

FITZWALTER

PROPERTY CONSULTANTS, DEVELOPMENT & PROJECT MANAGERS

24 August 2009

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**LAKE MACQUARIE
CITY COUNCIL**

The General Manager
Lake Macquarie City Council
Box 1906
HUNTER REGION MAIL CENTRE NSW 2310

Attention: Angel Troke

Dear Sir,

Local Environmental Study – Pasminco and Incitec Sites

Please find enclosed a local environmental study (LES) for the Pasminco and Incitec sites.

The LES addresses comments made by Lake Macquarie City Council (Council) in January 2009, following a review of the Bunderra Master Plan and Planning Report. It is noted that the review identified further information required for Council to proceed with the rezoning of the Pasminco and Incitec sites. The information provided in the LES is in accordance with the information requested in the review documentation, ie it addresses comments made under the headings 'Further Information or Consideration Required' in Section 2 of that report.

We hope that the information provided in the LES is sufficient for Council to proceed with the rezoning of the above sites.

Should you have any queries in relation to the above, please do not hesitate to contact me on (02) 8925 6769 or 0419 206 992.

Yours sincerely,
FITZWALTER GROUP



ANTHONY FITZSIMMONS
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Bunderra Stage 2

Local Environmental Study

Volume 1



Bunderra Stage 2

Local Environmental Study

Prepared for

Fitzwalter Group

(an operating division of WSP Environmental Pty Ltd)

On behalf of PCCS (Subject to Deed of Company Arrangement)

And

Incitec Fertilisers Limited

August 2009

Volume 1

Bunderra Stage 2 Local Environmental Study

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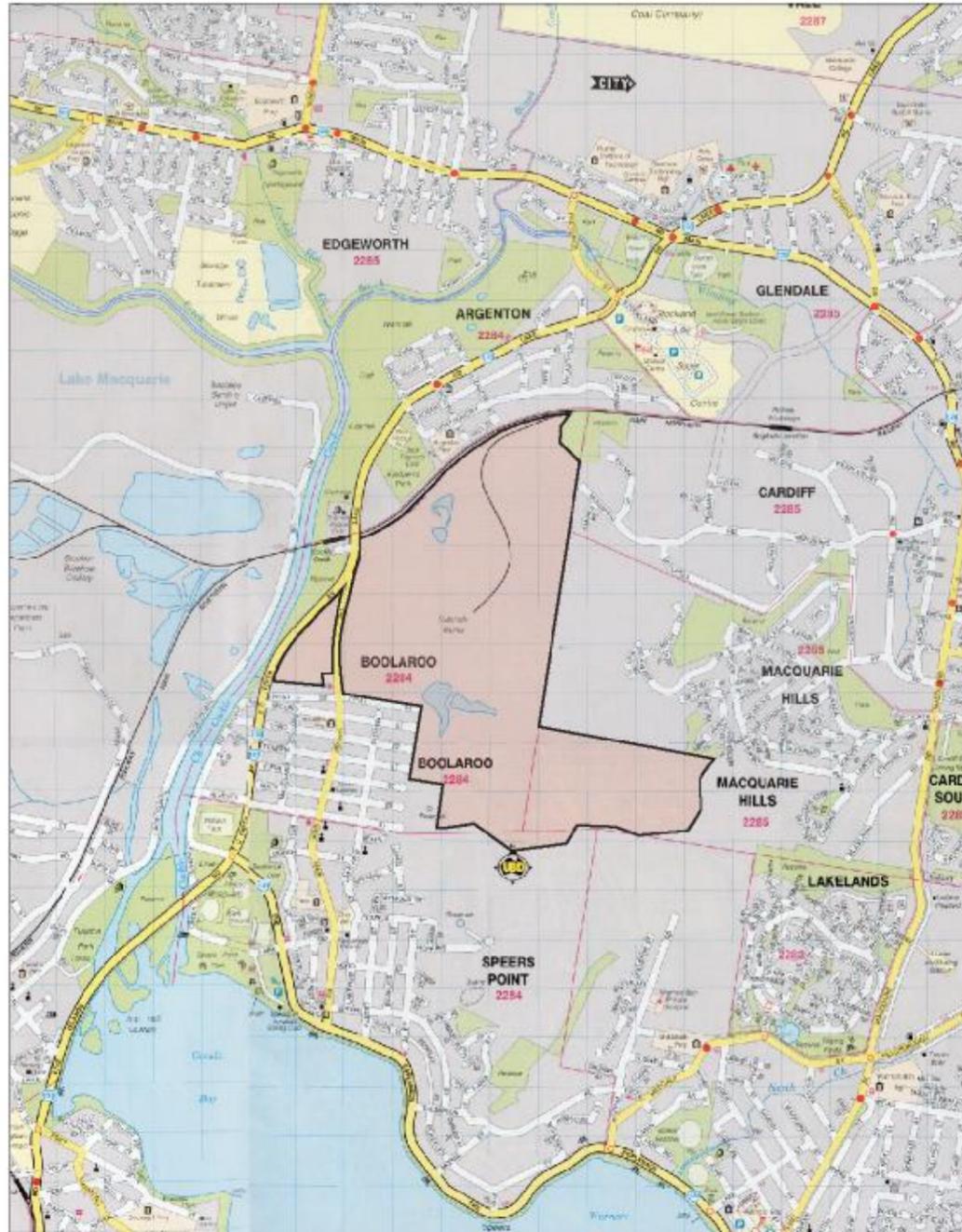


Figure 1

EXECUTIVE SUMMARY

Pasmenco Cockle Creek Smelter Pty Ltd (Subject to Deed of Company Arrangement) ("Pasmenco") ceased operations at Cockle Creek in September 2003. Since that time, a number of activities have commenced, or have been completed, including demolition of buildings and structures, extensive ongoing remediation works, winding up operations and a range of strategic land use planning investigations.

Incitec Fertilisers Limited occupies land that was formerly part of the Pasmenco site. Incitec have announced that it will be ceasing operations on the site in 2009 and will vacate the site in 2010. This provides the opportunity for an integrated planning approach for the future use and development of these former industrial sites.

These sites are shown on Figure 1 and have an area of 207.25 hectares.

Planning initiatives to date include a resolution of Council to prepare a draft LEP for part of the site (approximately 15.8 hectares) and a development application for subdivision of land at the north eastern part of the site for industrial purposes as a logical extension of Cardiff West Industrial Estate.

The closure of the Pasmenco smelter and the Incitec operations creates an opportunity for a new strategic direction for the site that reflects the sustainability principles in the City of Lake Macquarie Lifestyle 2020 Strategy. There have been a series of strategic planning initiatives by the Council and by the owners of the Pasmenco and Incitec sites, remediation has commenced in accordance with a major project approval of the Minister for Planning, and Incitec have announced a timetable for the closure of their operations.

It is now an opportune time to consider the balance of the site to enable this "brownfield" site to be put to its highest and best use consistent with strategic planning policies and intentions of Council and the State government and with the objects of the Environmental Planning and Assessment Act 1979.

The redevelopment provides significant opportunity for infill residential and employment generating development to foster growth in the existing communities of Boolaroo and Argenton, as well as taking advantage of excellent access to existing community facilities, open space and services, including those available in the emerging major regional centre at Glendale approximately 2 kms to the north by road.

The purpose of the local environmental study is to:

- Address the specifications for an LES issued by the Director General of the NSW Department of Planning;
- fulfil the requirements of the Planning Circular PS-06-13 – Local Environmental Studies;
- address the comments from Council on the Bunderra Master Plan.

A comprehensive site analysis has been undertaken to identify the physical and environmental constraints to development and opportunities for development. This led to the formation of a master plan illustrating the preferred future urban footprint as a basis for the preparation of the local environmental study and draft LEP.

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It is considered that the proposed rezoning is justified on the following grounds:

- **The proposal is consistent with the provisions of the Strategic Land Use Plans**

Lifestyle 2020 Strategy indicates the site partially as “Urban Area” (Triangular Paddock) and “Non Centre Based Employment Land” (part of the main site). The Master Plan is consistent with the aims and strategies contained in Lifestyle 2020 Strategy.

The proposed residential and additional employment uses are consistent with the Lower Hunter Regional Strategy and the Pasmenco Munibung Hill Land Use Strategy as adopted by the Council. Development would allow an underutilised site within an existing urban area to be developed for uses appropriate for its location in the vicinity of existing residential areas and the Glendale major regional centre.

The development in accordance with the Master Plan would be generally consistent with S117 Directions and with the provisions of relevant SEPPs and REPs. In particular the development of the site for a variety of residential purposes in close proximity to public transport is consistent with the policies and guidelines associated with Draft SEPP No 66 Integrating Land Use and Transport.

- **The site is suitable for urban development**

The site is presently disused and partially undeveloped land, a considerable amount of which is zoned for heavy industry. Accordingly, a suitable and more efficient use of the land is sought. Investigations will confirm that the site is suitable, or can be made suitable following remediation, for a range of urban uses for the following reasons:

- It has all the physical characteristics making it suitable for urban development. It is relatively flat, devoid of significant vegetation and is capable of being serviced;
- It is within walking distance of Cockle Creek Station, providing a potentially high level of public transport access and supporting higher residential densities on the site;
- The development of the site will provide the opportunity for improved pedestrian access from Boolaroo to the station;
- All urban services are available or can be readily extended to meet the needs of the development;
- There is good access to the regional road network and to the subregional centre at Glendale;
- It is in close proximity to the existing neighbourhood retail centre and community and recreational facilities and supports further reducing car dependency and providing the opportunity to support existing community networks;
- It is in close proximity to major recreational facilities such as Glendale, Lake Macquarie and the future open space corridor along Cockle Creek.

A residential zoning allows the site to be developed as a logical extension of Boolaroo reinforcing and consolidating this neighbourhood and providing the opportunity for the revitalisation of the township and an increase in population. Residential development will complement the existing township, relate well to the proposed open space corridor along Cockle Creek to the west of the site and support increased public transport utilisation.

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Employment uses closer to the railway line and on the flatter land in the vicinity of the proposed containment cell will meet the objectives of Council in providing jobs on the site in accordance with need and to provide employment opportunities in a range of new industries.

- **Development is not likely to have significant environmental, social or economic impacts**

There will be no significant adverse effects of the development in accordance with the Master Plan for primarily residential and employment purposes.

- **A rezoning facilitates the orderly and efficient use of land**

The site is well located in an existing urban environment and is vacant/disused and capable of being serviced. A rezoning based on the Indicative Development Concept (Master Plan) will facilitate the remediation and more efficient use of the land for a productive purpose in a manner that has no significant impacts on the environment.

The proposed rezoning will facilitate the more efficient use of the land for a productive purpose in a manner that has no significant impacts on the environment.

1. INTRODUCTION

1.1 Background

Pasminco Cockle Creek Smelter Pty Ltd (Subject to Deed of Company Arrangement) ("Pasminco") ceased operations at Cockle Creek in September 2003. Since that time, the receivers and managers of the site have commenced, or have completed, a number of activities including remediation planning, the extensive remediation of the site, demolition of buildings and structures, winding up operations and a range of strategic planning investigations and development planning for the site.

Incitec Fertilisers Limited has announced that it will be ceasing operations on the site in 2009 and will remediate the site commencing in 2010.

The closure of the Pasminco smelter and the Incitec operations creates an opportunity for a new strategic direction for the site that reflects the sustainability principles in the City of Lake Macquarie Lifestyle 2020 Strategy. There have been a series of strategic planning initiatives by the Council and by the owners of the Pasminco and Incitec sites, remediation has commenced in accordance with a major project approval of the Minister for Planning, and Incitec have announced a timetable for the closure of their operations and have commenced the remediation approval process.

The Pasminco and Incitec sites are being rezoned in two stages. The basis for the staged rezoning is to allow development of less contaminated land while remediation continues on the other parts of the site.

It is now an opportune time to consider the balance of the site to enable this "brownfield" site to be put to its highest and best use consistent with strategic planning policies and intentions of Council and the State government and with the objects of the Environmental Planning and Assessment Act 1979.

The site redevelopment provides significant opportunity for infill residential and employment generating development to foster growth in the existing communities of Boolaroo and Argenton, as well as taking advantage of excellent access to existing community facilities, open space and services, including those available in the emerging major regional centre at Glendale approximately 2 kms to the north by road.

1.2 Stage 1 Rezoning Proposal

Consistent with the findings of the on-going strategic planning investigations of Lake Macquarie Council and the State Government, Pasminco has lodged a number of rezoning applications with the Council to progress the future redevelopment of its underutilised holdings. These applications were intended to allow for the staged disposal of relatively unencumbered land to progress while remediation works are carried out on the more contaminated parts of the site. The rezoning applications were:

1. an application to rezone a parcel of land (approximately 18 hectares) the subject of DA No. 203/2005 to Zone 4(2) Light Industry, in view of its proximity to the Cardiff Industrial Park and to Argenton. A change in zoning is also required to alter the location of land within Zone 5 Infrastructure to reflect the revised location of an extension of Munibung Road from the current edge of Cardiff Industrial Park;
2. an application to rezone land immediately to the east of Boolaroo for residential development, as a logical eastern extension of Boolaroo. Council resolved at its meeting on 23 May 2005 that this

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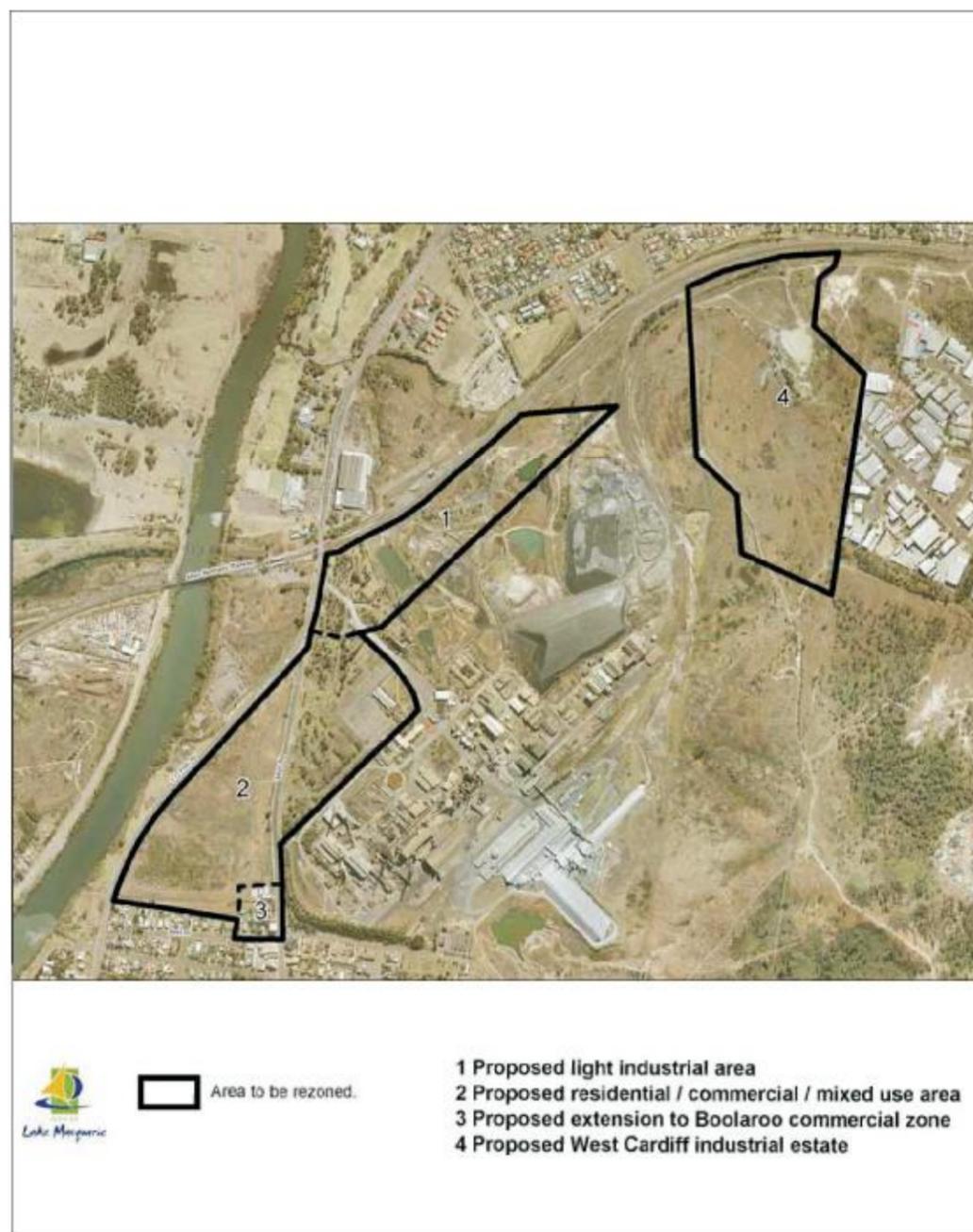


Figure 2

3. application proceed no further whilst the Incitec site remains operational. Incitec has now made official their intentions to vacant the site and thus this rezoning can be reactivated; and
4. an application to rezone land immediately to the north of Boolaroo located between Main Road and TC Frith Avenue (the “triangular paddock”) for residential uses as a logical northern extension of Boolaroo. At its meeting on 23 May 2005, Council resolved that this rezoning should be included in the Action Plan of Council’s Environmental Planning Department and that Council will not consider the proposal further until the completion of the Pasmenco-Munibung Land Use Strategy. This strategy has now being completed and the Council considered the Strategy at its meeting on 28 November 2005.

In early 2006, Pasmenco presented to Council a revised strategy for rezoning the Pasmenco site, further implementing the intention for the rezoning and redevelopment of the site to allow the disposal of relatively unencumbered land to progress while remediation works are carried out on the more contaminated parts of the site. This proposal incorporated the proposals in paragraphs 1 and 3 above and additional land on the main Pasmenco site. The proposal was for the rezoning of two sections of the land, one predominantly for residential uses and one predominantly for employment uses. This rezoning proposal was consistent with the land use principles adopted for the site by the Council and included a small component of commercial zoning along Main Road as an extension of the existing Boolaroo commercial area.

At its meeting of 6 March 2006, the Council resolved to support the preparation of a draft amendment to the Lake Macquarie LEP 2004 to allow rezoning of the land identified in Figure 2 for urban and light industrial purposes.

Council engaged independent consultants to prepare a Local Environmental Study to review all of the information provided as part of the rezoning application. The LES determined that there are no significant factors that would prevent the sites being rezoned as recommended in the report. This is subject to a number of recommended strategies being implemented. The LES also makes recommendations in regard to how development on the land should be designed to provide good linkages between each of the sites to ensure appropriate integration of the subject land and surrounding existing and future uses.

The Stage 1 Draft LEP was exhibited from 2 June 2008 to 30 June 2008. The completion of this rezoning is awaiting finalisation of funding arrangements for roads infrastructure. Council is proceeding to finalise this rezoning.

The applications lodged to date seek to achieve a zoning of the site that reflects its land use capability and suitability having regard to its characteristics and its context.

The finalisation of the Pasmenco-Munibung Hill Land Use Strategy process has enabled further rezoning applications to be considered or prepared for the rezoning of parts of the site.

The Stage 2 rezoning is consistent with the agreed strategy of a staged approach to rezoning.

1.3 Stage 2 Rezoning Proposal

1.3.1 Council Resolution

Application was made to rezone the balance of the Pasminco site and the Incitec site in November 2007. In December 2007 Council resolved pursuant to section 54 of the Environmental Planning and Assessment Act 1979 to rezone the balance of the Pasminco site and the Incitec site incorporating a combination of land use zones to support urban development and conservation. Council has notified the NSW Department of Planning of Council's resolution and has undertaken consultation with State Government agencies and service authorities.

The NSW Department of Planning issued Director General Specifications for a Local Environmental Study associated with the Stage 2 rezoning on 11 February 2008 in response to councils view that such a study was required. These specifications are contained in Appendix 1.

1.3.2 Bunderra Master Plan

As part of the overall site planning and remediation processes for the site, Pasminco and Incitec have undertaken a range of investigations designed to determine the suitability and capability of the site for development and to determine the most appropriate form and nature of development on the site. These investigations identify the constraints to development and opportunities for additional development on the site. They provide an objective analysis of the capability and suitability of the land for future development and outline a form of future development that achieves sustainability outcomes.

These investigations were undertaken in the context of a number of existing strategic planning studies that support a change to the zoning of the land to allow a broader range of employment opportunities and additional residential opportunities. They integrated a range of existing reports on the site and included additional investigations to provide a comprehensive assessment of the whole site. This included additional investigations on the Incitec site. These investigations were integrated into the Bunderra Master Plan presented to Council in September 2008.

The Master Plan comprised written documents and plans consisting of information, maps and diagrams relating to the future development of the site. It included:

- A site analysis which considers the site in its regional context and provides information on the characteristics of the site and the physical and environmental constraints to development;
- An indicative development concept (Master Plan) for the site showing the pattern and nature of future land uses for the site. It deals with issues such as access and movement (street systems and connections with the surrounding established urban form), location of open spaces and open space linkages, provision of utility services and other infrastructure and the like. The indicative development concept enables investigations to be undertaken into human facilities and open space requirements and forms the basis for future Council decisions regarding rezoning and the preparation of appropriate development controls for the site. The indicative development concept will guide the development of the statutory provisions including a draft LEP, amendments to the DCP if required, infrastructure funding arrangements and the like.

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A Planning Report was prepared and submitted to Council following preparation of the Master Plan. This report contained a draft LEP reflecting the Master Plan and provided an assessment of the public policy implications of a rezoning.

The Bunderra Master Plan and Planning Report have been reviewed by Council to identify how these reports satisfy the Department of Planning's specifications for a Local Environmental Study, Council and other government agencies requirements. Based on this review, Council requested Pasmenco and Incitec to revise the Master Plan to address matters identified by Council. With these matters addressed, Council has advised that the Master Plan can be utilised to form a local environmental study for the site fulfilling the requirements of the EP&A Act, 1979 and also fulfilling the requirements of the Planning Circular PS-06-13 – Local Environmental Studies.

Council requested the Master Plan has been updated to form a local environmental study in line with Council's review. This document presents this study. Council intends to engage an external planning consultant will be engaged by Council to provide independent planning advice to comment on the preferred land use zones.

1.3.3 Purpose of this Local Environmental Study

The purpose of the local environmental study is to:

- Address the specifications for an LES issued by the Director General of the NSW Department of Planning;
- fulfil the requirements of the Planning Circular PS-06-13 – Local Environmental Studies;
- address the comments from Council on the Bunderra Master Plan.

The local environmental study incorporates the findings of the Master Plan.

1.3.4 Background Studies

The LES is supported by a range of studies and investigations into the site including those listed in the bibliography contained in Appendix 2. Studies recently completed as part of the master plan and LES for the site are appended to this report.

2. SITE CONTEXT

2.1 Regional Context

The site is located approximately 13km south west of Newcastle between Boolaroo in the south, Argenton and Glendale in the north, Cardiff in the north east, Cockle Creek in the west and Munibung Hill in the east. The site is approximately 1.5 km to the north of Lake Macquarie and is located in an established urban area (Dwg CO-01).

The site has access to the arterial road network with frontages to Lake Road which becomes T.C. Frith Avenue providing an eventual link to the north and the Newcastle Freeway, and the centres at Glendale, Cardiff and Kotara, and to the south to Toronto, and other residential areas to the west of Lake Macquarie. Main Road provides access to Speers Point and Warners Bay and thus areas to the east of the lake.

The site has excellent access to the emerging Glendale Regional Centre, to Lake Macquarie and the regional road network.

The regional topography is influenced by the lake and Cockle Creek, draining the north lakes area and by the 'ring' of hills comprising Sugarloaf Range to the west extending across to the north through Seahampton, West Wallsend and the northern boundary of the Cameron Park release area and then falling away in elevation towards Cardiff (Dwg CO-02).

Munibung Hill has regional significance for its landmark scenic qualities, particularly from the south where it terminates vistas from and over Lake Macquarie. Visual catchments to the north are smaller and more discrete.

2.2 Local Context

The site is bound by Munibung Hill to the east and adjoins the western borders of Cardiff Industrial Park (predominantly light industrial zone) and Macquarie Hills (a recent residential subdivision) which is mostly visually obscured from the site. The development consent for the Macquarie Hills site requires provision of a future road connection to the site from Macquarie Hills residential area. This connection is accommodated in the indicative development concept for the site and the proposed zoning.

To the south Boolaroo and Speers Point (residential suburbs with small scale commercial strip streets) lead down to Lake Macquarie. Immediately west lies the Great Northern Railway line and Cockle Creek and Teralba. The railway separates Argenton (residential zone) and Glendale commercial centre to the north (Dwg CO-03).

To the south east of the site is the former Speers Point Quarry site. This quarry site is on the southern side of the main east west ridge line from Munibung Hill that forms the southern boundary. It is in an adjoining visual and stormwater drainage catchment. Council has resolved to prepare a draft LEP for the quarry site to facilitate urban development and conservation.

It is recognised that part of the adjoining quarry site may be developed. There may be a requirement for pedestrian connection to the land to the south if this land is developed. The indicative development concept for the site does not preclude such access. Drawing DA 01 indicates potential connection points to the south. Given the nature of the terrain, it is proposed that these connection points would form part

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of an open space linkage system from Munibung Hill to other public open spaces. In this regard, consideration has been given to connections to other Council landholdings adjoining the site including the proposed open space area behind the Macquarie Hills development, Council land to the east of Munibung Hill.

2.2.1 The Glendale Regional Centre and Cardiff Industrial Park

The site adjoins Cardiff Industrial Park which forms part of the Glendale/Cardiff sub-regional centre, the largest employment zone in the Hunter Region. The Cardiff Industrial Park comprises 105 hectares of serviced industrial land, employing 7,500 persons and catering for over 500 businesses (Lake Macquarie Council, 2004). The industries located at Cardiff Industrial Park include engineering companies, distribution and logistic companies and food processing and production businesses.

The Glendale centre contains a retail complex with 40,000m² of floor area, a regional athletics centre, a large hardware store, a campus of the Hunter Institute of Technology and the Glendale Technical High School.

Planned improvements in the Glendale sub-regional centre include the construction of a railway station and bus interchange and a bridge over the railway line to connect Glendale sub-regional centre with Cardiff Industrial Park and to improve local linkages in the area.

The area is emerging as a major regional centre offering a variety of employment, retail and community facilities in a location accessible by bus, rail and road. Lake Macquarie Council and the State Government have plans for the expansion of the regional centre at Glendale and the renewal corridor of Glendale-Cardiff. It is intended that Cardiff and Glendale will accommodate additional population and employment growth providing up to 4,000 new dwellings and 6,500 jobs.

2.2.2 Urban Structure and Form

The site comprises a major land holding between Boolaroo in the south, Argenton and Glendale in the north and Cardiff in the north east. It lies between Cockle Creek and the foothills of Munibung Hill. To the north the rail line forms a boundary separating the site from the residential areas of Argenton.

To the south the site adjoins Boolaroo which is characterised by a grid street pattern through which runs Main Road providing access to suburbs to the south and to Lake Macquarie. The township is effectively bound to the west by TC Frith Avenue and to the east by Munibung Hill. To the south it merges with Speers Point extending to the northern foreshore of Lake Macquarie. To date the Pasminco site limits future growth of Boolaroo. Through-traffic is encouraged to use the arterial road network bypassing Boolaroo, enabling a higher level of amenity within the township. The collector role played by Main Road is supported by the grid pattern of residential streets giving a highly legible and permeable street network supporting high quality pedestrian and cycle movement. The township supports a neighbourhood centre which is attractive and low rise in scale with a village character. The built form is primarily detached residential with some dual occupancy and townhouses. Boolaroo integrates with Speers Point and shares facilities such as active open space, schools and community facilities.

Boolaroo is an established community with good access to the Lake Macquarie and to the sub regional centre at Glendale. It is fully serviced and has a neighbourhood centre and facilities capable of supporting additional infill development and an extension to the urban area such as that envisaged under the proposed rezoning.

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To the north-east, the urban form is characterised by light industries within the Cardiff Industrial Park. These industries are situated on land zoned for light industrial activities and are mainly service industries including logistics operations and warehousing. Also to the north-east is the Macquarie Hills residential area, the final subdivision stage of which was approved in March 2004 allowing for the establishment of 154 residential allotments in two stages. Construction of the final stages in the Macquarie Hills subdivision has recently commenced.

The generalised land use of the surrounding area is shown on Dwg CO-03.

2.2.3 Centres and Services

Boolaroo

The Boolaroo township supports a neighbourhood centre which is small in scale with a village character. Business services include take away shops/cafes, beauty salons, hardware supplies and general stores. The centre has the ability to support additional residential and employment generating development whilst retaining the attractive village character. The outcomes of the rezoning include supporting and expanding the viability of the commercial hub of Boolaroo.

Glendale

Glendale is one of the Hunter's largest employment zones, combining industrial and commercial property, with residential and recreational areas. The Stockland Shopping Centre at Glendale has expanded to become a significant sub-regional centre featuring many national chains and an eight-screen cinema complex.

Glendale is identified as an emerging regional centre in the Lower Hunter Regional Strategy and is planned to contain 6,200 jobs and 4,000 dwellings over the next 25 years. In addition the Strategy has identified Glendale to Edgeworth as one of 5 urban renewal corridors capable of accommodating additional residential development along public transport corridors.

Council is currently developing plans for the Cardiff Glendale regional centre including an Urban Structure Plan and master planning for the Glendale Transport Interchange Precinct. A development application for a new rail station and transport interchange has been lodged by Railcorp and is subject to consideration in the context of the interchange master plan and urban structure plan.

Charlestown

As is described in the Lake Macquarie Lifestyle 2020 Strategy, Charlestown is a sub-regional centre and the major commercial centre in eastern Lake Macquarie. It provides high order retail, commercial and community facilities. Significant investment within Charlestown is currently being experienced in commercial, retail and mixed use developments. The Charlestown Square Shopping Centre is to be expanded by almost doubling the existing retail and commercial floor space.

3. UNDERSTANDING THE SITE AND ITS CONTEXT

3.1 Property Description

The Pasmaenco site comprises:

- The main site extending from Cardiff and Argenton to Boolaroo occupied by the disused smelter being Lot 201 in DP 805914 (“the main site”);
- Land immediately to the east of Boolaroo south of the Smelter Site leading up to Munibung Hill being Lot 1 in DP 523781 (“Boolaroo Heights site”); and
- Land immediately to the north of Boolaroo located between Main Road and T.C. Frith Avenue being Lot 21 in DP251322 (“the Triangular Paddock”).

The land owned by Incitec Fertilisers Limited is Lot 1 in DP 225720 (“the Incitec site”) and was formerly part of the Pasmaenco site. Incitec have announced that it will be ceasing operations on the site in 2009 and will vacate the site in 2010.

These sites have an area of 207.25 hectares. Part of this site (approximately 15.8 hectares) is the subject of a resolution of Council to prepare a draft LEP. This plan is in the course of preparation.

Part of Main Road between the triangular paddock and the main site is also likely to be affected by rezoning.

The site is affected by a range of easements for access and utility services. Many of these easements are in relation to the Incitec operations on the site and thus will become affectively redundant for the purposes of the Master Plan. High voltage electricity transmission line easements across the northern part of the site and running east of First street will remain. The Master Plan assumes that the low voltage transmission line running north south through the site will be relocated underground and the easement relinquished. Investigations are underway to relinquish other easements on the site including those associated with the zone substation on First Street.

3.2 History of Settlement and History of the Site

The Lake Macquarie Development Control Plan No. 1 contains the following description of the settlement of Boolaroo.

“Much of the area now known as Boolaroo was granted to William Brooks in 1839. By the mid 1880’s Sir James Fairfax was the owner and it was around this time that the Stockton Borehole Colliery opened west of Boolaroo, across Cockle Creek. Fairfax subdivided his land in the 1890s and further subdivisions followed. By 1902, three subdivisions had taken place, setting up the residential allotment bounded by Main Road, Creek Road and Seventh Street.

In 1896 land was cleared north of First Street by the Sulphide Corporation (Ashcrofts Process) Ltd, for a lead and silver ore treatment plant. The construction, expansion, and continued operation of this plant led to increased demand for adjacent residential land, and Boolaroo began to thrive. Subsequently, several businesses, including G Hawkins & Sons Transport

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and Construction firm, Finlay's sawmill, and TC Frith's grocery, grew to include hardware and associated goods.

The Boolaroo Public School officially opened in 1900. The Post Office (since demolished) soon followed in 1901.

Continued prosperity was recognised by the opening of the Fire Brigade in 1901 and the Ambulance Station in 1922, the first ambulance station in the Newcastle area."

A Heritage Precinct is established in the Lake Macquarie DCP and relates to lots along the eastern and western sides of Main Road between First Street and Eighth Street.

Conybeare Morrison undertook a Preliminary Heritage Assessment and Heritage Impact Statement in November 2004 to accompany a DA for the demolition of existing Pasminco buildings. That report provided the following additional information.

