Appendix D

Phase 1 ESA – Central Rail Access Option

Moorebank Intermodal Company

Phase 1 Environmental Site Assessment, Moorebank Intermodal Terminal

Central Rail Access Option

9 July 2014

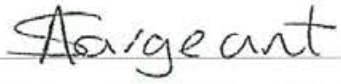
PARSONS BRINCKERHOFF
A BALFOUR BEATTY COMPANY

Document information

Client: Moorebank Intermodal Company
Title: Phase 1 Environmental Site Assessment, Moorebank Intermodal Terminal
Subtitle: Central Rail Access Option
Document No: 22189293E-CLM-RPT-0727 RevB
Date: 9 July 2014

Rev	Date	Details
A	04/05/2014	Draft
B	09/07/2014	Updated based on Auditor comments

Author, Reviewer and Approver details

Prepared by:	Lisa Powell	Date: 09/07/2014	Signature: 
Reviewed by:	Yung Kho	Date: 09/07/2014	Signature: 
Approved by:	Anthea Sargeant	Date: 09/07/2014	Signature: 

Distribution

Moorebank Intermodal Company, Parsons Brinckerhoff file, Parsons Brinckerhoff Library

Document owner

Parsons Brinckerhoff Australia Pty Limited

ABN 80 078 004 798

Level 27 Ernst & Young Centre
680 George Street
Sydney NSW 2000
GPO Box 5394
Sydney NSW 2001
Australia
Tel: +61 2 9272 5100
Fax: +61 2 9272 5101
www.pbworld.com

Certified to ISO 9001, ISO 14001, OHSAS 18001

Contents

List of tables

List of appendices

Abbreviations

ACM	asbestos containing materials
AHD	Australian Height Datum
ASS	acid sulfate soils
DNSDC	Defence National Support and Distribution Centre
EPA	Environment Protection Authority
ESA	environmental site assessment
GWS	Glenfield Waste Services
ha	hectares
IMT	Intermodal Terminal
m	metres
MIC	Moorebank Intermodal Company
m BGL	metres below ground level
m BTOC	metres below top of casing
PASS	potential acid sulfate soils
SME	School of Military Engineering
SSFL	Southern Sydney Freight Line
SWL	standing water level

Executive summary

Introduction

Parsons Brinckerhoff Pty Ltd (Parsons Brinckerhoff) was commissioned by the Moorebank Intermodal Company (MIC) to undertake a Phase 1 environmental site assessment (ESA) for an area of open space legally identified as Lot 4 in DP1130937 ('the site') located adjacent to Casula Road, Casula NSW.

Purpose and scope

The Phase 1 ESA was completed to assess the potential contamination issues at the site with the purpose of evaluating the feasibility of the site for the future proposed use as the Moorebank Intermodal Terminal (IMT). The Moorebank IMT Project (the Project) includes a rail link connecting the site to the Southern Sydney Freight Line (SSFL) and road entry and exit points from Moorebank Avenue. At the time of preparing this Phase 1 ESA, three separate rail access options are being considered, which are:

- northern rail access option — with rail access from the north-western corner of the Moorebank IMT site, passing through the former Casula Powerhouse Golf Course (which is currently owned by Liverpool City Council (LCC)) and crossing the Georges River and floodplain;
- central rail access option — with rail access from the centre of the western boundary of the Moorebank IMT site, passing through Commonwealth land on the western bank of the Georges River (also referred to as the 'hourglass land'); and
- southern rail access option — rail access from the south-western corner of the Moorebank IMT site, passing through the Glenfield Landfill site (owned by Glenfield Waste Services (GWS)) and crossing the Georges River and floodplain.

The site subject to this Phase 1 ESA is known as the central rail access option. The Moorebank IMT site and the other rail access options are the subject of separate ESA reports.

The scope of works for the Phase 1 ESA comprised a desktop review including identification of the site, a review of aerial photographs, historical land titles, council records, local geology, hydrology and hydrogeology, a site walkover, undertaken 5 May 2014 and preparation of a Phase 1 ESA report.

Site description

The site is owned by Commonwealth comprising an hourglass shaped area of densely vegetated land along the western bank of the Georges River covering a total area of approximately 3.2 ha (shown in section 8 Figure 1). The area that would be impacted by the construction footprint of the central rail access option is approximately 1.4 ha based on the concept design. The site surface is generally undulating with a steep slope towards the Georges River along the eastern boundary. The area is underlain by alluvial sands, silts and clays overlying shale of the Wianamatta Group and Hawkesbury Sandstone.

The Georges River flows to the north along the eastern boundary of the site. Casula Powerhouse is situated to the north of the site with LCC owned land beyond and GWS (landfill) is located immediately to the south. Based on local topography, it is considered that the inferred groundwater flow direction beneath the site would be towards the east to north-east in the direction of the Georges River.

Based on a review of aerial photographs, the site has been heavily vegetated since the 1970s, prior to which it appeared to be farmland. Land use surrounding the site has evolved from vacant bushland to residential, commercial and industrial uses since the 1970s until the present day.

Findings and recommendations

Based on the review of available information, it is considered there is limited potential for contamination to exist, however, due to the landfill located to the south and the inferred north-easterly groundwater flow direction; there may be the potential for contamination from offsite to have migrated onsite through groundwater flow.

Based on the review of available information, it is considered limited potential for onsite contamination sources to exist with the exception of uncontrolled fill that may have been previously deposited at the site. If contamination were to exist in the subsurface, the key exposure pathways would likely be via direct contact with soils, surface water or groundwater (dermal contact, ingestion and inhalation) by construction/utility workers during site redevelopment and through the migration of airborne dust to offsite receptors and uptake via dermal contact, ingestion and inhalation. It is considered that these exposure pathways can be adequately managed by implementing good health and safety practices during any future works to avoid contact with potentially contaminated soils and groundwater.

The active waste facility located immediately to the south and hydraulically up gradient of the site has the potential to cause contamination through the migration of groundwater, leachate or landfill gases (such as methane, carbon dioxide and hydrogen sulfide).

Based on Council records, the land is also affected by Liverpool Local Environmental Plan 2008 that restricts the development of the land because of the likelihood of ASS class 5. The presence of potential acid sulfate soils should be further investigated and an appropriate management strategy developed (as required) prior to commencement of any site excavation or construction works.

It is recommended that at subsequent project approval stages (under the NSW *Environmental Planning and Assessment Act 1979*), a targeted intrusive investigation be undertaken in order to gather data on soil and groundwater quality (including landfill gas and ASS assessments) so that management and/or remediation options for the site can be evaluated (if required).

1. Introduction

Parsons Brinckerhoff Pty Ltd (Parsons Brinckerhoff), was commissioned by Moorebank Intermodal Company (MIC) to undertake a Phase 1 environmental site assessment (ESA) for the site legally identified as Lot 4 in DP1130937 (the site) located on the western bank of the Georges River, Casula NSW. The site area is approximately 3.2 ha.

At the time of preparing this Phase 1 ESA, three separate rail access options are being considered connecting the Moorebank IMT to the Southern Sydney Freight Line (SSFL), which are:

- northern rail access option — with rail access from the north-western corner of the Moorebank IMT site, passing through the former Casula Powerhouse Golf Course (which is currently owned by Liverpool City Council (LCC)) and crossing the Georges River and floodplain;
- central rail access option — with rail access from the centre of the western boundary of the Moorebank IMT site, passing through Commonwealth land on the western bank of the Georges River (referred to as the 'hourglass land'); and
- southern rail access option — rail access from the south-western corner of the Moorebank IMT site, passing through the Glenfield Landfill site (owned by Glenfield Waste Services (GWS)) and crossing the Georges River and floodplain.

The site subject to this Phase 1 ESA is known as the central rail access option. Based on the concept design, approximately 1.4 ha of the total site area would be impacted by the proposed construction footprint of the central rail access option. The Moorebank IMT site and the other rail access options are the subject of separate ESA reports.

A review of available site information was undertaken to evaluate the environmental setting and potential contamination concerns at the site. This included a review of regional and local geological and hydrological information including topographic maps, geological maps, local registered groundwater bore records, relevant public records and council records.

The Phase 1 ESA was completed to assess the potential contamination issues at the site with the purpose of evaluating the feasibility of the site for the future proposed use as the Moorebank IMT.

1.1 Objectives

The objectives of the Phase 1 ESA were to:

- assess the site history and historical uses of the site and the surrounding land uses ;
- identify areas of potential environmental concern;
- assess the potential for any contamination identified to impact human health or environmental; receptors relative to the proposed land use and the potential exposure pathways; and
- provide recommendations for additional works/site assessment.

1.2 Scope of works

The scope of works for the Phase 1 ESA comprised:

- desktop review including;
  - identification of the site, including location of surrounding infrastructure, area, boundaries and title descriptions;
  - a review of aerial photographs;
  - a review of historical land titles;
  - a review of council records (section 149 Certificates);
  - a review of the local geology, hydrology and hydrogeology;
- a site walkover (5 May 2014); and
- preparation of a Phase 1 ESA report.

2. Site setting

2.1 Location

The site comprises a strip of land (known as the 'hourglass land') along the western bank of the Georges River which is located approximately 30 km south-west of Sydney, between Liverpool and Campbelltown, along the Georges River. The site is located to the west of the School of Military Engineering (SME) at Moorebank and to the south of the M5 South Western Motorway. The coordinates for the arbitrary central point of the site are easting 307064.75 and northing 6241045.08.

