Appendix I Soils and Contamination Specialist Study

Newcastle Power Station

Soils and Contamination Specialist Study

AGL

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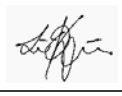
Author signature		Approver signature	-
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Executive Summary

Aurecon Australia has been engaged by AGL Energy Limited (AGL) to undertake an Environmental Impact Statement (EIS) for the proposed Newcastle Power Station, located in Tomago, NSW (the proposal). This report provides a review of the current soil and contamination conditions and potential soil and contamination impacts that may arise during the construction and operational phases of the power station.

The proposal includes the power station site as well as two easement investigation areas, for the gas pipelines linking the power station to the existing Newcastle Gas Storage Facility (NGSF) as well as the electrical transmission lines.

This report provides a review of the current soil conditions and potential sources of contamination during the construction and operational phases of the power station. Potential constraints and impacts as a result of the soil and contamination conditions are identified with recommended mitigation measures, residual impact and monitoring requirements.

A desktop review of existing information and previous environmental reports has been undertaken to assess the current environmental conditions of the site, soil types and establish the sources of potential contamination historically as well as during the construction and operational phase of the project. A site visit was also undertaken on 25 March 2019 by an Aurecon environmental consultant to confirm the findings of the background assessment and assess for potential signs of contamination.

Based on the desktop review of available information, historical aerial imagery, previous reports provided and proposal area inspection by Aurecon, the following conclusions regarding soil and contamination aspects for the proposal area are made:

General

- Potential impacts of the proposal are typical of large scale power generation construction projects and would be managed with the implementation of proposal specific environmental management plans, adherence to industry standards for earthworks and construction activity and handling and storage of chemicals and contaminated materials.
- The earthworks and site preparation would alter the current topography, landscape and visual amenity. Measures to mitigation and manage soil and contamination land degradation, will be collated in environmental management plans to be approved prior to the proposal construction works and operation of the power station.

Contamination

- The potential for significant widespread contamination to be present throughout the proposal area as a result of past and present land use activities, is considered to be low to moderate, most commonly due to historical land filling/presence of surface wastes, buildings that may have contained asbestos, legacy regional and industrial precinct contamination issues, waterways impacted by contamination discharges and industrial land uses with formerly poor waste management practices.
- There are several localised areas that pose potential human health or ecological risk that require further assessment during proposal development and potential management or remediation. The existing proposal area contamination dataset (typically previous ground investigation reports) shows elevated concentrations are localised and are not representative of broad/site wide gross contamination.
- Confirmation of ground conditions and assessment of contamination for moderate risk AECs (illegal surface dumping) should be considered as part of future geotechnical and concurrent contamination investigations when power station engineering designs and preferred options are known.
- Where considered required, further characterisation of wastes that require removal/management and Remedial Action Plans (RAPs) should be prepared to manage contamination risks prior to proposal area construction activities commencing. Typically, these activities should be undertaken during early works construction.

- Assessment of waste/spoil quality for trenching/ground disturbance will be required to ensure that waste classifications are known prior to excavation occurring to a high level of confidence for materials management purposes for the proposal.
- Low contamination risk sites should be assessed concurrently with any future geotechnical investigations to inform engineering designs. Where no further intrusive ground investigations are undertaken prior to future construction, the proposal construction environmental management plan (CEMP) must have an unexpected finds protocol (UFP) for incidental potential contamination finds during earthworks for the proposal.
- Aurecon note there is deemed to be a LOW residual environmental risk where the plans are prepared and implemented.
- Further assessment is likely required to adequately prepare the recommended management plans. This will include HAZMAT audits, lead paint surveys, further assessment of identified areas of contamination and asbestos for building fabric and structures to be demolished.

Soils and ASS

- The potential for ASS is moderate to high throughout most of the proposal within low lying areas and drainage lines. Management and mitigation measures should be taken during construction/excavation to limit generation of acid by oxidation which may impact the environment, groundwater and durability of structures (design life) through generation of acidic surface water or groundwater. Management of these issues should be addressed through an appropriate acid sulfate soil management plan (ASSMP) during construction.
- Based on the information review, there are no major geotechnical constraints in the proposal area. However, normal engineering design and practice are to be implemented in accordance with relevant Australian Standards and their engineering design principals.
- Both the construction and operational phases of the proposal have the potential to impact upon the surrounding environment. As such, the following management plans should be prepared and implemented to mitigate any potential risk:
    - Construction and Operation Environmental Management Plans (CEMP and OEMP).
    - Acid Sulfate Soil Management Plan.
    - Sediment and Erosion Control Plan.
    - Construction Waste Management Plan.
    - Operational Waste Management Plan.

1 Introduction

1.1 Background

AGL Energy Limited (AGL) engaged Aurecon Australasia Pty Ltd (Aurecon) to undertake an environmental impact statement (EIS) for a proposed Power Station, located in Tomago, NSW (the Proposal). This report provides a review of the current soil conditions and potential sources of contamination during the construction and operational phases of the Power Station. Potential constraints and impacts as a result of the soil conditions are identified with recommended mitigation measures, residual impact and monitoring requirements.

This project is declared as Critical State Significant Infrastructure (SSI) and Secretary's Environmental Assessment Requirements (SEARs) have been issued. This report addresses the soils and contaminated land aspects of the SEARs.

To support the abating or elimination of potential adverse impacts on the receiving environment caused by the proposal, the report incorporates proposed mitigation measures, including recommendations for the development of specific construction and operational environmental management plans.

1.2 Proposal Summary

AGL propose to construct and operate a dual fuel (gas or diesel) fired fast-start peaking power station with a nominal operating capacity of approximately 250MW, and associated infrastructure including natural gas supply and electrical connection to the existing TransGrid Tomago 132kV switchyard.

The proposal includes the Newcastle Power Station (NPS), gas pipelines supplying gas to the facility, electricity transmission from the NPS, site access and associated ancillary facilities. The pipeline(s) would supply the proposed NPS with gas from the eastern Australia gas transmission pipelines via the Jemena HPP network. A new electricity transmission line would transfer the electricity produced by the proposed NPS to the national electricity network via connection to the existing 132kV Tomago switchyard.

1.3 Study objective

An objective of the EIS is to address potential soil and contamination impacts associated with the construction and operational phase of the proposal. It also aims to provide guidance on ways of managing the potential sources of soil and contamination impacts to avoid any environmental degradation.

This assessment has been prepared to fulfil the requirements included in the SEARs, which are outlined in **Table 1-1** below. The assessment also addresses agency comments outlined in **Table 1-2**. Relevant legislation and policy, as outlined within the SEARs is outlined in **Table 1-3**.

Table 1-1 SEARs requirements for soils and contamination

Secretary's requirements	Scope of assessment	Report section
A description of the existing environment likely to be affected by the proposal using sufficient baseline data.	Review of recent and historic reports relevant to soil and contamination assessment for the proposal area.	Section 5
	Site inspection to obtain a valid understanding and conceptualisation of the soil and contamination conditions within and around the proposal area.	Section 4.12
	Baseline desktop analysis of available information to characterise the soil and environment within and around the proposal area.	Section 4

Secretary's requirements	Scope of assessment	Report section
An assessment of impacts of the project on soils, land capability and geotechnical stability of the site and surrounds.	Review previous investigations data and desktop analysis of proposal area soil conditions as they relate to land capability and geotechnical stability. Assessment of the proposal area and impact on soils and ground conditions.	Section 6 Section 6.4 Section 6.5
An assessment of the extent and nature of any contaminated materials or acid sulphate soils on site or in dredged material.	Review previous investigations data and desktop analysis of proposal area contamination conditions and acid sulfate soil presence and occurrence. Assessment of the proposal area and impacts from disturbance of contaminated materials and excavation and potential changes to hydrogeological conditions impacting in situ acid sulfate soils.	Section 4.6 Section 4.10 Section 5.2
As assessment of potential risks to human health and the receiving environment.	Review previous investigations data and desktop analysis of proposal area contamination conditions relevant to the site currently and for future proposal development.	Section 5.4 Section 6.2
A description of the measures that would be implemented to avoid or mitigate impacts.	Conclusions and recommendations for management or mitigation of potential impacts and residual impacts of the proposal.	Section 7

Table 1-2 Agency comments for soils and contamination

Agency	Agency comments	Report section
NSW EPA	An assessment of potential impacts on soil and land resources should be undertaken, being guided by Soil and Landscape Issues in Environmental Impact Assessment (DLWC 2000). The nature and extent of any significant impacts should be identified. Particular attention should be given to: ■ Soil erosion and sediment transport - in accordance with Managing urban stormwater: soils and construction, vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; B Waste landfills; C. Unsealed roads; D. Main Roads; E. Mines and quarries) (DECC 2008).	Section 4 Section 4.1 Section 6
NSW EPA	A description of the mitigation and management options that will be used to prevent, control, abate or minimise identified soil and land resource impacts associated with the project. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.	Section 7 Section 8
NSW EPA (waste)	Include a detailed plan for in-situ classification of waste material, including the sampling locations and sampling regime that will be employed to classify the waste, particularly with regards to the identification of contamination hotspots.	Section 7.1.2
NSW EPA (waste)	Identify, characterise and classify all waste that will be generated onsite through excavation, demolition or construction activities, including proposed quantities of the waste. Note: All waste must be classified in accordance with EPA's Waste Classification Guidelines.	Section 5.4 Section 6.1 Section 7.1.2
NSW EPA (waste)	Include a commitment to retaining all sampling and classification results for the life of the project to demonstrate compliance with EPA's Waste Classification Guidelines.	Section 7.1.2

Agency	Agency comments	Report section
NSW DPIE (formerly NSW OEH)	The EIS must map the following features relevant to water and soils including: ■ Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map).	Section 4.6 Figure 4-6

Table 1-3 Relevant planning instruments, policies, guidelines and plans (as outlined in SEARs attachment 1)

Aspect	Description
Land and soils	Managing Urban Stormwater: Soils & Construction (Landcom) 2004
	Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC & NHMRC) 2000
	National Environment Protection (Assessment of Site Contamination) Measure 1999 (with amendment April 2013)
	Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water (DECCW, 2010)
	The land and soil capability assessment scheme: Second approximation (OEH) Guidelines for Surveying Soil and Land Resources (CSIRO)
	Australian Soil and Land Survey Handbook (CSIRO)
	Soil and Landscape Issues in Environmental Impact Assessment (DPI)
Contamination	State Environmental Planning Policy No. 55 – Remediation of Land, 1998
	Managing Land Contamination – Planning Guidelines SEPP 55 – Remediation of Land (EPA) 1998
	Guidelines for Consultants Reporting on Contaminated Sites 2011 (EPA)
	Contaminates Sites Sampling Design Guidelines 1995 (EPA)
	Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC) 2000
	National Environment Protection (Assessment of Site Contamination) Measure 1999 (with amendment April 2013)
	Acid Sulfate Soils Manual (OEH), 1998
	Australian and New Zealand Guidelines for Fresh and Marine Water Quality (EPA)
Waste	Waste Classification Guidelines (NSW EPA) 2014

On 15 August 2019, the Proposal was determined to be a controlled action by the Commonwealth Department of Environment and Energy (DoEE) and supplementary SEARs were created. As such, the EIS addresses the supplementary SEARs relating to soil and contamination as specified below. This assessment considers the following relevant supplementary SEARs to inform the EIS (Table 1.4).

Table 1.4 Supplementary SEARs

Supplementary SEARs	Scope of assessment	Report section
As assessment of physico-chemical status of the Hunter Estuary Wetlands Ramsar site	Review previous investigations on soil and contamination impacts pertaining to nearby Ramsar wetlands.	Section 6
The extent of acid sulphate soil occurrence and how soils will be managed to avoid impacts to the Hunter Estuary Wetlands Ramsar site.	Review desktop studies and previous investigations on acid sulfate soil impacts pertaining to nearby Ramsar wetlands.	Section 6

1.4 Scope of works and methodology

The scope of works undertaken to prepare this soils and contamination specialist study included:

- A desktop review of existing information and previous ground investigation reports to assess the current environmental conditions of the proposal area, soil types, land capability and establish the sources of potential contamination historically as well as during the construction and operational phase of the proposal.
- Review of available Government land quality and environmental data bases for soils, geology, hydrology, hydrogeology, acid sulfate soils (ASS), contaminated lands and others as necessary.
- A site walkover and inspection to confirm the findings of the background desktop assessment and assess the proposal area (where access was available) for potential signs and sources of land contamination. The inspection to include observation and recording of the proposal area terrain, surface condition, topography, vegetative cover, drainage pathways, contaminated land risk areas and surrounding land uses.
- Review of relevant legislation, policy and guidelines to address SEARs and agency requirements, and to inform potential construction, operational and cumulative impacts, in conjunction with possible mitigation controls for the proposal.
- Review of Aurecon's Concept Design Report (2019) for the proposal enabled the identification of construction and operational phase activities relevant to this soils and contamination specialist study. The potential impacts and associated mitigation measures were also assessed with consideration to the relevant components of the proposal design.
- Review and coordination with the design team and other specialist study report authors for the proposal.

The following existing environmental and ground investigation reports have been reviewed or incorporated as part of the preparation of this technical study:

- *Preliminary Site Investigation (Contamination) – Newcastle Power Station.* Aurecon, August 2019.
- *Geotechnical Interpretive Report – Newcastle Gas Peaker Development*. Aurecon, August 2019.
- *Phase 1 Preliminary Environmental Site Assessment, Tomago Development Site*. Environmental Strategies in 2017.
- *Additional Pre-Existing Contamination Study, Tomago Development Site.* Environmental Strategies, 2018.
- *Environmental Assessment – Newcastle Gas Storage Facility Project.* Coffey, 2011.
- *Tomago Gas Fired Power Station EIS For Macquarie Generation.* URS, 2002.
- *Geotechnical Investigation – Proposed Gas Storage Area – Proposed Power Station,* Old Punt Rd, Tomago. Douglas Partners, 2008.

The summary findings of the above scope of works and previous reports are documented in:

- Section 2 Project description.
- Section 3 Legislation, policy and guidelines.
- Section 4 Existing environment .
- Section 5 Previous investigations and reports.

Based on desktop review, site inspection and current understanding of the environmental status of the proposal the following sections outline the impact assessment of the proposal along with the mitigation measures that can be adopted to minimise environmental impacts:

- Section 6 Impact assessment.
- Section 7 Mitigation.
- Section 8 Residual impact.
- Section 9 Monitoring .
- Section 10 Conclusions

2 Project description

2.1 Overview

The proposal would involve the construction and operation of a power station with a nominal capacity of approximately 250 MW. The proposal would supply electricity to the grid at short notice during periods of high electricity demand, particularly during low supply periods from intermittent renewable sources or during supply outages.

The proposal would also involve the construction and operation of gas pipeline(s) and an electricity transmission line. The pipeline(s) would supply the proposed power station with gas from the Eastern Gas Pipeline via the Jemena network and from the Newcastle Gas Storage Facility (NGSF). A new electricity transmission line would transfer the electricity produced by the proposed power station to the national electricity network via connection to the existing 132kV Tomago switchyard.

The main elements of the proposal are as follows:

- Power station comprising of either large reciprocating engine generators or gas turbine generators, necessary supporting ancillary equipment and supporting infrastructure. The power station would be capable of operating with diesel fuel, if necessary.
- 132kV electricity transmission line to the existing Tomago switching yard, operated by TransGrid.
- Gas transmission/storage pipeline(s) and receiving station, compressor units, and ancillary infrastructure.
- Storage tanks and laydown areas.
- Water management infrastructure including pond(s), stormwater drainage and a connection to Hunter Water potable infrastructure in line with Hunter Water requirements.
- Diesel storage and truck unloading facilities.
- Site access road.
- Office/administration, amenities, workshop/storage areas and carparking.

2.2 Site location

The proposal area is located approximately 15km north-west of Newcastle CBD, NSW as indicated in **Figure 2-1**.

The proposed power station will be located in Lot 3 DP 1043561 at 1940 Pacific Highway, Tomago. Some additional clearing may be required to augment the current cleared areas within Lot 2 DP1043561 for use as laydown area during construction (see **Figure 2-2**). AGL owns both Lot 2 and Lot 3 DP 1043561.

The site has been used previously for agricultural purposes, including grazing, and hosts a single storey residential dwelling which would be demolished if not repurposed during construction and operation. The nearest residential areas off the site are more than two kilometres away. There are some isolated trees on the site as well as stands of native vegetation generally confined to the boundaries. The nearest major water body is the Hunter River, approximately 470 metres north-west, however two minor ponds have also been identified within the site boundary.

Lot 2 and Lot 3 (proposed power station and laydown areas) are zoned IN-1 General Industrial under the current Port Stephens Local Environmental Plan (LEP) as indicated in **Figure 2-2**. Pipeline and electricity easement corridors would extend east into Lot 4 DP 1043561, Lot 1203 DP 1229590 and Lot 202 DP 1173564. These Lots are owned by the Tomago Aluminum Company (TAC).

Land within the gas pipeline and electrical transmission easement investigation areas is also zoned IN-1 General Industrial under the current Port Stephens LEP. The land is vegetated and contains existing easements for gas pipelines, electrical infrastructure, and roads. There are no dwellings in these investigation areas.

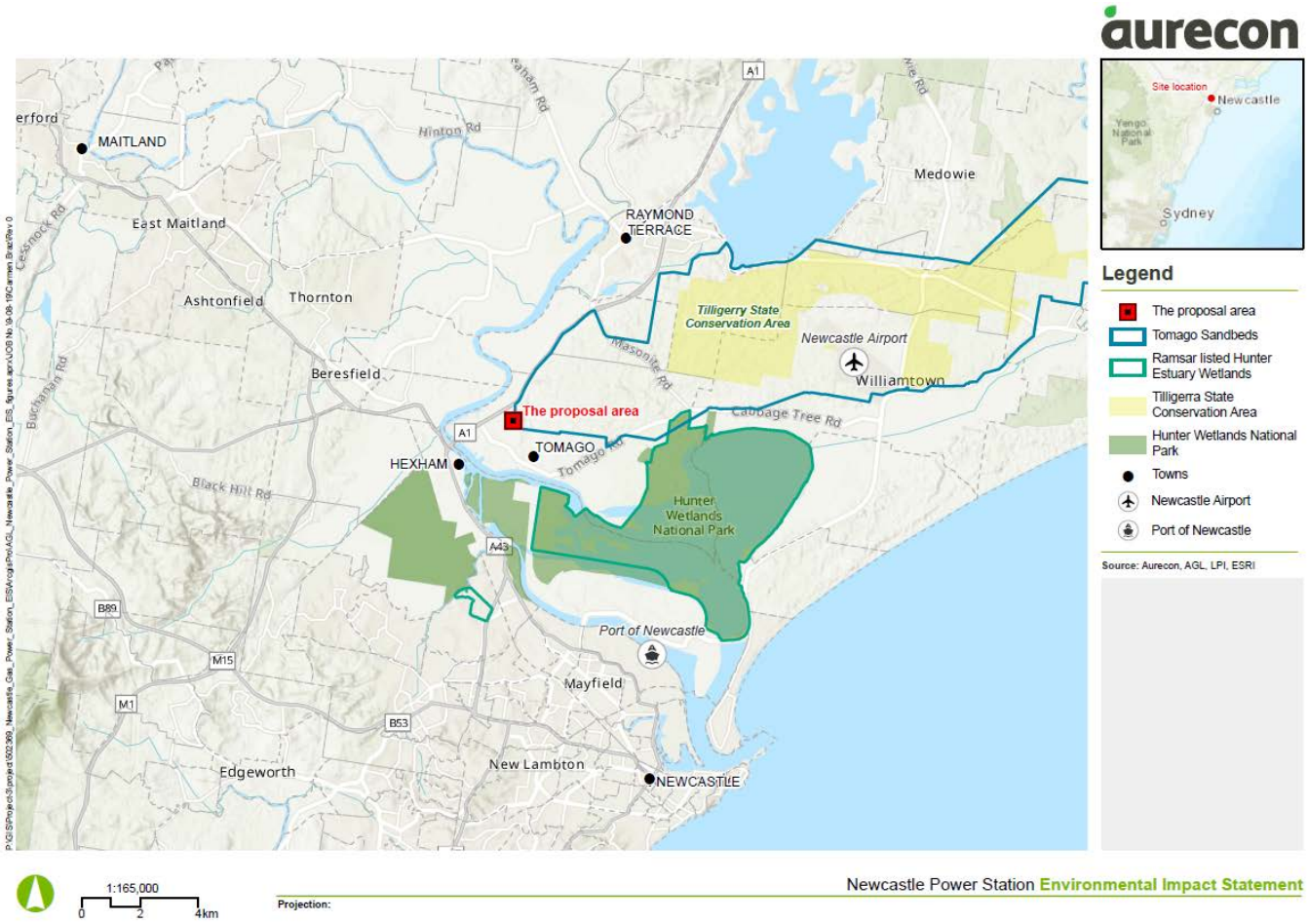


Figure 2-1 Proposal location

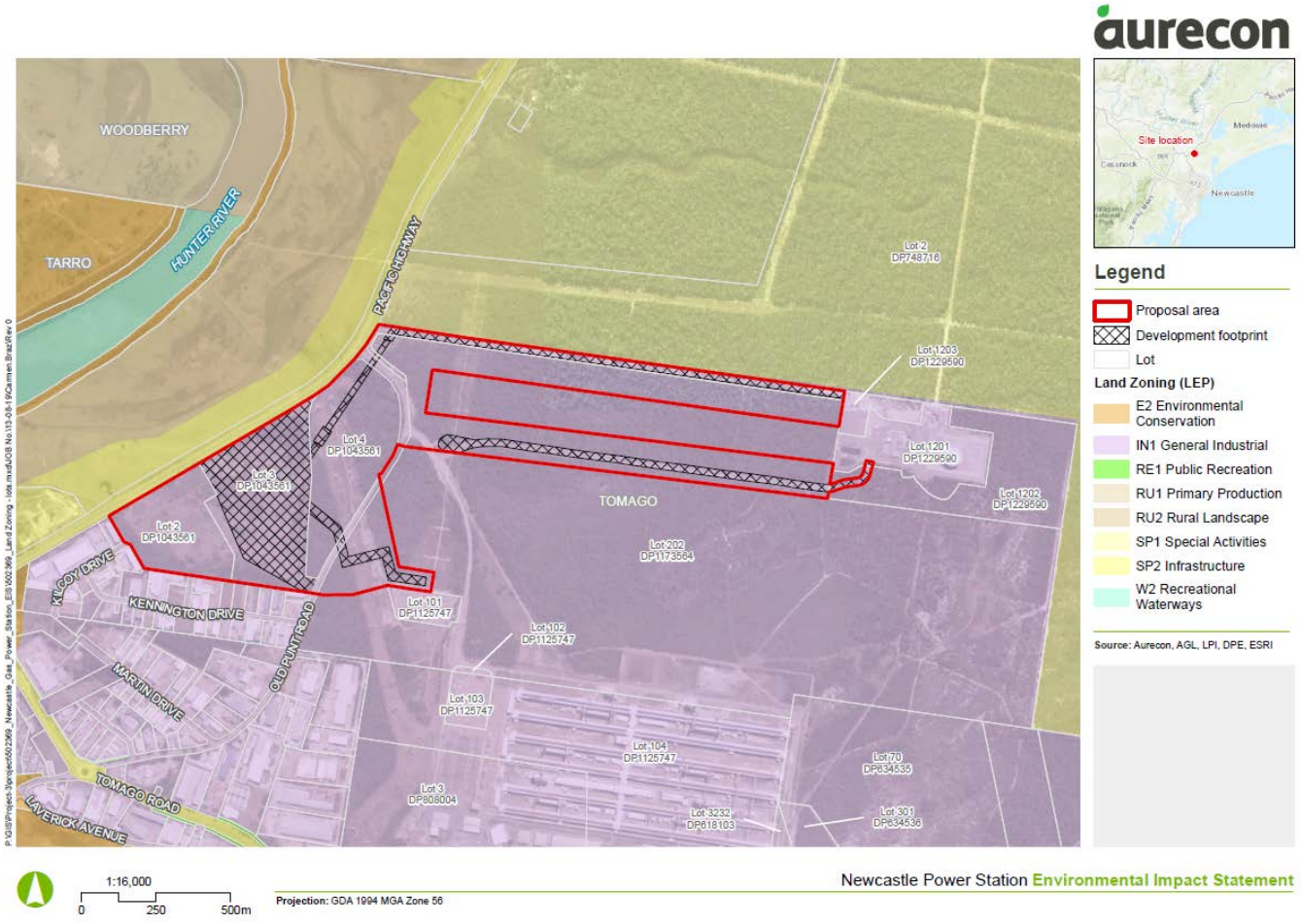


Figure 2-2 Land zoning

The proposed site concept layout plan is provided in **Figure 2-3**. The current layout is an indicative one and will only be finalised once the engine technology type has been selected.