- A Government Land Grant, selected in 1829 and given in 1839 to William Brooks, extended from the existing railway line at Cockle Creek, along the creek to the lake, along the shore of the lake to Fairfax Road and then north to join the railway line in the vicinity of Cardiff railway workshops.
- A community of Chinese gardeners were among the earliest settlers. They lived on the flats near the delta of Cockle Creek and were involved in farming and orchards. Fishing and timber getting were also earlier industries.
- The township of Boolaroo was established in 1886, with the Teralba Cooperative Coal Company commencing mining on "Blacks Estate". Workers of the mines settled in the township of Boolaroo. Miners lived in tents and bag huts with their families.
- In 1895 the Sulphide Corporation selected land at Cockle Creek as an industrial smelter site. The land was chosen because it had rail access, harbour facilities, a good supply of salt and fresh water, was near coal deposits and at the time was relatively isolated.
- The first works at the Sulphide Corporation included iron buildings housing furnaces, boilers and generators; a crushing plant, a steam engine and pumping plant, and a crushing plant.
- Apart from the newly constructed Sulphide Corporation buildings, there was very little further development in the district.
- Laboratories and office buildings were constructed between 1897 and 1899. By 1899, there were over 400 employed at the Sulphide Corporation works.
- By the 1890s the township of Boolaroo had developed and the township of Argenton had come into existence. The railway line separated the two townships.
- Between 1897 and 1924, the Sulphide Corporation site was used for a silver-lead smelter to treat crude ores and concentrates.
- From the outset, the Sulphide Corporation used electricity to power its plant. In 1920, the plant supplied the houses and streets of Boolaroo. Boolaroo was the first township in the Lake Macquarie region to be provided with electricity. In 1925, electricity was provided to a substation nearby the site by overhead high tension cables from Newcastle. By 1926, Newcastle City Council took over the electricity supply.
- Sulphide Corporation produced sulphuric acid, superphosphates and fertilisers between 1917 and 2003. Sulphuric Acid and Superphosphate plant was constructed in 1913 and 1917. Phosphate rock was imported from the Pacific Islands and unloaded at the Corporation's wharf at

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Newcastle, then transported by rail to Cockle Creek. In 1949, existing plant and equipment was upgraded to double the production of sulphuric acid and introduce zinc production. In 1964, the Corporation founded Greenleaf Fertilizers Ltd and Greenleaf acquired the existing fertilizer activities.

- Between 1925 and 1955, the Sulphide Corporation also produced cement. New buildings were constructed of iron and steel, with silos of reinforced concrete. Cement was transported via the Sydney-Newcastle and northern railway.
- Between 1949 and 1955, Sulphide Corporation mined coal on its own land, with much of the coal used to fire cement clinker kilns.
- Between 1961 and 2002, the Corporation produced zinc-lead through a new smelter process. In 1978, a new lead dross plant was opened.
- During the 1970s and 1980s, the Sulphide Corporation undertook significant pollution control measures, including a new emissions stack and upgrades to equipment used in zinc, lead and cadmium plants.
- Incitec-Pivot Fertilizers Limited took ownership of a portion of the site from Greenleaf Fertilizers, using some of the original buildings and occupying a separate allotment of land registered in 1965 for the use of Greenleaf Fertilizers.
- Pasminco Cockle Creek Smelter Limited, later changing its name to Pasminco Cockle Creek Smelter Pty Ltd, operated the majority of the site between 1988 until its closure in 2003.

The above history identifies the strong historic connections between the site and the township of Boolaroo and its regional transport connections. It also shows that the site has been used for heavy industrial activities since 1895 and therefore has not been accessible to the public for approximately 112 years. The master plan process seeks to ensure that site is opened up to the existing Boolaroo community through open space connections, connecting streets and a legible urban development.

The heritage values of the site are discussed further in a draft Heritage Interpretation Plan for the site prepared by Graham Brooks & Associates as an outcome of previous approvals for the demolition of buildings and remediation of the site. This draft report is contained in Appendix 3.

3.3 Existing Land Uses

The Pasminco site is currently the subject of remediation activity. Incitec Fertilisers Limited occupies land that was formerly part of the Pasminco site. Incitec have announced that it will be ceasing operations on the site in 2009 and will vacate the site in 2010. A major projects application has been made to the Minister for Planning for approval for the first stage in the remediation of this site. Other uses include various utility installations including overhead transmission lines and communications infrastructure.

3.4 Topography and Slope

Drawing CO 08 indicates site elevation rising gently from the low points towards Cockle Creek to the foothills and peak of Munibung Hill which forms the eastern extremity of the site. The majority of the site is below RL70 with the highpoint being the hilltop at RL 162 metres. This is a regional landmark and is visible from Charlestown and the coast to the east, Lake Macquarie to the south and Sugarloaf Ranges to the west.

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Drawing CO.08A prepared by Monteath and Powys Pty Ltd indicates the slope of the site with the steeper land being to the south east rising steeply to Munibung Hill. The steeper lands, with a slope greater than 25% is located in the south east with more isolated areas of steeper land along the foothills of the northern ridge line leading from the hill top.

3.5 Land Capability

Detailed investigations have been undertaken into the capability of the site for urban development. These reports (refer to bibliography) provide information on the underlying geology of the site and soil types and provide an assessment of the constraints to urban development, particularly from a slope stability perspective. The report contained in Appendix 4 summaries the findings of previous reports in so far as they relate to urban capability assessment for the Munibung Hill area including areas of slope stability constraints.

Investigations into slope stability focussed on the eastern part of the site. Topographically this part of the site is characterised by the prominent landmark of Munibung Hill and its associated ridges with steep side slopes and incised gullies. The southern boundary of the eastern part of the site runs generally along an east west ridge from Munibung Hill which rises to approximately RL 160 metres. This east west ridge provides the boundary to the visual catchment of the site.

There is another north south ridge that forms the eastern boundary of the site with a series of spurs and gullies that splay off the ridgeline at a south westerly to north westerly trend. The sides of the spurs and gully bases are locally steep and incised toward the upper to middle slopes of the ridgeline and become less accentuated toward the lower slopes, with broader concave gullies and low uniform slopes/sides. The overall slope angle toward the upper slopes of the ridge is in the order of 12° to 15°, flattening to slope angles in the order of 7° to 10° toward the lower section of the hillside. The overall middle to lower slope surface is predominantly uniform, with major surface discontinuity caused by rock outcrop and some minor hummocky surface features.

The findings of the urban capability assessment are as follows:

South Eastern Section

Lot 1 in DP 523781 lies immediately to the east of First Second Third and Fourth Streets Boolaroo, south of the Smelter Site. It contains Munibung Hill and the main east west ridge running from the top of the hill which forms the southern boundary of the site. Thus the site is not visible from Lake Macquarie or locations to the south of Boolaroo.

This area is drained by two minor streams excised into the foothills and draining to the freshwater dam on the Pasminco site. The eastern most stream contains two small dams that could be retained and perform a role in stormwater management of residential development. A smaller dam is located on the other stream trending eastwards.

A significant part of this lot is not suitable for development due to a combination of slope and instability factors. The upper foothills are steep and unstable in locations. Areas of instability appear to be associated with the Great Northern coal seam sub crop.

Drawing CO-10 summarises the findings of this analysis which shows the steeper lands site and surrounding lands divided into 4 urban land suitability zones as shown in the following table.

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SLOPE INSTABILITY AND DEVELOPMENT RISK¹

AREA	ZONE	HAZARD TYPES	REASONABLY CONCEIVABLE CONSEQUENCES	RISK
Ridge tops			Development not proposed	
Conglomerate Escarpments			Development not proposed	
On and immediately below areas of identified slides and inferred instability associated with Great Northern Seam	Z1	A, B, C, D	Almost certain ongoing slow slope movement resulting in severe structural damage to buildings and services. Likely slow slope movement resulting in crushing of buildings and surface features Impact by rock falls, severe structural damage, possible loss of life	VERY HIGH
Down slope of likely debris flow path	Z2	C, D	Possible rapid debris flows resulting in crushing of buildings and surface features and possible loss of life Impact by rock falls, severe structural damage, possible loss of life	VERY HIGH
Lower slopes, slope angle $\geq 15^\circ$	Z3	B	Possible slides not directly associated with Great Northern Seam resulting in severe structural damage to buildings and services.	MEDIUM
Lower slopes, slope angle $< 15^\circ$	Z4			LOW

Areas with very high risk are considered unsuitable for development unless major geotechnical work can satisfactorily improve the stability. Areas with medium risk are considered suitable for development subject to the findings of additional geotechnical investigation and compliance with development restrictions. Areas with low risk are considered suitable for development provided that good engineering practices suitable for hill side development are followed. The developable area contains primarily Zone 4 and limited areas of land with Zone 3. Land with Zone 2 is located along the streams and along a potential slide area near Third Street. These areas are localised and are not intended for development.

Coffey's Geotechnics have advised that the delineation of the potential debris flow paths in their reports should be considered an approximation based on available data at the time of preparation. This data included detailed desk tops study and field mapping, however no detailed subsurface investigation has been conducted. The existing debris flow path zone boundaries are likely to be relatively conservative. The expectation is that the above works would see a reduction in width of this zone (up to 10m to 20m width) due to the greater confidence of data that a detailed subsurface investigation would provide.

Detailed subsurface investigations can be undertaken at development application stage of development once the size and extent of development layout are finalised. Consequently these areas have been included in the land zoned residential and it is considered that development in these areas will be controlled during the development application process following rezoning. Indicative layouts of an urban form in these areas have been prepared indicating a possible road and subdivision layout within the identified residential area. This is discussed in greater detail in Section 7.

¹ "Munibung Hill Development Urban Capability Assessment" prepared for Fitzwalter Group, December 2004.

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Land with a slope above 25% has been excluded from development in most cases except where the steeper land is an isolated occurrence. It is noted that Council's DCP generally excludes residential development on land with a slope greater than 25% and recommends selective residential development generally of lower density on lots larger than 450 square metres and of suitable form and construction.

The geotechnical analysis has found that development on the slopes up to 25% should be undertaken in accordance with good hillside construction practice and sound engineering principles.

Eastern Slopes

A similar analysis was undertaken for the generally west facing slopes of the north south ridgeline from Munibung Hill. This area is characterised topographically by a prominent north/south ridge located along the eastern boundary, with a series of spurs and gullies that splay off the ridgeline at a south westerly to north westerly trend. The sides of the spurs and gully bases are locally steep and incised toward the upper to middle slopes of the ridgeline and become less accentuated toward the lower slopes, with broader concave gullies and low uniform slopes/sides.

The overall slope angle toward the upper slopes of the ridge is in the order of 12° to 15°, flattening to slope angles in the order of 7° to 10° toward the lower section of the hillside. The overall middle to lower slope surface is predominantly uniform, with major surface discontinuity caused by rock outcrop and some minor hummocky surface features. The upper slope surface is irregular in areas where rock outcrop is present with undercutting and block fall occurring, predominantly toward the head of gullies.

No significant areas of slope instability were noted in this area. A similar analysis of urban land suitability was undertaken and the area divided into a number of zones. Most of this area is suitable for development from a slope stability, soil erosion and drainage viewpoint. Zones 1 and 2 are considered unsuitable for development.

Remainder of the Site

The remainder of the site is generally free from geotechnical constraints. This area is being subject to remediation activity including the removal of unsuitable material with the site being left in a condition suitable for urban development. Areas of general filling around the plant areas will be removed where contaminated and replacement material consolidated to a level suitable for development. Otherwise any structures will be supported on piers or other suitable foundations.

There is an area of abandoned shallow mine workings in the northern part of the site in the vicinity of the Cardiff West subdivision. There may be some restrictions by Mine Subsidence Board on development in this area.

Incitec Site

Investigations into the geology and soils on the Incitec site have been undertaken as part of process for major project application for remediation of this site. Major project applications have been prepared for the remediation of soil and groundwater (MP 07_0014).²

Geotechnical investigations indicate fill materials on the site comprising slag / cinders and general industrial rubbish within a sand, gravel and clay matrix. The near surface fill materials at many locations were generally sandy and gravelly with various waste inclusions. The slag is distributed within the fill.

² Soil and Groundwater Consulting in association with Golder Associates "Conceptual Remediation Action Plan Incitec Fertilisers Limited Cockle Creek Site Redevelopment" 17 July 2008.

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The thickness of fill at the site is typically two to three metres, except for the western edges of the site and the former creek bed gully below the dam wall where the fill and reworked colluvial materials is reported to extend to over 10 m in thickness. The fill materials are underlain by the weathered siltstone and sandstone associated with the underlying natural formation, the Newcastle Coal Measures. The deeper profile included carbonaceous layers and the weathered materials grade to more consolidated materials with increasing depth.

Slope analysis has indicated that site had moderate grades, mostly less than 12% with some localised areas of cut to form building platforms with slopes greater than 25%. Such areas can be remodelled.

3.6 Landscape and Visual Character

A number of investigations have been undertaken into the visual qualities of Munibung Hill and its associated ridgelines. The findings of these studies are discussed below. A visual impact assessment of development generally in accordance with indicative development concept has been undertaken and is discussed in Section 7.7 and Appendix 19.

Draft Land Use Strategy - Munibung Hill

As part of the overall Munibung Hill land use strategy, Council engaged consultants to assess the visual qualities and significance of the site. The key findings of this study are summarised below.

The ridgelines running from Munibung Hill divide the visual catchment into a number of landscape zones. The site is located in the north west zone with the other landscape zones being the southern zones and the north east zone which includes the Macquarie Hills development. This study identified a primary catchment of the hill to the east, north and west extending a distance of 2 to 3 kms and a far more extensive catchment to the south extending across Lake Macquarie for a distance of about 16kms. The peak of the hill is visible from a much wider area extending in the west to Sugarloaf Ranges and in the east from Nobby's Head and more elevated locations at Charlestown.

From the south, views from the lake with the mountain as a backdrop are significant. When viewed from the south the hill forms a key component of a landscape of very high visual quality as a vegetated backdrop to the lake. The whole landform is visible in a single view. Views from the west north and east are significantly lower in visual quality compared with those from the south due to the visual dominance of urban development in the foreground and mid-distance. Thus the visual quality of Munibung Hill is highest from the south and substantially lower from the north, west and east.

The analysis identified a series of cross sections through the site including east west cross sections through the northern spur line that forms the eastern boundary to the northern part of the site. These sections indicate the potential for residential development up to approximately contour RL70 while keeping the roofline of buildings below the skyline when viewed from the west. The potential for development towards the northern end of this northern spur reduces to approximately RL60.

The key development principle for this area is to ensure that the re-established tree cover on the ridge top provides a backdrop to development and to avoid rooflines becoming visible against the sky.

Pasminco Cockle Creek Smelter Site Visual Analysis, Conybeare Morrison, August 2004)

The purpose of this study was to provide a visual analysis of the Pasminco and Incitec-Pivot sites located along the north-western slopes of Munibung Hill above the northern shores of Lake Macquarie. The study identified the scenic quality of the site, evaluating views both from within the site and to the

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site from accessible vantage points. The visual analysis defined the status of the scenic amenity of the site which would be used to determine the visual effect and impact of future development on its landscape environment. The analysis provided a visual curtilage for development and the basis for the preparation of a set of visual criteria for development along the north-western to south-western slopes of Munibung Hill. A copy of this study is contained in Appendix 5. Appendix 6 contains further visual assessment of the site prepared to assess the impacts of the Pasmenco containment cell currently under construction.

The National Trust considers Munibung Hill as *a most important feature of the landscape adjoining Lake Macquarie*. This is a reference to the more important views of the hill from the lake to the south.

The site lies within the two main valleys of the northern and western spurs of Munibung Hill. The valleys form natural drainage lines. Munibung Hill is identified as a significant viewing point, in Council's Scenic Quality Guidelines which recognise the scenic qualities of the hill.

The analysis considered options for development on the slopes of Munibung Hill and its spurs at a range of contour levels. This formed the basis for establishing a visual curtilage for development, the key principle of which is to retain the natural and scenic qualities of Munibung Hill and its ridgelines spurs and escarpments.

The western slope of the north western spur and the northern slope of the western spur are within the site. The ridgelines of these spurs rise to RL 130-160. The report recommends:

Due to the high slopes within the PCCS site, it is proposed that the visual curtilage for development on these slopes be established at RL 80-90 and below. However, the visual curtilage for development at the end of the spurs should be lowered to RL60 in order to retain the visual profile of the natural ridgeline.

The analysis identifies a permissible development contour at RL 70 for the northern spur rising to RL 90 in locations.

The findings of this study are consistent with the study undertaken by Council as part of the draft Pasmenco Munibung Hill Land Use Strategy.

These studies form the basis for an assessment of the visual impacts of development as part of the process to identify the upper limits of development from a visual perspective. This impact assessment is contained in Appendix 19 and is discussed in Section 7.

3.7 Flora and Fauna

The flora and fauna on the site has been affected by the long history of industrial use and more recently by remediation activity. Remaining vegetation on the site has been investigated in the report prepared by Umwelt which summaries all previous report prepared for the site (Appendix 7) and is shown on Drawing CO-13.

The site has been modified by previous industrial activity and more recently by the remediation actions necessary to for the site. Overall the floristic diversity of the study area is regarded as moderate. The overall number of plant species recorded is affected by industrial activity and bushland regeneration.

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Vegetation within the site proposed for development has been modified and mostly removed as a result of the remediation activity currently being undertaken. A proposed *Angophora inopina* reserve has been identified and will be protected.

Despite the disturbed state of the site, it provides a habitat for a range of fauna species. The threatened grey-headed flying fox and eastern bent-wing bat were recorded in the study area in a location subsequently remediated. A range of other threatened species have been recorded in habitats within a 10 kilometre radius of the site.

The remaining flora and fauna on the site is within an area that is not proposed for development being located within a proposed *Inopina Reserve* and on *Munibung Hill*.

3.8 Bushfire Risk

Most of the site is unaffected by bushfire hazard. However part of the site is identified as bush fire prone land on Council's bushfire prone land maps (Drawing CO-18). The southern part of the site is mostly affected and there is the threat of bushfire from the adjoining *Macquarie Hills residential estate* to the east. This threat will reduce with the development of this area.

The vegetation on the site has been the subject of fire events with fire escaping the site and affecting adjoining lands.

The owners of the *Pasminco* site had prepared and implemented a fire management plan to manage activities necessary to mitigate the threat to life and property from an unscheduled fire event within the site.

Fire management regimes for the site will need to address potential fire events starting on the site and starting off the site and affecting potential development on the site.

The Master Plan has been prepared having regard to the need to incorporate appropriate asset protection within the land use zoning. This is discussed in the report entitled *Bushfire Protection Assessment for the Proposed Rezoning of Land within the Pasminco Cockle Creek and Incitec Pivot Site* prepared by Australian Bushfire Protection Planners Pty Limited in August 2009 (Appendix 8)

3.9 Archaeology

Investigations into aboriginal cultural heritage issues have been undertaken on the site.³

No previously unrecorded Aboriginal sites were located during the survey, despite the fact that historical records indicate that *Munibung Hill* was important to Aboriginal people and was the location of a number of stone arrangements. No flaked or ground stone artefacts were observed.

The lower and mid slopes of *Munibung Hill* in the site have been heavily disturbed by activities associated with past industrial development, earthworks, land filling, erosion and more recently remediation activity. There are no archaeological constraints across these disturbed parts of the site is part of the study area.

³ Umwelt (Australia) Pty Ltd "Aboriginal Cultural Heritage Issues - Former Pasminco Cockle Creek Smelter Site", December 2004. (Appendix 9)

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The principal issues for future management are considered to be:

- The Aboriginal cultural value of Munibung Hill is in its landscape context. This value appears to be attributed particularly to the high ridge crest. The area is not currently accessible to local Aboriginal people, but the stories about the past uses of Munibung are well known in the local Aboriginal community. This value exists whether or not any archaeological evidence of past activities is retained;
- The potential for previously undetected sites associated with rock outcrop on the steep upper slopes and drainage lines (deposits associated with small rock shelters, grinding grooves); and
- The potential for subsurface stone artefacts to be retained in the shallow soils, particularly along the ridge crest and possible on benches adjacent to drainage lines.

The study recommends:

- Further consultation with the Koopahtoo LALC (particularly elders of the community) about how respect for the Aboriginal cultural values of Munibung Hill can be shown.
- Further archaeological investigations, targeting the ridge crest and any benches adjacent to drainage lines if development is proposed for these areas. For instance, some preliminary subsurface investigation of these areas prior to disturbance by new development should be considered.
- Confirm the absence of rock based sites in drainage lines and associated with overhangs, if development is proposed for these areas. This can only realistically be done if the dense cover of weeds is removed.

The investigations included a site visit with representatives of the Koopahtoo Local Aboriginal Land Council. Site inspectors inspected the site and do not recommend any further actions.

3.10 Heritage

The site is significant as a place with multiple layers of history, use and association with prominent people and industrial processing. Conybeare Morrison (in association with Umwelt Australia, Industrial Archaeologists) prepared the Pasminco Cockle Creek Smelter – Preliminary Heritage Assessment and Heritage Impact Statement ('Pasminco HIS') in November 2004 (refer to bibliography). The assessment determined that the Pasminco site had buildings, plant and archaeology of varying degrees of heritage significance associated with patterns of development of the economy and industrial development in Australia. The following extract is the Summary Statement of Significance taken from the Pasminco HIS and outlines the significance of the Site:

“The Pasminco Cockle Creek Smelter at Main Road, Boolaroo, was established as the Sulphide Corporation in 1895 and operated continuously between 1897 and 2002 in chemical and metallurgical industrial production and by-product recovery. It has historical significance for its associations with various chemical and metallurgical industrial processes including the Ashcroft process of treating sulphide ores, production of zinc, fertiliser and sulphuric acid, lead refining, cement manufacture, coal mining, zinc refining, production of cadmium and selenium, and copper sulphate manufacture. The Smelter contains the earliest application of ISF technology, dating to the mid-twentieth century, and the only example extant in Australia. The Sulphide Corporation and Pasminco were innovative in market leadership, technological advancements, export of chemical products, occupational health and safety issues, staff welfare and employment. The place is the final evolutionary form of an early industrial development in the Hunter region and the state of NSW and reflects the significant industrial developments and economic phases of the twentieth century. While no surface evidence remains of the original plant buildings, buildings

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dating to the 1917 phase are extant with substantial modifications. Late-twentieth century adaptations to the plant reflect the period of environmental legislative changes.

The Pasminco Cockle Creek Smelter has aesthetic significance associated with its local landmark qualities. It is considered to have rare technical/ research significance at State level for its associations as a zinc/ lead smelter with by-product recovery and has significance at the National level as the last substantially surviving example of such a smelting process. The metallurgical processes applied throughout the 100 years of smelter operations have a high degree of scientific/ technical achievement having evolved through metallurgical research, experimentation and application of technological expertise which established the company as a national leader and innovator.

The Pasminco Cockle Creek Smelter is associated with the prominent person Edgar Ashcroft, electrical engineer and the first person to attempt to commercially produce an electrolytic zinc smelting process. It is also associated with the Earl of Kinmore (Sir Thomas Fowell Buxton, Governor of SA 1895-98), who was the Sulphide Corporation's first Chairman. The numerous Managers and General Managers of the Sulphide Corporation and Pasminco have close associations with the plant.

The smelter has strong social significance for citizens of the local townships of Cockle Creek and Boolaroo and wider communities associated with its employment, financial support and strong association with the place for over one hundred years. The Sulphide Corporation and Pasminco have promoted and provided educational, medical, social and sporting activities for workers and the wider community."

In response to the Pasminco HIS and the demolition of the majority of the buildings and plant on the site, PCCS embarked on a comprehensive and extensive program to record the buildings, structures, processes, plant, equipment and other items of significance associated with the Site. The recording fieldwork was undertaken and completed in advance of the demolition works and continued during the dismantling of many of the buildings to obtain further information.

Conybear Morrison advise that the various actions of the recording program, which are completed, currently underway, or planned to be undertaken shortly, include:

- retention of buildings of high significance (where possible) for adaptive reuse, and preparation of a Conservation Management Plan;
- complete survey of all features of the Site (buildings, roadways, earth features, rail lines, adjoining land, etc);
- archival photographic recording with digital and slide media;
- preparation of measured drawings of key buildings and specific construction features;
- aerial photographs of the Site;
- collection, storage and archival cataloguing of historic relics from the Site (building fabric, plant components, reports, old photos, plans and drawings, brochures and newsletters etc);
- monitoring of dismantling of key structures to take further recording of the internal detail and also to salvage any relics where possible;
- documentation of detailed history of the Site, including the industrial and smelting processes used;

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- oral history of the Site by representatives from several areas associated with the PCCS site and operation (administration, various smelting processes, engineering, environmental, health, community etc) involving videotaped site inspection and interviews;
- production of prepared reports of the heritage significance the buildings/Site and recording documentation, and
- prepared guidelines for the future preparation of a Heritage Interpretation Plan.

The heritage and the significance of the site have been extensively documented. Although the physical evidence of the heritage significance of the site has been removed through demolition, by undertaking the above actions - extensive, detailed recording the significance of the site and by making this information publicly available through the local Public library – the documented history of the Pasmenco Cockle Creek Smelter will be accessible more so than it was as a privately owned heavy industrial plant.

Most of the heritage interpretation work involved detailed recording of the history of uses and buildings and machinery on the site as outlined above. The site has been closed to public access since the 1890's and the redevelopment provides the opportunity to contribute to the response to the history of the site and its context, including the development of Boolaroo.

A draft Heritage Interpretation Plan for the site has been prepared by Graham Brooks & Associates as an outcome of previous approvals for the demolition of buildings and remediation of the site (Appendix 3). The HIP identified means that the redevelopment of the site can respond to the heritage context.

The indicative site layout as reflected in the Master Plan (Drawing DA-01) incorporates and responds to the historical context by:

- responding to the landmark qualities of the site by providing for public access to Munibung Hill and by creating a landmark landscape form for the containment cell as a reflection of past activity on the site and as a viewing platform over the site;
- retaining the high ridge crest of Munibung Hill which is a landscape context of Aboriginal cultural value;
- consulting with the local Aboriginal people in relation to the detailed design and location of access to the hill;
- retaining the old laboratory building in a prominent location in the site layout and facilitating its use for a wide range of purposes through the suggested zoning;
- maintaining the alignment of the former spur railway line over most of its length as part of the movement system of the site;
- reflecting the alignment of Fotheringham Road in the subdivision planning for the site subject to appropriate connections to the main road network;
- extending the interconnective grid subdivision pattern of Boolaroo northward respecting the pattern of subdivision of the existing township;
- providing significant opportunities for the continued provision of employment opportunities on the site in modern industries and businesses;
- creating open spaces with the potential for the display of salvageable items.

Heritage investigations have been undertaken on the Incitec site as part of the remediation planning process and part 3A major project application for remediation works at this site⁴. The heritage study

⁴ Incitec Fertilizers Limited Heritage Assessment October 2008 by ERM (Appendix 10)

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determined that the study area is of local heritage significance due to its close association with the local community and the development of the towns of Argenton and Boolaroo. The site is also of local significance because of its association with fertiliser manufacturing from the early 20th century until 2008. Significant elements of building and structure such as the disused railway gantry and the sandstone and brick building. For environmental reasons the site is to be remediated. It is proposed that the site will be remediated to a standard that would allow future residential development. The remediation will require to removal of structures on the site. The study provides a heritage management strategy to be implemented as part of the remediation project.

3.11 Site Contamination

Pasminco Site Remediation

The Pasminco site is currently being remediated in accordance with a major project application approved by the Minister for Planning in May 2007. This includes a number of different techniques and procedures but generally comprises excavating contaminated material from the various parts of the Pasminco site and placing the contaminated material in a capped containment cell. Where necessary the excavation will involve the removal of building slabs and underground services. The remediation will occur in a staged manner. After the excavation of any particular area is complete, and the site validated and signed off by the Site Auditor as being fit for its future intended purpose (which will be one or more of industrial/commercial, residential or open space), the remediated area will be re-filled and/or regraded to achieve expected future development levels as necessary.

A capped containment cell is being constructed on the Pasminco site for the receipt and long term storage of contaminated material. At the completion of the site remediation, the surface of the cell will be stabilised and landscaped and will effectively encapsulate the contaminated material and provide an acceptable and safe long term management solution to the potential risk of harm to human health or the environment.

The remediation will include the construction and use of environmental controls during and after the remediation including surface and groundwater controls for the cell and a treatment plant to treat potential future leachate and groundwater that may be emitted from the cell.

There are certain areas on the western part of the Pasminco site and on Munibung Hill that are too steep for development and for machinery. These areas will not be remediated. For these areas, it is proposed to develop and implement a Site Management Plan which will include a Health and Safety Plan, planting of vegetation for dust and erosion control and other controls as required.

The remediation of the Pasminco site and associated works are the subject of a major project application that was approved by the Minister for Planning in May 2007. Remediation work has commenced in accordance with that consent. It is anticipated that remediation will be completed during 2012.

Remediation of the Cardiff West Industrial area is completed and remediation of the remainder of the site will generally occur as follows:

- The foothills to the south of Cardiff West Industrial area adjoining the eastern site boundary including the land east of the Incitec site with remediation commenced and due for completion by the end of 2009;

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- Triangular Paddock with remediation to commence in August 2009 and to be completed by December 2009;
- Main Entry Precinct area with remediation to commence in November 2009 and to be completed in September 2010;
- Area 5 (east of First and Second Streets) with remediation to commence in September 2010 and to be completed in December 2011.

Incitec Site Remediation

Investigations into the nature and extent of contamination on the Incitec site are continuing. It is envisaged that remediation in the form generally undertaken for the Pasminco site will be undertaken on the Incitec site including the construction of a containment cell within the Incitec site.

It is understood that IFL will submit their Part 3A application in September 2009. Assuming normal approval times, remediation on site could commence by April 2010 with completion as early as 2014 possible, although a later date could also occur for a variety of reasons.

Implications for Rezoning and Development

This Master Plan has been prepared on the basis of the site in its condition following remediation. It is anticipated that remediation activity will be completed prior to any residential development on the site. Measures have been incorporated into the remediation approval and strategy to ensure that no development on the site will occur within 200 metres of land subject to remediation, including the containment cell.

It is envisaged that similar provisions will be included in the LEP for the Stage 1 and Stage 2 rezonings to the effect that development should not occur unless the Council is satisfied that there are no significant land use conflicts between the proposed development and the on-going remediation of the site. This may require a buffer zone of approximately 200 metres between any dwelling and areas undergoing remediation.

Site redevelopment will be compatible with the remediation program. It is expected that the Cardiff West Industrial area will proceed within the next 2-3 years. As remediation proceeds, it is expected that residential land will be developed in the area subject to the Stage 1 LEP and then progress in a logical and sequential manner in accordance with market demand.

It is expected that initial demand for both residential and industrial land can be met without restrictions from the IFL remediation timetable. Further releases of developed land suitable for occupation are not likely to be required until after 2014 which is the predicted earliest completion time for the IFL remediation completion. It is possible that delays in the IFL project may cause some limited delays in potential occupation of PCCS lands and this will be monitored and reviewed.

It is unlikely that the 200m buffer condition between remediation and occupation will be required. Nevertheless for abundant caution provisions are included in the draft LEP requiring measures to manage potential conflict issues.

The site is being remediated to a level appropriate for urban development. Appropriate site audit statements will be provided indicating the suitability of the site for urban development. The remediation action involves the removal of contaminated materials and as a consequence of this much of the existing

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grass cover and vegetation within the remediated areas. The LES has been prepared on the basis of the site in its condition following remediation.

3.12 Access and Movement

3.12.1 Road Network – Existing and Proposed

The existing road hierarchy in the vicinity of the site is as follows (refer to Figure 1).

T.C Frith Avenue forms part of Main Road 217 and is an arterial road. It is known as Lake Road to the north of Main Road and Five Islands Road to the south of The Esplanade. It carries generally one traffic lane in each direction, with additional lanes provided on approach to key intersections. The intersection of Main Road with T.C.Frith Avenue mid way on the western boundary of the site is a 'seagull' treatment which incorporates a right turn lane on the southern approach of T.C.Frith Avenue and a right turn storage/merge lane in Lake Road for the right turn movement out of Main Road. Main Road approaches this intersection on an acute angle and this approach diverges locally to form a right-angled approach to its intersection with T.C.Frith Avenue/Lake Road. The movement from Lake Road into Main Road operates under free-flow conditions and incorporates a dedicated left turn lane on Lake Road (the northern approach).

T.C Frith Avenue enjoys 'limited access controls' over the majority of its length between Main Road and The Esplanade, with access only available via priority controlled intersections with Second Street and Seventh Street. First Street as well as Third to Sixth Streets inclusive on the western side of the Boolaroo Township are all closed on their approaches to T.C.Frith Avenue (eastern side).

The Esplanade is also an arterial road and forms part of Main Road 674. It extends to the east of Boolaroo and Speers Point to traverse the eastern side of Lake Macquarie, connecting to MR 527 (Macquarie Drive) south of Warners Bay. The Esplanade forms a cross-intersection with T.C.Frith Avenue to the south of the subject site and this intersection is under roundabout control, with two lanes locally on all approaches and with two lanes for circulating traffic. It carries generally single lane traffic flow in each direction over the majority of its length.

Main Road may be described as a local collector road which provides the main 'spine road' through the Boolaroo Township. It provides single lane traffic flow in each direction with additional parallel parking lanes on both sides within the township and extending between First Street and The Esplanade. The section between First Street and T.C.Frith Avenue adjacent to the site (including along the entire eastern boundary of the subject site) is constructed with one lane in each direction and unsealed shoulders over the majority of its length (north of the Fire Station). The majority of intersections along Main Road through the township are priority controlled (either Give Way or Stop signs), with the priority movement being along Main Road. It also incorporates pedestrian crossings between First and Second Streets, between Second and Third Streets and at Fourth Street.

To the south of the site (and the Boolaroo Township), Main Road forms the stem of a 'T' junction with The Esplanade. This intersection is constructed with a 'seagull' treatment, with a right turn bay provided on the eastern approach of The Esplanade. This intersection also provides a dedicated lane in The Esplanade for the left turn movement out of Main Road.

All other roads in the vicinity of the site are local roads which constitute the majority of the Boolaroo Township.

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There are a number of public roads that terminate at the site boundary. These include:

- Munibung Road which is a collector road adjoining the north eastern boundary of the site and providing the main access to Cardiff Industrial Estate from Macquarie Road;
- First, Second, Third, Fourth and Lakeview Streets Boolaroo that terminate at the site boundary and provide the opportunity for multi-access points to the existing urban form;
- Delaware Drive extension from Macquarie Hills residential estate to the east of the site.

These roads provide the opportunity for integrating the site into the surrounding urban form.

3.12.2 Public Transport Systems

The site is in close proximity to Cockle Creek Railway Station, with the northernmost part of the site being about 250 metres away. A distance of 800 metres is considered reasonable for commuter trips to the railway station and are in accordance with current practice.

In addition, it is noted that regular scheduled bus services operate along Main Road including STA Route 363 which operates between Cockle Street Station and Lake Road, traversing the township of Boolaroo. There are plans for a new rail station, overpass and bus interchange at Glendale to the north east of the site at Pennant Street. There is potential for significantly improved public transport access to the area as a consequence of this development and the construction of access roads through the site will have beneficial effects on the operation of the public transport system in the area by providing alternative inter-connective street opportunities.