The site covers an area of approximately 3.2 ha and is covered in dense vegetation. Based on the concept design, the construction footprint of the central rail access option would cover approximately 1.4 ha of the total site area. Access to the site is restricted on all boundaries due to a fence on the north boundary, the SSFL to the west, Glenfield Waste Services (GWS) landfill to the south and the Georges River to the east.

2.2 Surrounding land uses

The land use surrounding the site consists of:

- north – M5 South Western Motorway and industrial, commercial and residential land beyond;
- east – Georges River, SME, Moorebank Avenue and the Defence National Storage and Distribution Centre (DNSDC) beyond;
- south – former quarry and current Glenfield Waste Services (GWS) landfill and waste transfer station, a decommissioned power station (now the Casula Powerhouse Arts Centre), the Casula railway station and residential properties beyond; and
- west – the Main South/Cumberland Rail Line and the SSFL) and residential properties of Casula and the Hume Highway beyond.

The Environmental Protection Licence (EPL) for the adjacent GWS landfill is held by L.A. Kennett Enterprises Pty Ltd trading as Glenfield Waste Disposal. The EPL (Number 4614) stipulates that the landfill is permitted to accept non putrescible general solid waste and waste tyres and permitted activities are non-thermal treatment of general waste, waste storage, waste disposal by application to land, crushing, grinding or separating and land-based extractive activity. The depth of the waste landfilled including capping and any other material placed above the cap must not exceed 30 metres.

The decommissioned power station was built in 1953 and fuelled by oil and coal. The power station was decommissioned in 1976 and remained disused until 1994 when it was redeveloped as a multi-arts facility. No details are known of the decommissioning.

The site and surrounding features are shown in Figure 2, section 8.

2.3 Physical setting

2.3.1 Regional and local geology

The Department of Mineral Resources Penrith 1:100,000 geological series sheet 9030 showed that the underlying geology comprises silts, sands and clays from quaternary fluvial deposition underlain by tertiary clayey sand and clay. The alluvial deposits overlay shales of the Wianamatta group which are typically black to dark grey shales and laminates from the Triassic period.

2.3.2 Topography and hydrology

A review of topographical data provided by the Department of Lands Spatial Information Exchange showed that the site lies at an approximate elevation of 10 m Australian Height Datum (AHD). Based on the local topography, it is considered that surface water is likely to flow across the site to the north and north-east towards the Georges River.

Part of the land is affected by flood inundation and therefore flood related development controls are applicable. Development of the project site has been planned around existing regional flooding constraints which are in line with the NSW Flood Prone Land policy as outlined in the NSW Floodplain Development Manual (DIPNR 2005). Technical Paper 6 – *Surface water assessment* prepared by Parsons Brinckerhoff (June 2014) identified that the impacts from the project on regional flooding are relatively minor and do not significantly affect the existing flood risk associated with the Georges River and its floodplain.

2.3.3 Acid sulfate soils

Acid sulfate soils (ASS) are acidic soil horizons or layers resulting from the aeration of soil materials that are rich in iron sulfides, primarily pyrite (FeS_2). They are likely to be present in marine and estuarine sediments of the recent (Holocene) geological age, soils usually not more than 5 m above mean sea level and in marine or estuarine settings.

Landform elements in which the geomorphic processes have been suitable for the formation of ASS have been classed as having a ‘high probability of occurrence’. These landforms include sediments of estuaries, rivers, creeks and lakes. Where environments have not generally been suitable for ASS formation, or where ASS is highly localised or sporadic, they have been classed as having a ‘low probability of occurrence’. In general, landforms above 10 m AHD are classed as having no known occurrence of ASS.

A review of the ASS risk maps from the online CSIRO Australian Soil Resource Information System showed that across the site there is generally an extremely low probability of ASS occurrence. However, there are areas immediately adjacent to the Georges River which have been characterised as areas of high probability of ASS occurrence therefore soils with acid generating potential may be present within these areas.

2.3.4 Regional and local hydrogeology

Groundwater is likely to be present in the alluvium and shale. Alluvial deposits occur in valleys, creeks and river beds in the region. The alluvial deposits are generally shallow, discontinuous and relatively permeable and are likely to be responsive to rainfall and stream flow. The shallow alluvium is likely to be hydraulically connected to the Georges River. Groundwater from within the alluvium is likely to sustain groundwater dependent ecosystems. Locally groundwater flow is likely to be towards the Georges River.

In contrast, groundwater within the Shale is likely to be characterised by more saline conditions. Regionally, the shale generally has a low hydraulic conductivity and thus behaves as an aquitard, restricting groundwater flow into the underlying Hawkesbury Sandstone unit. Locally, groundwater is likely to flow along the interface of the shale and alluvium following the gradient of the shale. During previous works undertaken on the adjacent site (Parsons Brinckerhoff 2011), shallow groundwater was encountered within the alluvium at a minimum depth of 5.2 m below ground level (m BGL).

2.3.5 Groundwater database search

A search of the NSW Office of Water licensed borehole register showed that 9 registered bores are present within a 1 km radius of the site. A summary is provided in Table 2.1.

Table 2.1 Groundwater database search results summary

Bore ID	Authorised purpose	Approximate distance (m) and direction	Date installed	SWL (m BTOC)	Total depth (m)
GW108804	Monitoring	400 south	Apr-2008	not known	11.0
GW109798	Monitoring	100 west	Jan-2007	not known	29.8
GW109799	Monitoring	400 south-west	Jan-2007	not known	22.8
GW109800	Monitoring	400 south-west	Jan-2007	not known	11.0
GW109801	Monitoring	400 south-west	Jan-2007	not known	14.0
GW109802	Monitoring	100 west	Jan-2007	not known	10.0
GW109803	Monitoring	700 south	Feb-2009	not known	29.8
GW109804	Monitoring	700 south	Feb-2009	not known	7.5
GW109805	Monitoring	750 south-west	Jan-2007	not known	12.0

Source: NSW Natural Resource Atlas
m BTOC: metres below top of casing
SWL: standing water level

All of the bores identified are monitoring bores associated with Glenfield Waste Services located immediately to the south of the site. Bore search information is provided in Appendix A and a map showing the registered borehole locations is provided in Figure 4 section 8.

2.4 Site walkover

The site was inspected by Parsons Brinckerhoff environmental scientists on 5 May 2014. The following observations were noted:

- An attempt was made to access the site via the northern boundary which borders the Casula Powerhouse near to Casula station. Access to the site was restricted by a wire fence. Access to the site was not possible from other directions due to the SSFL along the western boundary, the Georges River along the Eastern boundary and the GWS landfill site at the southern boundary.
- The site was covered with dense vegetation.
- The northern area of the site slopes steeply from the western boundary towards the Georges River.
- A groundwater monitoring well (which appeared to be newly installed based on freshly exposed soils around the well) was present in the north-western corner of the site. There is no record of this well within the NSW Office of Water licensed borehole register.

- There were no visible impacts observed from the northern site boundary that may be indicative of contamination such as surface staining, discolouration or retarded or stressed vegetation. Other areas of the site were not assessed due to the access restrictions described above.

Photographs taken during the site walkover are provided in Appendix B.

3. Site history

3.1 Land titles search

Historical land title information for the subject land has been summarised in Table 3.1.

Table 3.1 Titles search summary

Dates	Identifier	Ownership details
2009–Present	Lot 4 DP 1130937	the Commonwealth of Australia
1988–2009	Lot 21 DP 230435	the Commonwealth of Australia
1967–1988		Robert Alexander Paul, company executive ; the Commonwealth of Australia
1966–1967	Lot B DP 314975, Lot D DP 348357 and land adjoining on DP 354904, part of Portions 67 & 272, Parish of Minto – Area, 23 Acres 1 Rood 10 Perches	Robert Alexander Paul, company executive
1947–1966		Eugene Erskine Claud White, orchardist
1949–1965	Lot 2 DP 7507 – Area 6 Acres 0 Roods 8 Perches	Barfield Pty Limited
1949–1949	Lot 2 DP 7507 – Area 6 Acres 0 Roods 8 Perches.	Brian Norman de Meyrick, grazier
1944–1947	Lot B DP 314975, Lot D DP 348357 and land adjoining on. DP 354904, part of Portions 67 –& 272, Parish of Minto – Area. 21 Acres 1 Rood 10 Perches.	Eugene Erskine Claud White, orchardist
1926–1944	Lot B DP 314975, part of Portions 67 & 272, Parish of Minto – Area 16 Acres 1 Rood 10 Perches.	Eugene Erskine Claud White, sheriff's officer
1926–1926	Part of Portions 67 & 272, Parish of Minto – Area 376 Acres 2 Roods 0 Perches – CTVol 3823 Fol 81).	Eugene Erskine Claud White, sheriff's officer
		James Freeland Leacock, dairy farmer
		(various leases for dairy activities of part, shown on CTVol 3823 Fol 81)
1922–1949	Lot 2 DP 7507, with other lands – Area 6 Acres 0 Roods 8 Perches.	Julian Frank de Meyrick, area officer
1920–1922		George Thomas Barker, labourer; William Barker, porter
1914–1920		Federick Edwin Barker, orchardist

Title search documentation (held by the NSW Land and Property Information) is provided in Appendix C.

3.2 Section 149 (2) and (5) planning certificate

Section 149 (2) and (5) planning certificates were acquired from LCC. A copy of the Section 149 certificate is provided in Appendix D.

A review of this information showed that the site is subject to the following local, regional and development plans:

- Liverpool Local Environment Plan 2008;
- Liverpool Development Control Plan 2008 (as amended); and
- Greater Metropolitan Regional Environment Plan No. 2 – Georges River Catchment.