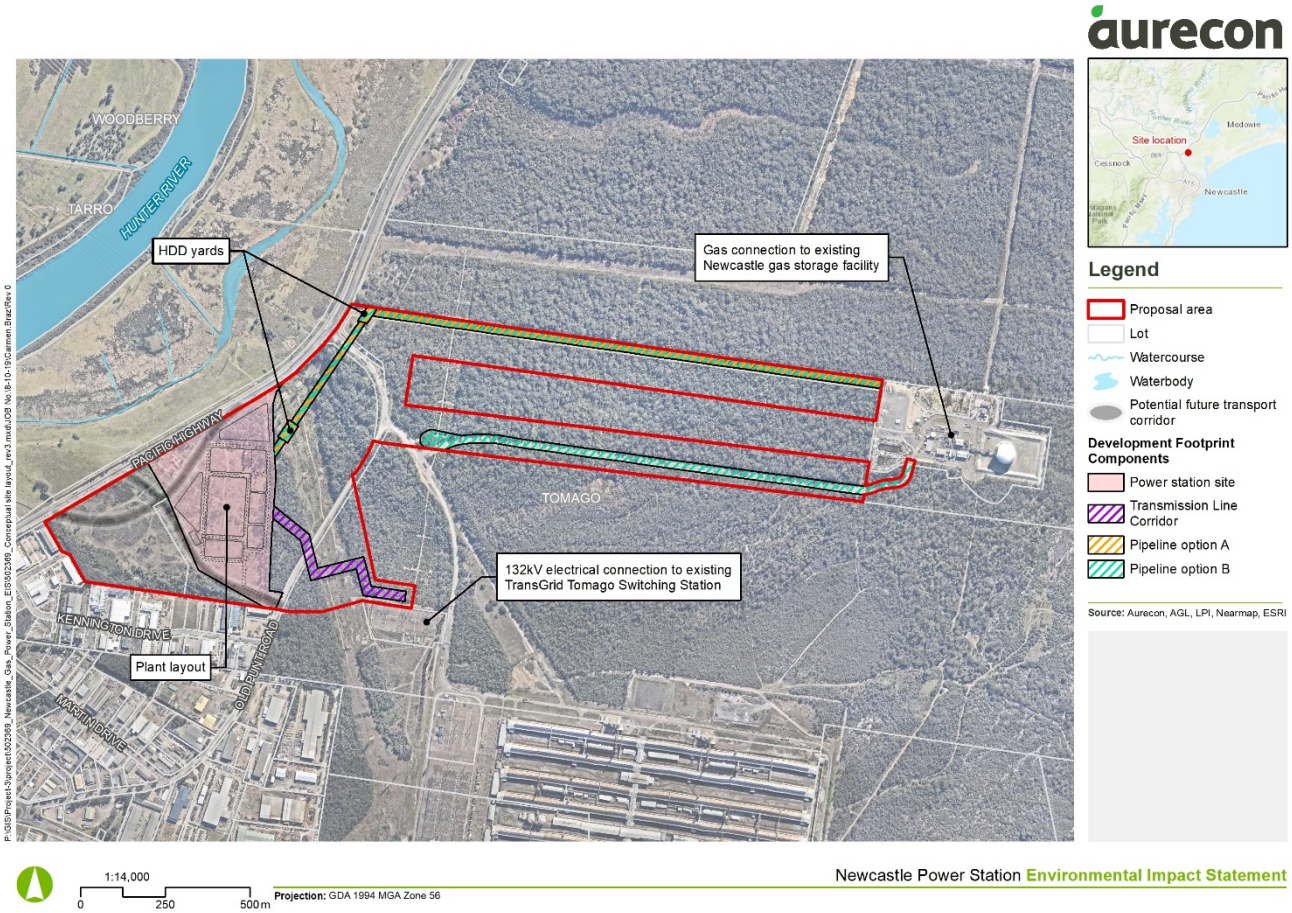


Figure 2-3 Site concept layout plan

2.3 Power station

The power station would be capable of generating approximately 250 MW of electricity. The power station would either consist of large reciprocating engine generators or aero-derivate gas turbine generators. Generation units would be dual fuel capable, meaning they would be able to be supplied by natural gas and/or liquid fuel.

The decision to install gas turbines or reciprocating technology would be made based on a range of environmental, social, engineering and economic factors that would be considered as the power station design progresses.

Gas Turbine Technology

Electricity would be generated by gas turbine technology through the combustion of natural gas and/or liquid fuel in turbines. Gas turbine units consist of a compressor, combustion chamber, turbine and generator. Air is compressed to a high pressure before being admitted into the combustion chamber. Fuel (natural gas or diesel as required) is injected into the combustion chamber where combustion occurs at very high temperatures and the gases expand. The resulting mixture of hot gas is admitted into the turbine causing the turbine to turn, generating power. In an open cycle configuration, hot exhaust gas is vented directly to the atmosphere through an exhaust stack, without heat recovery.

Reciprocating Engine Technology

Reciprocating engines used for power generation harness the controlled ignition of gas and/or diesel to drive a piston within a cylinder. Several pistons move sequentially to rotate a crank shaft which turns the generator.

Ancillary facilities

The power station, regardless of chosen technology, would require supporting ancillary facilities. These would include:

- Natural gas reception yard potentially including gas metering, pressure regulation, compression (if required), heating stations, pigging facilities (if required) and provision for flaring
- Generator circuit breakers, generator step-up transformers and switchyard including overhead line support gantry
- Water collection and treatment facilities
- Water storage tanks and pond(s)
- Truck loading/unloading facilities
- Liquid fuel storage tanks
- Emergency diesel generators with associated fuel storage
- Closed circuit cooling systems
- Control room
- Offices and messing facilities
- Electrical switch rooms
- Occupational health and safety systems including an emergency warning and evacuation system
- Workshop and warehouse
- Firefighting system
- Communication systems
- Security fence, security lighting, stack aviation warning lights (if required) and surveillance system
- Landscaped areas and staff parking areas
- Concrete foundations, bitumen roadways, concrete pads in liquid fuel unloading station and gas turbine or engine unit maintenance areas
- Concrete bunded areas with drains for liquid fuel tanks, liquid chemicals store, oil filled transformers (if installed) and other facilities where contaminated liquids could leak
- Level construction and laydown area
- Engineered batters to support and protect the power plant platform
- Sedimentation pond and associated diversion drain and earth bunding

2.4 Gas pipeline

Natural gas fuel would be supplied from the existing Eastern Gas Pipeline. The nearest supply point in the gas network is the AGL owned Tomago to Hexham high pressure gas pipeline (HPP) which terminates at the AGL owned and operated NGSF. The NGSF is located about two kilometres north east of the proposed power station site (see **Figure 2-3**).

A new gas pipeline connection to the Tomago to Hexham high pressure gas pipeline would supply the power station. This connection would be made just east of Old Punt Road, east of the proposed power station site. The pipeline would be constructed of approximately 100m of pipe.

AGL may augment the proposed gas supply by compressing natural gas in a new gas pipeline between the power station and the NGSF (potential alignment indicated by the “Gas Pipeline Investigation Area” in **Figure 2-3**). The pipeline route will use existing gas and road easements where possible. AGL will enter negotiations for any new pipeline easements in accordance with the *Pipelines Act 1967*.

The pipeline will be constructed of approximately 4.6 km of pipe. The installation of the pipeline may require boring pits (and associated tunnelling or horizontal directional drilling (HDD)) where it crosses existing

services or roads, all other portions along the pipeline route will be trenched with an estimated depth of cover between 900 mm and 1,200 mm from the top of pipe to the surface.

Gas compression, conditioning, heating and other facilities necessary to transport and store gas maybe required and would be constructed at the proposed power station site

2.5 Electricity transmission line

A high voltage 132 kV electricity transmission line would be required to connect the proposed power station to the TransGrid Tomago 132 kV switchyard, approximately 500 metres south east. The switching station would transfer the electricity produced at the power station to the regional electricity transmission system. The transmission line would be located alongside the existing transmission line running northwest from the switchyard before heading west to the power station.

2.6 Water and wastewater

Water would be required to operate the power station. Water would primarily be used for evaporative cooling and for nitrogen oxide (NOx) suppression, if necessary. When used for NOx suppression water would be injected into the combustion chamber where it would vaporise and discharge through the exhaust stack. Additionally, evaporative cooling would be used on hot dry days to reduce the temperature of the inlet air.

The water for the proposed power station would be sourced from the Port Stephens municipal water supply system via an extension of the existing water supply infrastructure on Old Punt Road.

Most of the water would be evaporated and discharged to the atmosphere via the exhaust stack. Any excess process water would be tankered off site. Other uses for water at the site would include:

- Firefighting water.
- Boosting the power of the power station.
- Water for washing the gas turbine compressor (if installed).
- Potable water for staff amenities.

The process water balance will be influenced by the engine technology installed, which has not been confirmed at this time.

Potable water drains and site sewage will be collected and discharged to a site sewerage system. Septic tank(s) will be used and pumped out by truck as required. The site sewerage system will comply with the requirements of Government Agencies.

All runoff from roads, car-park and hardstand areas will be collected in a ‘pit and pipe’ stormwater system. The pit and pipe stormwater system would be provided along the roads within the proposal site and would discharge to the natural depression at the south-west corner of the proposal site, after undergoing treatment via a proposed oil and grease separator and a Bioretention Pond.

2.7 Vehicular access

The area around Tomago is serviced by a road network adequate to cater for heavy haulage vehicles due to the existing surrounding industrial land uses. Old Punt Road is a sealed single lane, two-way council owned road. Old Punt Road connects to the Pacific Highway approximately one kilometre to the north of the proposed power station access point (as seen in **Figure 2-3**).

During construction oversized or heavy items would be transported along the Pacific Highway and Old Punt Road. During operation, vehicular access to the proposal area would be provided via the newly formed access off Old Punt Road. This access would be used by operational staff. Parking for staff would be provided within the proposal area.

3 Legislation, policy and guidelines

3.1 Legislation and policy

To address the SEARs and agency comments for soils and contamination assessment, this specialist study has been prepared with consideration of the following legislation and policy:

- *Contaminated Land Management Act 1997* (NSW) (CLM Act).
- *Protection of the Environment Operations Act 1997* (NSW) (POEO Act).
- *Environmentally Hazardous Chemicals Act 1985* (NSW) (EHC Act).
- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *Protection of the Environment Operations (General) Regulation* 2009.
- *Protection of the Environment Operations (Waste) Regulation* 2005.
- *Fisheries Management Act* 1994.
- Department of Urban Affairs and Planning (DUAP) and NSW EPA, 1998. *State Environmental Planning Policy No. 55 – Remediation of Land*.
- *NSW WHS Regulation 2017*.
- *Port Stephens Local Environmental Plan,* 2013. (specifically, part 7.1 – Acid Sulfate soils).
- *Port Stephens Development Control Plan*, July 2019. (specifically, part B3 Environmental Management – Acid Sulfate soils).

3.2 Guidelines

To address the SEARs and agency comments for soils and contamination assessment, this specialist study has been prepared with consideration of the following guidance documents:

- NSW EPA, 1995. *Contaminated Sites Sampling Design Guidelines*.
- NSW EPA, 2007 *Guidelines for the Assessment and Management of Groundwater Contamination.*
- NSW EPA, 2011. *Guidelines for Consultants Reporting on Contaminated Sites.*
- NSW EPA, 2012. *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases.*
- NSW EPA, 2014. *Waste Classification Guidelines – Part 1: Classifying Waste, Part 4: Acid sulfate soils and Addendum to Part 1.*
- NSW EPA, 2015. *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*.
- NSW EPA, 2017. *Guidelines for the NSW Site Auditor Scheme (Third Edition).*
- *National Environment Protection (Assessment of Site Contamination) Measure 1999 (with amendment April 2013).*
- Acid Sulfate Soils Management Advisory Committee, 1998. *Acid Sulfate Soils Manual.*
- Acid Sulfate Soils Management Advisory Committee, 1998. *Acid Sulfate Soils Assessment Guidelines.*
- Queensland Department of Natural Resources, Mines and Energy, Indooroopilly, Queensland. 2004. *Acid Sulfate Soils Laboratory Methods Guidelines.*
- Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (ANZG), 2018. *Guidelines for Fresh and Marine Water Quality: Water Quality Management Framework.*

- DECC, 2008. *Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries).*
- DECCW, 2010. *Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water.*
- NSW OEH, 2012. *The land and soil capability assessment scheme: Second approximation.*
- CSIRO, 2008. *Guidelines for Surveying Soil and Land Resources.*
- CSIRO, 2009. *Australian Soil and Land Survey Handbook.*
- DLWC, 2002. *Soil and Landscape Issues in Environmental Impact Assessment.*
- DLWC, 2002. *Site investigations for Urban Salinity.*
- Australian Geomechanics Society, 2007. *Landslide risk management guidelines presented in Australian Geomechanics Society*.
- Other guidelines made or approved under section 105 of the *Contaminated Land Management Act 1997*.

4 Existing environment

4.1 Soil landscapes

Reference to the NSW DPIE Soil and Land Information (eSPADE) online mapping for the proposal area indicates it is situated across four soil landscape units:

- Millers forest (mf) – Estuarine landscape.
- Beresfield (be) – Residual soil landscape.
- Tea Gardens (tn) – Aeolian landscape.
- Shoal Bay (sb) – Aeolian landscape.

A summary of soil landscape properties is presented in **Table 4-1**. Soil landscape mapping across the proposal area is presented in **Figure 4-1**. Soil landscape reports for the four landscapes are presented in **Appendix A**.

Table 4-1 Soil landscapes of the proposal area summary

Soil landscape	Proposal area	Geology and regolith	Soils (proposal area landscape)	Qualities and limitations
Millers forest (mf)	Small portion of the southern proposal area.	Quaternary Holocene alluvial sediment—predominantly clay, silt and sand from overbank deposition of the lower Hunter and Williams Rivers, which overlies estuarine mud deposits at depth.	■ Deep (>150 cm), imperfectly to poorly drained Prairie soils. ■ mf1—Well-structured brownish black silty clay loam (topsoil—A horizon) ■ mf2—Well-structured brown silty clay (subsoil—B horizon)	■ flood hazard ■ permanently high watertables ■ seasonal waterlogging and foundation hazard ■ low wet bearing strength soils.
Beresfield (be)	Covers majority of proposed power station area.	Permian Tomago Coal Measures—shale, mudstone, sandstone, coal, tuff and clay. Permian Mulbring Siltstone—siltstone, claystone, thin sandstone, and limestone. Small areas of Permian Waratah Subgroup also occur— cross-laminated grey brown sandstone	■ Imperfectly to poorly drained Yellow Podzolic Soils, yellow Soloths and Gleyed Podzolic Soils on lower slopes. ■ be1—Friable brownish black loam (topsoil—A1 horizon) ■ be2—Hardsetting dull yellowish brown sandy loam ■ be5—Gleyed “puggy” silty clay	■ high foundation hazard ■ water erosion hazard ■ Mine Subsidence District ■ seasonal waterlogging and high run-on on localised lower slopes ■ highly acid soils of low fertility.
Tea Gardens (tn)	Covers the northern most parts of the proposal area and gas pipeline options.	Pleistocene beach ridges and sandsheets consisting of marine and aeolian quartz sands.	■ Deep (>200 cm), very poorly drained Acid Peats in swamps. ■ tn1—Sandy peat ■ tn2—Brownish black to brownish grey loose loamy sand ■ tn4—Massive organic pan	■ permanently high watertables ■ seasonal waterlogging ■ ground water pollution hazard ■ strongly to extremely acid soils of low fertility

Soil landscape	Proposal area	Geology and regolith	Soils (proposal area landscape)	Qualities and limitations
Shoal Bay (sb)	Covers a very small portion in the north eastern proposal area near the NGSF.	Pleistocene aeolian sand sheets and low dunes composed of quartz sands.	■ deep (>300 cm), well-drained Podzols, with deep (>300 cm), imperfectly drained Humus Podzols on low rises and deep (>300 cm), poorly drained Humus Podzols on poorly drained flats and depressions. ■ sb1—Brownish grey loose sand ■ sb2—Loose bleached light grey sand ■ sb3—Coherent organic- and iron-stained sand	■ wind erosion hazard ■ ground water pollution hazard ■ steep slopes (localised) ■ foundation hazard (localised swamps) ■ permanent waterlogging (localised, swamps) ■ permanent high watertables (localised, swampy depressions) ■ seasonal waterlogging (localised, low lying swales) ■ acid sandy non-cohesive soils with very low fertility.

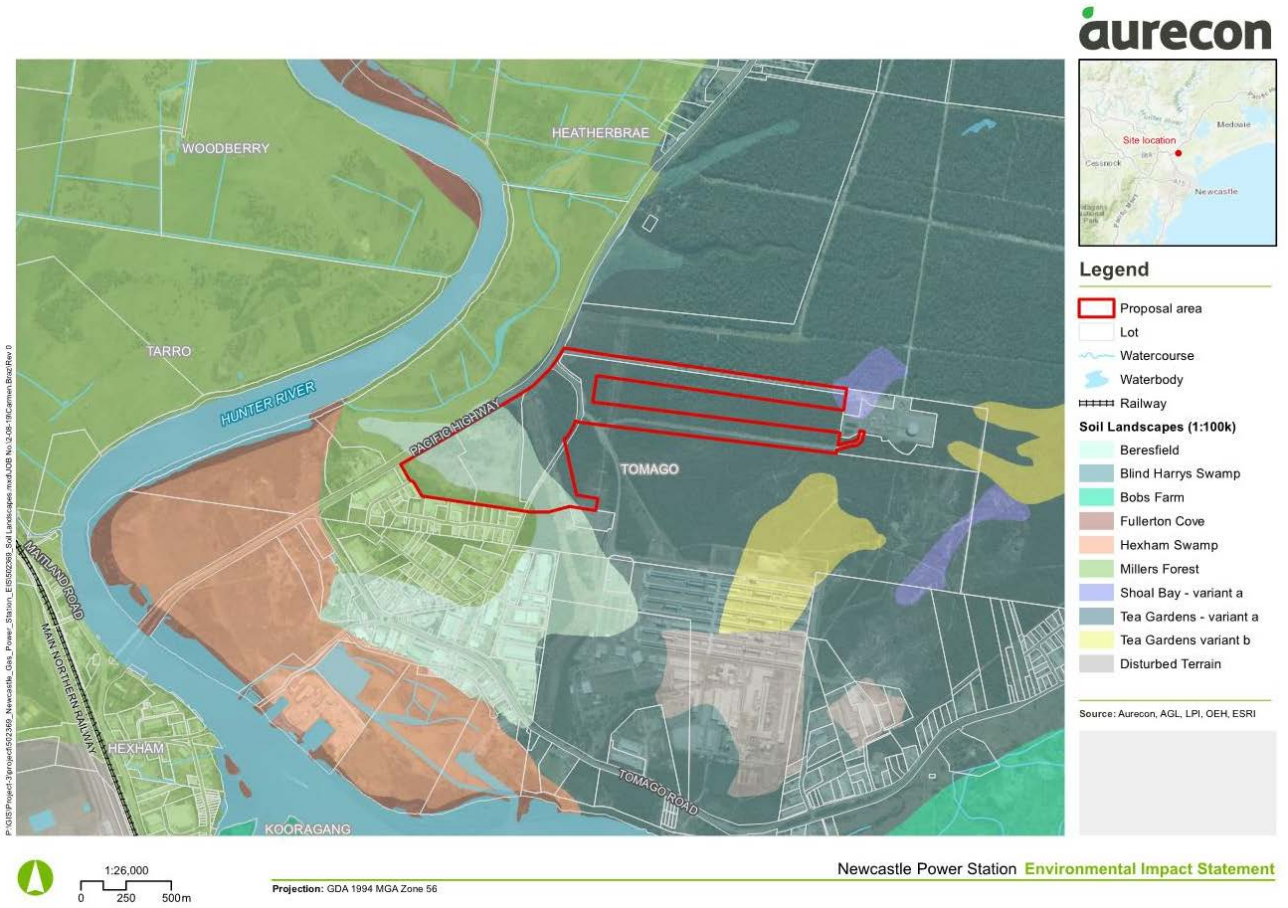


Figure 4-1 Proposal area soil landscape classes

4.1.1 Soil erodibility

Soil erodibility for each soil landscape is presented in **Table 4-2** with further soil type detail presented in the soil landscape sheets **Appendix A.**

For Beresfield soil types and without management and mitigation applied to the landscape, disturbed areas can suffer considerable erosion. Moderate to severe rill erosion may occur on exposed batters, occasionally batter collapse may occur due to tunnel erosion of subsoils. Moderate sheet erosion occurs where vegetative cover has been removed.

For Tea Gardens soil types and without management and mitigation applied to the landscape, they are susceptible to wind erosion hazard on localised, dry sandy ridges. To prevent wind erosion, it is important to maintain sufficient ground cover. Fertilisers may be necessary to establish good cover. Protective fences around critical vegetated areas and weed control may also be necessary.

For Shoal Bay soil types and without management and mitigation applied to the landscape, they are susceptible to wind erosion due to their aeolian deposition and dune like environments. To prevent wind erosion, it is important to maintain sufficient ground cover or mitigation during earthworks.

Table 4-2 Soil types and erodibility within the proposal area

Soil landscape	Proposal area	Soil type and erodibility K factor	Non concentrated flows	Concentrated flows	Wind
Millers forest (mf)	Small portion of the southern proposal area.	▪ mf1 – 0.023 ▪ mf2 – 0.036 ▪ [1]Urban erosion hazard	▪ moderate ▪ moderate ▪ low	▪ moderate ▪ mod to high ▪ moderate	▪ Very low ▪ Very low ▪ slight
Beresfield (be)	Covers majority of proposed power station area.	▪ be1 – 0.028 ▪ be2 – 0.033 ▪ be5 – 0.048 ▪ [1]Urban erosion hazard	▪ moderate ▪ moderate ▪ high ▪ mod to high	▪ high ▪ moderate ▪ high ▪ high	▪ Very low ▪ Very low ▪ Very low ▪ slight
Tea Gardens (tn)	Covers the northern most parts of the proposal area and gas pipeline options.	▪ tn1 – peaty ▪ tn2 – 0.016 ▪ tn4 – pan ▪ [1]Urban erosion hazard	▪ very low ▪ low ▪ very low ▪ slight	▪ high ▪ very high ▪ moderate ▪ moderate	▪ moderate ▪ high ▪ low ▪ very high
Shoal Bay (sb)	Covers a very small portion in the north eastern proposal area near the NGSF.	▪ sb1 – 0.000 ▪ sb2 – 0.009 ▪ sb3 – 0.000 ▪ [1]Urban erosion hazard	▪ very low ▪ very low ▪ very low ▪ slight	▪ high ▪ very high ▪ high ▪ very high	▪ moderate ▪ high ▪ moderate ▪ very high

Table note:

1. Urban erosion hazard used instead of grazing or land cultivation as the closest hazard to the proposed development.

4.2 Australian soil classification

Reference to the NSW DPIE Soil and Land Information (eSPADE) online mapping for the proposal area indicates it is situated across two Australian soil classifications:

- Dermosols in the south western portion of the proposal area.
- Podosols in the centre and northern portions of the proposal area.

Dermosols have well-developed soil B2 horizons in which the major part is massive or has only a weak grade of structure and have a maximum clay content in some part of the B2 horizon which exceeds 15% (i.e. heavy sandy loam).

Podsols have a clay field texture of 35% or more clay throughout the soil profile except for thin, surface crusty horizons 0.03 m or less thick. Unless too moist, they often have open cracks at some time in most years that are at least 5 mm wide and extend upward to the surface or to the base of any plough layer, peaty horizon, self-mulching horizon, or thin, surface crusty horizon. At some depth in the soil profile they have slickensides and/or lenticular peds.

Soil landscape mapping across the proposal area is presented in **Figure 4-2**.

