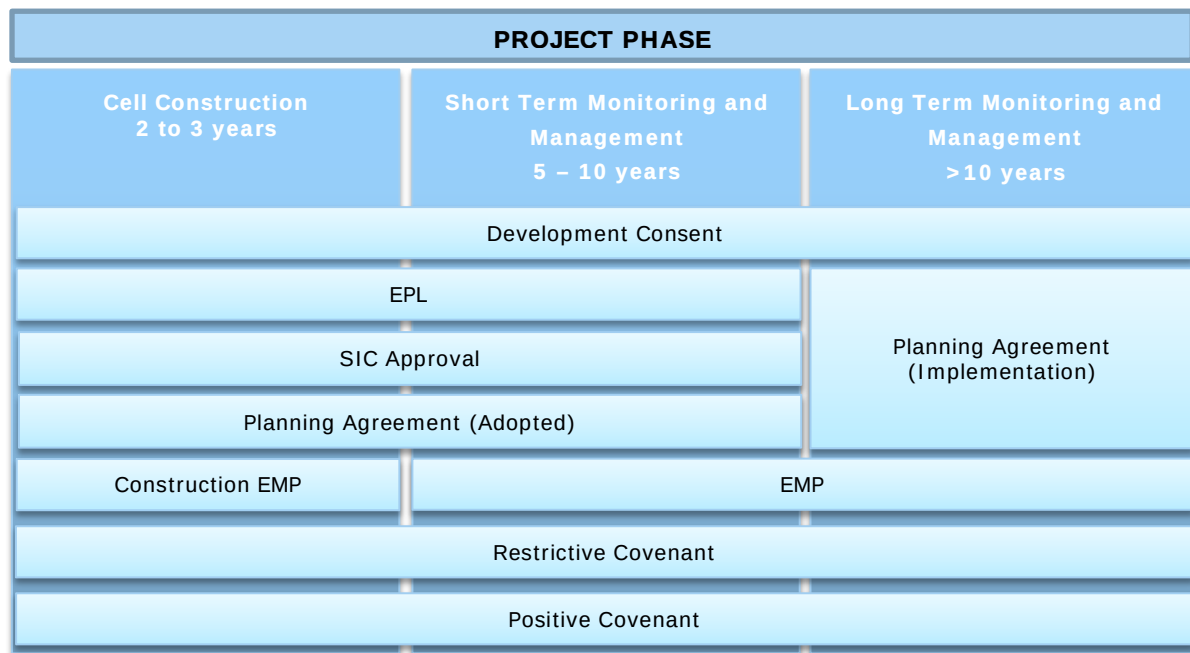


Figure 9-1: Potential Containment Cell Regulatory Options

The following sections describe how the potential regulatory mechanisms could be implemented to ensure the environmental performance of the Containment Cell. **Table 9.9.1** summarises the key funding, liability and financial security elements of the potential regulatory mechanisms.

Table 9.9.1: Regulatory Mechanism Elements

Regulatory Mechanism Element	Description
Funding	The owner of the Containment Cell land will be responsible for funding compliance with the regulatory framework. The Containment Cell land cannot be divested to a third party, unless the applicable regulatory agency is satisfied that the incoming owner has financial capacity to fund compliance with the regulatory framework.
Liability	The regulatory framework is binding on, and enforceable against, the owner/occupier of the Containment Cell land.
Financial Security	The EPL and Planning Agreement would ensure that there is adequate financial security throughout the life span of the Containment Cell for the total likely costs of complying with the long term environmental management obligations.

9.4.1.1 Development Consent

Development Consent for the Project could include a standard suite of conditions under Section 80A(1)(a) of the EP&A Act to:

- Prevent, minimise and/or offset adverse environmental impacts;
- Set standards and performance measures for acceptable environmental performance;
- Require regular monitoring and reporting; and
- Provide for the ongoing environmental management of the Project.

The Development Consent could include conditions which impose the following obligations to ensure the environmental performance of the Containment Cell:

- The preparation and implementation of an EMP;
- Arrangement of a positive covenant;
- The registration of a restrictive covenant against the Containment Cell land; and
- The requirements of a voluntary planning agreement.

This approach is described below and is illustrated in **Figure 9-2**.

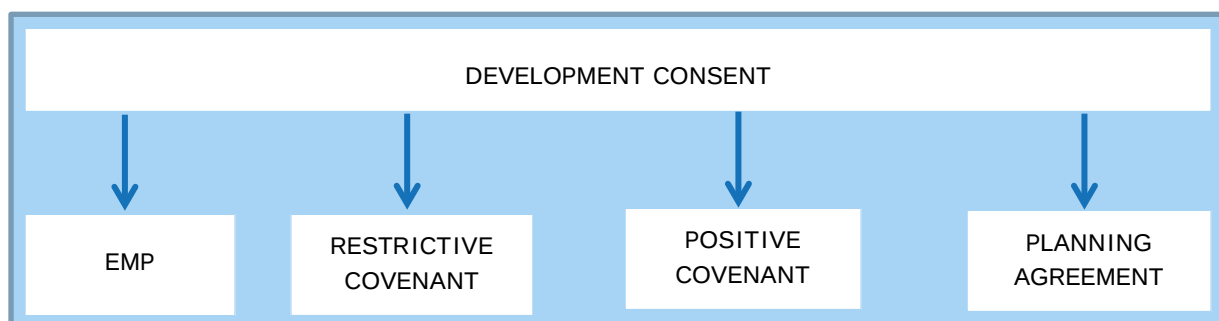


Figure 9-2: Potential Development Consent Containment Cell Long Term Management Options

Under the EP&A Act the Development Consent (which would include the obligation to implement and comply with the EMP, and potentially including conditions requiring a restrictive covenant, positive covenant and/or planning agreement) would remain with the land and bind, and be enforceable by any person against the person responsible for carrying out the long term environmental management of the Containment Cell as outlined in the EMP. This would include, for example, the suitably qualified expert that is proposed to be engaged to carry out the long term

environmental management of the Containment Cell (Containment Cell Manager) and the owner/occupier of the Containment Cell land.

9.4.1.2 Environmental Management Plan

The EMP would contain a detailed description of the environmental management, monitoring and reporting information described in **Section 9.1**, and would be agreed with the Department of Planning and Environment and the EPA.

9.4.1.3 Restrictive Covenant

Limits on Use of Containment Cell Land

As discussed in **Section 2.4.2.2** the Containment Cell is located within an area that a Local Environmental Plan Amendment proposes to rezone to zone IN3 Heavy Industrial. Preliminary layouts propose that the Containment Cell would be centrally located in the land zoned IN3 Heavy Industrial.

Hydro has identified a restrictive covenant (pursuant to section 88E of the *Conveyancing Act 1919*) as a potential regulatory mechanism. The restrictive covenant would constrain any development from being carried out on the Containment Cell land that presents a risk of adverse impacts on the cap structure of the Containment Cell.

Limits on Divestment of Containment Cell Land

The restrictive covenant could contain a mechanism which restricts the land owner from transferring the Containment Cell land to a third party unless the third party satisfies the applicable regulatory agency that it has the financial capacity to comply with all the long term environmental management obligations for the Containment Cell. The financial capacity requirements are developed in consultation with the EPA prior to surrender of the EPL, as outlined in **Section 9.4.1.5**.

The restrictive covenant would be registered against the title to the land and bind, and be enforceable by the applicable regulatory agency against the owner of the Containment Cell land.

9.4.1.4 Planning Agreement

Hydro has identified a planning agreement (pursuant to section 93F of the EP&A Act) as a potential regulatory mechanism.

A planning agreement could operate from the date of surrender of the EPL and SIC Approval (if surrendered) to regulate the long term environmental management of the Containment Cell. However, terms of agreement of the planning agreement would need to be approved prior to determination of the Development Application for the Project.

Environmental protection measures (including financial assurance obligations) that could be included in the planning agreement would be:

- Generally consistent with the conditions of the EPL (and Specific Immobilised Contaminants Approval where relevant), as amended to address the findings of an environmental performance review report; and
- Agreed by the parties to the planning agreement prior to Development Consent being granted for the Project and enacted prior to the surrender of the EPL and SIC Approval under the POEO Act.

A planning agreement could:

- Specify the procedures to ensure that a suitably qualified consultant has been engaged to undertake the long term environmental management of the Containment Cell (the Containment Cell Manager). This would include how the ongoing performance of the Containment Cell Manager would be assessed; and
- Restrict the developer from transferring the Containment Cell land to a third party unless:

- (i) The third party first enters into a deed agreeing to comply with all the developer's obligations in relation to long term environmental management of the Containment Cell as if it were the land owner; and
- (ii) The developer satisfies the applicable regulatory agency that the proposed transferee has the financial capacity to comply with the obligations in relation to long term environmental management of the Containment Cell.

A planning agreement would be registered against the title to the land and be binding on, and enforceable against, the owner of the Containment Cell land.

9.4.1.5 Positive Covenant

A positive covenant (pursuant to Section 88E of the *Conveyancing Act 1919*) can be imposed on a property by an appropriate regulatory agency, placing restrictions on the use of that property. In addition (pursuant to Section 88BA of the *Conveyancing Act 1919*) a positive covenant can include a requirement for maintenance and repair (if required) of the property.

The applicable regulatory authority is responsible for enforcement of a positive covenant.

9.4.1.6 Environment Protection Licence

The occupier of the Containment Cell land would be required to hold an EPL under the POEO Act to authorise the proposed scheduled activities associated with construction, placement of material within, and capping of the Containment Cell.

The holder of the EPL would be required to satisfy the fit and proper person test prescribed in the POEO Act. This test includes, among other matters, satisfying the EPA that they are technically competent and have the financial capacity to undertake the long term environmental management of the Containment Cell.

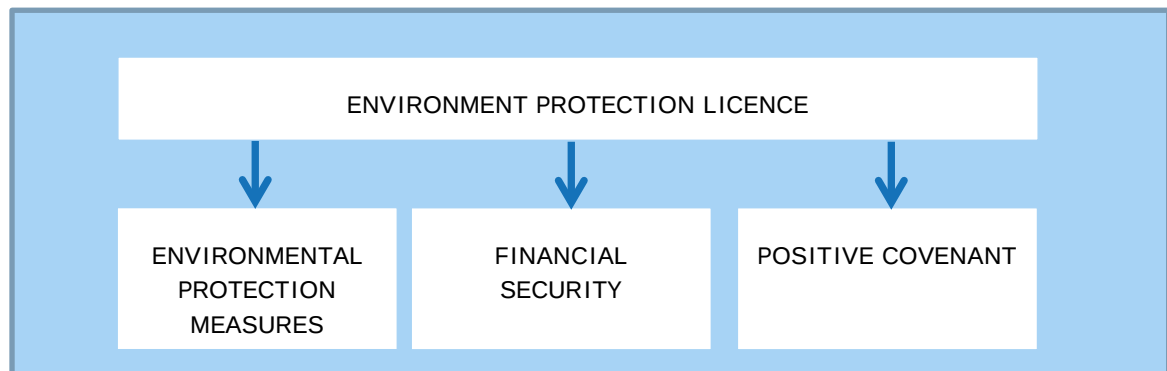


Figure 9-3: Environment Protection Licence Potential Key Elements

As illustrated in **Figure 9-3**, Hydro proposes that the EPL could contain:

- A standard suite of conditions to prevent, minimise and mitigate the environmental impacts of the Containment Cell.
- A condition/s requiring the licence holder to provide one or more of the following:
 - Financial assurance to secure the performance of the environmental obligations set out in the EPL (in accordance with section 70 of the POEO Act).
 - A policy of insurance for the payment of costs for clean-up action, and for claims for compensation or damages, resulting from pollution caused by the scheduled activity (in accordance with section 72 of the POEO Act).
 - Arrangement of a positive covenant under section 88E of the *Conveyancing Act 1919* (in accordance with section 74 of the POEO Act).

The amount and form of the financial assurance is proposed to be agreed with the EPA following Development Consent and once the detailed design and location plans for the Containment Cell are approved by the Department of Planning and Environment and the EPA (pursuant to the conditions of the Development Consent). This approach would enable the amount and form of financial

assurance to properly reflect the EPA's consideration of the following prescribed matters in the POEO Act:

- (i) The degree of risk of environmental harm associated with the Containment Cell;
- (ii) The remediation work that may be required because of activities under the licence;
- (iii) The environmental record of the holder or former holder of the licence or proposed holder of the licence; and
- (iv) Other matters prescribed in the regulations.

The EPL could not be surrendered, or transferred to another person, except with the consent of the EPA in accordance with the POEO Act (which would include the transferee satisfying the EPA of its financial capacity to comply with the environmental protection measures in the EPL). The conditions of the EPL (including maintaining the financial assurance) would remain binding and enforceable against the holder of the EPL.

There is potential that the EPL would not apply to the Containment Cell in perpetuity, and could remain in place until monitoring demonstrates to the satisfaction of the EPA that the Containment Cell complies with specified environmental performance criteria. The environmental performance criteria, time period for monitoring and mechanism for the engagement of a suitably qualified expert to prepare an environmental performance review report that assesses the Containment Cell's compliance with such criteria would be agreed with the EPA and inserted as conditions into the EPL.

Alternatively, the EPL could apply to the completed Containment Cell in perpetuity in place of, or in parallel with, the planning agreement (as described in **Section 9.4.1.4**). If such an approach was implemented, it is expected that the conditions of the EPL would be reviewed: following completion of the Containment Cell; and following an assessment of its operational environmental performance.

The EPL could address (among other potential matters):

- The specified environmental performance criteria for the Containment Cell which may include the Containment Cell's compliance with the Development Consent, EPL and the POEO Act, whether there will be an ongoing environmental impact arising from the activity authorised by the EPA after the activity ceases to be carried on, and whether it is appropriate to manage that impact through conditions of the EPL.
- The minimum time period for monitoring compliance with the environmental performance criteria.
- An obligation to engage a suitably qualified expert to prepare an environmental performance review report which assesses the Containment Cell's compliance with the environmental performance criteria and makes findings in respect of an appropriate ongoing management, monitoring, maintenance and financial assurance regulatory framework for the Containment Cell following surrender of the EPL.

9.4.1.7 Specific Immobilised Contaminants Approval

As discussed in **Section 2.5.1.1**, the specific immobilised contaminants approval application is required to include the following:

- Details of the proposed immobilisation methodology.
- Evidence that it is not possible to reprocess the waste in order to reuse or recycle it.
- Details on quantity, form, background information and chemical composition of the waste.
- The equipment to be used and evidence of quality assurance/quality control.
- A description of the nature of the physical barrier to be established between the waste and the surrounding environment.
- Demonstration that the means by which the contaminants are immobilised will be maintained over time.

The specific immobilised contaminants approval would include conditions relating to operation, including:

- The period for which the approval is valid.
- The treatment required to immobilise the waste, for waste that is not naturally immobilised.
- Testing and record keeping requirements.
- Any other conditions which are required.

There is the potential that the specific immobilised contaminants approval (as with the EPL) would not apply to the Containment Cell in perpetuity, and that it would be revoked on the date the EPL is surrendered. Alternatively it could apply to the completed Containment Cell in perpetuity with the EPL in place of, or in parallel with, a planning agreement.

9.4.2 Ownership

Hydro, as the current owner of the Project Site, is responsible for funding and ensuring compliance with the long term environmental management obligations for the Containment Cell. Hydro proposes to meet this obligation by engaging a suitably qualified consultant to oversee the construction of the Containment Cell, and implement the long term environmental management of the Containment Cell.

Subject to market demand, Hydro may seek to divest the Project Site (or parts thereof containing the Containment Cell land) to a third party for the purposes of industrial development. The incoming owner of that part of the Project Site containing the Containment Cell land would then take on responsibility for the long term environmental management of the Containment Cell. Hydro would need to satisfy the applicable regulatory agency that the incoming owner of the Project Site (or parts thereof containing the Containment Cell land) has financial capacity to comply with the long term environmental management obligations for the Containment Cell before it could sell that land to a third party. The regulatory framework described in **Section 9.4** would operate to bind, and be enforceable against, the new owner and any subsequent owners of the Project Site (or parts thereof containing the Containment Cell land).

Other divestment options that Hydro may wish to implement include subdividing the Project Site to realign existing land parcels to meet industrial market demand (including for example subdividing the Project Site so that the Containment Cell land is within a separate property). Hydro would need to obtain development consent to carry out any such subdivision of the Project Site. Hydro would need to satisfy the applicable regulatory agency that the incoming owner of the Project Site (or parts thereof containing the Containment Cell land) has financial capacity to comply with the long term environmental management obligations for the Containment Cell before it could sell that land to a third party. The regulatory framework described in **Section 9.4** would continue to operate to bind, and be enforceable against, the new owner (and any subsequent new owners) of the Containment Cell land within the subdivided Project Site.

PART C: ENVIRONMENTAL ASSESSMENT

10. ENVIRONMENTAL RISK ANALYSIS

10.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify the need to undertake an assessment of potential environmental risks as part of the Environmental Impact Statement. This section outlines the environmental risk assessment undertaken for the Project.

Table 10.1 outlines the Secretary's Environmental Assessment Requirements relating to environmental risk and where they have been addressed.

Table 10.1: Secretary's Environmental Assessment Requirements – Environmental Risk

Requirement	Where Addressed
The EIS must include:	
risk assessment of any potential environmental impacts of the development, identifying the key issues for further assessment.	Section 10

This section describes the Environmental Risk Analysis undertaken for the Project. The analysis provides a framework for identifying and analysing potential environmental impacts of the Project, and enables the Project to be developed to address these potential impacts through design elements or management measures.

The objectives of the risk assessment are to:

- Assess the risk level of potential environmental impacts of the Project and identify those environmental impacts which require detailed investigation and summarise the risk assessment findings, particularly identification of those with significant residual risks.
- Facilitate a consistent approach to risk assessment across the various environmental aspects and issues.
- Inform the ongoing design, demolition, construction and remediation processes of the risks and provide a clear process for the formulation and management of measures to mitigate the risk.
- Encourage the level of investigation of various project risks to be appropriate to the risk of the environmental impacts.

The key steps in the risk assessment process are as follows:

- Establishment of the risk framework: the likelihood of a risk event occurring, the consequence of that event, and overall risk matrix.
- Risk Identification: A process of identification of the risks associated with the key issues set out in the Secretary's Environmental Assessment Requirements, as well as risks associated with any other issues identified by the Project Team.
- Risk Assessment: The potential risk is assessed (assessment of likelihood as described in **Table 10.2** and consequence as described **Table 10.3**) and a risk rating (Low, Medium, High, Extreme) is allocated, as calculated in **Table 10.4** and defined in **Table 10.5**.
- Risk Analysis and Treatment: Identify the potential mitigation measures for the risk and estimate any residual risk after implementation of the measure.

A broad risk identification and prioritisation was undertaken to rank potential risks from the Project. This provided a basis for scoping the key risks for the Project.

Table 10.2: Likelihood Table

Likelihood	Description
Almost Certain	The event is expected to occur in most circumstances.
Likely	The event will probably occur in most circumstances.
Possible	The event could occur.
Unlikely	The event could occur but not expected.
Rare	The event occurs only in exceptional circumstances.

Table 10.3: Consequence Table

Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Air and Odour	Relevant air quality standards met across the region.	Isolated exceedence of air quality standards that is short lived.	Exceedence of relevant air quality standards in a location.	Exceedence of relevant air quality standards in a number of locations.	Widespread exceedence of relevant air quality standards.
Noise and Vibration	Relevant noise and vibration standards met across the region.	Isolated exceedence of noise and vibration standards that is short lived.	Exceedence of relevant noise and vibration standards in a location.	Exceedence of relevant noise and vibration standards in a number of locations.	Widespread exceedence of relevant noise and vibration standards.
Health and Safety	No injury or illness associated with the Project.	Minor injury or illness to less than 10 individuals. Major injury or illness to one individual.	Minor injury or illness to 10 to 100 individuals. Major injury or illness to between 1 and 10 individuals.	Minor injury or illness to between 100 and 1000 individuals. Major injury or illness to between 10 and 100 individuals.	One or more fatalities or permanent disabilities.
Surface Water	Applicable water quality standards met.	Short term and isolated exceedence of water quality standards.	Exceedence of water quality standards in a location.	Exceedence of water quality standards in a number of locations.	Widespread exceedence of water quality standards across the Project Site and off-site.
Groundwater	Negligible change to groundwater regime and quality.	Changes to groundwater regime and quality but no significant implications.	Changes to groundwater regime and quality with minor implications.	Groundwater regime or quality significantly compromised.	Widespread groundwater resource depletion or quality impacts.
Transport and Access	Temporary and localised changes in the road network.	Short term impacts to road networks within the localised area. Traffic delays of up to 10 minutes	Impacts on traffic and transport that negatively impact access and use. Traffic delays of 10 to 30 minutes.	Significant impacts on the road network or delays to traffic of greater than 30 minutes.	Permanent changes to the road network resulting in negative impacts to use, access and traffic movement.

Table 10.3: Consequence Table

Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Heritage	No impact to heritage site	Disturbance or partial removal of a small number of heritage artefacts.	Complete removal of one or more heritage Artefacts confined to a small number of locations.	Complete removal of many heritage artefacts across many locations. Disturbance of a heritage site of high scientific significance.	Widespread removal of heritage artefacts across a region. Destruction of a heritage site of high scientific significance.
Biodiversity	Population change not detectable. Insignificant loss of native vegetation.	Detectable change in population without impact on population viability. Loss of endangered ecological community (EEC) significant at the local level. Net gain achievable.	Detectable change in population and impact on population viability that is significant at a local level. Loss of EEC significant at the regional level. Net gain achievable	Detectable change in population and impact on population viability that is significant at a regional level. Loss of EEC significant at the State level. Net gain achievable.	Detectable change in population and impact on population viability that is significant at a State or Commonwealth level Loss of EEC significant at the State level. Net gain not achievable.

Table 10.4: Risk Matrix

Likelihood Level	Consequence Level				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	Low	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	High	Extreme
Possible	Negligible	Low	Medium	High	High
Unlikely	Negligible	Low	Medium	Medium	High
Rare	Negligible	Negligible	Low	Medium	Medium

10.2 Potential Environmental Impacts and Risks

The potential risks, proposed management and mitigation measures and residual risk categories of the key issues in the Secretary's Environmental Assessment Requirements (that are environmental aspects/ issues) are presented in **Table 10.5**. Ranking of the risks has been undertaken to group risks into the five categories identified in **Table 10.4**.

Impacts assigned a risk category level of 'A' would be considered to be a significant risk for the Project. However as shown in **Table 10.6** none of the residual risks (after consideration of the design elements and the management measures that form part of the Project) of the environmental aspects pose a significant risk.

Table 10.5: Environmental Risk Analysis Risk Level Definitions

Risk Level	
EXTREME	May have significant impacts. Detailed assessment necessary to determine the level of potential impact and to develop appropriate measures to mitigate and manage the impacts.
HIGH	May have moderate to high impacts. Detailed assessment necessary to determine the level of potential impact and to develop appropriate measures to mitigate and manage the impacts.
MEDIUM	May have moderate impacts that can be mitigated by the application of standard environmental management measures.
LOW	Will have low impacts, which can be managed by standard environmental management measures.
NEGLIGIBLE	Will have minimal impact, which requires no or minimal implementation of standard environmental management measures

Table 10.6: Environmental Risk Analysis

Environmental Aspect/ Issue	Potential Impacts	Analysis/ Mitigation Measures	Residual Risk Category	EIS Section
Air and Odour	Adverse air quality and odour impacts on surrounding sensitive receivers and Works employees.	- Distance to nearest sensitive receivers reduces potential air quality and odour impacts. - Implementation of an Air Quality Management Plan within the Construction Environment Management Plan that would include standard dust management measures and controls such as: wetting down the demolition, construction and remediation areas; and covering or stabilising exposed soils as soon as practicable. - Works personnel required to wear the required personnel protective equipment appropriate to the activity. - Blasting events to be undertaken when the wind is less than 8 m/s and blowing from the south to southeast. - Weather and dust monitoring would be undertaken to allow implementation of an appropriate management response to dust generating activities. - Spoil would be managed with Soil and Water Management Plan to maintain stockpiles at a suitable height, width and slope and surface treatment, with appropriate erosion and sediment controls. - Construction traffic would be controlled by designated traffic speeds and routes. - All areas would have long term stabilisation (such as hydromulching) undertaken once demolition and remediation activities are complete.	HIGH (Possible/ Major)	Section 11

Table 10.6: Environmental Risk Analysis

Environmental Aspect/ Issue	Potential Impacts	Analysis/ Mitigation Measures	Residual Risk Category	EIS Section
Air and Odour	Adverse air quality and odour impacts on surrounding sensitive receivers resulting from gas emissions from the Containment Cell. Potential for accumulation of flammable gases causing explosion.	- Types of material placed in the Containment Cell and the Containment Cell design would minimise the potential for odorous gas generation. - Current monitoring of the Capped Waste Stockpile shows low odour generation. - Distance to and height of gas vents above nearest sensitive receivers reduces potential impacts. - The gas venting system is designed to vent gas generated within the containment cell. Gas levels within the current Capped Waste Stockpile show levels of flammable gases to be outside the flammability ranges.	LOW (Rare/ Moderate)	Section 11
Noise and Vibration	Adverse noise and vibration impacts from to Works activities	- Distance to nearest sensitive receivers reduces potential noise and vibration impacts. - Implementation of a Noise, Vibration and Blasting Management Plan within the Construction Environment Management Plan that would include standard noise and vibration measures. - Mitigation measures would be refined during detailed Works methodology development. - Works activities predicted to generate an audible noise at the nearest sensitive receiver would not be undertaken outside standard construction hours. - Noise, Vibration and Blasting Management Plan would be implemented which would include notification to residences of proposed activities outside of standard construction hours and the proposed blasting events.	MEDIUM (Unlikely, Major)	Section 12

Table 10.6: Environmental Risk Analysis

Environmental Aspect/ Issue	Potential Impacts	Analysis/ Mitigation Measures	Residual Risk Category	EIS Section
Health and Safety	Noise and air quality (dust) results in health impacts on-site personal and nearby receivers	Refer to measures described for Air and Odour, and Noise and Vibration.	MEDIUM (Rare, Catastrophic)	Section 22
Health and Safety	Injury or harm to site personnel during demolition activities	- Demolition activities to be undertaken by licensed contractors in accordance with standard procedures. - Access to demolition areas restricted and managed.	MEDIUM (Rare, Catastrophic)	Section 8.1.2
Health and Safety	Injury or harm to site personnel and nearby receivers as result of inappropriate handling of hazardous materials	- Hazardous materials to be handled and managed in accordance with Safety Data Sheets, Codes of Practice and applicable guidelines. - Access to hazardous materials removal and storage areas restricted and managed.	MEDIUM (Rare, Catastrophic)	Section 8.1.2
Health and Safety	Injury or harm to site personnel, nearby residents, or spectators due to unexpected projectiles from blasting	- Drop zones and exclusion zones to be established and vehemently implemented. - Blasting/ detonation to be designed and undertaken by licensed and experienced contractors in accordance with standard procedures.	MEDIUM (Rare, Catastrophic)	Section 22
Soil and Water	Soil erosion resulting in sediments entering watercourses during Works activities	- Implementation of a Soil and Water Management Plan that includes erosion and sediment control measures. - Continued operation and management of the existing water management system.	MEDIUM (Unlikely, Major)	Section 13

Table 10.6: Environmental Risk Analysis

Environmental Aspect/ Issue	Potential Impacts	Analysis/ Mitigation Measures	Residual Risk Category	EIS Section
Soil and Water	Contaminants runoff during placement of material in the Containment Cell, Capped Waste Stockpile removal and spent pot lining removal	- Runoff from these work locations to be isolated from clean water and captured for treatment at a water treatment plant and/ or the existing water management system. - Restrictions on the removal and placement of materials prior to and during rain events. - Implementation of a Soil and Water Management Plan that includes water management measures, and cleaning of any materials spilled on haul and access roads.	HIGH (Possible, Major)	Section 8
Soil and Water	Leachate generation in the completed Containment Cell and then leaking into the surrounding environment.	- Containment Cell would be designed to avoid leachate generation, but to include contingency leachate detection and collection systems. - In the event that leachate is generated it is expected to be of low quantity. - A water treatment plant would treat any collected leachate. - In the event that there were operational issues with the water treatment plant, there would be approximately three weeks of leachate storage capacity available, providing sufficient time for maintenance to be completed. - In the "Rare" (highly unlikely) event that leachate leaked from the Containment Cell, it would likely be of a small quantity and therefore have limited impact on the water quality of downstream watercourses (as observed from leachate from the Capped Waste Stockpile), and the source of the leak could be identified and rectified.	LOW (Rare, Moderate)	Section 8.4, Section 8.8 and Section 9