Relevant information has been summarised in Table 3.2.

Table 3.2 S149 search summary

Subject	Detail
Zoning	SP2 Infrastructure – Defence
Critical habitat	The land does not include or comprise critical habitat.
Conservation area	Land is not located in a conservation area.
Environmental heritage	No item of Environmental Heritage is situated on the land.
Mine subsidence	The land is not a mine subsidence district.
Coastal Protection Act 1979	There has been no notification from the Department of Public Works that the land is subject to the operation of Section 38 or 39 of the *Coastal Protection Act 1979*.
Bushfire prone land	All of the land is bush fire prone land as defined in the *Environmental Planning and Assessment Act 1979*. The land is affected by the *Rural Fires Act 1997* that restricts the development of the land because of the likelihood of bushfire.
Acid sulfate soils	The land is affected by Liverpool Local Environmental Plan 2008 that restricts the development of the land because of the likelihood of ASS class 5.
Flood related controls	Part of the land is affected by flood inundation and therefore flood related development controls apply to development or any other purpose. The property is identified as flood prone and is within the high risk flood category. High Flood Risk Category means land below the 1% Annual Exceedance Probability flood that is either subject to high hydraulic hazard or where there are significant evacuation difficulties (see Liverpool Growth Centres Precincts Development Control Plan 2008 for controls relating to flood prone land).
Tree preservation provisions	The land is subject to a tree preservation provision under the Liverpool Local Environmental Plan 2008.
Controlled access road	The land does not have a boundary to a controlled access road under the provisions of the Liverpool Local Environmental Plan 2008.
Notices	No
Environmentally significant land	The subject property is identified as containing environmentally significant land under Division 2 General provisions of the Liverpool Local Environmental Plan 2008. The objectives of this clause are as follows: a) to maintain bushland, wetlands and wildlife corridors of high conservation value; b) to identify areas of significance for revegetation to connect to or buffer bushland, wetlands and wildlife corridors; c) to protect rare and threatened native flora and native fauna; and d) to ensure consideration of the significance of vegetation, the sensitivity of the land and the impact of development on the environment prior to the giving of any development consent.

Subject	Detail
Archeological management plan	No
Unhealthy building land proclamation	No
Matters arising to the *Contaminated Land Management Act 2009*	No
Contaminated land	No

Source: Liverpool City Council S149 Records.

Further information in this regard is available from LCC's City Strategy Department or the Liverpool Local Environmental Plan 2008.

3.3 NSW EPA online notice records database search

An online search of the NSW EPA Contaminated Land Records Database returned no notice records for the Project site. One site was identified within a 5 km radius the central alignment study area that was subject to notice.

Nine records (eight former and one current) were returned for ABB Transmissions Pty Ltd (ABB) located on Bapaume Road to the North on the eastern side of the Georges River to the North of the main Moorebank IMT Site Area. Notices have been issued under Section 35 of the *Environmentally Hazardous Chemicals (EHC) Act 1985*. The notices dated between 1990 and 2013 detailed that the premises are reasonably believed to be affected by chemical contamination including polychlorinated biphenyl (PCB) compounds. The site is subject to an ongoing maintenance order associated with PCB contamination. Based on the geographical location in relation to the Phase 1 study area and separation by the Georges River, it is not considered that ABB constitutes an offsite source of contamination to the central alignment area.

A copy of the management order is in Appendix E for reference.

3.4 Dangerous goods

A WorkCover search was not undertaken as a letter of authority from the landowner for this application could not be obtained. Based on a review of the site history, it is considered unlikely that dangerous goods would be present or would have been stored at the site in the past.

3.5 Aerial photographs

Available historical aerial photographs dating back to 1930 were reviewed to assess any major changes to the site and surrounding areas over time. These are presented in Appendix F. No available aerial photos have been identified prior to 1930. The main features noted for the site and surrounding areas in each of the photographs are summarised in Table 3.3.

Table 3.3 Aerial photograph review summary

Year	Site features and surrounding areas
Current	No significant change on the site from 1978.
1994	No significant change on the site from 1978.
1978	No significant change on the site from the previous description. Increased residential development to the west (Casula).
1970	With the exception of the north-western corner of the site which remains sparsely vegetated, the site is more densely vegetated, appearing similar to present day with the southern Rail line clearly visible and development of land on the eastern side of the river and residential development to the north-west is evident.
1965	It appears that the vegetation has been removed across the majority of the site. An access road is visible in the northern end of the site. Development of land on the eastern side of the river is evident.
1930	The site appears to be cleared of vegetation (possibly farmland) with the exception of some trees in the northern area of the site and along the bank of the Georges River. The general surrounds appears to be open pasture/farmland and roads are absent.

(1) Historical aerial photographs can be obtained from NSW Land and Property Information.

3.6 Historical land use summary

3.6.1 Site

From the historical land use records reviewed, it appears that the site has remained generally unchanged since the 1970s before which is appeared to be vacant land or farmland.

3.6.2 Surrounding lands

Residential and industrial developments have gradually increased in the area since the 1970s with transport infrastructure increasing with the construction of the M5 Motorway to the north, the East Hills Line to the southwest and the SSFL to the east.

3.7 Reliance on source information

Historical information has been obtained from government held land use records and is considered reliable. Identified data gaps in information include the following;

- interpretation of aerial images which are low resolution making it difficult to see all pertinent features; and
- lack of WorkCover Dangerous Goods search.

Based on the fact that the site has remained relatively unchanged since the 1970s and is heavily vegetated, likelihood that dangerous goods have been stored at the site is considered to be low.

4. Potential for contamination

4.1 Conceptual site model

The conceptual site model (CSM) has been developed based on the available information to outline the potential sources of impacts, transport mechanisms and receptors based on the site setting including surrounding land uses. For a potential risk to be present, a source, a receptor (human or environmental) and a pathway between the source and receptor must be present for a complete exposure pathway to exist. The CSM is summarised in Table 4.1.

Table 4.1 Conceptual site model

CSM inputs	Factors (contaminants of potential concern)
Potential sources	Buried fill and soils or imported fill associated with previous excavation or reworking of the site surface (including but not limited to TPH, PAH, heavy metals and asbestos)
	Leachate and contaminated groundwater from adjacent landfill (including but not limited to TPH, BTEX, PAH, heavy metals, PCBs, OCPs, OPPs, ammonia, nitrogen and dissolved methane)
	The potential for the presence of landfill gas (methane, carbon dioxide and hydrogen sulfide) associated with the adjacent landfill
	Residual contamination associated with the former diesel fuelled power station (TPH, BTEX and PAH)
	Residual soils that may have the potential to be acid generating if exposed (PASS)
Potential pathways	Direct contact with contaminated surface soils (dermal contact, ingestion and inhalation)
	Migration of airborne dust during ground disturbance
	Leaching and migration of contaminants from surface soils vertically into underlying groundwater systems and migration/ seepage including lateral migration of contaminated water through preferential pathways such as drainage lines or geological features
	Direct contact with surface water or groundwater via pumping to other areas of the site or abstraction of potentially impacted groundwater from the identified registered bores)
	Landfill gas migration from adjacent land via soil or groundwater
	Migration of potentially contaminated groundwater on site and from off-site sources
Potential receptors	Current and future site users and utility/construction personnel involved in ground disturbance activities
	Groundwater beneath the site and potential down gradient users of abstracted groundwater for domestic use
	Terrestrial ecosystems

Based on the review of available information, it is considered that there is limited potential for onsite contamination sources with the exception of uncontrolled fill that may have been previously deposited at the site. If contamination were to exist in the subsurface, the key exposure pathways would likely be via direct contact with soils, surface water or groundwater (dermal contact, ingestion and inhalation) by construction/utility workers during site redevelopment and through the migration of airborne dust to offsite receptors and uptake via dermal contact, ingestion and inhalation.

Offsite sources of contamination that have the potential to affect the site may exist comprising:

- The active waste facility (known as GWS) located immediately to the south and hydraulically up gradient of the site. The landfill has the potential to cause contamination of groundwater via generation of leachate and/or landfill gases (such as methane, carbon dioxide and hydrogen sulfide) which could migrate beneath the site.
- The former diesel fuelled power station that was historically located immediately to the north of the site (now the Casula Powerhouse Arts Centre) where residual contamination may exist.

5. Conclusions and recommendations

The Phase 1 ESA was completed to identify the potential contamination issues present at the site to evaluate the feasibility of the site for the future proposed use as part of the Moorebank IMT. The site subject to this Phase 1 ESA is known as the central rail access option. The scope of works included a review of aerial photographs, council records, public registers, geological and hydrological information, a site visit and the preparation of this Phase 1 ESA report.

Based on a review of the available information, the site is owned by the Commonwealth. The site covers a total area of approximately 3.2 ha and slopes towards the Georges River form the western boundary and is covered in dense vegetation. The area that would be impacted by the construction footprint of the central rail access option is approximately 1.4 ha based on the current concept design.

The site is underlain by alluvial sands, silts and clays overlying shale and sandstone. The inferred groundwater flow direction is considered likely to be east to north-east in the direction of the Georges River which flows northwards along eastern boundary of the site. Based on a review of aerial photographs, it appears that the site has generally remained unchanged since the 1970s and was previously vacant land/farmland.