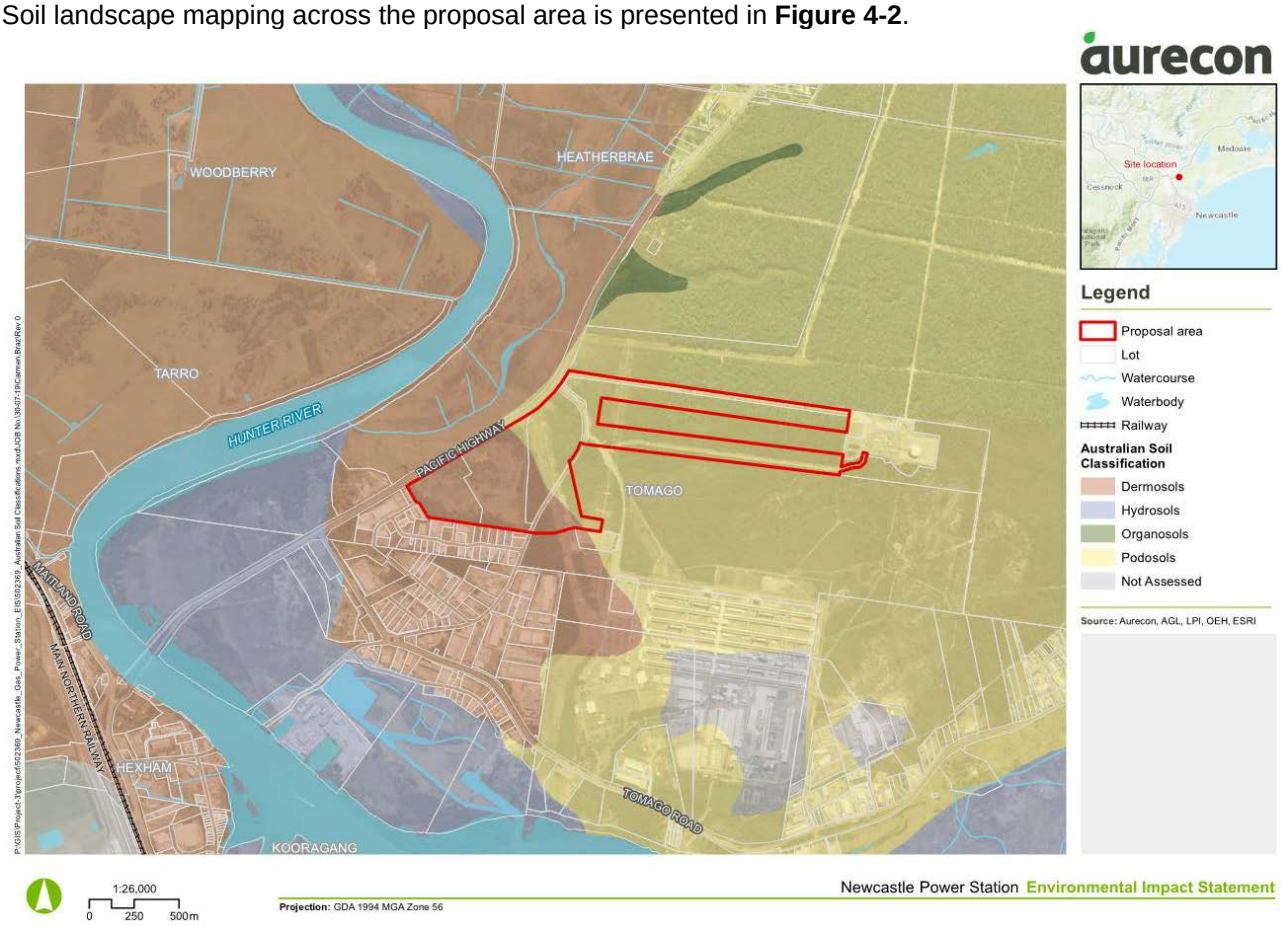


Figure 4-2 Proposal area Australian soil classification

4.3 Hydrologic soil groups

Reference to the NSW Government hydrologic soil mapping (2016) for the proposal area indicates it is situated across two hydrologic soil groups:

- Group A (high infiltration) in the central and northern portion of the proposal area.
- Group C (slow infiltration) in the southern portions of the proposal area, including the proposed power station area.

Group A soils have a high infiltration rate and low runoff. These soils consist of deep, well drained sands or gravelly sands and have a high rate of water transmission. Group C soils have a slow infiltration rate. This group consists of soils with a layer that impedes the downward movement of water or fine textured soils and a slow rate of water transmission.

Hydrologic soil group provides an index of the rate that water infiltrates a soil and is an input to rainfall-runoff models that are used to predict potential stream flow.

Soil hydrologic mapping across the proposal area is presented in **Figure 4-3**.

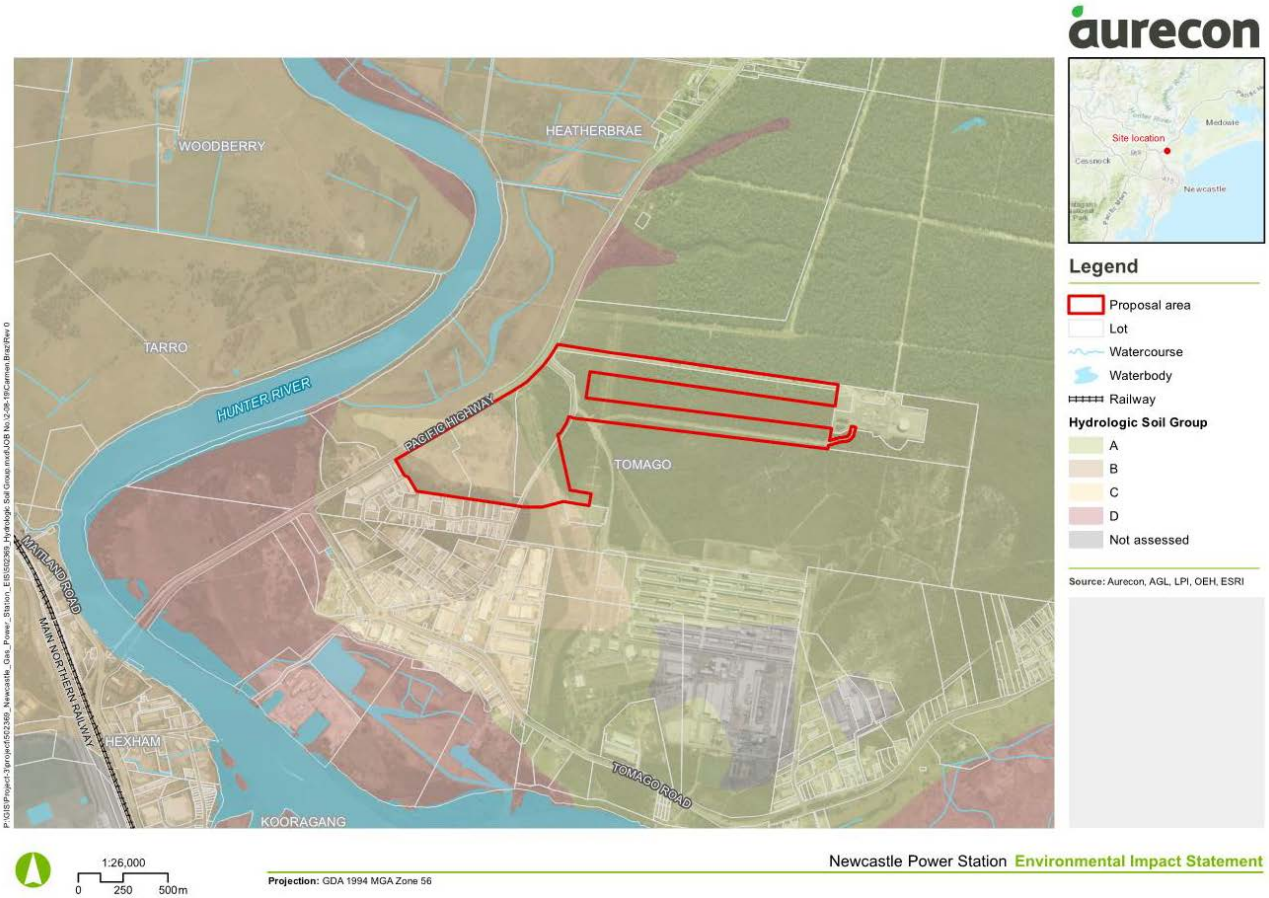


Figure 4-3 Proposal area hydrologic soil groups

4.4 Estimated inherent soil fertility

Reference to the NSW DPIE Soil and Land Information (eSPADE) online mapping for the proposal area indicates it is situated across three inherent soil fertility classifications:

- High in the southern portion of the proposal area (approx. 150 m width).
- Moderate in the central portion of the proposal area and proposed power station.
- Low in the northern and north eastern portion of the proposal area.

The mapping provides an estimation of the inherent fertility of soils within the proposal area. It uses the best available soils and natural resource mapping developed for the Land and Soil Capability (LSC) dataset.

Soil estimated inherent fertility mapping across the proposal area is presented in **Figure 4-4.**

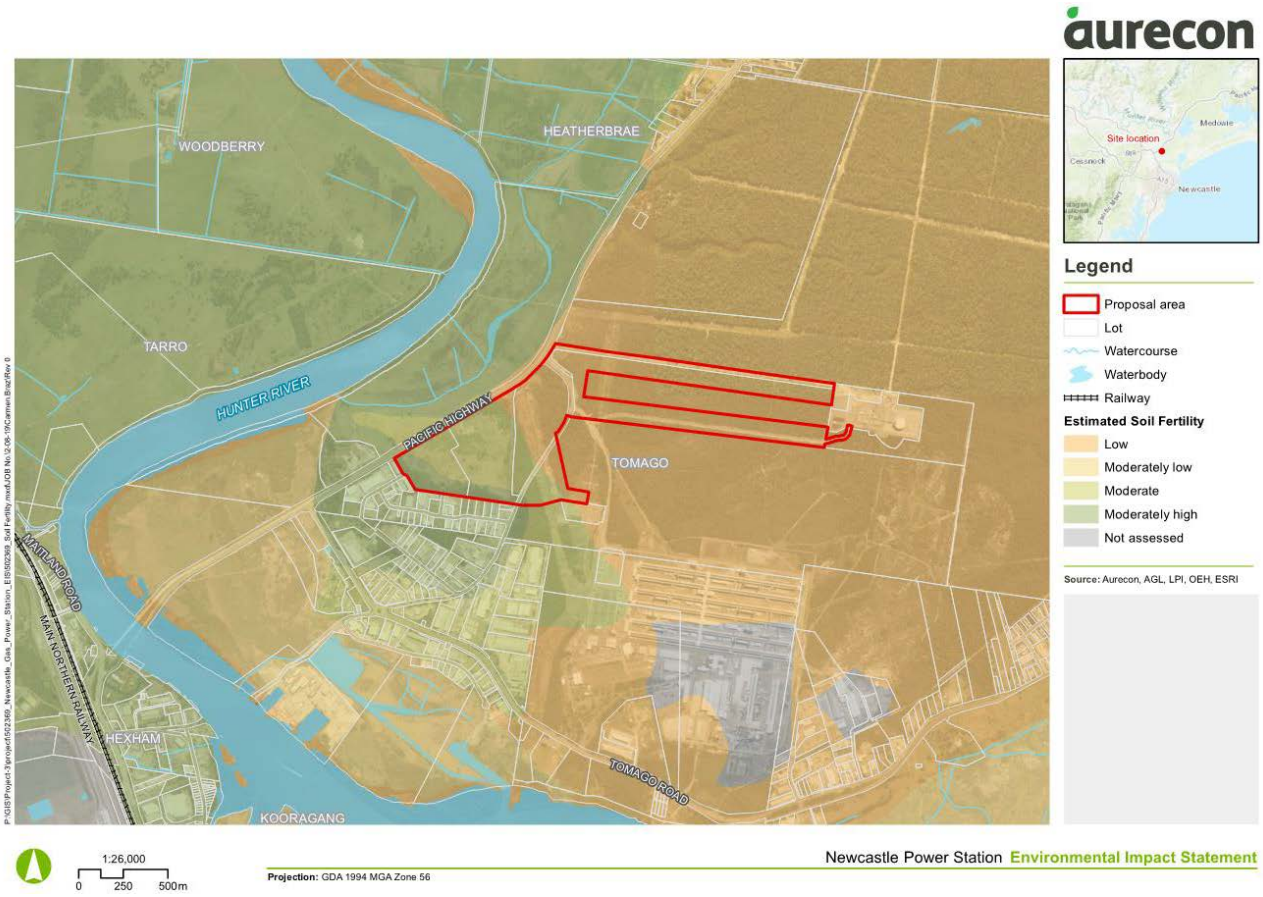


Figure 4-4 Proposal area estimated inherent soil fertility

4.5 Land and soil capability class

Reference to the NSW DPIE Soil and Land Information (eSPADE) online mapping for the proposal area indicates it is situated across four land and soil capability classes:

- 5 – Moderate to low capability land, located within the southern portion of the proposal area (approx. 150 m width).
- 4 – Moderate capability land, located within the central and southern portions of the proposal area and covering the proposed power station site.
- 6 – Low capability land, located within the central and northern portions of the proposal area.
- 8 – Extremely low capability land, located in a very small portion of the north eastern proposal area near the NGSF.

The mapping provides an estimation of the land and soil capability within the proposal area. Land and soil capability mapping across the proposal area is presented in **Figure 4-5.**

Table 4-3 presents the land and soil capability class definitions with the four land and soil capability classes within the proposal area annotated.

Table 4-3 Land and soil capability classes general definitions (NSW OEH, October 2012)

LSC class	General definition
Land capable of a wide variety of land uses (cropping, grazing, horticulture, forestry, nature conservation)	
1	**Extremely high capability land:** Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices.
2	**Very high capability land:** Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.
3	**High capability land:** Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation.
Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)	
4 (Proposal area)	**Moderate capability land:** Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology.
5 (Proposal area)	**Moderate–low capability land:** Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.
Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)	
6 (Proposal area)	**Low capability land:** Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation
Land generally incapable of agricultural land use (selective forestry and nature conservation)	
7	**Very low capability land:** Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation.
8 (Proposal area)	**Extremely low capability land:** Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation.

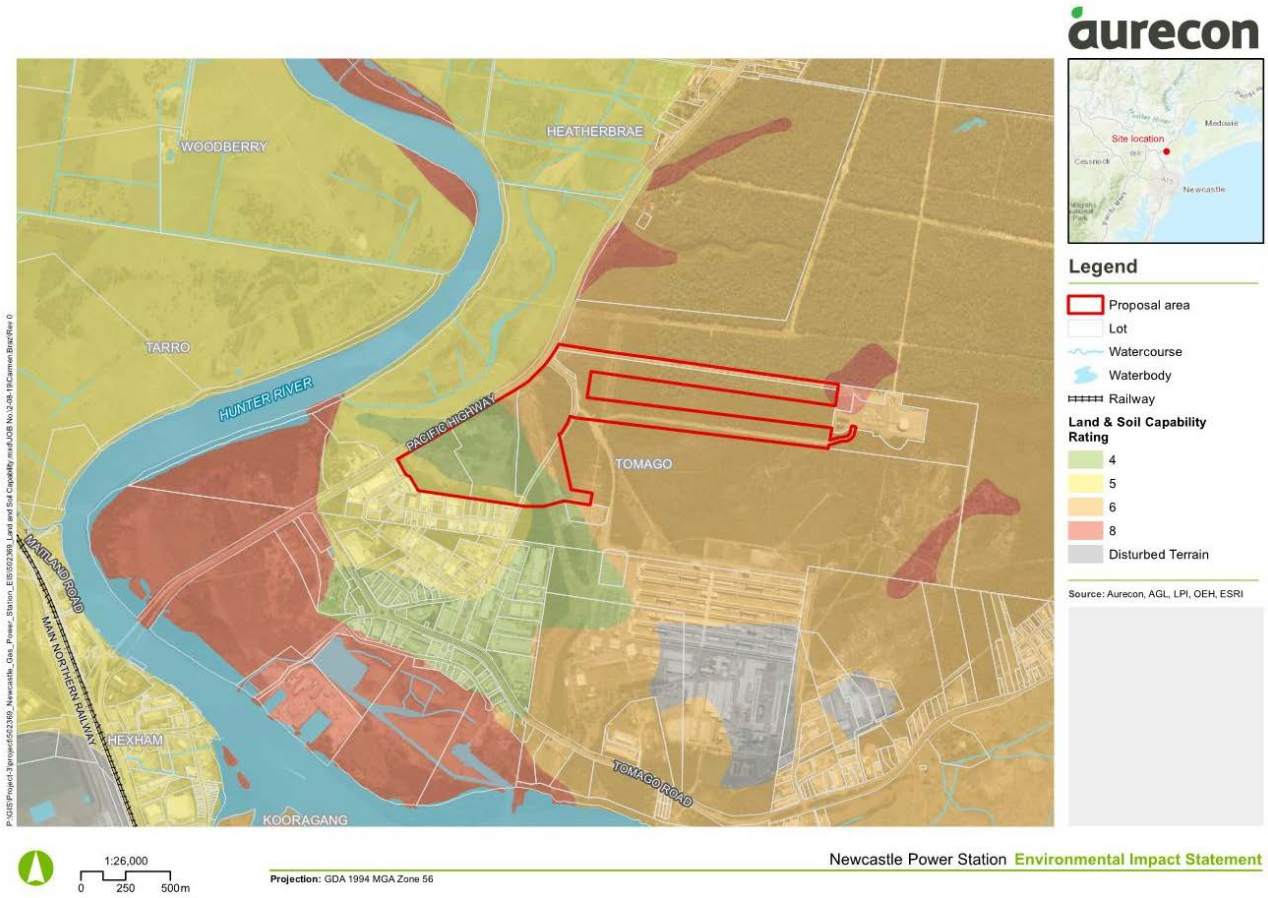


Figure 4-5 Proposal area land and soil capability rating

4.6 Acid sulfate soils

Reference to the NSW DPIE Soil and Land Information (eSPADE) online mapping and Port Stephens LEP 2013 for the proposal area indicates it is situated across two acid sulfate soil (ASS) probability classes:

- Class 3 – located within the southern portion of the proposal area (approx. 150 m width).
- Class 4 – located within the central and northern portions of the proposal area.

The mapping provides an estimation of ASS presence within the proposal area. ASS probability mapping classes across the proposal area is presented in **Figure 4-6**.

Table 4-4 presents the ASS probability class and development consent definitions with class 3 and class 4 ASS present as discussed above within the proposal area. Clause 7.1 of the Port Stephens LEP 2013 details the restrictions to works within the appropriate class on the land.

Table 4-4 ASS probability classes and development consent conditions (Port Stephens LEP, 2013)

Class of land	Works
1	Any works.
2	Works below the natural ground surface. Works by which the watertable is likely to be lowered.
3	Works more than 1 metre below the natural ground surface. Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.
4	Works more than 2 metres below the natural ground surface. Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.

Class of land	Works
5	Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.

Reference to the NSW DPIE Soil and Land Information (eSPADE) online mapping for the proposal area indicates it is situated across two ASS elevation risk classes:

- High risk 2 – 4 m AHD – located within the southern portion of the proposal area (approx. 150 m width).
- Low risk above 4 m AHD – located within the central and northern portions of the proposal area.

The mapping provides an estimation of the land and soil capability within the proposal area. ASS probability mapping classes across the proposal area is presented in **Figure 4-7**.

The highest risk of disturbing ASS within the proposal area includes the proposed power station elements and ground disturbance, pipelines, HDD options and transmission corridors where deeper piles and pad footings may be used. Refer to **Figure 2-3** for the concept layout for the proposal area for specific elements. The main disturbance mechanisms will be ground disturbance by excavation and localised dewatering for in ground structures to support the proposal.

Review and interpretation of ASS conditions from previous proposal area site investigations and analytical testing are summarised in Section 5.

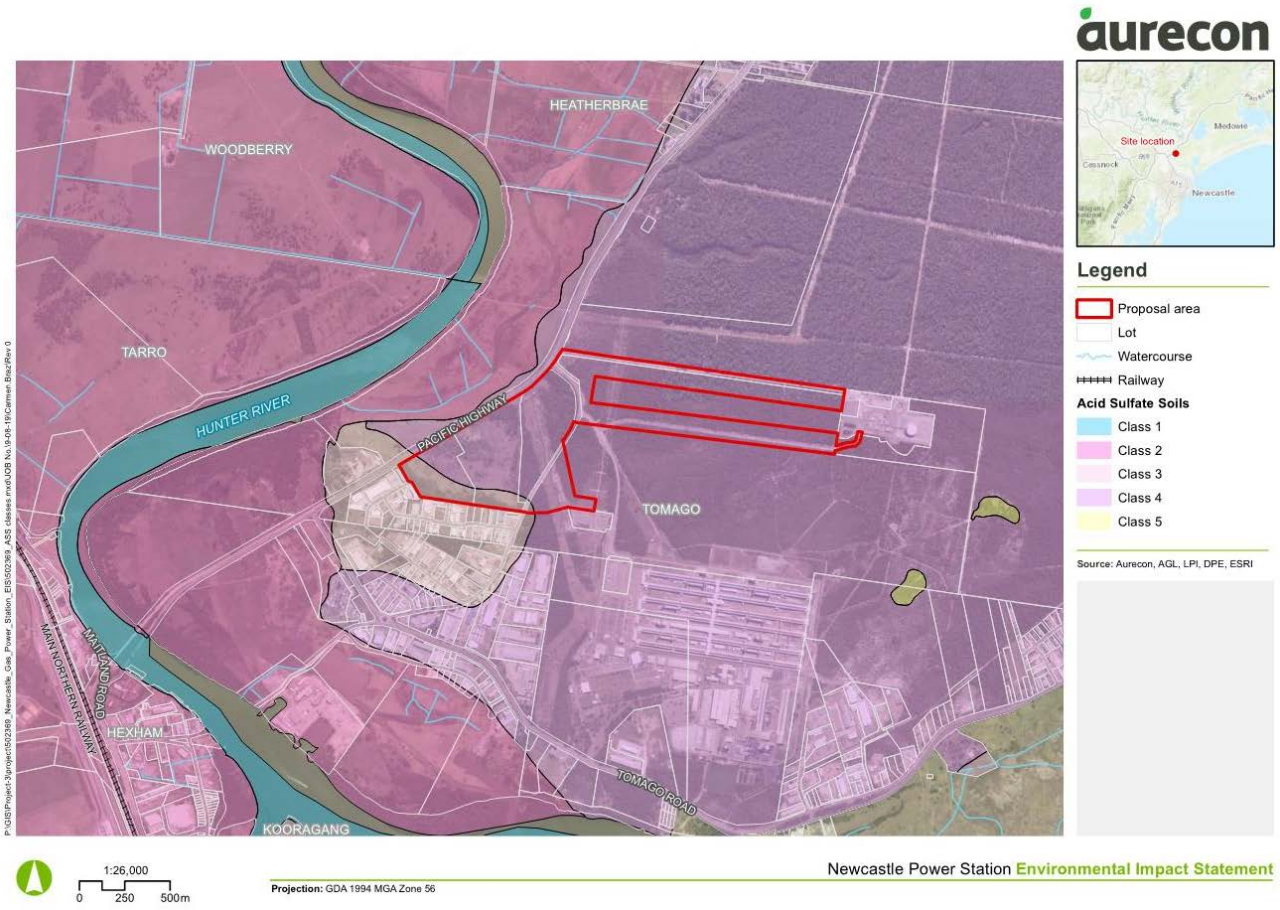


Figure 4-6 Acid sulfate soils probability and classes within the proposal area (Port Stephens LEP 2013)

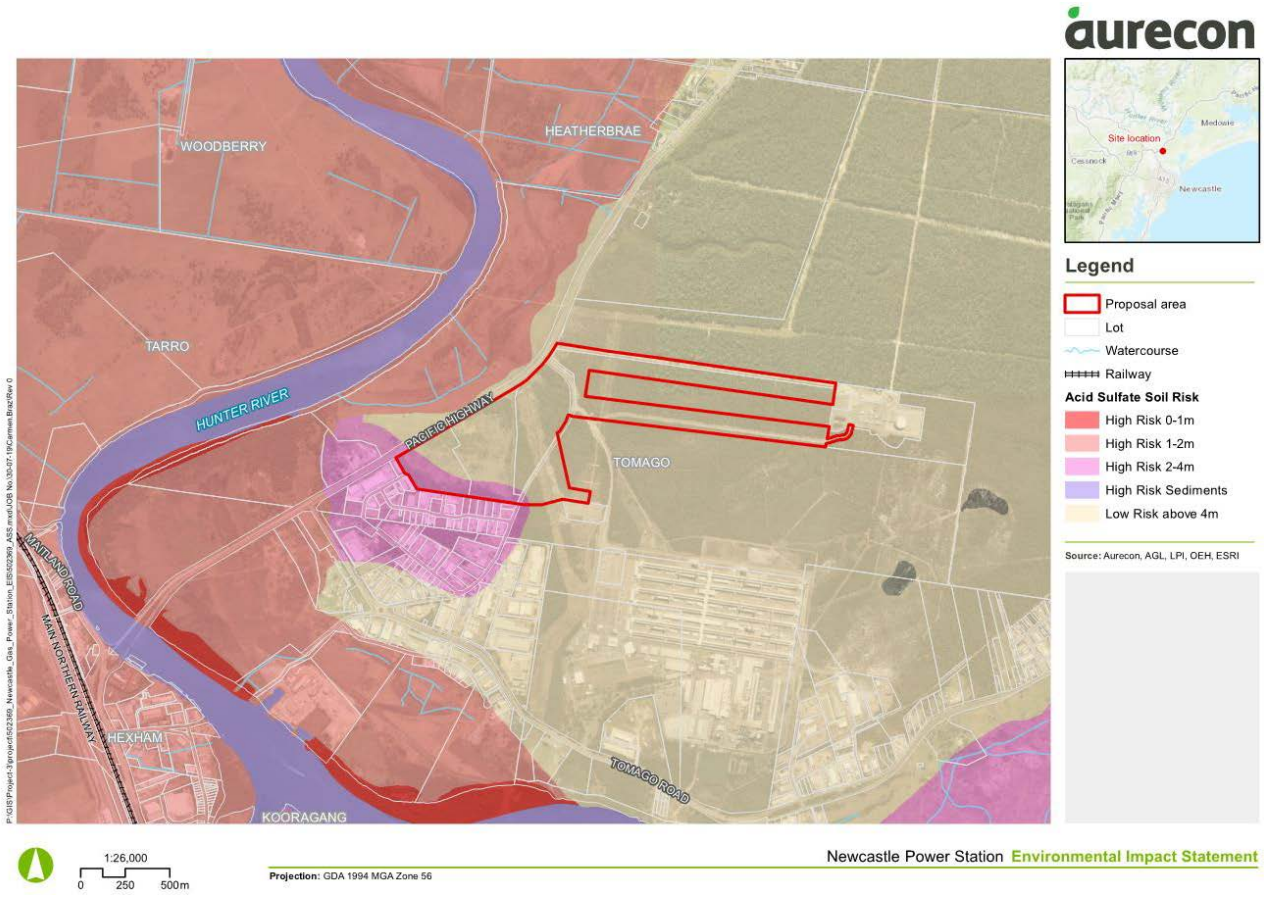


Figure 4-7 Acid sulfate soils elevation (m AHD) within the proposal area

4.7 Geology

The proposal area is in the northern part of the Sydney Basin, a major structural basin containing thick Permo-Triassic sedimentary sequences that extend from Batemans Bay to Port Stephens. The geology typically comprises sandstone and siltstone, with underlying coal seams.