Table 10.6: Environmental Risk Analysis

Environmental Aspect/ Issue	Potential Impacts	Analysis/ Mitigation Measures	Residual Risk Category	EIS Section
Soil and Water	Erosions and sediment runoff from the completed Containment Cell and the Project Site following completion of the Works.	- The Containment Cell has been designed with suitable slope and grass cover to minimise erosion potential. - Any erosion of the Containment Cell capping would be repaired as part of the ongoing maintenance. The Containment Cell Manager would be required to inspect the Containment Cell quarterly, and after any recorded earthquake or heavy rain event. As such any such erosion would be identified and addressed early. - The ground surface of the Project Site would be graded and grass seeded/ hydromulched to minimise erosion potential.	LOW (Rare, Moderate)	Section 13
Soil and Water	Significant event (such as earthquake or major flooding/ rain event) causes damage to Containment Cell Animal burrowing affects the integrity of the capping layers. Differential settlement affects capping layers.	- The Containment Cell has been located: - In an area underlain by suitable soils comprising low permeability residual clays and bedrock, and avoiding alluvial soils. Bedrock to be massive with minimal defects and fractures. This provides geological stability as well as protection to groundwater. - An acceptable distance above the highest observed groundwater level. - In an area not affected by underground mine workings. - A minimum of three metres above the highest known groundwater level. - The containment cell will be filled in a manner that maximises compaction and minimises void space. Wastes within the containment cell are not degradable and therefore long term settlement will not occur. - A review of the Geosciences Australia website noted that there were 23 earth tremors between January 1970 and January 2015 within a 400km² area centred on the Containment Cell. The largest of these was an event with a magnitude of 3.6, and an average event magnitude of 2.6. These earth tremors did not cause impacts to the Smelter structures, and are unlikely to adversely impact the	LOW (Rare, Moderate)	Section 5.3.6 Section 8.4, Section 8.8 and Section 9

Table 10.6: Environmental Risk Analysis

Environmental Aspect/ Issue	Potential Impacts	Analysis/ Mitigation Measures	Residual Risk Category	EIS Section
		Containment Cell. The nature of the materials proposed to be used in construction of the Containment Cell would make it even less susceptible to damage than buildings and other structures. - The Containment Cell Manager would be required to inspect the Containment Cell quarterly, and after any recorded earthquake or heavy rain event. As such in the event any damage occurred it would be immediately identified and addressed. - The Containment Cell capping design includes several layers, including vegetation cover, topsoil and a fauna barrier that protect the major containment layers. This would protect and maintain the containment of the material in the event of any damage to surface layers and allow for any damage to be repaired without compromising the containment. - In the "Rare" (highly unlikely) event that leachate leaked from the Containment Cell, it would likely be of a small quantity and therefore have limited impact on the water quality of downstream watercourses (as observed from leachate from the Capped Waste Stockpile), and the source of the leak could be identified and rectified.		
Transport and Access	Access and traffic issues during events at the Kurri Kurri Speedway and Junior Motorcycle Club	- Installation of traffic signage and temporary traffic controls at intersections during events. - Maintain regular consultation with event organisers to discuss traffic management during events.	MEDIUM (Unlikely, Moderate)	Section 15
Transport and Access	Traffic delay on local roads due to Works traffic	Drivers transporting equipment and materials to and from the Project Site to be informed of required traffic routes during Works induction.	LOW (Possible, Minor)	Section 15

Table 10.6: Environmental Risk Analysis

Environmental Aspect/ Issue	Potential Impacts	Analysis/ Mitigation Measures	Residual Risk Category	EIS Section
Heritage	Disturbance of indigenous heritage sites or places of significance during earthworks	- The one identified Aboriginal heritage relic and potential archaeological deposits would be clearly identified on construction drawings. - The relic would be salvaged prior to commencement of construction and disturbance of potential archaeological deposits avoided. - Monitoring for potential artefacts and skeletal remains would take place throughout earthworks. - All project and contract staff would undergo adequate heritage training to assist in artefact identification and protection. - Any Aboriginal heritage items directly affected would be managed in consultation with Aboriginal stakeholders and OEH. - Should any skeletal remains be identified, work would cease and the appropriate authorities (NSW Police and OEH) would be notified.	MEDIUM (Almost Certain, Minor)	Section 16
Heritage	Disturbance of non-indigenous heritage items	- No impacts on known non-indigenous heritage items would occur. - Should any potential non-indigenous heritage items be identified, work would cease and OEH would be notified. - Photographs and drawings of Smelter buildings would be made available to interested community and heritage groups.	LOW (Rare, Low)	Section 17

Table 10.6: Environmental Risk Analysis

Environmental Aspect/ Issue	Potential Impacts	Analysis/ Mitigation Measures	Residual Risk Category	EIS Section
Biodiversity	Removal of native vegetation: - Impacts to endangered ecological communities - Impacts to threatened flora	- Approximately 2.5 hectares of endangered ecological communities would be removed as a result of the Project. - Approximately threatened flora species individuals would be removed as a result of the Project. - Exclusion fencing for protection of vegetation to be retained would be erected and maintained. - Education of construction workers of conservation requirements through the site induction process. - Implementation of a Flora and Fauna Management Plan which would include a Weed Management Strategy and a Pre-clearance Survey Protocol. - The area of vegetation clearance would be accounted for in the Biocertification Agreement developed for approval as part of the planning (rezoning) proposal for the Hydro Land.	MEDIUM (Almost Certain, Minor)	Section 18
Biodiversity	Impacts to threatened fauna or habitat areas and habitat connectivity	- Pre-clearing survey would be undertaken by a qualified ecologist to identify and, if required, relocate individuals prior to clearing activities. Action for relocation would be determined by specialist advice. - Areas for habitat clearance would be minimised where practicable to reduce the potential impact to the receiving environment. This would include erection and maintenance of exclusion fencing for protection of vegetation to be retained. - Education of construction workers of conservation requirements through the site induction process.	MEDIUM (Almost Certain, Minor)	Section 18

Table 10.6: Environmental Risk Analysis

Environmental Aspect/ Issue	Potential Impacts	Analysis/ Mitigation Measures	Residual Risk Category	EIS Section
		- The area of fauna habitat clearance would be accounted for in the Biocertification Agreement developed for approval as part of the planning (rezoning) proposal for the Hydro Land. - Vehicle speed would be limited to 20km/h on-site to avoid vehicle collisions with macro fauna. - An Air Quality Management Plan and Soil and Water Management Plan within the Environment Management Plan would be implemented to control the release of dust and sediment to the receiving environment.		
Biodiversity	Adverse impact on downstream biodiversity as a result of leachate leaking into the surrounding environment	- As noted above, the Containment Cell would be designed and constructed to avoid leachate generation, but would include contingency leachate detection and collection systems. In addition there is a water treatment plant that would collect and treat any leachate. - In the "Rare" (highly unlikely) event that leachate leaked from the Containment Cell, it would likely be of a small quantity and therefore have limited impact on the water quality of downstream watercourses (as observed from leachate from the Capped Waste Stockpile), and the source of the leak could be identified and rectified. As the leachate is likely to have limited impact on downstream water quality, it is not expected to have a major adverse impact on downstream biodiversity.	NEGLIGIBLE (Rare, Minor)	Section 8.4, Section 8.8 and Section 9
Visual	Adverse visual impact from construction of the Containment Cell	- Due to the location and topography, views of the Containment Cell location are limited. - Vegetation cover would mitigate potential visual impacts. - In the long term the Containment Cell would be located within an employment land development.	MEDIUM (Almost Certain, Minor)	Section 19

Table 10.6: Environmental Risk Analysis

Environmental Aspect/ Issue	Potential Impacts	Analysis/ Mitigation Measures	Residual Risk Category	EIS Section
Greenhouse Gas Emissions	Generation of greenhouse gases through use of fuels and electricity during the Works	- Vehicles and machinery would be maintained in accordance with manufacturer's requirements. - Where possible vehicles and machinery would be turned off or throttled down when not in use. - Other energy efficient work practices would be adopted to limit energy use. Measures would include conducting awareness programs for all site personnel regarding energy conservation methods.	HIGH (Likely, Moderate)	Section 20

10.3 Conclusion

The Environmental Risk Analysis did not identify any environmental aspect or issue with significant residual risks.

The Environmental Risk Analysis identified air quality and odour, noise and vibration, health and safety, soil and water, biodiversity, visual and greenhouse gas emissions with moderate to high residual risks.

Through the application of project controls and additional controls the Environmental Risk Assessment demonstrated a range of successful mitigation measures and management techniques to reduce the risks to acceptable levels. These mitigation measures are typically applied to risks that are medium or greater.

11. AIR AND ODOUR

11.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify air and odour as a key issue for the Environmental Impact Statement. This section identifies the potential air and odour impacts of the Project and the management measures proposed to reduce these impacts.

Table 11.1 outlines the Secretary's Environmental Assessment Requirements relating to air and odour and where they have been addressed.

Table 11.1: Secretary's Environmental Assessment Requirements – Air and Odour

Requirement	Where Addressed
Air and Odour including	
- a quantitative Air Quality Impact Assessment (AQIA) which assesses the air quality and odour impacts of all phases of the proposal including impacts on any surrounding receivers. The assessment must include: – details of all pollutants of concern; – details of the air emission inputs and outputs; – dispersion modelling, including adequate justification and validation (where appropriate) of all model inputs and outputs; – a cumulative assessment of all existing and proposed emission sources; and – details of the proposed management and monitoring measures.	
	Section 11.3
	Section 11.3
	Section 11.3
	Section 11.3
	Section 11.4

An Air Quality Impact Assessment has been prepared and is presented in **Appendix 6**. This section presents the key findings of the assessment.

11.2 Existing Environment

11.2.1 Meteorological Conditions

Meteorological mechanisms govern the generation, dispersion, transformation and eventual removal of pollutants from the atmosphere. Dust generation rates are particularly dependent on wind energy and on the moisture budget, which is a function of rainfall and evaporation rates.

A meteorological tower has been maintained at the Smelter since 1996 providing long term observations of wind speed, temperature, relative humidity and rainfall. Measurements at the tower are made at 10 metres and 30 metres above ground level (AGL). In order to describe the dispersion meteorology for the area surrounding the Smelter, analysis of data recorded between January 2010 and December 2014 is presented.

11.2.1.1 Annual Wind Regime

Annual wind roses of recorded wind speed were recorded at the Smelter meteorological tower at 10 metres and 30 metres AGL

There is reasonable consistency in wind speed and direction at both measurement heights. At 10 metres AGL, each year experiences a dominant southeasterly flow, with notable southwest and northwest components. At 30 metres AGL, the dominant wind direction is less defined from the southeast, with more even distribution between the east to southwest.

At both measurement levels, the highest wind speeds are most frequently experienced from the west to north quadrant. Recorded wind speeds are higher at 30 metres AGL than 10 metres AGL. The average recorded wind speed for all years is in the order of 1.5m/s at 10 metres AGL and 2.7m/s at 30 metres AGL. The frequency of calm conditions (wind speeds less than 0.5 m/s) is higher at 10m AGL than 30 metres AGL.

11.2.1.2 Ambient Temperature

Monthly mean minimum temperatures are in the range of 4°C to 17°C, with monthly mean maxima of 17°C to 30°C, based on the long-term average record from the Bureau of Meteorology (BoM) Automatic Weather Station (AWS) at Cessnock Airport (Station Number 061242) located approximately 12 kilometres to the west of the Project Site. Peak temperature occurs during summer months with the highest temperatures typically being recorded between November and February. The lowest temperatures are usually experienced between June and August.

11.2.1.3 Precipitation and Evaporation

Precipitation is important to air pollution studies since it impacts on dust generation potential and represents a removal mechanism for atmospheric pollutants.

Based on historical data recorded since 1968 at Cessnock Airport by the BoM, the region is characterised by moderate rainfall, with a mean annual rainfall of approximately 730mm, and an annual rainfall range between 460mm and 1,040mm. Rainfall is most pronounced between November and March, with significantly lower rainfall during the colder months of the year. According to the records, an average of 112 rain days occur per year. Rainfall data recorded at the Smelter Site between 2010 and 2014 is comparable with the long-term rainfall recorded at Cessnock.

Evaporation is a function of ambient temperature, wind and the saturation deficit of the air. The closest evaporation measurement station to the Smelter is the BoM Cessnock Nulkaba station (Station Number 061242), which is located approximately 12 kilometres to the west-southwest of the Project Site. On average, the region experiences an annual evaporation rate of 1,350mm/year, with greatest evaporation rates occurring during the summer months

11.2.2 Air Quality Conditions

11.2.2.1 Sensitive Land Uses

Land uses in the vicinity of the Project include:

- Native vegetation: native ecological communities (with some cleared or disturbed areas) generally surround the Smelter and are within the Hydro owned land. Security fencing separates the Smelter from the vegetation.
- Electricity infrastructure: overhead power lines are located within easements to the north, west, southwest and northwest of the Smelter.
- Recreation: the Kurri Kurri Speedway and the Kurri Kurri Junior Motorcycle Club facility are approximately 500 metres to the east of the Project.
- Roads: The key roads in the vicinity of the Project are:
 - Hart Road is used to access the Smelter and is immediately adjacent to the western section of the Project.
 - Dickson Road intersects with Hart Road approximately 120 metres south of the Smelter security gate and immediately adjacent to the western section of the Project.
 - The Hunter Expressway is approximately 380 metres southwest of the Project.
- Residential: the Project is approximately 440 metres to the north of the nearest sensitive receiver, which is a rural residence owned by Hydro. The nearest rural residence not owned by Hydro is approximately 500 metres to the southeast, and the next nearest is approximately 750 metres to the southeast. There are approximately 24 rural residences within 1000 metres of the Project, of which 15 are on Hydro Land.

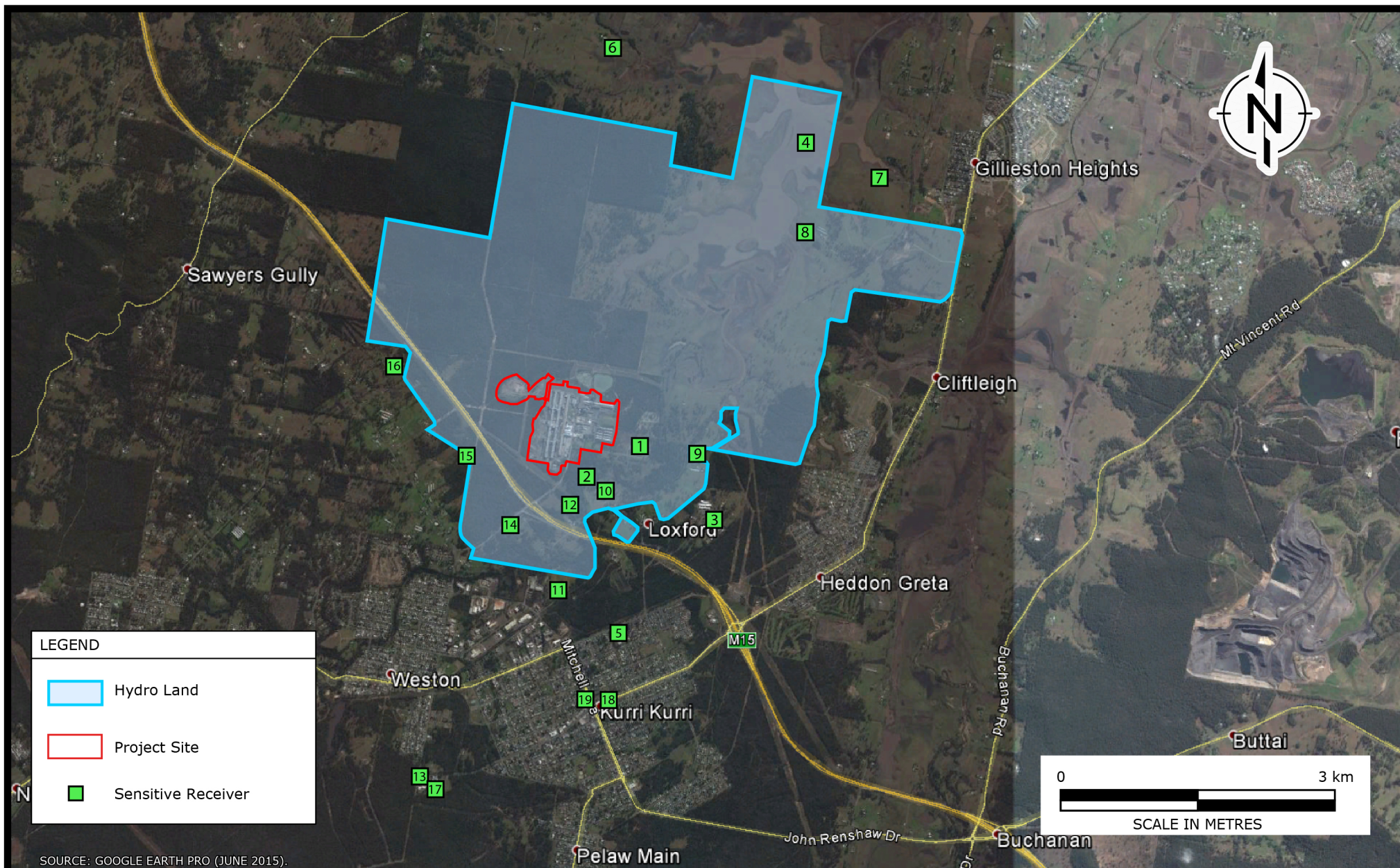
The nearest residential area to the Project is Weston, which is approximately 1800 metres to the southwest.

- Education: The Kurri Kurri TAFE is located approximately 1500 metres to the southeast of the Project and Kurri Kurri High School is approximately 1900 metres to the southeast of the Project.

The Air Quality Impact Assessment considered the potential air quality impacts on the representative sensitive receivers described in **Table 11.2** and shown in **Figure 11-1**.

Table 11.2: Selected Surrounding Sensitive Receiver Locations

ID	Distance / Direction from Project Site	Name
R1	310 m / East	Kurri Kurri Speedway
R2	270 m / East-southeast	Cricket Pitch (Hydro owned)
R3	1.4 km / Southeast	Hunter TAFE
R4	3.54 km / North-northeast	Wentworth Swamp
R5	1.88 km / South-southeast	Kurri Kurri High School
R6	3.73 km / North	Resident – North
R7	3.79 km / Northeast	Resident - Northeast
R8	2.78 km / Northeast	Resident - Northeast (Hydro owned)
R9	920 m / East-southeast	Resident – East
R10	500 m / South	Resident – Southeast
R11	1.29 km / South	Resident – South
R12	370 m / South-southeast	Resident - South (Hydro owned)
R13	3.63 km / South-southwest	Kurri Kurri Hospital
R14	700 m / Southwest	Resident - Southwest
R15	660 m / West	Resident - West
R16	1.63 km / West-northwest	Resident - Northwest
R17	3.69 km / South-southwest	RFBI Masonic Village Nursing Home
R18	2.55 km / South-southeast	Kurri Kurri Early Childhood Centre
R19	2.51 km / South	Church of Christ



SURROUNDING AIR QUALITY RECEIVER LOCATIONS
 FORMER HYDRO ALUMINIUM KURRI KURRI SMELTER
 DEMOLITION AND REMEDIATION

FIGURE
11-1

AS130401

11.2.2.2 Air Emissions Sources

Air quality in the Kurri Kurri area may be influenced by a number of air emission sources including:

- Open-cut and underground coal mining operations to the southeast and northwest, in particular the Bloomfield Open Cut, Donaldson Open Cut, Abel Underground and Tasman Underground mines located between 7km and 12km east to southeast of the Project.
- Mobile sources, such as emissions from road and rail transport, in particular the Hunter Expressway to the immediate south of the Project. Emissions from light industrial, commercial and residential activity.
- Wind entrained dust from exposed areas.
- Biogenic (natural) sources, including the contribution of sea salt to airborne aerosol concentrations.

More remote sources which contribute episodically to suspended particulates in the region include dust storms and bushfires. Whereas dust storms generate primary particles from mechanical attrition, bushfires are a source of both primary and secondary fine particles, occurring from atmospheric gas to particle conversion processes. Long-range transport of emissions from power generation within the Upper Hunter Valley and on the Central Coast may also contribute to secondary fine particulate concentrations within the region.

11.2.2.3 Baseline Air Quality Characterisation

The NSW Office of Environment and Heritage (OEH) maintain a network of air quality monitoring stations across NSW. The three closest OEH stations are located at:

- Beresfield – established in 1993, approximately 16km east of the Project Site;
- Wallsend – established in 1992, approximately 21km southeast of the Project Site; and
- Singleton South – established in 2011, approximately 33km northwest of the Project Site.

All available daily-varying particulate matter less than 10 microns in aerodynamic diameter (PM_{10}) monitoring data from these three OEH stations recorded between January 2010 and December 2014 was obtained in order to analyse existing ambient particulate matter concentrations in the Kurri Kurri region.

A frequency distribution of 24-hour average PM_{10} concentrations recorded across the three OEH monitoring stations between 2010 and 2014 is presented to estimate the likelihood of ambient concentrations within various concentration bands, for the Kurri Kurri area. The frequency distribution found that 24-hour average PM_{10} concentrations recorded by the three stations were less than $30\mu g/m^3$ approximately 90% of the time between January 2010 and December 2014. The likelihood of a 24-hour average PM_{10} concentration of greater than $50\mu g/m^3$ (which is the EPA criteria) was 0.7%. This equates to two and a half days in a calendar year.

The average PM_{10} concentration for the five years of monitoring data was $17.8\mu g/m^3$ across the three OEH monitoring stations.

11.3 Impact Assessment

11.3.1 Assessment Criteria

The Project must demonstrate compliance with the impact assessment criteria outlined in the *Approved Methods for Modelling* (DEC, 2005). The impact assessment criteria are designed to maintain ambient air quality that allows for the adequate protection of human health and well-being.

The primary emissions to air from the Project would be particulate matter (PM) from material handling and processing. For this assessment, focus has been given to the primary PM size fractions of Total Suspended Particulate (TSP) matter, particulate matter with an equivalent aerodynamic diameter of 10 microns (PM_{10}) and particulate matter with an equivalent aerodynamic diameter of 2.5 microns ($PM_{2.5}$). Dust deposition is also considered based on TSP emissions.

In addition to PM, the Project would have the potential to generate diesel combustion –related pollutants and assorted individual air quality toxins, metals and metalloids.

11.3.2 Assessment Methodology

The atmospheric dispersion modelling carried out within this assessment used the AMS/US EPA regulatory model known as AERMOD (US-EPA, 2004a). AERMOD is designed to handle a variety of pollutant source types, including surface and buoyant elevated sources, in a wide variety of settings such as rural and urban as well as flat and complex terrain.

Simulations were undertaken for the 12 month period between 1 January 2014 and 31 December 2014 using the on-site meteorological monitoring dataset as input

Air pollutant emissions during the Works would largely comprise of particulate matter (TSP, PM₁₀ and PM_{2.5}). Particulate matter emission sources associated with activities at the Project Site would include:

- Vehicle movements on paved and unpaved roads;
- Erosion of stockpiles and freshly exposed areas on-site;
- Handling, transfer and storage of materials;
- Heavy earthwork operations such as excavation and earth moving activities; and
- Re-contouring of land and soil exposure for reseeding.

Further details regarding emission estimation factors and assumptions included in the modelling are provided in the Air Quality Impact Assessment in **Appendix 6**.

11.3.2.1 Excluded Emission Sources

In addition to the emission sources identified in **Section 11.3.2**, air pollutant emissions are also likely to be associated with the demolition of the three stacks and one water tower via controlled explosives detonation. This specific demolition works could generate emissions of particulate matter and individual air toxics. However, given the short term nature of these specific demolition activities and considering all other on-site activities would be suspended during detonation events, associated emissions have not been included within the air quality impact assessment. Specific management measures for detonation events are presented in **Section 11.4**.

The excavation works proposed for the Project would involve the removal of potentially contaminated soils. As a result of the contaminated soils being exposed to the ambient air environment there is potential for some odorous emissions to be released. On-site surveys of the soils identified that there were few volatile contaminants and odorous compounds detected.

Overall, odorous emissions are not expected to be significant (particularly beyond the Project Site and Hydro Land) during excavation works related to the Project.

11.3.2.2 Containment Cell Management Impacts

As discussed in **Section 8.8.3**, due to the nature of the material to be placed in the Containment Cell, and the cell design, the potential for the generation of gases in sufficient quantities to cause odour impacts is low.

Gas well monitoring at the existing Capped Waste Stockpile has shown that gas generation has significantly reduced since the cap was installed, and there are no odour issues associated with the Capped Waste Stockpile. As such the gas collection layer and gas vents are a contingency rather than an inherent part of the Containment Cell.

Section 9.1.1.3 describes the gas monitoring to occur during Containment Cell Management, and provides an outline of the response in the event that gas concentrations exceed trigger levels to be outlined in the OEMP.

11.3.3 Assessment Results

The Air Quality Impact Assessment in **Appendix 6** presents the results of dispersion modelling as:

- Particulate matter (TSP, PM₁₀, PM_{2.5} and dust deposition) concentrations and deposition rates.
- NO₂, SO₂ and CO concentrations.
- Individual air toxics and metals concentrations.

In summary, the modelling indicates that:

- At all the sensitive receiver locations described in **Table 11.2** and shown in **Figure 11-1**, the predicted incremental and cumulative concentrations and deposition rates are below the applicable NSW EPA assessment criteria and NEPM advisory reporting goals.
- Where the criterion is applicable at or beyond the Project Site boundary (individual toxins and metals), the predicted concentrations are within the applicable NSW EPA assessment criterion.

11.4 Mitigation Measures

An Air Quality Management Plan would be developed as part of the Project Environmental Management Plan prior to the commencement of the Project. The plan would incorporate the measures described in **Table 11.3**.

Table 11.3: Air Quality and Dust Mitigation Measures

Project Phase	Mitigation Measures
Site Establishment	All Works personnel would be informed during the site induction of their obligations to minimise potential air quality and dust and the need to take reasonable and practical measures to minimise impacts.
	Establish four dust deposition monitoring locations around the Project Site. Where practicable the monitoring locations would be established a minimum of three months prior to the Project to establish baseline conditions.
The Works	Accumulated fines from within the buildings would be removed where safe, reasonable and feasible to do so prior to building demolition.
	Dust suppression to be applied during induced collapse of buildings or structures.
	Watering of the demolition areas and unsealed access roads.
	Vehicles would use wherever practicable existing sealed roads.
	A speed limit of 20km/hr would be imposed on internal roads.
	Where possible construction vehicles and machinery would be turned off or throttled down when not in use.
	Construction vehicles and machinery would be maintained in accordance with manufacturer's requirements.
	The erosion and sediment control measures described in Section 8.2.1 would assist in controlling dust generation.
	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
	Record any exceptional incidents that cause dust and/or air emissions, either on or off-site, and the action taken to resolve the situation in the log book.
	Carry out regular site inspections to monitor compliance with the AQMP, record inspection results, and make an inspection log available to the EPA and/or Cessnock City Council when asked.
	Keep site fencing, barriers and scaffolding clean using wet methods.
	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.

Table 11.3: Air Quality and Dust Mitigation Measures

Project Phase	Mitigation Measures
The Works (continued)	Provide and maintain an adequate water supply on the Project Site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
	Use enclosed chutes and conveyors and covered skips where possible and appropriate.
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
	Vehicles entering and leaving the Project Site would be covered to prevent escape of materials during transport.
Containment Cell Management	Haul routes would be inspected for integrity and, where required, instigate necessary repairs to the surface as soon as reasonably practicable.
	As discussed in Section 9.1.1.3 gas monitoring would be completed from the gas monitoring vents on a quarterly basis, until results indicate that gas generation is not an issue. Gas monitoring would be completed for ammonia and methane.
	In the event that gas concentration trigger levels outlined in the OEMP are exceeded, appropriate contingency responses would be implemented.

12. NOISE AND VIBRATION

12.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify noise and vibration as a key issue for the Environmental Impact Statement. This section identifies the potential noise and vibration impacts of the Project and the management measures proposed to reduce these impacts.

Table 12.1 outlines the Secretary's Environmental Assessment Requirements relating to noise and vibration and where they have been addressed.

Table 12.1: Secretary's Environmental Assessment Requirements – Noise and Vibration

Requirement	Where Addressed
Noise and Vibration including:	
a quantitative noise and vibration assessment, including impacts on nearby sensitive receivers;	Section 12.3
cumulative impacts of other developments on and off-site; and	Section 12.3
details of the proposed noise management/mitigation and monitoring measures.	Section 12.4

A Noise and Vibration Impact Assessment has been prepared and is presented in **Appendix 7**. This section presents the key findings of the assessment.

12.2 Existing Environment

A series of baseline noise surveys were undertaken on the Hydro Land and at noise sensitive receivers located in the vicinity of the Project Site in order to determine Project Specific Noise levels of the potentially affected areas across the site and at representative sensitive receivers located in the surrounding areas.

Noise logging equipment was installed at twelve locations to measure baseline environmental noise levels at representative noise sensitive receiver locations in the vicinity of the proposed development site. The location of the monitoring points are listed in **Table 12.2** and shown in **Figure 12-1**. **Table 12.2** includes the results of unattended noise monitoring.