Based on the review of available information, it is considered there is limited potential for contamination to exist, however, due to the landfill located immediately to the south and the inferred north-easterly groundwater flow direction; there may be the potential for contamination from offsite to have migrated beneath the project area through groundwater, leachate and/or or landfill gases (methane, carbon dioxide and hydrogen sulfide). Should landfill gases be present beneath the site, there is a potential risk of exposure to hazardous gases via inhalation and the potential for explosive atmospheres to be generated.

There may also be contamination associated with uncontrolled fill that may have been previously deposited at the site historically including, but not limited to TRH, PAH, PCBs, heavy metals and asbestos). The key exposure pathways would likely be via direct contact with soils, surface water or groundwater (dermal contact, ingestion and inhalation) by construction/utility workers during site redevelopment and through the migration of airborne dust to offsite receptors and uptake via dermal contact, ingestion and inhalation. It is considered that these exposure pathways can be adequately managed by implementing good health and safety practices during any future works to avoid contact with potentially contaminated soils and groundwater.

Based on Council records, the land is also affected by Liverpool Local Environmental Plan 2008 that restricts the development of the land because of the likelihood of ASS class 5. The presence of potential acid sulfate soils should be further investigated and an appropriate management strategy developed (as required) prior to commencement of any site excavation or construction works.

It is recommended that at subsequent project approval stages (under the NSW *Environmental Planning and Assessment Act 1979*), a targeted intrusive investigation be undertaken in order to gather data on soil and groundwater quality (including landfill gas and ASS assessments) so that management and/or remediation options for the site can be evaluated (if required).

6. Limitations

Scope of services

This environmental site assessment report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and Parsons Brinckerhoff (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on data

In preparing the report, Parsons Brinckerhoff has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, Parsons Brinckerhoff has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Parsons Brinckerhoff will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Parsons Brinckerhoff.

Environmental conclusions

In accordance with the scope of services, Parsons Brinckerhoff has relied upon the data and has not conducted any environmental field monitoring or testing in the preparation of the report. The conclusions are based upon the data and visual observations and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Within the limitations imposed by the scope of services, the assessment of the site and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for benefit of client

The report has been prepared for the benefit of the client (MIC) and no other party. Parsons Brinckerhoff assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of Parsons Brinckerhoff or for any loss or damage suffered by any other party in relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other limitations

Parsons Brinckerhoff will not be liable to update or revise the report to take into account any events, emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to nor ownership of the properties, buildings and structures referred to in the report, nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

7. References

- ANZECC (1992) Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites.
- Department of Lands Spatial Information Exchange – http://gsp.maps.nsw.gov.au.
- Department of Land and Water Conservation (1998) – Guidelines for the use of acid sulfate soils risk maps (2nd Edition) - March 1998.
- Department of Mineral Resources (1991), Penrith 1:100,000 Geological Series Sheet 9030.
- NSW EPA Contaminated Land Records Database - http://www.environment.nsw.gov.au/prclmapp/searchregister.aspx.
- NSW Land and Property Information - http://www.lpi.nsw.gov.au/.
- NSW Natural Resource Atlas - http://www.nratlas.nsw.gov.au.
- Parsons Brinckerhoff (2014), Moorebank Intermodal Terminal Surface Water Assessment (Reference 2103829E-TPT-REP-003 RevA).