3.12.3 Cycle and Pedestrian Access

Cyclepaths in the vicinity of the site include the extensive the cycle path around Lake Macquarie from Booragul to Eleebana and a more localised connection from Dalmeny Drive to Neegalbah Park in Macquarie Hills. The development of the site provides the opportunity for integrating cycle paths and pedestrian movement systems into the local street pattern and for improving linkages to surrounding areas.

3.13 Engineering Services

3.13.1 Electrical Supply

Although the site currently contains a number of overhead electrical cables, all 240V electrical lines within the site either have been or will be decommissioned. Similarly we understand that all 11kV transmission lines and local transformers will be removed as part of the demolition/remediation works. Supply will be retained to Incitec until operations cease.

The remaining 33kV and 132kV transmission lines are currently in operation.

The existing Boolaroo zone sub-station is located at the southern end of the site, adjacent to first street, and currently supplies electrical requirements for the site and surrounding areas. The new Argenton zone sub-station is currently under construction in nearby Kindyerra Park. Following the completion of the Argenton zone sub-station, Energy Australia has advised that the Boolaroo zone sub-station will be decommissioned and converted to a switching hub.

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Refer to ACOR Consultant's report, *Pasminco Cockle Creek Site – Site Trunk Services Strategy*, for additional information (Appendix 11).

3.13.2 Water and Sewer Supply

There are presently three water supply mains within the site, all of which are located in the south western corner of the site, along Main Road. Possible water supply tie in points are located in the vicinity of the site, including at the end of Munibung Road in the north and the existing mains in and around Main Street, First Street and TC Frith Avenue.

No sewer mains are currently present on site. Possible tie-in points are available in Boolaroo, Argenton and the Cardiff Industrial Estate.

Refer to Appendix 11 for additional information.

3.13.3 Gas Supply Strategy

There is currently limited gas reticulation with the site, with the exception of the south western corner where a gas main runs along Main Road. Tie-in points are available from existing mains at the south western side of the site, as well as Mains from Argenton and the Cardiff Industrial Estate.

Refer to Appendix 11 for additional information.

3.14 Stormwater Management Strategy

A Stormwater Management and Water Quality Concept has been developed by Acor and is contained in Appendix 12. Due to the long term industrial use of the site, and the resulting need to modify the natural topography to suit plant and equipment, the natural water courses through the developed areas are unrecognisable. Many existing drainage pipes and facilities remain on-site, however others have been damaged or demolished.

The site can however, be divided into the 4 primary catchments. The catchments all drain to Cockle Creek but via various routes.

Flows from the existing catchments are detained and/or treated in ponds, dams and wetlands. Due to the potential for contaminated flow from parts of the site, a treatment plant at the southern end of the site currently treats approximately 2,000m³ of runoff per day prior to discharging it, via ponds, into Cockle Creek.

3.15 Air Quality

On an annual basis the most common winds are from the NE and SW. This pattern is seen in spring and in summer where easterlies are also common. In autumn the winds from the SW are the most common and in winter the westerlies dominate.

Remediation activities are currently underway and are expected to be completed by 2011. Investigations by Holmes Air Sciences for the remediation works indicates that dust deposition and ambient lead monitoring for the site shows that the current air quality is within acceptable limits based on DECC air quality standards. Current remediation activities are within the expectations of the dispersion modelling as part of the environmental investigations prior to remediation.

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Care is required to ensure adequate separation distances between new urban development proposed under the Master Plan and ongoing or remaining remediation activity to prevent any amenity impacts from dust and lead deposition. Current air quality monitoring shows that dust strategies being implemented on the site are effective in the control of dust and lead emissions. These strategies include intense watering of haul roads and a reactive strategy during adverse weather conditions.

It is expected that the continuation of these strategies will effectively manage amenity impacts. As an additional precaution, it is suggested that no part of the site closer than 200 metres from active remediation stages should be redeveloped for urban purposes.

Odour impacts from the existing Incitec operations will cease when operations wind down on the Incitec site in 2009.

3.16 Noise Environment

The major source of noise to be managed in the development process is traffic noise from TC Frith Avenue and to a lesser extent from Main Road and the proposed new Munibung Road. TC Frith Avenue is an arterial road and is expected to carry increasing traffic flows in the future. Traffic is generally free flowing on flat ground although there is deceleration and acceleration from the intersection of TC Frith Avenue and Main Road.

Traffic noise levels along TC Frith Avenue substantially exceed the relevant criteria. The RTA recommend no access from TC Frith Avenue to retain its efficiency as an arterial road. This provides the opportunity for acoustic treatments as required to meet the relevant noise criteria. Such treatments include service roads and setbacks and other measures such as walls, mounds and building construction measures. Measures common to residential areas will be required.

Traffic noise levels along Main Road and the proposed Munibung Road also exceed the relevant criteria but to a lesser extent than TC Frith Drive.

The suitability of the site for residential development from an acoustic perspective has been investigated by Vipac whose report is contained in Appendix 13. They find that development of a residential area on the subject land is possible provided the recommendations outlined in the report are implemented. Recommendations include façade treatment of the dwellings most affected by traffic noise and installation of 2 metre high barriers adjacent to selected roadways. Council has indicated a preference for noise attenuation to be incorporated into building design rather than noise barrier walls.

Other measures can be implemented including service road access to dwellings fronting TC Frith Drive in addition to façade treatment and boundary fencing.

Lake Macquarie Development Control Plan No. 1 contains requirements for managing acoustic impacts from traffic noise. It is proposed that appropriate acoustic treatment will be incorporated into the design of the residential development to ensure that relevant acoustic criteria can be satisfied. Vipac have listed specific means of mitigating noise in the Acoustic Assessment.

Vipac have also undertaken an assessment of rail related vibration. This assessment (contained in Appendix 14) found that current rail related vibration levels at the proposed development boundary which is 18 metres from the rail track centre line are well below the relevant criteria for structural damage and human perception.

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It is noted that residential development is not proposed near the railway line.

3.17 Community Profile

The Pasmenco site lies to the north east of the suburb of Boolaroo, an established community with good access to Lake Macquarie, to the south, and the sub-regional centre of Glendale, to the north. The village of Boolaroo is fully serviced and has a neighbourhood centre and facilities which are currently underutilised. Lake Macquarie Council offices are located in the village. The built form is primarily detached residential with some dual occupancy and townhouses. Boolaroo integrates with Speers Point and shares facilities such as active open space, schools and community facilities.

The Master Plan residential sectors continue the existing urban form of Boolaroo, following the grid pattern of residential streets, allowing for high quality pedestrian and cycle movement. The population of Boolaroo has declined over the last decade or so, partly in response to the closure of the Pasmenco mines and loss of employment associated with the site. The proposed residential expansion will have a significant role to play in boosting the population of Boolaroo to its previous levels.

A description of the community structure is provided below with more detail provided in the report prepared by BBC Consulting Planners entitled *Assessment of Future Housing, Community Facility and Open Space Needs*, March 2008 contained in Appendix 15.

3.17.1 Community Profile

In 2006, 954 people lived in Boolaroo, a twenty percent reduction from 1,188 in 2001. The population of Boolaroo comprised approximately 0.5% of the Lake Macquarie LGA, which experienced a 3.4% increase from 177,185 in 2001 to 183,138 in 2006.

Age

- In 2006, Boolaroo had a lower proportion of children aged 0-14 years (17.2%) compared to the Lake Macquarie LGA (19.6%). The proportion of children in both Boolaroo and the Lake Macquarie LGA had decreased since 2001, however the decline was more significant in the suburb (3.7% versus 1.7%).
- The proportion of 15-24 year olds residing in Boolaroo increased from 11% in 2001 to 14.8% in 2006. The proportion of 15-24 year old remained steady in the Lake Macquarie during this period, constituting 12.6% of the population in both 2001 and 2006.
- The proportion of people aged 65 years and over in Boolaroo (17.0%) was slightly higher than the Lake Macquarie LGA (16.8%). However, this proportion had increased at a notably higher rate in Boolaroo than in the Lake Macquarie LGA (from 13.5% and 15.2% in 2001 respectively).
- The median age for both Boolaroo and the Lake Macquarie LGA was 40 in 2006.

Ethnicity

- The suburb, like the Lake Macquarie LGA as a whole, is relatively homogenous in terms of ethnicity, with 88.8% and 85.4% of residents respectively born in Australia.
- In 2006, 95.5% of the Boolaroo population spoke only English at home, slightly higher than the Lake Macquarie LGA as a whole (93.2%), suggesting there is not a large NESB community present in either location.
- Although small in number, the proportion of people who identified themselves as being of Aboriginal or Torres Strait Islander origin in Boolaroo was somewhat higher than the Lake Macquarie LGA (3.2% versus 2.3%).

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Marital Status

- In 2006, the suburb had significantly fewer residents who were married (39.5%) compared to the Lake Macquarie LGA (52.9%) and correspondingly more residents who had never been married (35.5% versus 28.2%). The decrease in the proportion of married people in Boolaroo since 2001 (8.4%) was more significant than in the Lake Macquarie LGA (1.8%).

Family Type

- There have been a number of notable changes to household structures in Boolaroo between the 2001 and 2006 Censuses. In 2006, there was a lower proportion of couple families with children (34.8% compared to 44.7% in 2001). Correspondingly, there was an increase in the number of couple families without children (from 30.2% in 2001 to 34.8% in 2006) and an increase in single parent families (from 22.4% to 28.5%). While each of these trends were also present in the Lake Macquarie LGA, the change was relatively small (generally less than 2% for each family type). In 2006, Lake Macquarie had a higher proportion of both couple families with children (43.6%) and couple families without children (38.4%) compared to the suburb of Boolaroo. However, there was a significantly lower proportion of single parent families than Boolaroo (16.8% versus 28.5%). There were also proportionately fewer lone person households in the Lake Macquarie LGA (22.4%) than the suburb (30.1%).

Household Mobility

- In 2001, 84.9% of Boolaroo residents had resided at the same address one year previously, similar to the Lake Macquarie LGA (84.2%). A total of 58.3% of Boolaroo residents and 59.7% of Lake Macquarie LGA residents had lived at the same address for the five years prior to the 2001 Census.

Travel

- In 2001, a higher proportion of households in Boolaroo (15.3%) did not have access to a motor vehicle compared to the Lake Macquarie LGA (9.5%). A lower proportion of Boolaroo households had access to two or more vehicles compared to the Lake Macquarie LGA (38.3% and 45.6% respectively).

Types of Housing

- The total number of dwellings in Boolaroo declined from 514 in 2001 to 429 in 2006, a 16.5% decrease. Conversely, the Lake Macquarie LGA as a whole experienced a 3.8% increase in the number of dwellings, from 71,986 in 2001 to 74,740 in 2006.
- The predominant housing stock in Boolaroo in 2006 was separate houses (94.9%), a higher proportion than for the Lake Macquarie LGA (87.0%). Flats, units and apartments comprised 4.3% of Boolaroo's housing stock, up from 2.7% in 2001, and there were no semi-detached, terrace or townhouses in Boolaroo at the time of either the 2001 or 2006 Censuses. Overall, the dwelling mix in the Lake Macquarie LGA remained relatively constant.
- In 2006, the occupancy rate for Boolaroo (2.4 persons per dwelling) was lower than the Lake Macquarie LGA as a whole (2.6 person per dwelling).

Tenure

- The number of Boolaroo residents who were renting their homes has increased from 17.1% in 2001 to 23.8% in 2006. The number of Lake Macquarie residents living in rented housing increased slightly, from 21.0% in 2001 to 21.9% in 2006.
- In 2006, 70.4% of residents in Boolaroo owned their own home or were in the process of purchasing it, a slightly lower proportion than the Lake Macquarie LGA (72.0%).

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- According to the 2006 Census, there were no public housing properties located in Boolaroo. However, in the Lake Macquarie LGA, public housing represented 22.3% of all rental dwellings.

Median Rent & Mortgage

- In 2006, the median weekly rent in Boolaroo was \$180, which was marginally lower than the Lake Macquarie LGA (\$185).
- Boolaroo had a considerably lower median monthly housing loan repayment than the Lake Macquarie LGA (\$1,096 versus \$1,300).
- In the June Quarter of 2007⁵, the median weekly rent in both the Lake Macquarie LGA and the postcode 2284⁶ for all two bedroom dwellings was \$220.

Education

- Residents of Boolaroo were generally less educated than the wider Lake Macquarie LGA population, with only 39.0% having obtained some form of post-school qualification in 2001 (versus 45.9% in the Lake Macquarie LGA). A total of 72.0% of Boolaroo residents had left school at or before the end of Year 10, compared to 58.2% in the Lake Macquarie LGA.

Employment

- In 2001, the largest employment industries in both Boolaroo and the Lake Macquarie LGA were Retail Trade (19.5% and 17.7% respectively), Manufacturing (16.3% and 12.3% respectively) and Health and Community Services (13.4% and 12.0% respectively).
- In 2001, 58.9% of Boolaroo residents (aged 15 years and over) were participating in the labour force, marginally higher than the Lake Macquarie LGA (58.2%).
- In 2001, the most common occupations held by Boolaroo residents were Tradespersons and Related Workers (19.2%); Intermediate Clerical, Sales and Service Workers (18.4%); and Elementary Clerical Sales and Service Workers (13.0%). The largest occupation category in the Lake Macquarie LGA in 2001 was Professionals (16.9%), followed by Intermediate Clerical, Sales and Service Workers (16.6%) and Tradespersons and Related Workers (14.9%).
- Boolaroo had a relatively high rate of unemployment (12.2%) in 2001, compared to 9.5% in the Lake Macquarie LGA. The rate for the LGA had decreased to 5.1% in March 2007⁷. The unemployment rate for Boolaroo is likely to have also decreased since the 2001 Census⁸, but would be expected to have remained higher than the LGA average.

Income

- In 2006, the median individual income for Boolaroo was \$367, slightly less than the Lake Macquarie LGA (\$394).
- The median weekly household income in Boolaroo was \$718, considerably less than the Lake Macquarie LGA (\$922).

SEIFA

⁵ Source: Department of Housing (2007) *Rent and Sales Report No. 80*

⁶ Includes the suburbs of Argenton, Boolaroo, Booragul, Marmong Point, Speers Point, Teralba and Woodrising.

⁷ Commonwealth Department of Employment and Workplace relations (2007) *Small Area Labour Markets Australia*. Retrieved from <http://www.workplace.gov.au/>

⁸ Employment data is not yet available for the 2006 Census and the Small Area Labour Markets data is not available for Boolaroo.

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- In 2001, the median SEIFA Disadvantage Index for Boolaroo was 913, indicating that generally the residents of Boolaroo were relatively more disadvantaged than NSW as a whole. In comparison the Disadvantage Index for Lake Macquarie LGA was 985.

Boolaroo has a relatively homogenous profile, and contains a higher proportion of 15-24 year olds and people over 65 years of age compared to the Lake Macquarie LGA. The household structure in Boolaroo is characterised by a declining proportion of couples with children and a corresponding increase in couples without children. There has also been a considerable increase in both single parent families and a slight increase in lone person households. The majority of Boolaroo households are fully owned or being purchased and dwellings are predominantly separate houses, with few apartment-style structures in the suburb. Boolaroo is characterised by relatively higher levels of disadvantage, with lower levels of education and median household income, as well as a higher rate of unemployment.

3.18 Housing Needs

Investigations have been undertaken into housing needs and housing strategies in the area with a view to identifying an appropriate housing strategy for the site (Appendix 15). This has involved:

- reviewing local and regional strategic planning policies for housing in so far as they relate to the Boolaroo Expansion
- consideration of the existing and projected future demographic profile and associated housing requirements of the City of Lake Macquarie and Boolaroo suburb
- Examining the suitability of the site to accommodate a range of housing types
- Developing a housing mix for the site.

The Lower Hunter Regional Strategy examines the pattern of settlement in the Hunter Region, noting that in recent decades, “the great majority of housing (at least 75 per cent) has been provided in the form of single detached cottages in new housing estates on the urban fringe” leading to a dispersed pattern of settlement with people living in areas removed from major centres of employment and removed from the commercial and services centres where essential services are located. This pattern of settlement also presents difficulties and additional expense in providing services and infrastructure.

The focus of the Strategy is to refocus these development trends, from a current pattern of 75% of all new housing being in new release areas and 25% in existing urban areas, to a new balance of 60% in new release areas and 40% in existing urban areas. The site has the potential to make a significant contribution towards achieving these targets for Lake Macquarie.

The Strategy identifies the location of proposed new release areas across the region, based on the hierarchy discussed previously. However, the Strategy does allow that other release sites, not currently identified in the Strategy, may be considered if “it can demonstrated that the proposal satisfies the Sustainability Criteria”, as long as they are not situated within the identified green corridors.

The Strategy also identifies a set of *Neighbourhood Planning Principles* which will be relevant to any housing proposal. These include:

- *A range of land uses to provide the right mix of houses, jobs, open space, recreational space and green space.*
- *Easy access to major town centres with a full range of shops, recreational facilities and services along with smaller village centres and neighbourhood shops.*

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- *Jobs available locally and regionally, reducing the demand for transport services.*
- *Streets and suburbs planned so that residents can walk to shops for their daily needs.*
- *A wide range of housing choices to provide for different needs and different incomes. Traditional houses on individual blocks will be available along with smaller, lower maintenance homes, units and terraces for older people and young singles or couples.*
- *Conservation lands in-and around the development sites, to help protect biodiversity and provide open space for recreation.*
- *Public transport networks that link frequent buses into the rail system.*

The site has the potential to readily achieve these planning principles.

3.19 Employment Needs

SGS Economics and Planning was commissioned by Paclib Management to undertake an 'Employment Land Use Study' of the subject site (Appendix 16). This assessment investigated the employment land use opportunities of the site. The key purpose/objectives of this study include:

- Review of available reports on Commercial and Employment Land Needs at the subregional and LGA level;
- Review of reports on centres strategies and the longer term demand for different employment land use including creative industries;
- Review of site attributes suitable to employment uses;
- Discussion of employment self containment issues;
- Preparation of a brief strategy for employment land uses on the site.

The Pasmenco Site is located next to the established and sought after Cardiff Industrial Estate which was one of the first large scale light industrial areas in the Lower Hunter Region. The site is in close proximity to major arterial routes and other transport infrastructure such as train stations and airports. In summary, the site is positioned close to arterial routes such as the Sydney Newcastle Highway, the Pacific Highway as well as Newcastle port and railway stations. It also adjoins one of the major employment precincts in the region (Cardiff) and is close to the Glendale retail centre.

The different State Government and local policy documents have the following implications for the establishment of an employment precinct on the site:

- Glendale/Cardiff is defined as a major regional centre in the Lower Hunter Strategy and as a sub regional centre in the Lake Macquarie Strategy. Centres are the main focus of future growth and Glendale/Cardiff will generate 6,200 new jobs within the next 25 years.
- A total of 825ha of land will be needed to accommodate the future job growth in the Lower Hunter Region, most of this will stem from already industrial zoned, but currently vacant land, such as the Site.
- The proximity of the site to the Glendale/Cardiff major regional centre will be beneficial for future attraction of businesses. The site can be seen as a natural expansion of the Cardiff Business Centre.
- There is a strong commitment to enable employment opportunities within the Lake Macquarie LGA and to keep a high self containment rate of workers.

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- The envisioned employment land is already close to retail, sports complex etc, which will enable the site to attract workers.
- The planned Glendale railway station and interchange will be of high importance for the development of the northern part of the site as it will improve the connection between Cardiff and Glendale via road and also offer public transport.
- The Town Centres Strategy reflects that there is a high proportion of employment in the retail sector and the site is adjoining three suburbs that have established retail centres: Glendale, Cardiff and Warners Bay. The three neighbouring centres account for more than 40% of the region's total commercial floorspace.
- The renewal corridor Glendale-Edgeworth will enable increased housing density and commercial activity. A growing number of residents will create a higher demand for employment in the region.

Considering the labour market indices, it can be stated that Lake Macquarie LGA and the Lower Hunter Region have a high percentage of population of working age. The future increase in population will expand the skills pool, but also lead to an increasing ageing population with its own needs that have to be addressed e.g. health services. The labour market participation rate is high for both areas with a relatively low unemployment of around 7% (which will have decreased since 2001).

Almost 80% of the Lake Macquarie LGA residents work within the Lower Hunter Region and three quarters of all jobs within the LGA are taken up by local residents. Professionals and technicians and trades workers were the highest professional group which mirrors the educational attainment with 43% of the population having graduated with a 'certificate'.

The Lower Hunter Region economy is diversified and key employment sectors are retail trade, health and community services and manufacturing. Primary sectors such as agriculture and mining are on the decline whereas service sectors such as finance and insurance, property and business services are on the rise. Manufacturing still plays a very important role in the region and is a growing sector within Lake Macquarie LGA. The region has strength in metal related industries such as iron and steel forging and basic non-ferrous metal manufacturing. The Cardiff Estate adjoining the site has a strength in poultry processing, wholesaling, and manufacturing.

The creative industry sector in Lake Macquarie is very small and mostly concentrated in Charlestown. This can be attributed to the fact that creative people and industries are looking for a thriving and vibrant environment.

The study found that highest and best use of the site for employment is use for light industrial purposes. This would build on Cardiff's existing strength in wholesaling and manufacturing.

Notwithstanding the findings of this report, there is support for a wider range of employment opportunities on the site to take advantage of proximity to Cockle Creek station and Glendale and to support employment opportunities in Lake Macquarie.

3.20 Community Facilities

Investigations into the likely socio-economic characteristics of the population and the provision of community facilities have been undertaken by BBC Consulting Planners and are contained in Appendix 15. The new population projected for the site will require access to a range of services and

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facilities to meet their social, cultural, recreational, educational, health, transport and shopping needs. These will include:

- § Children's services
- § Health services
- § Neighbourhood community centres/halls
- § Schools and other educational institutions
- § Cultural, entertainment and leisure facilities
- § Shopping and commercial services
- § Open space and recreation facilities
- § Welfare and support services for individuals and families
- § Public transport
- § Places of worship
- § Police and emergency services

As the site is located in an existing urban area and because the population of Boolaroo has been declining, many of the necessary facilities and services are available in the area. Others will be planned and provided by relevant authorities as part of their normal operations.

The residential development on the site will be an extension to an existing community, which already has an established network of community facilities, both Council operated and a number of privately operated facilities.

The age and condition of existing facilities varies considerably with implications for accessibility and adaptability and on-going maintenance. The declining population and shift in characteristics of the community will also affect the current and future capacity of the facilities.

The Lake Macquarie Section 94 Contributions Plan No. 1 notes that:

“currently the City has a mix of housing of various types, a regional commercial shopping centre in Charlestown, district commercial service centres and local shopping areas and industrial areas. The geographic location can be a limiting factor in the provision of community facilities around the foreshores of a coastal lake with inadequate public transport links, particularly in the western area. For this reason, together with a lack of a City Centre, there has been a need to duplicate the provision of public facilities in order to provide accessibility for all residents. However these facilities have tended to be relatively small and therefore not able to provide the range of services required”.

The Plan emphasises Council's current strategy of concentrating on the development of larger multi-purpose community facilities in order that services may be co-located.

Community facilities provided through multipurpose centres currently funded through Section 94 Contributions in Lake Macquarie LGA are:

- § Children's Services, including day care, OOSH and children's services and programs
- § Youth Facilities
- § Facilities for Older People, People with a Disability and SEPP 5 developments
- § General Purpose/Family/Community Section

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Contributions for library facilities are also collected across the LGA.

Community facilities are largely planned and provided for on a catchment basis, with the LGA divided into Eastlakes, Northlakes and Westlakes. Boolaroo falls within the Northlakes sector. Council has advised that they are soon to begin a comprehensive overview of the Citywide (2004) Section 94 plan, however it had yet to commence at the time of preparation of this report.

Children's Services

There are a range of children's services available in the LGA, provided through Council and the private sector. Lake Macquarie Council's Family Day Care service has carers in most suburbs throughout the city and generally has some vacancies.

There are 4 pre-schools in Glendale and one in Argenton. Vacation care is provided at Boolaroo Primary School. The Boolaroo/Speers Point Community Kindergarten is a community operated pre-school for children. There is an increasing trend towards privately operated child care centres which is likely to continue.

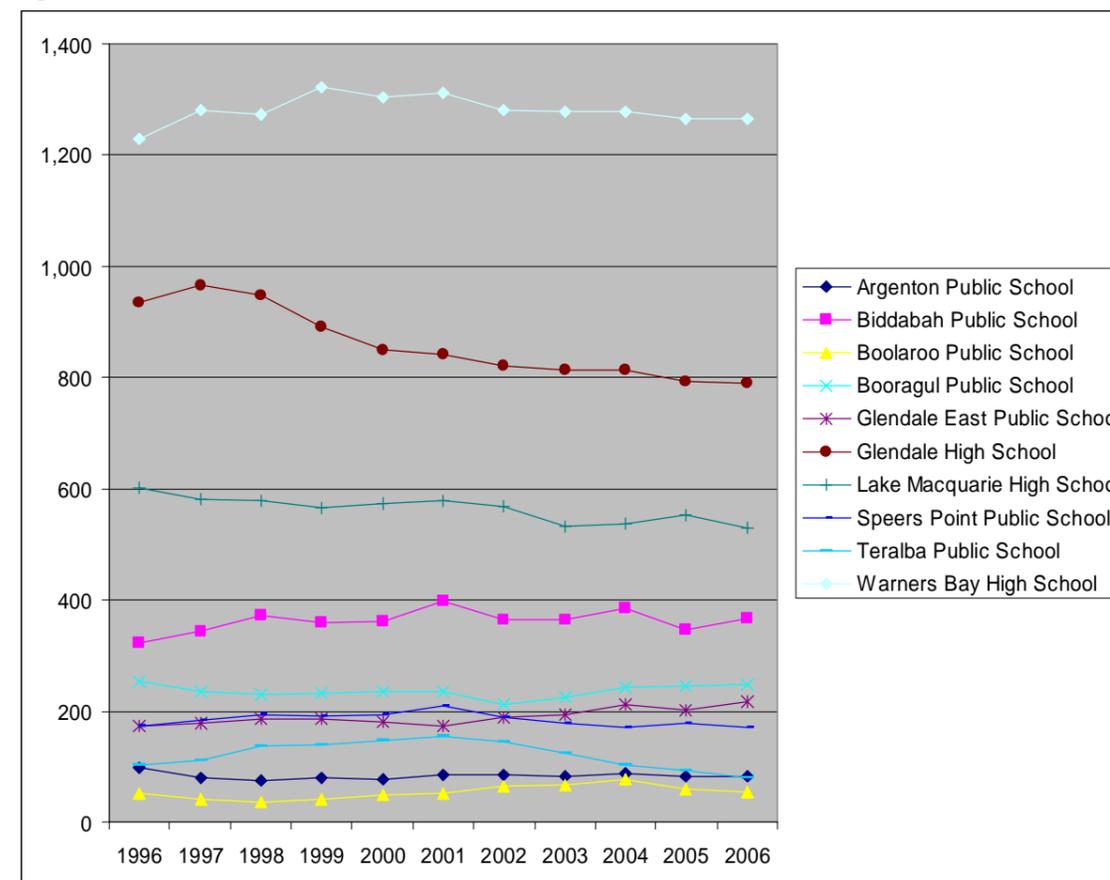
The population forecasts suggest that there will be additional pre-school aged children on the site some of whom will require child care services. It is not possible to anticipate the number of childcare places such a population would require, as this will depend on the proportion of parents in the workforce. However it is likely that there will be some available capacity as the existing population ages. This figure is likely to be the peak demand also and would drop off over time as the population ages. Furthermore, based on the recent increase in privately funded child care centres, this demand is likely to be met by the private sector.

Educational Facilities

Figure 3-1 shows the patterns of enrolment over the ten-year period 1996-2006, showing that most schools have had steady or declining enrolments.

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Figure 3-1: Government School Enrolment Patterns around Northlakes, 1996-2006



Source: NSW Department of Education and Training, Planning and Innovation, (2007) Mid Year Censuses 1996-2006

There are two government owned primary schools within close proximity to the site. Boolaroo Primary School currently has an enrolment of 55 and Argenton Primary has an enrolment of 82 students⁹. There are a number of other primary schools, private and public, which will be easily accessible to the new residents of the site.

Students will have the choice of attending one of several high schools in the area, including Glendale Technology High School, Lake Macquarie High School, Warners Bay High School and St Paul's Catholic High School. As can be seen in the figure above, Glendale High School has seen a significant drop in enrolments in recent years (791 in 2007).

The Hunter Institute of TAFE has a branch at Glendale, attached to the Glendale Technology High School, providing technical and vocational training, focussing on Business and Info Tech, Community Services, Health and Tourism and Manufacturing and Construction.

⁹ As identified on <http://www.schools.nsw.edu.au/schoolfind/locator> , accessed 14 December, 2007.

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Consideration also needs to be given to spare capacity in existing facilities as a consequence of the ageing and declining population. Overall enrolment trends show declining numbers in most schools in the area and it is anticipated that the additional demand for education places created by the development can be adequately met through existing supply. This is expected in renewal areas where efficiencies in the provision of public amenities and services are seen as a major benefit of urban consolidation policies such as those incorporated into the Lower Hunter Regional Strategy.

Neighbourhood and Community Centres

The new residential population will require access to spaces for community activities and events. These spaces are usually provided in community centres or halls, and in addition to providing meeting and activity rooms, community centres can also provide a base for community development activities, training and continuing education opportunities.

The Boolaroo/Speers Point Senior Citizens Centre is located on Main Road in Boolaroo is a basic hall with a simple kitchen and is available for hire for activities.

Small community halls are also located in Warners Bay, Teralba and Argenton.

There is the opportunity to use smaller parks and open space areas for community meeting spaces for informal recreation and social activities. These spaces have the added benefit of complete flexibility in the range of potential uses and require very little infrastructure.

The former laboratory building on the site is considered suitable for future community use subject to Council identifying an appropriate use consistent with Council's facility provision strategy which is yet to be determined.

Council has advised that the mode of delivery for community meeting and activity spaces has changed over the years, with a shift away from small locally based halls towards larger multipurpose centres which are designed to be flexible and to meet the needs of a much broader cross section of the community. The Section 94 plan notes that there is some capacity within existing halls and neighbourhood centres which will continue to provide access to incoming residents.

The Section 94 Plan identifies that a new Youth and Community Centre will be built at Glendale, incorporating general purpose community activity area, disability services area and a youth section. There is potential for residential development on the site to contribute towards this facility.

Youth Services

It is important to not overlook the provision of facilities and services for young people in the new community. The Lake Macquarie Council Youth Community Plan¹⁰ identified several key priorities in relation young people and leisure and culture, including:

- a need for increased entertainment and sporting options for young people;
- a need for libraries to expand their services to focus on young people; and
- lack of access to youth services after hours and on weekends.

There are currently no youth specific facilities in Boolaroo, Speers Point or Glendale. However, as noted above, the proposed Glendale Community Centre may have youth specific facilities and programs

¹⁰ Lake Macquarie City Council (2007) Youth Community Plan 2007-2011 draft p43.

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available. Furthermore, a number of cultural and entertainment facilities are available in Glendale, including cinemas and the Hunter Regional Sports Centre.

Health and Medical Services

As with any area, the provision of accessible health services will be of primary concern. Due to the dispersed nature of development in the Lake Macquarie LGA, health services are provided on a regional rather than local basis.

The location of the site in close proximity to both Charlestown and Newcastle town centres will mean that residents will have good access to a wide range of health services, including the new Royal Newcastle Centre, replacing the former Royal Newcastle Hospital. Community Health Centres in Toronto, Newcastle, Windale and Wallsend will provide more generalised support and services. At present there are only a few aged care facilities in the neighbouring suburbs, however this is likely to change in the future as development catches up with the ageing population trend.

There are two medical centres in Glendale and two general practitioners in Speers Point providing primary health care services to residents in the area.

The ratio of GPs to population in the Lake Macquarie LGA was 4.6 compared to 5.0 in NSW¹¹, indicating that there is an acceptable level of provision of services in the area.

Services for Older People

The Boolaroo/Speers Point Senior Citizens Centre is a basic hall with a simple kitchen and is available for hire for activities. Programs are operated on a voluntary basis.

The preferred model of provision for services and facilities for older people has changed over the years, with a trend away from dedicated seniors facilities and focus instead on developing multi-purpose community spaces which can be used by the whole community for a variety of activities, including seniors specific programs.

The proposed Glendale Community Centre will be designed to consider the requirements of older people and people with a disability and programs will be offered to suit the needs of the local population profile.

Meals on Wheels services are offered through the Charlestown and District branch.

The proposed development may create an additional requirement for aged care services in the area, particularly as the population ages. The planned increase in population will allow service providers to apply for additional funding packages through HACC to expand their service provision.

Transport

Boolaroo is conveniently located on the Central Coast rail line, connecting Sydney to Newcastle. The closest station is at Cockle Creek, to the north east of the site, and this will be linked into the site and to Speers Point via the proposed cycleway along the creek.

Boolaroo is serviced by a regular bus service connecting Belmont to Newcastle, which includes Glendale and John Hunter Hospital. Numerous regional services operate through Glendale.

¹¹ As per NSW SLA Population Health Profiles, retrieved from www.publichealth.gov.au, based on 2001/2001 data.

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Additionally, the NSW State Government announced in March 2006 a proposal for the proposed Glendale rail/transport interchange, which will include a new railway station, bus interchange and commuter car park, will be located adjacent to Cardiff Industrial Park and Glendale Supacentre to the north east of the site.

Several new roads are being proposed as part of the redevelopment of the site which will allow a through connection to Macquarie Hills and the Cardiff West Industrial Area. These will facilitate better connectivity with the transport interchange and bus movements through the area.

Emergency Services

The Boolaroo Fire Station, operated by the NSW Fire Service is located on the corner of Main and Fourth Streets. The NSW Fire Service target response time is arrival of the first truck and crew within 10 minutes of the call being received, on 90% of occasions. It has been estimated that this level of service will be able to be met at the site. The closest Rural Fire Service is located at West Wallsend.