The Newcastle 1:100 000 Geological Sheets 9232 (First Edition 1975) and the interactive geological map of NSW indicate that the proposal area transverses two geological units:

- Tomago Coal Measures (Pt) from the Newcastle Coalfield group, formed in the Permian period. Typical lithologies associated with the formation include shale, mudstone, sandstone, claystone, tuff and coal. This unit covers much of the southern portion of the proposal area including the proposed power station site.
- Quaternary Alluvial Soils (Qpb/Qa/Qv) deposited during the late Pleistocene Quaternary period. Typical lithologies associated with the formation include sand, gravel, clay and silt. This formation covers the northern portion of the proposal area.

Surface geologic mapping across the proposal area is presented in **Figure 4-8.**

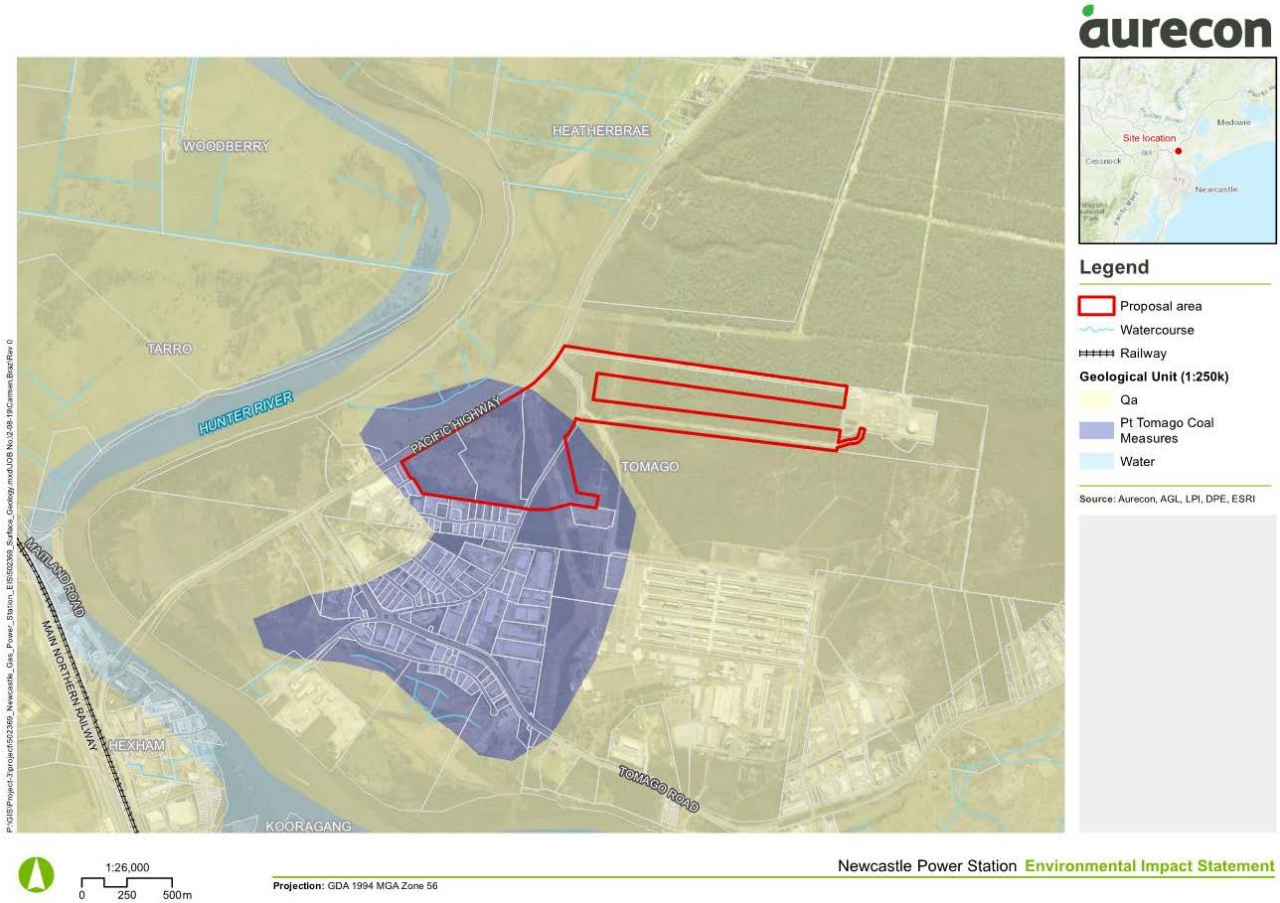


Figure 4-8 Proposal area surface geology

4.8 Topography

The proposal area is located adjacent to and partially within a designated floodplain area, situated between the Hunter River to the west and partially overlaying the Tomago Sandbeds to the east, within the Electrical Transmission and Pipeline investigation areas.

The proposed power station area is located on a topographic high point adjacent to the Hunter River and divided by a topographic ridge approximately central to the proposal, as shown in **Figure 4-9**. The average elevation along the ridge is approximately 15 m AHD with a high point of 16 m AHD in the north west portion. A gentle slope occurs to the southern proposal area boundaries, with elevations dropping to approximately 6-7 m AHD. The gradient north of the central ridge is slightly steeper, dropping to 8 m AHD over nearly half the distance. The proposal area gas pipeline options in the north are typically gently sloping to near flat with a slight rise towards the NGSF at approximately 6 m AHD.

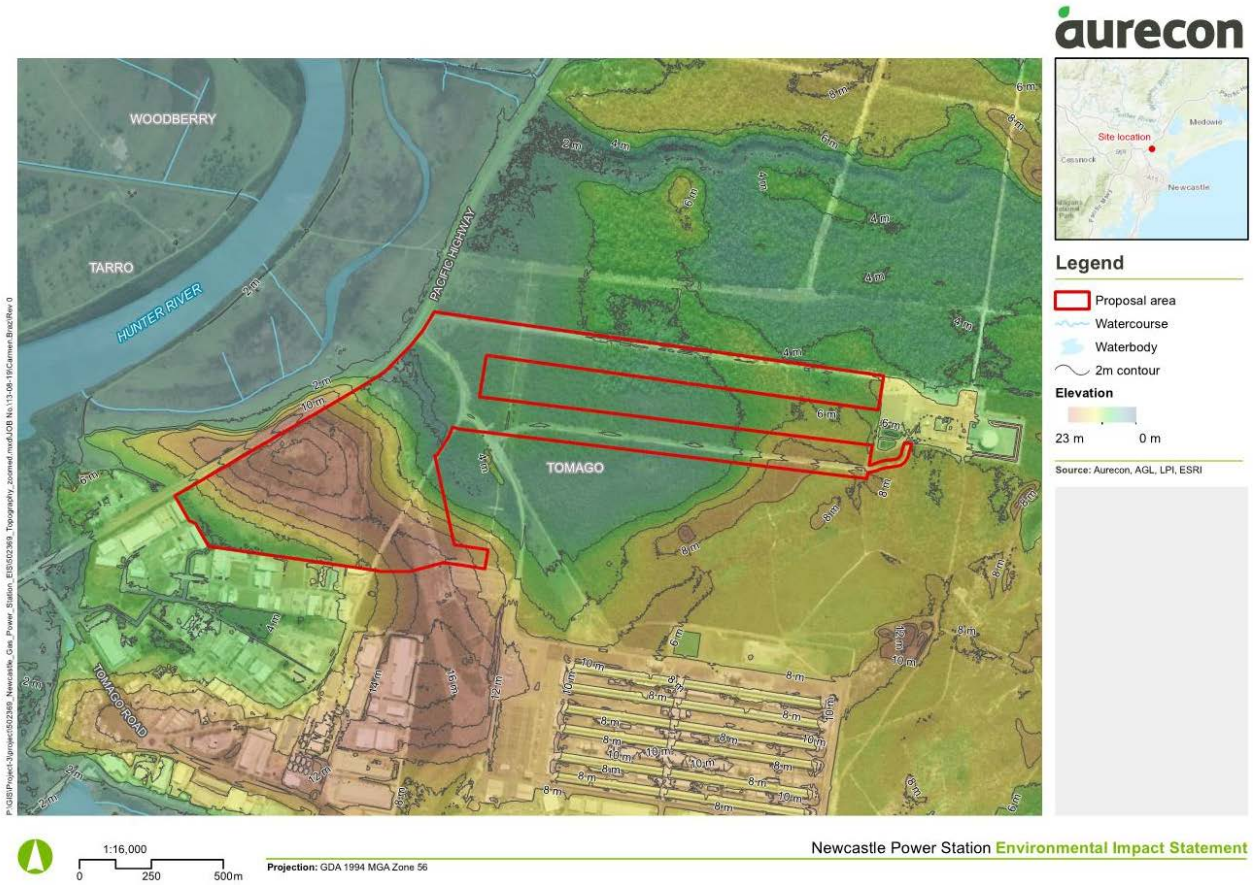


Figure 4-9 Proposal topography

4.9 Hydrogeology

The proposal is within the area of the Hunter Valley alluvial aquifer. This formation is composed of a sequence of clays, silts, sands and gravels. Highly permeable alluvial materials are often found in the base of the alluvial deposit. Hydraulic conductivity within the alluvial deposits range from 10 m/day to 239 m/day with the aquifer varying in thickness from 3 to 17 m (Williamson,1958). Generally, the water table is shallow and highly responsive to rainfall and flooding.

The Tomago Sandbeds, an extensive underground freshwater system running from Newcastle to Port Stephens is located within the eastern portion the proposal area (pipeline and electricity transmission line corridors overlay the western extent of these Sandbeds). **Figure 4-10** indicates the proposal area Tomogo Sandbeds groundwater management area.

The Tomogo Sandbeds groundwater management area acts as a back-up drinking water supply to the nearby Grahamstown Dam. The Sandbeds consist of highly permeable fine-grained sands underlain with impermeable clay and rock. On average the sand is 20 m thick, with some areas reaching a depth of 50 m.

Groundwater Dependent Ecosystems (GDEs) are defined as ecosystems that rely on groundwater for some or all of their water requirements. A search of the BOM Groundwater Dependent Ecosystem Atlas found two potential GDEs located within the proposal area (refer to **Figure 4-11**).

Whilst the majority of the proposed power station site does not have any GDE mapped, the north-east corner of the site is identified as a moderate potential GDE featuring Woodlands on coastal sand vegetation that rely on the availability of shallow groundwater. The gas pipeline options and electricity transmission line would be developed across land identified as high, moderate and low potential GDE.

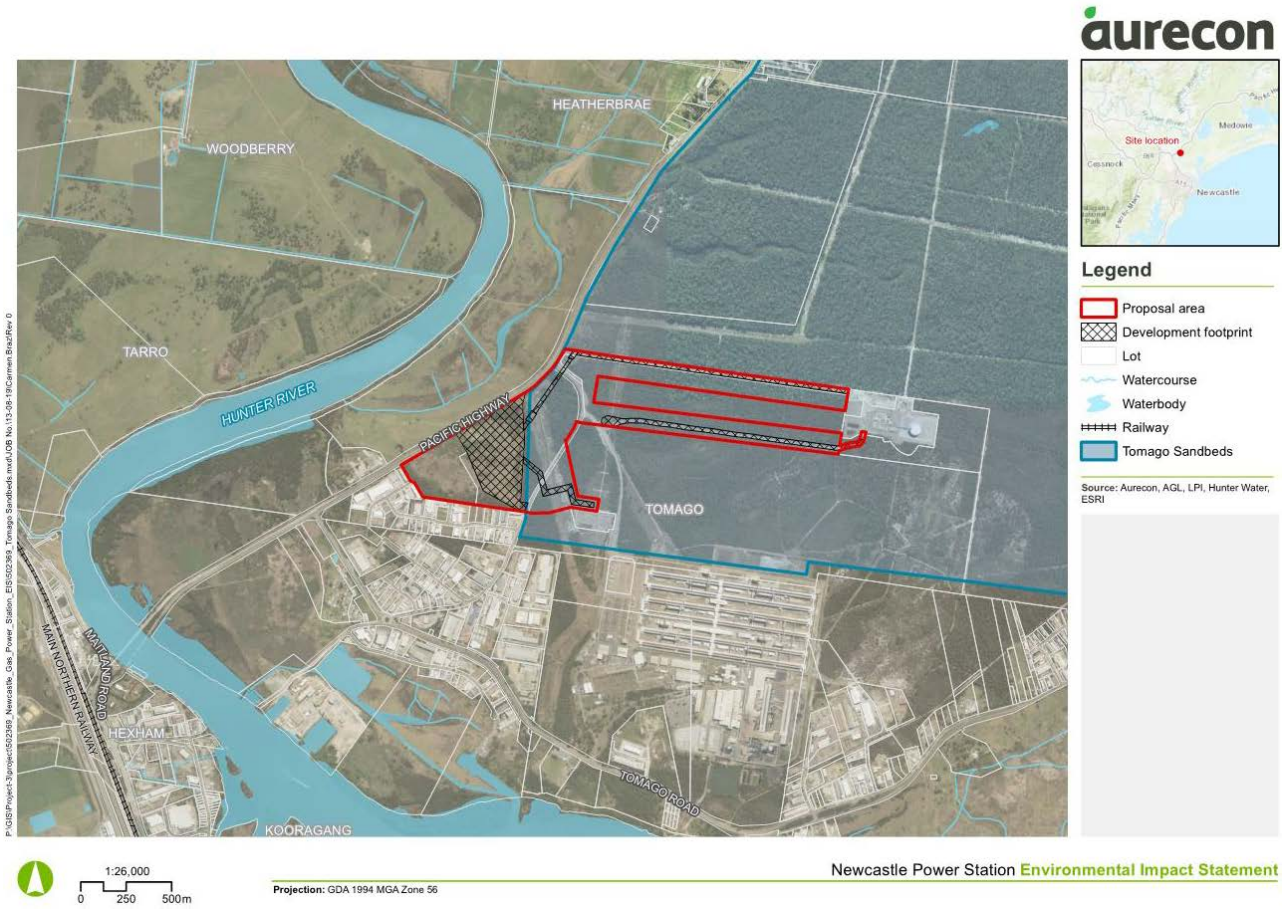


Figure 4-10 Tomago Sandbeds groundwater management area

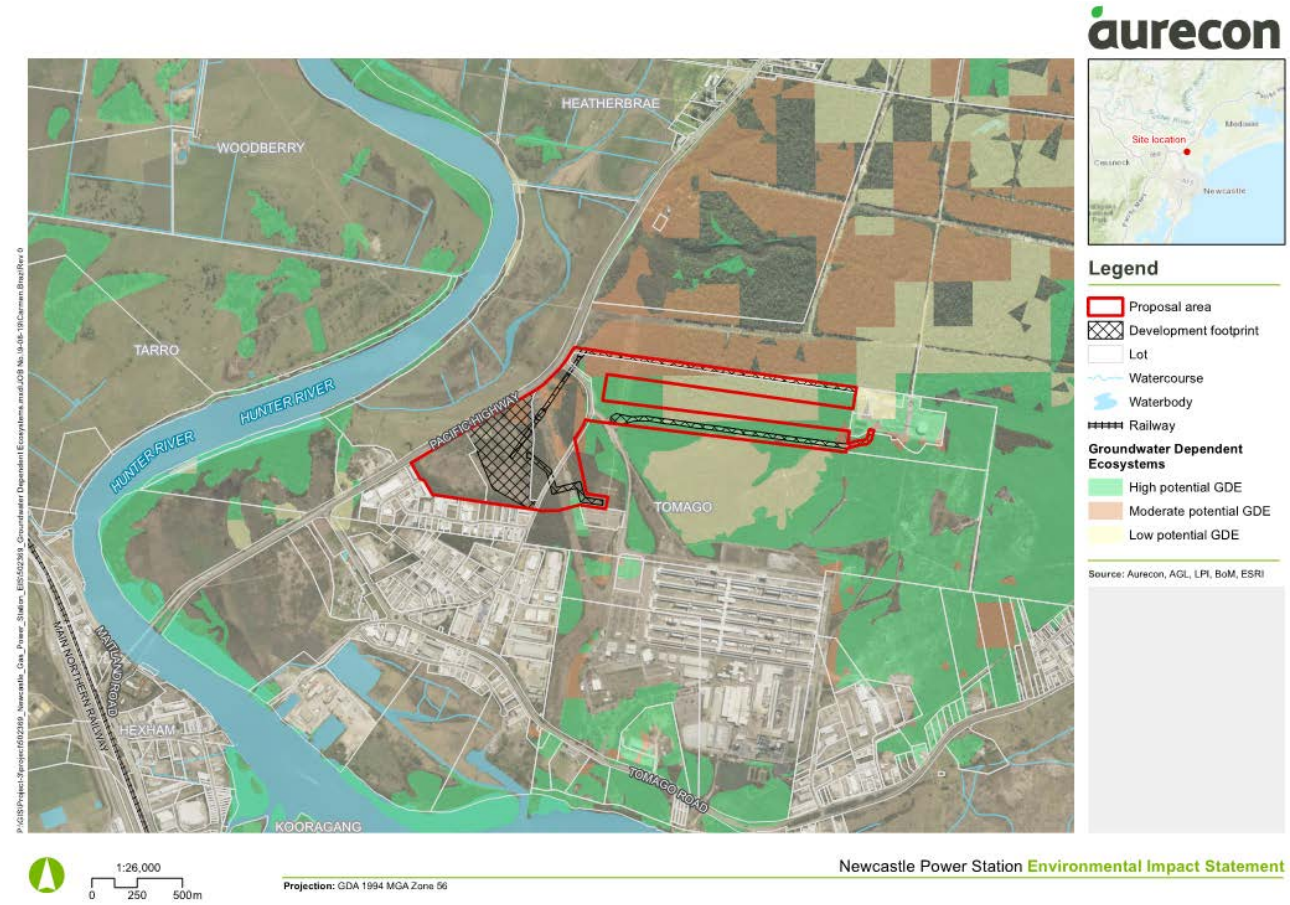


Figure 4-11 Proposal area Groundwater Dependent Ecosystems (GDE)

Review of data available through the NSW Department of Primary Industries - Water NSW and Commonwealth of Australia (Bureau of Meteorology) for the proposal area indicates 35 registered groundwater bores within 1 kilometre of the proposal area (refer to **Figure 4-12**). The metadata associated with these registered bores are presented in **Table 4-5.**

Table 4-5 Registered Groundwater Bores

ID	Depth (mbgl)	Purpose	Status	Reference Elevation (m AHD)	Latitude	Longitude
GW079412	-	Unknown	Unknown	3.03	-32.806865	151.712897
GW079437	-	Unknown	Unknown	15.34	-32.820699	151.725911
GW079455	-	Water supply	Unknown	7.34	-32.818242	151.735346
GW079456	-	Water supply	Unknown	7.34	-32.817795	151.734808
GW079484	-	Unknown	Unknown	6.89	-32.806365	151.725753
GW079507	-	Unknown	Unknown	8.22	-32.819772	151.728819
GW079509	-	Monitoring	Unknown	7.67	-32.818474	151.734179
GW079510	-	Unknown	Unknown	6.8	-32.815564	151.733633
GW079511	-	Unknown	Unknown	7.71	-32.816881	151.733635
GW079542	-	Unknown	Unknown	7.81	-32.821917	151.731299
GW079561	-	Unknown	Unknown	9.76	-32.804864	151.726308
GW079591	-	Unknown	Unknown	3.01	-32.808194	151.7115
GW079605	-	Unknown	Unknown	3.06	-32.814853	151.697732
GW079722	-	Unknown	Unknown	13.03	-32.822882	151.712773
GW079723	-	Unknown	Unknown	13.55	-32.822334	151.714746
GW079724	-	Unknown	Unknown	19.9	-32.821631	151.719147
GW079725	-	Unknown	Unknown	10.18	-32.823786	151.712012
GW079726	-	Unknown	Unknown	9.61	-32.814028	151.724533
GW079730	-	Unknown	Unknown	10.61	-32.824133	151.715105
GW200102	-	Monitoring	Unknown	1.94	-32.800172	151.716275
GW200980	4.2	Monitoring	Functional	9.27	-32.810628	151.727031
GW200983	4.5	Monitoring	Functional	7.11	-32.811795	151.736156
GW200984	4.5	Monitoring	Functional	8.73	-32.813934	151.730999
GW201068	7.5	Monitoring	Functional	14.75	-32.820576	151.712766
GW201070	6	Monitoring	Functional	17.31	-32.823977	151.718913
GW201722	6.5	Monitoring	Functional	0	-32.814385	151.730982
GW201723	6.3	Monitoring	Functional	0	-32.81234	151.727657
GW201724	5.1	Monitoring	Functional	0	-32.810963	151.728862
GW201725	5	Monitoring	Functional	0	-32.811265	151.731069
GW201726	5.5	Monitoring	Functional	0	-32.811547	151.733031
GW201727	8.5	Monitoring	Functional	6.83	-32.812976	151.731696
GW201728	10.5	Monitoring	Functional	4.8	-32.811802	151.730634
GW201729	8.5	Monitoring	Functional	6.97	-32.811971	151.728581
GW201730	5.5	Monitoring	Functional	5.65	-32.812993	151.729795
GW202976	6.3	Monitoring	Functional	0	-32.812242	151.733095

Information available regarding the registered bores indicate the status and purpose of the bores are largely unknown, with the exception of the more recent bores drilled to monitor the groundwater around the NGSF site to the east of the proposal area.