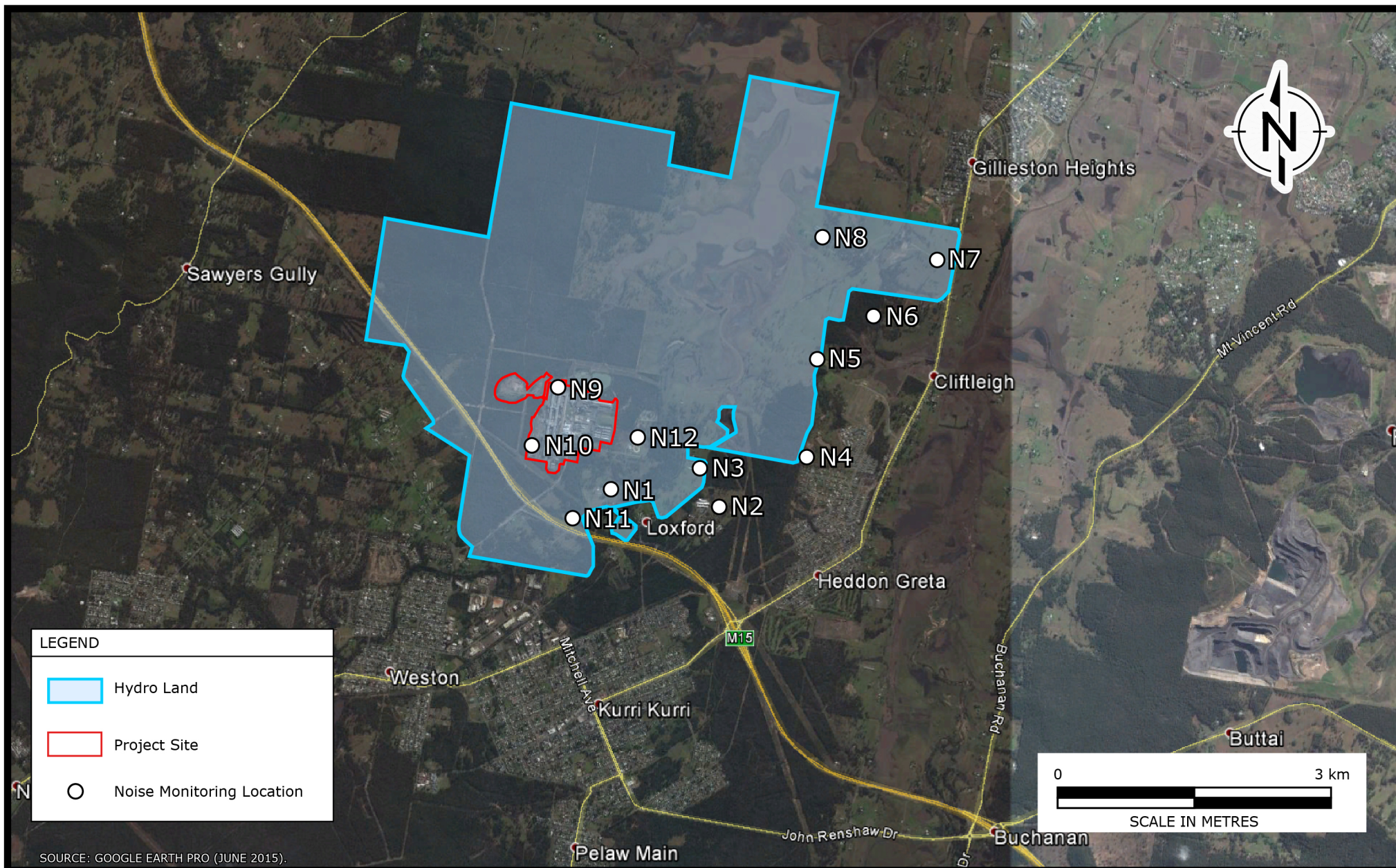


Table 12.2: Noise Monitoring Locations and Unattended Noise Monitoring Results

Location No.	Location Address	Period	LAeq	LA90	RBL ¹
N01	6 Dawes Avenue, Loxford	Day	49	44	43
		Evening	48	43	42
		Night	47	43	40
N02	Hunter TAFE, Kurri Kurri Campus	Day	52	44	44
		Evening	46	43	43
		Night	46	41	41
N03	18 Bowditch Avenue, Loxford	Day	48	39	38
		Evening	46	35	35
		Night	42	37	34
N04	Hydro Land near 10 Howe Street, Cliftleigh	Day	51	38	36
		Evening	45	35	35
		Night	49	35	32
N05	Hydro Land near Glen Ayre Avenue, Cliftleigh	Day	46	39	38
		Evening	46	33	33
		Night	40	35	31
N06	Hydro Land near 532 Main Road, Cliftleigh	Day	49	42	41
		Evening	46	35	34
		Night	42	36	33
N07	Hydro Land near Lot 54, 464 Cessnock Road, Gillieston Heights	Day	59	45	44
		Evening	54	45	44
		Night	49	51	36
N08	Hydro Land near 532 Main Road, Cliftleigh	Day	58	36	35
		Evening	47	33	33
		Night	40	34	32
N09	Smelter Site, northwest corner near substation	Day	45	39	38
		Evening	43	37	37
		Night	44	39	36
N10	Smelter Site, southwest corner near Hunter Expressway	Day	50	45	44
		Evening	51	45	44
		Night	50	43	38
N11	14 Horton Road, Loxford	Day	55	50	50
		Evening	52	47	47
		Night	51	45	42
N12	Kurri Kurri Speedway Track, 73 Dickson Road, Loxford	Day	46	43	41
		Evening	46	38	38
		Night	43	39	36

Note: RBL is the median of the overall assessment background noise level calculated using NSW EPA *Industrial Noise Policy* methodology as defined in the glossary of acoustic terms

Attended monitoring was also undertaken at these locations to verify noise levels and to quantify the dominant and contributory noise sources associated with the overall ambient noise levels in the area. The results of the attended monitoring are included in the Noise and Vibration Assessment included in **Appendix 7**. The attended monitoring identified a number of influences on the local noise environment, including:

- Traffic noise from the Hunter Expressway and Main Road/ Cessnock Road.
- Construction noise from new housing land at Clftleigh and Gilleston Heights, as well as construction activities at the Hunter TAFE.
- Industrial activities (such as metal fabrication business).
- Occasional air traffic.
- Sounds typical of the rural and bushland environment (such as agricultural activities and animal sounds).

12.3 Potential Impacts

12.3.1 Assessment Criteria

The *Interim Construction Noise Guideline* (DECC, 2009) contains detailed procedures for the assessment and management of construction noise impacts.

Table 12.3 and **Table 12.4** describe the management levels for noise at residences and other sensitive land uses, respectively. Restrictions to the hours of construction may apply to activities that generate noise at residences above the 'highly noise affected' noise management level.

Table 12.3: Noise Management Level at Residence using Quantitative Assessment

Recommended Hours	Time of Day	Management level LAeq(15min) *
Recommended standard hours	Monday to Friday - 7 am to 6pm	Noise affected
	Saturday - 8am to 1 pm	RBL + 10dB
	No Work on Sundays or Public holidays	Highly noise affected 75dB
Outside recommended standard hours		Noise affected RBL + 5dB

Notes:

- **L_{Aeq,15mins}** refers to the equivalent continuous A-weighted sound pressure level over a 15-minute period.
- Noise levels apply at the boundary that is most exposed to construction noise and at a height of 1.5 m above ground level. If the property boundary is more than 30m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence. Noise levels may be higher at upper floors of the noise-affected residence.
- RBL is the Rating Background Level as defined in the NSW EPA Industrial Noise Policy.
- **L_{Aeq 15-minute} ≥ 75 dB** is highly likely to generate strong community reactions and should be avoided.

Table 12.4: Noise Management Level at Sensitive Land Uses (other than residences)

Land use	Management Level, $L_{Aeq(15min)}$ Applies when properties are being used
Classrooms at schools and other educational institutions	Internal Noise level 45dB
Hospital wards and operating theatres	Internal Noise levels 45dB
Aged Care	Internal Noise levels 45dB
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External Noise levels 65dB
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External Noise Levels 60dB

Where internal noise management levels are specified, the external noise level may be 10dB(A) greater for buildings with no adequate ventilation or 20dB(A) for buildings with fixed external windows and mechanical ventilation.

The noise limits for the Project have been determined in accordance with the *Interim Construction Noise Guideline* which is standard practice for construction projects in NSW. The Project Specific Noise Limits (determined on the basis of the Interim Construction Noise Guideline Noise Management Levels) for standard hours, and outside standard hours (for day, evening, and night) are presented in **Appendix 7**. Where internal noise levels were specified, 10dB was added to approximate an external noise level to take account of the effect of façade attenuation.

12.3.1.1 Sleep Disturbance

The *Interim Construction Noise Guideline* also recommends that when construction works extend for more than two consecutive nights, the assessment should cover maximum noise levels, and the extent that they exceed the Rating Background Level (RBL).

Table 12.5 details the criteria for sleep disturbance for the noise monitoring locations that correspond with residential sensitive receivers.

Table 12.5: Sleep Disturbance Noise Criteria at Noise Sensitive Receivers - dB(A) - Residential

Location	L_{A90}	Criteria $L_{90} + 15$
N1	40	55
N3	34	49
N7	36	51
N8	32	47
N10	38	53
N11	42	57

12.3.1.2 Road Traffic

The requirements of the NSW *Road Noise Policy* (RNP) (DECCW, 2011) are also applicable to this assessment. Activities associated with the Project have the potential to generate additional traffic on the arterial and local roads that would provide access to the Project Site, and can potentially impact on the existing nearby noise sensitive receivers. **Table 12.6** summarises the applicable road categories to establish the noise assessment criteria based on the type of road and the proposed land use developments.

Table 12.6: Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of project / land use	Assessment Criteria / Target Noise Level, dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Freeway/arterial/sub-arterial Road Hunter Expressway, Hart Road(North)	3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments.	L _{Aeq} , (15hour). 60 (external)	L _{Aeq} , (9 hour) 55 (external)
Local Road Hart Road(South)	6. Existing residences affected by additional traffic on existing local roads generated by land use developments	L _{Aeq} , (1hour). 55 (external)	L _{Aeq} , (1 hour) 50 (external)

Note: These criteria are for assessment against façade- corrected noise levels when measured in front of a building façade. Hence, a correction factor of 2.5 dB is added to the predicted noise levels.

The Road Noise Policy states that any increase in total traffic noise level at existing residences and other sensitive land uses should be limited to 2dB above that of the corresponding 'no build option'.

12.3.1.3 Vibration

The effects of construction vibration upon buildings can be separated into three main categories:

- Perceptibility of the occupants to the vibration, and the possibility of them being disturbed or annoyed.
- Vulnerability of the building structures to vibration induced damaged.
- Vulnerability of the contents of the building that includes types of equipment, activities and processes.

Assessing Vibration: A Technical Guideline (DECC, 2006) provides evaluation methods to assess the human response from continuous, impulsive and intermittent vibration in buildings from 1Hz to 80Hz which is based on British Standards 6472:1992 *Evaluation of the Human Exposure to Vibration in Building (1Hz to 80Hz)*.

For continuous and impulsive vibration, assessment of impact should be considered on the basis of weighted RMS acceleration values. For intermittent vibration, assessment of impact should be considered on the basis of vibration dose values (VDV).

The recommended VDV levels outlined in *Assessing Vibration: A Technical Guideline* (based on the BS6472:1992 Standard) which specifies levels of VDV expressed in daytime, night-time and typical human response are presented in **Table 12.7**.

Table 12.7: Acceptable vibration dose values for intermittent vibration in various buildings (m/s^{1.75})

Location	Daytime (7am-10pm)		Night-time (10pm-7am)	
	Preferred Value m/s ^{1.75}	Maximum Value m/s ^{1.75}	Preferred Value m/s ^{1.75}	Maximum Value m/s ^{1.75}
Critical areas ¹	0.1	0.2	0.1	0.2
Residences	0.2	0.4	0.13	0.26
Offices, schools, educational institutions and places of worship	0.4	0.8	0.4	0.8
Workshops	0.8	1.6	0.8	1.6

Note: 1: Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical cases.

Further details on the assessment criteria for vibration impacts on human comfort are provided in the Noise and Vibration Impact Assessment in **Appendix 7**.

The German Standard *DIN 4150-3 Structural Vibration Part 3: Effects on buildings and structures* is commonly used in Australia to evaluate the effects of vibration on structures primarily used for static loading.

Short-term vibration is defined as vibration which does not occur often enough to cause fatigue and which does not produce resonance in the structure being evaluated.

Table 12.8 provides guideline limits for short-term vibration to ensure that damage reducing the serviceability of a building will not occur provided vibration levels do not exceed these limits.

Table 12.8: DIN4150-3 Vibration on Structures Limits

Type of structure	Guideline values for velocity in mm/s			
	Vibration at the foundation at a frequency of			Vibration at horizontal plane of highest floor at all frequencies
	1Hz to 10Hz	10 to 50Hz	50 to 100Hz (and above)	
Buildings for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15
Structures that because of their particular sensitivity to vibration, cannot be classified as above and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 to 8	8 to 10	8

Further detail on the assessment criteria for vibration impacts on structures are provided in the Noise and Vibration Impact Assessment in **Appendix 7**.

12.3.2 Assessment Results

12.3.2.1 Works Noise

The predicted noise levels were based on the worst-case Works scenario, where the plant and equipment are placed closer to the noise sensitive receivers, at the southern end of the pot rooms and the north-eastern corner of the Works area. This included consideration of Stage 1 Demolition activities that could be occurring concurrently with the Works.

The type and number of equipment included in the worst-case scenario is listed in the Noise and Vibration Impact Assessment in **Appendix 7** and discussed in **Section 8.12**.

Noise levels were calculated as external LAeq-15 minutes (outdoor ambient noise levels over a 15-minute period) at the nearest boundary of the receiver properties. These levels were calculated for:

- Standard construction hours.
- Daytime outside of standard construction hours.
- Evening.
- Night time.

The predicted noise levels associated with the modelled worst-case scenario comply with the standard construction hours noise criteria at all noise sensitive receivers.

However, for the worst-case scenario it is predicted to exceed the noise criteria for outside standard construction hours at three noise sensitive receivers:

- At 20 Bowditch Avenue, Loxford (approximately 910 metres to the east of the Project Site), 6 Dawes Avenue, Loxford (approximately 540 metres to the southeast of the Project Site) and Scales Avenue, Loxford (approximately 490 metres to the south of the Project Site) during the day (outside standard hours), evening and night-time periods.
- 103 Bishops Bridge Road, Sawyers Gully (approximately 650 metres to the west of the Project Site) during the evening and night-time period.

Noise levels at all of the noise sensitive receivers are predicted to comply with the highly affected noise criteria during standard construction hours and outside standard construction hours.

In order to comply with the noise level criteria for outside standard construction hours during the worst case conditions, the number of plant and equipment would be restricted. The number and items of equipment that could operate, without exceeding the applicable noise limit criterion, are included in the Noise and Vibration Impact Assessment in **Appendix 7** and addressed in **Section 8.12**.

12.3.2.2 Sleep Disturbance

The sleep disturbance assessment was undertaken using the reduced number of equipment that could be used so as to comply with the outside standard construction hours criteria. The sleep disturbance assessment predicted that the sleep disturbance criteria would not be exceeded at the residential receivers.

12.3.2.3 Road Traffic

Noise modelling was undertaken to assess the potential noise impacts on existing noise sensitive receivers associated with vehicle movements along Hart Road (South) and the Hunter Expressway (between Main Road-Cessnock Road and Allandale Road). The noise model has taken into account all noise sources associated with traffic that may be generated in conjunction with the Project, to determine the potential cumulative road traffic noise levels in the area.

The modelling predicts that the additional traffic generated by the Project along the Hunter Expressway and Hart Road (South) is insignificant as the relative increase between the existing and future traffic noise levels is extremely low. Therefore, the predicted noise impact associated with the Project (including Stage 1 Demolition Traffic) would comply with the *Road Noise Policy* criteria.

In addition, the internal noise levels from road traffic at existing noise sensitive receivers are predicted to be below the applicable maximum internal noise level limits, which would not be expected to cause any awakening reactions to occupants and would be unlikely to cause sleep disturbance impacts.

12.3.2.4 Vibration

Table 12.9 shows the typical vibration levels associated with the plant equipment that is likely to be used. It should be noted that the vibration levels presented in **Table 12.9** are indicative levels only. The actual vibration levels that may impact upon properties located in the vicinity of the Project Site may vary. This is due to the fact that vibration magnitudes would dissipate at varying levels dependent on ground conditions and source level variations associated with operational conditions of the plant and equipment.

Table 12.9: Vibration Levels of Equipment

Typical Vibration levels of construction plant items	Typical Ground vibration level
Vibratory roller	Up to 1.5mm/s @ 25m
Compactor	20mm/s @ 5m <0.3mm/s @30m
Bulldozer	1-2mm/s @5m 0.1 @ 50m
Truck traffic (Smooth surface)	<0.2mm/s @20m

The nearest receivers to the Project are located approximately 270 metres to the south of the Project Site. Based on the vibration levels provided in **Table 12.10** it is unlikely that there would be any vibration impacts generated by the Demolition plant that would give rise to annoyance or structural damage at any of the nearest receivers.

12.4 Mitigation Measures

A Noise and Vibration Management Plan would be developed as part of the Project Environmental Management Plan prior to the commencement of the Project. The plan would incorporate the measures described in **Table 12.10**.

Table 12.10: Noise and Vibration Mitigation Measures

Project Phase	Mitigation Measures
Site Establishment	A Stakeholder Engagement Plan (as discussed in Section 8.1.4) would be implemented to engage with government agencies, Cessnock and Maitland City Councils, landowners, community members and other stakeholders to provide a single consultation framework.
	The Plan would define the method and persons responsible for the dissemination of information regarding the Project. This would include the procedure for receiving and responding to comment or complaints from the community.
	Local residents would be notified in advance of the Project of the nature and estimated timescales for completion of the Project. Thereafter ongoing notifications and updates on new or changes to Demolition activities would be provided in accordance with the Stakeholder Engagement Plan.

Table 12.10: Noise and Vibration Mitigation Measures

Project Phase	Mitigation Measures
Site Establishment (continued)	A 24-hour telephone number would be provided as a contact point for any complaints, issues or general enquiries regarding the Project.
	All demolition personnel would be informed of their obligations to minimise potential noise impacts during the site induction and the need to take reasonable and practical measures to minimise noise.
The Works	Truck drivers are to be informed of site access routes, acceptable delivery hours and must minimise extended periods of engine idling.
	Demolition vehicles and machinery would be selected with consideration of noise emissions. Where possible the sound power level of equipment and plant would comply with the sound power levels listed in the Noise and Vibration Impact Assessment in Appendix 7 or it should be replaced with less noise intensive equipment.
	Activities that would generate an audible noise at sensitive receivers would be limited to occur between 7:00 am to 6:00 pm Mondays to Fridays and 7:00 am to 1:00 pm on Saturdays.
	Activities outside these standard hours would be undertaken with the equipment restrictions described in the Noise and Vibration Impact Assessment in Appendix 7 .
	Machines found to produce excessive noise compared to typical noise levels should be removed and replaced, or repaired or modified prior to recommencing works.
	Where possible construction vehicles and machinery would be turned off or throttled down when not in use.
	Equipment would be inspected and maintained in accordance with manufacturer's requirements.
	Use less noise-intensive equipment where reasonable and feasible.
	Construction equipment with the most effective mufflers, enclosures and low-noise tool bits and blades must be procured and utilised where practicable for the Project.
	Where possible mains power should be utilised for temporary traffic signals / work area lighting. Where this is not feasible silenced generator sets are to be used instead.
	Avoid unnecessary revving of engines and turn off plant that is not being used / required where practicable.
	Use only non-tonal reverse alarms (broadband alternatives are needed). Where possible organise the site so that delivery trucks and haulage trucks only drive forward to avoid the use of reversing alarms.
	Where practical fixed plant should be positioned as far away as possible from sensitive receivers.
	Upon receiving a noise complaint regarding demolition activities, the following steps would be undertaken:
	The person nominated in the Stakeholder Engagement Plan would investigate the source of the complaint. The aim would be to initiate an investigation no later than two hours after the complaint has been made (dependent on the nature of the complaint).
	Where practicable a visit would be made to the complainant to verify the nature of the complaint

Table 12.10: Noise and Vibration Mitigation Measures

Project Phase	Mitigation Measures
The Works (continued)	Where justified, appropriate action would be taken to amend the activity causing the complaint
	Where three or more substantiated complaints of a similar nature are received (from at least two complainants), the work element must be reviewed in order to consider whether the work methods can be changed or if additional mitigation methods can be employed in order to prevent or reduce the likelihood of further complaints being made.
	Attended monitoring should also be undertaken in response to substantiated complaints in order to validate and assess the source(s) giving rise to complaint(s).
	Attended monitoring would be undertaken every three months to assess compliance with the relevant noise limits.

13. SOIL AND WATER

13.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify soil and water management as a key issue for the Environmental Impact Statement. This section identifies the potential soil and water impacts of the Project and the management measures proposed to reduce these impacts.

Table 13.1 outlines the Secretary's Environmental Assessment Requirements relating to soil and water and where they have been addressed.

Table 13.1: Secretary's Environmental Assessment Requirements – Soil and Water

Requirement	Where Addressed
Soil and Water including:	
an assessment of the potential soil, groundwater and surface water and flooding impacts on all phases of the proposal;	Section 13
detailed baseline groundwater and surface water data and modelling of the potential surface water and groundwater impacts of the proposal;	Section 13
identification of any water licensing requirements or other approvals under the <i>Water Act 1912</i> and/or the <i>Water Management Act 2000</i>;	Section 2.5.2
details of water supply;	Section 8.2.7
a detailed water balance (including quantity, quality and source(s)) for the development, outlining the measures to minimise water use and any potential for a sustainable water supply;	Section 8.2.7
erosion, sediment, stormwater and wastewater management and controls during all phases of the proposal;	Section 8.2.1
consideration of any watercourses and impacts on groundwater dependent ecosystems; and	Section 13
wastewater predictions, and the measures that would be implemented to treat, reuse and/or dispose of this water.	Section 8.2.7

13.2 Existing Environment

13.2.1 Soils and Geology

According to the review of the regional geology described on the Sydney Basin Geological Sheet, the Smelter is underlain by siltstone, marl and minor sandstone from the Permian aged Rutherford Formation (Dalwood Group) in the Sydney Basin.

The Sydney Basin is a sedimentary basin consisting of Permian and Triassic sedimentary rocks, which extends from Newcastle in the north to Batemans Bay in the south and to Lithgow, just west of the Blue Mountains. The basin overlies older basement rocks of the Lachlan Fold Belt. The sedimentary rocks of the basin generally consist of near horizontal sandstones and shales, with some recent igneous dykes. Only minor folding and faulting has occurred since these sedimentary rock sequences first formed. The Dalwood Group is stratigraphically located near the base of the Sydney Basin below both the Greta Coal Measures and Newcastle Coal Measures and was deposited in a marine environment.

Quaternary sediments which are associated with Swamp Creek (located to the east of the Project), Wentworth Swamps and the Hunter River consist of complex interbedded fluvial and marine sands and estuarine muds deposited within an estuarine environment during periods of sea level rise and fall.

13.2.2 Water

13.2.2.1 Surface Water

Wentworth Swamp is the main water feature on the Hydro Land. Swamp Creek, Black Waterholes Creek and several smaller tributaries are tributaries of Wentworth Swamp. Swamp Creek flows in a northerly direction in the east of the Hydro Land, while Black Waterholes Creek flows in a northerly direction in the northwest of the Hydro Land. Both creeks flow into the Wentworth Swamp discharging to Wallis Creek, which then flows into the Hunter River. Swamp Creek is approximately 180 metres to the east of the southeast corner of the Project. **Figure 13-1** identifies the watercourses within and immediately adjacent to the Project Site.

An unnamed watercourse is located approximately 45 metres to the west of the Project Site. This unnamed watercourse is a tributary to Black Waterholes Creek. Other small ephemeral watercourses and low lying areas are located to the east of the Smelter and drain to Swamp Creek.

The Smelter has an existing stormwater and surface water management system. This includes:

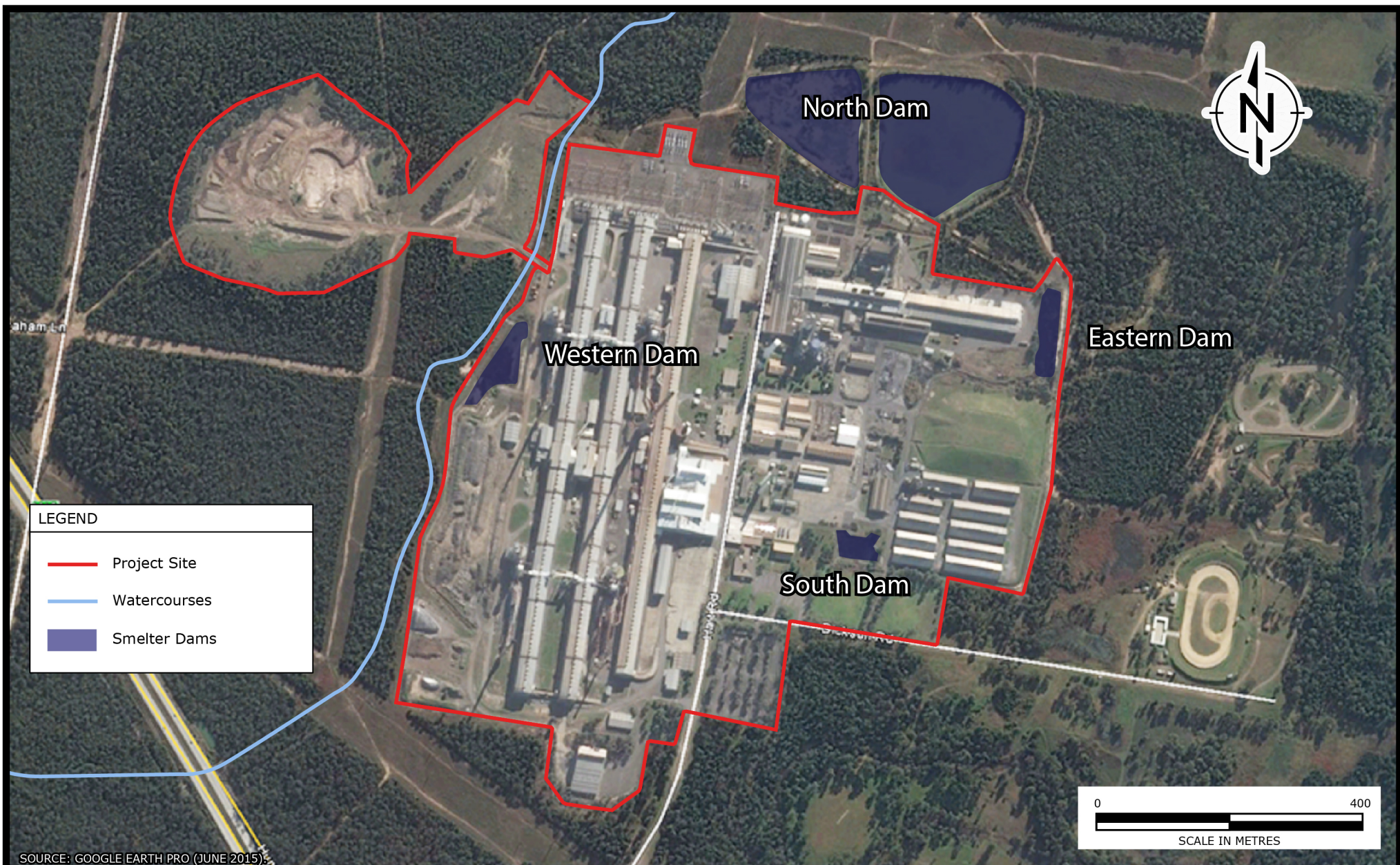
- Subsurface and open surface water drainage throughout the Smelter.
There three dams within the Smelter: one dam in the west of the Smelter, one in the east of the Smelter and one in the south of the Smelter. These are the initial collection and treatment points for the water. These dams are constructed with a compacted soil base. The east dam has a capacity of approximately 12,000m³, the west dam has a capacity of approximately 9,500m³ and the south dam has a capacity of approximately 4,600m³. Groundwater monitoring does not indicate that groundwater has been contaminated as a result of infiltration of contaminants from the dams.
- Two dams located to the north of the Smelter (known as the North Dam). The North Dam is constructed with a compacted clay soil base. The North Dam has previously been used as part of the water collection and treatment system for the Smelter. These continue to capture surface water runoff from the Smelter Site, receiving water that has passed through the east and west dams. Hydro is permitted under its EPL to irrigate an area of Hydro Land to the north of the Smelter with water from these dams. The North Dam has a capacity of approximately 129,500m³. Fluoride concentrations in the North Dam have been monitored on a monthly basis by Hydro. Results from 2015 indicate fluoride concentrations range from 9.8mg/L to 21mg/L.
Groundwater monitoring does not indicate that groundwater has been contaminated as a result of infiltration of contaminants from the North Dam. It is expected that infiltration to groundwater from the North Dam surface water would be limited due to the compacted clay base.