The development on the site comprises infill development in a location adjacent to an emerging sub-regional centre. It is therefore assumed that emergency services are available or can be readily augmented to meet any additional demand created.

Cultural, Entertainment and Leisure Facilities

The new population will contribute towards an increased demand for library services. Services for the Northlakes Planning District are currently provided in Speers Point (area library), Cardiff and Edgeworth (branch libraries). As noted above, the Section 94 Plan currently provides for a new Regional (Area) library to be constructed at Glendale to replace the Speers Point library which may either become a district or branch library or be demolished. Furthermore, there is no capacity to expand the Cardiff and Edgeworth libraries.

Shopping Centres

Local shops are important in defining a local community. Boolaroo contains a small neighbourhood shopping centre which cater to local, daily needs. There is some capacity for expansion to if the need was identified in the future. The sub-regional centre of Glendale currently has a full range of retail and commercial outlets, and is likely to expand considerably under the new regional strategy.

3.21 Summary of Opportunities and Constraints to Development

Regional Context:

- Close to emerging Glendale regional centre.
- Close to Lake Macquarie and Cockle Creek.
- Contains visually prominent Munibung Hill with regional recreational potential and significant views from the top at RL164.
- Brownfields site in an existing urban area.
- Well connected to arterial road network via TC Frith Drive and Macquarie Road and to public transport (Cockle Creek train station and future Glendale Station/Bus Interchange).

Land Use and Social Context:

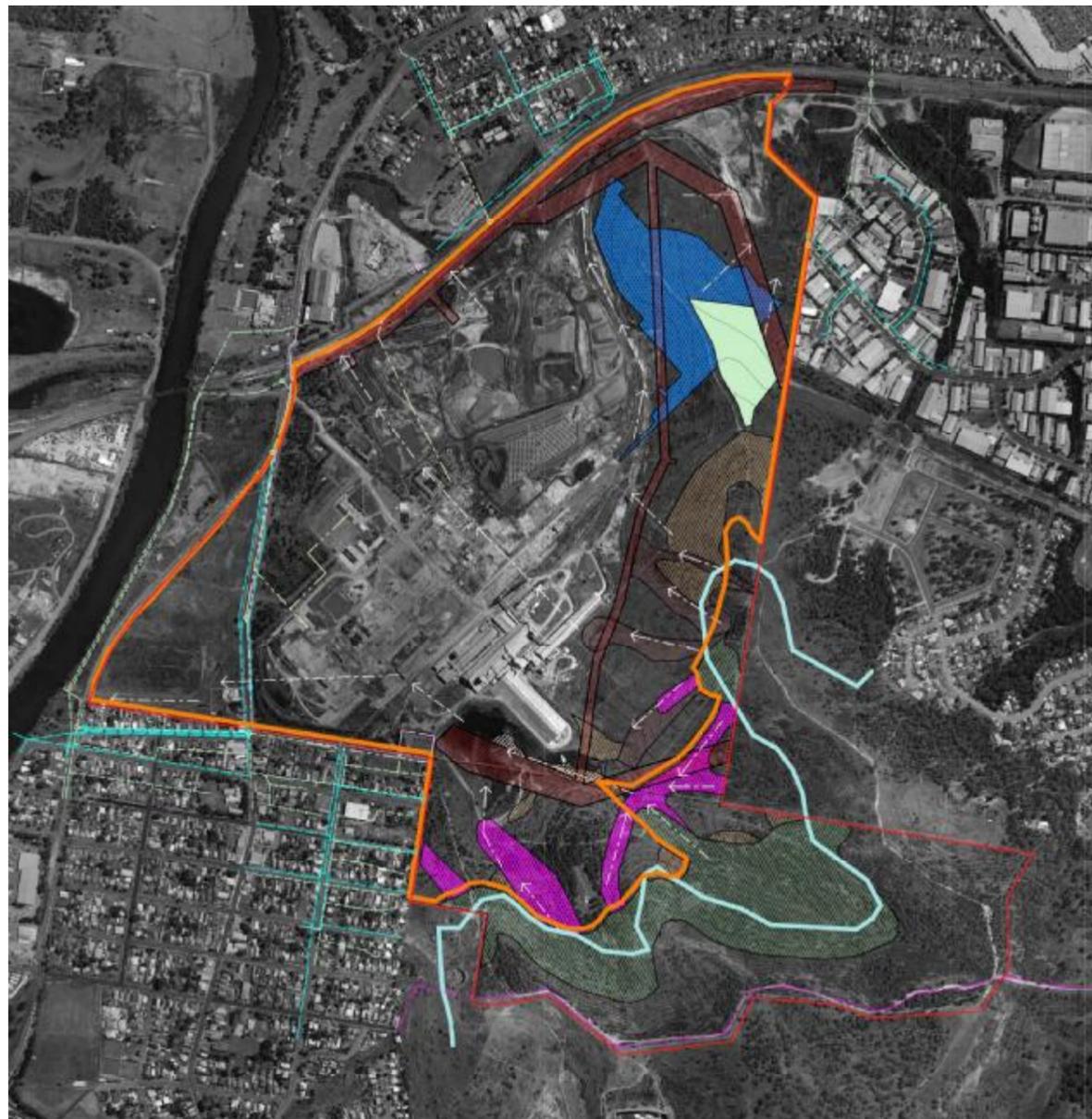
- Site is located in an established urban area close to an emerging regional centre. It adjoins existing residential communities of Boolaroo and Macquarie Hills and is adjacent to Argenton. It also adjoins employment land and has a long association with employment uses.
- Site redevelopment provides the opportunity for infill residential development to foster growth and rejuvenation of Boolaroo and Argenton and take advantage of an accessible site with good access to an existing network of community facilities.
- The site also provides the opportunity for additional employment lands to contain contemporary employment uses to replace the former heavy industry.

Views and Visual Context:

- Site is oriented to west and north and is thus screened from views from south and the lake.
- Major change in slope gradient occurs at about 70m to 90m contour with increased visual sensitivity above this level.
- Potential for dwellings on foothills of northern and eastern spurs of Munibung Hill up to about 70m to 90m contour with roofs below skyline when viewed from the west.
- Incised minor ridges provide screening to pockets of development on the mid slopes.
- Development of mid slopes generally between 55m and 70m to be subject to planning and design controls.
- The northern spur ridgeline is to be revegetated.
- Regionally significant views available from the top of the hill and from the journey to the top.

Open Space Links:

- Potential for regionally significant open space area at Munibung Hill with open space and biodiversity links to Cockle Creek taking a number of routes and forms.
- Potential to link Munibung Hill with the proposed Macquarie Hills reserve to the north.
- Potential for exciting new recreational uses and forms above the containment cells.



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- The site has been closed to public access for over 100 years and the redevelopment provides the opportunity to gain access to and through the site and to integrate the site into the existing built fabric and natural systems.
- Potential for public access links from Macquarie Hills to Speers Point via Munibung Hill (subject to access along upper ridges of Hawkins land) and from Lakelands east to Boolaroo.

Movement System:

- Connecting the site to the surrounding street system allows for improved accessibility in the locality by:
 - a logical extension of Boolaroo Streets northwards into the site;
 - the provision of a strategic link from Munibung Road to TC Frith Drive greatly reducing travel times from Cardiff area through to Boolaroo and West Lake;
 - connecting the suburbs of Macquarie Hills with Boolaroo and beyond to Speers Point;
 - improved access to Cockle Creek Station;
 - improved bus services.

Topography:

- The majority of the site is of moderate elevation below 55m RL with gradients increasing significantly at about 70m RL and then rising steeply to the pinnacle at the top of Munibung Hill.
- Areas of fill and other man made modifications to landform will be modified for redevelopment through the remediation process.
- The majority of the site is suitable for development with the exception of the upper parts of the site forming Munibung Hill and the eastern and northern ridge tops.
- North and north west facing slopes provides opportunities for good solar access.

Land Capability:

- Most of the site is suitable for development from a slope stability, soil erosion and drainage viewpoint.
- The site lies in an area where geology and land form contribute to slope instability in some areas associated with coal seams.
- Development on the mid slopes to occur in accordance with good hillside construction principles.
- Areas of high risk of slope instability have been identified and excluded from development.
- Areas of shallow former mine workings in Cardiff West to be considered in detailed design.

Remediation:

- The site is currently being remediated in stages which involves the removal of contaminated material and securing this material in containment cells.
- The Master Plan has been prepared on the basis of the site in its condition following remediation

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Water Management:

- Watercourses have been identified in consultation with DNR (now DWE) and are located above the man made freshwater dam.
- Other smaller drainage lines drain into these water courses and other directions generally to the west to Cockle Creek;
- Drainage lines through the former smelter site have been highly modified with the potential to recreate other riparian zones and more natural water management features in a visible urban context.
- Water quality treatment will be provided and stormwater flows detained where there are capacity constraints under railway lines and roads.
- The brownfield site will benefit from the application of water sensitive urban design principles absent from the former industrial uses.

Flora and Fauna:

- The site is highly disturbed and has a highly modified landscape, predominantly consisting of derived grassland areas with some regeneration in which immature canopy species are establishing.
- Areas subject to remediation contain no vegetation other than re-established grasses.
- The main vegetation outside the remediated areas are Coastal Foothills Spotted Gum – Ironbark Forest, Coastal Narrabeen Moist Forest and Derived Grassland and areas of eucalyptus plantings undertaken by the Pasminco horticulturalist over the course of the last 20 years.
- No threatened flora species, populations or communities were identified other than the Angophora inopina species retained in the proposed reserve and at isolated other locations.

Site Infrastructure:

- All urban services are available to the site or can be readily augmented to meet the needs of the development as can be expected in an existing urban environment.
- There are limits to the water supply that are currently being investigated. Supply to higher parts of the site may require booster pumps or higher reservoir and is being investigated by Hunter Water for the Munibung Hill area generally.
- Development on the site will require the provision of a new substation.
- Redundant easements on the site can be removed although the 132KV transmission lines and existing substation on First Street are required to be retained (the substation may be reduced in size).
- Opportunities to provide water and sewer services to the site from a number of directions.

Drawing CO 19 presents a summary of the constraints and opportunities for the site

4. INDICATIVE DEVELOPMENT CONCEPT

4.1 Overview

Based on the detailed analysis of the site and its context, an indicative development concept (Master Plan) has been prepared for the site indicating the pattern and nature of land uses proposed for the site. It deals with issues such as access and movement (main street systems and connections with the surrounding established urban form), location of open spaces and open space linkages, provision of utility services and other infrastructure and the like. The indicative development concept enables investigations to be undertaken into human facilities and open space requirements and forms the basis for future Council decisions regarding rezoning and the preparation of appropriate development controls for the site.

The indicative development concept guides the development of the statutory provisions including a draft LEP.

The indicative development concept is based on all site investigations including investigations into site servicing, stormwater management, geotechnical suitability, flora and fauna, visual impact of development, access and internal circulation, bushfire management, sustainability initiatives, open space/landscape management and housing/employment strategies.

The key elements of the Master Plan are:

- Approximately 800 additional dwellings based on an overall density of 15 dwelling units per hectare (allowing for roads, local open spaces and stormwater management);
- 2,000 additional residents based on 2.5 persons per dwelling;
- potential for 1,600 jobs in a variety of industries;
- additional passive regional open space on Munibung Hill and the containment cell linking with surrounding open space systems;
- integration with the existing urban fabric of the locality.

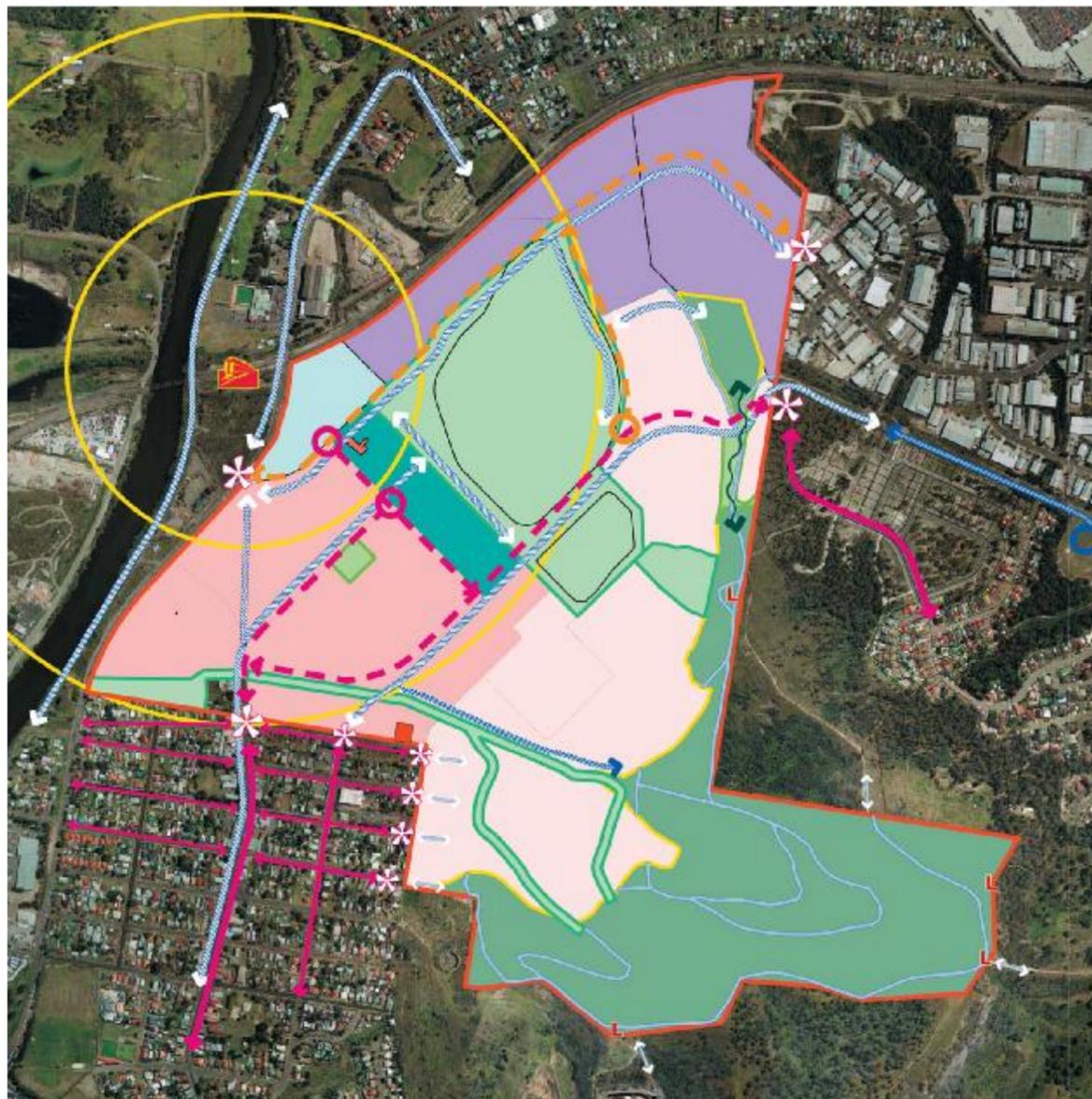
The Master Plan is shown on Drawing DA-01 and an indicative road layout is shown on Drawing DA-02.

4.1.1 Urban Design Principles

The future urban form of the site is informed by Lake Macquarie Council Strategic Planning policies and plans and the detailed analysis of the site and its context.

The Master Plan seeks to provide safe, sustainable residential and employment neighbourhoods which:

- comfortably integrates with the surrounding urban environment;
- recognises the natural environment;
- recognises the history of the site including the operations of Pasmenco and Incitec;
- incorporates appropriate asset protection zones;
- provides potential for greater choice in good quality housing;



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- is energy efficient; and
- encourages walking and cycling.

The street layout and location of development seek to achieve the following desirable qualities:

Permeability: Physical and visual connections with existing streets and activities should encourage integration of new and existing communities. Any new community should utilise facilities in the existing urban context such as shopping facilities and schools.

Variety: A range of urban experiences including variety in housing choice and land use should be provided.

Legibility: Site layout should be easily understood through elements such as a simple structured street system, clearly defined edges, and clearly expressed gateways with accompanying landscape treatment.

Robustness: Site layout should be sufficiently flexible to enable the urban form to adapt to changing needs over time.

4.2 Distribution of Land Uses

4.2.1 Residential Land Use

Location of Residential Areas

Residential areas have been located having regard to the site constraints and the existing pattern of urban development. Residential areas are located as a logical northern extension of Boolaroo towards the containment cell which forms a barrier generally between employment land and residential land.

Residential development is also proposed in the lower foothill areas with the location of development determined having regard to development constraints. Areas of very high risk of slope instability are avoided.

Housing Types

Investigations have been undertaken into the housing forms appropriate for the site having regard to population trends and projections for the Lower Hunter and Lake Macquarie and the implications for the demand for dwelling types and densities for the site. Finally, the characteristics of the site and its context influence the types of housing appropriate for the site.

This site has a number of attributes that make it suitable for a range of housing types:

- § ***the proximity to public transport*** - The NSW Ministry of Transport, Service Planning Guidelines, indicate the interstate and international walking distance criteria for bus and rail routes is between 400 to 500 metres during the day and between 800 and 1,000 metres at night;
- § ***proximity to arterial road network*** - the site is located adjacent to the arterial road network;
- § ***proximity to employment zones*** – employment zones are planned for the site encouraging mixed use of the area and integrating with Cardiff West Industrial Estate. The site is also close to the emerging Glendale regional centre;
- § ***proximity to existing communities and facilities*** – the site adjoins an existing community and can integrate with and revitalise the existing community. Residents of the site will use existing schools and other available facilities.

The review of strategic directions for housing, demographic trends for the City of Lake Macquarie and the characteristics of the site indicates the need for planning controls and policies that:

- provides for a range of housing types and densities to meet the emerging demographic profile of the City of Lake Macquarie;
- recognises the location close to an existing village centre and rail station;
- reflects the predominance of households containing couples with children;
- provides a balanced socio-economic structure given the emerging characteristics of multi-unit housing areas such as Boolaroo and Glendale.

The Master Plan achieves these objectives and provides the opportunities for housing types that reflect Council and State government objectives and respond to emerging demographic characteristics.

The housing types envisaged for the site will be influenced by market perceptions and intentions of the ultimate developer of the land. However varying densities can accommodate a range of dwelling types

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in the low to medium density range. It is envisaged that higher density development would be more appropriately located closer to the rail station and the existing urban area. A range of lot types and dwelling types including townhouses, villas, courtyard housing, integrated housing small lot housing and traditional detached dwelling styles are proposed. The proposed zoning also permits residential flat buildings in certain areas. Again this will be provided subject to demand with a preference being for more accessible areas closer to the existing commercial centre of Boolaroo. It is noted that SEPP (Housing for Seniors) would also apply.

Lower density housing is more appropriate in the foothills with care taken in the siting and design of dwellings and access driveways.

The residential area will be located as a northern extension of Boolaroo and close to Cockle Creek Railway Station. The residential component will cover approximately 50 ha and is well located with regards to public transport, access to the arterial road network and proximity to the Boolaroo.

Housing is proposed with the density and form influenced by the topography, proximity to the station and Boolaroo and the future mixed use employment zone. Lower densities are proposed on the steeper foothills with the density increasing closer to the station, employment area and Boolaroo.

The following four main character areas are envisaged under the Master Plan:-

Traditional Detached Housing

Traditional detached housing is proposed on the lower slopes leading up to the ridges. Streets are oriented to provide a layering of street trees and rear garden trees up the slope with lots sizes generous to allow retention of the ridge top against the skyline. The predominant character of the area shall be of low to mid rise roof form interspersed with vegetation.

Compact Housing

Predominantly detached housing is proposed on smaller lots in the lower gentle slopes. Generous street widths allow street tree planting and lot dimensions allow for a rear garden area.

Multi Dwelling Housing

Development closer to the railway station and mixed use employment zone is proposed to be medium density consistent with metropolitan planning policies. Development in the form of apartments, townhouses and integrated housing is envisaged with a strong built edge to the street and a preference for dwellings that address the streets. Residential flat buildings would provide greater diversity in dwelling stock.

The emerging structure plan will accommodate a range of dwelling types as presented in the following table.

It is expected that this will result in an overall density of nearly 15 dwellings per hectare with higher densities in more accessible locations and lower densities in the foothill areas.

This mix is appropriate for the location and consistent with the emerging trends and needs in the area. It offers a significantly higher percentage of medium density housing compared with Greenfield release areas. Additional forms of housing are also appropriate such as integrated housing. Lots can be sized to prove attractive to housing for older persons.

4.2.2 Employment

SGS Economics and Planning was commissioned by Paclib to undertake an 'Employment Land Use Assessment for the proposed employment lands at the site. The conclusions and recommendations of this study are as follows.

This study found that the highest and best use of employment land was for light industrial purposes. Consequently land is identified for the westward expansion of the Cardiff Industrial Estate and the provision of a strategic road link by extending Munibung Road and the provision of a connection through employment lands from Macquarie Road to TC Frith Avenue.

In addition to the light industrial land uses, it is considered that the site has characteristics making it suitable for a range of other employment opportunities in a mixed use employment context. This site has good access to public transport and to the arterial road network, is close to the emerging regional centre of Glendale and is readily accessible to a trained and skilled local workforce. It also has an attractive amenity with the scenic backdrop of Munibung Hill and the rehabilitated containment cells.

Thus employment lands closer to the station and to the open space system have been identified for mixed use employment uses. It is not envisaged that this area would contain uses that would compete with Glendale as a regional retail facility or with Boolaroo as a neighbourhood retail and service centre. This area would provide employment in a range of industries and commercial operations and bulky good retailing operations.

The redevelopment of the site for a mixture of residential and employment uses inevitably results in situations where the boundary of residential zoned land adjoins or is adjacent to employment land. Although the Master Plan has been designed to minimise such situations, there are instances where residential land adjoins employment land. This occurs in the northern part of the site where residential land to the east of the containment cell adjoins industrial land and to the south west of the containment cell where a similar situation occurs, although separated by a street. In these cases, potential amenity impacts can be managed by measures such as streets, building setbacks, retaining walls, acoustic screens and restrictions on use and hours of operation. These measures are development specific and it is expected that an area plan will identify these areas as requiring special consideration at the DA stage to ensure that amenity impacts can be minimised. If buffer areas are required these can be resolved at the DA stage in conjunction with a specific design and use.

4.2.3 Open Space and Conservation

The Master Plan seeks to achieve the following objectives in relation to open space:

- to recognize the regional scenic landscape qualities of Munibung Hill and provide opportunities for public access to the hill and walking connections with adjoining areas;
- to facilitate passive recreation, pedestrian and cyclist access;
- to create interesting and well designed local parks neighbourhood community and recreation nodes, providing visual and open space amenity to the local neighbourhood;
- to ensure that the landscaping of local parks is attractive and memorable, contributing to a high quality public realm;
- to incorporate overland stormwater flows into the open space system with appropriate riparian and wetland plantings;

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- to integrate areas of environmental sensitivity into the open space system;
- to interpret the site's former natural and cultural heritage within the open space;
- to link pedestrian and cycle ways through green open spaces and provide opportunities for lookouts, recreation and visually appealing areas and facilities for the community.

The key open space elements of the Master Plan are:

- integrating the new street system with fire trails on Munibung Hill to provide the opportunity for public recreational access to the hill;
- providing a reserve for the *Angophora inopina* species and connecting this reserve to the hill;
- provision for ecological corridors linking with the site;
- to provide one 5,000 square metre passive neighbourhood park located in an accessible location to the new community and intended as a meeting place for the community;
- providing for linkages to nearby shared pedestrian and cycle paths;
- providing an urban design solution that does not preclude future recreational use of the containment cells;
- protecting riparian zones along relevant streams;
- integration of the new community with the existing community by the provision of a connective movement system and the joint use of existing active sporting facilities.

Local and Neighbourhood Open Space and Facilities

Provision has been made for a local park of approximately 5,000 square metres situated within the residential area. There is the potential for the containment cells to be used for passive recreation also.

Munibung Hill

Munibung Hill, located to the south east of the proposed residential area, has the potential to provide significant passive open space, with extensive walking and cycling trails and access to important regional views.

Consideration could be given to vehicular access to car parking and other facilities at the top of the hill. Easements for access to the telecommunications facilities at the top of the hill are in place. However, there are existing access issues with the terrain steep and safety a major concern. A more likely alternative would be for vehicular access to be limited in favour of pedestrian access only with parking provided in designated areas.

There are opportunities for viewing areas and lookouts on the walks on the hill and for connecting to Council owned recreational land to the east and south east through the open space and conservation (secondary) lands. These are indicated on the Master Plan.

It is envisaged that the use and management of any future public land at Munibung Hill will be the subject of a future plan of management.

Munibung Hill also has conservation significance because of its scenic qualities, its archaeological significance and its habitat qualities including rocky outcrops. Munibung Hill does not provide habitat for any threatened flora species populations or communities.

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The vegetation on the site and on adjoining sites provides habitat for a range of fauna including threatened species. The grey-headed flying-fox and eastern bent-wing bat were recorded in the study area.

The draft LEP does not propose that the zoning of Munibung Hill change. The Master Plan recognises its potential recreational use and values which is considered to be a use compatible with the conservation significance of the hill.

Pasminco Containment Cell

Arrangements for the on-going management of the contaminated material in the containment cell will be put in place as part of the remediation process. The surface level of the cell provides further opportunities for use for passive open space purposes. Maintenance access will be provided to the top of the cell which can be used for pedestrian and cycle access to the top of the cell. Car parking can be provided at the base. Uses could include dog exercise, kite flying and other similar passive pursuits.

There may be similar opportunities for the use of the Incitec containment cell.

The containment cells and adjoining lands are also seen as contributing to an environmental corridor from Munibung Hill to Kindyerra Park and Cockle Creek. The Master Plan and draft LEP accommodates the establishment of a connection from Munibung Hill and the adjoining Macquarie Hills proposed reserve via the containment cells, water quality treatment ponds and the existing drainage lines in the Railway Employment Zone through the site to Cockle Creek.

Inopina Reserve

The location of the Angophora Inopina Reserve has been discussed and agreed with the Council.

The Inopina Reserve is linked via a pedestrian system to the north south ridge connecting with a proposed reserve on the adjoining Macquarie Hills site and with Munibung Hill. This provides a connection in the open space system and also can act as part of the environmental corridor system.

The indicative layout and proposed zoning allows for the greening of the ridgeline as part of the landscaped open space system.

Environmental Corridor

Council's adopted land use principles from the Pasminco Munibung Hill Draft Land Use Strategy included the principle of maintaining and enhancing an environmental corridor from Munibung Hill to Kindyerra Park and Cockle Creek. This link is provided, although in a slightly different location resulting from the more detailed consideration of the site and its features. The containment cells for Incitec and Pasminco and associated drainage corridors to the north west provides the opportunity for a stronger environmental corridor connection to Kindyerra Park and Cockle Creek than that proposed in the land use principles.

4.2.4 Active Space

The incoming residents are not likely to create the need for any one district scale sporting or recreation facility and it is not proposed to establish any such facilities within the site. There is a preference to focus such activity in the Speers Point area or at other locations such as Macquarie Hills or Argenton.

Cycleways

Specific targets for cycleways are not set, however it is recognised that cycleways and natural vegetated corridors play an important part in linking neighbourhoods and facilities and encouraging recreation. Providing safe and convenient pathways for both pedestrians and cyclists is important for improving access to open space and increasing the range of open space opportunities available to residents and visitors. Council has indicated that a cycleway/walkway network should include cycleways on-site and off-site in several directions linking key destinations.

In most instances local streets can be used for cycle access and in other cases dedicated cycleways are preferred. There is potential for a link along Cockle Creek from the station to Lake Macquarie which will form part of an existing network and connect the site with Speers Point and the lake. There is some potential for this to extend to the north across the railway line to Glendale.

4.3 Access and Internal Circulation

The movement system incorporated into the Master Plan seeks to achieve the following design objectives:

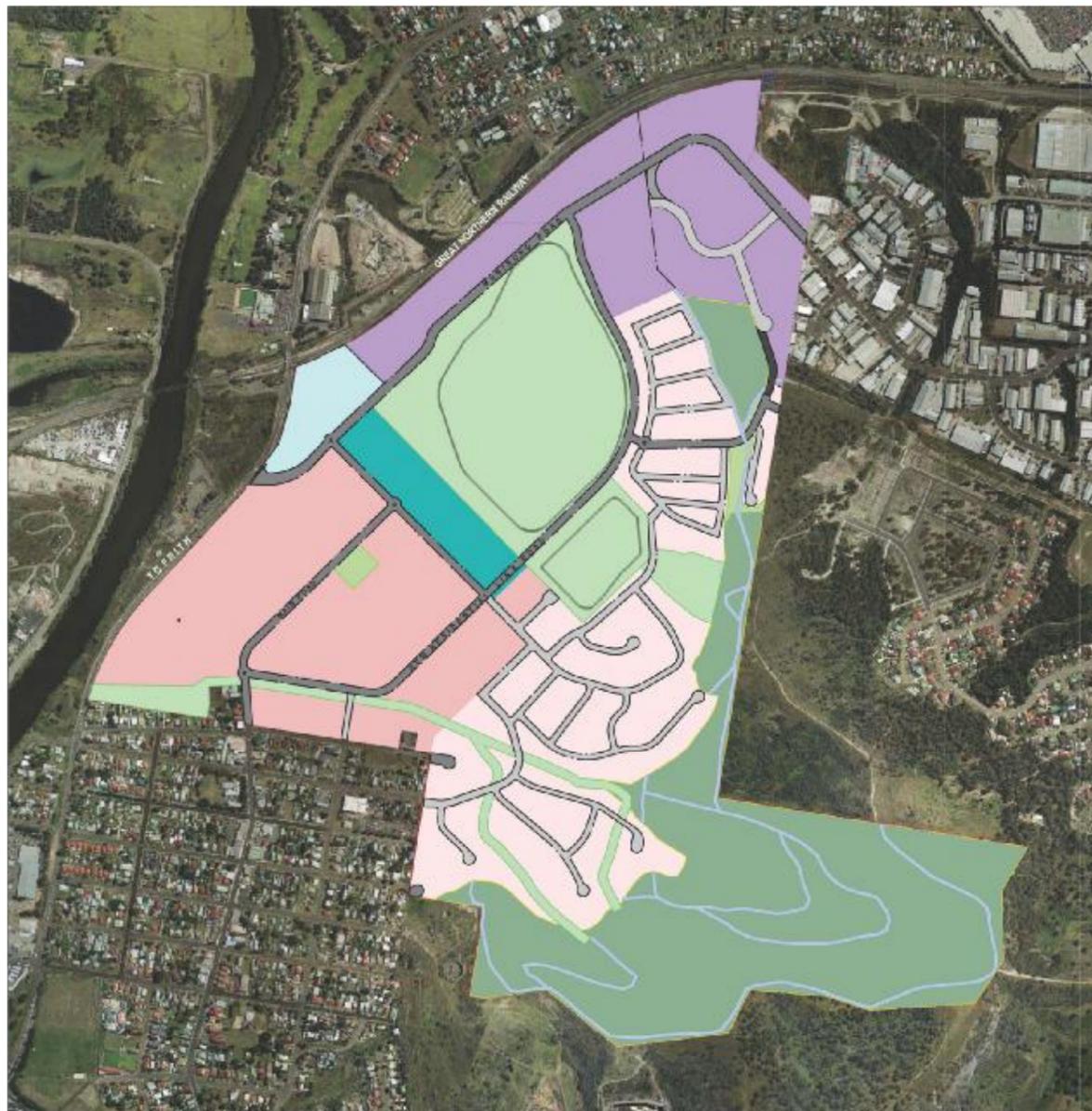
- Development of a rational and logical road hierarchy based on a functional classification of major collector, minor collector and local roads;
- Identification of bus routes to facilitate the future introduction of services through the site should these be required;
- Identification of pedestrian and cycle links connecting transport services to all areas within the site and particularly major desire lines;
- Separation of residential and employment lands to avoid heavy vehicle intrusion into residential areas and to preserve residential amenity;
- Maintaining a low speed environment within the total site. It is proposed that a general 50 km/h speed zoning apply within the residential areas and the local road design is intended to ensure that this limit is self-enforcing as far as practicable, by avoiding long straight road sections;
- Provision of attractive streetscapes throughout the site by the use of open space elements; and landscaping within road verges and road carriageways where required for drainage purposes.

Proposed Road Hierarchy

The recommended road hierarchy incorporates the following key elements. Consideration should be given in the design of the roads to the Landcom publication entitled "Street Guidelines for Landcom Projects - 2006".

- The existing arterial road network is recognised and respected with limited additional access points. It is envisaged that new lots will not directly access TC Frith Drive although some lots may access Main Road. Service road arrangements are possible parallel to, and adjoining, TC Frith Drive.
- The new east-west link road is proposed as a major collector road linking Munibung Road and TC Frith Drive. It provides access to all land uses within the site with its major role being employment traffic. It meets an identified strategic road connection function identified by Council

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independent of the development on the site. It is proposed within a 23 metre wide road reservation.

- A new link street generally following the alignment of the former railway line providing a connection from Main Road to the Munibung Road extension accessing future residential areas and facilitating a connection with Macquarie Hills.
- A minor connecting street is proposed linking Macquarie Hills with Boolaroo. Council made provision for this connection in its approval of the Macquarie Hills development. The subsequent delineation of the Inopina Reserve has restricted options for this link. Nevertheless an alignment has been identified that would avoid the reserve.
- A street connecting the Munibung Road extension and the new residential link road.

It is proposed that all local streets will be designed to meet Council's engineering and design standards.

An indicative urban form including the local roads is shown on Drawing DA-02.

Potential Bus Routes

Main streets have been designed to accommodate bus routes. It is considered highly desirable to incorporate an internal bus network which traverses the proposed collector road system. This provides the option of implementing services in the future in response to demand. This may include designated services although it is more likely that these routes will be used to divert other services.