8. Figures

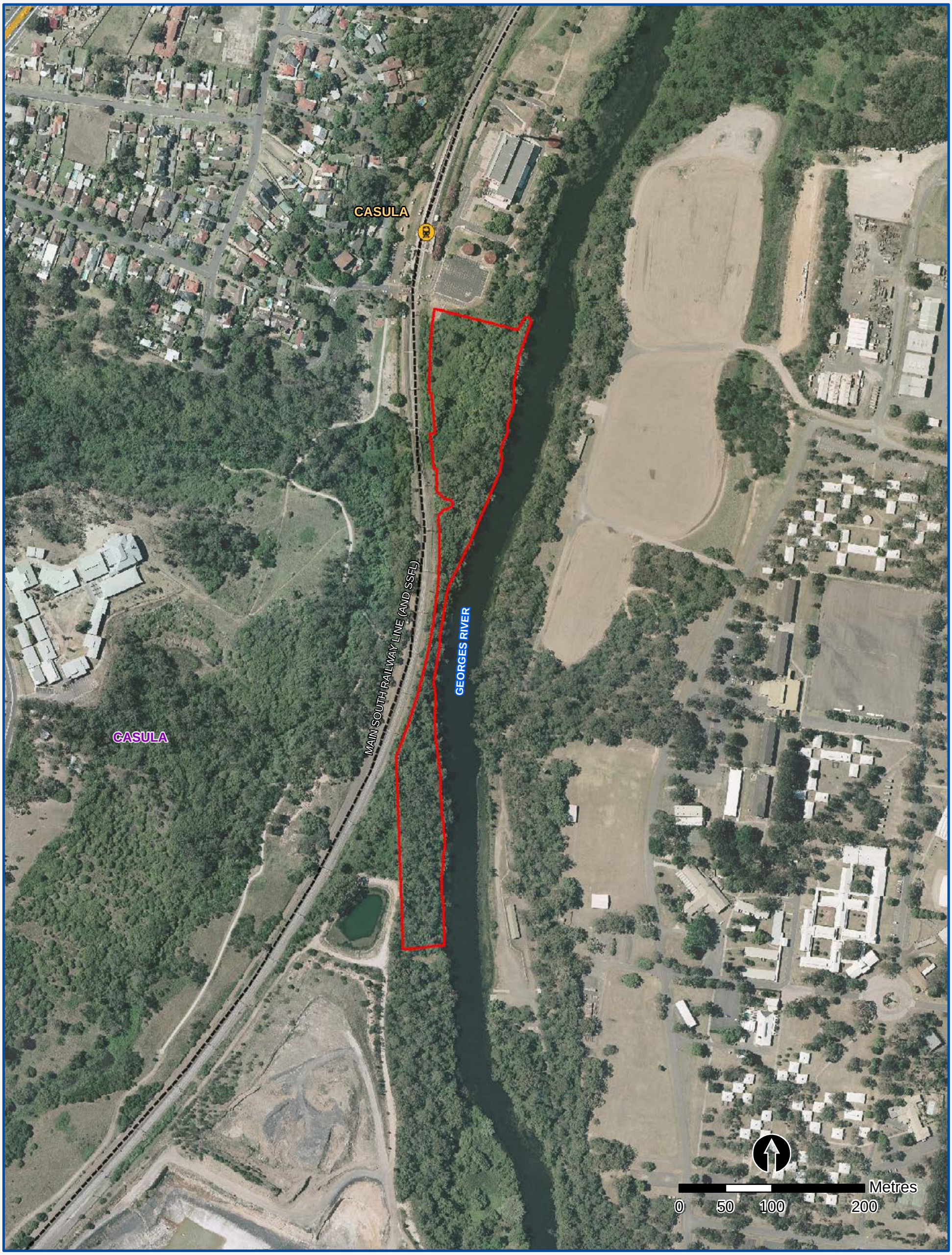


Figure 1: Site location

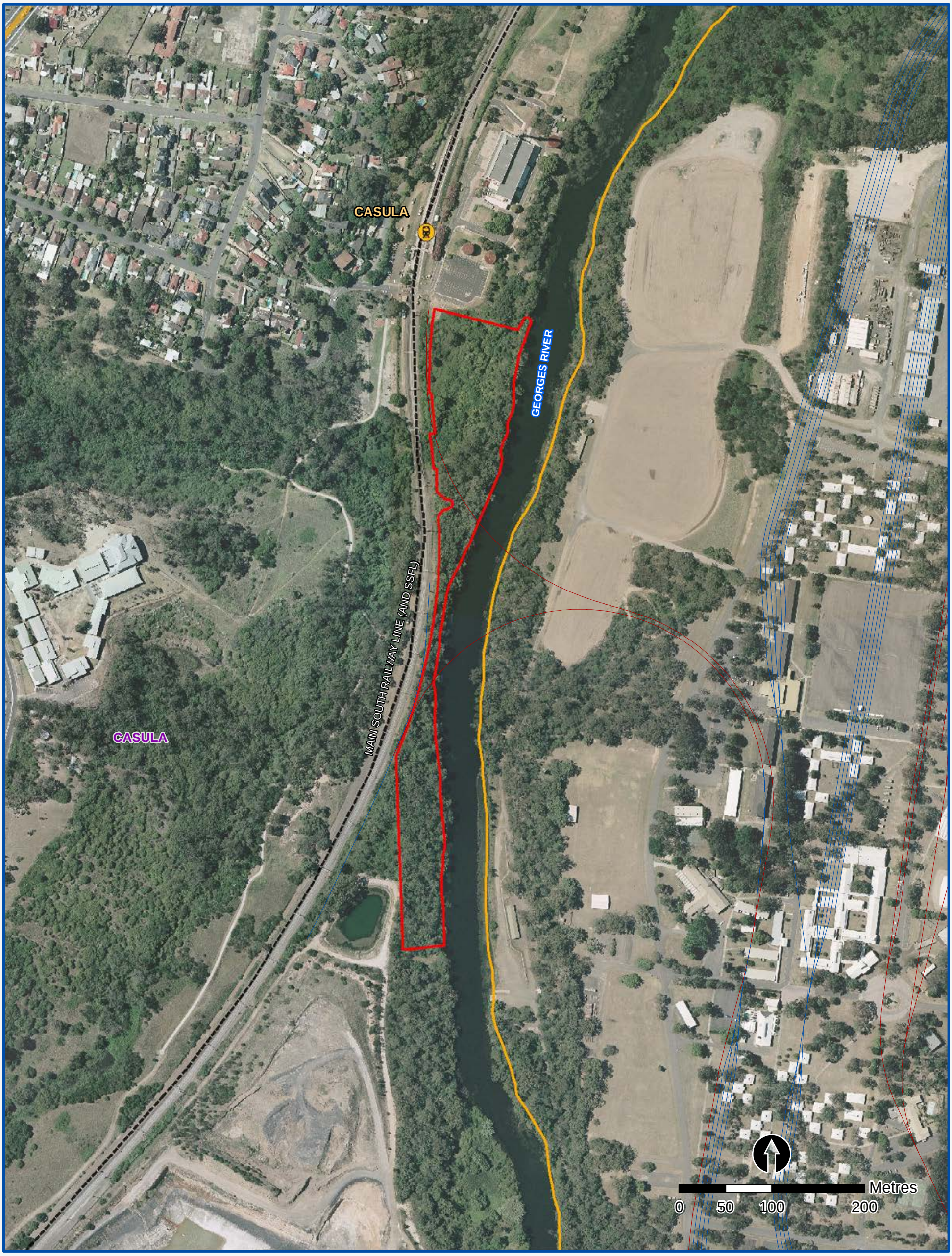


Figure 2: Central rail alignment option

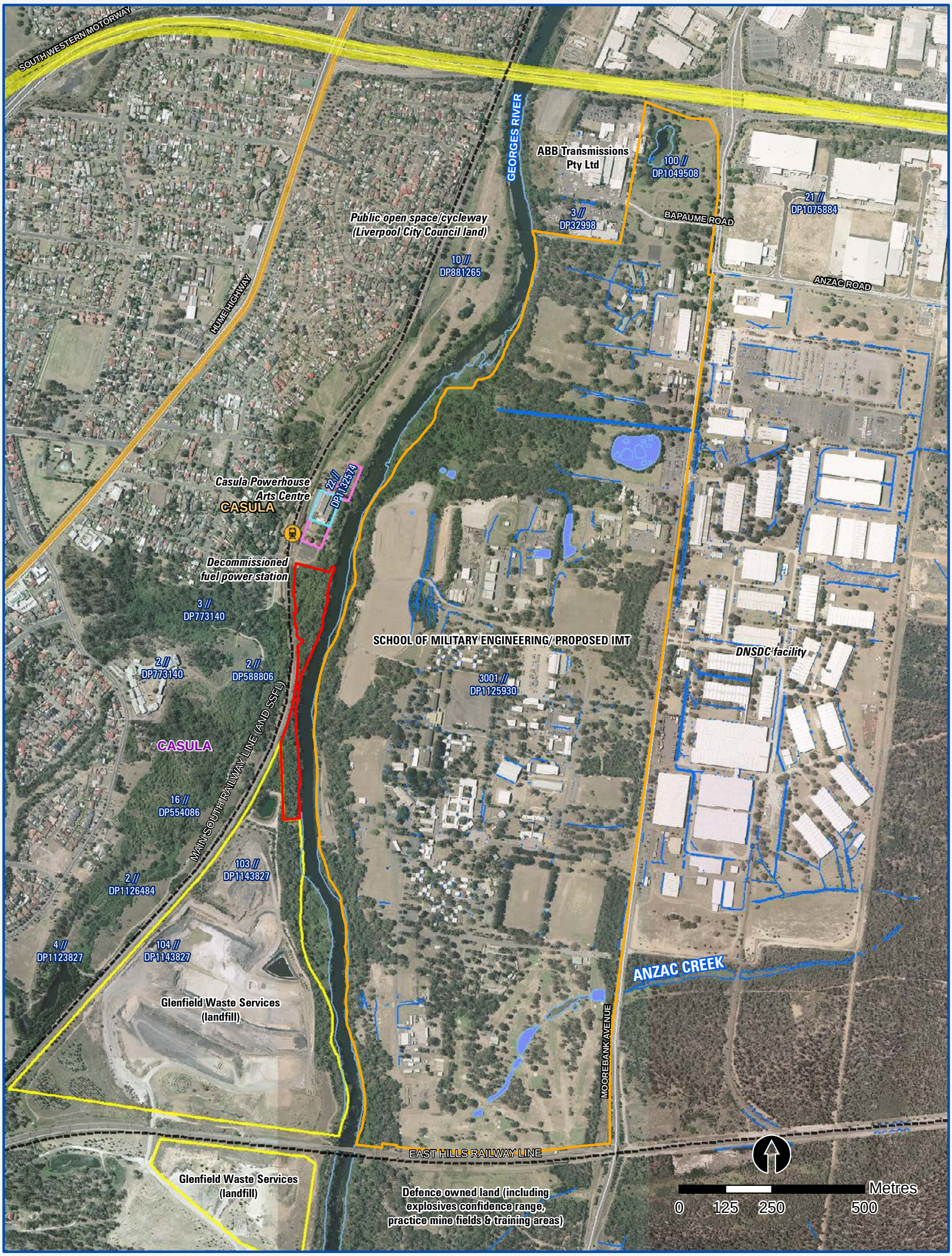
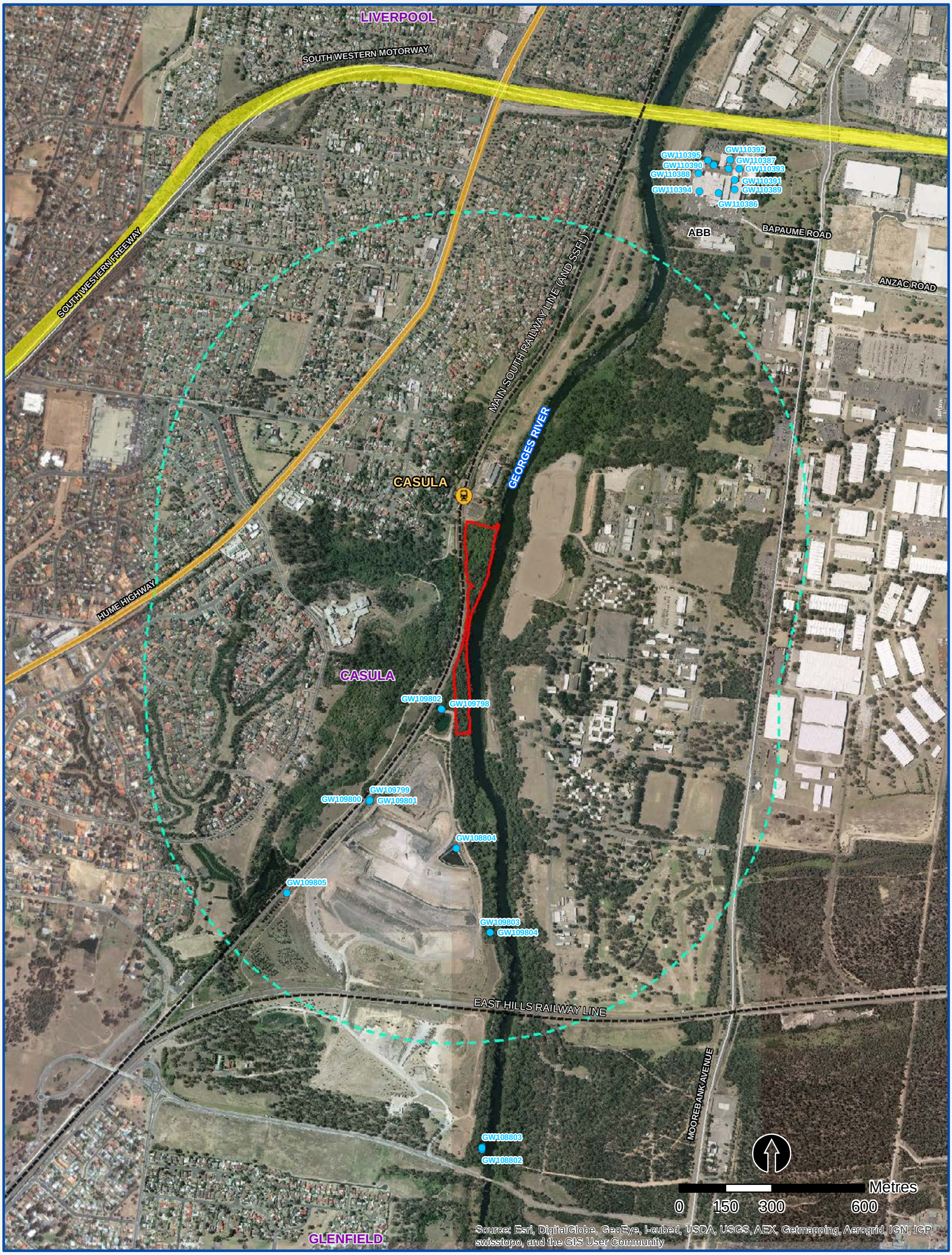


Figure 3: Site setting and surrounding features



Aerial Source: © 2014 Google earth and its data suppliers

\\Apsydfil03\proj\KKPMG_Australia\2103829A_Moorebank_Intermodal_Terminal\10_GIS\Projects\ESRI\2103829A_GIS_F292_A1.mxd // MitchellEm // 14/05/2014

Rail line & station

Study area

1km radius

Registered monitoring wells

- Domestic
- Industrial
- Monitoring well
- Waste disposal

Figure 4: Registered boreholes

Appendix A

Registered groundwater bore search information

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, May 7, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW108804

Works Details (top)