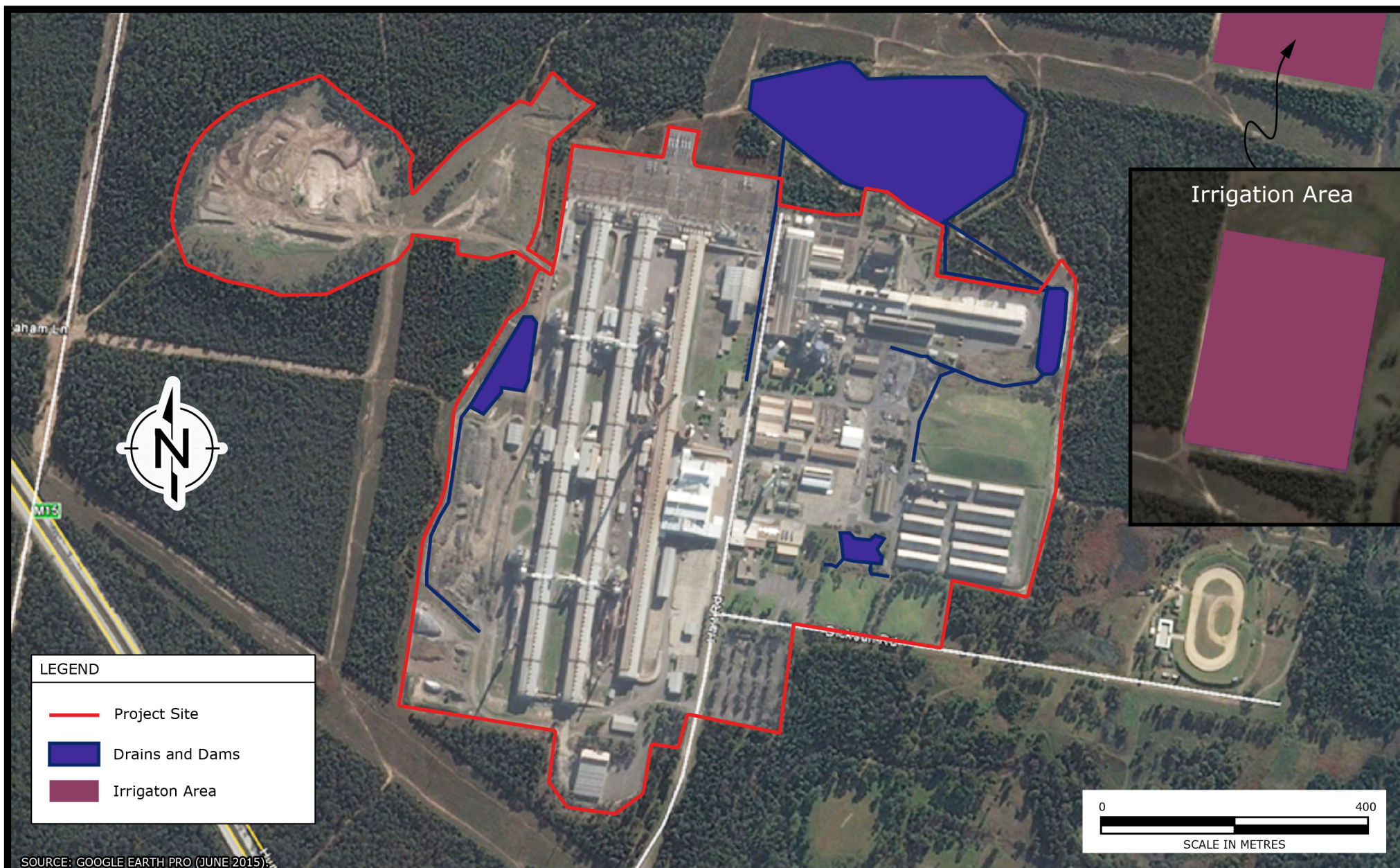
Figure 13-2 shows the major elements of the existing stormwater and surface water management system.

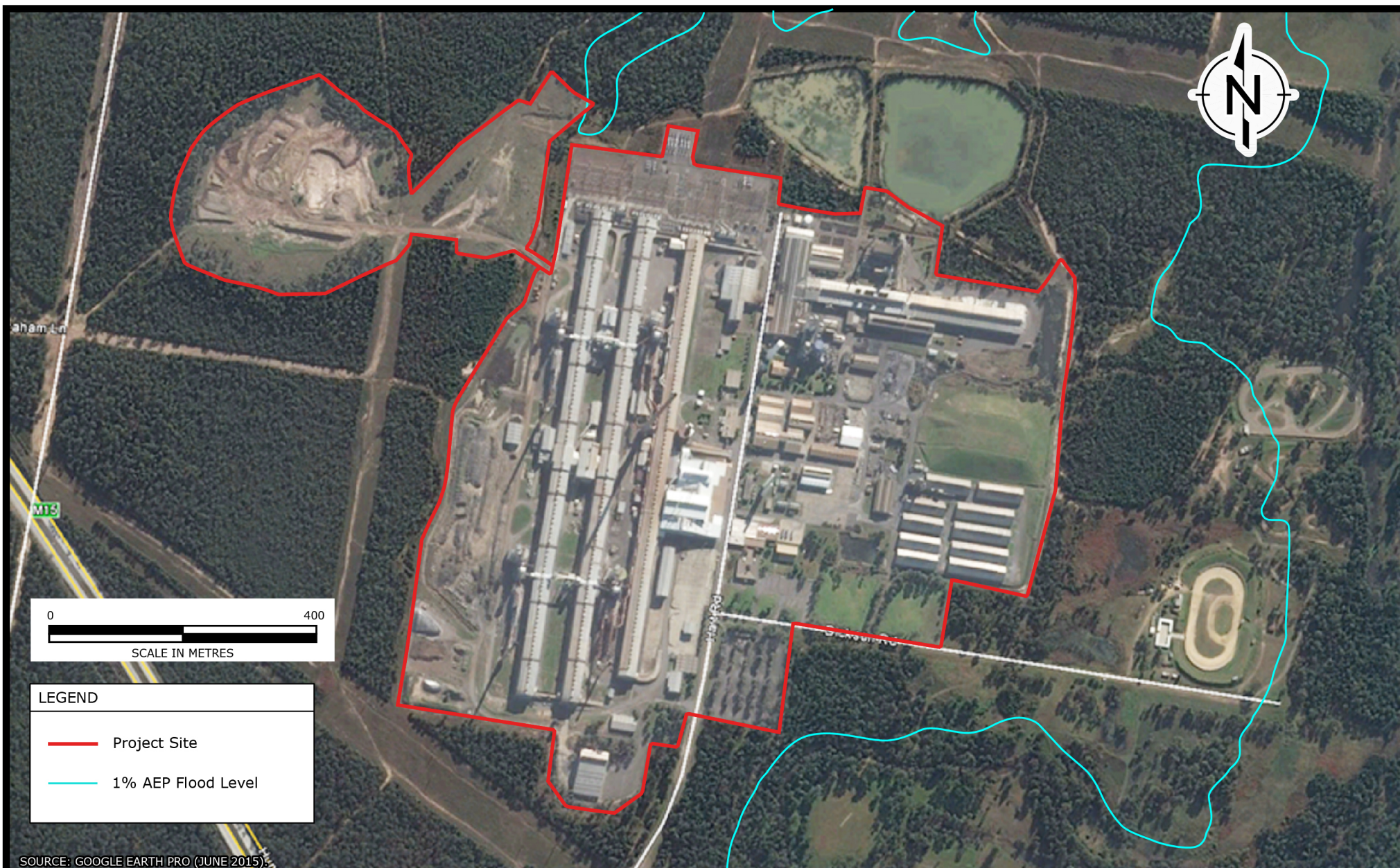
The Project Site is located above the 1% Annual Exceedence Probability (AEP) flood level. **Figure 13-3** shows the 1% AEP flood level.

Concentrations of fluoride and cyanide and pH level are routinely monitored in the North Dam. Concentrations measured in 2015 show:

- Fluoride below 21mg/L
- Conductivity below 810 uS/cm.
- pH between 6.9 and 8.0 pH units.







1% ANNUAL EXCEEDENCE PROBABILITY FLOOD LEVEL
 FORMER HYDRO ALUMINIUM KURRI KURRI SMELTER
 DEMOLITION AND REMEDIATION

FIGURE
13-3

AS130401

Hydro undertakes a surface water monitoring program that encompasses the creek systems of Wentworth Swamp, ephemeral ponds within the Hydro Land and catchment dams located between 2km and 7km from the Smelter. Upstream and downstream locations are monitored monthly for pH, conductivity, fluoride, with several locations also monitored for free cyanide. Monitoring results are compared against ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* stock watering and irrigation (long term) guidelines and pH guidelines for irrigation and aquatic ecosystems. Monitoring results are reported annually in the Annual Environmental Monitoring Report.

Free cyanide results have been consistently below the laboratory detection limit. Fluoride concentrations upgradient of the Smelter have been consistently below the guidelines for stock watering and irrigation. Elevated fluoride has been identified at ephemeral ponds in close proximity to the Smelter site, with fluoride levels increasing between significant rainfall periods. These ephemeral ponds are only able to be sampled around three to four months of the year. Fluoride concentrations downgradient of the Smelter in Wentworth Swamp have generally been below the stock watering guideline but occasionally marginally above the irrigation guideline. pH at all locations has been within the guideline range of 4.5 to 9.

13.2.2.2 Groundwater

Groundwater in the east of the Project Site was identified at shallow depths within the estuarine sands, between 1m and 5m bgs. At the Clay Borrow Pit in the groundwater was identified within residual clay at depths ranging between 8m and 9m bgs.

Groundwater generally flows to the north and northeast following topography. Shallow groundwater would discharge to the Wentworth Swamp surface water system.

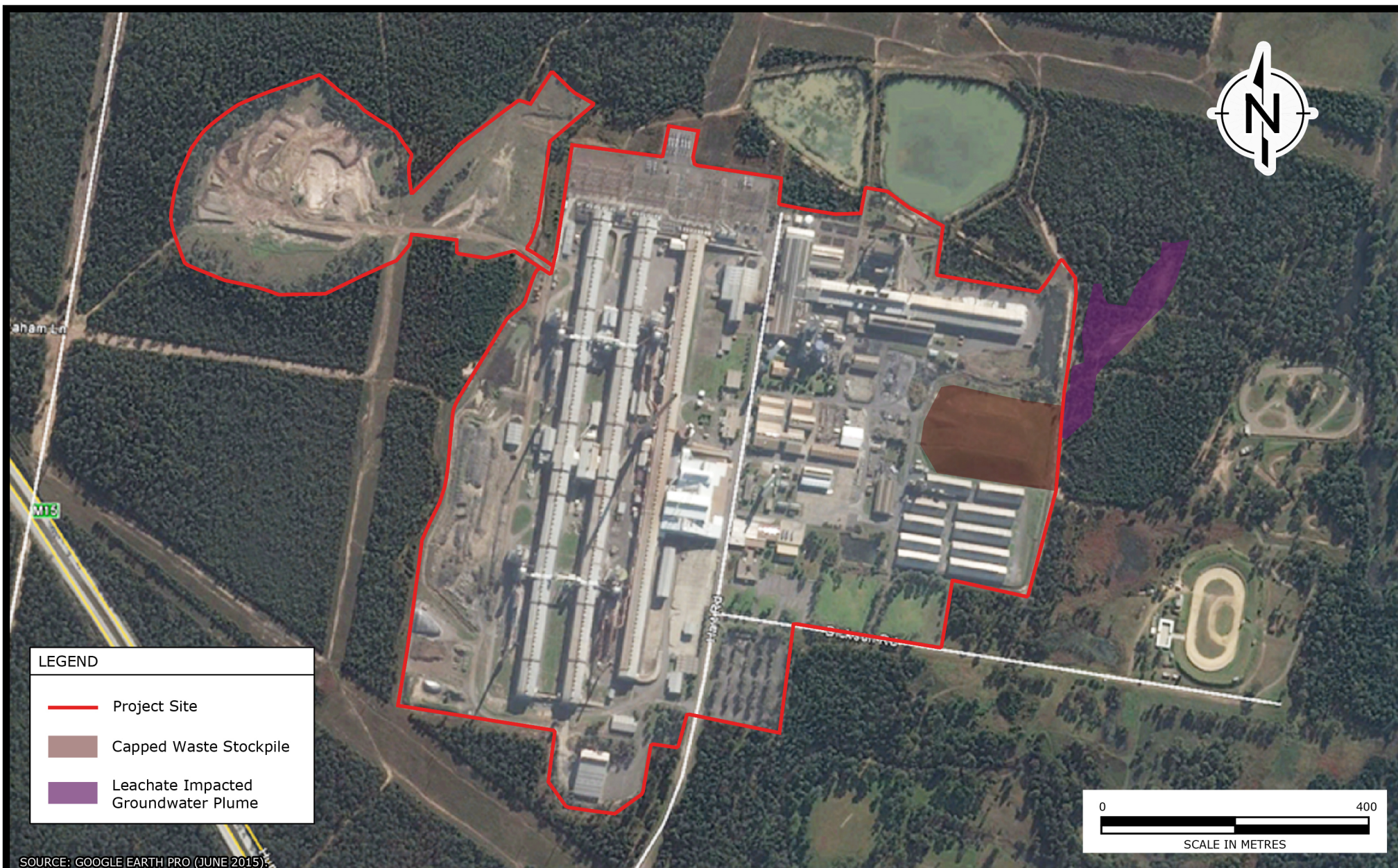
Groundwater beneath the Smelter Site has been impacted primarily due to the leaching of fluoride and aluminium from smelter materials into groundwater. Fluoride concentrations ranged between 0.22 and 43mg/L, and aluminium concentrations ranged between 0.08 and 13.6mg/L over two sampling rounds.

Groundwater immediately down gradient of the Capped Waste Stockpile has been impacted by leachate generated from contact of wastes in the stockpile with shallow groundwater and from the infiltration of water through the Capped Waste Stockpile (prior to capping). The leachate plume is characterised by elevated fluoride, cyanide and sodium concentrations and by a high pH (>9). The leachate plume extends approximately 350m northeast of the eastern toe of the Capped Waste Stockpile. The extent of the leachate plume is limited by the geology of this area, with the leachate moving through coarse grained sand lenses surrounded by high plasticity clays. The leachate has not moved laterally or vertically through the high plasticity clays due to low permeability of these structures. The plume therefore presents as a localised sinuous configuration that is approximately 350m in length.

The aquifer impacted by the leachate is close to the ground surface (0.3m to 2.5mbgs) within unconsolidated estuarine sediments, is ephemeral in nature and has a low yield (and therefore not a useful water supply source).

Figure 13-4 shows the location of the Capped Waste Stockpile leachate plume.

Long term monitoring has shown that groundwater quality has significantly improved since the capping of the stockpile in 1995. In addition Hydro has installed a trench down gradient of the Capped Waste Stockpile to capture leachate, which is then diverted to a water treatment plant before being discharged to the North Dam. Monitoring indicates that this has also resulted in improvements in groundwater quality. **Figure 13-5** presents the results of the Capped Waste Stockpile fluoride in groundwater monitoring.



CAPPED WASTE STOCKPILE LEACHATE IMPACTED GROUNDWATER PLUME
 FORMER HYDRO ALUMINIUM KURRI KURRI SMELTER
 DEMOLITION AND REMEDIATION

FIGURE
13-4

AS130401

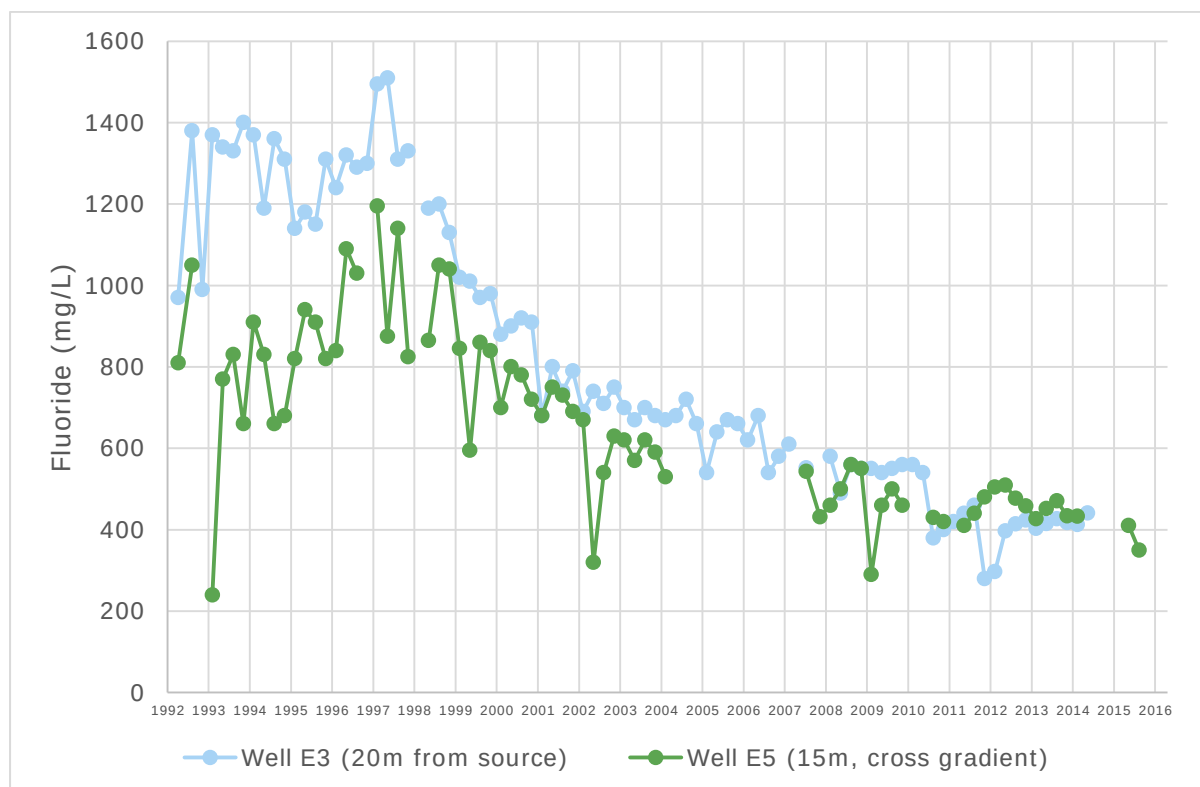


Figure 13-5: Capped Waste Stockpile Fluoride Groundwater Levels

Groundwater Dependent Ecosystems are associated with the coarse grained sand lenses. As a result of the contamination of the shallow aquifer, there has been some dieback of vegetation in the area corresponding to the leachate impacted groundwater leachate plume. Some improvements in vegetation condition have been witnessed since the leachate capture and treatment commenced in 2014.

Fate and transport modelling of the plume migration was completed to assess the potential for migration of the plume to the surface water receiver, Swamp Creek. Fate and transport modelling used a two dimensional model and assumed conservative transport and source parameters in order to provide a reasonable worst case prediction of migration. Particularly, the modelling assumed an infinite leachate source, which would not occur following relocation of the Capped Waste Stockpile and treatment of the entrained leachate.

Fate and transport modelling predicted that concentrations of fluoride at the Swamp Creek receiver, if no remediation was completed, would be around 5mg/L.

13.2.2.3 Water Supply

The Smelter is currently serviced by a potable water supply from the Hunter Water Corporation (Hunter Water) network.

13.2.3 Contamination

13.2.3.1 Soils

A number of contamination investigations have been undertaken at the Smelter since operations ceased in 2012. These investigations included a historical review of the Smelter Site, identification of Potential Areas of Concern and Areas of Concern, intrusive investigations for soil and groundwater and delineation of Areas of Concern. These investigations (described in further detail in the Remedial Action Plan in **Appendix 5**) identified the following Areas of Environmental Concern:

- Capped Waste Stockpile: Whilst not identified to represent a risk to downgradient ecology, the ongoing migration of leachate from the stockpile may present an unacceptable risk to future development of the site for industrial land use.
- Anode Waste Pile: Polycyclic aromatic hydrocarbon (PAH) contamination in surface soils to 0.2m below ground surface (bgs).
- Diesel Spray Area: PAH contamination of fill material at 0.4m to 0.6m bgs.
- Drainage Lines: PAH contamination of sediments in drainage lines around the Capped Waste Stockpile and the Anode Waste Pile.
- East Surge Pond: PAH contamination of sediments.
- Carbon Plant: PAH contamination of shallow soils to 0.4m bgs in grassed areas and gardens beds at the western end of the Carbon Plant.
- Bake Furnace Scrubber: PAH contamination in shallow soils to 0.3m bgs in grassed areas below the scrubber duct work.

Figure 8.7 and **Figure 8.8** show the location of the Capped Waste Stockpile and key areas of contamination within the Smelter.

Vertical delineation of the soil contamination at each Area of Environmental Concern was completed as part of the Stage 2 Phase 2 investigations. The soil contamination identified was PAH (primarily benzo(a)pyrene) contamination in fill, which has not extended into the underlying alluvial sands and has not impacted groundwater. Lateral delineation of soil contamination has been completed to the extent practicable (buildings, stockpiles, roads and services limit potential sampling locations).

Lateral delineation of soil contamination and hotspots would be undertaken at some Areas of Environmental Concern (such as the Diesel Spray Area) following demolition and prior to remediation.

Vertical delineation beneath the Capped Waste Stockpile has found limited impacts to residual soils. Excavation of these soils and validation forms part of the remediation strategy.

13.2.3.2 Groundwater

As discussed in **Section 13.2.2.2** monitoring results show groundwater within the Smelter and below and downstream of the Capped Waste Stockpile are contaminated, with elevated fluoride, cyanide and sodium concentrations and a high pH.

13.3 Impact Assessment

13.3.1 Soil

Runoff from stormwater and dust suppression water has the potential to collect and disperse dust, soils and other particulates beyond the Works area and into the surface water drainage and watercourses. Erosion and sediment controls (as described in **Section 8.2.1**), such as geotextile fabric, would be installed at appropriate locations to divert clean water and to capture and collect soils, dusts and particulates from water runoff.

The existing sealed road network within the Smelter would continue to be used for vehicle access wherever possible, minimising vehicle movements over exposed soils and unsealed access tracks.

13.3.2 Water

13.3.2.1 Surface Water

Section 8 describes a number of measures to be implemented as part of the Works to protect surface water quality:

- Implementation of erosion and sediment controls (as described in **Section 13.4**
 - Continued operation and maintenance of the existing stormwater and surface water management system (as described in **Section 8.2.1.5**).
- The quality of water (including stormwater, used dust suppression water and treated discharges from the water treatment plants) that would be managed by the system would

be consistent with water quality currently managed by the system. As such there would be no adverse impacts on the system and no upgrades to the system would be required.

- The wastewater management measures described in **Section 8.2.3** (amenity facilities), **Section 8.8.2** (Containment Cell), **Section 8.5** (Capped Waste Stockpile removal) and **Section 8.10** (leachate management).
- The methodology to be implemented in excavating the Capped Waste Stockpile (**Section 8.5.4**) and material placement at the Containment Cell (**Section 8.8.1**) would minimise the area of contaminated material potentially exposed to stormwater and thereby reduce the amount of contaminated water requiring treatment.

As discussed in **Section 13.3.2.1** and shown in **Figure 13-2** the Project Site is located above the 1% AEP flood level. As such the Works locations would be protected from flood waters. In addition, Hart Road is above the 1% AEP flood level and therefore Works personnel would have a safe egress from the Project Site in the event of major flooding of surrounding areas.

As discussed in **Section 8.2.6** the haul road connecting the Smelter to the Containment Cell would require installation of a culvert or small bridge construction at the crossing of the unnamed watercourse. The crossing on the existing access track to the Clay Borrow Pit would not be sufficient to allow two 30 tonne trucks to pass. As such a new crossing would be constructed. The key elements of the crossing would be:

- A culvert design that minimises impacts on the existing hydrology. This would include maintaining the existing flows in the watercourse and minimising increases in the upstream 1% AEP flood levels.
- A road surface above the 5% AEP flood level.
- Drainage (such as a dish drain) that captures and diverts surface drainage to the Smelter water management system (refer to **Section 8.2.1**).

In the event that heavy rain events are predicted for the Project Site:

- Weather warnings and local weather conditions would be continually observed to determine the likelihood the Project Site would be impacted.
- Preparations would be made for appropriate protective measures (such as placement of wet weather covers over exposed materials at the Containment Cell and the Capped Waste Stockpile).
- Works would cease and protective measures implemented.
- The stormwater management system would be inspected during (when safe to do so) and immediately after the heavy rain event to assess performance and if maintenance is required.

As discussed in **Section 13.2.2.1** the Smelter dams provide significant capacity to retain stormwater if required as a result of a heavy rain event.

13.3.2.2 Groundwater

Groundwater is not expected to be encountered during the Works with the exception of excavation of the Capped Waste Stockpile and demolition works less than 1.5m bgs. Groundwater impacted with fluoride is a potential concern for personnel undertaking subsurface activities, if intercepted.

Groundwater encountered in the Capped Waste Stockpile comprises leachate and groundwater impacted with leachate. This groundwater would be extracted using sumps or extraction wells within the Capped Waste Stockpile and treated prior to discharge through the on-site water management system.

The base of the Containment Cell would be a minimum of three metres above the highest predicted groundwater table level and would not impact on groundwater flow rates or direction. The near surface geology in the location of the Containment Cell comprises low permeability clays and as such is not an area of significant rainfall recharge.

The geology in the area of the Containment Cell, the engineered base layers to the Containment Cell and the proposed distance between the Containment Cell and the highest predicted groundwater table level combine to provide significant protection to groundwater in the highly unlikely event that leachate is generated.

The presence of the Containment Cell and the diversion of infiltration around the cell would not significantly affect aquifer recharge.

The implementation of environmental management measures throughout the Works (including those described in **Table 13.2**) would protect groundwater quality.

Leachate from the Capped Waste Stockpile is the source of the groundwater contamination (as discussed in **Section 13.2.2.2**). The removal of the Capped Waste Stockpile described in **Section 8.5** and the leachate removal and treatment described in **Section 8.11** would remove the source of the groundwater contamination. The removal of the contamination sources would significantly accelerate the reduction of contaminant levels in the plume.

This improvement in groundwater quality resulting from remediation of the Capped Waste Stockpile would also accelerate improvements in the Groundwater Dependant Ecosystems in the area of the plume.

13.3.2.3 Water Supply

As discussed in **Section 8.2.7** to maintain the connection to the Hunter Water potable supply system for as long as possible during the Works. The internal water supply network would be maintained and supplemented as required (such as to service contractor compounds).

Hydro proposes that rather than to irrigate an area of pasture to the north of the Smelter, water from the North Dam would be used for dust suppression throughout the Project Site. As discussed in **Section 8.2.1** a water cart refilling station would be installed on the southern side of the North Dam.

13.3.3 Contamination

Contaminated soils and groundwater within the Project Site would be managed and remediated as described in **Section 8.5** (Capped Waste Stockpile), **Section 8.6** (Contamination Remediation) and **Section 8.11** (Groundwater and Leachate Removal and Treatment). The Project Site would be remediated to make it suitable for redevelopment for employment land (refer to **Section 2.4.2** for the proposed land use zoning for the Project Site and Hydro Land).

Where contaminated soils have been stockpiled prior to placement in the Containment Cell, erosion and sediment controls described in **Section 8.2.1** would be installed to minimise the potential for contaminated sediments to leave the stockpile. In addition the applicable remediation activities described in **Section 8.6** would also be implemented so that the location is suitable for the proposed future land use.

Buildings and structures to be demolished during the Works contain contaminants that, without appropriate management, could result in contamination of surrounding soils. To minimise the potential for this to occur, the following activities have been or would be implemented:

- The removal of hazardous materials (such as asbestos containing materials, oils and smelter wastes) has commenced (as discussed in **Section 3.4.2**) and would continue as required during the Works prior to demolition (as described in **Section 8.7.2**).
- The demolition methodology described in **Section 8.7** and the additional air quality mitigation measures described in **Section 11.4** would further mitigate the potential for dispersion of any residual contaminants.

13.4 Mitigation Measures

A Soil and Water Management Plan would be developed as part of the Project Environmental Management Plan prior to the commencement of the Project. The plan would incorporate the measures described in **Table 13.2**.

Table 13.2: Soil and Water Management Measures

Project Phase	Mitigation Measures
Site Establishment	Erosion and sediment controls would be installed prior to the commencement of the Works. This would include installation of geotextile fabric downstream of Works areas. These controls would continue to be managed and maintained throughout the Works.
	All Works personnel would be informed during the site induction of their obligations to minimise erosion and protect water quality.
	Undertake any required additional maintenance of the existing surface water drainage and dams prior to commencing the Works.
The Works	Erosion and sediment controls would be inspected and maintained as required on a weekly basis and after a rain event.
	The surface water drainage system would be inspected and maintained as required on a monthly basis.
	Vehicles exiting the Project Site onto public roads would be inspected for mud and dirt. If required vehicles would be manually cleaned prior to exiting the Smelter.
	Vehicle refuelling would be undertaken using mobile refuelling vehicles equipped with spill containment equipment and a spill kit.
	All chemicals on-site would be stored in accordance with the applicable Safety Data Sheet.
	An appropriate spill kit is to be on-site at all times and any spillage is to be immediately cleaned up. In the event of a large or hazardous spill, the fire brigade, police, ambulance and OEH would be contacted as appropriate.

14. HAZARDS AND RISKS

14.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify hazards and risks relating to hazardous materials as key issues for the Environmental Impact Statement. This section identifies the potential hazards and risks posed by the Project and the management measures proposed to address these potential hazards and risks in accordance with the requirements of SEPP 33.

Table 14.1 outlines the Secretary's Environmental Assessment Requirements relating to hazards and risks associated with hazardous materials and where they have been addressed.