Council requires the potential for a bus link from Cardiff West Industrial Estate to Macquarie Hills residential area to provide the potential for public transport connectivity in the future. The rezoning provides the opportunity for a more efficient and effective link through the street system on the site as indicated in the master plan and road network drawings (DA-01 and DA-02). Connections from the extension to Munibung Road are provided which will provide for a more appropriate connection to Macquarie Hills.

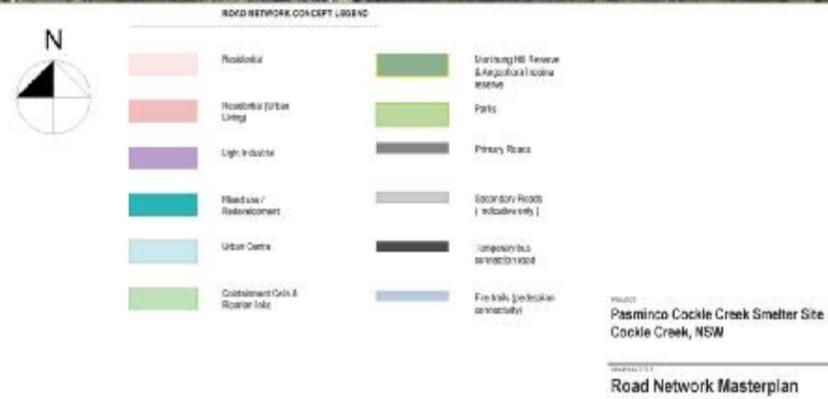
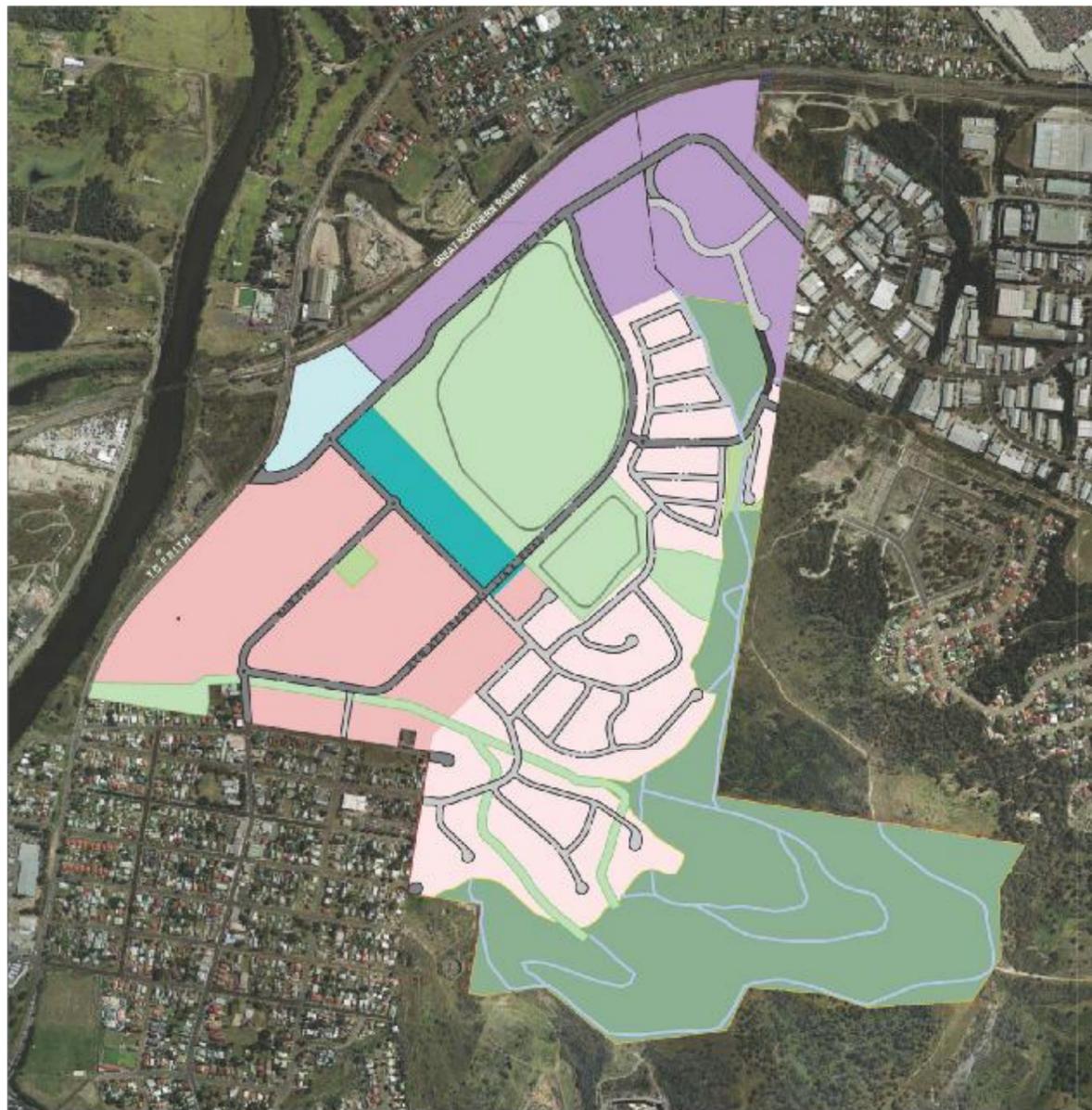
Potential Cycle Routes

All streets within the sub-precinct are designed to incorporate pedestrian footpaths along both sides, unless undesirable on conservation grounds. In addition, crossing facilities will be provided at critical points, subject to an evaluation against relevant warrants.

Planned primary cycle routes on the site are shown on Drawing DA-02. Also shown are potential off site routes which include:

- A potential link to an existing cycle path to the north of Macquarie Hills linking to Neegulbah Park;
- A 2.5 metre wide off-road cycle route is envisaged along Cockle Creek linking to the existing path around Lake Macquarie;
- A link along Main Road to the south connecting to Boolaroo village and community facilities such as the school;
- A link to Cockle Creek Station;
- A potential link to the north to Argenton Public School, Kindyerra Park and the BMX Track. This link could eventually extend to Glendale Shopping Centre;
- Links from Munibung Hill to adjoining sites such as the quarry site and other Council controlled open space areas.

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Local streets will accommodate cycle movements and will integrate with the existing local street network at Boolaroo.

Potential Pedestrian Connections

Streets will be designed to accommodate pedestrian movements. In particular an interconnective street system is envisaged that will connect with Boolaroo to the south and to Macquarie Hills. Connections to the north are restricted by the railway line.

There is the potential for the following pedestrian linkages:

- Connections to the south to the former water reservoir site and to the quarry site as part of an integrated connective open space system;
- Connections to Munibung Hill from future residential areas and from Munibung Hill to the east and south east connecting to an existing open space walking trail system;
- Connections to the north the Macquarie Hills residential area and the future reserve to the south.

4.4 Stormwater Management Strategy

The Stormwater Management strategy (Appendix 12) is intended to “minimise impacts on the natural water cycle”, in accordance with Council’s *Water Cycle Management Guidelines* and other Council guidance. The overall strategy aims to capture all site stormwater and provide effective treatment, prior to releasing the water into downstream watercourses. Council officers were consulted in the preparation of this strategy.

Localised capture of stormwater flows will be provided in surface drains, such as swales, where possible and elsewhere in underground piped systems. Overland flow paths will be provided to ensure that flows due to major storms or blockage of underground piped systems are permitted to escape from the site without being a significant risk to life or property.

One aspect of stormwater treatment generally involves detaining storm flows such that post-development outflows are no greater than pre-development outflows. Stormwater detention is achieved via a number of methods including grassed swales, dams, detention basins and underground tanks on individual allotments.

The approach taken in this strategy is to provide large-scale community operated stormwater detention facilities for each catchment, whilst also requiring individual allotments to include rainwater tanks in their construction.

Other aspects of stormwater treatment aim to improve the quality of outflows, such that downstream catchments are not adversely affected by upstream pollutants. These pollutants most often consist of large objects, suspended solids, nitrogen (in various forms), phosphorous (in various forms) and hydrocarbons such as oil and road grime.

The approach taken in this strategy is to provide community operated water quality treatment facilities in the form of wetlands and ponds. It is envisaged that, following remediation works, treatment of stormwater for industrial pollutants will not be required. Treatment of leachate from the proposed containment cells is considered elsewhere in this document.

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Whilst all stormwater captured on the site will be subjected to quality treatment, Council has indicated that major storm flows from certain areas of the site need not be subjected to detention.

Water from the main drainage catchment in the south east of the site drainage corridors will be retained and / or created with riparian buffers of 10 metres from the top of the bank on upstream tributaries above freshwater dam. These tributaries include:

- A tributary running south from the dam which runs through a localised area of instability due to slip potential. This tributary will be retained in a natural state.
- A tributary running east that branches into 3 smaller drainage lines. Above the area of the Pasminco and Incitec sites being remediated, these streams will be retained in a natural state. The remediation process is likely to involve some land form changes including the removal of freshwater dam.

Below the location of freshwater dam, a system will be designed to accommodate the stormwater flow. Initial advice suggests that a corridor width of 20 metres would be required to convey stormwater via an open swale. The details of this system and its integration into the road network and urban form is a matter for detailed design.

This system will be designed to allow an interconnective street system in the area to the north First Street Boolaroo.

It is proposed that the land below the remediation line in this area will be zoned residential with the management of drainage lines and localise slip areas and the restriction of development in these areas controlled during the development application process.

Land will be provided between the Pasminco cell and employment zone to accommodate stormwater flows from the other catchments on the site. This includes combined detention and water quality treatment ponds prior to discharge under the railway line. These systems will be located adjacent to the containment cell.

4.5 Utility Services Strategy

4.5.1 Water Supply Strategy

Water supply for the site will be derived from existing connection points identified by Hunter Water. The proposed tie-in points are located close to or within the existing site. The water supply points identified by Hunter Water allow for maximum developable levels of between RL 54m and RL 61m. Areas above this level will require the provision of augmentation works such as booster pumps or an elevated reservoir. Hunter Water is investigating the potential for an elevated reservoir to serve development in the Macquarie Hills area.

Generally new water supply mains will be located within the proposed road reserves and will be designed in a looped main arrangement to improve supply reliability. The water supply strategy is described in Appendix 11.

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4.5.2 Sewerage Supply Strategy

Sewer reticulation for the site will be drained to existing connection points, which have been identified by Hunter Water and have a total capacity suitable for the development's needs. The proposed tie-in points are located outside of but close to the existing site boundary.

The spare capacity of each of the identified tie-in points each was nominated and a plan has been prepared showing proposed sewer catchments throughout the site.

Due to landform and capacity constraints, sewer pump stations will be required at certain locations to deliver sewerage to connection points with available capacity.

The sewerage strategy is described in Appendix 11.

4.5.3 Electricity Supply Strategy

The long term 33kV supply requirements of the site will be derived from the Argenton zone sub-station, which is scheduled for completion in September 2008. As the Boolaroo zone sub-station is to be decommissioned, the 33kV feeders from Argenton zone substation will ultimately feed a new sub-station located within the PCCS site. From this substation 11kV transmission lines will feed local pad mounted transformers appropriately located around the site.

In the interim, 11kV supply for the Cardiff West Estate will be derived from the existing Cardiff Estate supply and later the new Argenton substation. The existing Cardiff Estate supply has limited capacity, and hence will not be able to provide for the entire Cardiff West Estate needs.

In order to provide the interim 11kV supply from the Argenton zone sub-station, conduits will be installed under the Great Northern Railway. This same conduit crossing will later supply 33kV feeders to the new PCCS zone sub-station.

Low voltage and 11kV electrical reticulation will utilise underground cables installed within the proposed road reserves, with the exception of the Cardiff West Estate interim 11kV supply, which will follow an overhead route after the railway crossing. The new 33kV feeders would most likely use an underground route from Argenton zone sub station.

Where feasible existing overhead HV cabling will be undergrounded and will likely follow proposed road reserves. An exception is the 132kV transmission lines at the north end of the site, which will remain in their current overhead location.

4.5.4 Communications Strategy

Telstra has been contacted and has indicated that there are no envisaged concerns with telecommunications supply. Communication cabling will be located underground and will follow road reserves.

4.6 Heritage Conservation Strategy

The Master Plan incorporates and responds to the historical context by:

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- responding to the landmark qualities of the site by providing for public access to Munibung Hill and by creating a landmark landscape form for the containment cell as a reflection of past activity on the site and as a viewing platform over the site;
- retaining the high ridge crest of Munibung Hill which is a landscape context of Aboriginal cultural value;
- consulting with the local Aboriginal people in relation to the detailed design and location of access to the hill;
- retaining the old laboratory building in a prominent location in the site layout and facilitating its use for a wide range of purposes through the suggested zoning;
- maintaining the alignment of the former spur railway line over most of its length as part of the movement system of the site;
- extending the interconnective grid subdivision pattern of Boolaroo northward respecting the pattern of subdivision of the existing township;
- providing significant opportunities for the continued provision of employment opportunities on the site in modern industries and businesses;
- creating open spaces with the potential for the display of salvageable items.

4.7 Bushfire Management Strategy

Consideration has been given to the need to incorporate asset protection measures in the design of the development envisaged under the master plan. It is proposed that asset protection zones will be provided as part of the development on land within the residential zone and identified as asset protection areas.

Advice from bushfire consultants (Appendix 8) indicates that asset protection zones ranging from 10 metres to 35 metres will be required on the up hill side at the southern and eastern edges of the development where it adjoins the foothills to Munibung Hill.

In addition to asset protection zones, consideration has been given to access for fire fighting vehicles. Two options are available to provide the necessary access:

- access handles between lots;
- fire trails at the rear of lots.

The choice of the preferred measure is a matter for determination at the DA stage.

4.8 Built Form Controls

The Master Plan envisages compliance with Council's existing planning controls in terms of dwelling design and employment uses built for controls. The information on which this Master Plan is based would enable any modification or addition to Council's existing development control plan to be drafted in areas such as ecological values, open space corridors, uses on Munibung Hill, controls to protect scenic values, bushfire risk, geotechnical suitability, stormwater management, road layout, development precincts and built form controls and the like.

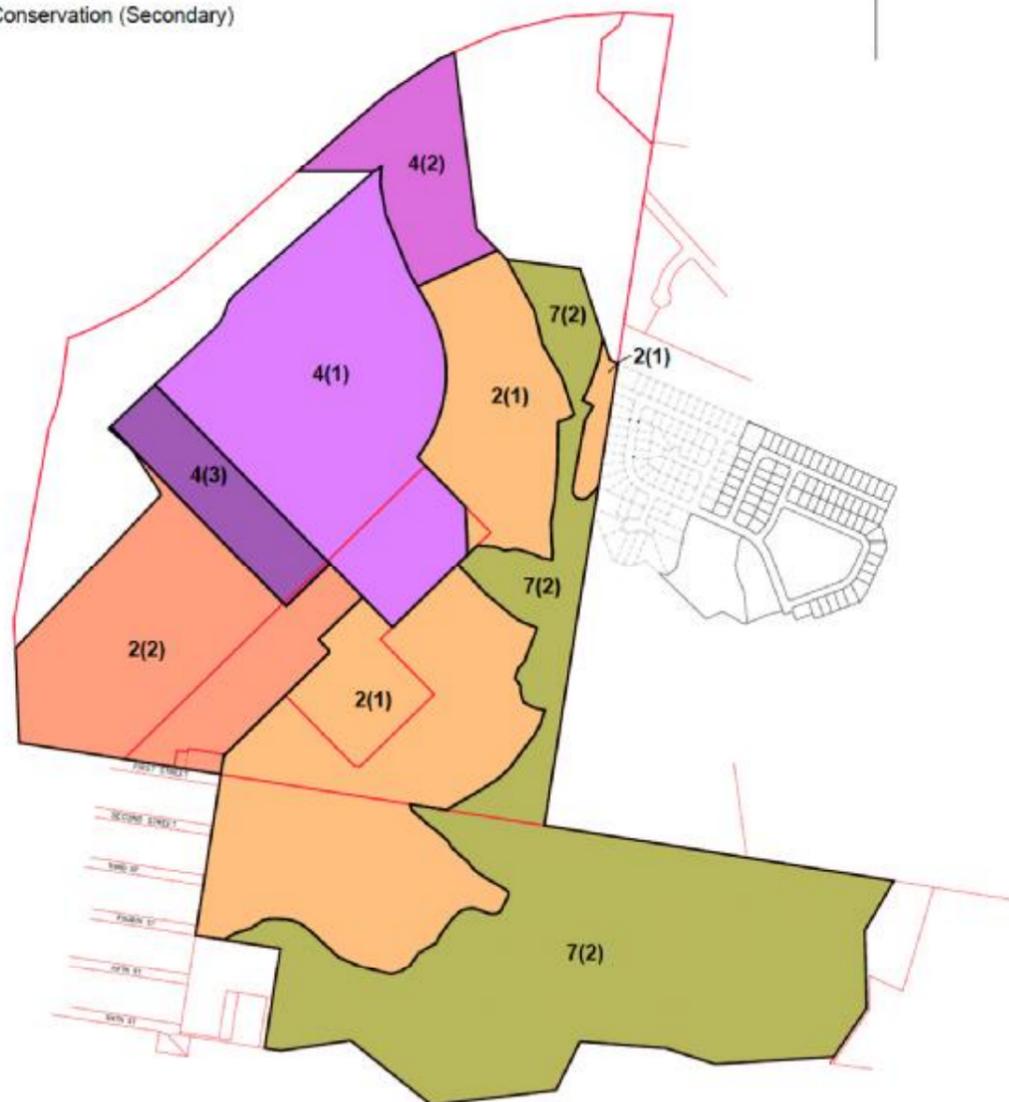
4.9 Development Staging

The process of remediation is critical to staging development. It is envisaged that remediation will be completed by 2011-12. It is recommended that appropriate clauses be inserted into any draft LEP applying to the site to provide for appropriate setbacks to unremediated land until the remediation of that land is completed.

It is envisaged that the release and development of land will be staged in a manner that responds to the remediation strategy.

LEGEND

- 2(1) Residential
- 2(2) Residential (Urban Living)
- 4(1) Industrial (Core)
- 4(2) Industrial (General)
- 4(3) Industrial (Urban Services)
- 7(2) Conservation (Secondary)



5. PROPOSED ZONING

5.1 Draft Local Environmental Plan

5.1.1 Amendment to Lake Macquarie Local Environmental Plan 2004

A draft LEP has been prepared based on the studies and investigations into the suitability and capability of the site for development. This includes the site Master Plan which outlines a possible future urban structure and form of development on the site in terms of principal roads and land uses. The draft LEP is contained in Appendix 20.

The draft LEP has been prepared as an amendment to Lake Macquarie Local Environmental Plan 2004. It proposes to rezone the site from 4(1) Industrial (Core), Zone 5 Infrastructure and Zone and 7(2) Conservation (Secondary) Zone to 2 (1) Residential Zone, 2(2) Residential (Urban Living) Zone, 4(2) Industrial (General) Zone, 4(3) Industrial (Urban Services) Zone and 7(2) Conservation (Secondary) Zone to facilitate residential, commercial and industrial development and protection of scenic qualities.

The justification for the proposed zoning is presented in the following table.

Proposed Zone	Justification of Zoning
Zone 2 (1) Residential Zone	This zoning is proposed primarily on the moderately sloped land in the east and west of the site.
Zone 2 (2) Residential (Urban Living) Zone	<p>The location of the higher density residential zoning is influenced by proximity to the town centre and the railway station, land suitability and accessibility. In view of the closure of Pasmenco and Incitec sites, Council may consider providing greater intensity of development within the existing urban area of Boolaroo around the town centre and this has been taken into consideration in the proposed zoning. Consideration has also been given to the proposed Stage 1 zoning to ensure compatibility between the draft LEPs.</p> <p>Consequently the area to the north of First Street has been included in Zone 2(2).</p> <p>It is recognised that this zoning allows a wide range of residential forms with the ultimate form driven partly by market forces.</p>
Zone 4 (2) Industrial (General) Zone	This zoning is consistent with that currently applying in the Cardiff Industrial Estate and with the recommendations of the Munibung Hill Land Use Strategy.

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Zone 4 (3) Industrial (Urban Services) Zone	The Design principles adopted from the Munibung Hill Land Use Strategy encourage a mix of employment opportunities. A location adjacent to the containment cell is seen as an appropriate location for a zone that allows a broader mix of employment opportunities. This area has good access, is relatively close to public transport and has an attractive backdrop of the landscaped containment cell.
Zone 7 (2) Conservation (Secondary) Zone	This zone reflects the scenic and vegetation qualities of Munibung Hill, the ecological qualities of the proposed Inopina Reserve and the scenic and corridor qualities of a proposed link between the Inopina Reserve and Munibung Hill.

The Draft LEP special provisions to ensure there would be no land use conflicts between the proposed development and the on-going remediation of the remainder of the site with the requirement for a 200 metre buffer between remediation works and areas to be developed for residential purposes.

It is also envisaged that a development control plan would be prepared to address specific planning issues in more detail where this is necessary prior to granting development consent. It is envisaged that the DCP would be prepared as an area plan specific to the site. The form and content of the area plan would address matters such as urban structure, site access and mobility, connectivity with adjoining areas including road, pedestrian and cycleway linkages, urban design outcomes, measures to protect amenity at the interface between land zoned residential and industrial, noise attenuation, heritage interpretation, location and management of public open space, landscaping, stormwater management, land stability, visual impact and staging of development.

The draft LEP proposes a number of adjoining zones whereby land within a residential zone adjoins land within an employment zone. This occurs in the northern part of the site where residential land to the east of the containment cell adjoins land within an industrial 4(2) zone and to the south west of the containment cell where land residential land adjoins land within an industrial 4(3) zone. In the case of the 4(2) zone interface, potential amenity impacts can be managed by measures such as building setbacks, retaining walls, acoustic screens and restrictions on use and hours of operation. These measures are development specific and it is expected that the area plan will identify these areas as requiring special consideration at the DA stage to ensure that amenity impacts can be minimised. Land within the 4(3) zone will be separated from residential land by a street. This area is expected to be occupied by employment uses that do not have a significant adverse impact on the amenity by way of noise, traffic air emissions or other like impacts.

Investigations are continuing into the staging of development and land disposal strategy which are important elements to be considered in the DCP.

The draft LEP does not identify and separately zone the areas identified in the Master Plan for public open space and drainage. These uses are permissible in residential zones. More work is required to finalise a location of a park for zoning purposes. Zoning land for open space reduces flexibility in its location and could inhibit alternative locations integrated into the pattern of development. Changes to the location of the park to reflect a proposed lot layout or block dimensions that can only be resolved at subdivision design stage can affect the location of a park. The proposed zoning allows required flexibility in the location of open spaces. The requirement for a DCP to address the location of the open space in greater detail will provide greater certainty on the planned location.

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Similarly the detailed design process for subdivision is likely to result in changes to the location or dimensions of stormwater management works including detention basins and drainage lines. The draft LEP acknowledges that some of the land zoned for residential or industrial purposes will be required for public utility undertaking purposes.

There are localised areas zoned for residential purposes in the south eastern part of the site that are potentially subject to geotechnical hazards. The precise extent of these areas cannot be identified with any certainty at this stage. The draft LEP acknowledges that some of the land zoned for residential purposes requires more detailed assessment of geotechnical suitability. It is proposed that the DCP would contain a requirement for such assessment.

The containment cells have been retained in an industrial zone. Consideration was given to the inclusion of this land in a private recreation zone. The ultimate uses for the containment cells will be reviewed at a later stage when the final form of the cell is known. The land will be managed in a manner that recognises the nature of contamination stored in the cell. Notwithstanding this, the final form of the cell could be designed to allow the use of the grassed enclosure to the cell for passive recreation pursuits. An alternative zoning or other designation can be considered for this land by the Council in preparing the draft LEP.

5.1.2 Consideration of Zones under Standard Instrument

The draft LEP has been prepared as an amendment to the existing Lake Macquarie Local Environmental Plan 2004. Consideration has been given to the zone options under the Standard Instrument referred to in Section 33A of the Environmental Planning and Assessment Act 1979. Potential equivalent zones are shown in the following table.

Proposed Zone	Standard Instrument Equivalent Zone
Zone 2 (1) Residential Zone	Zone R2 Low Density Residential or Zone R1 General Residential
Zone 2 (2) Residential (Urban Living) Zone	Zone R3 Medium Density Residential or Zone R1 General Residential
Zone 4 (2) Industrial (General) Zone	Zone IN1 General Industrial
Zone 4 (3) Industrial (Urban Services) Zone	Zone B5 Business Development
Zone 7 (2) Conservation (Secondary) Zone	Zone E2 Environmental Conservation

The choice of zone under the standard instrument is a matter for consideration in the context of any proposed new 'standard instrument' LEP for the City as a whole.

5.2 Amendment to Lake Macquarie Development Control Plan

The master plan proposes a broad range of employment generating development for the site. Part of the site is proposed for light industrial purposes with remaining areas of employment land being for a mix of uses that could include high tech industries and a higher component of commercial uses. Council has advised that additional specific controls are to be required for these areas. Residential development is proposed on the foothills of Munibung Hill. This form of residential development requires sensitive design having regard to slope, visibility, access and bushfire management. More detailed controls of these areas are being prepared and will be submitted at a later date. The controls will form a chapter in Council's existing DCP.

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6. STATE, REGIONAL AND LOCAL PLANNING POLICY CONTEXT

6.1 Environmental Planning Instruments and Directions

6.1.1 State Environmental Planning Policies

The following is a summary assessment of the Master Plan development in light of existing State Environmental Planning Policies.

Policy No.	State Environmental Planning Policy	Complying	Inconsistent	N/A
SEPP No. 1	Development Standards	√		
SEPP No. 4	Development without consent	√		
SEPP No. 6	Number of Storeys	√		
SEPP No. 14	Coastal Wetlands			√
SEPP No. 15	Rural Landsharing Communities			√
SEPP No. 19	Bushland in Urban Areas	√		
SEPP No. 22	Shops and Commercial Premises			√
SEPP No. 26	Littoral Rainforests			√
SEPP No. 29	Western Sydney Recreational Area			√
SEPP No. 30	Intensive Agriculture			√
SEPP No. 32	Urban Consolidation (Redevelopment of Urban Land)	√		
SEPP No. 33	Hazardous and Offensive Development	√		
SEPP No. 36	Manufactured Home Estates	√		
SEPP No. 39	Spit Island Bird Habitat			√
SEPP No. 41	Casino Entertainment Complex			√
SEPP No. 44	Koala Habitat Protection	√		
SEPP No. 47	Moore Park Showground			√
SEPP No. 50	Canal Estate Development			√
SEPP No. 52	Farm Dams & other works in land & water management plan areas			√
SEPP No. 53	Metropolitan Residential Development	√		
SEPP No. 55	Remediation of Land	√		
SEPP No.59	Central Western Sydney Economic and Employment			√

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Policy No.	State Environmental Planning Policy	Complying	Inconsistent	N/A
	Area			
SEPP No. 60	Exempt and Complying Development			√
SEPP No. 62	Sustainable Aquaculture			√
SEPP No. 64	Advertising and Signage	√		
SEPP No. 65	Design Quality of Residential Flat Design	√		
SEPP No. 70	Affordable Housing (Revised Schemes)			√
SEPP No. 71	Coastal Protection			√
SEPP (Building Sustainability Index: BASIX) 2004		√		
SEPP (Infrastructure) 2007		√		
SEPP (Housing for Seniors) 2004		√		
SEPP (Major Development) 2005		√		
SEPP (Temporary Structures and POPE) 2007		√		
SEPP (Exempt and Complying Development Codes) 2008		√		
SEPP (Western Sydney Parklands) 2009				√
SEPP (Rural Lands) 2008		√		
SEPP (Kosciuszko National Park - Alpine Resorts) 2007				√
SEPP (Mining, Petroleum Production and Extractive Industries) 2007				√
SEPP (Sydney Region Growth Centres) 2006				√
SEPP (Affordable Rental Housing) 2009		√		

On the basis of the above table, the Master Plan is consistent with State Environmental Planning Policies where relevant.

6.1.2 Lake Macquarie Local Environmental Plan 2004

The Lake Macquarie LEP 2004 does not contain any specific provisions relating to the preparation of a Master Plan for the site. An assessment of the Master Plan against the general objective of the LEP 2004 is contained below, together with comment thereon.

Objective	Comment
<p><i>The objective of this plan is to achieve development of land to which this plan applies that is in accordance with the principles of ecologically sustainable development by:</i></p> <p><i>(a) promoting balanced development of that land, and</i></p> <p><i>(b) implementing the Lifestyle 2020 Strategy adopted by the Council on 27 March 2000.</i></p>	<p>The proposed Master Plan promotes the balanced development of land in the locality with takes into account the principles of ecologically sustainable development and observes the aims and objectives of the Lake Macquarie Lifestyle 2020 Strategy (see Section 6.2 below).</p>

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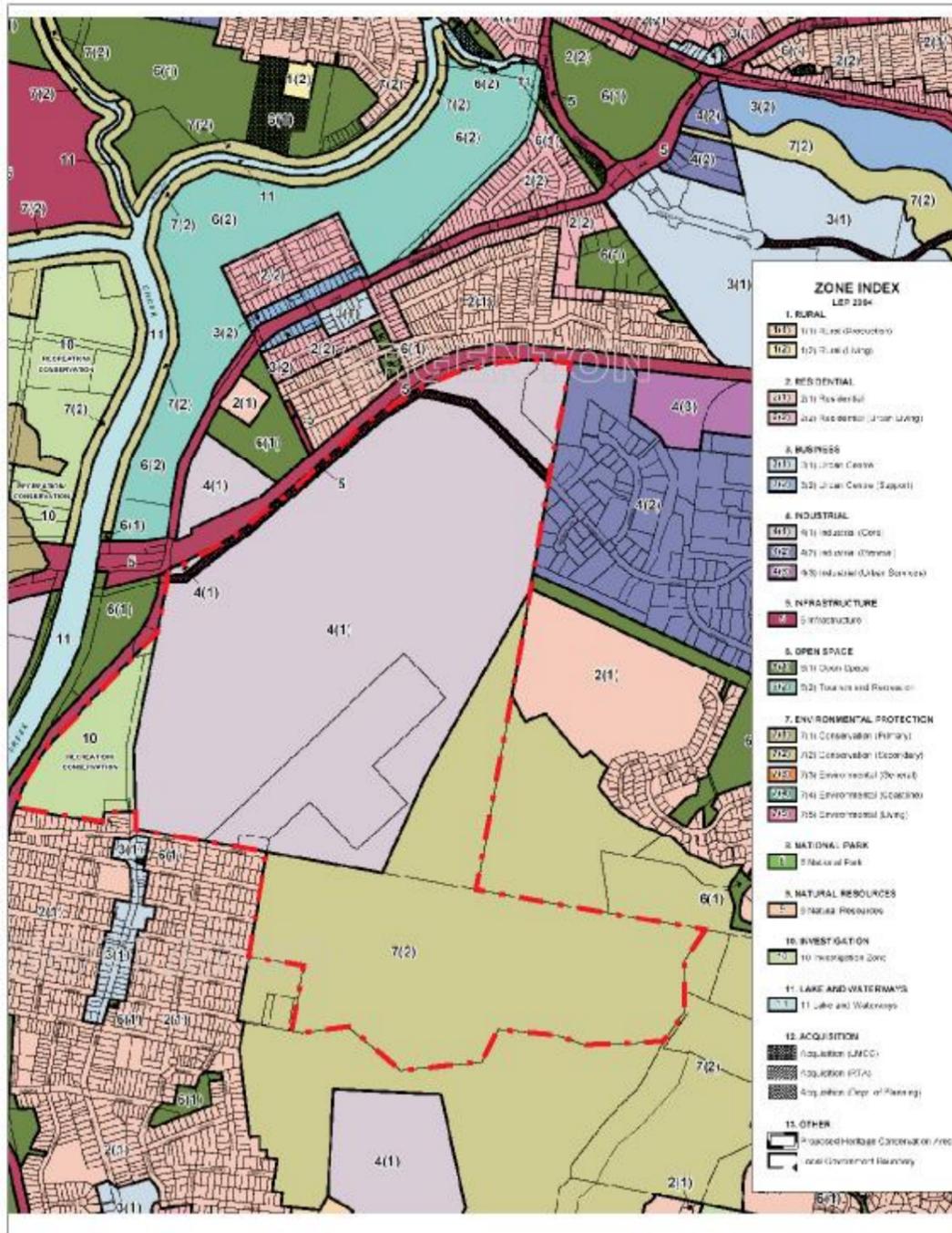


Figure 3

The site is presently within the following land use zones under the LEP (Figure 3):

- Zone 10 Investigation Zone (Triangular Paddock);
- Zone 4(1) Industrial (Core) applying to most of the site with the exception of an area above Incitec and the south eastern part of the site leading up to Munibung Hill;
- Zone 7(2) Conservation (Secondary) applying to an area above Incitec and the south eastern part of the site leading up to Munibung Hill.

The proposed zones for the site are discussed in Section 5. These zones are considered to be consistent with the zoning of land generally in the area and are considered to be more compatible with the zoning of adjoining land than the present heavy industrial zone.

6.1.3 Development Control Plans

The Master Plan can guide the development of an area plan for the site for inclusion into Lake Macquarie Local Environmental Plan 2004, the Lake Macquarie Development Control Plan No. 1 ("DCP No. 1"). DCP No.1 does not contain any specific requirements for master plans. While this may be the case, an assessment of the proposed Master Plan against the general objectives of DCP No. 1 is provided below.