GROUNDWATER NUMBER	GW108804
LIC-NUM	10BL601719
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	Equipped - bore used for obs
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2008-04-22
FINAL-DEPTH (metres)	11.00
DRILLED-DEPTH (metres)	11.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GLENFIELD WASTE DISPOSALS
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6240274.00
EASTING	307015.00
LATITUDE	33 57' 37"
LONGITUDE	150 54' 41"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	50//229438

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	50 229438

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	11.00	100			Auger - Solid Flight
1	1	Casing	P.V.C.	-0.75	5.00	50			Screwed
1	1	Opening	Screen	5.00	11.00	50			PVC; Screwed
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded; GS: 2-5mm; Q: 4500m³

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	7.50	7.50	SAND,BROWN,FINE TO MEDIUM GRAINED		
7.50	10.00	2.50	CLAY,ORANGE,GREY,CLAYEY SAND,DRY		
10.00	11.00	1.00	WEATHERED SHALE.DARK GREY		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, May 7, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW109798

Works Details (top)

GROUNDWATER NUMBER	GW109798
LIC-NUM	10BL601720
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2007-01-29
FINAL-DEPTH (metres)	29.80
DRILLED-DEPTH (metres)	29.80
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GLENFIELD WASTE DISPOSALS
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6240724.00
EASTING	306970.00
LATITUDE	33 57' 23"
LONGITUDE	150 54' 40"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	22//230435

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	22 230435

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	10.00	100			Auger - Solid Flight
1		Hole	Hole	10.00	29.80	100			Auger - Solid Flight
1	1	Casing	P.V.C.	-0.70	23.80	50			Screwed
1	1	Opening	Screen	23.80	29.80	50			PVC; Screwed
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded; GS: 2-5mm

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	3.50	3.50	SANDY CLAY, BROWN,FINE TO MEDIUM GRAINED		
3.50	9.00	5.50	SANDY CLAY,LIGHT GREY,DRY TO MOIST		
9.00	10.00	1.00	SILTY SAND,WET BROWN,DARK GREY,COURSE GRAINED		
10.00	20.50	10.50	SHALE,DARK GREY,MEDIUM STRENGTH,TRACE CLAY		

20.50	22.50	2.00	SHALE.LAMINATED SANDSTONE,DARK GREY
22.50	29.80	7.30	SANDSTONE,LIGHT GREY,MEDIUM GRAINED

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, May 7, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW109799

Works Details (top)

GROUNDWATER NUMBER	GW109799
LIC-NUM	10BL601720
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2007-01-29
FINAL-DEPTH (metres)	22.80
DRILLED-DEPTH (metres)	22.80
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GLENFIELD WASTE DISPOSALS
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6240430.00
EASTING	306736.00
LATITUDE	33 57' 32"
LONGITUDE	150 54' 30"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	22//230435

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	22 230435

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	8.80	100			Auger - Solid Flight
1		Hole	Hole	8.80	22.80	100			Auger - Solid Flight
1	1	Casing	P.V.C.	-0.40	17.00	50			Screwed
1	1	Opening	Screen	17.00	22.80	50			PVC; Screwed
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded; GS: 2-5mm; Q: 6800m³

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	3.00	3.00	SANDY CLAY LOAM,BROWN,FINE TO MEDIUM GRAIN,DRY		
3.00	7.50	4.50	SILTY SANDY CLAY,BROWN,MEDIUM GRAINED,DRY		
7.50	8.50	1.00	CLAYEY SAND,LIGHT GREY,MEDIUM GRAINED,DRY TO MOIST		
			SHALE,DARK GREY,MEDIUM		

8.50	13.00	4.50	STRENGTH,WATER FROM 8m
13.00	15.00	2.00	WEATHERED SHALE AND LAMINATED SANDSTONE,GREY
15.00	22.80	7.80	SANDSTONE,LIGHT GREY,FINE TO MEDIUM GRAINED

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, May 7, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW109800

Works Details (top)

GROUNDWATER NUMBER	GW109800
LIC-NUM	10BL601720
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2007-01-29
FINAL-DEPTH (metres)	11.00
DRILLED-DEPTH (metres)	11.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GLENFIELD WASTE DISPOSALS
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6240426.00
EASTING	306733.00
LATITUDE	33 57' 32"
LONGITUDE	150 54' 30"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	22//230435

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	22 230435

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	11.00	100			Auger - Solid Flight
1	1	Casing	P.V.C.	-0.75	7.00	50			Screwed
1	1	Opening	Screen	7.00	11.00	50			PVC; Screwed
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded; GS: 2-5mm; Q: 6300m³

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	2.00	2.00	SILTY CLAY LOAM,BROWN,FINE TO MEDIUM GRAIN,DRY		
2.00	3.50	1.50	SILTY CLAY,DARK BROWN,FIRM		
3.50	4.30	0.80	SILTY SAND,DARK GREY MEDIUM TO COARSE GRAINED,MOIST		
4.30	10.50	6.20	CLAYEY SAND,LIGHT GREY,MEDIIUM GRAINED,DRY TO MOIST		
10.50	11.00	0.50	WEATHERED SHALE,DARK GREY,HARDER WITH DEPTH		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Friday, May 16, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW109801

Works Details (top)

GROUNDWATER NUMBER	GW109801
LIC-NUM	10BL601720
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2007-01-30
FINAL-DEPTH (metres)	14.00
DRILLED-DEPTH (metres)	14.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GLENFIELD WASTE DISPOSALS
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6240429.00
EASTING	306735.00
LATITUDE	33 57' 32"
LONGITUDE	150 54' 30"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	22//230435

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	22 230435

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	14.00	100			Auger - Solid Flight
1	1	Casing	P.V.C.	-0.75	10.00	50			Screwed
1	1	Opening	Screen	10.00	14.00	50			PVC; Screwed
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded; GS: 2-5mm; Q: 5000m³

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	3.00	3.00	SANDY CLAY LOAM,BROWN,FINE TO MEDIUM GRAIN,DRY		
3.00	4.00	1.00	SILTY SANDY CLAY,BROWN,MEDIUM GRAINED,DRY		
4.00	7.50	3.50	SAND,GREY,FINE TO MEDIUM GRAINED		
7.50	8.50	1.00	CLAYEY SAND,LIGHT GREY,MEDIUM GRAINED,DRY TO MOIST		
8.50	10.00	1.50	WEATHERED SHALE,DARK GREY,HARDER WITH DEPTH		

10.00	14.00	4.00	SHALE,DARK GREY

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Friday, May 16, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW109802

Works Details (top)

GROUNDWATER NUMBER	GW109802
LIC-NUM	10BL601720
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2007-01-29
FINAL-DEPTH (metres)	10.00
DRILLED-DEPTH (metres)	10.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GLENFIELD WASTE DISPOSALS
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6240725.00
EASTING	306967.00
LATITUDE	33 57' 23"
LONGITUDE	150 54' 39"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	22//230435

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	22 230435

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	10.00	100			Auger - Solid Flight
1	1	Casing	P.V.C.	-0.60	6.00	50			Screwed
1	1	Opening	Screen	6.00	10.00	50			PVC; Screwed
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded; GS: 2-5mm; Q: 4000m³

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	3.50	3.50	SANDY CLAY,BROWN,FINE TO MEDIUM GRAINED,TRACE CLAY,DRY		
3.50	9.00	5.50	SANDY CLAY,LIGHT GREY,DRY TO MOIST		
9.00	10.00	1.00	SILTY SAND,WET,BROWN,DARK GREY		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, May 7, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW109803

Works Details (top)

GROUNDWATER NUMBER	GW109803
LIC-NUM	10BL601722
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2009-02-10
FINAL-DEPTH (metres)	29.80
DRILLED-DEPTH (metres)	29.80
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GLENFIELD WASTE DISPOSALS
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6240002.00
EASTING	307124.00
LATITUDE	33 57' 46"
LONGITUDE	150 54' 45"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	5//833516

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	5 833156

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	7.50	100			Auger - Solid Flight
1		Hole	Hole	7.50	29.80	100			Other
1	1	Casing	P.V.C.	-0.82	20.80	50			Screwed
1	1	Opening	Screen	20.80	29.80	50			PVC; Screwed
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded; GS: 2-5mm; Q: 11800m³

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.40	0.40	FILL,CLAY,(REWORKED NATURAL) DRY, STIFF		
0.40	7.50	7.10	SAND AND SANDY CLAY,DARK BROWN WITH CLAY LENSES FROM 4.5m		
7.50	10.90	3.40	SHALE,LAMINATED SANDSTONE,DARK GREY,MEDIUM STRENGTH		
10.90	29.80	18.90	SANDSTONE,LIGHT GREY/WHITE,MEDIIUM GRAINED		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, May 19, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW109804

Works Details (top)

GROUNDWATER NUMBER	GW109804
LIC-NUM	10BL601722
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2009-02-10
FINAL-DEPTH (metres)	7.50
DRILLED-DEPTH (metres)	7.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GLENFIELD WASTE DISPOSALS
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6240002.00
EASTING	307125.00
LATITUDE	33 57' 46"
LONGITUDE	150 54' 45"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	5//833516

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	5 833156

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	7.50	100			Auger - Solid Flight
1	1	Casing	P.V.C.	-0.78	4.00	50			Screwed
1	1	Opening	Screen	4.00	7.00	50			PVC; Screwed
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded; GS: 2-5mm; Q: 3500m³

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.40	0.40	FILL,CLAY,(REWORKED NATURAL) DRY STIFF		
0.40	1.50	1.10	SAND,BROWN,FINE GRAINED		
1.50	4.00	2.50	SAND,GREY/BROWN,FINE GRAINED		
4.00	7.50	3.50	SANDY CLAY,DARK BROWN WITH CLAY LENSES FROM 4.5m.		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, May 7, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW109805