Table 14.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
Hazards and Risks including - a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (DoP, 2011), and Multi-Level Risk Assessment (DoP, 2011). The PHA must: - provide details of all hazardous materials stored or handled on the premises during the demolition and remediation phases. - identify the hazards associated with each material that will be stored or handled in the proposed development. Any safety measures to be implemented should also be clearly identified; - estimate the risks from the proposed development; - demonstrate that the potential off-site risk from the proposed development comply with the criteria set out in Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning; and - an evaluation of the impacts of the transport of dangerous goods to and from the site in the surrounding area.	Section 14

14.2 Impact Assessment

14.2.1 Hazardous Materials

Table 14.2 lists the hazardous materials at the Smelter to be handled during the Project and the potential hazards associated with the material.

Table 14.2: Project Site Potential Hazards

Hazardous Material	Potential Hazard / s
Existing Project Site	
Hazardous demolition wastes (refer to Section 8.7.2)	Potential for exposure to hazardous materials (inhalation or ingestion) if not handled in accordance with SafeWork NSW guidelines.
Capped Waste Stockpile materials	Potential for hazardous demolition wastes (such as asbestos) and smelter wastes (such as spent pot lining) to be present, resulting in potential health impacts (via inhalation or ingestion) during excavation, transportation and placement in the Containment Cell. Potential for generation of hazardous gases and liquids, and potential for exposure (inhalation, ingestion or skin contact) during excavation, transportation and placement in the Containment Cell.

Table 14.2: Project Site Potential Hazards

Hazardous Material	Potential Hazard / s
Contaminated soils	Potential for exposure (inhalation, ingestion or skin contact) to contaminants if incorrectly handled.
Contaminated groundwater	Potential for exposure (inhalation, ingestion or skin contact) to contaminants if incorrectly handled.
Works Activities	
Oil and fuels	Potential for fire or explosion if incorrectly transported, stored or handled. Potential for exposure (inhalation, ingestion or skin contact) if incorrectly handled.
Explosives	Potential for explosion if incorrectly transported, stored or handled.
Containment Cell Management	
Containment Cell contents and leachate	Potential for leachate and gases to be generated and uncontrolled discharge to occur.

As discussed in **Section 3.4** Hydro has commenced, and has planned, a number of decommissioning and pre-demolition activities that do not require development approval. This includes the removal of a number of the hazardous materials listed in **Table 14.2** and transportation from the Smelter to an appropriately licensed facility.

As development approval is not required for these activities, and it is anticipated many of these materials would be removed prior to Project commencement, they have not been included in this PHA.

14.2.2 Potential Hazards

Table 14.3 identifies the hazardous materials to be handled as part of the Project (including materials likely to be transported to the Project Site), how they would be managed and/or used and the potential residual consequence (with regard to the potential hazards identified in **Table 14.2** and the consequence assessment methodology described in the *Multi-level Risk Assessment* (Department of Planning, 2011)).

Table 14.3: Project Site Hazardous Materials and Proposed Management Approach

Hazardous Material	Proposed Management Approach	Potential Residual Consequence
Existing Project Site		
Hazardous demolition wastes	Removal of accessible hazardous materials prior to demolition. Removal of remaining hazardous materials requiring demolition for access in accordance with a removal protocol. Implementation of an Unexpected Hazardous Materials Protocol for management of previously unidentified hazardous materials. All hazardous material removal in accordance with SafeWork NSW guidelines, including provision of personal protective equipment. Containment and storage of removed hazardous materials in accordance with SafeWork NSW requirements.	Minor On-site

Table 14.3: Project Site Hazardous Materials and Proposed Management Approach

Hazardous Material	Proposed Management Approach	Potential Residual Consequence
	Disposal of hazardous materials within the Containment Cell (refer to Section 8.8). Implementation of the Work Health and Safety Management Plan outlined in Section 8.1.2.	
Capped Waste Stockpile materials	Refer to removal, transport and Containment Cell placement procedures described in Section 8.5 and Section 8.8. Implementation of the monitoring and personal protective equipment requirements identified in Section 23.3. Implementation of the Work Health and Safety Management Plan outlined in Section 8.1.2.	Minor On-site
Contaminated soils	Refer to the removal, transport and Containment Cell placement procedures described in Section 8.6 and Section 8.8. Implementation of the Work Health and Safety Management Plan outlined in Section 8.1.2.	Minor On-site
Contaminated groundwater	Implementation of the personal protective equipment requirements identified in Section 23.3. Implementation of the Work Health and Safety Management Plan outlined in Section 8.1.2.	Minor On-site
Works Activities Materials		
Oil and fuel storage	Small amounts to be stored at the Project Site, with refuelling vehicles to travel to the Project Site as required for refuelling Works machinery. Oils and fuels stored in accordance with the applicable Safety Data Sheet. Implementation of the Work Health and Safety Management Plan outlined in Section 8.1.2. Provision of appropriate spill kits as described in Section 13.4.	Minor On-site
Explosives	Explosives to be stored on-site for a limited timeframe within a secured location as required by the applicable Safety Data Sheet. Blasting would be designed and undertaken by an experienced and qualified specialist. Blasting would be undertaken as described in Section 8.7.3. This includes the implementation of an exclusion zone. Implementation of the Work Health and Safety Management Plan outlined in Section 8.1.2.	Major On-site

Table 14.3: Project Site Hazardous Materials and Proposed Management Approach

Hazardous Material	Proposed Management Approach	Potential Residual Consequence
Containment Cell Management		
Containment Cell Contents	Design, construction and filling of the Containment Cell as described in Section 8.4.1 and Section 8.8 . Operation of the leachate collection and treatment system as described in Section 8.8.2 and Section 9.2 . Management, monitoring and maintenance of the Containment Cell as described in Section 9 .	Minor On-site Minor Off-site

14.2.3 Hazard Analysis

The *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (Department of Planning, 2011) identifies “Water/ Sewage treatment” as a potentially hazardous industry, with “Chemical spills, Mixing of incompatibles” the potential hazard source and “Exposure to toxic liquids and gases” being the possible impact.

The *Multi-level Risk Assessment* (Department of Planning, 2011) identifies “fuel storage” and “explosives (storage of ammunition)” as potentially hazardous industries.

A hazard analysis has been undertaken with consideration to the risk assessment approach in the Australian Standard AS4360: *Risk Management*, the *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (NSW Department of Planning, 2011a), *Hazardous Industry Planning Advisory Paper No 6: Hazard Analysis* (NSW Department of Planning, 2011b) and *Multi-Level Risk Assessment* (Department of Planning, 2011c).

A qualitative assessment has been undertaken for the PHA. The *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* says that a qualitative assessment can be undertaken if the criteria listed in **Table 14.4** are met (which is achieved by the Project and this assessment):

Table 14.4: PHA Qualitative Assessment Criteria and How Achieved

PHA Qualitative Assessment Criteria	How Criteria Achieved
Screening and risk classification and prioritisation indicate there are no major off-site consequences and societal risk is negligible	The Consequence Analysis (refer to Section 14.2.3.1) considered the potential residual consequences described in Table 14.3 and the potential for major off-site consequences and societal risk (as described in the <i>Multi-level Risk Assessment</i> (Department of Planning, 2011)). The Analysis concluded that there are no major off-site consequences, and the societal risk is negligible. The Human Health Risk Assessment (refer to Appendix 11) concluded that the potential health risks to off-site sensitive receivers associated with the Project was not major.

Table 14.4: PHA Qualitative Assessment Criteria and How Achieved

PHA Qualitative Assessment Criteria	How Criteria Achieved
The necessary technical and management safeguards are well understood and readily implemented	Section 8 includes measures and safeguards to be implemented that would minimise the potential for potential hazards to occur. Section 22.4 lists additional mitigation measures identified by the Human Health Risk Assessment (refer to Appendix 12) to further protect Works personnel working at the Capped Waste Stockpile.
There are no sensitive surrounding land uses	The nearest sensitive land use (residential) is located approximately 420 metres from the Project Site.

14.2.3.1 Consequence Analysis

The Works

Table 14.3 identifies explosives as the Works activity posing the greatest residual consequence. The worst case consequence of such an occurrence would be **major** due to a fatality or permanent injury to Project Site personnel. For this to occur the Works activities described in **Section 8** and **Table 14.3** would not have been followed and the conditions conducive to this occurrence have been allowed to occur, and personnel being in a position of risk.

In the rare event (refer to **Section 14.2.3.2**) that all the conditions conducive to an unscheduled or poorly managed explosion occurred the distance to the nearest sensitive receivers (420 metres from the Project Site boundary to the nearest residence, and 240 metres from the Project Site boundary to the Kurri Kurri Speedway) would minimise the potential for off-site impacts.

Containment Cell Management

Containment Cell Management poses a **minor** on-site and off-site residual consequence. The worst case consequence would be **minor** (short term and isolated exceedence of water quality standards) due to leachate discharging to the environment without passing through the water treatment system. For this to occur the Containment Cell material would need to generate leachate, the leachate to discharge from the Containment Cell, the water treatment plant to not be operational, and the leachate storage capacity of the water treatment plant breached. Due to the likely quantity of leachate the impact of such a discharge would largely be restricted to the Project Site, but could result in a low level of pollution of the unnamed watercourse.

14.2.3.2 Likelihood Analysis

The Works

The Works methodology described in **Section 8** has been developed with recognition of the potential risks associated with the hazardous materials and the need to minimise the potential risks to Works personnel and off-site residents and land users. Measures addressing these issues are inherent in the procedures described in **Section 8** and identified in **Table 14.3**.

These measures would be detailed in the management documentation described in **Section 8.1**. These documents would be implemented to maintain the efficient and effective operation of these elements. A monitoring and auditing program would be developed as part of the management documentation and implemented to assess compliance with the procedures.

An emergency response procedure would also be a key component of the management documentation, advising site personnel of how to respond to a particular potential event.

With the proposed measures and management structure for the Works, the likelihood of the hazards identified in **Table 14.2** would be **rare** (it would only occur in exceptional circumstances).

Containment Cell Management

The Containment Cell is to be designed, constructed and filled to minimise the potential for leachate generation. Containment Cell Management would include management, maintenance and monitoring activities that

With the proposed Containment Cell design and operation procedures, the likelihood of the hazards identified in **Table 14.2** would be **rare** (it would only occur in exceptional circumstances).

14.3 Risk Level and Management

The Works

With a **major** consequence and a **rare** likelihood, the risk level of the Works according to *AS4360: Risk Management* is **medium**. Medium level risks can be managed with the standard measures described in **Section 8** and **Table 14.3**.

Containment Cell Management

With a **minor** consequence and a **rare** likelihood, the highest risk level of the Containment Cell Management according to *AS4360: Risk Management* is **negligible**. Negligible level risks can be managed with the standard measures described in **Section 8**, **Section 9** and **Table 14.3**.

15. TRANSPORT AND ACCESS

15.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify transport and access management as a key issue for the Environmental Impact Statement. This section identifies the potential transport and access impacts of the Project and the management measures proposed to reduce these impacts.

Table 15.1 outlines the Secretary's Environmental Assessment Requirements relating to transport and access and where they have been addressed.

Table 15.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
Transport and Access including:	
accurate predictions of the traffic generated by all phases of the proposal	Section 15.3
a detailed assessment of the potential impacts of the proposal on the capacity, efficiency and safety of the road network, including the truck routes and cumulative traffic generated	Section 15.3
details of any required upgrades to road infrastructure	N/A
site access, internal roads and vehicular parking required as a result of the development	Section 8.2.6, Section 8.3 and Section 15.3

A Traffic Impact Assessment has been prepared and is presented in **Appendix 8**. This section presents the key findings of the assessment.

15.2 Existing Environment

15.2.1 Public Roads

Table 15.2 identifies the key public roads in the area surrounding the Project Site and describes their characteristics.

Table 15.2: Key Roads Surrounding the Project Site

Road	Hierarchy	Main characteristics
M15 Hunter Expressway	Motorway	M15 Hunter Expressway is a dual carriageway motorway with two lanes in each direction running in southeast-northwest direction from M1 Motorway at the Newcastle Link Road (A15) interchange to the New England Highway (A43) north of Branxton. Two interchanges connect to the M15 Hunter Expressway in the vicinity of the Project Site: Hart Road Interchange. The Hart Road interchange is constructed as a half interchange with east-facing ramps at Hart Road. Traffic traveling towards Branxton can exit the expressway at this interchange to access Hart Road. Traffic on Hart Road can use the on-ramp to travel southeast towards Newcastle. Kurri Kurri Interchange. Kurri Kurri interchange is constructed as a full interchange with east and north facing on/off ramps at Main Road-Cessnock Road.

Table 15.2: Key Roads Surrounding the Project Site

Road	Hierarchy	Main characteristics
Hart Road	Local	Hart Road is a local road with the main purpose to provide access to/from the Smelter. Hart Road is undivided road with one lane in each direction. It has post speed limit of 70 km/h. Hart Road is connected with M15 Hunter Expressway via the Hart Road Interchange. An overbridge (one lane in each direction) is constructed to maintain access on Hart Road over M15 Hunter Expressway. The southern end of Hart Road intersects with Government Road/ Sawyers Gully Road.
Dickson Road	Local	Dickson Road is a local road which intersects with the northern end of Hart Road and provides access to the eastern parts of the Hydro Land, including properties leased by the Kurri Kurri Speedway and the Kurri Kurri Junior Motorcycle Club. Dickson Road is undivided road with two travel lanes (one lane in each direction). Dickson Road is currently a no through road, and on-street parking is permitted.
Main Rd- Cessnock Road	Route of State Significance	Main Road-Cessnock Road is an arterial route connecting Maitland and Cessnock via Gillieston Heights, Cliftleigh, Heddon Greta, Kurri Kurri, Weston and Abermain. Main Road is connected with M15 Hunter Expressway via Kurri Kurri Interchange. Main Rd-Cessnock Rd passes through the Kurri Kurri town centre as Lang Street, part of Mitchell Avenue and Northcote Street. Main Road-Cessnock Road is undivided road with two travel lanes (one lane in each direction). It has various sign post speed limits between 60-80 km/h along the entire route.

Traffic count surveys were undertaken in February 2015 for the purpose of the traffic assessment of the Project.

Table 15.3 shows existing peak hour traffic volumes on Hart Road, Cessnock Road (Main Road) and the Hunter Expressway.

Table 15.3: Peak Hour Traffic Volumes on Key Roads in 2015

Site ID	Locations	AM Peak		PM Peak	
		NB / EB	SB / WB	NB / EB	SB / WB
M-1	Hart Road, East of Hunter Expressway	8	2	3	7
M-2	Hart Road, West of Hunter Expressway	374	216	237	350
M-3	Hunter Expressway, Between Loxford Interchange and Kurri Kurri Interchange	979	1,067	875	1,240
M-4	Hunter Expressway, South of Kurri Kurri Interchange	1,288	1,290	1,209	1,549
M-5	Main Road-Cessnock Road, East of Hunter Expressway	691	632	862	804
M-6	Main Road-Cessnock Road, West of Hunter Expressway	478	505	615	582

Note: NB: Northbound, EB: Eastbound, SB: Southbound, WB: Westbound

15.2.2 Internal Access

The Smelter includes an existing internal road network. This includes sealed and unsealed roads. Separated pedestrian access is provided adjacent to most of these roads. Concrete footpaths also connect a number of buildings.

15.3 Impact Assessment

15.3.1 Project Traffic Generation

The following assumptions have been made in predicting traffic generation for the Project:

- About 30 working days per month.
- During site establishment, there would be about eight workers on-site.
- During demolition activities, there would be 25 workers on-site.
- A total of 20 truckloads per day per direction for transporting metals for recycling.
- One refuelling vehicle per day per direction.
- Six trucks per day per direction for miscellaneous deliveries and waste removals.
- Delivery and removal of equipment occurs over the first and last 10 working days of the construction stage.
- The number of truck loads means number of trucks visiting the site for Works activities. Each truck load would generate two truck trips a day.
- Each staff car would generate on average around three car trips a day.
- The number of daily truck movements would vary between two and 57 truck trips depending on the Project phase. The highest truck movements are expected to be during demolition activities with about 57 truck trips per day.
- The number of daily car movements would vary between six and 75 car trips depending on the Works phase. In the event that all demolition staff drive a private vehicle, then about 25 parking spaces would be utilised on-site. The highest car movements are expected to be during the demolition activities with about 75 car trips per day.

Additional details on the traffic during the Project (including a breakdown based on vehicle types) are provided in **Appendix 8**.

15.3.2 Public Roads

15.3.2.1 Traffic Distribution

The Traffic Impact Assessment predicts that the distribution of traffic would be as follows:

- About 15% trips towards north to Maitland via Hunter Expressway (Hart Road and Kurri Kurri interchanges) and Cessnock Road.
- About 40% trips towards east to Newcastle, Lake Macquarie, M1 Pacific Motorway via Hunter Expressway (Hart Road interchange).
- About 15% trips towards south to Kurri Kurri via Hart Road.
- About 30% trips towards west to Branxton. This would require U-turns at Kurri Kurri interchange for westbound trips on the Hunter Expressway.

15.3.2.2 Intersection Capacity

The Level of Service criteria set by the Roads and Maritime Services (RMS) in the *Guide to Traffic Generating Developments* (RTA, 2002) is outlined in **Table 15.4**. In analysing intersection performance, a Level of Service (LoS) "D" or better is generally acceptable to the RMS.

Table 15.4: Level of Service Criteria for Intersections

Level of Service	Average Delay (seconds / vehicle)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity, requires other control mode
F	More than 70	Roundabouts require other control mode	

Source: *Guide to Traffic Generating Developments* (RTA, 2002)

All Project traffic would pass through the Hart Road interchange intersection. **Table 15.5** shows the existing Level of Service of the Hart Road interchange intersection and the Kurri Kurri interchange, and **Table 15.6** shows the predicted Level of Service during the Project.

Table 15.5: Modelled Level of Service for Existing Condition

Intersections	Intersection Control	AM Peak		PM Peak	
		Average Delay (seconds)	LoS	Average Delay (seconds)	LoS
Hart Road/Off Ramp	Give Way/ Yield	11.1	A	12.5	A
Hart Road/On-Ramp	Give Way/ Yield	10.9	A	10.7	A
Kurri Kurri interchange	Give Way/ Yield	9.3	A	9.3	A

Table 15.6: Modelled Level of Service with Project Traffic

Intersections	Intersection Control	AM Peak Average Delay (seconds)	LoS	PM Peak Average Delay (seconds)	LoS
Hart Road/Off Ramp	Give Way/ Yield	10.8	A	15.2	B
Hart Road/On-Ramp	Give Way/ Yield	10.9	A	10.7	7
Kurri Kurri interchange	Give Way/ Yield	9.4	A	9.4	A

Table 15.6 shows that the Level of Service at these intersections remain at “A” for the majority of peak periods, with no to minimal change in the average delay for vehicles at the intersection. The exception is the PM peak for the intersection of Hart Road and the Hart Road interchange off-ramp, which would have a Level of Service of B, and an increase in the average delay for vehicles of less than five seconds. The predicted change in the Level of Service and average delay at this intersection would still be a minor change in traffic conditions.

The existing access to the Kurri Kurri Speedway and the Kurri Kurri Junior Motorcycle Club along Dickson Road would be maintained during the Project. The majority of events at these facilities occur outside of standard construction hours (typically Saturday evenings). While there is the potential for Demolition vehicles to leave the Smelter during these events, the number of such occasions, and the number of vehicles during such occasions, would be limited and unlikely to adversely affect traffic at the intersection.

Regular consultation with the Speedway and the Motorcycle Club would be undertaken to understand their planned activities and to advise of the proposed Project program.

15.3.2.3 Public Transport

There are currently no bus service in the proximity of the Project Site. Given that the majority of demolition activities would be contained on-site, it is considered unlikely that there would be any significant impacts to public transport services.

15.3.3 Internal Access

As described in **Section 8.2.6**, the Project would include a range of safety measures within the Project Site. This would require the temporary closure of, or access restrictions to, a number of internal roads and pedestrian footpaths for non-Works vehicles. This would protect non-Works personnel from Works activities, as well as minimising interactions with Works vehicles.

A Smelter Access Plan would be prepared that would reflect the progressive nature of the Works and the required amendments to access. The plan would identify access routes for demolition and non-demolition vehicles and personnel to be implemented during the various stages of the Works, including the type and location of signage and fencing to be installed.

15.3.4 Car Parking

As discussed in **Section 8.2.4** the existing Smelter car parking immediately south of the existing Administration Buildings (at the north eastern corner of the intersection of Hart Road and Dickson Road) would continue to be available throughout the Works. Sufficient parking (over 130 parking spaces) would be available for the predicted peak personnel on-site during the Works.

15.4 Mitigation Measures

A Traffic Management Plan would be developed as part of the Project Environmental Management Plan prior to the commencement of the Project to manage traffic on public roads. **Table 15.7** describes the proposed traffic management measures.

Table 15.7: Traffic Management Measures

Project Phase	Mitigation Measures
Site Establishment	In consultation with Cessnock City Council and Roads and Maritime, general signposting of the demolition vehicle routes with appropriate heavy vehicle and construction warning signs.
	Review of speed restrictions along Hart Road and additional signposting of speed limitations.
	Installation of specific warning signs at Dickson Road to warn existing road users of entering and exiting demolition traffic.
	All demolition personnel required to transport recyclable demolition materials on public roads would be informed during the site induction of the required transport routes.
The Works	The promotion of carpooling for construction demolition staff and other shared transport initiatives.
	Management of the transportation of demolition materials/waste to maximise vehicle loads to therefore minimise vehicle movements.
	Regular consultation with the Kurri Kurri Speedway and the Kurri Kurri Junior Motorcycle Club would be undertaken to understand their planned activities and to advise of the proposed Project program.

A Smelter Access Plan would be developed and implemented as part of the Project Environmental Management Plan to manage traffic within the Project Site. **Table 15.8** describes the proposed site access management measures.

Table 15.8: Access Management Measures

Project Phase	Mitigation Measures
Site Establishment	All personnel required to drive on the Smelter would be informed during the site induction of the access restrictions during the Project.
	The initial internal access restrictions and alternative access routes would be established for the initial Works phase.
The Works	The initial internal access restrictions and alternative access routes would be altered as required to reflect the progression of the Works.
	A speed limit of 20km/hr would be imposed on internal roads.

16. ABORIGINAL HERITAGE

16.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify Aboriginal heritage as a key issue for the Environmental Impact Statement. This section assesses the potential impacts of the Project on Aboriginal heritage and the management measures proposed to reduce these impacts.

Table 16.1 outlines the Secretary's Environmental Assessment Requirements relating to Aboriginal heritage and where they have been addressed.

Table 16.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
Heritage including an Aboriginal cultural heritage assessment (including cultural and archaeological significance), which must demonstrate effective consultation with relevant Aboriginal community groups	Section 16

An Aboriginal Cultural Heritage Assessment has been prepared and is presented in **Appendix 9**. This section presents the key findings of the assessment.

16.2 Existing Environment

The Aboriginal Cultural Heritage Assessment was undertaken to identify Aboriginal archaeological sites, areas of potential archaeological significance and any areas of cultural significance within the Project Site.

The assessment was undertaken in accordance with the NSW Office of Environment and Heritage *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) and with reference to the NSW Office of Environment and Heritage's *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). Aboriginal community consultation for the assessment was conducted in accordance with OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010). A total of 32 Registered Aboriginal Parties were involved in the assessment.

Archaeological survey of the Project Site was undertaken on Friday 10 April 2015 by a combined field team of two archaeologists and two Registered Aboriginal Party field representatives. The survey focussed on areas of minimally to moderately disturbed terrain in the northern and western portions of the Project Site, which offered the highest potential for archaeological site identification. All survey was conducted on foot, with a total of four transects completed over the course of the survey.

One new Aboriginal archaeological site was identified during survey. This comprised an isolated stone artefact (Hydro-IA35-15) in a disturbed surface context. An assessment of the scientific significance of Hydro-IA35-15 finds that the site is of low scientific significance. Levels of Ground Integrity across the surveyed portions of the Project area ranged from low to moderate, with the majority of surveyed land comprising grossly disturbed terrain.

An area of high archaeological sensitivity was identified in the northernmost portion of the Project Site to the north of the existing excavated natural material stockpile to the east of the Clay Borrow Pit. A powerline passes between the existing stockpile and the area of high archaeological sensitivity.

The majority of the Project Site has been subject to a number of recent and historical ground surface activities noted during including the Smelter construction; dam and drainage channel construction/modification; pipeline and powerline installation; vegetation clearance; vehicle track construction/ use and remediation earthworks.

16.3 Impact Assessment

An assessment of the archaeological sensitivity of the Project Site has applied three levels of sensitivity: Nil, Low and High. Categorisation of areas using these categories is based on the results of previous Aboriginal heritage investigations within and surrounding the Project Site, levels of past land disturbance and the predicted complexity of deposits within each category.

Consultation with the Registered Aboriginal Parties identified the Project Site was within an area of significance to local Aboriginal people because of it is close to watercourses and food resources.

The majority of land within the Project Site has been assessed as being of Nil archaeological sensitivity owing to intensive landscape modification associated with the construction and expansion of the Smelter and associated ground disturbance activities.

Areas of low archaeological sensitivity within the Project Site include the vegetated peripheries of the Clay Borrow Pit; patches of regenerating native vegetation between the Smelter and North Dams; and the cleared electricity easement to the east of the Clay Borrow Pit. These areas do not, on the basis of field observations and historical aerial photographs, appear to have been heavily disturbed but are located more than 100 metres from a mapped higher order watercourse. One area of high archaeological sensitivity was located in a cleared section of elevated low gradient terrain overlooking the unnamed second order stream that bisects the Project Site.

An assessment of the potential impacts of the Project on the identified Aboriginal heritage values of the Project area concluded that Aboriginal archaeological site Hydro-IA35-15 would be directly impacted by the construction of the Containment Cell. Due to its location within the footprint of the Containment Cell, destruction or removal of the artefact would be required.

The area of high archaeological sensitivity is located within the northern section of the proposed Containment Cell material stockpile area. In the event this area was used for stockpiling materials, physical impacts to the integrity of natural soil profiles within this area could occur as a result of sediment deposition and removal activities (including associated heavy vehicle movements). This could in turn impact on Aboriginal archaeological relics present in this area.

Identified areas of low archaeological sensitivity to the north of the Smelter would be impacted by vegetation clearance activities while other such areas would be disturbed by construction of the Containment Cell and ENM stockpiling. Any Aboriginal archaeological materials present within these areas are expected to be severely disturbed or destroyed as a result of these activities.

The approach to managing the area of high archaeological sensitivity and the management measures described in **Section 16.4** have been developed to mitigate potential impacts on archaeological and cultural significance, in consultation with the Registered Aboriginal Parties.

16.4 Mitigation Measures

An Aboriginal Cultural Heritage Management Plan would be developed as part of the Project Environmental Management Plan prior to the commencement of the Project to manage impacts on Aboriginal heritage. **Table 16.2** describes the proposed Aboriginal cultural heritage management measures.

Table 16.2: Aboriginal Cultural Heritage Management Measures

Project Phase	Mitigation Measures
Site Establishment	Precautionary fencing of Hydro-IA35-15 prior to surface collection.
	Surface collection and relocation of newly identified isolated artefact Hydro-IA35-15.
	All personnel required to undertake earthworks within the Project Site outside of the Smelter would be informed during the site induction of Aboriginal cultural heritage issues.

Table 16.2: Aboriginal Cultural Heritage Management Measures

Project Phase	Mitigation Measures
The Works	Where possible, avoid the need to stockpile material in the area of high archaeological sensitivity. In the event that stockpiling in this area is required, geo-matting would be placed on the surface of the area prior to stockpiling. An unexpected finds procedure would be implemented in the event that a potential Aboriginal site was identified during the Works. This procedure would include: 1) All works would cease immediately in the area to prevent any further impacts to the site. 2) Notify the Works' Environment Officer. 3) Engage a suitably qualified archaeologist and RAP representative to determine the nature, extent and significance of the Aboriginal site and provide appropriate management advice. Management action(s) would vary according to the type of evidence identified, its significance (both scientific and cultural) and the nature of potential impacts. 4) Prepare and submit an AHIMS site card for the Aboriginal site. A standard procedure would be implemented for the management of any potential human skeletal remains identified throughout the Works. This procedure would include: 1) All work in the vicinity of the remains should cease immediately. 2) The location should be cordoned off and the appropriate authorities notified. 3) A physical or forensic anthropologist should be commissioned to inspect the remains <i>in situ</i> and make a determination of ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or modern). Following completion of task three, the applicable action/s listed below would be implemented: - If the remains are identified as non-human, work can recommence immediately. - If the remains are identified as modern and human, the area would become a crime scene under the jurisdiction of the NSW Police. - If the remains are identified as pre-contact or historic Aboriginal, the site would be secured and OEH and all RAPs notified in writing. Where impacts to exposed Aboriginal skeletal remains cannot be avoided, remains would be retrieved via controlled archaeological excavation and reburied outside of the Disturbance Boundary in a manner and location determined by RAPs. - If the remains are identified as historic non-Aboriginal, the site would be secured and the NSW Heritage Branch contacted.

17. NON-ABORIGINAL HERITAGE

17.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify non-Aboriginal heritage as a key issue for the Environmental Impact Statement. This section addresses the potential impacts of the Project on non-Aboriginal heritage and the management measures proposed to reduce these impacts.