Objectives	Comment
<p><i>To implement the Lifestyle 2020 Strategy by facilitating ecologically sustainable development.</i></p> <p><i>To support the core values of the Lifestyle 2020 Strategy by having the following objectives:</i></p> <ul style="list-style-type: none"> • <i>Promote environmentally sustainable and quality development in the City;</i> • <i>Provide detailed guidance to prospective applicants of Council's requirements for building, subdivision and land development;</i> • <i>Elaborate on the requirements of the Lake Macquarie LEP as a key tool in the LEP's implementation;</i> • <i>Provide detailed criteria to assist Council in assessing Development Applications.</i> 	<p>The Master Plan of the site supports the strategies of the Lake Macquarie Lifestyle 2020 Strategy for ecologically sustainable development.</p> <p>The proposed sustainability and quality of subsequent development envisaged in the Master Plan will be assessed in the context of future development applications to Council.</p> <p>No amendments are proposed to the existing development controls within the Lake Macquarie LEP 2004 or the controls contained in the Lake Macquarie DCP No 1. To this end, the LEP and DCP will provide guidance, elaborate on and provide detailed criteria for future development applications over the site.</p>

6.1.4 Section 117 Directions

The proposed rezoning displays no significant inconsistencies with the relevant Section 117 Directions. Where there are inconsistencies, these are justifiable having regard to the objectives of the directions. An assessment of consistency with these directions is contained in Appendix 21

6.2 Planning Strategies

6.2.1 Lower Hunter Regional Strategy

The NSW government released the Lower Hunter Regional Strategy in October 2006. The primary to sustainably accommodate the projected housing, employment and environmental needs of the Region's population over the next 25 years.

The Regional Strategy reports that the Region's economic base is rapidly diversifying, shifting from reliance on traditional primary and secondary industries to a wide range of service industries. It seeks to ensure an adequate supply of employment land within identified centres and other specialised/industrial lands.

The Regional Strategy places emphasis on employment generation at the existing and emerging centres such as Glendale which is identified in the Regional Strategy as a major emerging centre. Such centres are planned to accommodate 60% of additional jobs to 2031.

The Regional Strategy includes a strategic analysis of the employment and industrial land needs for the Lower Hunter Region. It predicts demand for general purpose industrial land until 2031 to be 825 hectares. The Regional Strategy states that currently there is approximately 500 hectares of vacant industrial land able to meet that need and an additional 1,000 hectares of additional employment land identified through the strategy including land at West Wallsend, Tomago and Black Hill. There is also a large amount of vacant industrial land for 'specialised' purposes, such as heavy industry (Hunter Economic Zone land, 847 hectares) or airport and port-related activities.

This indicates that there is adequate supply of general industrial land within the Region.

In relation to residential development, the Regional Strategy seeks more vibrant regional centres, such as Cardiff/Glendale, with greater population density in and around them. The Strategy facilitates greater opportunities for housing to be provided within the existing urban areas.

The Strategy defines a number of *Sustainability Criteria* to guide decision making on urban settlement in the Lower Hunter. The Strategy requires that any development proposal satisfy these criteria, in addition to the proposal being assessed by the LEP Review Panel and public exhibition.

The following table sets out the *Sustainability Criteria* in the Lower Hunter Regional Strategy, presenting an indicative assessment of the proposed rezoning according to these criteria.

Threshold Sustainability Criteria	Measurable Explanation of Criteria	Assessment of Proposal
<p>1. Infrastructure Provision</p> <p><i>Mechanisms in place to ensure utilities, transport, open space and communication are provided in a timely and efficient way</i></p>	<ul style="list-style-type: none"> • Development is consistent with any regional strategy, sub-regional strategy, State Infrastructure Strategy or section 117 direction • The provision of infrastructure is costed and economically feasible based on Government methodology for determining infrastructure development contributions • Preparedness to enter into developer agreement 	<p>The site is located in an established area with access to utilities transport and a range of open space and community facilities opportunities.</p> <p>Notwithstanding the location within an existing urban area and the current zoning of most of the site for urban purposes or urban investigation purposes, the owner has indicated a preparedness to enter into discussions on a planning agreement in lieu</p>

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Threshold Sustainability Criteria	Measurable Explanation of Criteria	Assessment of Proposal
		of S94 contributions.
<p>2. Access</p> <p><i>Accessible transport options for efficient and sustainable travel between homes, jobs, services and recreation to be existing or provided</i></p>	<ul style="list-style-type: none"> • Accessibility of the area by public transport and/or appropriate road access in terms of: <ul style="list-style-type: none"> - Location/land use – to existing networks and related activity centres. - Network – the area's potential to be serviced by economically efficient transport services. - Catchment – the area's ability to contain, or form part of the larger urban area which contains adequate transport services. Capacity for land use/ transport patterns to make a positive contribution to achievement of travel and vehicle use goals. • No net negative impact on performance of existing subregional road, bus, rail, ferry and freight network. 	<p>The site is in close proximity to a rail line and rail station, the Glendale Regional Centre, an existing neighbourhood centre and bus transport. It has the potential to augment the road network by the provision of a strategic road connection from Munibung Road to TC Frith Drive.</p> <p>There is the opportunity to provide for cyclists and to connect to Council's existing cycleway network in the vicinity of the site.</p>
<p>3. Housing Diversity</p> <p><i>Provide a range of housing choices to ensure a broad population can be housed</i></p>	<ul style="list-style-type: none"> • Contributes to the geographic market spread of housing supply, including any government targets established for aged, disabled or affordable housing. 	<p>The site will provide land for residential development in an accessible location for seniors housing and affordable housing. The range of landscapes provided on the site and its proximity to Boolaroo and Glendale and to Lake Macquarie make the site suitable for a range of dwelling types.</p>
<p>4. Employment Lands</p> <p><i>Provide regional/local employment opportunities to support the Lower Hunter's expanding role in the wider regional and NSW economies</i></p>	<ul style="list-style-type: none"> • Maintain or improve the existing level of subregional employment self-containment • Meets subregional employment projections • Employment related land is provided in appropriately zoned areas 	<p>The site has the potential to provide additional employment opportunities in industries for which there is a demand for land. Existing heavy industrial zoning will be replaced by new employment land controls ensuring the jobs lost through the closure of the smelter operations will be replaced.</p>
<p>5. Avoidance of Risk</p> <p><i>Land use conflicts and risk to human health and life avoided</i></p>	<ul style="list-style-type: none"> • No residential development within 1:100 floodplain • Avoidance of physically constrained land eg high slope or highly erodible. • Avoidance of land use conflicts with adjacent existing or future land use as planned under relevant subregional or regional strategy. • Where relevant, available safe evacuation route (flood and bushfire) 	<p>The site is currently being remediated and the owners have prepared a Lead Abatement Strategy. This will significantly reduce the risks from previous land uses.</p> <p>Detailed consideration has been given to the capability of the site for urban development including land stability and slope and development is restricted to those areas suitable for development.</p>
<p>6. Natural Resources</p> <p><i>Natural resource limits not exceeded/environmental footprint minimised</i></p>	<ul style="list-style-type: none"> • Demand for water within infrastructure capacity to supply water and does not place unacceptable pressure on environmental flows • Demonstrates most efficient/suitable use of land: <ul style="list-style-type: none"> - Avoids identified significant agricultural land - Avoids productive resource lands – extractive industries, coal, gas and other mining and quarrying • Demand for energy does not place 	<p>The site is located in an established urban area and is currently provided with utility services capable of sustaining the previous heavy industrial uses on the site. The site is a typical brownfields site capable of making a significant contribution to the orderly and economic use of land in the Lower Hunter.</p>

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Threshold Sustainability Criteria	Measurable Explanation of Criteria	Assessment of Proposal
	unacceptable pressure on infrastructure capacity to supply energy – requires demonstration of efficient and sustainable supply solution.	
7. Environmental Protection <i>Protect and enhance biodiversity, air quality, heritage and waterway health</i>	<ul style="list-style-type: none"> • Consistent with Government approved Regional Conservation Plan (if available) • Maintains or improves areas of regionally significant terrestrial and aquatic biodiversity (as mapped and agreed by DEC) • Maintain or improve existing environmental condition for air quality • Maintain or improve existing environmental condition for water quality • Protects areas of Aboriginal cultural heritage value 	<p>Detailed consideration has been given to protecting the environmental and scenic qualities of Munibung Hill which has regional scenic qualities. Provision has been made for the protection of species of Inopina within a proposed park reserve and for environmental corridors.</p> <p>Air quality in the area has improved and continues to improve with the on-going remediation activities.</p> <p>The remediation of the site has made a positive contribution to the environmental qualities of the locality.</p>
8. Quality and Equity in Services <i>Quality health, education, legal, recreational, cultural and community development and other Government services are accessible</i>	<ul style="list-style-type: none"> • Available and accessible services: <ul style="list-style-type: none"> - Do adequate services exist? - Are they at capacity or is some capacity available - Has Government planned and budgeted for further service provision? - Developer funding for required service upgrade/access is available. 	<p>The site is located in an established urban area in close proximity to existing services. The site is close to the Glendale regional centre which will be a focus for further investment in commercial and community infrastructure.</p>

The rezoning of the site to allow a mix of employment and residential uses is totally consistent with the Lower Hunter Regional Strategy.

6.2.2 Lake Macquarie Lifestyle 2020 Strategy

The Lifestyle 2020 Strategy provides strategic direction, visions and values for land use activities, environmental conditions and economic and social growth in Lake Macquarie. As part of the Lifestyle 2020 Strategy, a series of broad planning maps have been created to guide future urban centre, transport and open space development. The following Lifestyle 2020 Strategy initiatives are of relevance to the proposed rezoning:

- The Glendale/Cardiff area is proposed to be transformed into a sub-regional centre by the introduction of town centre improvements, greater residential densities and landmark commercial buildings;
- Boolaroo and Speers Point town centres are identified as remaining as neighbourhood urban centres;
- A road between the Cardiff Industrial Area and the intersection of Frith Avenue/Main Road via the extension of the existing Munibung Road is regarded as being a “critical road link”;
- A new railway station to the north of the Pasmenco site in Argenton is planned; and

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- The western ridges of Munibung Hill are nominated as containing “high value habitat”.

The proposed rezoning is consistent with the overall aims and strategic directions of the strategy in that:

- it responds to the environment by not affecting significant natural environments, rezoning land suitable for development, providing for the management of potential acid sulphate soils and promoting the efficient use of available and suitable land for urban purposes;
- it contributes to a well serviced and equitable city by providing land in an accessible location that is part of an existing community, focuses activity in an existing centre, facilitates land for housing and employment generating uses and ensures the provision of infrastructure;
- it contributes to a well designed and liveable city by protecting scenic amenity, provides housing choice, enhances the existing centre at Boolaroo and encourages additional residential development in a highly accessible location;
- it contributes to an easily accessible city by providing land for residential and employment generating purposes in a location close to public transport, the arterial road network and neighbourhood and subregional centres and by facilitating walking and cycling;
- it is consistent with the Urban Structure Map which shows the site as “Urban Area” (non industrial).
- it maintains the efficiency of operation of the arterial road network by restricting access to TC Frith Avenue and supports the increased use of non-car based transport modes such as rail public transport, walking and cycling.
- it does not affect any land identified as important on the Green System Map.

It is considered that the rezoning is consistent with and supports the strategies in the Lifestyle 2020 Strategy.

6.2.3 Draft Pasmenco Munibung Hill Land Use Strategy

In August 2004, Lake Macquarie Council appointed Dickson Rothschild and URS to prepare a land use strategy for the Glendale State Rail Authority Land, the PCCS site, the southern slopes of Munibung Hill and parts of Boolaroo. As a result a series of reports were prepared, one of which was the Pasmenco Munibung Hill Draft Land Use Strategy. On 21 November 2005, Council’s Strategy Committee reviewed a report by planning consultants regarding the Dickson Rothschild / URS Pasmenco Munibung Hill Strategy. In relation to the level of detail expressed in the land use strategy, the report advised:

“A definitively land use strategy is not possible at this time for the Pasmenco site due to uncertainties regarding the future of Incitec-Pivot, the proposed extent and form of the A1 Cell providing a solution for containment of contaminated materials on the site, and the details of the site remediation strategy yet to be agreed with Department of Environment and Conservation.

A more valid strategic land use approach is to establish a set of guiding principles with which Council can determine future rezoning and development applications for the sites. These principles.....would provide direction to Council in dealing with applications for rezoning or development, and guide the proponents in the preparation of such applications, while allowing flexibility in the determination of eventual land uses for the sites.”

Lake Macquarie Council at its meeting of 28 November 2005 resolved to:

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- (a) adopt the land use principles developed by the planning consultants to guide future rezoning and development applications; and
- (b) note the Pasminco Munibung Hill Draft Land Use Strategy prepared by Dickson Rothschild / URS as a background report outlining constraints, opportunities and broad land use principles for the Pasminco site.

The adopted Land Use Principles diagram provides guidance on the preparation of rezoning and development applications for the PCCS and adjoining lands and the consideration of these applications by Council. It indicates Council's strategic planning intentions for this area which can be progressed further by the preparation and lodgement of development applications and rezoning applications.

In adopting this strategy, Council has identified the suitability of the site for a range of land uses including a mix of light industry, business park, institutional, mixed use development and residential uses.

The broad land use principles which have been developed for the site which have direct relevance to this Master Plan are identified below, together with comment thereon.

Principle	Comment
<i>Promote vehicle and/or pedestrian access between Boolaroo and the site;</i>	The Master Plan identifies how the site may be developed to provide pedestrian and vehicle access between Boolaroo and the PCCS site. The development concept builds on the existing structure of Boolaroo and reflects to potential of this area for greater intensity of development following the closure of Pasminco and Incitec plants.
<i>Extend Boolaroo Commercial Area along Main Road with mixed-use development.</i>	The Master Plan does not preclude the development of commercial and/or mixed use development along the eastern side of Main Road. This change is reflected in the Stage 1 rezoning.
<i>Maintain and enhance a riparian corridor along existing stormwater drainage lines along the southern boundary of PCCS.</i>	The southern most portion of the site is required for stormwater conveyance. The land will be maintained as a drainage channel with some crossings and integrated into the open space system.
<i>Within the PCCS site, promote a mix of light industry, business park, institutional, mixed-use development and residential uses, subject to resolution of the future of Incitec-Pivot operations and Pasminco RAP.</i>	The rezoning of the site will form part of an overall mixed use development of the site.
<i>Development within the Triangular Paddock to face Main Road (T.C. Frith Avenue), have no vehicle access from Main Road and access from internal roads.</i>	This is a matter for consideration in the area plan or DCP for the site and for subsequent development applications.

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Principle	Comment
<i>Provide noise buffer to Main Road/T.C. Frith Avenue and restrict vehicle access to/from Main Road.</i>	Acoustic advice received from Vipac Engineers has indicated the need for noise buffers and other mitigation along T.C. Frith Avenue and Main Road in Boolaroo. Mitigation includes a combination of physical separation, noise barriers, building orientation and building materials choice. Council has indicated a preference for measures to be incorporated into building design and does not support noise barrier walls. As above, all internal access to the site will come from minor roads from Main Road or an extended Munibung Road.
<i>Retain or interpret rail spur line subject to allocation of future land uses</i>	The railway spur line is reflected in the proposed structure of the site. It forms the boundary to the containment cell and is partly the location of a collector road through the site connecting with Macquarie Hills.
<i>Maintain and enhance environmental corridor from Munibung Hill to Kindyerra Park and Cockle Creek.</i>	This link is provided, although in a slightly different location resulting from the more detailed consideration of the site and its features. The containment cells for Incitec and Pasmenco and associated drainage corridors to the north west through the Railway Employment Zone provides the opportunity for a stronger environmental corridor connection to Kindyerra Park and Cockle Creek.
<i>Future land use over A1 cell to be resolved when form and extent of cell is agreed.</i>	The design of the cell is progressing and can accommodate access to the top of the cell for passive recreational purposes. Access for maintenance vehicles will be provided to the top of the cell although it is not envisaged that parking areas and public vehicular access would be provided. Pedestrian and cycle access is envisaged with parking areas at the base of the cell. As discussed in Section 4, the ultimate use of the containment cells will depend to some extent on the final form of the cells which is not known at this stage. The master plan recognises the potential of the cells for recreation and environmental corridor purposes which is consistent with the principles.
<i>Road to link Macquarie Hills with new internal roads. Provide public transport link Cardiff Industrial Estate and Boolaroo.</i>	The master plan and zoning are consistent with this principle in that a connection is proposed to Macquarie Hills at the location identified by Council in its approval of the Macquarie Hills subdivision. A bus link is accommodated.
<i>Advanced planting to protect and enhance ridgeline. No buildings on ridgeline.</i>	This can occur via a management plan for land to be managed by the Council in the longer term. The significant ridgelines have been protected from development.
<i>Upper limit of development in foothills determined by geotechnical constraints, maximum slope of 20% slope and visual assessment.</i>	Geotechnical investigations and visual impact assessments have been undertaken to determine the land capable of development. Generally land with a slope above 25% has been excluded from development in most cases except where the steeper land is an isolated occurrence. It is noted that Council's DCP generally excludes residential development on land with a slope greater than 25%. The geotechnical investigations considered slope in addition to geology and soil characteristics. These investigations conform that land generally below 25% slope is suitable for residential development subject to standard controls over development on such land. In some minor instances the rear of larger lots may contain land with a slope greater than 25% although with adequate provision for dwelling sites and access at acceptable grades.

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Principle	Comment
<i>Future development in foothills subject to design controls to minimise visual impacts and maintain scenic qualities of Munibung Hill</i>	Detailed assessment has been made of the visual impacts of development. Specific controls will be developed in the area plan to provide controls on the form of residential development in the foothills.
<i>Extent of development off First and Second Streets subject to closure of Incitec and visual assessment.</i>	Incitec has announced it will close. Consequently Council can proceed to consider residential development in this area.
<i>Extend Munibung Road to from Cardiff Industrial Estate to intersect with Main Road.</i>	The Master Plan provides this link for Council.

The Land Use Principles diagram provides guidance on the preparation of rezoning applications for the site and adjoining lands and the consideration of these applications by Council. It indicates Council's strategic planning intention for this area which can be progressed further by the preparation and lodgement of development applications and rezoning applications.

The Department of Planning attended a stakeholder workshop on the Land Use Strategy and was given the opportunity to comment.

The proposed rezoning is generally consistent with these principles.

6.2.4 Lake Macquarie Scenic Quality Guidelines

The Scenic Quality Guidelines were adopted by Lake Macquarie Council in September 2003 and relate to strategies and land use controls for areas and items of scenic and landscape value. The only landform in proximity to the site that is nominated as a significant visual feature is Munibung Hill. Munibung Hill is identified as being a feature within a Very High Scenic Management Zone, however, the Main Entry Precinct is located adjacent to a category "C" (Moderate) Scenic Management Zone and is located in the lower foothills of Munibung Hill in an area of low elevation. The highest point on the Main Entry Precinct extends to RL 29m AHD, an elevation significantly less than the Main Northern Railway to the north and industrial land uses in the north-east. No significant adverse visual impacts associated with future development of the Main Entry Precinct are considered likely on the basis of the elevation of the site relative to adjoining lands.

7. IMPLICATIONS OF DEVELOPMENT CONCEPT

7.1 Characteristics of the Population and Community Facility Needs

7.1.1 Characteristics of Incoming Population

A description of the likely characteristics of the future population has been prepared to assist in the process of planning for the provision of facilities to the future residents. The age and household characteristics of the new population will be a reflection of:

- § The size, type and style of housing to be provided, and its cost;
- § The appeal of the area to different sections of the population;
- § The proximity to community facilities and infrastructure.

Based on the housing projections, it is estimated that the site could house up to 2,000 additional residents, based on an average occupancy rate of 2.5 persons per dwelling. However it acknowledged that this will likely be the upper limit, with household occupancy likely to decrease over time, in line with national trends.

General population projections for the area suggest that there will be a higher proportion of young families moving to the area, to benefit from the lifestyle available in the area and the affordability and proximity to employment opportunities. However as the development matures it is likely that there will be an increase in the older population moving in, particularly if the proposed varied range of dwelling types is offered.

Based on an indicative dwelling yield¹² proposed for the site, some estimates as to the likely household and family types have been made, as shown in Table 7-1 below. It has been assumed that the incoming population will be proportionally similar to the existing Boolaroo suburb. However it is unlikely that the relatively high proportion of lone person households will be achieved during the initial stages of development. Thus it is anticipated that there will be a slightly higher number of couples with children and single parent families, particularly in the short term, shifting to a pattern similar to that shown below in the medium to long term.

¹² Yield is subject to change and is approximate only.

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Table 7-1: Housing Typology and Household Structure in Lake Macquarie and Boolaroo in 2006

	Lake Macquarie LGA	Boolaroo suburb	Site	
	ABS 2006 %	ABS 2006 %	Est. %	No.
Dwelling Type				772
Separate house	87.2	94.7	60.4	466
Semi-detached/townhouses	6.9	0	35.1	271
Flat, unit or apartment	4.5	4.5	4.5	35
Family Types				1,260
Couple family with children	43.6	34.8	34.8	439
Couple family with no children	38.4	34.8	34.8	439
One parent family	16.8	28.5	28.5	359
Other families	1.1	1.9	1.9	24
Household Types				1,930
Family Households	72.8	65.3	65.3	1,260
Lone Person Households	22.4	30.1	30.1	581
Group Households	2.1	4.3	4.3	83

Source: ABS 2006 Census of Population and Housing, BBC Consulting Planners estimates.

Smaller lots, and the mix of medium density dwellings are more attractive to older people, both couples and single persons, offering a more affordable and more manageable housing option than larger detached dwellings. The convenience and accessibility of the site to Glendale and the availability of local services in Boolaroo will likely prove attractive to young families.

As a consequence of the proposed dwelling mix discussed above, it is likely that the site will attract:

- A higher proportion of young families with children than is currently the case in Boolaroo;
- A similar proportion of working age couples without children to existing Boolaroo; and
- Higher proportion of single parent families and aged persons that would be typically expected in new release areas.

On this basis, the likely age profile of the future population of the site has been estimated in Table 7-2 below, to provide an approximate indicator for planning purposes of the numbers of people in each age cohort to be expected in the area approximately five years post occupancy when household structures have become established.

These projections should be taken as indicative only as they are not related to any specific housing product or developer intention.

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Table 7-2: Projected Age Profile

Age Cohort	Boolaroo 2006		Lake Macquarie LGA 2006		Site Projections *		Lake Macquarie LGA 2016		LGA projected population (Council) 2004-2009	
	Count	%	Count	%	Count	%	Count	%	Count	%
0-4	41	4.3%	10,668	5.8%	154	8.0%	10,180	5.0%	646	7.1%
5-14	125	13.1%	25,205	13.8%	290	15.0%	23,570	11.6%	1377	15.2%
15-19	67	7.0%	12,879	7.0%	116	6.0%	12,850	6.3%	640	7.1%
20-24	77	8.1%	10,278	5.6%	97	5.0%	11,400	5.6%	569	6.3%
25-39	171	17.9%	31,325	17.1%	405	21.0%	34,650	17.0%	1880	20.8%
40-54	194	20.3%	39,065	21.3%	425	22.0%	40,270	19.7%	1876	20.7%
55-64	119	12.5%	22,967	12.5%	212	11.0%	27,990	13.7%	812	9.0%
65+	160	16.8%	30,753	16.8%	232	12.0%	43,090	21.1%	1255	13.9%
Total	954	100%	183,140	100%	1930	100%	204,000	100%	9055	100%

Source: ABS 2006 Census, Department of Planning Population Projections (2005 Release),

* BBC Estimate

7.1.2 Community Needs

The new population projected for the site will require access to a range of services and facilities to meet their social, cultural, recreational, educational, health, transport and shopping needs. These will include:

- § Children's services
- § Health services
- § Neighbourhood community centres/halls
- § Schools and other educational institutions
- § Cultural, entertainment and leisure facilities
- § Shopping and commercial services
- § Open space and recreation facilities
- § Welfare and support services for individuals and families
- § Public transport
- § Places of worship
- § Police and emergency services

As the site is located in an existing urban area and because the population of Boolaroo has been declining, many of the necessary facilities and services are available in the area. Others will be planned and provided by relevant authorities as part of their normal operations.

The extent to which this demand may be met by existing services and facilities in the area, or will give rise to a need for additional services and facilities, is examined in this section. This assessment has drawn on:

- § Lake Macquarie City Council Section 94 Contributions Plan No.1 – Citywide (2004)
- § Lake Macquarie Lifestyle 2020 Strategy
- § Lake Macquarie Social Plan (2005)
- § Department of Education, Demographic Division

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§ Discussions with social planning staff at Lake Macquarie City Council

§ Service providers in the local community

There is no definitive way of assessing what community needs might be in the future. Rather, it is a continual process of analysing existing provision, the changing demography, population projections and assessing demand as perceived by the community and those who provide services to them.

Applying a benchmarking or threshold approach to community facility planning, informed by the existing situation, suggests that the expected residential population would not justify or sustain the provision of any specific community facilities because the expected population is insufficient to support the provision of any such facilities.

In determining the community facility needs of the future residents of the site, the following factors are relevant:

- The physical separation between Boolaroo and Cardiff and Macquarie Hills to the east;
- The proximity to the existing neighbourhood centre of Boolaroo; and
- The proximity of to the broad range of facilities and services in the sub-regional centre of Glendale.

Population growth will generate a demand for additional community facilities and services of the type typically provided by Council, however the development of the site is unlikely to generate sufficient demand for the establishment of any one facility in the community. Instead, a number of needs have been identified including:

- a contribution to the need for additional library floor space and books;
- a need for child care services, recognising the role played by the private sector in the provision of child care services;
- a need for access to multi-purpose community centre space;
- a need for access to youth specific facilities;
- a need for informal meeting places which could be located with a well designed and safe neighbourhood park; and
- a need for community information to welcome new residents and inform them of the services and facilities available in the area.

7.2 Employment Implications

The Master Plan envisaged significant areas of employment land. Council has expressed an intention for the provision of employment land to replace the jobs lost following the closure of the smelter on the site. The Master Plan provides employment capable of accommodating approximately 1,600 jobs which is far in excess of the number required to replace the smelter and Incitec operations.

In addition to the light industrial land uses which would see an expansion of the Cardiff Industrial Estate, it is considered that the site has characteristics making it suitable for a range of other employment opportunities in a mixed use employment context. This site has good access to public transport and to the arterial road network, is close to the emerging regional centre of Glendale and is readily accessible

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to a trained and skilled local workforce. It also has an attractive amenity with the scenic backdrop of Munibung Hill and the rehabilitated containment cells.

Thus employment lands closer to the station and to the open space system have been identified for mixed use employment uses. It is not envisaged that this area would contain uses that would compete with Glendale as a regional retail facility or with Boolaroo as a neighbourhood retail and service centre. Similarly it is not expected that the employment uses would compete with the smaller Argenton village centre. This area would provide employment in a range of industries and commercial operations and bulky good retailing operations.

The site comprises a brownfield renewal area situated along strategic transport routes in close proximity to emerging strategic centres and corridors. The site presents opportunities for economic renewal and housing renewal and intensification. This is totally consistent with the Lower Hunter Regional Strategy.

The employment opportunities on the site will:

- Reinforce and strengthen the role of Glendale as an emerging centre;
- Reinforce and contribute to the development of the Cardiff to Edgeworth renewal corridor;
- Improve the level of employment self containment in Lake Macquarie;
- Reflect the accessibility of the site to public transport and to existing residential areas;
- Be consistent with the strategic planning initiatives of Council and the State government.

The rezoning will have a positive impact on existing centres such as Glendale, Boolaroo and Argenton by:

- Providing additional population growth to support and sustain retail and community facility functions in existing centres;
- Provide additional residential development in the primary trade catchment of Glendale;
- Provide additional employment opportunities in areas that would complement the commercial opportunities in the emerging regional centre and for commercial and support services in existing centres;
- Improving local accessibility including a connection from Cardiff and Macquarie Hills to Boolaroo;
- Providing support for further investment in public transport;
- Providing opportunities for additional community facilities and support for existing facilities such as schools.

It is considered that impacts on existing centres can be minimised by planning controls that limits retailing in residential areas and industrial areas to those uses permissible under the current LEP zones to be applied to the site which includes convenience retailing. The clear intention of the master plan is to reinforce rather than compete with existing centres.

7.3 Access and Traffic

The Traffic Impact Assessment prepared by Traffix (Appendix 17) to accompany the Master Plan has assessed the access and traffic impacts of development of the site in light of the findings of previous investigations and discussions with the RTA and Council.

Traffic generated by the development has been considered in the development of the road network in the area and in particular in the investigations relating to the construction of the Munibung Road extension to TC Frith Avenue. These investigations have found in summary that:

Bunderra Stage 2 Local Environmental Study

- The road hierarchy underpinning the LES responds to the views of the RTA for the possibility of staging access onto TC Frith Avenue;
- The proposed intersection of Munibung Road with TC Frith Avenue is located about 270 metres south of the railway overbridge. This enables the development of industrial land to occur as heavy industrial traffic is removed from the Boolaroo township to the maximum extent practicable. Satisfactory access to TC Frith Avenue to/from the north is nevertheless maintained through the provision of a reasonably direct route via Main Road (diverted as proposed) and Munibung Road. This intersection is capable of accommodating traffic from Munibung Road and the entire development of the Bunderra site.
- The intersection of Munibung Road with TC Frith Avenue has been analysed to determine its required geometry based on the need to accommodate all traffic associated with the full development of the PCCS site, as well as traffic associated with general growth in traffic in the region and traffic under the Glendale Draft Urban Structure Plan. This analysis has been based on manual adjustments to the outputs from the RTA's EMME2 computer model as previously provided (for 2016 scenario). The analysis has established that the intersection will operate satisfactorily under either dual lane roundabout control or under traffic signal control. This is consistent with the RTA's separate analysis, although the assumptions underpinning the RTA's modelling have not been provided but are thought not to include the Pennant Street link or the Glendale traffic at full development under the Draft Structure Plan;
- Notwithstanding the above, the intersection with TC Frith will need to accommodate safe pedestrian movements and accordingly, the provision of traffic signal control with pedestrian crossings on all approaches is the preferred form of control;
- There is the potential for a second intersection with TC Frith formed by a relocation of the northern part of Main Road through the Triangular Paddock to form a new intersection approximately 260 metres south of the proposed Munibung Road extension intersection;
- The secondary intersections along the route of Main Road (as diverted) to connect with Munibung Road (three intersections) all operate satisfactorily with single lane roundabout control although this requires more detailed assessment based on the revised road layout, as well as (ideally) a review of more recent RTA regional modelling that should include the Pennant Street link and the Glendale Draft Structure Plan;
- The developed road hierarchy is considered logical and is therefore easily interpreted by drivers. It is recommended that Munibung Road over its entire length as well as the diverted Main Road route between Boolaroo and Munibung Road be accorded collector road status. All other roads are considered local roads;
- Two new links are provided to improve connectivity to the Boolaroo township. The first is a new local road connection onto Second Avenue. This road presently carries about 30 veh/hr during peak periods which is substantially less than the 200 veh/hr environmental goal for a residential street as established by the RTA's Guide to Traffic Generating Developments. This route should therefore be limited to no more than an additional 170 veh/hr, which is equivalent to about 200 dwellings. This threshold is unlikely to be achieved but if necessary, traffic management measures are able to limit use of this corridor to the required extent. The second new connection is via a short link to the "New Residential Link Road" which is an extension of Lake View Street. This route presently carries no traffic at its northern end and moderate traffic further south. Again, use of this route will need to be managed through detailed design, to limit volumes to 200 veh/hr during peak periods. This will also be assisted by the designation of the "New Residential Link Road" as a local road as discussed above. The imposition of a 3 tonne load limit on both roads is also recommended;

Bunderra Stage 2 Local Environmental Study

- There is potential for additional links to Boolaroo. Interconnectivity is encouraged;
- It is evident that “New Residential Link Road” accesses a small industrial precinct at its northern end, on the south-east corner of its intersection with Munibung Road. It is recommended that use of this road by heavy vehicles be limited as far as practicable, with consideration given to a ‘threshold’ treatment adjacent to the southern boundary of this site, to create a gateway into the residential precinct;
- A new road link is provided to Delaware Drive at Macquarie Hills. This is recommended to be constructed as a local road, providing only a local access function;
- It is recommended that Munibung Road, the diverted Main Road route to Munibung Road, “New Residential Link Road” and the connection to Delaware Drive all be designed to accommodate bus services. The use of indented bus bays is not favoured by the Ministry of Transport; and
- It is recommended that detailed design incorporate cycle and pedestrian facilities, in consultation with Council officers.

Having regard for the above, it is concluded that the proposed LES, the Draft LEP and the indicative master plan development are supportable on traffic and transport planning grounds.

7.4 Water Cycle Management

The existing and proposed drainage networks for the site are described in the Master Plan Servicing and Water Management Strategy by Acor Consulting (Appendix 12). The principles of the water management strategy include the following:-

- Prevention of nuisance flooding and provision of habitable development that is safe from flooding;
- Retention and restoration of natural watercourses, riparian vegetation, wetlands and other natural features;
- Ensure that peak runoff volumes do not exceed existing volumes;
- Aim to treat surface runoff as close as possible to the source;
- Aim to recycle and reuse roof runoff and storm water runoff where possible for non-potable purposes;
- Ensure the potential impacts of salinity are managed in the design of all water management measures; and
- Aim to minimum long-term maintenance costs.

Adopting the above principles, the development of the site will have incorporated Water Sensitive Urban Design and ESD principles and comply with relevant BASIX requirements.

7.5 Natural Environment

Studies which accompany this Local Environmental Study have demonstrated that the development of the site will not have any detrimental impact on aspects of the natural environment. To the extent that the future development of the site will finance the remediation of the site, there is a significant overall environmental gain. In this regard, the following reports have been prepared relating to the natural environment:-

Bunderra Stage 2 Local Environmental Study

- *Land Capability Assessment;*
- *Contamination Assessment;*
- *Flora and Fauna Report;*
- *Archaeology and Heritage Assessment;*
- *Visual Assessment; and*
- *Bushfire Hazard Assessment.*

The above reports find that there are no natural constraints to development of the site which cannot be managed. Issues concerning soil conditions, contamination, flora and fauna, archaeology and heritage, existing landscape and bushfire hazard are not impediments to development.

Future urban development will be contained within areas that are currently being remediated because of previous disturbances from industrial activity.

7.6 Land Capability

Extensive investigations have been undertaken into the suitability of the site for development. The drawings contained in Appendix 18 indicate the location of the proposed land use zones reflected in the draft LEP discussed in Section 5 against the background of the key site constraints of land instability. These constraints are discussed in Sections 3.4 and 3.5 and the report contained in Appendix 4.