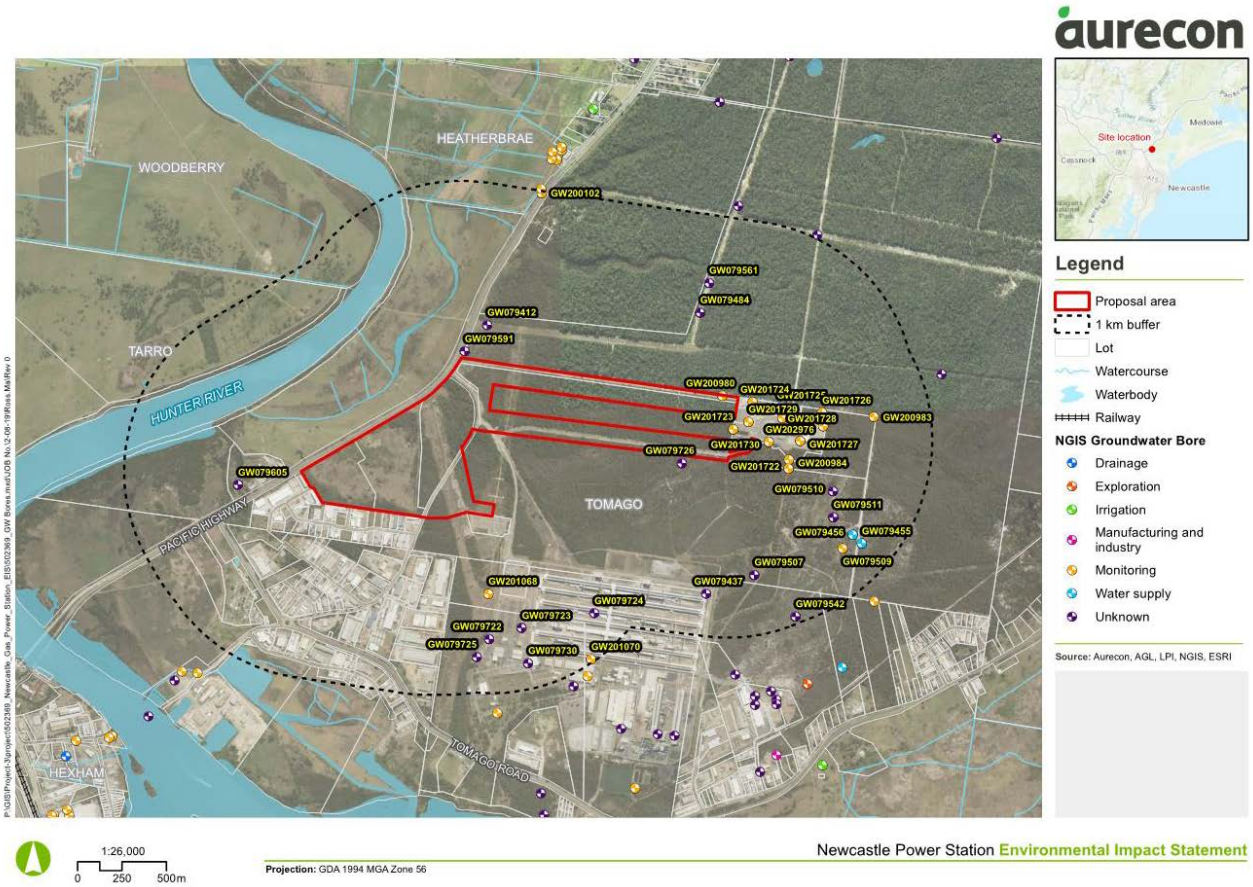


Figure 4-12 Proposal area registered groundwater bores

The closest functional bore to the proposal area is GW201068. The bore was drilled to 7.50 mbgl within the Quaternary alluvial formation approximately 500 metres to the south-east of the proposal area.

Review of geological information available from GW201068 indicates that the underlying geology is primarily characterised by a top layer of sand to a depth of 8 metres, below this clay extends down to 20 metres. Lithology of this nature is typical of the Tomago Sandbeds.

Further information on groundwater characteristics within the proposal are discussed in Section 5 from previous site investigations undertaken.

Further detailed description of groundwater characteristics (including flow direction and quality) across the proposal area and surrounding areas is presented within the Groundwater Technical Specialist Study (Aurecon, 2019).

4.10 Proposal area contamination risk review

Detailed assessment of contamination risks for the proposal area have been reported in a preliminary site investigation (PSI) contamination report (Aurecon, 2019). The PSI includes a detailed assessment of NSW Government data bases and historical aerials photography review for the proposed power station area (Lot 3 DP 1043561). The following sections are summarised from the PSI report and relevant contamination risks identified.

4.10.1 Register of NSW EPA notified contaminated sites

Records indicate that there are 2 contaminated sites within the project 1 km buffer. This includes RZM, located across Pacific Highway from the project site, which is currently being assessed by the EPA to determine any regulation requirements. The second contaminated site notified to the EPA is the Balcombe Sweat Furnace. EPA has determined this does not require regulation under the Contaminated Land Management Act 1997 (CLM Act).

The contaminated sites and their proximity to the proposal are shown in **Figure 4-13.**

The Balcombe Sweat Furnace is considered likely to be down gradient hydraulically (via groundwater) of the proposal area and therefore a low risk of contamination impacting the proposal. The RZM Tomago site is also considered to be down gradient hydraulically (via groundwater) or cross gradient and therefore a low risk of contamination impacting the proposal area.

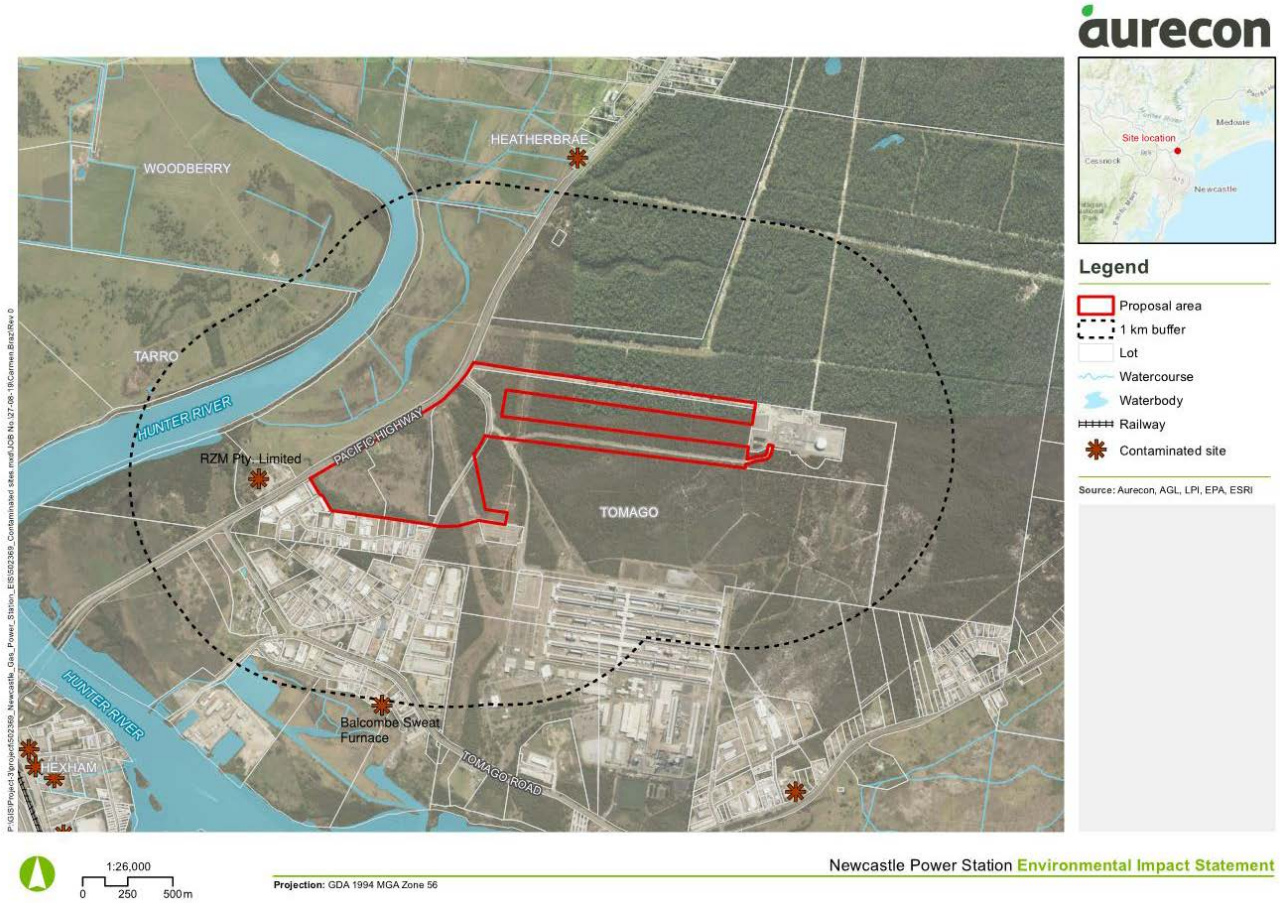


Figure 4-13 NSW EPA notified contaminated sites

4.10.2 National waste management site database

Records indicate that there is 1 site located within the 1 km buffer area that is on the National Waste Management Site Database. These findings are summarised in **Table 4-6** with a map showing site location in in the contamination PSI report (Aurecon 2019).

Table 4-6 1940 Pacific Highway, Tomago – National Waste Management Site Database

License Number	Organisation	Name	Process	Address	Distance from proposal area	Status
4659	Regain Services Pty Ltd	Spent Pot Lining Reprocessing Facility	Reprocessing	Tomago Road	20 m	Current

4.10.3 Licensed activities under the POEO Act 1997

There are 8 currently licensed activities within the proposal area and within a 1 km buffer under the Protection of the Environment Operations Act (POEO) 1997. These relate to the industrial activities on adjacent properties. POEO license details for the site are summarised in **Table 4-7** with a map showing site location in in the contamination PSI report (Aurecon 2019).

Table 4-7 1940 Pacific Highway, Tomago – POEO Licensed activities

License Number	Organisation	Name	Licensed Activity	Address	Distance from proposal area	Status
6163	Tomago Aluminium Company Pty Ltd	Tomago Aluminium Company Pty Ltd	■ Aluminium production (alumina) ■ Metal waste generation ■ Non-thermal treatment of hazardous and other wastes ■ Waste storage (hazardous, restricted solid, liquid, clinical and related waste and asbestos waste)	576-638 Tomago Road, Tomago, NSW, 2322	20 m	Current
13269	Regain Services Pty Ltd	Regain site located within the Tomago Aluminium site	■ Recovery of hazardous and other waste ■ Waste storage (hazardous, restricted solid, liquid, clinical and related waste and asbestos waste)	576-638 Tomago Road, Tomago, NSW, 2322	20 m	Current
5583	Newcastle City Council	Waterways of Newcastle City	■ Other activities	-	166 m	Current
20125	Toll North Pty Ltd	Toll North Pty Ltd	■ General Chemical Storage	12 Old Punt Road, Tomago, NSW, 2322	233 m	Current
12014	Hunter Galvanizing Pty Limited	Hunter Galvanizing	■ Metal coating ■ Metal waste generation	13 Old Punt Road, Tomago, NSW, 2322	516 m	Current
10393	Maitland City Council	All waterbodies in the Maitland Local Government area	■ Other activities	-	636 m	Current
5007	Whiteley Corporation Pty Ltd	Whitley Corporation Pty Ltd	■ Dangerous good production ■ Pharmaceutical and veterinary products production	19-23 Laverick Avenue, Tomago, NSW, 2322	837 m	Current
10585	Newcastle Recycling (NSW) Pty Ltd		■ Waste storage – other types of waste, recovery of general waste	29 Laverick Avenue, Tomago, NSW, 2322	930 m	Current

4.10.4 Former licensed activities under the POEO Act 1997

The proposal area has had 5 former licenses within a 1 km buffer zone, that have been surrendered. These are listed below in **Table 4-8** with a map showing site location in in the contamination PSI report (Aurecon 2019).

Table 4-8 1940 Pacific Highway, Tomago – Former POEO Licensed activities

License Number	Organisation	Licensed Activity	Address	Distance from proposal area	Status
4653	Luhrmann Environment Management Pty Ltd	▪ Other activities/Non-scheduled activity ▪ Application of herbicides	Waterways throughout NSW	155 m	Surrendered 6 September 2000
4838	Robert Orchard	▪ Other activities/Non-scheduled activity ▪ Application of herbicides	Various waterways throughout NSW	155 m	Surrendered 7 September 2000
6630	Sydney Weed and Pest Management Pty Ltd	▪ Other activities/Non-scheduled activity ▪ Application of herbicides	Waterways throughout NSW	155 m	Surrendered 9 November 2000
11807	Ampcontrol Service (NSW) Pty Ltd	▪ Hazardous, industrial or Group A waste generation or storage	8 Martin Drive, Tomago, NSW, 2322	314 m	Surrendered 15 May 2003
370	RZM Pty Limited	▪ Other activities	11 Pacific Highway, Tomago, NSW, 2322	400 m	Surrendered 15 January 2001

4.10.5 Potential PFAS source areas

The proposal area is currently not identified as having potential PFAS contamination (per- and poly-fluoroalkyl substances) used for firefighting. However, there is potential for nearby industrial sites to the south (including Tomago Smelter) to have historically used aqueous film forming foam (AFFF) fire suppression systems (which are a source of PFAS).

There is a potential source of PFAS contamination upstream along the Hunter River. 'Total Fire Solutions' at Heatherbrae is currently under NSW EPA investigation due to its historic use of firefighting foams. However, this is not considered a high-risk contamination source, as it is located ~3km north-east of the proposal area.

Further afield, the suburbs of Salt Ash and Williamtown have been exposed to PFAS contamination associated with firefighting foams at RAAF Base Williamtown. It is unlikely that this contamination has impacted the proposal area due to the upstream topography and the reported direction of groundwater flow.

4.10.6 Historical aerial photograph review

A review of historical aerial photos for Lot 3 DP1043561 covering the proposed power station footprint area was undertaken. The aerial photograph review from the mid-1950s to present indicated the following:

- **1954:** Proposal area (power station) is cleared with one residential dwelling. Unnamed track running north to south of the Lot boundary already established.
- **1965:** No significant changes since 1954.
- **1976:** Land has been cleared of forest within a small/narrow portion on the southern boundary.
- **1983:** No significant changes. Old Punt Road developed and paved through to the connecting industrial area. Power transmission lines installed.
- **1993:** Some dirt tracks appear to have been developed on site, however, no significant changes since 1983.

- **2005:** No significant changes since 1993, some additional minor dirt bike tracks apparent. Clearing for industrial land development to the south of the proposal area is evident.
- **2010:** No significant changes since 2005, some additional minor dirt bike tracks apparent. Industrial development is now apparent to the south of the proposal area.
- **2018:** No significant changes since 2010. Additional industrial development apparent to the south of the proposal area.

4.10.7 Proposal construction and operation land contamination risks

As part of the construction and operation of the proposal, the following contamination risks could be encountered (if no appropriate mitigation measures and design are put in place) during the earthworks, construction and operational aspects of the proposal:

- Importation of unsuitable fill materials for earthworks and construction of fill platforms and other early works such as access tracks.
- Poor demolition practices of current structures (single residential house with sheds) whereby hazardous building materials could be poorly handled and contaminant surface soils in the demolition footprint.
- Poor handling and management of oils, fuels and chemicals used in constructions of the proposal.
- Stripping and grubbing soils that contain waste materials such as construction and demolition wastes and potentially asbestos from previously dumped wastes.
- Discharge of surface waters and groundwater impacted by oils, fuels or chemicals poorly handled and contained.
- Poor ASS management planning leading to acidified soils and potential for mobilisation of heavy metals and acidic waters during construction.
- Poor design of diesel storage units and containment systems leading to leaks or spills.
- Leaking of process water from ponds and poor water quality to surrounding receptors such as creeks and groundwater systems.

4.11 Section 10-7 planning certificate

The Port Stephens Council planning certificate for the site, under Section 10.7 of the Environmental Planning and Assessment Act 1979, for Lot 3 DP1043561 covering the proposed power station footprint area was reviewed for contamination risks. The certificate includes the following regarding contamination and environmental constraints:

- There are no prescribed matters under section 59(2) of the *Contaminated Land Management Act* 1997 to be disclosed for the proposed power station footprint area.
- Port Stephens Local Environmental Plan 2013 does not identify the land as including or comprising critical habitat.
- The land is not located within a heritage conservation area under the Port Stephens Local Environmental Plan 2013.
- The land is not within a proclaimed or declared mine subsidence district.
- The land does not include any residential dwelling identified on the Loose-Fill Asbestos Insulation Register as containing loose-fill asbestos ceiling insulation.
- The land or part thereof, is identified as containing a wetland in Port Stephens Local Environmental Plan 2013.
- The land, or part thereof, is located within a drinking water catchment area as identified in Port Stephens Local Environmental Plan 2013. The catchment boundary is identified on the Drinking Water Catchment Map in Local Environmental Plan 2013.

- This parcel of land is considered to carry minimal flood risk; however, flood related development controls may apply. Detailed assessment of flood risk is addressed in the flooding impact assessment technical report, surface water and hydrology technical report and incorporated within the EIS for the proposal area.

4.12 Site inspection of proposal area

A site inspection was undertaken on 25th of March 2019 by Aurecon to assess potential sources of contamination and confirm the findings of the desktop review information. The following summary observations were made:

- The site generally appeared to slope to the south.
- Vegetation on site appeared relatively healthy and ranged from grasses to shrubs and blackberry bushes with trees in some areas.
- A water drainage channel was observed running parallel to the industrial area south of the site.
- A naturally occurring pond feature was noted during the site walk-over; however, no standing water was noted during the inspection.
- Several existing monitoring wells were identified on site (inferred to have been installed as part of previous environmental investigations undertaken in 2018 (refer to Section 5.2).
- Several illegal dumping locations (also referred to as “fly dumping”) were identified onsite – locations contained discarded items such as fill containing shale, brick, asphalt, cement sheeting, and tyres, as well as paint cans and car parts. The majority of the waste was located along the southern edge of the proposal area within Lot 2 and Lot 3 DP1043561 adjacent to industrial land uses.
- At the time of inspection, the residential property located within the proposal area was occupied so no access to the residence was possible. However, this does not impact the findings of this report, which identify the residential property as a potential contamination source (refer to Section 5.2).

Site inspection photos and further details are provided in a preliminary site investigation (PSI) contamination report for the proposal area (Aurecon, 2019).

4.13 Geotechnical stability

Specific geotechnical assessment from various previous proposal area investigations has been summarised from consultant reports in Section 5.3. These investigations were undertaken across several areas of the proposal area and assessed specific areas of the proposal including the proposed power station area, surrounding areas and pipe route alignment options. For detailed summary information on various geotechnical and soil stability parameters, please refer to Section 5.3 and the specific reports.

4.14 Existing environment summary

Table 4-9 provides a summary of the key existing environment aspects for the proposal area in regard to soil and contamination risks and constraints.

Table 4-9 Existing environment summary

Aspect	Summary
Soil landscapes	**Soil landscapes and capability** Proposal area is situated across four soil landscapes: ■ Millers forest (mf) – Estuarine landscape. ■ Beresfield (be) – Residual soil landscape. ■ Tea Gardens (tn) – Aeolian landscape. ■ Shoal Bay (sb) – Aeolian landscape. The key constraints within the proposal area are flooding, seasonal water logging and high watertables in all soil landscapes and foundation hazards in localised swamp area. Soils of low wet bearing strength and acidic soils are present and should be considered during earthworks for the proposal area. Shallow watertables and high infiltration soils are also a groundwater hazard for spills of liquids and chemicals. **Soil erodibility** For Beresfield soil types and without management and mitigation applied to the landscape, disturbed areas can suffer considerable erosion. Moderate to severe rill erosion may occur on exposed batters, occasionally batter collapse may occur due to tunnel erosion of subsoils. Moderate sheet erosion occurs where vegetative cover has been removed. For Tea Gardens soil types and without management and mitigation applied to the landscape, they are susceptible to wind erosion hazard on localised, dry sandy ridges. To prevent wind erosion, it is important to maintain sufficient ground cover. Fertilisers may be necessary to establish good cover. Protective fences around critical vegetated areas and weed control may also be necessary. For Shoal Bay soil types and without management and mitigation applied to the landscape, they are susceptible to wind erosion due to their aeolian deposition and dune like environments. To prevent wind erosion, it is important to maintain sufficient ground cover or mitigation during earthworks.
Hydrologic soil groups	Proposal area is situated across two hydrologic soil groups: ■ Group A (high infiltration) in the central and northern portion of the proposal area. ■ Group C (slow infiltration) in the southern portions of the proposal area, including the proposed power station area. The proposal area has more course grained (sandy) soils within the northern portion and finer grained soils (clays and silts) within the lower portion. Key constraints will be higher water infiltration and hydraulic movement in the higher infiltration soils and lower infiltration and movement in the finer grained soils that can lead to water logging. Due to the depositional soil environments present within the proposal area, particularly in the central and southern portions, it is expected that water infiltration and movement would be controlled by the layering of the alluvial sediment.
Estimated inherent soil fertility	Proposal area is situated across three inherent soil fertility classifications: ■ High in the southern portion of the proposal area (approx. 150 m width). ■ Moderate in the central portion of the proposal area and proposed power station. ■ Low in the northern and north eastern portion of the proposal area. Inherent soil fertility is not considered to be a constraining factor for the proposal and the majority of the proposal area is considered to be moderate to low soil fertility.

Aspect	Summary
Land and soil capability class	Proposal area is situated across four land and soil capability classes: ■ 5 – Moderate to low capability land, located within the southern portion of the proposal area (approx. 150 m width). ■ 4 – Moderate capability land, located within the central and southern portions of the proposal area and covering the proposed power station site. ■ 6 – Low capability land, located within the central and northern portions of the proposal area. ■ 8 – Extremely low capability land, located in a very small portion of the north eastern proposal area near the NGSF. The mapping provides an estimation of the land and soil capability within the proposal area, principally for agricultural and forestry activities. The majority of the proposal area is of low to moderate capability land suitable for grazing, high intensity horticulture, cropping and nature conservation. Careful soil and land management would be required for these activities to be successful and prevent longer soil and landscape degradation. Due to the low to moderate soil capability classes present across the proposal area, along with current land zoning (General Industrial IN1), the proposal is not considered to be impacting on high soil capability land in the region.
Acid sulfate soils	Proposal area is situated across two acid sulfate soil (ASS) probability classes: ■ Class 3 – located within the southern portion of the proposal area (approx. 150 m width). ■ Class 4 – located within the central and northern portions of the proposal area. Proposal area indicates it is situated across two ASS elevation risk classes: ■ High risk 2 – 4 m AHD – located within the southern portion of the proposal area (approx. 150 m width). ■ Low risk above 4 m AHD – located within the central and northern portions of the proposal area. The highest risk of disturbing ASS within the proposal area includes the proposed power station elements and ground disturbance, pipelines, horizontal directional drilling (HDD) options and transmission corridors where deeper piles and pad footings may be used. The main disturbance mechanisms will be ground disturbance by excavation and localised dewatering for in ground structures to support the proposal. Review and interpretation of ASS conditions from previous proposal area site investigations and analytical testing are summarised in Section 5 that provide further ground investigation interpretation of the alluvial and aeolian depositional environments. Typically, higher risk ASS will be present within the Class 3 southern areas of the proposal especially for deeper excavations and ground disturbance. A key requirement for management of ASS for the proposal will be to determine ASS with sulfidic sources and those soils which are acidic for other reasons (non-sulfidic) due to humic materials (organic decay), siliceous aeolian sands with low calcium and neutralisation capacity, coastal soil leaching processes and soils with higher concentrations of constituents such as manganese and iron.
Geology	Proposal area transverses two geological units: ■ Tomago Coal Measures (Pt)L: Typical lithologies associated with the formation include shale, mudstone, sandstone, claystone, tuff and coal. This unit covers much of the southern portion of the proposal area including the proposed power station site. ■ Quaternary Alluvial Soils (Qpb/Qa/Qv): Typical lithologies associated with the formation include sand, gravel, clay and silt. This formation covers the northern portion of the proposal area.