Table 17.1 outlines the Secretary's Environmental Assessment Requirements relating to non-Aboriginal heritage and where they have been addressed.

Table 17.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
Heritage including a non-Aboriginal cultural heritage assessment, (including both cultural and archaeological significance) which must outline any proposed management and mitigation measures.	Section 17

17.2 Existing Environment

The Smelter has been significantly disturbed through construction (including earthworks and filling) and ongoing operation of the Smelter.

A search of the NSW Heritage Inventory and Schedule 5 (Environmental heritage) of the Cessnock Local Environmental Plan 2011 did not identify any heritage items of local or state significance within the Project Site. The nearest listed heritage item is the South Maitland Railway (of local significance) which is approximately 700 metres to the east/ southeast of the Project Site.

The Smelter played a significant role in the recent social and industrial history of the local area and the Hunter Region from the commencement of operations in 1969 until the cessation of production in 2012. It was a significant employer for over 40 years and played a key role in the local area.

17.3 Impact Assessment

The Project is for the demolition of most Smelter buildings. While these are of importance to the recent social and industrial development of the local area and the Hunter Region, they are not of historical significance under the NSW Heritage Inventory and the Cessnock Local Environmental Plan 2011, and none of the buildings would be deemed a heritage item under the *Heritage Act 1977*.

17.4 Mitigation Measures

The measures described in **Table 17.2** would be implemented as part of the Project Environmental Management Plan to manage non-indigenous heritage.

Table 17.2: Heritage Management Measures

Project Phase	Mitigation Measures
The Works	In the event that a potential heritage item is unearthed during construction works would cease and the Office of Environment and Heritage would be notified.
	Photographs and drawings (from construction, operation and demolition) of the Smelter would be made available to interested historical societies or community groups.
	Hydro would work with the community on how to recognise the history of the Smelter.

18. BIODIVERSITY

18.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify biodiversity as a key issue for the Environmental Impact Statement. This section identifies the potential impacts of the Project on biodiversity and the management measures proposed to reduce these impacts.

Table 18.1 outlines the Secretary's Environmental Assessment Requirements relating to biodiversity and where they have been addressed.

Table 18.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
Biodiversity including identification of species on-site, and potential direct and indirect impacts on critical habitats, threatened species and populations, ecological communities, vegetation reserves, riparian vegetation and wetlands.	Section 18

An Ecological Assessment has been prepared and is presented in **Appendix 10**. This section presents the key findings of the assessment.

18.2 Existing Environment

18.2.1 Methodology

To assess the ecological characteristics of the Project Site, the following activities were undertaken:

- A review of previous studies on the biodiversity values of the Project Site, Hydro Land and surrounding area.
- Ecological field investigations were undertaken between October 2014 and March 2015. This included:
 - Flora surveys (biometric plots and rapid vegetation assessment, and threatened flora surveys).
 - Fauna surveys (hair sampling and analysis; nest box inspection; camera traps; spotlight survey; microbat echolocation call recording and identification; call playback; amphibian survey; and bird survey).

Further details on the methodology are presented in the Ecological Assessment in **Appendix 10**.

18.2.2 Ecological Conditions

18.2.2.1 Flora

Plant Communities

Four different plant community types were within the Hydro Land. These were:

- Parramatta Red Gum - Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area.
- Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter.
- Forest Red Gum - Grey Gum dry open forest on hills of the lower Hunter Valley, Sydney Basin Bioregion.
- Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter.

Two additional vegetation categories were also mapped:

- Water/Swamp.
- Cleared/disturbed areas.

Table 18.2 shows: the plant community types within the Project Site; the condition of the vegetation; the corresponding EEC; and the area of the community in the Project Site.

Table 18.2: Plant Community Types within the Project Site

Plant Community Type	Condition	EEC	Area (ha)
Parramatta Red Gum – Narrow-leaved Apple – Prickly-leaved Paperbark Shrubby Woodland in the Cessnock - Kurri Kurri Area	Intact	Kurri Sand Swamp Woodland in the Sydney Basin Bioregion	1.35
Spotted Gum – Red Ironbark – Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter	Intact	Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion	1.15

Threatened Flora

Two flora species listed under the *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were located in the Project Site:

- *Eucalyptus parramattensis* ssp. *decadens* (Parramatta Red Gum) is a dominant or co-dominant canopy species throughout much of the Kurri Sand Swamp Woodland within the Hydro Land. Four individuals of *Eucalyptus parramattensis* subspecies *decadens* (listed as vulnerable under the TSC Act and EPBC Act) were found to occur within the north eastern portion of the Project Site.
- *Grevillea parviflora* subsp. *parviflora* (Small-flowered Grevillea) was also found in scattered patches throughout much of the Kurri Sand Swamp Woodland within the Hydro Land and was particularly abundant within and directly adjacent to the large power easements to the north and south of the Project Site. A single clump of *Grevillea parviflora* subsp. *parviflora* (listed as vulnerable under the TSC Act and EPBC Act) consisting of five stems was found within the proposed Containment Cell area.

18.2.2.2 Fauna

In total 167 fauna species were recorded by during the Ecological Assessment. This consisted of 15 microbat species, a further 15 mammal species, 110 bird species, 15 reptile and 12 amphibian species were detected within the study area. A species list for all fauna detected by during the Ecological Assessment is provided in **Appendix 10**.

Ten threatened and six listed migratory fauna species were detected within the Hydro Land. Two threatened fauna species (Squirrel Glider and Little Lorikeet) were also recorded within the Project Site. Additional fauna species are considered likely or have some potential to utilise the Project Site despite not being recorded during survey. **Table 18.3** lists the threatened and migratory species recorded or considered likely to utilise the Project Site.

Table 18.3: Threatened and migratory species recorded or considered likely to utilise the Project Site

Class	Common Name	Scientific Name	TSC Act	EPBC Act
Aves	Regent Honeyeater	<i>Xanthomyza phrygia</i>	Endangered	Endangered
	Square-tailed Kite	<i>Lophoictinia isura</i>	Vulnerable	Not listed
	Little Eagle	<i>Hieraaetus morphnoides</i>	Vulnerable	Not listed
	White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	Not listed	Marine and Migratory
	Freckled Duck	<i>Stictonetta naevosa</i>	Vulnerable	Not listed
	White-throated Needletail	<i>Hirundapus caudacutus</i>	Not listed	Marine and Migratory
	Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	Not listed	Marine and Migratory
	Latham's Snipe	<i>Gallinago hardwickii</i>	Not listed	Marine and Migratory
	Rainbow Bee-eater	<i>Merops ornatus</i>	Not listed	Marine and Migratory
	Brown Treecreeper	<i>Climacteris picumnus victoriae</i>	Vulnerable	Not listed
	Grey-crowned Babbler	<i>Pomatostomus temporalis</i>	Vulnerable	Not listed
	Cattle Egret	<i>Ardea ibis</i>	Not listed	Marine and Migratory
	Eastern Great Egret	<i>Ardea modesta</i>	Not listed	Marine and Migratory
	Little Lorikeet	<i>Glossopsitta pusilla</i>	Vulnerable	Not listed
	Diamond Firetail	<i>Stagonopleura guttata</i>	Vulnerable	Not listed
	Hooded Robin	<i>Melanodryas cucullata</i>	Vulnerable	Not listed
	Black-tailed Godwit	<i>Limosa</i>	Vulnerable	Not listed
	Speckled Warbler	<i>Pyrrholaemus sagittata</i>	Vulnerable	Not listed

Table 18.3: Threatened and migratory species recorded or considered likely to utilise the Project Site

Class	Common Name	Scientific Name	TSC Act	EPBC Act
Mammalia	Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	Vulnerable	Vulnerable
	Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	Vulnerable	Not listed
	Little Bentwing-bat	<i>Miniopterus australis</i>	Vulnerable	Not listed
	Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	Vulnerable	Not listed
	East-coast Freetail Bat	<i>Mormopterus norfolkensis</i>	Vulnerable	Not listed
	Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	Vulnerable	Not listed
	Large-footed Myotis	<i>Myotis macropus</i>	Vulnerable	Not listed
	Squirrel Glider	<i>Petaurus norfolcensis</i>	Vulnerable	Not listed
	Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	Vulnerable	Endangered
	Koala	<i>Pascolarctos cinereus</i>	Vulnerable	Vulnerable
	Southern Brown Bandicoot	<i>Isodon obesulus</i>	Endangered	Endangered
Reptile	Pale-headed Snake	<i>Hoplocephalus bitorquatus</i>	Vulnerable	Not listed
	Rosenburgs Goanna	<i>Varanus rosenbergi</i>	Vulnerable	Not listed
Amphibians	Green-thighed Frog	<i>Litoria brevipalmata</i>	Vulnerable	Not listed
	Green and Golden Bell Frog	<i>Litoria aurea</i>	Endangered	Endangered

18.3 Impact Assessment

As discussed in **Section 18.2.2.1** the Project would require the clearance of approximately 1.35 hectares of the Kurri Sand Swamp Woodland in the Sydney Basin Bioregion EEC and approximately 1.15 hectares of the Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion.

Table 18.4 compares the area of these EEC proposed to be cleared against that recorded within the Hydro Land.

Table 18.4: Area of EEC Proposed for Clearance and Present in the Hydro Land

EEC	Area proposed to be cleared (ha)	Area mapped (ha) in Hydro Land	Percentage to be Cleared
Kurri Sand Swamp Woodland in the Sydney Basin Bioregion	1.35	339.20	0.001
Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion	1.15	366.66	0.001

The Project would remove or modify up to 2.5 hectares of native vegetation in varying condition. All of this vegetation is considered to qualify as either *Kurri Sand Swamp Woodland in the Sydney Basin Bioregion* or *Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion*.

The TSC Act and EPBC Act listed species in **Table 18.2** and **Table 18.3**, and the described EEC were assessed pursuant to s5A of the EP&A Act in **Appendix 10**. The assessment concluded that the Project was unlikely to have a significant impact on these species or EEC as:

- The area of vegetation to be disturbed is small (less than five hectares).
- The Project Site is heavily disturbed.
- The Hydro Land provides a large area of suitable habitat for all the assessed species and EEC.

As such it was concluded that the Project would not have a significant impact as defined under Section 5A of the EP&A Act and the EPBC Act.

18.3.1 Biobanking Assessment

As per the Secretary's Environmental Assessment Requirements and based on consultation with the OEH, the Project is considered to require a biodiversity offset for the proposed impacts.

Credit calculations for ecosystem and species credits, using the Biobanking Assessment Methodology (BBAM), have been completed and the detailed results are provided in **Appendix 9**. Hydro would look to secure both ecosystem **and** species credits within the broader study area though the timing of the credit transfer is proposed to be delayed until after a Biocertification assessment (using the Biocertification Assessment Methodology (BCAM)) application has been submitted for the entirety of the Hydro Land. If the Biocertification assessment is not successful, Hydro would secure the offsets through a Biobank site within the Hydro Land. As noted in Section 18.3 the Hydro Land provides a large area of suitable habitat for all the assessed species and EEC that could provide sufficient biodiversity offsetting for the Project.

Appendix 10 describes the biobanking assessment methodology and identifies the ecosystem and species credits that would be required to offset the impact of the Project.

Table 18.5 and **Table 18.6** summarise the ecosystem credits and species credits required to offset the vegetation clearance required by the Project.

Table 18.5: Ecosystem Credits Required

Vegetation Zone	Biometric Vegetation Type	Ancillary	Area (ha)	Credits
1a	Parramatta Red Gum - Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area	Intact	1.35	94
5a	Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter	Intact	1.15	61
TOTAL			2.5	155

Table 18.6: Species Credits Required

Common Name	Scientific Name	Count	Credits
Green-thighed Frog	<i>Litoria brevipalmata</i>	1.46 ha	19
Koala	<i>Phascolarctos cinereus</i>	1.35 ha	35
Southern Myotis	<i>Myotis macropus</i>	14.23 ha	313
Pale-headed Snake	<i>Hoplocephalus bitorquatus</i>	1.15 ha	38
Regent Honeyeater	<i>Anthochaera phrygia</i>	1.15 ha	89
Parramatta Red Gum	<i>Eucalyptus parramattensis</i> subsp. <i>decadens</i>	4 ind.	56
Small-flower Grevillea	<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	5 ind.	70

18.4 Mitigation Measures

A Flora and Fauna Management Plan would be developed as part of the Project Environmental Management Plan prior to the commencement of the Project to manage impacts on flora and fauna. **Table 18.7** describes the proposed Aboriginal cultural heritage management measures.

Table 18.7: Biodiversity Management Measures

Project Phase	Mitigation Measures
Site Establishment	All personnel required to undertake vegetation clearance or activities adjacent to native vegetation would be informed during the site induction of biodiversity protection procedures.
	The Project Site boundary would be clearly delineated to limit the extent of vegetation clearance to that described in this EIS, and to restrict access during the Works.
	This would include erection of security fencing around the Containment Cell and maintaining the security fencing around the Smelter Site.
	Pre-clearing surveys would be undertaken by an appropriately qualified ecologist prior to vegetation clearance.
	Where required (such as the felling of hollow bearing trees) vegetation clearance would be supervised by an appropriately qualified ecologist or animal handler.

Table 18.7: Biodiversity Management Measures

Project Phase	Mitigation Measures
The Works	To minimise the potential for the spreading of weeds hygiene protocols, including vehicle wash-downs, would be implemented for machinery used in vegetation clearance.
	Appropriate shallow rooted native grasses would be used in the vegetation cover for the Containment Cell.
	Appropriate hybrid grass species (that cannot become weed issues in adjoining native vegetation) would be used in stabilising surfaces following completion of the Works.

19. VISUAL

19.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify visual impact as a key issue for the Environmental Impact Statement. This section identifies the potential visual impacts of the Project and the management measures proposed to reduce these impacts.

Table 19.1 outlines the Secretary's Environmental Assessment Requirements relating to visual impacts and where they have been addressed.

Table 19.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
Visual including an assessment of the visual impacts of the proposal including a detailed description (including plans and RLs) of how the site will be rehabilitated and landscaped.	Section 19

19.2 Existing Environment

The existing visual environment of the area is dominated by four main elements:

- The native vegetation immediately adjacent to the north, west and southwest of the Smelter.
- The cleared agricultural land to the east and northeast of the Smelter.
- The Hunter Expressway, including noise attenuation barriers and bridges, to the south of the Smelter.
- The Smelter.

From many directions the majority of the Smelter is not visible due to the surrounding native vegetation and the local topography. The tallest chimney stack visible is primarily the only Smelter structure visible from residential areas to the south and east. However the stacks and other structures are visible from a number of elevated areas in the surrounding area (such as Mitchell Avenue Kurri Kurri as shown in **Photo 2**). Some rural residences to the northeast, east and southwest have views over most of the Smelter, as do motorists travelling on part of the Hunter Expressway.

Hart Road and Dickson Road are public roads directly adjacent to the Project Site. Therefore the public would have direct views of the Works. However traffic using these roads is generally restricted to Smelter personnel and competitors and spectators of the Kurri Kurri Speedway and Kurri Kurri Junior Motorcycle Club. The speedway and motorcycle club are approximately 500 metres to the east of the Project Site.

Photo 1, **Photo 2**, **Photo 3** and **Photo 4** provide examples of the views of the Smelter from the surrounding area.

The proposed Containment Cell location is within a cleared area surrounded by native vegetation. Due to this vegetation views of this location are restricted. It is visible from the western boundary of the Smelter Site.



Photo 1: View of the Smelter from Sawyers Gully Road, Sawyers Gully (approximately 1,300 metres southwest of the Project Site)



Photo 2: View of the Smelter from Mitchell Avenue Kurri Kurri (approximately 2,500 metres south of the Project Site)



Photo 3: View of the Smelter from Bowditch Avenue Loxford (approximately 1,100 metres southeast of the Project Site)



Photo 4: View of the Smelter from Maitland Road (approximately 3,300 metres east of the Project Site).

19.3 Impact Assessment

19.3.1 Smelter Site

The Smelter has been part of the visual environment of the local area since 1969. Its removal from the visual landscape is likely to be considered a neutral or positive visual impact by the local community.

The stacks form the major visual element of the Smelter, and are a key element of the local visual environment. Their demolition would be visible from a large area surrounding the Project Site. Feedback received from the local community has indicated there would be significant interest in viewing the demolition of the stacks.

The demolition of the remaining structures and other Works activities would be visible from those locations that currently have views of the Smelter. Clear views of the Works activities would be available from Hart Road and Dickson Road (public roads), the Kurri Kurri Speedway and the Kurri Kurri Junior Motorcycle Club. However due to the limited traffic on these roads (used to access the Smelter, the Speedway and Motorcycle Club) and the limited times that the Speedway and Motorcycle Club are used, there would be limited views from these locations.

Due to topography and the surrounding native vegetation, there would be limited views of the ground level Works elements. As seen in **Photo 1** to **Photo 4**, views of the Smelter Site are largely limited to elevated structures. As such, the Works would not pose an adverse visual impact.

As discussed in **Section 8.9** the Smelter Site would be rehabilitated and stabilised to provide a generally level surface. The surface would be stabilised with a combination of grass coverage and compressed crushed concrete to minimise the potential for dust and erosion. The haul road and selected sealed internal roads would remain as part of the final landform. It is not anticipated that this would have an adverse visual impact on the local area.

The Smelter's demolition would facilitate the future redevelopment of the Smelter for industrial activities that would likely to be visible from those rural residences and residential areas to the northeast, east and southwest of the Smelter, and motorists travelling on part of the Hunter Expressway.

19.3.2 Containment Cell

The Containment Cell would be located within an area that is surrounded by native vegetation. **Photo 5** presents impressions of the Containment Cell.



Photo 5: Impression of the Containment Cell (looking northwest)

Due to the height of the Containment Cell, part of it would potentially be visible above the native vegetation to the north, west and south of the Containment Cell, while it could be visible from the east (with varying degrees of visibility). The species used in the vegetation cover on the Containment Cell would mitigate potential visual impacts by complementing the adjoining native vegetation.

As discussed in **Section 2.4.2** the Project Site is the subject of a planning proposal with Cessnock City Council that would facilitate its development for industrial development. The proposed Containment Cell is located in the centre of an area proposed for IN3 Heavy Industrial zoning, which would be surrounded by native vegetation (zoned E2 Environmental Conservation).

In the event that the land is rezoned and commercially viable for redevelopment, the Containment Cell would eventually be adjacent to developments permissible in the IN3 zone (such as heavy industry, warehouses and distribution centres, freight transport facilities and general industry), the occupants, employees and customers of these facilities would have a direct view of the Containment Cell.

It is not anticipated that the Containment Cell would have an adverse visual impact on the potential future occupants, employees and customers.

19.4 Mitigation Measures

Implementation of mitigation measures described in **Section 8.1**, **Section 8.2** and **Section 21.4** (that would be outlined in the Works Environmental Management Plan) would maintain the Works site in an orderly condition and minimise visual impacts during the Works.

The measures described in **Table 19.2** would further mitigate potential visual impacts.

Table 19.2: Visual Impact Management Measures

Project Phase	Mitigation Measures
Site Establishment	All personnel would be informed during the site induction of requirement to maintain the site in an orderly condition.
The Works	Under the Stakeholder Engagement Plan (as described in Section 8.1.4) the local community would be advised of Works activities, including those with the potential for visual impacts. In recognition of the likely community interest in the demolition of the stacks, Hydro would consider establishing viewing areas, including suitable parking and traffic control.
Containment Cell Management	The Containment Cell vegetation cover would be maintained (as described in Section 9.1.2).

20. GREENHOUSE GAS

20.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify greenhouse gas emissions as a key issue for the Environmental Impact Statement. This section identifies the potential greenhouse gas emissions of the Project and the management measures proposed to reduce these emissions.

Table 20.1 outlines the Secretary's Environmental Assessment Requirements relating to greenhouse gas emissions and where they have been addressed.

Table 20.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
Greenhouse Gas Emissions including a quantitative assessment of the potential scope 1 and 2 greenhouse gas emissions from the proposal, and a qualitative assessment of the potential impacts of these emissions on the environment.	Section 20

A Greenhouse Gas (GHG) Assessment has been prepared and is presented in **Appendix 11**. This section presents the key findings of the assessment.

20.2 Smelter Operations Greenhouse Gas Emissions

During the operational period of the Smelter, emissions generated by the facility were reported under the National Greenhouse and Energy Reporting Scheme (NGERS).

For the 2010-11 reporting year (latest full year of operation) emissions were reported to be 2,963,825 tCO₂e comprising scope 1 and 2 emissions.

The total annual GHG emissions for 2011-12 for NSW reported by the Australian Government's Department of the Environment were 154.7 million tCO₂e. The Smelter's GHG emissions for the same period represented approximately 1.92% of the total annual GHG emissions for NSW.

20.3 Impact Assessment

The GHG Assessment has been prepared to assess the cumulative GHG emissions of the Project and Stage 1 Demolition activities (as discussed in **Section 3.4.3.2**).

20.3.1 Assessment Criteria

The scope and methodology for the greenhouse gas assessment has been undertaken in accordance with the following guidelines:

- *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition, 2004* (the GHG Protocol), developed by World Resources Institute (WRI) and World Business Council on Sustainable Development (WBCSD) (the GHG Protocol).
- *National Greenhouse and Energy Reporting (Measurement) Determination 2008*, July 2014.
- *National Greenhouse and Energy Reporting (Measurement) Determination 2008, Technical Guidelines*, July 2014, Australian Department of the Environment.

These are considered to represent current good practice in Australian greenhouse gas accounting.

20.3.2 Methodology

Emissions associated with the Project are described as Scope 1, 2 and 3 emissions in accordance with the GHG Protocol. These are defined as:

- Scope 1 emissions – direct emissions created from sources owned and controlled by the proponent, Hydro.
- Scope 2 emissions – indirect emissions created from purchasing energy (heat or electricity) consumed by the Project. These indirect emissions are a consequence of the activities of the Project, but arise from sources that are not owned or controlled by Hydro.

- Scope 3 emissions – all other indirect emissions that occur in the value chain of the reporting organisation, including upstream and downstream activities.

Table 20.2 summarises the emission factors for all emission sources included in this GHG assessment.

Table 20.2: Emission Factors for the GHG Assessment

Emission Source	Scope	NGERS ID	Emission Factor	Unit	Reference
Diesel oil - stationary, used on-site	1	40	2,682.70	kgCO ₂ e/kL	<i>National Greenhouse and Energy Reporting (Measurement) Determination 2008</i> , (Commonwealth, 2014); Schedule 1, Part 3
Diesel oil - transport, used on-site	1	65	2,694.67	kgCO ₂ e/kL	<i>National Greenhouse and Energy Reporting (Measurement) Determination 2008</i> , (Commonwealth, 2014); Schedule 1, Part 4
Construction and demolition waste	1		0.2	tCO ₂ e/t	<i>National Greenhouse Accounts Factors</i> (Australian Department of the Environment, 2014). Appendix 4, Table 44
Purchased electricity from grid, NSW	2	77	0.86	kgCO ₂ e/kWh	<i>National Greenhouse and Energy Reporting (Measurement) Determination 2008</i> , (Commonwealth, 2014); Schedule 1, Part 6
Gasoline - transport, personnel commuting	3	64	2,288.66	kgCO ₂ e/kL	<i>National Greenhouse and Energy Reporting (Measurement) Determination 2008</i> , (Commonwealth, 2014); Schedule 1, Part 4
Diesel oil - transport, used to transport equipment, machinery, materials and waste	3	65	2,694.67	kgCO ₂ e/kL	<i>National Greenhouse and Energy Reporting (Measurement) Determination 2008</i> , (Commonwealth, 2014); Schedule 1, Part 4

20.3.3 Assessment Results

20.3.3.1 Emission Sources

The Scope 1 and Scope 2 Project GHG emission sources are described in **Table 20.3**.

Table 20.3: Scope 1 and Scope 2 GHG Emission Sources

Stage 1 Demolition	The Project
Scope 1 Emissions	
Diesel consumption by excavation equipment used on-site (including excavators, boom lifts, trucks, telehandlers, water trucks, service vehicles, prime movers)	Diesel consumption by excavation and construction equipment used on-site (including excavators, graders, dozers, rollers, telehandlers, rollers, compactors, backhoes, water carts, mulching machines)
Diesel consumption by concrete crushing plant used on-site	Diesel consumption by concrete crushing plant used on-site
	Waste placed in the Containment Cell
Scope 2 Emissions	
	Electricity for on-site office and contractor compounds, and temporary lighting
	Consumption of purchased electricity for water treatment plant

The Scope 3 Project GHG emission sources are described in **Table 20.4**.

Table 20.4: Scope 3 GHG Emission Sources

Stage 1 Demolition	The Project
Diesel consumption in vehicles transporting scrap metal from the Project Site to Port of Newcastle	Diesel consumption in vehicles transporting Containment Cell construction materials and site establishment materials to the Project Site (such as sand, gravel, liner, filter fabric and security fencing)
Diesel consumption in vehicles transporting plant, equipment and machinery to and from the Project Site	Diesel consumption in vehicles transporting plant, equipment and machinery to and from the Project Site
Unleaded petrol consumption in vehicles bringing Hydro and contractor personnel to and from the Project Site	Diesel consumption in vehicles transporting waste oil and scrap metal from the Project Site to Port of Newcastle
	Unleaded petrol consumption in vehicles bringing Hydro and contractor personnel to and from the Project Site

All GHG emissions in this assessment have been quantified by calculation (rather than direct measurement), by multiplying estimated quantities by an emission factor. Quantities of fuel, electricity and waste (i.e. activity data) were estimated based on concept design quantities for the Project. Emission factors have been primarily sourced from the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (Commonwealth, 2014). If factors have been sourced elsewhere, the source reference has been provided in this report.

When data was unavailable, assumptions and approximations were made to obtain a reasonable estimate of activity data and emission factors

20.3.3.2 Results

Greenhouse gas emissions during Stage 1 Demolition and the Project are presented in **Table 20.5**. The Project is predicted to result in emissions of 83,070 tCO₂e primarily due to emissions from the encapsulated waste in the Containment Cell. Total scope 1 and 2 emissions for Stage 1 Demolition and the Project are estimated to be 85,350 tCO₂e.

Table 20.5: Stage 1 Demolition and the Project – Scope 1 and Scope 2 GHG Emissions

Emission Source	Quantity	Units	Scope 1 Emissions (tCO ₂ e)	Scope 2 Emissions (tCO ₂ e)	Total Emissions (tCO ₂ e)
Stage 1 Demolition					
Diesel	846.56	kL	2,280.45		
Electricity	0	kWh			
Total Stage 1 Demolition			2,280.45	0.00	2,280.45
The Project					
Diesel	3072.008	kL	8,140.61		
Electricity	22,940,972.00	kWh		19,729.24	
Waste	276,000.00	tonnes	55,200		
Total the Project			63,340.61	19,729.24	83,069.84
Total Stages 1 Demolition and the Project			65,621.06	19,729.24	85,350.29

Scope 3 emissions associated with the Stage 1 Demolition and the Project are presented in **Table 20.6**. Total scope 3 emissions for Stage 1 Demolition and the Project are estimated to be 664 tCO₂e.

Table 20.6: Stage 1 Demolition and The Project – Scope 3 GHG Emissions

Emission Source	Quantity	Units	Scope 3 Emissions (tCO ₂ e)
Stage 1 Demolition			
Diesel – equipment delivery	0.34	kL	0.91
Diesel – scrap metal recycling	21.58	kL	58.16
Petrol – personnel travel	36.33	kL	83.14
Total Stage 1			142.21
The Project			
Diesel – equipment delivery	5.56	kL	14.97
Diesel – scrap metal recycling	9.25	kL	24.92
Diesel – waste oil disposal	0.32	kL	0.86
Diesel – Containment Cell construction material delivery	28.2	kL	75.99
Petrol – personnel travel	177.12	kL	405.36
Total the Project			522.10
Total Stage 1 Demolition and the Project			664.31

Approximately 87% of the Project's Scope 1 emissions would be attributed to the wastes encapsulated in the Containment Cell and the remainder due to emissions from on-site equipment and machinery use. Approximately 78% of the Scope 3 emissions would be attributed to personnel travelling to and from the Project Site.

20.3.3.3 Emissions Comparisons

The latest total annual greenhouse gas emissions for NSW reported by the Australian Government's Department of the Environment was 154.7 million tCO₂e for 2011-12. The estimated emissions associated with Stage 1 Demolition and the Project are 0.06% of the total greenhouse gas emissions for NSW, taking into account scope 1, 2 and 3 emissions associated with the Project.

The estimated emissions associated with the Project are 2.88% of the total greenhouse gas emissions during the 2010-11 operational period of the Smelter, comparing scope 1 and 2 emissions associated with the Project against Smelter operations.

20.4 Mitigation Measures

An Energy Efficiency Management Plan would be developed as part of the Project Environmental Management Plan prior to the commencement of the Works. The plan would incorporate the measures described in **Table 20.7**.

Table 20.7: Energy Efficiency Management Measures

Project Phase	Mitigation Measures
The Works	Implementation of the measures described in Section 8.5.4 and Section 8.8.1 to minimise the exposure of the waste material to moisture during the stockpiling, transport and placement activities (to reduce the potential for generation of methane emissions).
	Use light emitting diode (LED) lighting in offices, contractor compounds and temporary site lighting.