The drawings in Appendix 18 focus on the sloping land in the eastern and south eastern part of the site and show a potential site layout that considers the nature of the constraints on the land proposed to be zoned for residential development. The Site Constraints Summary Drawing indicates areas with a slope greater than 25% and areas of potential instability.

In some instances potential debris flow paths are included in the land identified for residential zoning. Coffeys Geotechnics have advised that the delineation of the potential debris flow paths in their reports should be considered an approximation based on available data at the time of preparation. This data included detailed desk tops study and field mapping, however no detailed subsurface investigation has been conducted. The existing debris flow path zone boundaries are likely to be relatively conservative. The expectation is that the above works would see a reduction in width of this zone (up to 10m to 20m width) due to the greater confidence of data that a detailed subsurface investigation would provide.

Detailed subsurface investigations can be undertaken at development application stage of development once the size and extent of development layout are finalised. Consequently these areas have been included in the land zoned residential and it is considered that development in these areas will be controlled during the development application process following rezoning.

The indicative layouts of an urban form in these areas have been prepared indicating a possible road and subdivision layout within the identified residential area. These avoid the areas of potential debris flow, the extent of which will be refined during subdivision stage. It is expected that requirements for this analysis will be included in the Area Plan to be prepared for inclusion into the DCP.

The drawings in Appendix 18 also show the land slope including land with a slope greater than 25%. Generally these areas are excluded from the land proposed for a residential zone except in localised instances where minor areas of steeper land reflecting existing batters for buildings or the existing dam will be recontoured as part of the site rehabilitation process. It is noted that Council's DCP generally

Bunderra Stage 2 Local Environmental Study

excludes residential development on land with a slope greater than 25% and recommends selective residential development generally of lower density on lots larger than 450 square metres and of suitable form and construction.

The geotechnical analysis has found that development on the slopes up to 25% should be undertaken in accordance with good hillside construction practice and sound engineering principles.

7.7 Visual Impacts

Site Image Landscape Architects has undertaken a detailed assessment of the potential visual impact of residential development proposals that would likely result from development in accordance with the Master Plan for the site. Their report is contained in Appendix 19 and is summarised below.

Views of the site and to Munibung Hill and ridgelines are available from the surrounding streets and more distant elevated positions. The visibility to the hills is somewhat limited given the geographical and physical barriers. Most notable was the finding that the locations where the ridgeline and hills are visible are a significant distance away, and therefore reducing the impact of development significantly. This is reflected in the photo montages prepared by Virtual Ideas.

Based on the analysis and assessment, it can be summarised that the subject site has a low degree of visibility for both the passing traffic and from surrounding and nearby development.

Distant views of parts of the site are available from Seven Islands Road and the western parts of the lake although these are views from a considerable distance with intervening features breaking the view path. Similarly the site would be visible from the north from arterial roads such as Lake Road as it rises towards the Newcastle Link Road.

It is proposed the development will incorporate appropriate landscape and vegetation to street verges, park areas and other open spaces, thus reducing further visual impact of development, as well as providing vegetated green links to the hill.

The visual impact of the proposed development is important given the significant ridge lines of Munibung Hill and the prominence it has from the west.

The site is located on the lower slopes below the Munibung Hill ranges. The overall setting is framed by the open and thinly vegetated Munibung Hills set between the Pacific Ocean and perched just above Lake Macquarie's northern most confluence.

The main road, TC Frith Avenue, and the Sydney/Newcastle railway line, as well as a golf course and a coal preparation/colliery are located on lower lying lands to the west and northwest along the western boundary to the site.

A small amount of residential land, part of Argenton has views to the ridgeline and is located to the north. Also to the north and east of the site are areas of industrial and commercial land uses, respectively Cardiff and Glendale.

To the south-west the elevated suburb of Teralba has distant views to the Munibung Hill.

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Impact assessment included a detailed computer modelling and rendering analysis of the changes to the view from a number of key vantage points. The landscape design documentation is supported by computer rendering of the landscape setting and built proposals as prepared by Virtual Ideas.

The rendering is a full 3-D computer model that incorporates the landform, road and buildings, existing and proposed vegetation to a high degree of accuracy. This information is combined in a computer photo montage so that the representation is a substantially accurate representation of the expected views to the site after completion.

Five key viewing positions have been selected and give a good basis for the assessment of the likely appearance of the proposed development. These views are:

- Camera Position 02: Macquarie soccer and athletic Park, at the confluence of Cockle Creek, on Creek Reserve Rd, near car park.
- Camera Position 04: Anzac Parade, Teralba residential area.
- Camera Position 10: Bottom of Victoria Street in Argenton, overlooking the railway lines to the site
- Camera Position 14: From Lake Road, Argenton overlooking Kindyerra Park
- Camera Position 18: Main Road, Edgeworth - from elevated point on major road, golf course in foreground

The viewpoints represent the visibility and character of the proposed development from key view points and corridors. Photo locations were chosen in areas where the maximum amount of development could be seen as well as from developed or residential areas and locations of significance.

The Virtual Ideas photomontage renderings demonstrate the presence of the ridgeline as a distant background. The ridgeline from closer key points such as from TC Frith Avenue and the railway line is impeded due to vegetation or foreground elements, or the areas are not elevated enough.

From the review of the computer rendered selected views, which are considered to be representative of external views to the site, the visual impact of the proposed streetscape configuration and residential form is considered to be minor, and well within an acceptable range in the context of the surrounds and locality character.

Moreover, the potential for mature trees and landscaping in open space, streets and gardens will further reduce the potential for visual impact from future residential buildings and roads.

Site Image concludes that the study has demonstrated that the proposed residential development of the subject areas of the site will be within a minor and therefore an acceptable range of visual impact.

8. CONCLUSION

It is considered that the proposed rezoning is justified on the following grounds:

- **The proposal is consistent with the provisions of the Strategic Land Use Plans**

Lifestyle 2020 Strategy indicates the site partially as “Urban Area” (Triangular Paddock) and “Non Centre Based Employment Land” (part of the main site). The Master Plan is consistent with the aims and strategies contained in Lifestyle 2020 Strategy.

The proposed residential and additional employment uses are consistent with the Lower Hunter Regional Strategy and Pasmenco Munibung Hill Land Use Strategy as adopted by the Council. Development would allow an underutilised site within an existing urban area to be developed for uses appropriate for its location in the vicinity of existing residential areas and the Glendale major regional centre.

The development in accordance with the Master Plan would be generally consistent with S117 Directions and with the provisions of relevant SEPPs and REPs. In particular the development of the site for a variety of residential purposes in close proximity to public transport is consistent with the policies and guidelines associated with Draft SEPP No 66 Integrating Land Use and Transport.

- **The site is suitable for urban development**

The site is presently disused and partially undeveloped land, a considerable amount of which is zoned for heavy industry. Accordingly, a suitable and more efficient use of the land is sought. Investigations will confirm that the site is suitable, or can be made suitable following remediation, for a range of urban uses for the following reasons:

- It has all the physical characteristics making it suitable for urban development. It is relatively flat, devoid of significant vegetation and is capable of being serviced;
- It is within walking distance of Cockle Creek Station, providing a potentially high level of public transport access and supporting higher residential densities on the site;
- The development of the site will provide the opportunity for improved pedestrian access from Boolaroo to the station;
- All urban services are available or can be readily extended to meet the needs of the development;
- There is good access to the regional road network and to the subregional centre at Glendale;
- It is in close proximity to the existing neighbourhood retail centre and community and recreational facilities and supports further reducing car dependency and providing the opportunity to support existing community networks;
- It is in close proximity to major recreational facilities such as Glendale, Lake Macquarie and the future open space corridor along Cockle Creek.

A residential zoning allows the site to be developed as a logical extension of Boolaroo reinforcing and consolidating this neighbourhood and providing the opportunity for the revitalisation of the township and an increase in population. Residential development will complement the existing township, relate well to the proposed open space corridor along Cockle Creek to the west of the site and support increased public transport utilisation.

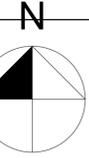
Bunderra Stage 2 Local Environmental Study

Employment uses closer to the railway line and on the flatter land in the vicinity of the proposed containment cell will meet the objectives of Council in providing jobs on the site in accordance with need and to provide employment opportunities in a range of new industries.

- **Development is not likely to have significant environmental, social or economic impacts**
There will be no significant adverse effects of the development in accordance with the Master Plan for primarily residential and employment purposes.
- **A rezoning facilitates the orderly and efficient use of land**
The site is well located in an existing urban environment and is vacant/disused and capable of being serviced. A rezoning based on the Indicative Development Concept (Master Plan) will facilitate the remediation and more efficient use of the land for a productive purpose in a manner that has no significant impacts on the environment.

INDICATIVE MASTER PLAN

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LEGEND:



A	31.03.08	Approval
B	13.05.08	Information
C	03.06.08	Approval
D	05.08.09	Approval
E	06.08.09	Approval

No.	DATE	REVISION / ISSUE DETAILS
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PROJECT
**Pasminco Cockle Creek Smelter Site
 Cockle Creek, NSW**

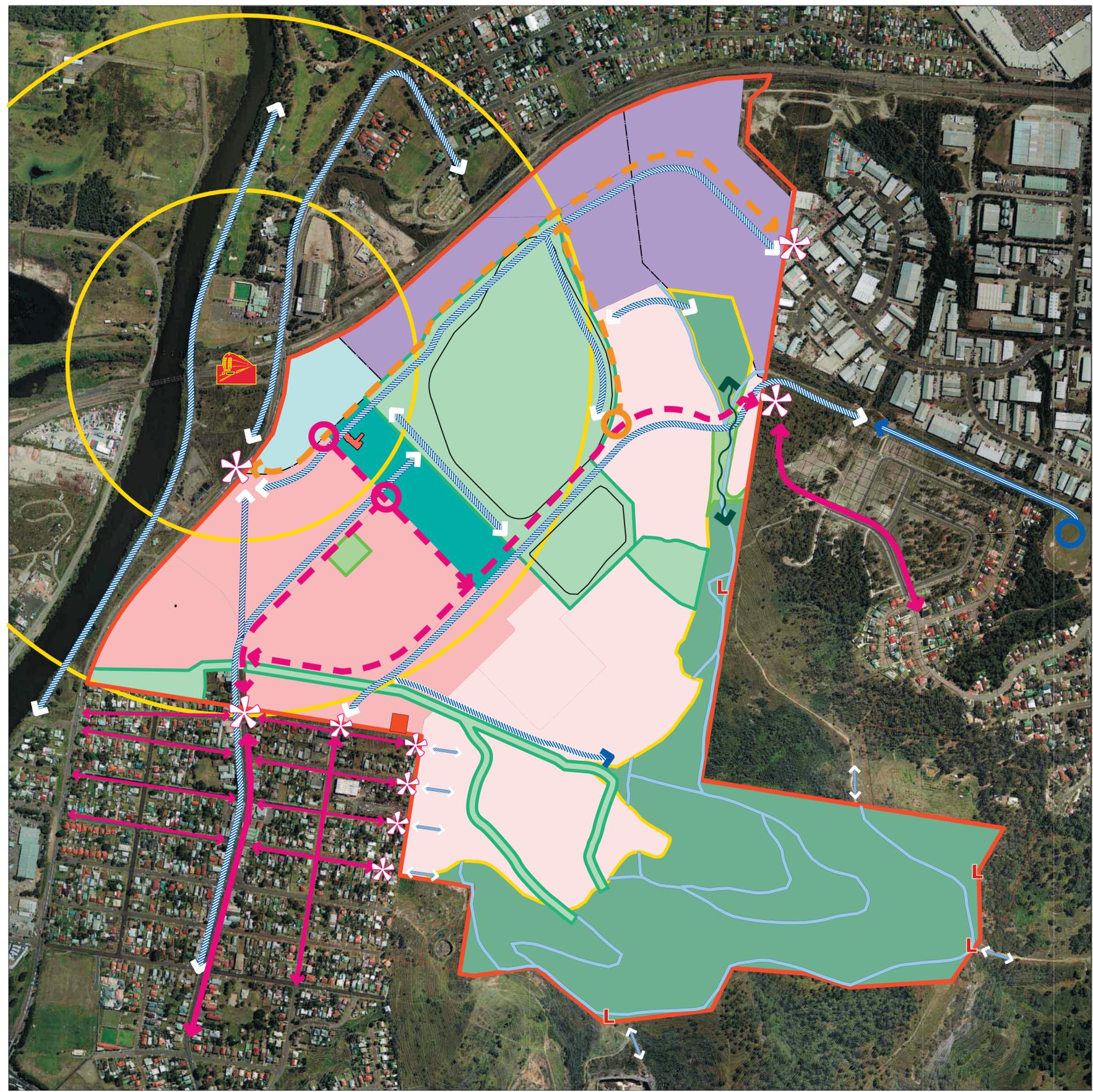
DRAWING TITLE
Concept Masterplan

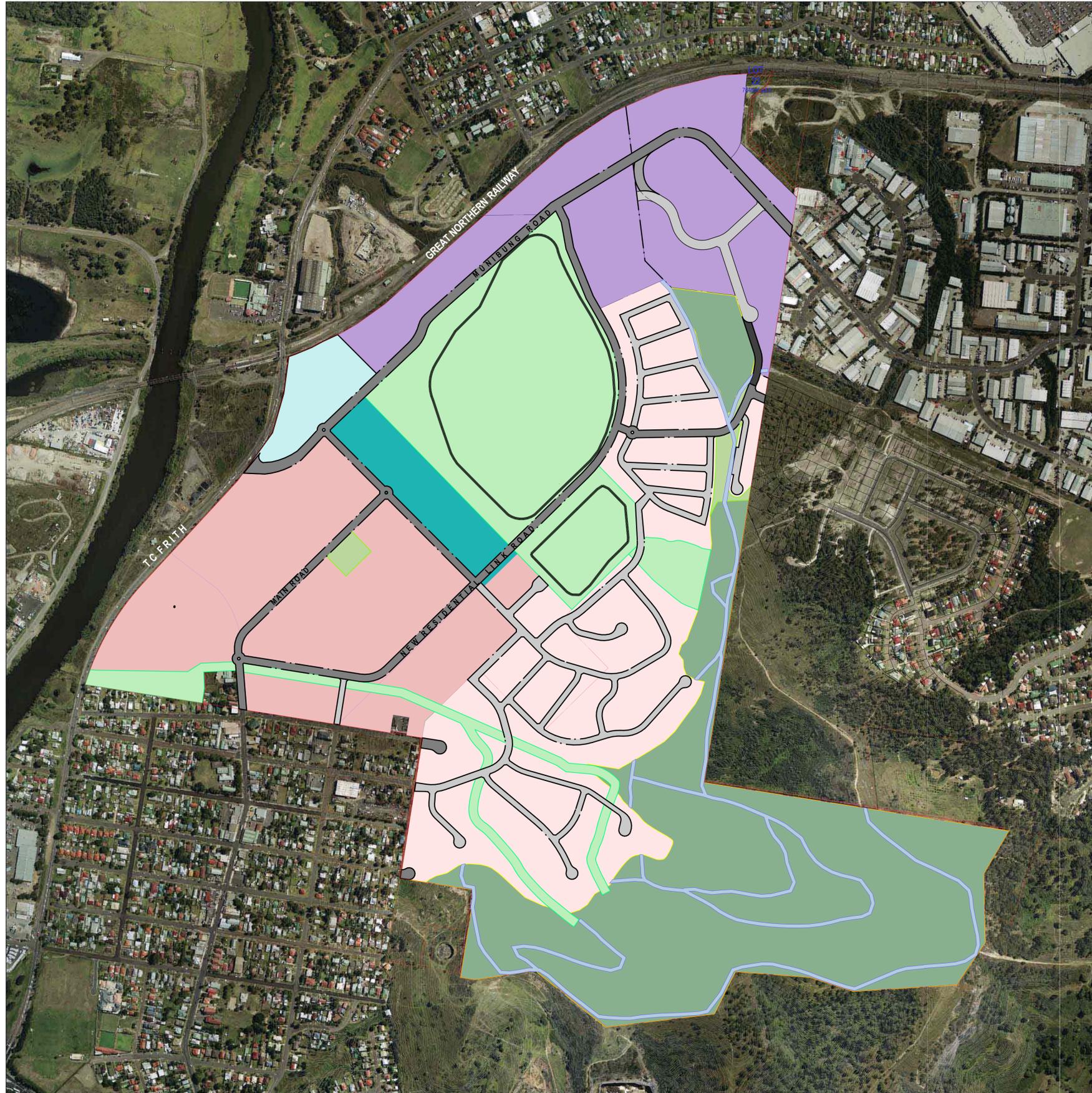
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 DRAWN BY: @A1
 PLOT DATE: 6/08/2009
 CHECKED: QA

PROJECT NUMBER: 05055
 DRAWING NUMBER: DA-01
 ISSUE: E

MASTERPLAN PRINCIPLES LEGEND

- Residential
- Residential (Urban Living)
- Light Industrial
- Mixed use / Redevelopment
- Urban Centre
- Containment Cells & Riparian links
- Munibung Hill Reserve & Angophora Inopinata reserve
- Parks
- Fire trails (pedestrian connectivity)
- Proposed Road Intersection
- Proposed Industrial Main Road /Link
- Proposed Residential Main Road /Link
- Potential Pedestrian / Cycleway Link
- Existing Pedestrian / Cycleway Link
- Proposed Ridge Vegetation Regeneration link
- Cockle Creek Train Station
- Major Site Access / Egress Points





ROAD NETWORK CONCEPT LEGEND

- Residential
- Residential (Urban Living)
- Light Industrial
- Mixed use / Redevelopment
- Urban Centre
- Containment Cells & Riparian links
- Munibung Hill Reserve & Angophora Inopina reserve
- Parks
- Primary Roads
- Secondary Roads (Indicative only)
- Temporary bus connection road
- Fire trails (pedestrian connectivity)

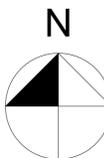
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P1	14.08.08	Information
C	05.08.09	Approval
D	06.08.09	Approval

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PROJECT:
**Pasmenco Cackle Creek Smelter Site
Cackle Creek, NSW**

DRAWING TITLE:
Road Network Masterplan

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PROJECT NUMBER:	DRAWING NUMBER:	ISSUE:
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DRAWINGS



Reference: 2007 Google Map data Mapdata Sciences Pty Ltd, PSMA

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LEGEND:

 N

 PASMINCO AND INCITEC SITE

P	10.09.07	Preparation
R1	10.10.07	Preparation
A	02.11.07	Finalisation
B	12.11.07	Finalisation
C	14.11.07	Finalisation
D	14.05.08	Approval
E	05.08.08	Approval

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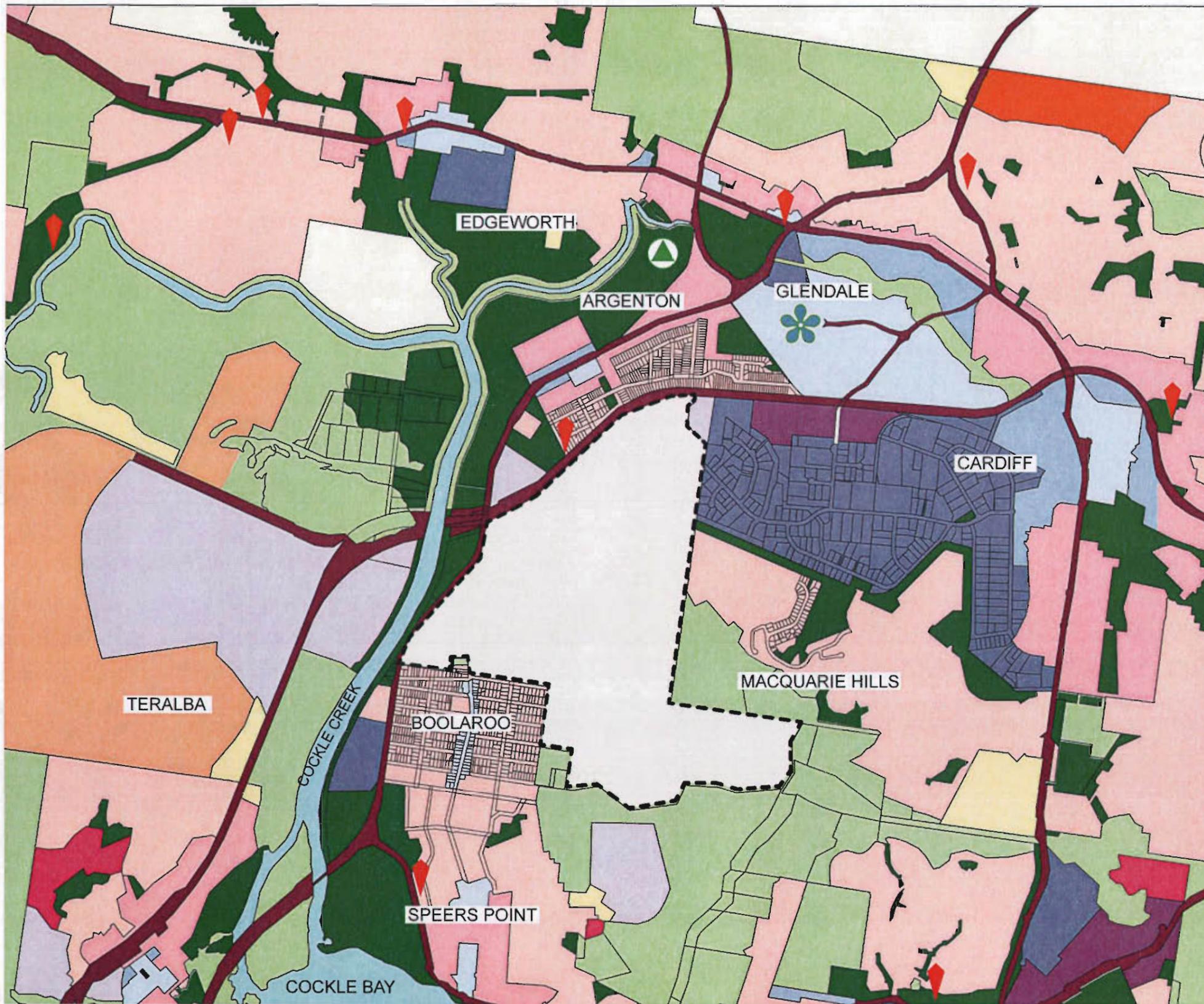
CLIENT:

**Pasminco Cockle Creek Smelter Site
 Cockle Creek, NSW**

DRAWING TITLE:

Regional - Urban centres

DATE:	DRAWN BY:	PLotted DATE:	CHECKED:	BY:
NA	GA	GO	20/08/07	GA
05055	CO-01			E



Reference: Environmental Planning & Assessment Act, 1979 LAKE MACQUARIE LOCAL ENVIRONMENTAL PLAN 2004, Published in Govt Gazette No.55, March 2004 Locality: Booteroo/Argenton

Site is located in an established urban area close to an emerging regional centre. It adjoins existing residential communities of Booteroo and Macquarie Hills and is adjacent to Argenton.

It also adjoins employment land and has a long association with employment uses. Site redevelopment provides the opportunity for infill residential development to foster growth and rejuvenation of Booteroo and Argenton and take advantage of an accessible site with good access to an existing network of community facilities.

The site also provides the opportunity for additional employment lands to contain contemporary employment uses to replace the former heavy industry.

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LEGEND:

- URBAN CENTRE
- URBAN CENTRE (SUPPORT)
- RESIDENTIAL (URBAN)
- RESIDENTIAL
- LAKE AND WATERWAYS
- NATURAL RESOURCES
- INFRASTRUCTURE ZONE
- RURAL
- OPEN SPACE
- CONSERVATION
- MAJOR SHOPPING CENTRE
- SCHOOL
- GOLF CLUB
- GENERAL INDUSTRIAL
- ENVIRONMENTAL GENERAL
- ENVIRONMENTAL LIVING
- URBAN SERVICES
- CORE INDUSTRIAL
- PASMINCO AND ANOTHER SITE

REV	DATE	REVISION / ISSUE DETAILS
P1	18.10.07	Preliminary
A	09.11.07	Information
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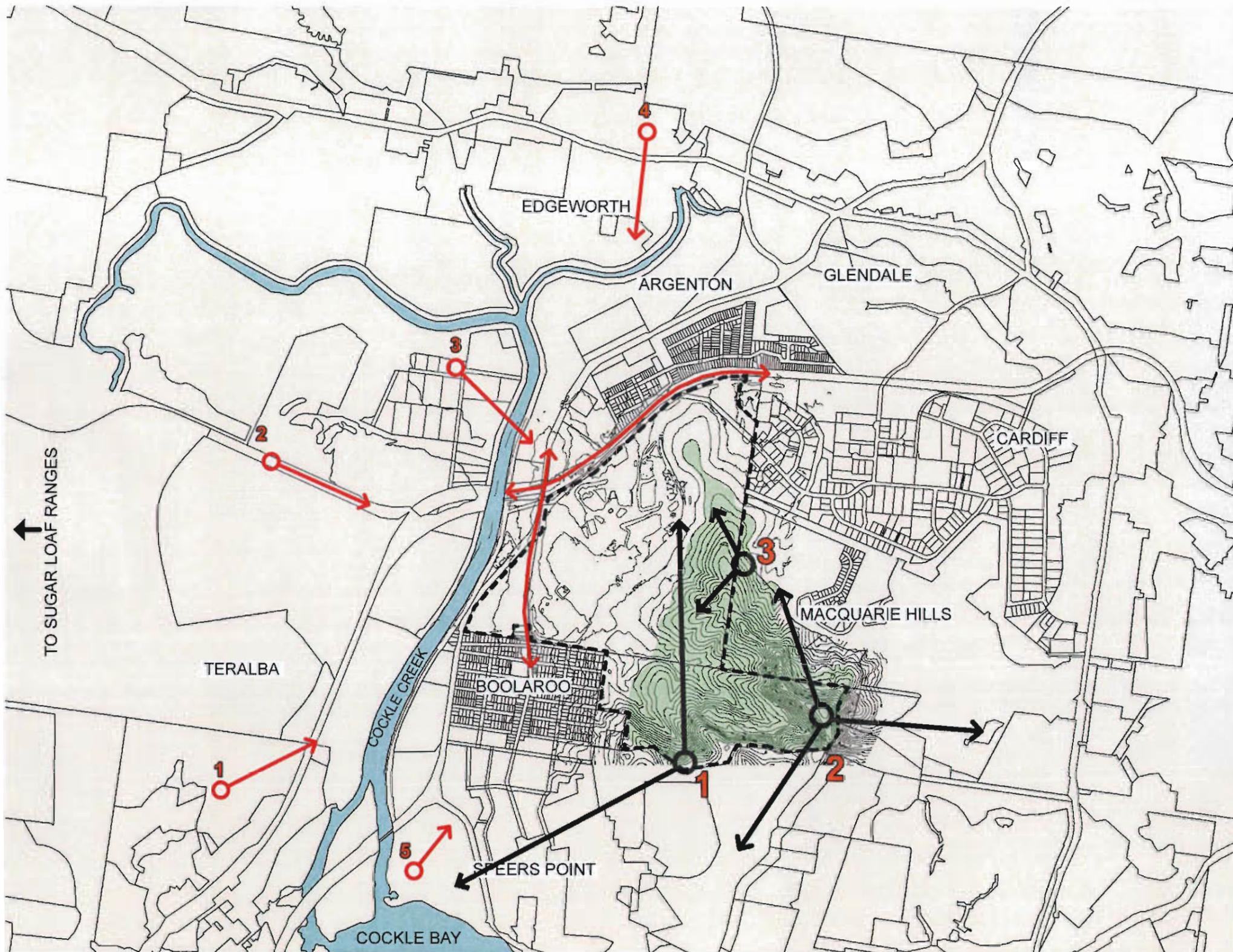
PROJECT:

**Pasminco Cockle Creek Smelter Site
 Cockle Creek, NSW**

DRAWING TITLE:

**Regional - Land use / Zoning
 context**

SCALE	DRAWN BY	PLotted DATE	CHECKED	QA
N/A	gjt	5/08/2009		
PROJECT NUMBER	DRAWING NUMBER			
05055	CO-03			E



TO SUGAR LOAF RANGES

Reference: Conybeare Morrison, 2004, Pasmenco Cockle Creek Smelter Site - Visual Analysis, Conybeare Morrison, Sydney

Site is oriented to west and north and is thus screened from views from south and the lake. Major change in slope gradient occurs at about 70m contour with increased visual sensitivity above this level.

Potential for dwellings on foothills of northern and eastern spurs of Mumbung Hill up to about 70m contour with roofs below skyline when viewed from the west.

Incised minor ridges provide screening to pockets of development on the mid slopes.

Development of mid slopes generally between 55m and 70m to be subject to planning and design controls.

Regionally significant views available from the top of the hill and from the journey to the top.

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LEGEND

- 1 VIEW WEST TO SUGARLOAF RANGES
- 2 LOCALISED VIEWS TO EXISTING COMMERCIAL AND INDUSTRIAL PRECINCTS AND VIEWS WEST AND SOUTH WEST TO LANE MANSIONARE
- 3 LOCALISED VIEWS TO COCKLE CREEK
- 4 VIEW NORTH TO MUMBUNG HILL
- 5 VIEW OF SITE, MUMBUNG HILL AND ASSOCIATED SLOPES
- 6 VIEW OVER GOLF COURSE TOWARDS PROPOSED CONTAINMENT CELL
- 7 VIEW SINCE ACROSS COCKLE CREEK AND KANGAROO HILL SITE
- 8 VIEWS TO SOUTHERN SIDE OF MUMBUNG HILL
- 9 NEW CORRIDORS
- 10 VISUAL SENSITIVITY
- 11 PASMENCO AND PROPOSED SITE BOUNDARY
- 12 SIGNIFICANT VIEWS
- 13 SECONDARY VIEWS

P	10.00.07	Information
R1	18.00.07	Preparation
A	08.11.07	Discussion
B	12.11.07	Discussion
C	14.11.07	Discussion
E	14.05.08	Approval
F	02.08.09	Approval

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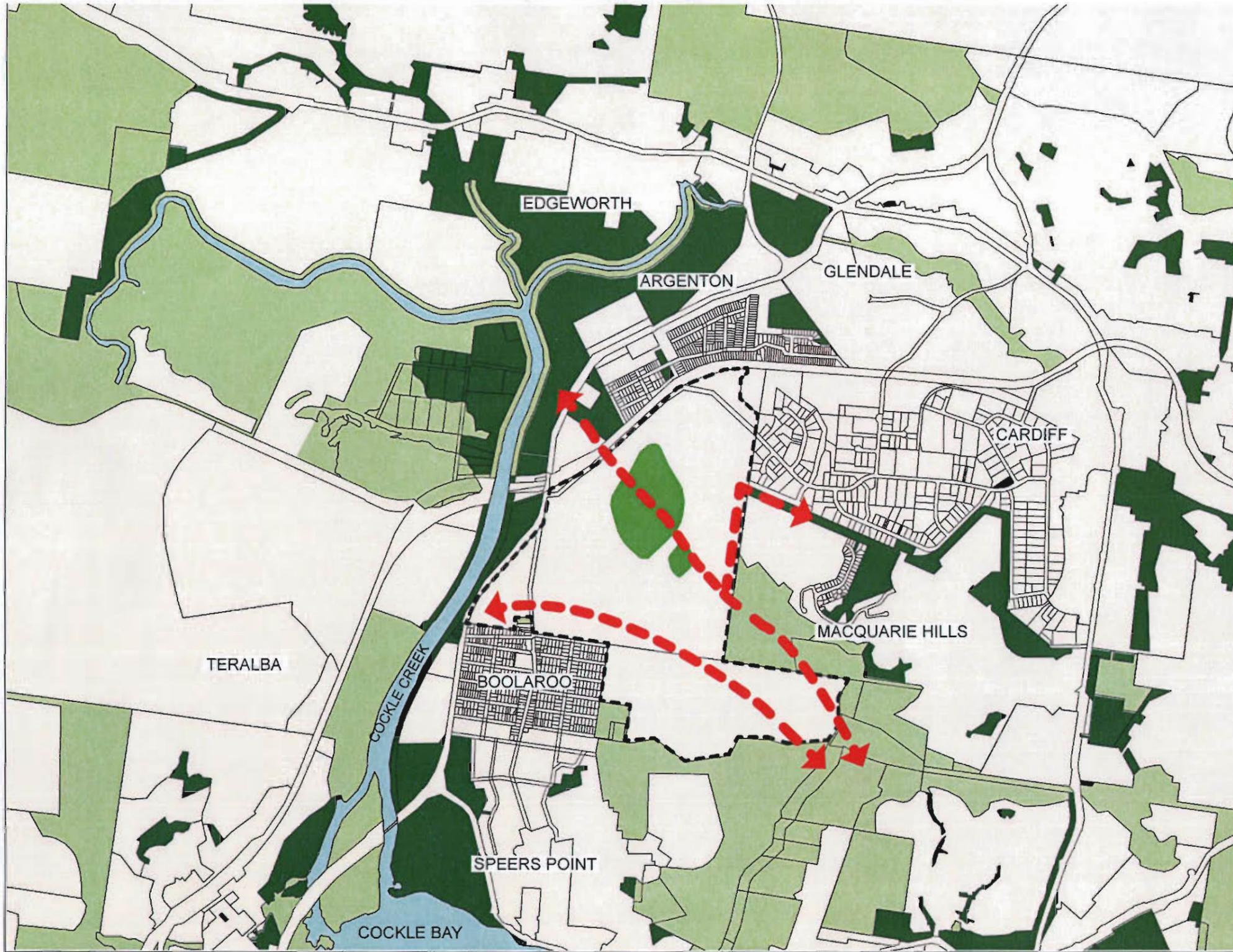
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PROJECT
**Pasmenco Cockle Creek Smelter Site
 Cockle Creek, NSW**

DRAWING TITLE
Regional - View Points

SCALE	DRAWN BY	CHECKED BY	DATE
1:1	GD	5/8/2009	
PROJECT NO.	DRAWING NO.	DATE	SCALE
05055	CO-04		E



Potential for regionally significant open space area at Munibung Hill with open space and biodiversity links to Cockle Creek taking a number of routes and forms.