Works Details (top)

GROUNDWATER NUMBER	GW109805
LIC-NUM	10BL601722
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2007-01-29
FINAL-DEPTH (metres)	12.00
DRILLED-DEPTH (metres)	12.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	GLENFIELD WASTE DISPOSALS
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6240130.00
EASTING	306467.00
LATITUDE	33 57' 42"
LONGITUDE	150 54' 20"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	//999999

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MINTO
PORTION-LOT-DP	5 833156

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	12.00	100			Auger - Solid Flight
1	1	Casing	P.V.C.	-0.75	5.10	50			Screwed
1	1	Opening	Screen	5.10	12.00	50			PVC; Screwed
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded; GS: 2-5mm; Q: 6900m^3

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.80	1.80	SILTY CLAY LOAM,BROWN,DRY		
1.80	2.80	1.00	SANDY LOAM,TRACE SILT, GREY/BROWN		
2.80	9.80	7.00	SAND,LIGHT BROWN, MEDIUM GRAINED,TRACE SILT		
9.80	12.00	2.20	SAND,GREY,MEDIUM GRAINED,WET,WEATHERED SHALE AT 12m		

(DIPNR) by drillers, licensees and other sources. The DIPNR does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

Appendix B

Site photographs

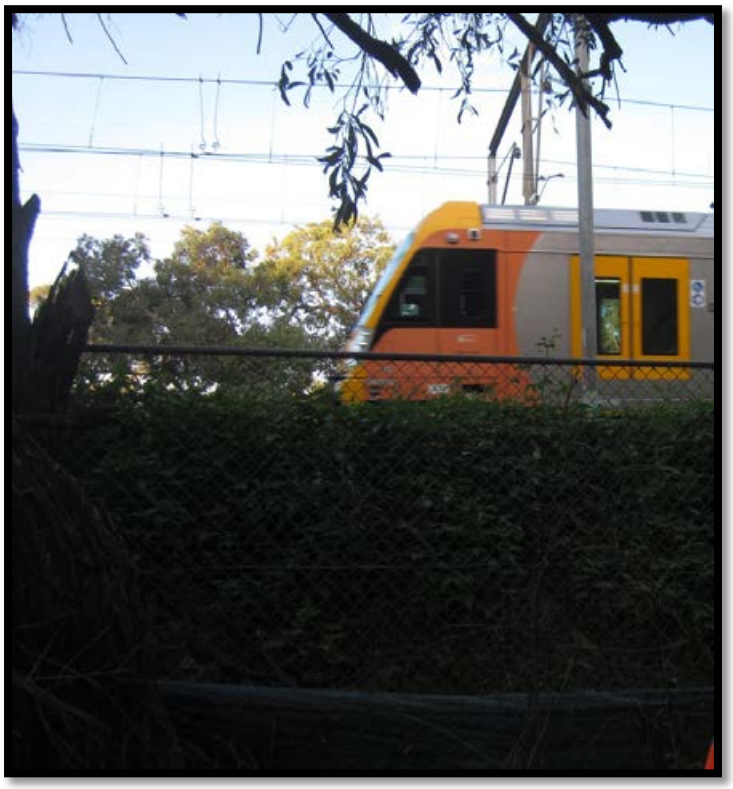
Photograph 1 View south west from northern boundary of the site taken from Casula Powerhouse showing rail corridor and existing groundwater monitoring well.

Photograph 2 View south east from northern boundary of the site taken from Casula Powerhouse, showing steep slope to the southern end of the site.

Photograph 3 View looking south from northern boundary of the site showing dense vegetation cover.

Photograph 4 View looking west from northern boundary of the site showing steep slope from the western side of the site to the Georges River on the eastern boundary of the site.

Photograph 5 Northern boundary of the site fenced from Casula Powerhouse car park, no access to the site from the northern end.



Photograph 6 View from the eastern side of the Georges River trying to view site from Bellbird walking track over the Main Southern Rail line.

Appendix C

Land titles

ADVANCE LEGAL SEARCHERS PTY LTD

(ACN 147 943 842)
ABN 82 147 943 842

P.O. Box 149
Yagoona NSW 2199

Telephone: +612 97644 1679
Mobile: 0412 169 809
Facsimile: +612 8-76 3026
Email: alsearch@optusnet.com.au

5th April, 2014

PARSONS BRINCKERHOFF PTY LIMITED
Level 27, 680 George Street,
SYDNEY NSW 2001

Attention: Lisa Powell,

RE: **Casula Road, Casula**
Project No: 218929E
Task: 14.700

Current Search

Folio Identifier 4/1130937 (title attached)
DP 1130937 (plan attached)
Dated 2nd April, 2014
Proprietor:
THE COMMONWEALTH OF AUSTRALIA

Title Tree
Lot 4 DP 1130937

Folio Identifier 4/1130937

Folio Identifier 21/230435

Certificate of Title Volume 10470 Folio 183

(a)

Certificate of Title Volume 5655 Folio 2

Certificate of Title Volume 5410 Folio 104

Certificate of Title Volume 3894 Folio 176

Certificate of Title Volume 3823 Folio 81

PA 26388

(b)

Certificate of Title Volume 6049 Folio 69

Certificate of Title Volume 2486 Folio 154

*****

Summary of proprietor(s)
Lot 4 DP 1130937

Year	Proprietor
	(Lot 4 DP 1130937)
2009 – todate	The Commonwealth of Australia
	(Loat 21 DP 230435)
1988 – 2009	The Commonwealth of Australia
	(Lot 21 DP 230435 – CTVol 10470 Fol 183)
1967 – 1988	The Commonwealth of Australia
1967 – 1988	Robert Alexander Paul, company executive The Commonwealth of Australia

See Notes (a) & (b)

Note (a)

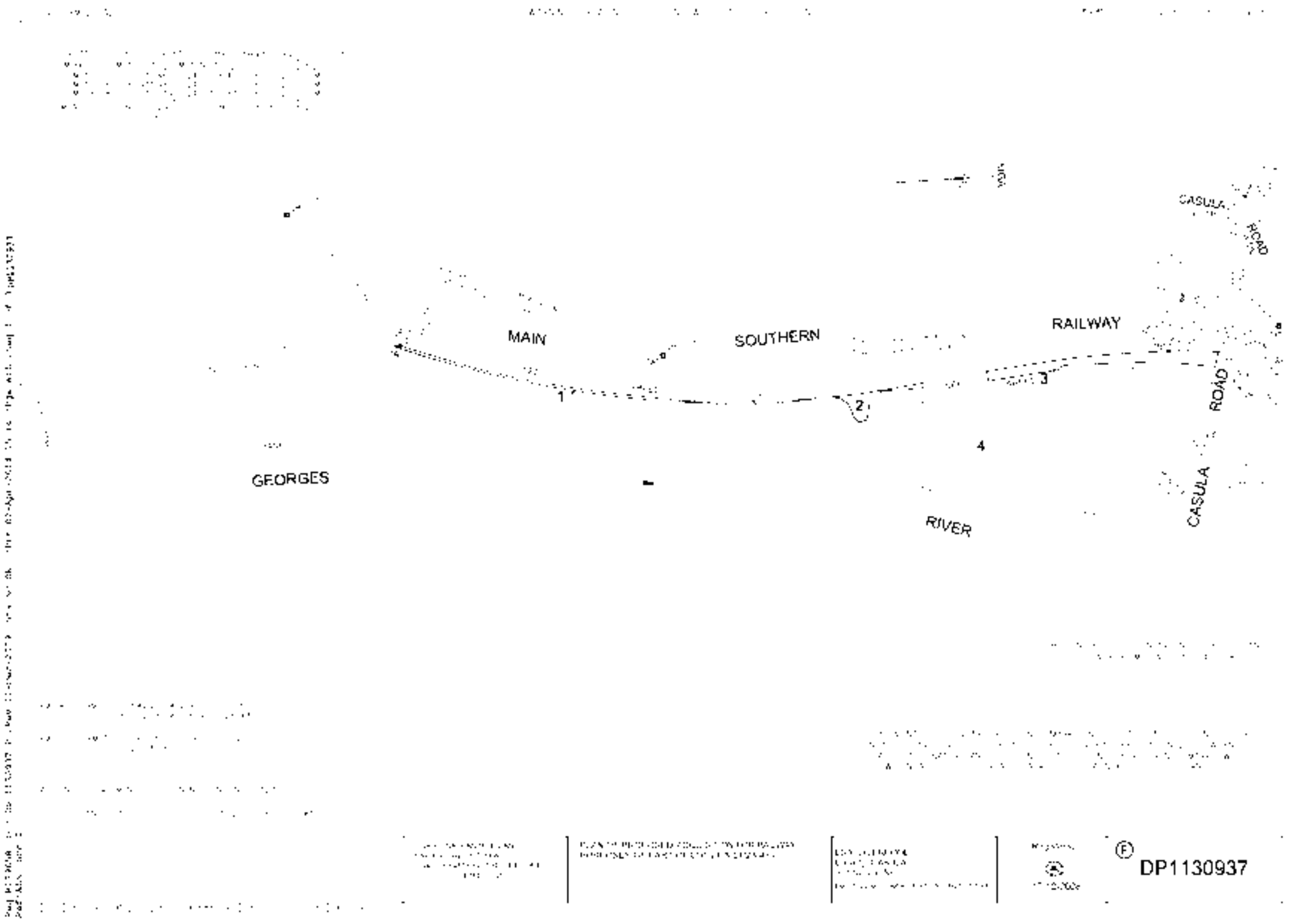
	(Lot B DP 314975, Lot D DP 348357 and land adjoining on DP 354904, part of Portions 67 & 272, Parish of Minto – Area 23 Acres 1 Rood 10 Perches – CTVol 5655 Fol 2)
1966 – 1967	Robert Alexander Paul, company executive
1947 – 1966	Eugene Erskine Claud White, orchardist
	(Lot B DP 314975, Lot D DP 348357 and land adjoining on DP 354904, part of Portions 67 –&272, Parish of Minto – Area 21 Acres 1 Rood 10 Perches – CTVol 5410 Fol 104)
1944 – 1947	Eugene Erskine Claud White, orchardist
	(Lot B DP 314975, part of Portions 67 & 272, Parish of Minto – Area 16 Acres 1 Rood 10 Perches – CTVol 3894 Fol 176)
1926 – 1944	Eugene Erskine Claud White, sheriff's officer
	(Part of Portions 67 & 272, Parish of Minto – Area 376 Acres 2 Roods 0 Perches – CTVol 3823 Fol 81)
1926 – 1926	Eugene Erskine Claud White, sheriff's officer
1926 – 1926	James Freeland Leacock, dairy farmer
(1926 – 1926)	*(various leases for dairy activities of part, shown on CTVol 3823 Fol 81)*