Table 20.7: Energy Efficiency Management Measures

Project Phase	Mitigation Measures
The Works (continued)	Energy efficient inverter split system units would be installed in contractor compounds where practical and timers set so that air conditioning systems are switched off after hours.
	Personnel would be instructed to turn off lights and office equipment when these are not in use such as before and after the working day.
	Modern and fuel efficient vehicles and machinery would be used during the Works wherever possible. All vehicles would be maintained in accordance with manufacturer's requirements to maintain efficiency.
	The potential for use of biodiesel blend fuels in its vehicles and machinery would be investigated.
	Personnel would be encouraged during the site induction to travel to and from the Smelter by carpooling.

21. WASTE

21.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify waste management as a key issue for the Environmental Impact Statement. This section identifies the potential impacts of the Project relating to waste and the management measures proposed to reduce these impacts.

Table 21.1 outlines the Secretary's Environmental Assessment Requirements relating to waste and where they have been addressed.

Table 21.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
Waste including:	
detail the quantity and type of liquid and non-liquid waste generated, handled, stockpiled, processed or disposed of on and off-site for all phases of the proposal;	Section 21.2
proposed controls for managing environmental impacts of these activities;	Section 8 and Part C
provide details of spoil disposal including the quantity, tracking, handling, stockpiling, reuse/recycling and proposed strategies for confirming that waste treatment and/or disposal facilities can lawfully accept waste generated; and	Section 8.8
provide details of any spoil to be imported to the site including the quantity and its waste classification.	Section 8.6

21.2 Waste Streams

Table 21.2 identifies the key waste streams to be generated by the Project, the estimated quantities and the proposed management strategy.

As discussed in **Section 3.4** Hydro has commenced the removal of reusable and recyclable materials and machinery from the Smelter. As such the management of these reusable and recyclable materials and machinery are not included in **Table 21.2** or addressed in this EIS.

The only material to be imported to the Project Site for disposal in the Containment Cell would be contaminated soils from other parts of the Hydro Land (as noted in **Table 21.2**) within the area regulated by EPL 1548. These soils would be derived from remediation works that would be category 2 remediation under State Environmental Planning Policy No. 55: Remediation of Land (SEPP 55). These soils are contaminated with Smelter wastes (a former Smelter landfill) or asbestos (former residential properties and a former municipal landfill).

21.3 Impact Assessment

Table 21.2 describes the proposed management approach for the waste streams during the Works, and where further details on these approaches are provided in this EIS. **Section 9** describes how the Containment Cell would be operated to minimise potential environmental impacts. **Section 2.5.1** describes how the approach is consistent with the existing waste management legislation.

The waste management approaches have been developed to minimise the potential impacts on the environment. These potential impacts have been considered in the assessments of key aspects, including: Air and Odour (**Section 11**); Noise and Vibration (**Section 12**); Soil and Water (**Section 13**); Hazards and Risks (**Section 14**); Transport and Access (**Section 15**); and Greenhouse Gas (**Section 20**).

Table 21.2: Project Waste Streams and Management Approach

Waste Stream	Examples	Estimated Quantity (tonnes)	Management Approach	Where Addressed in EIS
Capped Waste Stockpile	Mixed Smelter Waste classified as hazardous waste	320,000	Containment Cell	Section 8.4.1 and Section 8.8
Contaminated Soils	Contaminated Sites Stockpiled Contaminated Soils Dam Sediments Contaminated Soils (Hydro Land)	137,000	Containment Cell	Section 8.6 and Section 8.8
Demolition and Non-recyclable Process Waste	Metal	35,000 ¹	Transported for Recycling	Section 8.7.6
	Concrete, Brick and Refractory Brick	50,000 ¹	Crushed for reuse on-site (such as roads and filling voids)	Section 8.7.6
	Non-Recyclable Material, including Hazardous Building Materials (asbestos, synthetic mineral fibres) and process wastes (Anode cover material)	20,000 ¹	Containment Cell	Section 8.8
Green Waste	Smelter Site Landscaped Areas Cleared Native Vegetation	NA	Mulched for reuse on-site (erosion and dust control)	Section 8.2.2

Table 21.2: Project Waste Streams and Management Approach

Waste Stream	Examples	Estimated Quantity (tonnes)	Management Approach	Where Addressed in EIS
General Waste	Office Wastes Food Wastes Packaging	NA	Transported to a licensed waste management facility	Section 8.2.3
Human Wastes	Portable Toilets	NA	Regularly serviced by a licensed contractor and transported to a licensed waste management facility	Section 8.2.3

Note: 1 Total generated from Stage 1 Demolition and the Project

There is the potential for the Works to generate additional quantities of wastes than estimated in **Table 21.2** (such as additional contaminated soils from beneath the Capped Waste Stockpile, or concrete that has been contaminated and unsuitable for processing and reuse).

As discussed in **Section 8.8.1** (and described in **Table 21.2**) the current estimate of material to be placed in the Containment Cell is 265,000 m³. However to accommodate for the potential that additional material may need to be placed in the cell (and the cell size needs to be increased, or alternative waste management approaches need to be identified and implemented) the Containment Cell is designed to contain up to 410,000 m³ of non-recyclable wastes.

As discussed in **Section 8.5.5**, **Section 8.6**, **Section 8.7.2**, and **Section 8.7.6** a materials tracking system would be implemented. This would record when material has been removed from the source location, stockpiled (if required) and received at its designated receiving location (the Containment Cell or an off-site licensed waste management facility). Transporters would be required to provide evidence that any material transported off-site has been received by the nominated site licensed waste management facility.

Section 8.2.5 describes the stockpile and storage areas to be used for the temporary storage of materials prior to transportation to their final destination. The following environmental controls would be implemented at the stockpile and storage areas:

- Installation of erosion and sediment controls to minimise erosion and capture sediment runoff. This would include sediment fencing, hay bales and surface water diversion.
- Materials would be segregated and delineated as required.
- Water spraying would be used on appropriate stockpiles for dust suppression.
- Long term soil stockpiles would be hybrid grass seeded.

21.4 Mitigation Measures

A Waste Management Plan would be developed as part of the Project Environmental Management Plan prior to the commencement of the Project. **Table 21.3** describes the proposed waste management measures.

Table 21.3: Waste Management Measures

Project Phase	Mitigation Measures
Site Establishment	The designated storage and stockpile areas would be established, including the installation of the environmental controls described in Section 8.2.1 .
	All Works personnel would be informed during the site induction of the waste management hierarchy and the measures to be implemented.
The Works	Promotion of efficient resource use, waste avoidance and waste minimisation.
	Compounds and the stockpile area would be maintained in an organised condition, with waste materials to be transported to and stockpiled in the designated storage area.
	Wastes would be managed to minimise the potential for windblown wastes spreading within or beyond the Project Site, including into watercourses.
	Implementation of the materials tracking system described in Section 8.5.5 , Section 8.6 and Section 8.7.6 .
	Where possible recyclable wastes generated at the contractor's compound (paper, cans and bottles) would be collected by a recycling contractor. Remaining wastes would be collected for disposal at a licensed waste management facility.

Table 21.3: Waste Management Measures

Project Phase	Mitigation Measures
The Works (continued)	Trucks transporting recyclable demolition materials from the Project Site on public roads would be covered.
	Waste removal contractors transporting material from the Project Site would be required to provide dockets to confirm that waste was transported to a licensed waste management facility.
	The environmental controls and containment measures placed on waste stockpiles would be inspected and maintained as required on a weekly basis and after rain and strong wind events.

22. HUMAN HEALTH

22.1 Assessment Approach

The Secretary's Environmental Assessment Requirements identify health and safety as a key issue for the Environmental Impact Statement. This section identifies the potential impacts of the Project relating to human health and the management measures proposed to reduce these impacts.

Table 22.1 outlines the Secretary's Environmental Assessment Requirements relating to waste and where they have been addressed.

Table 22.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
The RAP (Remedial Action Plan) must also: Justify the proposed treatment and remediation criteria based on the conclusions of a Human Health Risk Assessment prepared in accordance with the Environmental Health risk Assessment – Guidelines for Assessing Human Health Risk from Environmental Hazards	Section 22 and Appendix 12
Occupational Health and Safety including Detail the measures to monitor and manage the exposure of workers to contaminants including the use of appropriate personal protective equipment, education and engineering controls at the facility to reduce exposures to contaminants	Section 14 and Appendix 12

A Human Health Risk Assessment (HHRA) has been prepared and is presented in **Appendix 12**. This section presents the key findings of the assessment.

22.2 Existing Environment

22.2.1 Human Receptors

22.2.1.1 Off-site Human Receptors

Off-site human receptors including:

- Off-site residents:* these receptors are child and adult residents who live within the vicinity of the Project Site and are potential receptors to particulates/vapour and noise generated by the Works.
- Off-site recreational users:* these receptors are children and adults who use passive and active recreational facilities such as parks, golf clubs and sporting venues.
- Off-site sensitive receptors:* these receptors are children and adults that use or reside in facilities such as childcare centres, educational facilities, places of worship, aged care facilities, immunocompromised and medical facilities.

When identifying the specific off-site human receptors for consideration in this HHRA, Ramboll Environ considered all sensitive receiver locations within a four kilometre radius of the Project Site. The HHRA then considered potential health risks to the most sensitive human receptor which was considered to be the receptor location where predicted particulate concentrations, generated from Project activities, were the highest (as predicted by the Ramboll Environ AQIA, 2015 study).

The off-site human receptors were separated into the following groups:

- Educational Facilities:* including Hunter TAFE, local high schools, primary schools and preschools.
- Childcare Facilities:* including early childhood centres, and before and after school care facilities.
- Aged Care Facilities:* only one facility was identified located within the grounds of the Kurri Kurri Hospital.

- *Medical Care Facilities*: including hospitals and family medical centres.
- *Residential properties*: the nearest eight properties in each direction from the Project Site, including properties owned by Hydro which would continue to be used as residential dwellings during the Works.
- *Recreational Facilities*: including parks, golf courses/clubs and sporting venues such as the Kurri Kurri Speedway and the Kurri Kurri Junior Motorcycle Club.
- *Places of Worship*: including local churches.

The human receptors of concern that were located closest to the Project Site are presented in **Table 22.2**, and are illustrated on **Figure 22-1**. Air quality and noise level predictions were generated at the location of each receptor in the Air Quality Impact Assessment (**Appendix 6**) and Noise and Vibration Impact Assessment (**Appendix 7**).

Table 22.2: Off-site Human Receptors

Sensitive Receptor	Address	Distance from Project (km)	Direction from the Project
Educational Facilities			
[R1] Hunter TAFE	McLeod Road, Kurri Kurri	1.4	Southeast
[R2] Kurri Kurri High School	Deakin and Stanford Streets, Kurri Kurri	1.8	South/ southeast
Child-Care Facility			
[R3] Kurri Kurri Early Childhood Centre	107 Lang Street, Kurri Kurri	2.6	South/ southeast
Medical Facility			
[R4] Kurri Kurri Family Medical Centre	312 Lang Street, Kurri Kurri	3	South
Aged-Care Facility			
[R5] RFBI Kurri Kurri Masonic Village/Nursing Home	Hospital Road, Kurri Kurri	3.6	South/ southwest
Nearest Residential Property			
[R6] Private dwelling	685 Old Maitland Road, Bishops Bridge	4	North
[R7] Hydro-owned dwelling	464 Cessnock Road, Gillieston Heights	2.8	Northeast
[R8] Private dwelling	20 Bowditch Avenue, Loxford	1.0	East
[R9] Private dwelling	6 Dawes Avenue, Loxford	0.5	Southeast
[R10] Hydro-owned dwelling	Scales Avenue (Lot 444, DP755231), Loxford	0.35	South
[R11] Private dwelling	78 Hart Road, Loxford	0.8	Southwest
[R12] Private dwelling	103 Bishops Bridge Road, Sawyers Gully	0.7	West
[R13] Private dwelling	78 Lumby Land, Sawyers Gully	1.8	Northwest

Table 22.2: Off-site Human Receptors

Sensitive Receptor	Address	Distance from Project (km)	Direction from the Project
Nearest Recreational Facility			
[R14] Hydro-owned Cricket Pitch Park, used by Scout clubs	Dawes Avenue, Loxford	0.15	Southwest
[R15] Kurri Kurri Speedway	73-81 Dickson Road, Loxford	0.2	West
Places of Worship			
[R16] Church of Christ	134 Maitland Street, Kurri Kurri	2.5	North

22.2.1.2 Works Personnel

These are adult workers that would be employed to undertake the Works at the Project Site. For the purpose of this HHRA they are considered to spend the majority of the day working outdoors as they travel through the Project Site, and may also undertake intrusive activities.

Specific tasks would include:

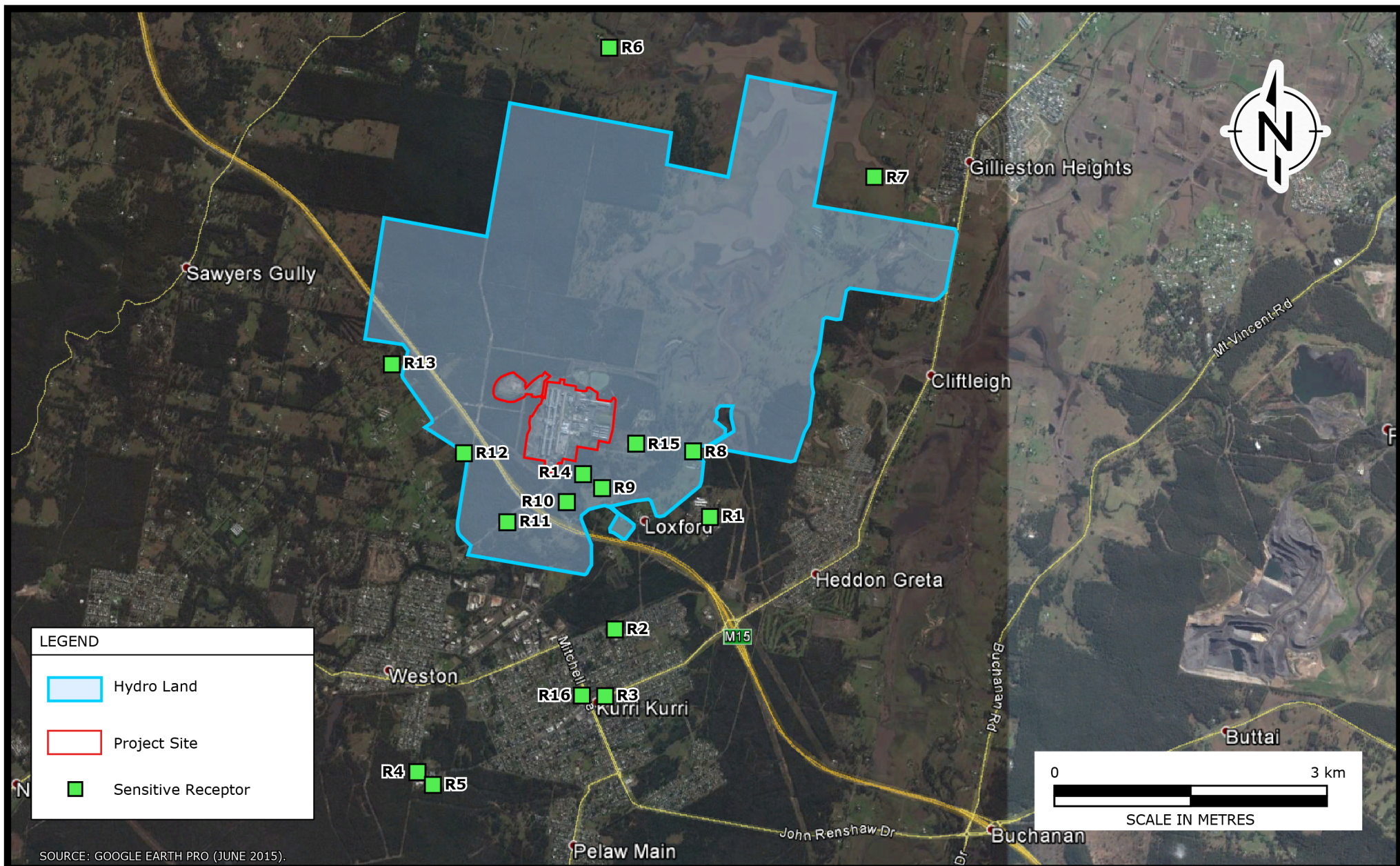
- Operation of trucks, excavators and other machinery.
- Operation of the concrete crushers and mulching/composting machine.
- Demolishing building structures, pavement, subsurface utilities and stacks.
- Construction of the Containment Cell including removal of top soil and placement of cell infrastructure.
- Excavation, transportation and placement of impacted material in the Containment Cell.
- Crushing bricks, concrete, anode blocks and other large items from the Capped Waste Stockpile prior to transportation to the Containment Cell.
- Supervisory and administrative tasks.

22.3 Impact Assessment

22.3.1 Assessment Approach

HHRA is used to inform and assist decision-makers in managing contamination issues with careful consideration of site-specific circumstances. It is used to estimate, in a way that is adequately protective of health, the potential for site contamination to have an adverse effect on the health of those potentially exposed to it. This is achieved by modelling the dose that an individual may receive through incidental exposure to contaminated soil and/or water as a result of everyday activities. This estimated dose can then be compared against doses that are considered to result in no observable adverse impact to health, as published by authoritative bodies and health protection agencies.

HHRA is a tiered process that begins with a comparison of observed chemical concentrations in media of concern (e.g. groundwater and soil) at the site with conservative generic screening criteria, termed "Tier 1 levels". These levels are designed to identify chemical concentrations that are likely to require further site-specific consideration. If all observed concentrations of chemicals in media at the site are less than the Tier 1 screening levels, the assessment will not proceed any further. If the Tier 1 screening criteria are exceeded, then further site specific analysis at a higher tier of analysis, Tier 2, will be carried out to evaluate whether the risks from the contaminant concentrations observed on the site are significant.



LOCATION OF OFFSITE RECEPTORS (HUMAN HEALTH)
 FORMER HYDRO ALUMINIUM KURRI KURRI SMELTER
 DEMOLITION AND REMEDIATION

**FIGURE
 22-1**

AS130401

The HHRA was undertaken in accordance with relevant Australian recognised guidelines for conducting human health risk assessment, including:

- National Environmental Protection Council (NEPC) (2013) *National Environment Protection (Assessment of Site Contamination) Amendment Measure (NEPM) 2013 (No. 1). Schedule B4, Guideline on-site-Specific Risk Assessment Methodology*.
- enHealth (2012) *Environmental Health Risk Assessment, Guidelines for assessing human health risks from environmental hazards*. Commonwealth of Australia.

In undertaking the HHRA data and information have been sourced from the: Air Quality Impact Assessment (refer to **Appendix 6**); Noise and Vibration Impact Assessment (refer to **Appendix 7**); and the Remedial Action Plan (refer to **Appendix 5**).

22.3.2 Methodology

22.3.2.1 Threshold Risks

Non-carcinogenic or threshold risks are estimated in the form of Hazard Quotients (“HQs”), which are estimated for the dermal/oral pathways and the inhalation pathways as described below.

Oral/Dermal Pathways

$$\text{Hazard Quotient (HQ)} = \frac{\text{Mean Daily Intake (MDI)} \left(\frac{\text{mg}}{\text{kg}} \text{ day} \right)}{\text{Tolerable Daily Intake (TDI)} \left(\frac{\text{mg}}{\text{kg}} \text{ day} \right)}$$

Inhalation Pathways (dust and vapour)

$$\text{Hazard Quotient (HQ)} = \frac{\text{Exposure Adjusted Air Concentration} \left(\frac{\mu\text{g}}{\text{m}^3} \right)}{\text{Tolerable Air Concentration} \left(\frac{\mu\text{g}}{\text{m}^3} \right)}$$

Since an individual might be exposed to a substance or combination of substances via several exposure pathways, the HQs (for multiple exposure pathways and a combination of chemicals) can be summed to calculate an overall risk level, or Hazard Index (HI), as described below.

$$\text{Hazard Index (HI)} = \Sigma \text{Hazard Quotients}$$

It is important however to consider the reasonable exposure pathways combinations and to assess whether it is likely that the same individual would consistently face the reasonable maximum exposure by more than one pathway. Although often a conservative process, this procedure can be used to assess the additivity of effects from concurrent exposure to a mixture of chemicals.

22.3.2.2 Non-Threshold Risks

Carcinogenic or non-threshold risks are estimated in the form of Increased Lifetime Cancer Risks (“ILCR”) which are estimated for the dermal/oral pathways and the inhalation pathways as illustrated below.

Oral/Dermal Pathways

$$\text{ILCR} = \text{Chronic Daily Intake} \left(\frac{\text{mg}}{\text{kg}} \text{ day} \right) \times \text{Slope Factor} \left(\frac{\text{mg}}{\text{kg}} \text{ day} \right)^{-1}$$

Inhalation Pathways (dust and vapour)

$$\text{ILCR} = \text{Exposure Adjusted Air Concentration} \left(\frac{\mu\text{g}}{\text{m}^3} \right) \times \text{Inhalation Unit Risk} \left(\frac{\mu\text{g}}{\text{m}^3} \right)^{-1}$$

Estimates from all pathways are summed to produce a total ILCR for each contaminant. ILCRs are evaluated against acceptability criteria set *a priori* to the risk assessment process, termed Maximum Acceptable Risk Levels (“MARLs”).

22.3.2.3 Risk Assessment Criteria

The MARL for non-carcinogenic risk is a HI of one (NEPM, 2013). A HI of less than one indicates that the estimated level of exposure is below that at which health risks are expected to occur. Should the HI exceed one then the 'risk driving' compounds and pathways need to be considered in more detail (such as segregating the pathways and/or different chemicals).

For non-threshold (carcinogenic) chemicals, the incremental lifetime cancer risk estimates for each receptor have been compared to an acceptable carcinogenic risk level of 1 in 100,000 (1×10^{-5}) in accordance with NEPM 2013 guidelines.

22.3.3 Assessment Results

A conceptual site model (CSM) is a site-specific qualitative description of the source(s) of contamination, the pathway(s) by which contaminants may migrate through the environmental media, and the populations (human or ecological) that may potentially be exposed. This relationship is commonly known as a Source-Pathway-Receptor (SPR) linkage. Where one or more elements of the SPR linkage are missing, the exposure pathway is considered to be incomplete and no further assessment is required.

22.3.3.1 Health Impact Source

The health impact sources assessed in the HHRA includes:

- Contamination sources including:
 - Particulates generated from surface soil and settled dust inside buildings;
 - Soil;
 - Groundwater;
- Noise and vibration; and
- Smelter waste buried in the Capped Waste Stockpile including asbestos.

The 'contaminant source' is identified by comparison of observed chemical(s) of potential concern (CoPC) concentrations in the media of concern (soil, groundwater, and particulates) at the site against conservative generic screening criteria, termed "Tier 1 screening criteria". A potential 'source' is identified when the CoPC concentration is reported to be present in the environmental media at the site above Tier 1 screening criteria which have been derived based on protection of human health. Further assessment of the CoPC that exceed the Tier 1 screening criteria is undertaken in the Tier 2 HHRA.

22.3.3.2 Exposure Pathways

In order for a human receptor to be exposed to a chemical contaminant derived from a site, there should be an exposure pathway linking the source of contamination and the exposed population. An exposure pathway describes the course a chemical or physical agent takes from the source to the exposed individual and generally includes the following elements (USEPA, 1989):

- Source and mechanism of chemical release;
- Retention or transport medium (or media where chemicals are transferred between media);
- Point of potential human contact with the contaminated media; and
- Exposure route (e.g. ingestion, inhalation) at the point of exposure.

A summary of the pathway-receptor linkages that will be assessed further in this HHRA is provided in **Table 22.3**.

Table 22.3: Conceptual Site Model Summary

Exposure Pathway	Works Personnel	Off-site Residential Receptors ¹
Dermal contact with soil	✓	X
Incidental ingestion of soil	✓	X
Indoor inhalation of dust	X	✓
Outdoor inhalation of dust	✓	✓
Dermal contact with groundwater	✓	X
Incidental ingestion of groundwater	✓	X
Outdoor inhalation of vapours (within a trench)	✓	X
Potable use of rainwater tank collected from roof surfaces	X	X

Notes:

✓ indicates a potential exposure pathway is present and assessed further in the HHRA

1. The off-site residential property located at 6 Dawes Avenue, Loxford was considered to be the most sensitive receptor off-site because Project-generated dust concentrations were predicted to be the highest at this property. Both adults and children are considered to reside at this residential property.

The contaminant source for the Tier 2 HHRA comprises:

- *Dust*: PAHs and asbestos to Works personnel, and chromium, fluoride and PAHs to off-site residential receptors.
- *Groundwater*: TPH C₆-C₂₈ and PAHs in shallow groundwater to Works personnel. Fluoride and cyanide in groundwater beneath the Capped Waste Stockpile to Works personnel.
- *Soil*: PAHs in surface soil to Works personnel.

A summary of the risk calculation results for Works personnel and off-site sensitive receptors is presented in **Table 22.4** for the threshold risk estimates and in **Table 22.5** for the non-threshold risk estimates.

Table 22.4: Summary of Hazard Indices

Exposure Pathway	Works Personnel	Works Personnel (Capped Waste Stockpile)	Off-Site Resident
Outdoor/trench dissolved phase vapour inhalation	5.4E-03	-	-
Dust inhalation	- *	-	0.26
Dermal contact with soil	- *	- (e)	-
Incidental ingestion of soil	- *	- (e)	-
Incidental ingestion of groundwater	1.3E-04 ^(d)	1.5	-
Dermal contact with groundwater	9.8E-02 ^(d)	2.8	-
Total HI	0.10	4.2	0.24

Notes:

- Acceptable risk level of 1.0 was adopted (NEPM, 2013)
- "-" indicates that the exposure pathway was not considered relevant for the HHRA
- "-*" indicates that this pathway was assessed for carcinogenic chemicals only
- Does not include groundwater beneath the Capped Waste Stockpile which is assessed separately
- Soil data at the Capped Waste Stockpile was not available. Management measures to eliminate groundwater pathways will protect from exposure to soil impacts

Table 22.5: Summary of Increased Lifetime Cancer Risk (ILCR) Estimates

Exposure Pathway	Works Personnel	Off-site Nearest Sensitive Receptor
Outdoor/trench dissolved phase vapour inhalation	-	-
Dust inhalation	1.249.49E-07	3.65E-07
Dermal contact with soil	4.3E-07	-
Incidental ingestion of soil	6.8E-07	-
Incidental ingestion of groundwater (c)	5.4E-10	-
Dermal contact with groundwater (c)	2.5E-07	-
Total ILCR	1.482.31E-06 (1 in 432,051)	3.65E-07 (1 in 2,739,726)

Notes:

- a) An acceptable cancer risk level of 1 in 100,000 was adopted in accordance with NEPM (2013) recommendations
- b) – indicates that the exposure pathway was not considered relevant for the HHRA
- c) Does not include groundwater beneath the Capped Waste Stockpile which is assessed separately. Note data indicating the presence of carcinogenic chemicals are not available for the CWS.

The health risks estimated for the Works personnel exposed to groundwater beneath the Capped Waste Stockpile exceeded the acceptable limits indicating potential health risks associated with this activity. The HHRA assumed that the Works personnel would have direct contact with the groundwater (to exposed hands and face) for two hours per day for 80 days (based on four months to complete removal of the Capped Waste Stockpile material). This is likely to be an overestimate of actual exposure. Recommended management measures to eliminate direct contact exposure pathways are discussed in **Section 22.4**.

The risk estimates for the off-site residential receptor represents the highest expected health risk for the off-site receptors via dust inhalation because they were considered to have the highest exposure (i.e. 24 hours per day every day of the year), and the risks were modelled based on the highest predicted off-site dust concentration (maximum cumulative annual average). Therefore, the health risks are likely to be lower for all other sensitive off-site receptors including recreational users. Site-derived dust was considered to be the only media that could potentially impact off-site sensitive receivers because any impacted soil and groundwater would be contained to the Project Site.

22.4 Mitigation Measures

The HHRA was prepared to assess the Works, including the human health and environmental protection measures described in **Section 8**.

Table 22.6 describes the additional management measures identified through the HHRA process that would be addressed in the Work Health and Safety Management Plan (as discussed in **Section 8.1.2**).

Table 22.6: Waste Management Measures

Project Phase	Mitigation Measures
The Works	Appropriate personal protective equipment would be provided to workers who are undertaking activities in or near the Capped Waste Stockpile. The equipment would remove exposure pathways relating to dermal exposure, incidental ingestion and inhalation. This would include: • Waterproof boots, pants and long sleeved shirt as a minimum. Face shields would be required for personnel working in close proximity to exposed groundwater (when in locations and situations where splashing could result in incidental ingestion of groundwater and/or eye and skin contact). • Appropriate masks would be required to prevent dust (including asbestos) inhalation. • A respirator appropriate for ammonia, methane, hydrogen, hydrogen cyanide and hydrogen sulfide (available and ready to be used for all workers at the Capped Waste Stockpile).
	Real-time ambient air monitoring would be undertaken at several locations around the Capped Waste Stockpile when waste from the Capped Waste Stockpile is exposed. At a minimum, the ambient air would be monitored for concentrations of ammonia and hydrogen cyanide gases, and airborne asbestos fibres.
	Real-time ambient air monitoring would be undertaken inside machinery housings, and workers within these housings would also have appropriate respirators available.