Aspect	Summary
Topography	Proposal area is located adjacent to and partially within a designated floodplain area, situated between the Hunter River to the west and partially overlaying the Tomago Sandbeds to the east, within the Electrical Transmission and Pipeline investigation areas. The proposed power station area is located on a topographic high point adjacent to the Hunter River and divided by a topographic ridge approximately central to the proposal. The proposal area gas pipeline options in the north are typically gently sloping to near flat with a slight rise towards the NGSF at approximately 6 m AHD.
Hydrogeology	Proposal is within the area of the Hunter Valley alluvial aquifer. This formation is composed of a sequence of clays, silts, sands and gravels. The Tomago Sandbeds, an extensive underground freshwater system running from Newcastle to Port Stephens is located within the eastern portion the proposal area (pipeline and electricity transmission line corridors overlay the western extent of these Sandbeds). The Sandbeds consist of highly permeable fine-grained sands underlain with impermeable clay and rock. On average the sand is 20 m thick, with some areas reaching a depth of 50 m. Groundwater Dependent Ecosystems (GDEs) are defined as ecosystems that rely on groundwater for some or all of their water requirements. Whilst the majority of the proposed power station site does not have any GDE mapped, the north-east corner of the site is identified as a moderate potential GDE featuring Woodlands on coastal sand vegetation that rely on the availability of shallow groundwater. The gas pipeline options and electricity transmission line would be developed across land identified as high, moderate and low potential GDE.
Contamination risk	Proposal area contamination risk has been assessed through desktop and historical aerial photos graph review and interpretation. Previous investigations and assessment reports provide a detailed understanding of potential contamination sources and areas of potential concern. These are considered to be limited to localised contamination risks associated with minor dumped wastes, stockpiled wastes and soils, residential compound, septic tanks, abandoned vehicles and dam sediments. Further detailed information on previous report findings is provided in Section 5. As part of the construction and operation of the proposal, the following contamination risks could be encountered (if no appropriate mitigation measures and design are put in place) during the earthworks, construction and operational aspects of the proposal: ■ Importation of unsuitable fill materials for earthworks and construction of fill platforms and other early works such as access tracks. ■ Poor demolition practices of current structures (single residential house with sheds) whereby hazardous building materials could be poorly handled and contaminant surface soils in the demolition footprint. ■ Poor handling and management of oils, fuels and chemicals used in constructions of the proposal. ■ Stripping and grubbing soils that contain waste materials such as construction and demolition wastes and potentially asbestos from previously dumped wastes. ■ Discharge of surface waters and groundwater impacted by oils, fuels or chemicals poorly handled and contained. ■ Poor ASS management planning leading to acidified soils and potential for mobilisation of heavy metals and acidic waters during construction. ■ Poor design of diesel storage units and containment systems leading to leaks or spills. ■ Leaking of process water from ponds and poor water quality to surrounding receptors such as creeks and groundwater systems.

5 Previous investigations and reports

Information provided in the following sections were primarily sourced from the reports listed in **Table 5-1**, unless otherwise referenced.

Relevant ground investigation data including tabulated soil, ASS, water and sediment analytical results is presented in **Appendix B** for the proposal area.

Table 5-1 Previous proposal area investigation reports

Document	Summary
Aurecon, 2019. *Preliminary Site Investigation (Contamination) – Newcastle Power Station.*	The aim of this assessment was to assess contamination risks and constraints within the proposal area and immediate surrounds based on the data reviewed in the context of the proposal and current land zoning.
Aurecon, 2019. *Newcastle Gas Peaker Development, Geotechnical Investigation Report.*	The purpose of the investigation was to assess the ground conditions along a trenchless pipeline crossing alignment beneath Old Punt Road (Tomago) along the Pacific Highway and footing conditions for transmission towers over Old Punt Road. The geotechnical scope comprised five boreholes, testing, logging lithology and interpretation of ground conditions.
Environmental Strategies, 2017. *Phase 1 Preliminary Environmental Site Assessment – Tomago Development Site.*	This report was prepared for the purposes of identifying pre-existing contamination risks at 1902 Pacific Highway, Tomago. This site extent incorporates both Lot 2 and 3 of DP1043561 – Lot 3 is the proposal area while Lot 2 is a proposed laydown area for construction.
Environmental Strategies, 2018. *Additional Pre-Existing Contamination Study*	Following on from the findings of the Phase 1 ESA (ES, 2017), including potential contamination sources, a site-specific sampling program was undertaken, consisting of soil, sediment, surface water and groundwater sampling. The assessment was undertaken over both Lots 2 and 3 of 1940 Pacific Highway Tomago (encompasses the proposed power station area).
Coffey, 2011. *Environmental Assessment – Newcastle Gas Storage Facility Project.*	This environmental assessment was undertaken across 3A Old Punt Road and 35A School Drive, Tomago (Lots 1201 – 1203/DP 1229590 and Lot 202/DP 1173564), adjacent to the northern boundary of the proposed power station area. Specifically, the assessment focuses on contamination risks that may be present within the proposal area.
Douglas, 2008. *Geotechnical Investigation – Proposed Gas Storage Area – Proposed Power Station, Old Punt Rd, Tomago*.	This geotechnical assessment was undertaken on Lot 2 (west of Lot 3 – the proposed power station). This area would be used as a laydown area during construction and for water storage and other ancillary infrastructure during operation. This report was primarily utilised for background ASS and geotechnical information.
URS, 2002. URS 2002. *Environmental Impact Statement (EIS) - Tomago Gas Fired Power Station, Volume 1: Main Report*.	Development consent was sought by Macquarie Generation for the construction and operation of a gas fired power station at Tomago - an EIS was prepared as part of this consent process, which included an assessment of a range of disciplines including soil contamination, waste and environmental management. This report was primarily utilised for background ASS and geotechnical information.

5.1 Proposal area history summary

The historical aerial photography review undertaken by Environmental Strategies (2017) and Aurecon (2019) indicated the following:

- The proposal area has never been used for industrial purposes or for market gardens.
- The proposal area appeared to be used partly for residential purposes (single house) but otherwise has remained vacant since the time of the earliest available aerial photograph in 1954.
- A large industrial facility (Tomago Smelter, in various stages of expansion), located 0.5 km to the south-east of the site, was present in the earliest available aerial photograph in 1954.

- The proposal area borders an industrial precinct (to the south), which began development from the 1960s and has a history of manufacturing of building materials and other general industrial and commercial activities.
- Motor sporting facilities: were present at approximately 0.5 km south to south-east from the proposal area between the 1966 and 1998 aerial photographs.
- General industrial and commercial land use in the Tomago Development Site (TDS) intensified in the period from 1980s to the present.

A majority of the background information provided in Section 4.10 was sourced from the following contamination risk report:

- Aurecon, 2019. *Preliminary Site Investigation (Contamination) – Newcastle Power Station.*

Therefore, as key information from the above report has been presented in Section 4.10, it has not summarised further in this section. This section focusses on environmental and geotechnical investigations and reporting across the proposal area where ground investigations, sampling and laboratory analysis was undertaken.

5.2 Environmental assessment reports

5.2.1 Environmental Strategies (2017): Phase 1 Preliminary Environmental Site Assessment – Tomago Development Site, NSW

Environmental Strategies (ES) produced a Preliminary Environmental Site Assessment (PESA) for the proposed site with the report issued January 2017. The following key potential contamination sources (referred to as areas of environmental concern – AECs) were identified as part of the Phase 1 ESA undertaken in 2017 (ES, 2017):

- AEC 1: Septic tank on TDS-1.
- AEC 2: Residential compound (which included the residential property and sheds on TDS-1).
- AEC 3: Abandoned motor vehicles on TDS-1.
- AEC 4: Stockpiled material/mounds on TDS-1.
- AEC 5: Dumped waste/stockpiled material adjacent to the alignment of the former section of Old Punt Road on TDS-1.
- AEC 6: Dam and stockpiled material at TDS-1.
- AEC 7: Stockpiled material on the boundary of the vacant property located on Kilcoy Drive and TDS-2.
- Tomago Smelter (offsite) - the proposal area is located within the Tomago Smelter Buffer Zone. The buffer area was established as part of the 1981 approval and 1991 expansion (as modified) of the Tomago Smelter. In relation to contamination risks, fluorides and polycyclic aromatic hydrocarbons (PAHs) are both known to not only be produced by aluminium smelting but to have potential to impact soil, surface and groundwater on the Tomago Smelter and surrounding areas. However, the potential for fluorides and/or PAHs originating from the Tomago Smelter to impact upon the proposal area is low considering the following:
    - The closest point of the Tomago Smelter is more than 0.5 km away from the site.
    - A natural ridge, fully vegetated with healthy, mature trees, which is higher than the smelter site is a likely a buffer to airborne impacts between the site and the Tomago Smelter.
    - The topography indicates that surface water between the Tomago Smelter and the site is likely to flow to the south, away from the proposal area. Surface runoff from Tomago Smelter is predominantly directed to a large catchment dam on the southern side of the facility and from there flows south into the Hunter River, also away from the proposal area.

- The topography indicates that groundwater on the Tomago Smelter site is likely to flow to the south, away from the proposal area.
- The existing Environmental Protection License 6163 for the Tomago Smelter provides maximum air emission concentrations. An air quality technical report has been prepared (Aurecon, 2019) for the proposal area that discusses existing air emissions across the broader Tomago area, any potential future increases as part of future development and implications for planning approval.

Based on the above summary, the following potential contaminants of concern (PCoC) were listed for the Tomago Smelter site:

- Total recoverable hydrocarbons (TRH).
- Fluoride.
- Faecal and Total Coliforms (F&TC).
- E Coli.
- Volatile Organic Compounds (VOCs).
- BTEX (benzene, toluene, ethyl benzene, xylene).
- Metals (e.g. arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc).
- Polycyclic aromatic hydrocarbons (PAHs).
- Organochloride pesticides (OCP)/Organophosphorus pesticides (OPP).
- Polychlorinated biphenyls (PCBs).

5.2.2 Environmental Strategies, 2018. Additional Pre-Existing Contamination Study

Following on from the findings of the Phase 1 ESA (ES, 2017), including potential contamination sources, a site-specific sampling program was undertaken, consisting of soil, sediment, surface water and groundwater sampling components. The assessment was undertaken over both Lots 2 and 3 of street address 1940 Pacific Highway Tomago (part of the proposal area). The assessment area within the ES report is referred to as the Tomago Development Site (TDS).

Soil bores were extended to a maximum depth of 3 m below surface level or, at least 0.5 m into natural material or, to refusal, whichever was shallower. The locations of new groundwater monitoring wells were determined following review of the Phase 1 ESA and potential contamination sources. Soil bores which were to be converted into groundwater wells were extended to a maximum depth of 15 mbgl, or to a nominal depth of 2 m beyond the depth at which an aquifer or first water bearing zone (WBZ) was encountered, whichever occurred first.

Several AECs were identified in the Phase 1 ESA and are numbered AEC 1-7 (refer to Section 5.2.1). Based on the assessment, the following results and conclusions were applicable:

AEC 1: Septic Tanks

No PCoC were detected in AEC 1 exceeding the adopted soil assessment criteria (SAC) within the scope of the completed investigation.

Zinc was detected in groundwater in an elevated concentration in one groundwater sample (T l_ESMW0l), that exceeded the adopted groundwater assessment criteria (GAC). The exceedance (28 µg/L) was 3.5 times the most sensitive of the adopted GAC, that being NEPM 2013 B1 Table 1C GlLs, Fresh Waters (A). Although this exceeded the criteria, zinc concentrations detected in groundwater collected from the background wells installed on the TDS ranged from 0.9 to 34 times the GAC. This puts the concentration detected in groundwater at AEC 1 toward the lower end of the range of zinc concentrations detected in the background wells.

Given the site use and history, the elevated concentration of zinc was thought likely to be indicative of the local catchment since even the background wells contained zinc. Zinc is common in groundwater where there have been local buildings and stormwater systems with galvanised roofs and downpipes and the exceedance of less than one order of magnitude is consistent with such use.

Chromium (III+ VI) was detected within one groundwater monitoring well (T_I_ESMW0l) at a concentration of 2 µg/L, which is above the adopted GAC of 1 µg/L. The filtered chromium groundwater sample from the sample location reported a concentration below the LOR. The Chromium (III+VI) exceedance was at the low-end range of detections above the GAC, with the highest concentrations reported in AEC 5. Therefore, it is unlikely that the reported Chromium (III+VI) exceedances within AEC 1 are related to the immediate use of the area, and they are considered more likely representative of background water quality.

AEC 2: Residential Compound

AEC 2 was identified predominantly due to the presence of the garage/shed adjoining the residence and due to the observations, that a number of PCoC including fuels, oils and other chemicals were observed to be stored unbunded within the garage/shed.

A number of PCoC were detected in one soil sample in elevated concentrations. The following concentrations were detected above the relevant SAC:

- NEPM 2013 Table B1(6) ESLs for Urban Res, Coarse Soil; 0-2 m.
  - Benzo(a)pyrene: 14 exceedances.
  - TRH C6-C34: 1 exceedance.
- NEPM 2013 B1 Table 1A (1) HIL Rec C Guideline.
  - PAH as B(a)P TPE: 5 exceedances.

Based on the above, the PCoC detected in AEC 2 were considered to be contamination and pollution under the definitions provided in the ES report.

The PCoC were detected in near-surface soils so the following exposure pathways were considered likely to exist for residents and visitors to the TDS, if not removed or managed during proposal development:

- Inhalation.
- Ingestion.
- Absorption (dermal contact).

Given that exposure pathways have been identified, the risk to residents and visitors to the TDS as a result of the impacts detected are increased. Evidence also shows that the residence and garage/shed are considered to be the likely sources of the identified contamination and pollution have been present on the site for some decades. Therefore, it is possible that over that time the PCoC detected may have been used in and around AEC 2 on more than one occasion. The extent of the PCoC also appeared vertically limited to near surface soils and were only detected in one sample, indicating that the impacts are not likely to be extensive across AEC 2. It is considered likely that these surface soil exceedances can be managed and removed during future development of the proposal area.

AEC 3: Abandoned Motor Vehicles

No PCoC were detected in AEC 3 exceeding the adopted SAC.

AEC 4: Mounds/Potentially Stockpiled Material.

No PCoC were detected in AEC 4 exceeding the adopted SAC.

AEC 5: Dumped Waste

AEC 5 was identified as an AEC predominantly due to the presence of extensive fly dumping (illegal disposal/dumping of waste). Extensive fly dumping of waste material was noted along the majority of the former alignment of Old Punt Road, for a distance of approximately 500-600 m. Wastes such as drums, vehicle bodies, timber, vegetation clippings and a number of other general wastes were observed along this section of the TDS.

<u>AEC 5: Soil</u>

A number of PCoC were detected in soil samples in elevated concentrations. The following concentrations were detected above the relevant SAC as summarised below:

- NEPM 2013 B1 Table 1A (1) HIL Rec C Guideline.

- PAH (as BaP TPE): 10-110 times the SAC.
- Total PAH: 1.6 - 10.7 times the SAC.

- NEPM 2013 Bl Table 1A (3) Res Soil HSL A/B for Vapour Intrusion, Sand 0-1 m
  - Naphthalene: 1-5 times the SAC.
- NEPM 2013 Table 18 (6) ESLs for Urban Res, Coarse Soil; 0-2 m.
  - TRH C16-C34: 2.4 - 3.1 times the SAC.
  - Benzo(a)pyrene: 1-357 times the SAC.
- NEPM 2013 Bl Table 18 (7) Management Limits, R/POS, coarse.
  - TPH C16-C34: 3 times the SAC.

AEC 5 encompasses the former alignment of Old Punt Road. This access way is not open to general traffic but can be accessed from either end. It appears that the former roadway provided a convenient location for unlicensed dumping of various waste materials.

Although several elevated TRH/PAH/benzo(a)pyrene concentrations were reported as per above, the impacted area is considered localised (not considered site/spatially extensive). Further description is provided in the section below.

A review of the borelogs from AEC 5 shows that an asphalt was noted at sampling locations:

- T_5_ESMW04 ("Asphalt" noted between 0.0 -0.05 mbgl).
- T_5_ESMW05 ("Asphalt" noted between 0.0 -0.05 mbgl).

The soil sample collected from T_S_ESMW05 at a depth of 0.1 mbgl reported concentrations of carcinogenic PAHs (45 mg/kg) and sum of total PAHs (480 mg/kg) above the SAC of 3 mg/kg and 300 mg/kg respectively. The sample is reported to be collected from beneath the observed asphalt within Fill (noted to be gravelly SAND). It was ES's opinion that given the proximity of asphalt to the collected sample, there was the potential for components of the asphalt to enter the sample during collection, thereby potentially increasing the carcinogenic PAH and sum of total PAH concentrations reported. ES, therefore, considered the T_5_ESMW05 0.1 mbgl results to be an indicator of actual concentrations from that location.

ES notes that two other soil bore locations (T_S_ESSB03 and T_S_ESSB04) from AEC 5 reported concentrations of either carcinogenic PAHs and/or sum of total PAHs above the SAC. These soil bores did not report asphalt within the bore logs. ES, therefore, consider these concentrations to be representative of the fill material within these locations. The source of the PAHs above the SAC are likely to be the result of dumping activities within AEC5.

A total of 10 soil samples were collected from AEC 5. Based on the results, two shallow samples exceeded the SAC (T_S_ESSB03 and T_S_ESSB04). Based on the distribution of the samples collected and on the limitations of the sampling density, ES estimated that a possible area of 350 m x 20 m x 0.3 m deep (i.e. 2,100 m^3) in AEC 5 could be impacted to an extent similar to the samples collected. Further investigation would be required to confirm this estimate of impact. The ES report states that as the waste dumped across AEC 5 is uncontrolled and the site is not secured, there remains potential for dumping to continue and for the waste to be disturbed and/or spread unless adequate controls are implemented.

AEC 5: Groundwater

A number of PCoC were detected in groundwater samples in elevated concentrations. In summary, arsenic, cadmium, chromium, copper, mercury, nickel, zinc, lead, bezo(a)pyrene exceeded their relevant GACs from 1 to 58 times the relevant individual GAC. ES considered the above groundwater concentrations may constitute contamination and/or pollution.

AEC 6: Dam and Stockpiled Material

AEC 6 was identified as an AEC predominantly due to the presence of a dam and material stockpiles. Given the position of the stockpiles which are placed immediately on the downgradient side of the dam, it is likely that they are comprised of material excavated to create the dam. Results of sampling on AEC 6 are discussed in the following sub-sections.

AEC 6: Soil

Soil samples collected from the stockpiled material did not exceed the adopted SAC for any analyte.

AEC 6: Sediment

Sediment samples collected from the dam did not exceed the sediment assessment criteria (SDAC) for any analyte.

AEC 6: Surface Water

A number of PCoC were detected in elevated concentrations in surface water sampled from the dam. The exceedances could be considered to be minor to moderate with the following concentrations detected above the relevant surface water assessment criteria (SWAC) as summarised below:

- ANZECC 2000 FW 95%
  - Copper: 2.8 times the SWAC.
  - 11 Chromium: 2 times the SWAC.
  - 11 Lead: 1.7 times the SWAC.
  - Zinc: 6.8 times the SWAC.

The PCoC detected at elevated concentrations in surface water were considered by ES to likely to be naturally occurring background levels rather than contamination and/or pollution.

AEC 7: Stockpiled Material Encroaching TDS-2 (Eastern Boundary from Adjacent Property)

AEC 7 was identified as an AEC predominantly due to the presence of material stockpiles on the property adjacent the eastern boundary of TDS-2.

A number of PCoC were detected in concentrations exceeding the adopted SAC in the stockpiled material located in AEC 7. The exceedances and waste classification screening results are provided below:

- NEPM 2013 B1 Table 1A (1) HIL Rec C Guideline.
  - Chromium (as Total Chromium): 2 times the SAC.
- NEPM 2013 Table 1B (6) ESLs for Urban Res, Coarse Soil; 0-2 m.
  - TRH C16-C34: 1 times the SAC.

The stockpiled materials which have encroached across the eastern boundary of TDS 2 may be determined to constitute contamination and/or pollution.

Background Areas

For the purpose of the ES report, “background areas” on the TDS were those areas which were not identified as being AECs. This term has been used where no specific source of potential contamination was identified. The following provides a summary of the results returned from samples collected across the Background areas compared to the adopted assessment criteria.

Background Areas - Soil

TRH (F2) was detected in one shallow soil sample, T_SB07_0.1 in the background areas which exceeded the adopted SAC. The sample was collected from the north eastern corner or TDS-2. This location was very close to a storm water culvert which diverts water predominantly from the Pacific Highway through TDS 2. The culvert has been in place for many years and a likely contamination source. Based on the above, the concentration of TRH detected in sample T _SB07 _0.1 may constitute contamination and/or pollution.

Background Areas -Groundwater

When considering whether groundwater conditions are likely to represent background conditions for the site, further consideration of the site setting, topography and hydraulic gradient was considered by ES before adopting results from any location as background.

The groundwater elevation data provided is based on a limited number of locations and indicates localised complexity at the TDS, which in turn precludes accurate inference of the flow direction without further

investigation. ES considers that in lieu of more data points within the site, that the local topography provides a reliable guide to the likely generalised flow direction of the aquifer/s in the area of the TDS.

ES concluded that the well which is most likely to represent local background conditions T_ESMW09, which also has the highest groundwater elevation. Due to the well's elevation, it was deemed unlikely to be impacted by development in and around the TDS. Apart from nickel (Ni), all metals within T_ESMW09 were found to be below the GAC. As a result, ES adopted the result from T_ESMW09 as the low reliability background screening level (LRBSL) for Ni only.

A number of PCoC were detected in concentrations exceeding the adopted GAC and or LRBSL (Ni) in the background areas of the TDS. The exceedances are provided below:

- NEPM 2013 B1 Table 1C GILs Fresh Waters (A) Guideline for groundwater.
  - Cadmium: 2 times the GAC.
  - Copper: 10-165 times the GAC.
  - Chromium: 2-11 times the GAC.
  - Zinc: 1.4 times the SAC.
- NEPM 2013 B1 Table 1C GILs Marine Waters(A) Guideline.
  - Lead: 1.6-7.3 times the GAC.
  - Chromium: 2.5 times the GAC.
  - Zinc: 1-18 times the GAC.
- NEPM 2013 B1 Table 1C GILs Drinking Water (B) Guideline.
  - Lead: 1.1-2.2 times the GAC.
- TDS LRBSL (Ni).
  - Nickel: 1- 3.4 times the GAC.

The high concentrations of copper detected in groundwater were similar across the eastern half of TDS-1, both in background and AEC wells. Based on the groundwater flow direction which can be interpolated from the groundwater elevation contours prepared by ES, it is unlikely that the concentrations of copper detected in the background areas on the TDS were evidence of impact from the AECs. Rather ES deemed that concentrations in groundwater of copper were generally high in this section of the TDS. No potential source of copper was noted during the ES Phase 1 ESA (ES, 2017) or during the fieldworks, either on or off site nor was copper detected in elevated concentrations in soil at any location sampled across the site. Based on the limitations of the scope of the completed, ES deemed the source of elevated copper in background groundwater across the eastern half of TDS-1 remains undefined but may be indicative of local natural concentrations throughout the general area.

Background Areas -Surface Water

A number of PCoC were detected in concentrations exceeding the adopted surface water assessment criteria (SWAC) in the background areas of the TDS. The exceedances are provided below:

- ANZECC 2000 FW 95%
  - Copper: 7.9 times the SWAC.
  - Chromium: 4 times the SWAC.
  - Lead: 2.6 times the SWAC.
  - Zinc: 21 times the SWAC.

The metals detected in background surface water on the TDS are consistent with those detected in both groundwater and surface water across AECS and Background areas. Therefore, they were considered likely to be representative of the background conditions in surface water on the TDS.

The low pH of the groundwater sampled on TDS is representative of the estuarine matrix. Low pH groundwater is consistent in the whole Hunter River Quaternary system and is likely to be natural on the TDS.