*****

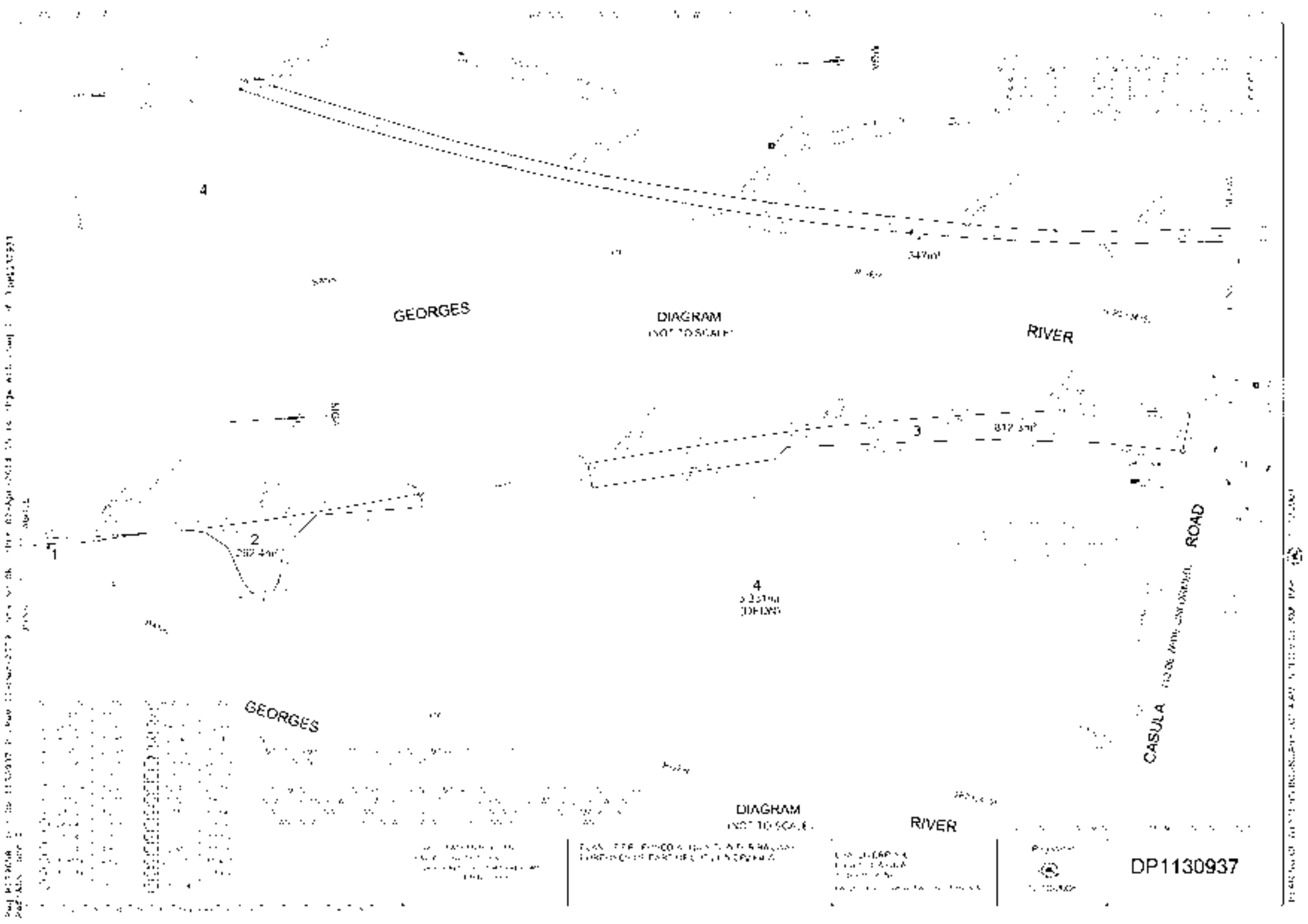
Note (b)

	(Lot 2 DP 7507 – Area 6 Acres 0 Roods 8 Perches – CTVol 6049 Fol 69)
1965 – 1967	The Commonwealth of Australia
1949 – 1965	Barfield Pty Limited
1949 – 1949	Brian Norman de Meyrick, grazier
	(Lot 2 DP 7507, with other lands – Area 6 Acres 0 Roods 8 Perches – CTVol 2486 Fol 154)
1949 – 1949	Brian Norman de Meyrick, grazier
1922 – 1949	Julian Frank de Meyrick, area officer
1920 – 1922	George Thomas Barker, labourer William Barker, porter
1914 – 1920	Federick Edwin Barker, orchardist
(1926 – 1933)	*(various leases of part, shown on CTVol 2486 Fol 154)*

*****



DP1130937


GEORGES
DIAGRAM
RIVER
3
2
4
ROAD
CASULA
GEORGES
DIAGRAM
RIVER

DP1130937

PLAN FORM 6 WARNING: Creasing or folding will lead to rejection

DEPOSITED PLAN ADMINISTRATION SHEET

Sheet 1 of 1 sheet(s)

SIGNATURES, SEALS and STATEMENTS of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

Approved for and on behalf of the Rail Corporation New South Wales
Authorised Officer
29/8/2008

Use PLAN FORM 6A for additional certificates, signatures, seals and statements

Crown Lands NSW/Western Lands Office Approval

.... in approving this plan certify (Authorised Officer) that all necessary approvals in regard to the allocation of the land shown herein have been given

Signature ....
Date ....
File Number ....
Office ....

Subdivision Certificate

I certify that the provisions of s.109J of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to:

the proposed .... set out herein (insert 'subdivision' or 'new road')

....
* Authorised Person/General Manager/Accredited Certifier

Consent Authority: ....
Date of Endorsement: ....
Accreditation no ....
Subdivision Certificate no ....
File no ....

* Delete whichever is inapplicable.

DP1130937

Registered: 17-10-2008
Title System: TORRENS
Purpose: ACQUISITION

PLAN OF PROPOSED ACQUISITION FOR RAILWAY PURPOSES OF PART OF LOT 21 IN DP230435

LGA: LIVERPOOL
Locality: CASULA
Parish: ST. LUKE
County: CUMBERLAND

Surveying Regulation, 2006

I, ...NATHAN MILLIGAN ....
of ....PROJECT SURVEYORS (ph 9588 3648)........
a surveyor registered under the *Surveying Act, 2002*, certify that the survey represented in this plan is accurate, has been made in accordance with the *Surveying Regulation, 2006* and was completed on ...1/07/2008...........

The survey relates to ....LOTS 1 - 4 ....

(specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey)

Signature .... Dated: 1/7/08
Surveyor registered under the Surveying Act, 2002

Datum Line: ...'X' – 'Y'...........
Type: Urban/Rural

Plans used in the preparation of survey/compilation

DP230435
DP590575
DP

(if insufficient space use Plan Form 6A annexure sheet)

SURVEYOR'S REFERENCE: 1850/08/13

* OFFICE USE ONLY

Advance Legal Searchers Pty Ltd

ACN 147 943 842
PO Box 149
YAGOONA NSW 2199

Tax Invoice

ABN	DATE	INVOICE NO
82 147 943 842	5/04/2014	1854

INVOICE TO

Parsons Brinckerhoff Australia Pty Ltd
GPO Box 5394
Sydney NSW 2001

Attention: Accounts Payable

P.O. NO.	TERMS
218929E	Net 30

DESCRIPTION	QTY	RATE	TAX	TAX AMT	AMOUNT
Casula Road, Casula Lots x 1 Attention: Lisa Powell/ Delyth Toghill					
Search & Report	1	250.00	GST	25.00	250.00
Disbursements	5	14.75	GST	7.38	73.75
Postage	1	15.00	GST	1.50	15.00

TAX SUMMARY

$ 33.88 GST ;

SUBTOTAL	338.75
TAX TOTAL	33.88
Total	$372.63

Thank you for your business.

St George Bank
99 Elizabeth Street, Sydney 2000
BSB: 112-879
Account No: 420464565

Contact: Norm 0412 169 809
Allan 0421 318 019