Potential to link Munibung Hill with the proposed Macquarie Hills reserve to the north.

Potential for exciting new recreational uses and forms above the containment cells.

The site has been closed to public access for over 100 years and the redevelopment provides the opportunity to gain access to and through the site and to integrate the site into the existing built fabric and natural systems.

Potential for public access links from Macquarie Hills to Speers Point via Munibung Hill (subject to access along upper ridges of Hawkins land) and from Lakelands east to Boolaroo.

Reference: Environmental Planning & Assessment Act, 1979 LAKE MACQUARIE LOCAL ENVIRONMENTAL PLAN 2004, Published in Govt Gazette No 55, March 2004 Locality: Boolaroo/Cardiff

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LEGEND:

- OPEN SPACE
- CONSERVATION
- LAKE AND WATERWAY
- PROPOSED CONTAINMENT CELLS
- LINKS THROUGH OPEN SPACE
- PASMINCO AND INCITEC SITE BOUNDARY



P	10.09.07	Information
P1	16.10.07	Finalisation
A	08.11.07	Information
B	02.12.07	Information
C	14.11.07	Information
D	14.05.08	Approval
E	05.06.09	Approval

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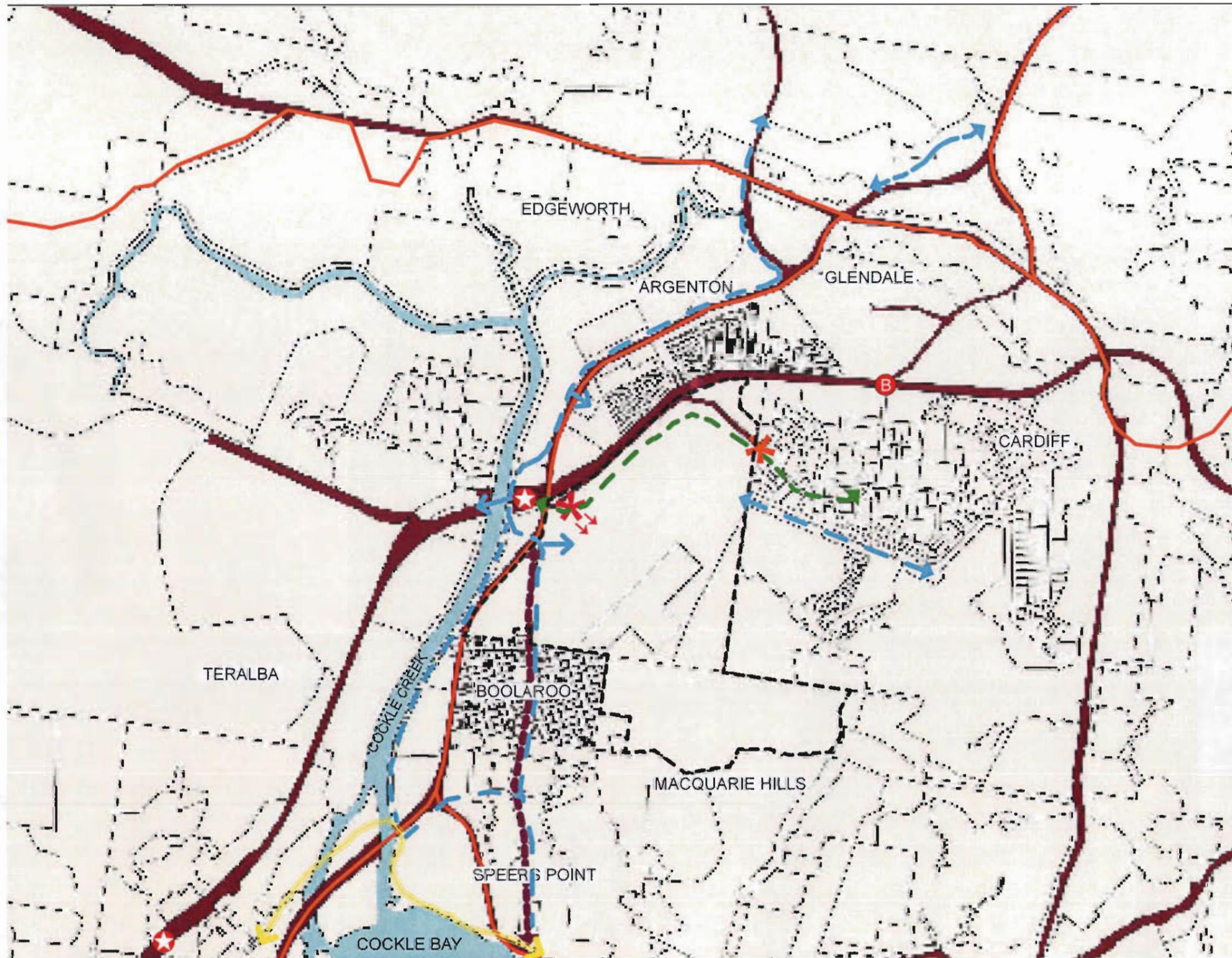
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PROJECT
 Pasmenco Cockle Creek Smelter Site
 Cockle Creek, NSW

DRAWING TITLE:
**Regional - Open space /
 conservation**

SCALE:	DRAWN BY:	PLOT DATE:	CHECKED:	QA:
N/A	GD	5/8/2009		
PROJECT NUMBER:	DRAWING NUMBER:	ISSUE:		
05055	CO-05	E		



Reference: Environmental Planning & Assessment Act, 1979 LAKE MACQUARIE LOCAL ENVIRONMENTAL PLAN 2004, Published in Govt Gazette No. 55, March 2004 Locality: Boolaroo/Cardiff

Connecting the site to the surrounding street system allows for improved accessibility in the locality by:

- A logical extension of Boolaroo Streets northwards into the site;
- The provision of a strategic link from Munibung Road to TC Frith Drive greatly reducing travel times from Cardiff area through to Boolaroo and West Lake;
- Connecting the suburbs of Macquarie Hills with Boolaroo and beyond to Speers Point;
- Improved access to Cocker Creek Station;
- Improved bus services.

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LEGEND:

- MAIN ROADS
- LAKE AND WATERWAYS
- RAILWAY LINE
- BUS ROUTE
- PROPOSED BUS ROUTE
- MAJOR NODE COCKLE CREEK RAILWAY STATION
- EXISTING BUS INTERCHANGE
- PROPOSED BUS INTERCHANGE AND CROSSING
- EXISTING CYCLE WAY
- PROPOSED CYCLE WAY
- ✱ EXISTING ENTRY TO SITE
- ✱ PROPOSED ENTRY FROM INDUSTRIAL PRECINCT
- ✱ CONNECTION TO LAKE

PASMINCO AND INCTEC SITE BOUNDARIES

F	15.12.07	Site Layout
E	09.11.07	Site Plan
D	02.11.07	Initial CAD
C	18.11.07	Initial 3D
B	14.08.07	Initial 2D
A	01.08.07	Initial

No.	DATE	REVISION / ISSUE DETAILS
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<p>PLANNING TITLE:</p> <p>Regional - Movement</p>		
SCALE	DRAWN BY	FILED DATE
1:1000	GD	5/03/2009
PROJECT NUMBER	DRAWING NUMBER	ISSUE
05055	CO-06	E



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LEGEND:

□ SITE BOUNDARIES



P	12.06.07	Information
P1	16.10.07	Finalisation
A	01.11.07	Finalisation
B	02.11.07	Finalisation
C	11.11.07	Finalisation
D	14.05.08	Approval

No. 045: REVISED: 14.05.08

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PROJECT: Fasmenco Cackle Creek Smelter Site

Cockle Creek, NSW

DATE: 14.05.08

PROJECT: Fasmenco Cackle Creek Smelter Site

Cockle Creek, NSW

DATE: 14.05.08

PROJECT: Fasmenco Cackle Creek Smelter Site

Cockle Creek, NSW

DATE: 14.05.08

PROJECT: Fasmenco Cackle Creek Smelter Site

Cockle Creek, NSW

DATE: 14.05.08

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Cockle Creek, NSW

DATE: 14.05.08

PROJECT: Fasmenco Cackle Creek Smelter Site

Cockle Creek, NSW

DATE: 14.05.08



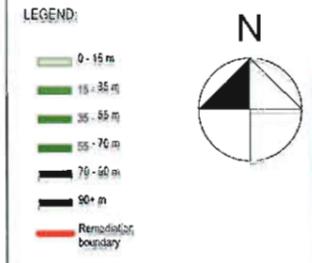
The majority of the site is of moderate elevation below 55m RL with gradients increasing significantly at about 70m RL and then rising steeply to the pinnacle at the top of Munibung Hill.

Areas of fill and other man made modifications to landform will be modified for redevelopment through the remediation process.

The majority of the site is suitable for development with the exception of the upper parts of the site forming Munibung Hill.

North and north west facing slopes provides opportunities for good solar access.

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Note: Levels subject to modification following remediation

P	10.09.07	Information
PI	16.10.07	Preliminary
A	09.11.07	Information
B	22.11.07	Information
C	14.11.07	Information
D	12.03.08	Approval
E	14.03.08	Approval

No.	DATE	REVISION / ISSUE DETAILS
-----	------	--------------------------

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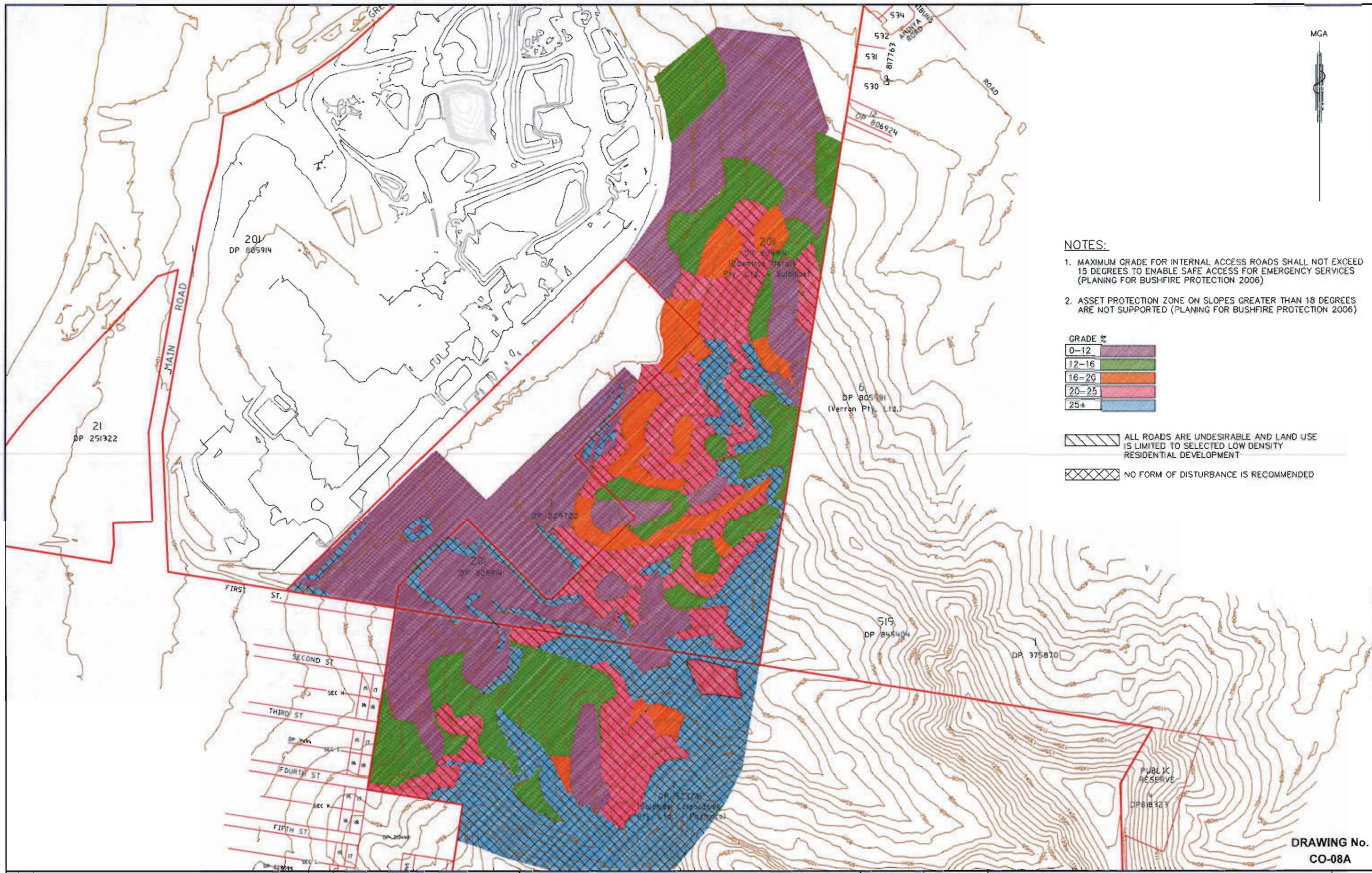
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PROJECT:
 Pasmenco Cocker Creek Smelter Site
 Cocker Creek, NSW

DRAWING TITLE:
 Site - Topography

SCALE	DRAWN BY	PLT DATE	REVISION	OK
1:5000	GD	14/03/08		
PROJECT NUMBER	DRAWING NUMBER	ISSUE		
05055	CO-08	E		



- NOTES:**
1. MAXIMUM GRADE FOR INTERNAL ACCESS ROADS SHALL NOT EXCEED 15 DEGREES TO ENABLE SAFE ACCESS FOR EMERGENCY SERVICES (PLANING FOR BUSHFIRE PROTECTION 2006)
 2. ASSET PROTECTION ZONE ON SLOPES GREATER THAN 18 DEGREES ARE NOT SUPPORTED (PLANING FOR BUSHFIRE PROTECTION 2006)

GRADE %

0-12	[Purple]
12-16	[Green]
16-20	[Orange]
20-25	[Red]
25+	[Blue]

[Hatched Box] ALL ROADS ARE UNDESIRABLE AND LAND USE IS LIMITED TO SELECTED LOW DENSITY RESIDENTIAL DEVELOPMENT

[Cross-hatched Box] NO FORM OF DISTURBANCE IS RECOMMENDED

DRAWING No.
CO-08A

REVISIONS				<p>Monteath & Powys Pty Ltd <small>ACN 001 981 176</small></p> <p>SURVEYING PLANNING ENGINEERING DESIGN PROJECT MANAGEMENT</p> <p>125 Bull Street Newcastle NSW 2300 PO Box 726 Newcastle NSW 2300 T 61 2 4926 1388 F 61 2 4920 3475 E survey@monteathpowys.com.au W www.monteathpowys.com.au</p>	Surveyed ADP Drawn AJM	Drafted SVET Checked SS	Client PACLIB	Sheet No. 1
					Title SLOPE ANALYSIS PASMENCO COCKLE CREEK SMELTER	Revision A		
					Registered Surveyor Scale @A1: 3000 @A3: 6000 DO NOT SCALE	Original Size A1	CAD File: 04026EV.dwg Ref No: 04/026 Date: 17/04/2009	

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Reference RCAustralia. Geology, Pasmenco site Masterplan, Main Road, Boolaroo. RCAustralia Newcastle:

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LEGEND:

- Areas of significant filling
- Alluvium
- Narabeen group - Munmarah conglomerate
- Walkarah coal seam
- Catherine Hill Bay formation - Teralba conglomerate
- Great northern coal seam
- Eleebana formation - Awaba tuff
- Fassifern coal seam

*Unhatched area indicates Croudace Bay / Raids Mistake formation including pilot coal seams

P	12.09.07	Information
P1	15.10.07	Preliminary
A	09.11.07	Information
D	12.11.07	Information
C	14.01.08	Information
G	12.03.08	Approve
E	14.06.08	Approval

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PROJECT TITLE:

Site - Geology

SCALE	DRAWN BY	PLLOT DATE	Subproject	QA
1:5000	GD	14/02/2008		
PROJECT NUMBER	DRAWING NUMBER	ISSUE		
05055	CO-09	E		



Most of the site is suitable for development from a slope stability, soil erosion and drainage viewpoint.

The site lies in an area where geology and land form contribute to slope instability in some areas associated with coal seams. Development on the mid slopes to occur in accordance with good hillside construction principles.

Areas of high risk of slope instability have been identified and excluded from development.

Areas of shallow former mine workings in Cardiff West to be considered in detailed design.

NOTES:

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LEGEND:

- VERY HIGH RISK
Do not develop areas of land of this risk and adjacent areas associated with Small Stream Sumps
- HIGH RISK
Do not develop areas of land of this risk
- MEDIUM RISK
Approximate maximum to maximum (10:1 & 2:1) soil drainage required
- LOW RISK
Develop areas of land of this risk in accordance with the best of practice
- SHALLOW FORMER MINE WORKINGS
Shallow former mine workings
- EXCLUDED AREAS
Excluded areas in accordance with the best of practice
- PROPERTY BOUNDARY



P	12/08/07	Information
B1	16/10/07	Preliminary
A	05/11/07	Information
B	12/11/07	Information
C	14/11/07	Information
D	12/01/08	Approved
E	14/01/08	Approved

No. 1075 REVISION: ISSUE 01/2008

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**Pasmenco Cockle Creek Smeelter Site
 Cockle Creek, NSW**

Site - Land capability

SCALE:	1:5000	DRAWN BY:	GD	DATE:	18/05/2008	CHECKED:	GA
PROJECT NUMBER:	05055	DRAWING NUMBER:	CO-10	ISSUE:	E		

*Note: Awaiting additional information on Inctec site.

Reference Coffeys Geotechnics. Munibung Hill redevelopment, Munibung Hill Boolaroo. Urban Capability Assessment. March 2005. NSW Australia:



The site is currently being remediated in stages which involves the removal of contaminated material and securing this material in containment cells.

Areas being actively remediated are shown on the figure and excluding the upper foothills and the identified Inopina reserve.

The master plan has been prepared on the basis of the site in its condition following remediation

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LEGEND:

- Remediation boundary
- Site boundary

P	10.00.07	Concept
P1	16.10.01	Preliminary
A	09.11.07	Interim
1	07.11.07	Information
1C	16.11.07	Information
1D	05.11.07	Approval

IN: Date: APPROX PUBLIC DETAILS

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PROJECT
**Pasmenco Cockle Creek Smelter Site
 Cockle Creek, NSW**

DRAWING TITLE
Remediation Boundaries

SCALE	DRAWN BY	PLLOT DATE	CHECKED BY
N/A	GD	14/05/2008	GD
PROJECT NUMBER	JOB NUMBER	ISSUE	
05055	CO-11	D	



Reference Acor, 2006, Pasmenco redevelopment infrastructure works, Stormwater services infrastructure plan. Acor Consultants, Sydney

Watercourses have been identified in consultation with DNR (now DWE) and are located above the man made freshwater dam.

Other smaller drainage lines drain into these water courses and other directions generally to the west to Cockle Creek;

Drainage lines through the former smelter site have been highly modified with the potential to recreate other riparian zones and more natural water management features in a visible urban context.

Water quality treatment will be provided and stormwater flows detained where there are capacity constraints under railway lines and roads.

The brownfield site will benefit from the application of water sensitive urban design principles absent from the former industrial uses.

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- Water drainage corridors
- Man made water bodies
- Development precincts

P	13/09/07	Information
R1	15/10/07	Preliminary
A	05/11/07	Information
B	18/11/07	Information
C	14/11/07	Information
D	13/03/08	Approval
E	14/05/08	As-built

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ARCHITECTS:

Pasmenco Cockle Creek Smelter Site
 Cockle Creek, NSW

DRAWING TITLE:

Site - Hydrology, water courses

SCALE:	DATE:	PROJECT:
1:5000	14/05/2008	05055

PROJECT NUMBER:	DATE:	SCALE:
05055	14/05/2008	E



Reference: Conybeare Morrison, 2004, Pasmenco Cockle Creek Smelter Site - Visual Analysis, Conybeare Morrison, Sydney

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LEGEND:

- AREA OF VISUAL SENSITIVITY
- CONTAINMENT CELLS
- SHOWFIELD SITE
- SHOWFIELD ROAD
- GREEN CORRIDOR
- OVERLAND FLOW PATH
- INDUSTRIAL CHARACTER TO BE RETAINED AND PROTECTED ALLOWING LAND USE
- RESIDENTIAL CHARACTER TO BE RETAINED AND REINFORCED BY PROPOSED ALLOWING LAND USE
- EXTENSION OF ROAD TO CONNECT RESIDENTIAL AREAS
- PASMINCO AND HOT SITE BOUNDARY
- EXISTING ROAD NETWORKS ADJACENT SITE
- PROPOSED EXTENSION OF ROAD NETWORKS
- PERMISSIBLE LAND COVER

RIPIARIAN CORRIDOR

PERMISSIBLE LAND COVER

P	12.0% PAVEMENT
PH	12.0% PAVEMENT
A	08.11.07
B	12.11.07
C	14.11.07
D	15.05.08
E	05.08.09

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ARCHITECTS

**Pasminco Cockle Creek Smelter Site
 Cockle Creek, NSW**

DESCRIPTION

Site - Landscape features

SCALE

1:5000

PROJECT NUMBER

05055

PROJECT CODE

CO-14

DATE

2015



REFERENCE: Vipac Engineers and Scientists, 2006, Noise Impact assessment, Pasmnico Redevelopment, Vipac Engineers and Scientists, Newcastle
 Conybeare Morrisson International, 2005, Proposed Land Use Strategy for PCCS Site, Conybeare Morrisson Int., Sydney

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LEGEND:

- PROPOSED LINKS (VEHICULAR AND PEDESTRIAN)
- STORM WATER / DRAINAGE CORRIDOR
- INDUSTRIAL LINKS
- INDUSTRIAL EDGE
- RESIDENTIAL EDGE
- RESERVE / OPEN SPACE EDGE
- RIDGE LINE (Natural Barrier)
- ROAD AND RAIL EDGE
- LOOKOUT
- OPEN SPACE
- PASMINCO AND INCITEC SITE BOUNDARY

P	10.08.07	Information
P1	18.10.07	Preliminary
A	08.11.07	Information
B	12.11.07	Information
C	14.11.07	Information
D	14.05.08	Approval
E	05.06.09	Approval

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Pasmnico Cockle Creek Smelter Site Cockle Creek, NSW		
DRAWING TITLE:		
Site - Corridors / Edge conditions		
SCALE	DRAWN BY	PLotted DATE
1:5000	GD	5/08/2009
PROJECT NUMBER	DRAWING NUMBER	ISSUE
05055	CO-15	E



Reference Acor, 2006, Pasmisco redevelopment infrastructure works, Site Trunk Services Strategy Consultants, Sydney

All urban services are available to the site or can be readily augmented to meet the needs of the development as can be expected in an existing urban environment;

There are limits to the water supply that are currently being investigated. Supply to higher parts of the site may require booster pumps or higher reservoir and is being investigated by Hunter Water for the Mumbung Hill area generally.

Development on the site will require the provision of a new substation.

Redundant easements on the site can be removed although the 132KV transmission lines and existing substation on First Street are required to be retained (the substation may be reduced in size). Opportunities to provide water and sewer services to the site from a number of directions.

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LEGEND:



- Existing boundary of site
- Existing easements to be retained
- Government easement
- Easements to be removed
- Property communication easement
- Existing water service
- Existing sewer service
- Existing gas service
- Existing power service

P	10.06.07	Information
PI	16.10.07	Preliminary
A	05.11.07	Information
B	12.11.07	Information
C	14.11.07	Information
D	12.03.08	Approval
E	14.05.08	Approval

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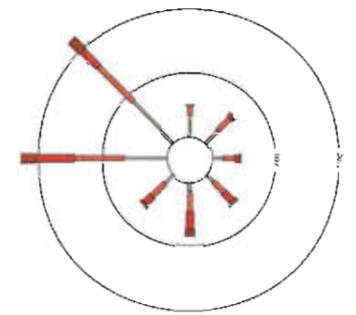
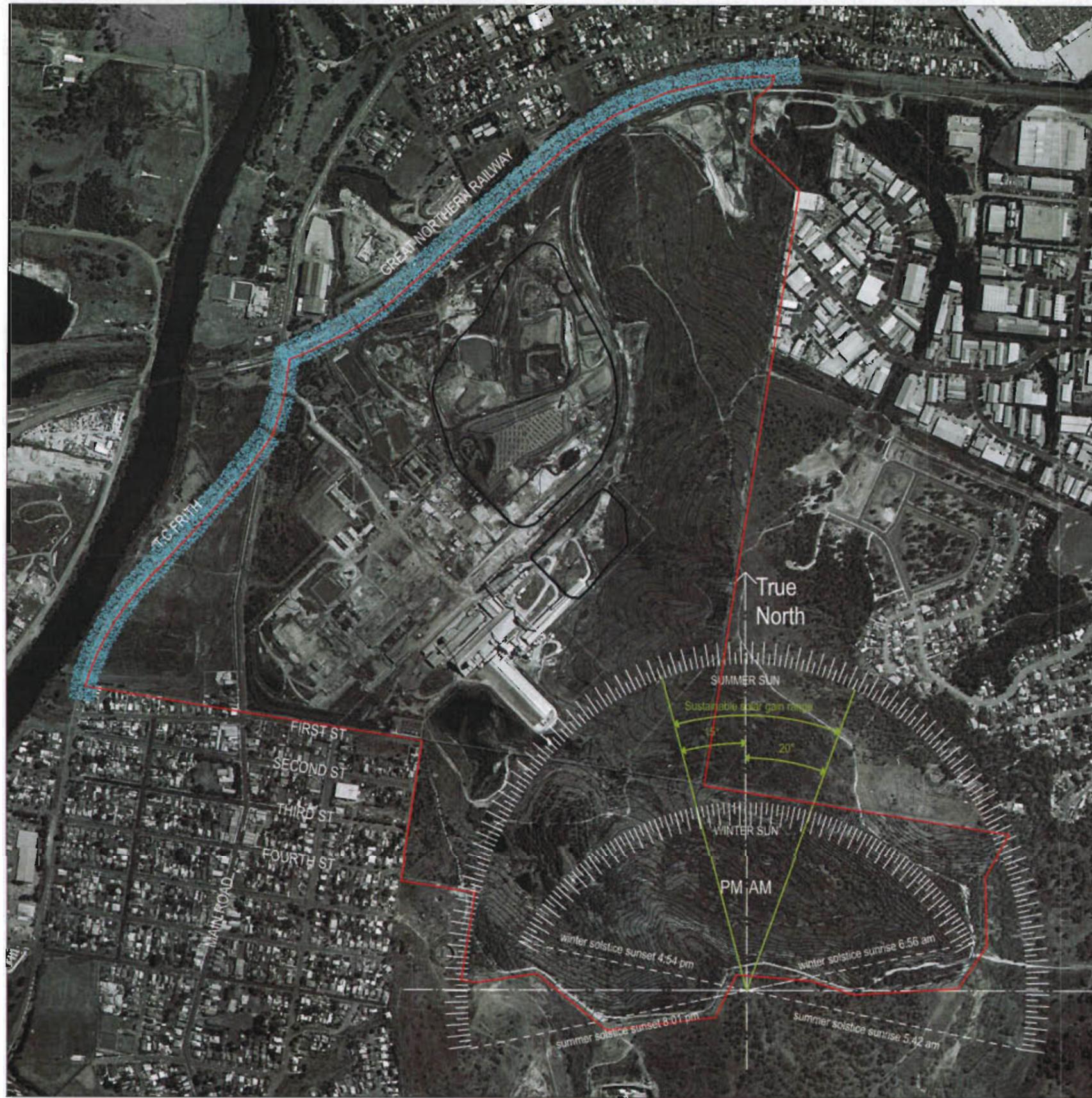
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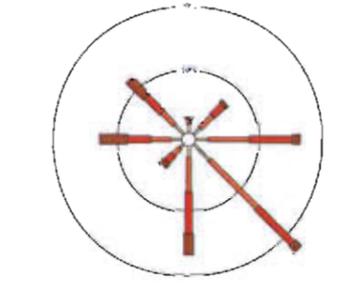
**Pasmisco Cocker Creek Smelter Site
 Cocker Creek, NSW**

**Site - Infrastructure &
 services, Easements**

SCALE:	DRAWN BY:	PLotted DATE:	DRAWN BY:	DATE:
1:5000	GD	14/05/2008	GD	04
PROJECT NUMBER:	DRAWING NUMBER:	ISSUE:		
05055	CO-16	E		



Wind Rose 9 am



Wind Rose 3 pm

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- Containment cells location
- Possible noise sources

P	10.06.07	Information
P1	16.10.07	Preliminary
A	09.11.07	Information
B	12.11.07	Information
C	14.11.07	Information
D	12.03.08	Approval
E	18.03.08	Approval

REVISION: ISSUE DETAILS

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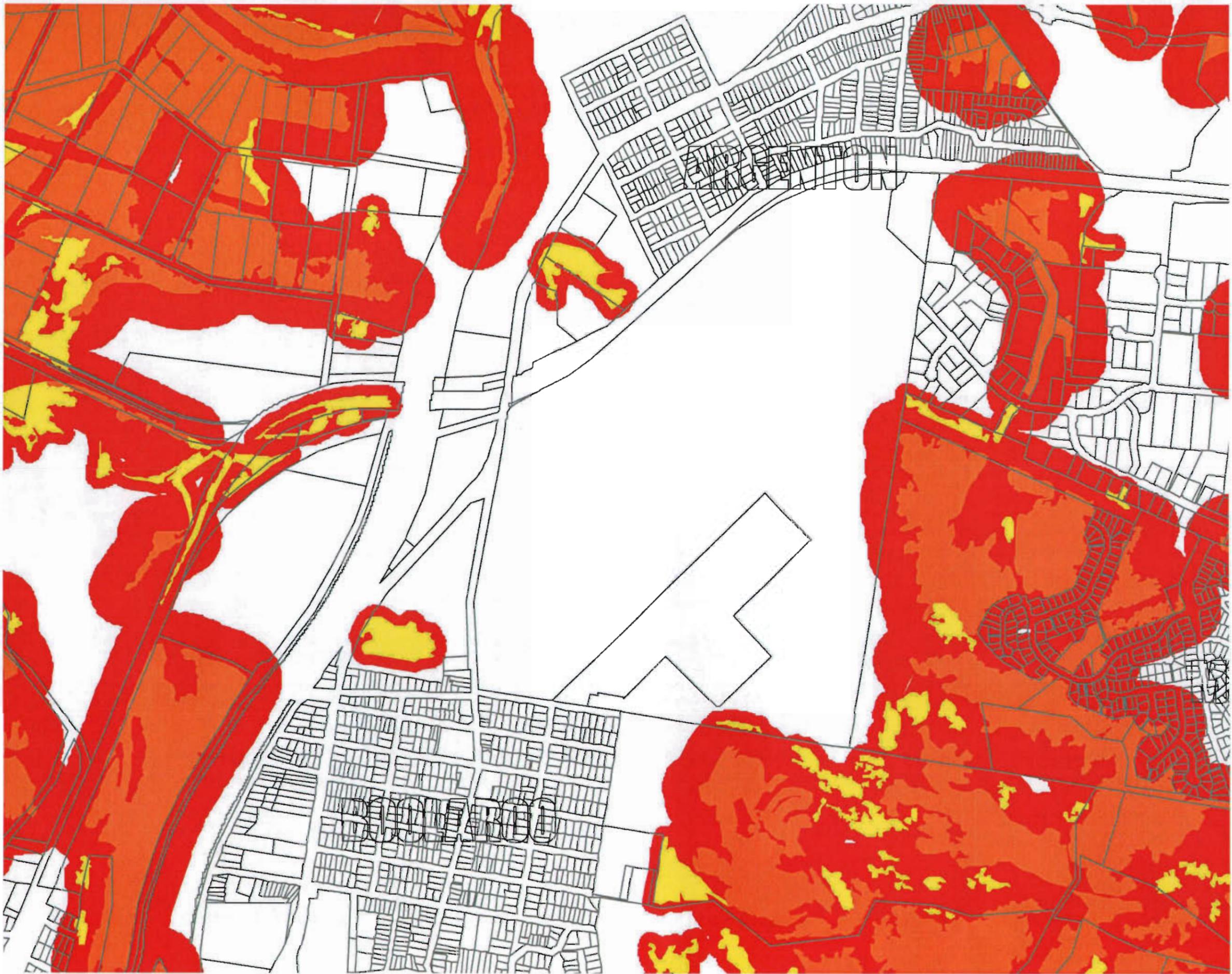
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PROJECT:
 Pasmenco Cockle Creek Smelter Site
 Cockle Creek, NSW

DRAWING TITLE:
 Site - Environment

SCALE:	DRAWN BY:	PLLOT DATE:	CHECKED:	QA:
1:5000	GD	14/05/2008		
PROJECT NUMBER:	DRAWING NUMBER:			
05055	CO-17			E



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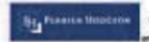
**LAKE MACQUARIE CITY COUNCIL
BUSH FIRE PRONE LAND
DATA CERTIFIED 16TH FEBRUARY 2007**

- LEGEND**
- Bushfire Prone Category 1
 - Bushfire Prone Category 2
 - Bushfire Prone Category 3
 - Lake Macquarie City Council
 - Lot Boundary
 - Lake & Dam Boundary

#	DATE	DESCRIPTION
1	12/01/07	Information
2	18/02/07	Information
3	08/11/07	Information
4	12/11/07	Information
5	14/11/07	Information
6	12/02/08	Approval

NO DATE REVISION (BUSH DETAILS)

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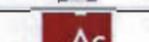
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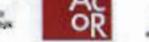
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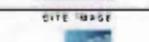
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PROJECT
Pasma Group Cockle Creek Smelter Site
Cockle Creek, NSW

DRAWING TITLE
Site - Bushfire Hazard

SCALE
1:5000

DRAWN BY
G.D.

PLOT DATE
22/03/08

CHECKED BY
D

PROJECT NUMBER
05055

DRAWING NUMBER
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G.D.

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