Asbestos

Asbestos was not detected in any of the soil or stockpile samples collected as part of the assessment. This is despite targeted samples being collected from areas in which potential asbestos containing materials were observed. That asbestos was not detected in soil does not infer that asbestos is not present on the site, particularly in or around waste piles, stockpiled materials or buildings and structures. However, it does provide an indication that widespread asbestos impacts in soils across the TDS are unlikely.

Microbial Indicators - E. Coli and Coliforms

Microbial indicators screened against the adopted screening criteria NHMRC ADWG 2011 (Ref.19) returned detections for total coliforms in two samples, T_ESMW08 and T_ESMW09.

The criterion, which is zero for all indicators screened, is considered to be conservative when applied to groundwater which is not being used as an untreated potable water source. It is noted that the criterion was solely a screening level criterion and not an acceptance/remediation criteria. The samples which returned detections were both collected from monitoring wells located within the background areas of the TDS, and not the AECs. No impacts or infrastructure were noted in the vicinity of the wells which could be considered to be likely sources of anthropogenic microbial impact.

Total coliforms alone do not necessarily indicate faecal contamination and can result from a number of sources including agricultural runoff. Given that faecal coliforms and E. coli were not detected, the wells were both in background locations, the surrounding land was unsealed and vegetated and the site has a long history of agricultural use, it was considered unlikely that the groundwater in the vicinity of the wells have been impacted by sewage contamination.

The identified AECs and all site investigation and sampling locations are presented in **Figure 5-1** and **Figure 5-2**.

Figure 5-1 AECs from ES, 2018

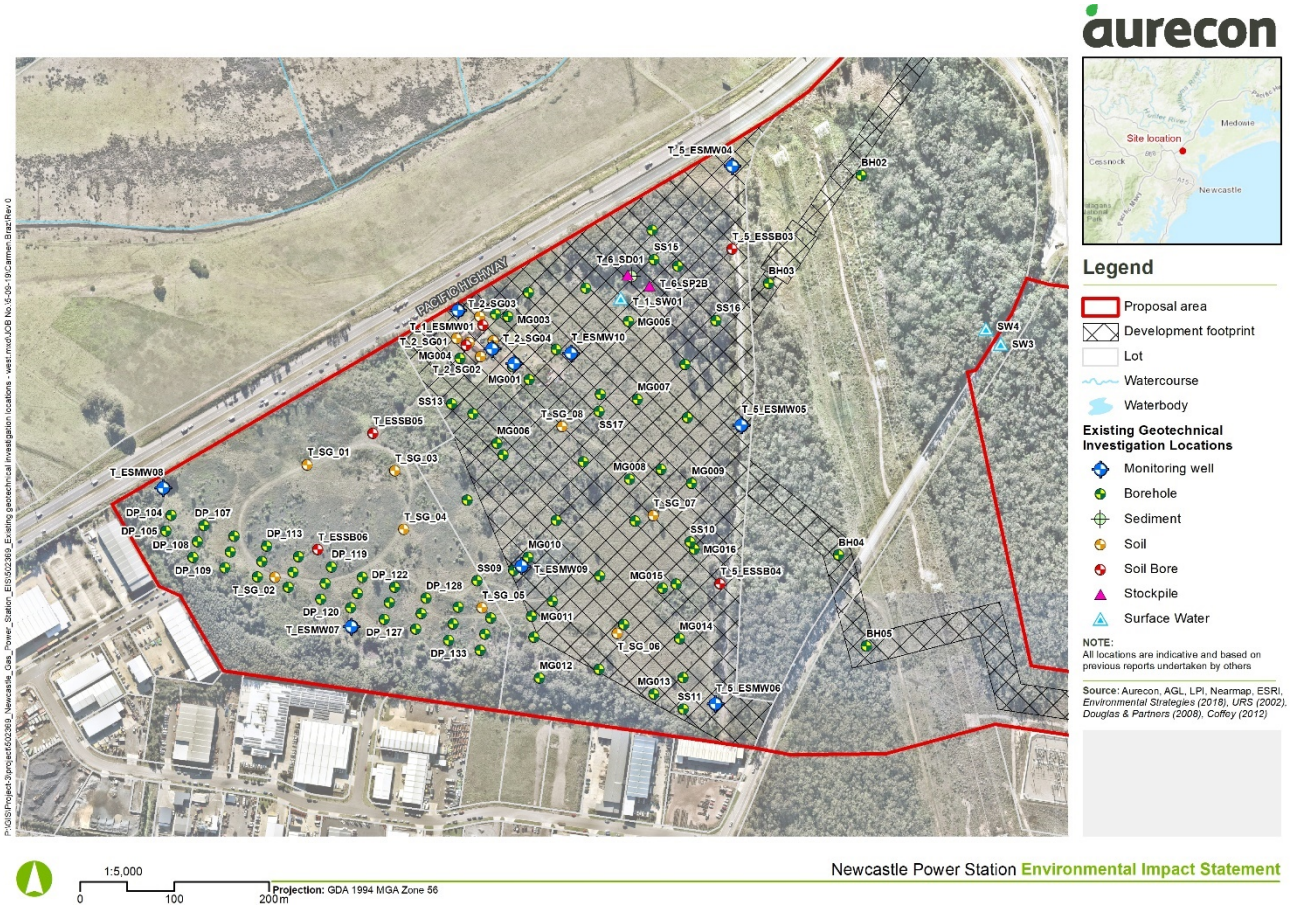


Figure 5-2 AECs from ES, 2018 with sampling locations undertaken (note – legend to be updated splitting out separate consultant's investigation locations)

5.2.3 Coffey, 2011. Environmental Assessment – Newcastle Gas Storage Facility Project

Coffey undertook a Preliminary Contamination Assessment (PCA) of the proposed NGSF (this facility has now been constructed, located to the east of the proposal area, (refer to **Figure 2-3**), which is located adjacent the northern boundary of the proposal area. The preliminary assessment consisted of a desktop review as well as a limited site assessment consisting of 14 soil bores and installation of 3 groundwater wells. A summary of the findings is provided below:

- The site history assessment identified that the eastern portion of the primary project area has been used for heavy mineral sand mining between 1970's and 1990's, and that the primary project area has been an industrial buffer zone for Tomago Smelter since 1981.
- Based on the site history assessment, field observations and laboratory analysis, it was considered that there is a low risk of significant soil and groundwater contamination on the primary project area. Some influence of atmospheric fallout from the nearby aluminium smelter was evident with low fluoride concentrations in soil detected at the ground surface.
- Groundwater parameters and concentrations of chemicals of concern were consistent with known data from the Tomago sand beds.
- The results of the ASS screening tests for the primary project area showed the soils are unlikely to be ASS (given the eastern inland area). There was potential that soils closer to Hunter River could be alluvial/estuarine in nature, and ASS may be present.
- Based on the results of the environmental assessment it was concluded that previous activities on and near the primary project area (NGSF) had not negatively impacted on soil or groundwater quality. It was also concluded that contamination issues did not pose a constraint to development of the proposed NGSF, the portion of the gas pipeline corridor and the portion of the proposed new road that fall within the proposal area for the NGSF.

- Based on the results of this study, it was considered that further contamination assessment or remediation was not required in the NGSF. It was noted that conditions between sampling locations could vary from those described in this report, and if suspicious material was encountered an environmental consultant should be engaged to provide guidance on management of the material. In this context, suspicious materials include oily or odorous material, potential asbestos containing materials, drums, metal or plastic containers, former fuel tanks or machinery.
- No contamination investigation was carried out on the proposed pipeline routes, and once the preferred pipeline route is known, contamination assessment was recommended. Further ASS investigations were also recommended along the pipeline route to assess the impact of trenching and horizontal directional drilling (HDD). Based on the results of further investigation, Coffey stated that appropriate liming rates can be then assessed and an acid sulfate soils management plan (ASSMP) prepared (where required).

All Coffey 2011 site investigation and sampling locations are presented in **Figure 5-3.**

Figure 5-3 Environmental assessment site investigation locations (Coffey, 2011) (note – legend to be updated splitting out separate consultant's investigation locations)

5.3 Geotechnical assessment reports

5.3.1 Aurecon, 2019. Newcastle Gas Peaker Development, Geotechnical Investigation Report

The purpose of the investigation was to assess the ground conditions along a trenchless pipeline crossing alignment beneath Old Punt Road (Tomago) along the Pacific Highway and footing conditions for transmission towers over Old Punt Road.

The objectives of the geotechnical investigation were to:

- Characterise the subsurface conditions along the proposed trenchless alignment and at the transmission tower locations;

- Provide geotechnical design parameters and construction advice;
- Classify the site according to AS2870 (2011): Residential Slabs and Footings;
- Provide soil parameters for foundation design of the proposed transmission towers over Old Punt Road.

The site investigation was carried out between 16 and 17 July 2019 and 24 and 25 July 2019. Site investigation works were completed in general accordance with AS1726-2017 Geotechnical Site Investigations. The geotechnical scope comprised five boreholes, three of these boreholes were scheduled to a target depth of 10 m below ground surface, and the remaining two boreholes were scheduled to achieve competent bedrock or 25 m below ground surface (BH01 and BH02). The borehole locations and the final depth for each borehole are presented in **Table 5-2** and **Figure 5-4**.

Table 5-2 Summary of borehole locations (Aurecon, 2019)

Borehole number	Easting[1] (m)	Northing[1] (m)	Ground surface level (m AHD)[2]	Drilled depth (m bgl)[3]	Termination level (m AHD)[2]
BH01	379363.77	6369122.99	2.26	19.72	-17.46
BH02	379241.46	6368915.78	2.61	17.00	-14.39
BH03	379142.76	6368801.21	8.04	10.00	-1.96
BH04	379214.86	6368513.90	10.38	11.00	-0.62
BH05	379243.96	6368414.67	12.214	10.00	2.21

Notes:

1) Easting and Northing relate to the Map Grid of Australia (MGA) coordinate system

2) AHD = Australian Height Datum

3) m bgl = metres below ground level

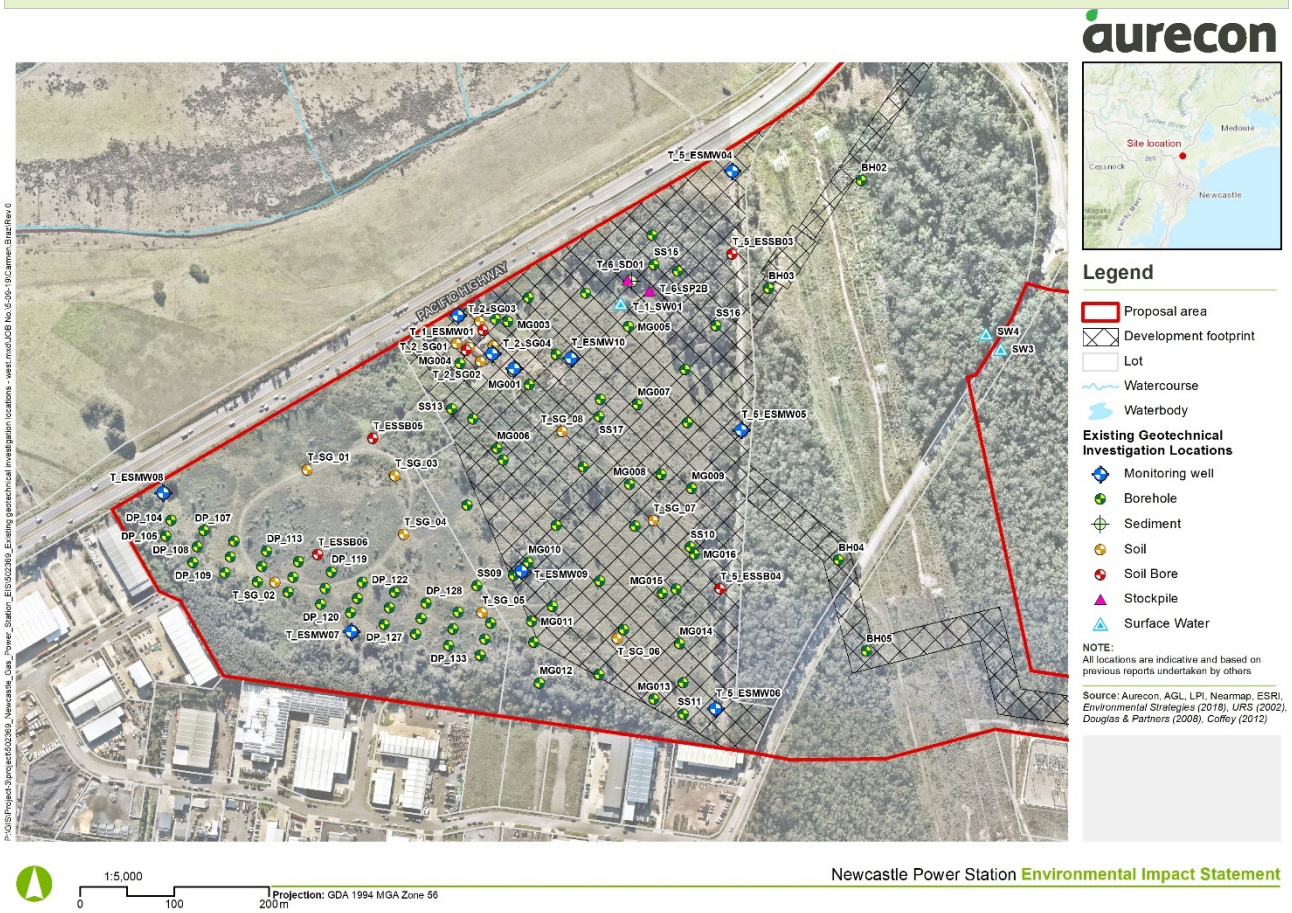


Figure 5-4 Aurecon geotechnical investigation locations 2019 (note – legend to be updated splitting out separate consultant's investigation locations)

A summary of the subsurface ground profile recorded within the boreholes is presented in **Table 5-3**.

Table 5-3 Subsurface ground profile summary (Aurecon, 2019)

Borehole ID	Depth below ground level (mbgl)			
	Topsoil	Alluvium	Residual soil	Bedrock
BH01	0.0-0.4	0.4-15.8	Not encountered	15.8-19.72
BH02	0.0-0.75	0.75-2.5	2.5.0-7.0	7.0-17.0
BH03	0.0-0.25	Not encountered	Not encountered	0.25-10.0
BH04	0.0-0.8	Not encountered	Not encountered	0.8-11.0
BH05	0.0-0.2	Not encountered	Not encountered	0.2-10.0

The results of the site investigation broadly confirm the conditions as presented in the geological map sheet. A wide, infilled paleochannel granular sediment layers is present and decreases in thickness towards the south of the area until the hillside rises out of the low-lying level ground. The soils at the site range from 15.8 m bgl of alluvial sand in the north (BH01) to 0.2 m bgl of Topsoil over weathered rock at the BH05 location.

Excavatability

All earthworks on site should be supervised and certified. Certification that all earthworks have been carried out in accordance with all relevant specifications and standards (AS3798) and are suitable for purpose, should be provided by a suitably qualified Geotechnical Engineer.

Earthworks

All earthworks on site should be supervised and certified. Certification that all earthworks have been carried out in accordance with all relevant specifications and standards (AS3798) and are suitable for purpose, should be provided by a suitably qualified Geotechnical Engineer.

Use of standard compaction plant will improve the in-situ compaction of the cohesive and granular soils encountered at shallow depths during geotechnical investigation. The soils encountered across the site should not be re-used for structural fill areas but can be re-used for general backfill and landscaping areas where required. In particular, cohesive soils used as general fill must be properly moisture conditioned and compacted to avoid long term settlement issues.

Trafficability

Given the nature of the near surface soils encountered across the proposed pipeline network comprising cohesive materials (BH02, BH03, BH04 and BH05), the trafficability of the in-situ material is expected to be significantly affected during or following period of wet weather. If trafficability of the site is found to require improvement, a working platform or access track comprising a well graded gravel fill should be provided. Loose sand and highwater table levels encountered around the BH01 location may also affect the trafficability due to the typically low bearing resistance. A well compacted access track treatment as discussed above for cohesive soil areas would improve site trafficability.

Slope stability

Maximum batter angles for the materials on the site are outlined in the report for surcharged cut and fill batters less than 3 m high.

Slope protection should be provided against sliding during wet conditions. Where surcharge loads from cut material stockpiles or equipment are located within the height of batter from the top edge of the batter, then shoring support of some reduction in design angle will be required. Should batter heights in excess of 3 m be required, then individual slope stability assessment will be required.

5.3.2 Douglas Partners, 2008. Geotechnical Investigation – Proposed Gas Storage Area – Proposed Power Station, Old Punt Rd, Tomago

This geotechnical assessment was undertaken on Lot 2 (west of the Lot 3 -proposed power station site) – this area would be used as a laydown area during construction of the proposed power station and for water storage and other ancillary infrastructure during operation.

A geotechnical investigation of the proposal area was undertaken in June 2008, consisting of 32 soil bores that ranged in depth from 1.4 to 7.2 m below ground level. Solid flight augers, rotary and coring drilling methods were used. The investigation also encountered shallow groundwater in several bores (less than 1 m depth from ground surface). An overview of the geotechnical as well as ASS characteristics of soils is outlined below.

Stability/risk of subsidence

Soils and rock encountered as part of the geotechnical assessment were found to be typical of the proposal area(refer to **Table 5-4**). Geotechnical recommendations were considered to be typical of the area (no high risk geotechnical hazards were identified).

Australian Standard AS1170.4-2007 indicates an earthquake hazard factor (Z) of approximately 0.11 for the Newcastle area (a mid-level classification), which was deemed appropriate for the site. Based on the soil profile, a site subsoil class of C_e was considered appropriate for the purposes of earthquake design on the site. Based on the profile of soils, Douglas Partners considered that liquefaction of site soils resulting from a seismic event would be unlikely on the site.

The site is not located within a proclaimed Mine Subsidence District. Correspondence received from Douglas Partners from the Mine Subsidence Board indicates the local area has not been undermined.

Acid sulfate soils

In relation to ASS testing, a total of 92 samples were analysed for a pH_{FOX} (field peroxide addition) preliminary analysis, while 9 were analysed for the more comprehensive reducible chromium suite (S_{CR}). Laboratory results indicate that ASS were present at the site.

Table 5-4 Site soil (and rock) conditions (from Douglas Partners, 2008)

From (m)	To (m)	Description
0.0	0.05/0.7	TOPSOIL: generally dark grey brown silty topsoil with abundant organics; encountered in the majority of bores from the ground surface up to 0.7 m depth, however, more generally in the range of about 0.1 m to 0.3 m depth
0.05/0.3	0.15/1.0	FIRM CLAYEY SILT/SILTY CLAY: not encountered in 10 of 32 bores
0.3/0.8	1.2/4.0	STIFF or better CLAY/SILTY CLAY generally stiff lo hard clay and/or silty clay was encountered in al bores either underlying the topsoil or the firm clay/silt layer
1.2/4.2	Termination depth	BEDROCK: generally, siltstone, sandstone or claystone ranging from extremely low to high strength

All Douglas Partners 2008 site investigation and sampling locations are presented in **Figure 5-5.**

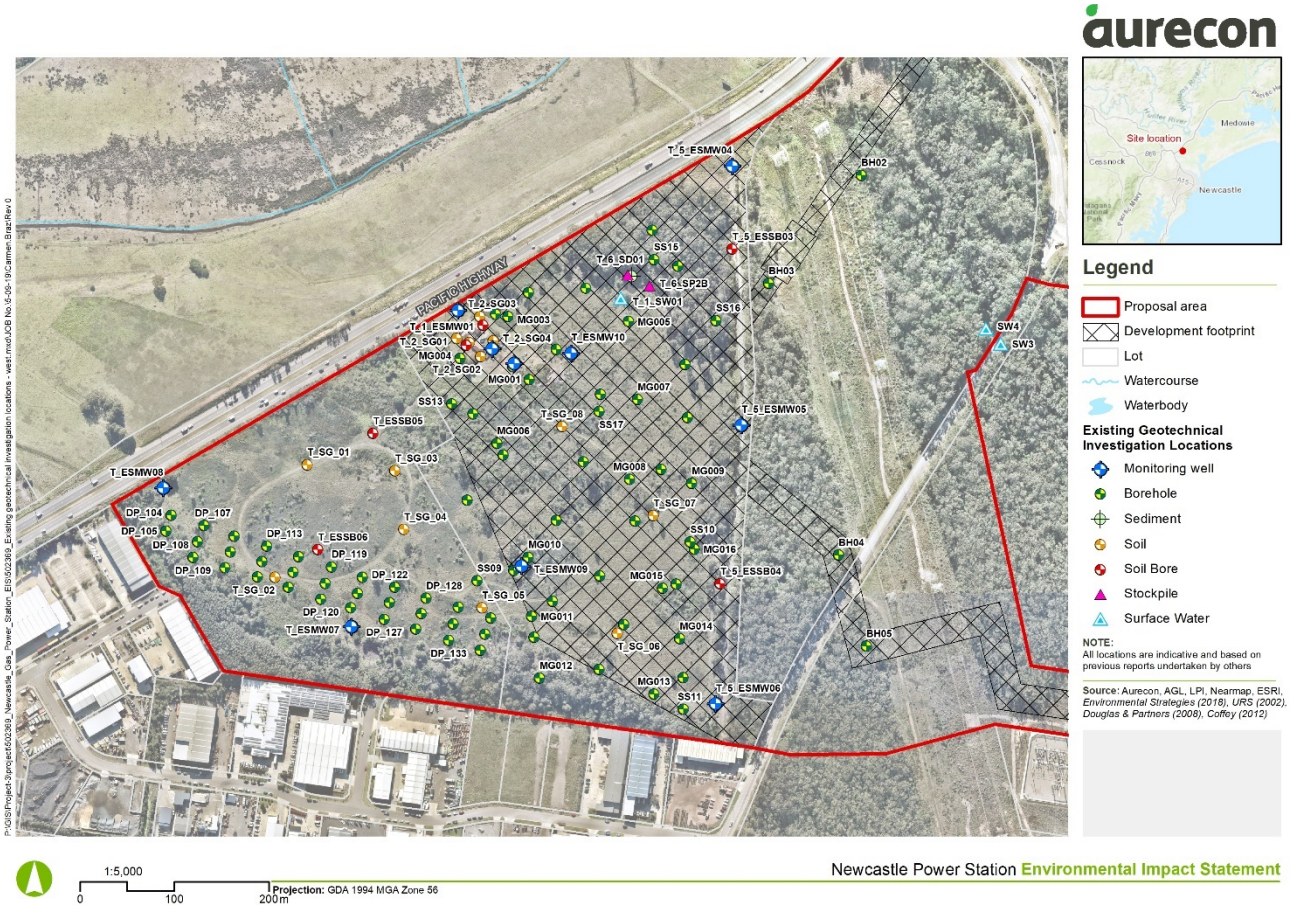


Figure 5-5 Geotechnical investigation locations at NGSF (Douglas Partners, 2008) (note – legend to be updated splitting out separate consultant's investigation locations)

5.3.3 URS, 2002. Tomago Gas Fired Power Station EIS For Macquarie Generation

The EIS focused environmental document prepared for the proposal area by URS in 2002 was utilised for information regarding geotechnical and ASS characteristics. The proposal extent assessed as part of the 2002 assessment lies within the area proposed for the power station. Further description is provided in the subsections below.

Acid sulfate soils

Based on Department of Land and Water Conservation's (DLWC) ASS Risk map for the area (accessed in 2002), the site is located in an area of high risk (middle and southern section of the site) and low risk (northern portion of the site) of ASS. Results of the preliminary laboratory testing indicated the presence of ASS at depth (below 2 m from ground level). Samples from within the upper 1 m were found to be free of ASS. Additional laboratory analyses on several soil samples collected from between 0 to 1 m at several locations across the site for the EIS reveal that the near surface soils down to a depth of 1.0 m below ground level have negligible potential to generate sulfidic acid.

Comparison of the criteria in the ASS Manual (NSW ASS Management Advisory Committee, August 1998) with the results obtained for the soil samples tested as part of the study indicated that if more than 1,000 tonnes of soils are to be disturbed in the upper 1 m during site earth works then an ASS Management Plan (ASSMP) would need to be prepared. If less than 1,000 tonnes are to be disturbed, comparison of the test results with Table 1 of the guidelines indicates that only the result obtained for sample MG001 fall into the category where an ASSMP is required.