23. CUMULATIVE IMPACTS

23.1 Assessment Approach

The Secretary's Environmental Assessment Requirements requires consideration of cumulative impacts in the Environmental Impact Statement. This section discusses how potential cumulative impacts have been considered in the Environmental Impact Statement and the mitigation measures to address potential cumulative impacts.

Table 23.1 outlines the Secretary's Environmental Assessment Requirements relating to cumulative impacts and where they have been addressed.

Table 23.1: Secretary's Environmental Assessment Requirements

Requirement	Where Addressed
an assessment of the potential impacts of all stages of the development, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and legislation.	Section 23 and throughout Part C

23.2 Impact Assessment

Consideration of potential cumulative impacts has been integral to the impact assessments undertaken as part of this EIS. This includes:

- Consideration of the potential impacts of concurrent Project activities.
- Consideration of the potential impacts of concurrent activities undertaken by Hydro (for example completion of Stage 1 Demolition concurrent with Works activities).
- Consideration of the contributions of existing developments and activities in the surrounding area.

Table 23.2 identifies the environmental aspects with potential cumulative impacts and how these have been considered in the EIS.

Table 23.2: Consideration of Potential Cumulative Impacts

Environmental Aspect	Consideration of Cumulative Impacts
Air and Odour	- Inclusion of Stage 1 Demolition within the Air Quality Impact Assessment. - Consideration of concurrent activities to assess the maximum potential air quality impacts. - Assessment of the Project's potential air quality impacts accumulated with existing air quality conditions and dust sources. - Mitigation measures that minimise potential cumulative air quality impacts.
Noise and Vibration	- Inclusion of Stage 1 Demolition within the Noise and Vibration Impact Assessment. - Consideration of concurrent activities to assess the maximum potential noise levels. - Assessment of the Project's potential noise levels accumulated with existing noise sources. - Mitigation measures that minimise potential cumulative noise impacts.
Soil and Water	- Consideration of concurrent activities to assess the maximum potential soil and water impacts. - Mitigation measures that minimise potential cumulative impacts on soil and water.

Table 23.2: Consideration of Potential Cumulative Impacts

Environmental Aspect	Consideration of Cumulative Impacts
Hazards and Risks	Consideration of concurrent activities to assess the maximum potential risks.
Transport and Access	- Inclusion of Stage 1 Demolition within the Traffic Impact Assessment. - Consideration of concurrent activities to assess the maximum traffic generation. - Assessment of the Project's traffic generation accumulated with existing traffic. - Mitigation measures that minimise potential cumulative impacts.
Biodiversity	Consideration of the Project impacts on threatened species and endangered ecological communities with regard to their local distribution.
Greenhouse Gas	- Inclusion of Stage 1 Demolition within the Greenhouse Gas Assessment. - Comparison of the Project's greenhouse gas contributions against NSW's total estimated emissions.
Human Health	- Inclusion of Stage 1 Demolition within the Human Health Risk Assessment. - Consideration of concurrent activities to assess the maximum potential human health impacts. - Consider the cumulative health impacts associated with various environmental aspects.

23.3 Mitigation Measures

Management measures described throughout **Part C** would mitigate potential cumulative impacts to acceptable levels.

PART D: ENVIRONMENTAL MANAGEMENT AND CONCLUSION

24. ENVIRONMENTAL MANAGEMENT

24.1 Summary of Environmental Management

Table 24.1 lists the environmental management measures identified in **Part C** of the EIS.

As described in the description of the Works in **Section 8** and the Containment Cell Management in **Section 9**, environmental management and impact minimisation are inherent to the Project. The activities described in **Table 24.1** are the additional measures that would further mitigate the potential environmental and social impacts of the Project.

Table 24.1: The Project Environmental Management Measures

Environmental Aspect	Management Measure
Site Establishment	
General	All Works personnel would be informed during the site induction of their obligations to minimise environmental impacts and the need to take reasonable and practical measures to minimise impacts.
	The Stakeholder Engagement Plan (as discussed in Section 8.1.4) would continue to be implemented to engage with government agencies, Cessnock and Maitland City Councils, landowners, community members and other stakeholders to provide a single consultation framework.
	The Stakeholder Engagement Plan would define the method and persons responsible for the dissemination of information regarding the Project. This would include the procedure for receiving and responding to comment or complaints from the community.
	Local residents would be notified in advance of the Project of the nature and estimated timescales for completion of the Project. Thereafter ongoing notifications and updates on new or changes to Works activities would be provided in accordance with the Stakeholder Engagement Plan.
	A 24-hour telephone number would be provided as a contact point for any complaints, issues or general enquiries regarding the Project.
Air Quality	Establish four dust deposition monitoring locations around the Project Site. Where practicable the monitoring locations would be established a minimum of three months prior to the Project to establish baseline conditions.
Soil and Water	Erosion and sediment controls would be installed prior to the commencement of the Works. This would include installation of geotextile fabric downstream of Works areas. These controls would continue to be managed and maintained throughout the Works.
	Undertake any required additional maintenance of the existing surface water drainage and dams prior to commencing the Works.
Traffic and Access	In consultation with Cessnock City Council and Roads and Maritime, general signposting of the demolition vehicle routes with appropriate heavy vehicle and construction warning signs.
	Review of speed restrictions along Hart Road and additional signposting of speed limitations.
	Installation of specific warning signs at Dickson Road to warn existing road users of entering and exiting demolition traffic.

Table 24.1: The Project Environmental Management Measures

Environmental Aspect	Management Measure
Traffic and Access (continued)	The initial internal access restrictions and alternative access routes would be established for the initial Works phase.
Aboriginal Heritage	Precautionary fencing of Hydro-IA35-15 prior to surface collection. Surface collection and relocation of newly identified isolated artefact Hydro-IA35-15.
Biodiversity	The Project Site boundary would be clearly delineated to limit the extent of vegetation clearance to that described in this EIS, and to restrict access during the Works. This would include erection of security fencing around the Containment Cell and maintaining the security fencing around the Smelter Site. Pre-clearing surveys would be undertaken by an appropriately qualified ecologist prior to vegetation clearance. Where required (such as the felling of hollow bearing trees) vegetation clearance would be supervised by an appropriately qualified ecologist or animal handler.
Waste	The designated storage and stockpile areas would be established, including the installation of the environmental controls described in Section 8.2.1 .
The Works	
Air Quality	Accumulated fines from within the buildings would be removed where safe, reasonable and feasible to do so prior to building demolition. Dust suppression to be applied during induced collapse of buildings or structures. Watering of the demolition areas and unsealed access roads. Vehicles would use wherever practicable existing sealed roads. A speed limit of 20km/hr would be imposed on internal roads. Where possible construction vehicles and machinery would be turned off or throttled down when not in use. Construction vehicles and machinery would be maintained in accordance with manufacturer's requirements. The erosion and sediment control measures described in Section 13.4 would assist in controlling dust generation. Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. Record any exceptional incidents that cause dust and/or air emissions, either on or off-site, and the action taken to resolve the situation in the log book. Carry out regular site inspections to monitor compliance with the AQMP, record inspection results, and make an inspection log available to the EPA and/or Cessnock City Council when asked. Keep site fencing, barriers and scaffolding clean using wet methods.

Table 24.1: The Project Environmental Management Measures

Environmental Aspect	Management Measure
Air Quality (continued)	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.
	Provide and maintain an adequate water supply on the Project Site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
	Use enclosed chutes and conveyors and covered skips where possible and appropriate.
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
	Vehicles entering and leaving the Project Site would be covered to prevent escape of materials during transport.
	Haul routes would be inspected for integrity and, where required, instigate necessary repairs to the surface as soon as reasonably practicable.
Noise and Vibration	Truck drivers are to be informed of site access routes, acceptable delivery hours and must minimise extended periods of engine idling.
	Demolition vehicles and machinery would be selected with consideration of noise emissions. Where possible the sound power level of equipment and plant would comply with the sound power levels listed in the Noise and Vibration Impact Assessment in Appendix 7 or it should be replaced with less noise intensive equipment.
	Activities that would generate an audible noise at sensitive receivers would be limited to occur between 7:00 am to 6:00 pm Mondays to Fridays and 7:00 am to 1:00 pm on Saturdays.
	Activities outside these standard hours would be undertaken with the equipment restrictions described in the Noise and Vibration Impact Assessment in Appendix 7 .
	Machines found to produce excessive noise compared to typical noise levels should be removed and replaced, or repaired or modified prior to recommencing works.
	Where possible construction vehicles and machinery would be turned off or throttled down when not in use.
	Equipment would be inspected and maintained in accordance with manufacturer's requirements.
	Use less noise-intensive equipment where reasonable and feasible.
	Construction equipment with the most effective mufflers, enclosures and low-noise tool bits and blades must be procured and utilised where practicable for the Project.
	Where possible mains power should be utilised for temporary traffic signals / work area lighting. Where this is not feasible silenced generator sets are to be used instead.

Table 24.1: The Project Environmental Management Measures

Environmental Aspect	Management Measure
Noise and Vibration (continued)	Avoid unnecessary revving of engines and turn off plant that is not being used / required where practicable.
	Use only non-tonal reverse alarms (broadband alternatives are needed). Where possible organise the site so that delivery trucks and haulage trucks only drive forward to avoid the use of reversing alarms.
	Where practical fixed plant should be positioned as far away as possible from sensitive receivers.
	Upon receiving a noise complaint regarding demolition activities, the following steps would be undertaken:
	The person nominated in the Stakeholder Engagement Plan would investigate the source of the complaint. The aim would be to initiate an investigation no later than two hours after the complaint has been made (dependent on the nature of the complaint).
	Where practicable a visit would be made to the complainant to verify the nature of the complaint.
	Where justified, appropriate action would be taken to amend the activity causing the complaint.
	Where three or more substantiated complaints of a similar nature are received (from at least two complainants), the work element must be reviewed in order to consider whether the work methods can be changed or if additional mitigation methods can be employed in order to prevent or reduce the likelihood of further complaints being made.
	Attended monitoring should also be undertaken in response to substantiated complaints in order to validate and assess the source(s) giving rise to complaint(s).
Soil and Water	Attended monitoring would be undertaken every three months to assess compliance with the relevant noise limits.
	Erosion and sediment controls would be inspected and maintained as required on a weekly basis and after a rain event.
	The surface water drainage system would be inspected and maintained as required on a monthly basis.
	Vehicles exiting the Project Site onto public roads would be inspected for mud and dirt. If required vehicles would be manually cleaned prior to exiting the Smelter.
	Vehicle refuelling would be undertaken using mobile refuelling vehicles equipped with spill containment equipment and a spill kit.
	All chemicals on-site would be stored in accordance with the applicable Safety Data Sheet.
	An appropriate spill kit is to be on-site at all times and any spillage is to be immediately cleaned up. In the event of a large or hazardous spill, the fire brigade, police, ambulance and OEH would be contacted as required.

Table 24.1: The Project Environmental Management Measures

Environmental Aspect	Management Measure
Traffic and Access	The promotion of carpooling for construction demolition staff and other shared transport initiatives.
	Management of the transportation of demolition materials/waste to maximise vehicle loads to therefore minimise vehicle movements.
	Regular consultation with the Kurri Kurri Speedway and the Kurri Kurri Junior Motorcycle Club would be undertaken to understand their planned activities and to advise of the proposed Project program.
	The initial internal access restrictions and alternative access routes would be altered as required to reflect the progression of the Works.
	A speed limit of 20km/hr would be imposed on internal roads.
Aboriginal Heritage	Where possible, avoid the need to stockpile material in the area of high archaeological sensitivity. In the event that stockpiling in this area is required, geo-matting would be placed on the surface of the area prior to stockpiling.
	An unexpected finds procedure would be implemented in the event that a potential Aboriginal site was identified during the Works. This procedure would include:
	1) All works would cease immediately in the area to prevent any further impacts to the site. 2) Notify the Works' Environment Officer. 3) Engage a suitably qualified archaeologist and RAP representative to determine the nature, extent and significance of the Aboriginal site and provide appropriate management advice. Management action(s) would vary according to the type of evidence identified, its significance (both scientific and cultural) and the nature of potential impacts.
	Prepare and submit an AHIMS site card for the Aboriginal site.
	A standard procedure would be implemented for the management of any potential human skeletal remains identified throughout the Works. This procedure would include:
	1) All work in the vicinity of the remains should cease immediately. 2) The location should be cordoned off and the appropriate authorities notified. 3) A physical or forensic anthropologist should be commissioned to inspect the remains <i>in situ</i> and make a determination of ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or modern).

Table 24.1: The Project Environmental Management Measures

Environmental Aspect	Management Measure
Aboriginal Heritage (continued)	Following completion of task three, the applicable action/s listed below would be implemented: - If the remains are identified as non-human, work can recommence immediately. - If the remains are identified as modern and human, the area would become a crime scene under the jurisdiction of the NSW Police. - If the remains are identified as pre-contact or historic Aboriginal, the site would be secured and OEH and all RAPs notified in writing. Where impacts to exposed Aboriginal skeletal remains cannot be avoided, remains would be retrieved via controlled archaeological excavation and reburied outside of the Disturbance Boundary in a manner and location determined by RAPs. If the remains are identified as historic non-Aboriginal, the site would be secured and the NSW Heritage Branch contacted.
Non-Indigenous Heritage	In the event that a potential heritage item is unearthed during construction works would cease and the Office of Environment and Heritage would be notified. Photographs and drawings (from construction, operation and demolition) of the Smelter would be made available to interested historical societies or community groups. Hydro would work with the community on how to recognise the history of the Smelter.
Biodiversity	To minimise the potential for the spreading of weeds hygiene protocols, including vehicle wash-downs, would be implemented for machinery used in vegetation clearance. Appropriate shallow rooted native grass species would be used in the vegetation cover for the Containment Cell. Appropriate hybrid grass species (that cannot become weed issues in adjoining native vegetation) would be used in stabilising surfaces following completion of the Works.
Visual	In recognition of the likely community interest in the demolition of the stacks, Hydro would consider establishing viewing areas, including suitable parking and traffic control.
Energy Efficiency / Greenhouse Gas	Implementation of the measures described in Section 8.5.4 and Section 8.8.1 to minimise the exposure of the waste material to moisture during the stockpiling, transport and placement activities (to reduce the potential for generation of methane emissions). Use light emitting diode (LED) lighting in offices, contractor compounds and temporary site lighting. Energy efficient inverter split system units would be installed in contractor compounds where practical and timers set so that air conditioning systems are switched off after hours. Personnel would be instructed to turn off lights and office equipment when these are not in use such as before and after the working day.

Table 24.1: The Project Environmental Management Measures

Environmental Aspect	Management Measure
Energy Efficiency / Greenhouse Gas (continued)	Modern and fuel efficient vehicles and machinery would be used during the Works wherever possible. All vehicles would be maintained in accordance with manufacturer's requirements to maintain efficiency.
	The potential for use of biodiesel blend fuels in its vehicles and machinery would be investigated.
	Personnel would be encouraged during the site induction to travel to and from the Smelter by carpooling.
Waste	Promotion of efficient resource use, waste avoidance and waste minimisation.
	Compounds and the stockpile area would be maintained in an organised condition, with waste materials to be transported to and stockpiled in the designated storage area.
	Wastes would be managed to minimise the potential for windblown wastes spreading within or beyond the Project Site, including into watercourses.
	Implementation of the materials tracking system described in Section 8.5.5 , Section 8.6 and Section 8.7.6 .
	Where possible recyclable wastes generated at the contractor's compound (paper, cans and bottles) would be collected by a recycling contractor. Remaining wastes would be collected for disposal at a licensed waste management facility.
	Trucks transporting recyclable demolition materials from the Project site on public roads would be covered.
	Waste removal contractors transporting material from the Project Site would be required to provide dockets to confirm that waste was transported to a licensed waste management facility.
Human Health	The environmental controls and containment measures placed on waste stockpiles would be inspected and maintained as required on a weekly basis and after rain and strong wind events.
	Appropriate personal protective equipment would be provided to workers who are undertaking activities in or near the Capped Waste Stockpile. The equipment would remove exposure pathways relating to dermal exposure, incidental ingestion and inhalation. This would include: • Waterproof boots, pants and long sleeved shirt as a minimum. Face shields would be required for personnel working in close proximity to exposed groundwater (when in locations and situations where splashing could result in incidental ingestion of groundwater and/or eye and skin contact). • Appropriate masks would be required to prevent dust (including asbestos) inhalation. • A respirator appropriate for ammonia, methane, hydrogen, hydrogen cyanide and hydrogen sulfide (available and ready to be used for all workers at the Capped Waste Stockpile). Real-time ambient air monitoring would be undertaken at several locations around the Capped Waste Stockpile when waste from the Capped Waste Stockpile is exposed. At a minimum, the ambient air would be monitored for concentrations of ammonia and hydrogen cyanide gases, and airborne asbestos fibres.

Table 24.1: The Project Environmental Management Measures

Environmental Aspect	Management Measure
Human Health (continued)	Real-time ambient air monitoring would be undertaken inside machinery housings, and workers within these housings would also have appropriate respirators available.
Containment Cell Management	
Visual	The Containment Cell vegetation cover would be maintained (as described in Section 9.1.2).
Air Quality	As discussed in Section 9.1.1.3 gas monitoring would be completed from the gas monitoring vents on a quarterly basis, until results indicate that gas generation is not an issue. Gas monitoring would be completed for ammonia and methane.
	In the event that gas concentration trigger levels outlined in the OEMP are exceeded, appropriate contingency responses would be implemented.

24.2 Works Environmental Management

As discussed in **Section 8.1.1** a Works Environmental Management Plan (EMP) would be developed that addresses the environmental management requirements for the Project. The EMP would be the primary method for implementation of the environmental management measures described in **Section 24.1** and the conditions of the Project Approval.

The EMP would be developed with the following structure:

- Requirements: identify the legislative, approval and licence requirements to be addressed by the EMP.
- Activities: describe the activities covered by the EMP.
- Management Structure: the environmental management structure for the Project; the key environmental management personnel and their responsibilities; and subcontractor requirements and responsibilities.
- Environmental Management: discuss how personnel and subcontractors would be made aware of the EMP requirements, environmental records and document controls, and the procedures to be implemented and who to be contacted in the event of an environmental emergency.
- Implementation: provide an outline of the environmental management measures to be implemented, and refer to the specialist management plans that would be appended to the EMP.
- Monitoring: describe the monitoring, auditing and review procedures to assess compliance with, and performance of, the EMP.
- Reporting: describe how the monitoring results would be reported; and the reporting procedures for environmental incidents and complaints.

24.2.1 Specialist Management Plans

As identified throughout **Part C** a number of specialist management plans would be included as part of the EMP to address the key environmental issues associated with the Works. These include:

- Air Quality Management Plan.
- Noise and Vibration Management Plan.
- Soil and Water Management Plan.
- Traffic Management Plan.
- Aboriginal Heritage Management Plan.
- Flora and Fauna Management Plan.
- Energy Efficiency Management Plan.
- Waste Management Plan.

These plans would complement the EMP and be based on the management measures described in **Section 24.1** and the conditions of the Project Approval relevant to their specific environmental aspect. The specialist management plans would be developed in coordination with relevant government agencies where appropriate.

24.3 Containment Cell Environmental Management

The Containment Cell Environmental Management Plan would have a similar structure to that outlined for the Works EMP in **Section 24.2**. It would detail the management, monitoring and reporting requirements discussed in **Section 9** to for ongoing management of the completed Containment Cell.

25. PROJECT JUSTIFICATION AND CONCLUSION

25.1 Environmental Impacts and Management

Avoiding, mitigating and managing environmental impacts have been key considerations in Project planning. This includes:

- Consideration of potential environmental and social impacts through the options identification and assessment process (refer to **Section 5**);
- The avoidance of environmental impacts in developing the Project footprint;
- The inclusion of environmental management as an inherent component of the Works and Containment Cell Management (refer to **Section 8** and **Section 9**);
- Preparation of detailed environmental impact assessments of the key environmental issues (refer to **Part C**), as identified in the Secretary's Environmental Assessment Requirements and with consideration to the environmental risk analysis (refer to **Section 10**); and
- The development of and commitment to additional environmental management measures (as summarised in **Section 24.1**) to further mitigate the potential environmental and social impacts of the Project.

Through these steps Hydro has developed the Project that mitigates the potential environmental and social impacts to an acceptable level.

25.2 Benefits of the Project

The Project is the key activity to help Hydro achieve the strategic vision for the Hydro Land: the establishment of significant employment, residential, rural and biodiversity conservation land uses. The Project would:

- Facilitate the Hunter Region achieving the economic, employment and environmental objectives identified in the NSW Government *NSW State Plan 2021*, the *Hunter Regional Action Plan*, the *Draft Hunter Regional Plan* and the *Draft Plan for Growing Hunter City*;
- Generate employment opportunities throughout the Works activities;
- Render the Project Site suitable for future long term employment uses;
- Achieve Hydro's commitment to meeting its corporate environmental and social responsibilities; and
- Allow for the significant social, environmental and economic benefits of the Project to be sustainably achieved.

As discussed in **Section 1.1** Hydro is committed to meeting its environmental and social commitments, and to managing environmental legacies within its landholdings. In achieving this, Hydro is committed to managing waste on the Project Site and undertaking demolition and remediation works to render the Project Site suitable for re-use as employment land.

In doing so this would facilitate the redevelopment of the Hydro Lands for future use including employment land, residential land, rural land and a large area dedicated for biodiversity conservation. These future uses would provide environmental, social and economic benefits to the local area, the Hunter Region, and the state of NSW.

Completion of the Project is the key activity to facilitating Hydro achieving these commitments.

25.3 Consequences of Not Proceeding

The key outcome of Project not proceeding is that the ability to deliver all the environmental, social and economic benefits to the local area, the Hunter Region, and the state of NSW that the Project would facilitate (by allowing the redevelopment of Hydro Land) would be compromised.

The Project has been identified as the preferred option for Hydro to achieve its environmental and social commitments. If the Project did not proceed, Hydro would implement alternative methods for addressing its environmental obligations. However these methods are not the most effective way of

addressing these environmental obligations, and would not provide the social and economic benefits the Project would facilitate.

25.4 Principles of Ecologically Sustainable Development

According to the EP&A Regulation, ecologically sustainable development (ESD) requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the consideration of the following four principles:

- The precautionary principle.
- Inter-generational equity.
- Conservation of biological diversity and ecological integrity.
- Improved valuation, pricing and incentive mechanisms.

The options development and design process has included the consideration of ESD principles.

25.4.1 The Precautionary Principle

Definition

The EP&A Regulation defines the precautionary principle as follows:

"... if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation".

Further, the EP&A Regulation states that, in applying the precautionary principle, decisions should be guided by:

"(i) Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) An assessment of the risk-weighted consequences of various options".

Discussion

The precautionary principle has played a key role in the development of the Project. From option identification assessment through to Project planning and the EIS, the EIS has undertaken an extensive evaluation to achieve a level of scientific certainty in relation to potential impacts associated with the Project. An assessment of the consequences of various options was undertaken as part of the options identification process. In identifying the preferred options (refer to **Section 5**), a number of processes and criteria were implemented to select the most appropriate option.

During the EIS sufficient information has been gathered to allow an informed process to be implemented. Careful evaluation of collected information was undertaken to avoid, wherever practicable, serious or irreversible damage to the environment. This has allowed the development of appropriate mitigation measures to limit the potential for both long and short-term impacts on the surrounding environment.

25.4.2 Intergenerational Equity

Definition

The EP&A Regulation states that achieving intergenerational equity means that *"the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations"*.

Discussion

The Project has been developed to anticipate the needs of future generations, by making the Hydro Land suitable for future use including employment land, residential land, rural land and a large area dedicated for biodiversity conservation. These new land uses would provide long-term environmental, social and economic benefits.

The Works would involve the implementation of mitigation measures to respond to potential adverse impacts on the environment. Measures have been formulated to minimise potential impacts on

existing and proposed land uses of the Hydro Land and surrounding area. These measures would assist with achieving the principle of intergenerational equity.

The Containment Cell would incorporate best practice design, construction and material placements procedures and operational environmental management measures. This would protect future environmental health by minimising the potential for environmental issues associated with the Containment Cell and removing the existing environmental issues associated with the Capped Waste Stockpile and other areas of contaminated soils.

25.4.3 Conservation of Biological Diversity and Ecological Integrity

Definition

The EP&A Regulation states that the *“conservation of biological diversity and ecological integrity should be a fundamental consideration”*.

Biological diversity is defined by the *Threatened Species Conservation Act 1995* as “the diversity of life and is made up of the following three components:

- (a) genetic diversity - the variety of genes (or units of heredity) in any population,*
- (b) species diversity - the variety of species,*
- (c) ecosystem diversity - the variety of communities of ecosystems”.*

Ecological integrity is not defined by any Australian legislation. However, ecological integrity is defined by the *Canada National Parks Act 2000*, as “a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes”.

Discussion

The option assessment process (particularly the location of the Containment Cell) and the Project Site footprint have sought to minimise disturbance to native vegetation and habitat.

The Project has been developed to minimise impacts to local biodiversity and ecological integrity. Where potential impacts have been identified, mitigation measures in the concept design have been developed to reduce the scale and intensity of those impacts so that the Project would not have a significant impact on biodiversity. The mitigation measures identified in this EIS to be implemented prior to and during the Works, and continuing in the operation phase, have the purpose of minimising impacts on native flora and fauna, and therefore maintaining biological diversity. A range of mitigation measures to minimise the potential impact on a range of environmental aspects, including noise, air quality, water and waste, would also play a role in the protection of biological diversity.

25.4.4 Improved Valuation, Pricing and Incentive Mechanisms

Definition

The EP&A Regulation states that *environmental factors should be included in the valuation of assets and services*. The EP&A Regulation identifies the following methods to achieve this:

- (i) polluter pays, that is those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
- (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
- (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems”.*

Discussion

The economic value of the environmental resources affected by the Project has been considered throughout the option selection process, Project planning and the EIS preparation. This has included:

- Consideration of environmental issues (including the costs of integration of effective management measures to minimise potential environmental and social impacts) in the options identification and assessment process.
- A number of the measures required to minimise potential impacts on the environment, such as the Containment Cell design, have been incorporated as key elements of the Project and its overall cost.
- Measures have been identified throughout the EIS for the mitigation of potential environmental impacts, including the avoidance and control of pollution associated with the Works and Containment Cell Management phases.
- Detailed investigations have been undertaken using a number of environmental parameters throughout the option identification and assessment process, Project planning and the EIS preparation. This has been developed so that potential issues requiring mitigation can be addressed early, thereby minimising the potential issues and associated costs.

25.5 Conclusion

The Project is the key activity to help Hydro achieve the strategic vision for the Hydro Land: the establishment of significant employment, residential, rural and biodiversity conservation land uses. The Project would:

- Facilitate the Hunter Region achieving the economic, employment and environmental objectives identified in the NSW Government *NSW State Plan 2021*, the *Hunter Regional Action Plan*, the *Draft Hunter Regional Plan* and the *Draft Plan for Growing Hunter City*;
- Generate employment opportunities throughout the Works activities;
- Render the Project Site suitable for future long term employment uses;
- Achieve Hydro's commitment to meeting its corporate environmental and social responsibilities; and
- Allow for the significant social, environmental and economic benefits of the Project to be sustainably achieved.

The Project would produce some environmental impacts, however planning for the Project has considered minimising potential environment and social impacts throughout Project planning, from the options assessment process, the location and design of the Containment Cell through to the identification of appropriate and targeted environmental measures for the Works and Containment Cell Management phases. As a result, the potential impacts of the Project have been minimised through appropriate Project design and environmental safeguards which are identified in this EIS. It is considered that the Project has identified and mitigated potential environmental impacts to an acceptable level to allow for the significant benefits of the Project to be sustainably achieved.

The Project is a key component in Hydro managing its environmental and social obligations, and facilitating the proposed future employment, residential, and biodiversity conservation land uses that would provide environmental, social and economic benefits to the local area, the Hunter Region, and the state of NSW.

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27. LIMITATIONS

Ramboll Environ Australia prepared this report in accordance with the scope of work as outlined in our proposal to Hydro Aluminium Kurri Kurri Pty Ltd dated 28 October 2014 and in accordance with our understanding and interpretation of current regulatory standards.

A representative program of sampling and laboratory analyses was undertaken as part of this investigation, based on past and present known uses of the site. While every care has been taken, concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. We cannot therefore preclude the presence of materials that may be hazardous.

Site conditions may change over time. This report is based on conditions encountered at the site at the time of the report and Ramboll Environ Australia disclaims responsibility for any changes that may have occurred after this time.

The conclusions presented in this report represent Ramboll Environ Australia's professional judgment based on information made available during the course of this assignment and are true and correct to the best of Ramboll Environ Australia's knowledge as at the date of the assessment.

Ramboll Environ Australia did not independently verify all of the written or oral information provided to Ramboll Environ Australia during the course of this investigation. While Ramboll Environ Australia has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided to Ramboll Environ Australia was itself complete and accurate.

This report does not purport to give legal advice. This advice can only be given by qualified legal advisors.

27.1 User Reliance

This report has been prepared exclusively for Hydro Aluminium Kurri Kurri Pty Ltd and may not be relied upon by any other person or entity without Ramboll Environ Australia's express written permission.