Considering that the deeper soils at the site contain ASS, it was deemed that an ASSMP would be prepared for the site to cover both shallow (less than 1 m) and the deeper earthworks (greater than 1 m) irrespective of the volume of soil that would be disturbed during earthworks.

Geotechnical characteristics

Shrink swell testing undertaken on clay soils samples indicated that the site contains moderately to highly reactive clays. Based on the available preliminary soil data and the depth of clay encountered during the investigations, a preliminary classification for the site was Class H, Highly Reactive, becoming Class M Moderately Reactive, where the depth of clay is less than about 0.9 m in accordance with Australian Standard *AS 2870-1996, Residential Slabs and Footings.*

Several surface samples collected from the site were tested for pH, conductivity, sulfate and chloride. The results of this testing are provided below:

- Results suggested that the site soils are non-aggressive and non-corrosive towards concrete and steel respectively and that no special precautions are needed with regard to the use of these materials.
- Emerson Crumb dispersion testing of soil samples indicated that the clay soils present on the site are of dispersion Class 5-6, marginally dispersive. The soils encountered on the site would, therefore, be protected from erosion by vegetation where exposed.
- No evidence of slope instability was observed across the site at the time of the initial fieldwork or during URS's site investigation. Based on these observations and the conditions encountered, the site is considered to have a very low risk of overall instability.
- Provided development is carried out in accordance with good engineering practice and the recommendations and advice of this report, the risk of local instability associated with cuts, fills and retaining walls is assessed to be extremely low.
- According to the Mine Subsidence Board (MSB) the subject area is not in a proclaimed mine subsidence district, is not undermined, and is not subject to any imposed conditions by the MSB.

All URS 2002 site investigation and sampling locations are presented in

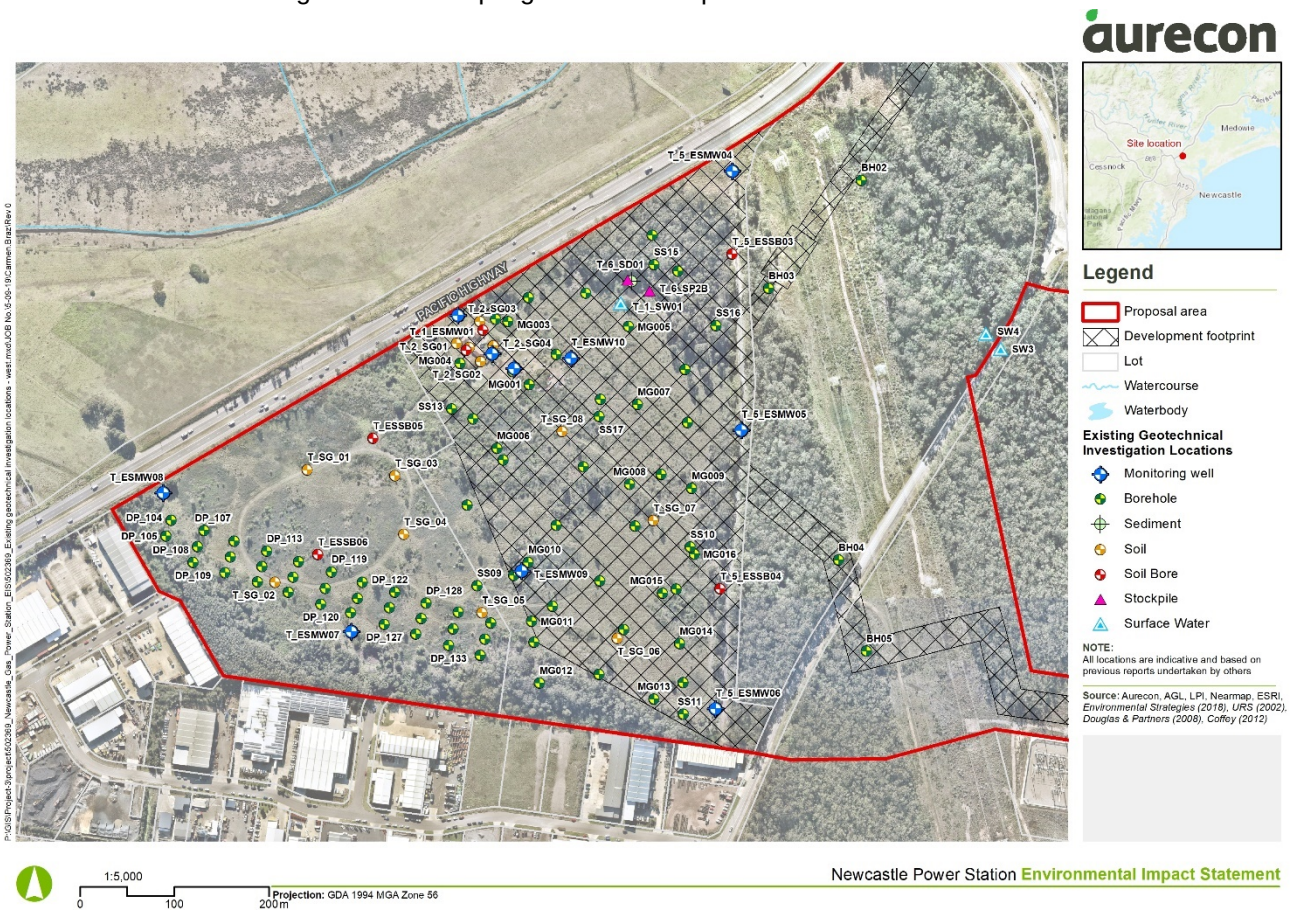


Figure 5-6**.**

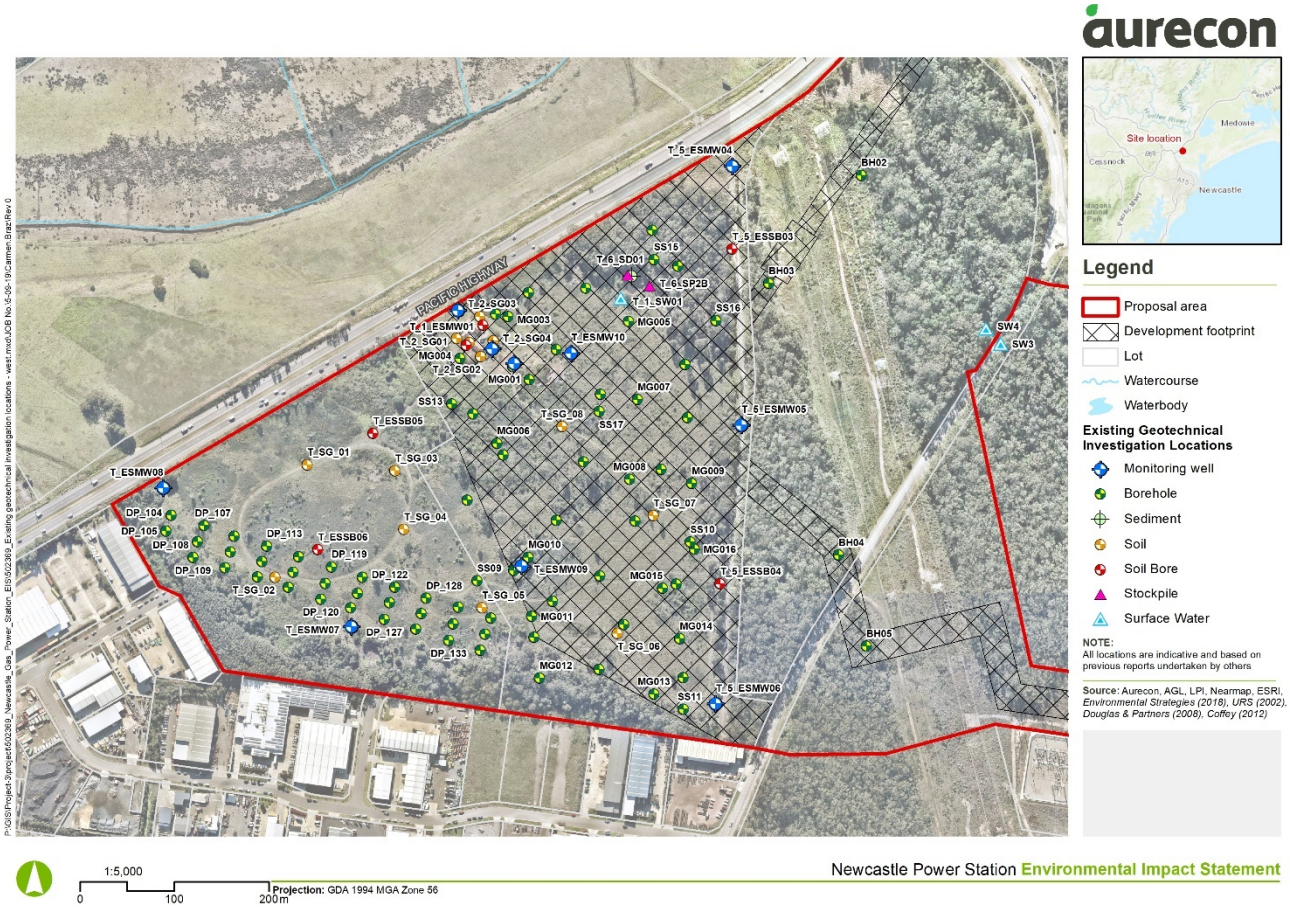


Figure 5-6 Geotechnical investigation locations (URS, 2002) (note – legend to be updated splitting out separate consultant's investigation locations)

5.4 Potential contamination sources

The following potential contamination sources, referred to as areas of environmental concern (AECs), were identified in this desktop review of information, site inspection and previous reports, primarily recent reports by ES in 2017 and 2018 summarised in sections 5.2.1 and 5.2.2. **Figure 5-1** and **Figure 5-2** show the AECs identified by ES in 2018 and **Figure 5-7** indicates AECs observed by Aurecon in March 2019.

The AECs within and adjacent to the proposal area include:

- AEC 1: Septic tank on TDS-1.
- AEC 2: Residential compound (which included the residential property and sheds on TDS-1).
- AEC 3: Abandoned motor vehicles on TDS-1.
- AEC 4: Stockpiled material/mounds on TDS-1.
- AEC 5: Dumped waste/stockpiled material adjacent to the alignment of the former section of Old Punt Road on TDS-1.
- AEC 6: Dam and stockpiled material at TDS-1.
- AEC 7: Stockpiled material on the boundary of the vacant property located on Kilcoy Drive and TDS-2.
- Tomago Smelter (offsite) - the proposed Power Station site is located within the Tomago Smelter Buffer Zone. The buffer area was established as part of the 1981 approval and 1991 expansion (as modified) of the Tomago Smelter. In relation to contamination risks, fluorides and polycyclic aromatic hydrocarbons (PAHs) are both known to not only be produced by aluminium smelting but to have potential to impact soil, surface and groundwater on the Tomago Smelter and surrounding sites. However, the potential for fluorides and/or PAHs originating from the Tomago Smelter to impact upon the site is low considering the following:

- The closest point of the Tomago Smelter is more than 0.5 km away from the site.
- A natural ridge, fully vegetated with healthy, mature trees, which is higher than the smelter site is a likely a buffer to airborne impacts between the site and the Tomago Smelter.
- The topography indicates that surface water between the Tomago Smelter and the site is likely to flow to the south, away from the proposed Power Station site. Surface runoff from Tomago Smelter is predominantly directed to a large catchment dam on the southern side of the facility and from there flows south into the Hunter River, also away from the site.
- The topography indicates that groundwater on the Tomago Smelter site is likely to flow to the south, away from the proposed Power Station site.

  The existing Environmental Protection License 6163 for the Tomago Smelter provides maximum air emission concentrations. A separate air quality technical report has been prepared (Aurecon, 2019) that discusses existing air emissions across the broader Tomago area, any potential future increases as part of future development and implications for planning approval.

- There is potential for nearby industrial sites to the south (including the Tomago Smelter) to have historically used aqueous film forming foam (AFFF) fire suppression systems (which are a source of PFAS).
- There is also potential for ASS across the proposal area.

Based on the above list, the following potential contaminants of concern (PCoC) were listed:

- Total recoverable hydrocarbons (TRH).
- Fluoride.
- Faecal and Total Coliforms (F&TC).
- E Coli.
- Volatile Organic Compounds (VOCs).
- BTEX (benzene, toluene, ethyl benzene, xylene).
- Metals (e.g. arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc).
- Polycyclic aromatic hydrocarbons (PAHs).
- Organochloride pesticides (OCP)/Organophosphorus pesticides (OPP).
- Polychlorinated biphenyls (PCBs).
- Asbestos in building fabric and near surface soils.
- Per- and poly-fluoroalkyl substances (PFAS).

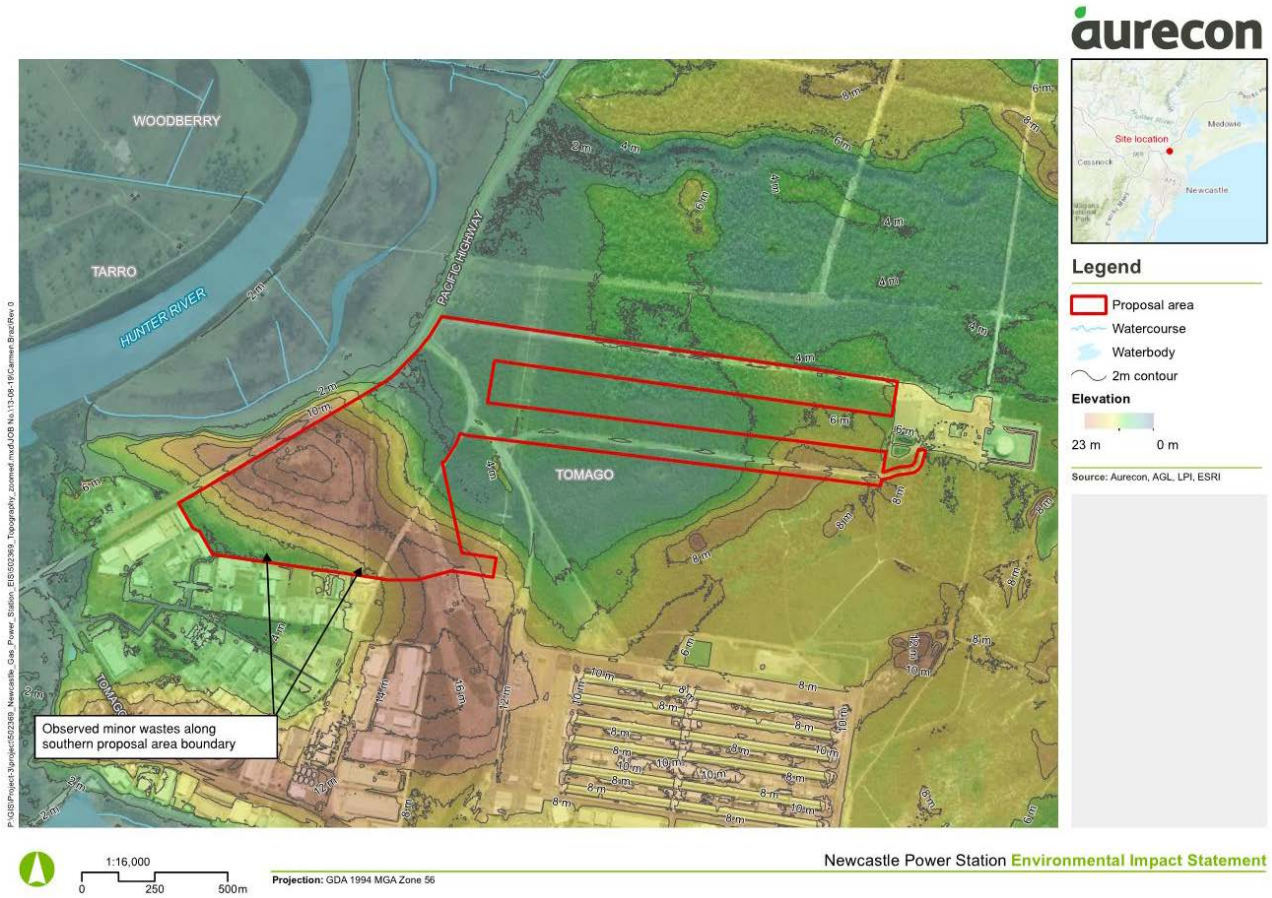


Figure 5-7 AECs observed by Aurecon during site walkover in March 2019

6 Impact assessment

The following sections respond to the SEARs outlined in **Table 1-1**, while providing an overview of potential construction and operational phase impacts for the proposal.

6.1 Land contamination

Construction has the potential to disturb and interact with existing contamination of land within the proposal area. Construction and operation of the proposal would also involve the storage, treatment or handling of fuels, chemicals building materials, wastes and other potential contaminants. Any contamination discovered during construction would be managed and mitigated to make the land suitable for the proposal and intended use and to prevent impacts on human health and the environment.

Any building or structure demolition works before construction would include measures to mitigate contamination risks or asbestos in building fabric and lead based paints, including site clearance by licensed asbestos assessors (LAA) during proposal construction and early works.

Although unlikely, the accidental release or mobilisation of contaminants has the potential to affect human health and the environment through contact with pathogens (such as septic tank wastes), inhalation (such as asbestos dusts and chemical vapours), or mobilisation of contaminants to surface waters and groundwaters.

These events (if occurred) would be managed through the application of applicable Australian Standards for the storage and handling of fuels and chemicals for the proposal and appropriate engineering designs. In the unlikely event of significant leaks or spills of contaminants, remediation would be implemented immediately during construction and operation of the proposal.

Land contamination risks for the proposal are not considered to be significant based on the assessment of desktop information and previous reports available and would be avoided, mitigated and managed during construction and operation of the proposal by implementing mitigation measures detailed in Section 7.

6.2 Summary of potential human health and ecological risks

Based on the previously prepared assessment reports, particularly the 2018 report prepared by Environmental Strategies, the following provides a summary of potential human health and ecological risks for the proposal:

- Several AECs were identified as part of the desktop assessment/Phase 1 ESA prepared by Environmental Strategies in 2017, which are referred to AEC 1 – 7, in Section 5.2.1. These AECs related to activities/observations such as dumped waste or stockpiled material. These AECs were identified as having the potential to pose human health or ecological risk during construction and operation of the proposal.
- An intrusive environmental assessment was undertaken by Environmental Strategies in 2018 that found the following:
    - **AEC 1 (**Septic Tanks), AEC 3 (Abandoned Motor Vehicles), AEC4 (Mounds) and AEC 6 (Dam and Stockpiled Material) were deemed to pose a low risk based on results of the intrusive assessment.
    - **AEC 2** (Residential Compound) – Based on the existing dataset, elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) in soil may pose a potential risk to ecological or human health.
    - **AEC 5** (Dumped Waste) - Based on the existing dataset, elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) in soil may pose a potential risk to ecological to human health. Environmental Strategies provided an indicative/conservatively high estimate of 2,100 m^3 potentially PAH impacted soil in this area. Concentrations of heavy metals/PAHs in groundwater may not be reflective of background conditions and may impact upon human health (e.g. drinking water) or ecological receptors (e.g. aquatic ecosystems within a nearby creek).
    - **AEC 7** (Stockpiled Material Encroaching TDS-2) – Minor elevated concentrations of chromium and total recoverable hydrocarbons ($TRHC_{16}$-C_{34}) were reported in soils that may pose a potential risk to ecological or human health.

- Background Area (north-east corner of TDS-S). A sample was reported close to a culvert which reported elevated TRH in soils that may pose a potential risk to ecological or human health.
- Given the observations of dumped/stockpiled material across portions of the proposal area by ES in 2018 and Aurecon in 2019, there will be localised areas of asbestos in soil contamination and within waste stockpiles.
- Aurecon in 2019 also identified dumped wastes along the southern most boundary of the proposal area along the industrial precinct boundary.

In summary, there are several localised areas that pose potential human health or ecological risk that require further assessment and potential management or remediation prior to or during construction. The existing contamination proposal areas dataset shows elevated concentrations are localised and are not representative of broad/site wide contamination issues based on the available information reviewed.

State Environmental Planning Policy 55 (Remediation of Land), 1998 provides planning controls for the remediation of contaminated land. The policy states that land must not be developed if it is unsuitable for a proposed use because it is contaminated. If the land is unsuitable, remediation must take place before the land is developed. As investigations and site observations conclude that potential sources of contamination and associated impacts are likely to be localised, remediation will be possible where required using construction machinery.

6.3 Acid sulfate soils and naturally acidic soils

There is moderate to high risk of encountering ASS during excavations, ground disturbance and shallow dewatering, including HDD activities (for pipeline construction options). These soils, when disturbed, would require management (and potential treatment) in accordance with an acid sulfate soil management plan (ASSMP) specific to the proposal. The management of ASS should be based on further site investigation data to determine the areas of ASS that may generate sulfidic acidity from sulfide oxidation and areas that are naturally acidic due to their constituents (such as organic matter, leached soils and elevated iron and manganese).

Naturally acidic soils may not require addition of neutralising agents and the estuarine and coastal environment of the proposal area may have ecological species that prefer slightly acidic environments. Thereby addition of excessive neutralising agent may have a net negative benefit to the surrounding landscape. The aeolian derived soil landscapes in the northern portion of the proposal area require careful management so not to generate acidity (if sulfide is present), nor add excessive neutralising agents that are unnecessary.

Building and in ground structure materials such as concrete and steel would be selected at the design stage to take into account potential acidic conditions (guidance provided in Australian Standards 2159 and 2885). Care would be taken not to dewater shallow groundwater where possible, to prevent oxidation of previously un-oxidised ASS in situ for trenches, drainage lines and shallow excavations.

6.4 Topography and landscape

The proposal bulk earthworks for the power station, pipeline options, sedimentation ponds and large scale addition of built structures will change the topography and current landscape. The earthworks and power station areas development would impact the upper geological layers and topography within the proposal area. Following proposal development and construction, the built structures will be higher than pre development and the secondary impact would mainly relate to hydrology and visual amenity discussed in separate technical specialist reports for the proposal.

6.5 Soils, land capability and geotechnical stability

Topsoils would be removed and stockpiled for beneficial reuse within the proposal area. Excavated soils that cannot be beneficially reused within the proposal area (for works such as filling) would be handled and managed in accordance with the proposal materials management plan. This may include offsite disposal to a

licensed waste facility or beneficial reuse where appropriate to do so under NSW waste and resource recovery legislation and guidance.

Removal of topsoil and vegetation would expose soils to great risk of erosion by water and wind across the proposal area. The majority of proposal area earthworks would occur within the power station area which consists of the Beresfield soil landscape which has a moderate to high risk of erosion during non-concentrated flows. Soils will require specific management and mitigation measures to minimise erosion risk.

Soil erosion may occur in the form of runoff during rainfall, flooding events or windblown. Potential soil erosion and degradation impacts would be avoided, mitigated or managed by implementing standard stormwater, erosion and dust control measures. As a result of the implementation of these measures, erosion impacts are not considered to be significant for the proposal.

Based on the information review (refer to Section 5), there are no major geotechnical constraints for the proposal. However, normal engineering design and practice are to be implemented in accordance with relevant Australian Standards (AS) and their engineering design principals.

No evidence of slope instability was observed across the proposal area and based on these observations as well as sampling activities, the site is considered to have a very low risk of overall instability.

Provided development is carried out in accordance with good engineering practice and the recommendations and advice of this report and reports referred to in Section 5, the risk of local instability associated with cuts, fills and retaining walls is assessed to be extremely low.

Based on the information review, the proposal area is not in a proclaimed mine subsidence district, is not undermined, and is not subject to any imposed conditions by the NSW Government Subsidence Advisory (previously the Mine Subsidence Board).

6.6 Construction and operation of sediment basis

Construction has the potential to cause sedimentation runoff into nearby waterways, with potential on flows to the Hunter Wetlands National Park, a listed Ramsar wetland. To mitigate this, construction and operation of two sediment basis has been proposed. These were assessed as being feasible to negate short- and long-term erosion and the adverse effects of sediment transport.

Sediment basins are ponds containing open water that capture coarse sediment and litter carried by stormwater. The coarse sediment settles to the bottom and the cleaner water remains at the top of the pond, preventing the coarse sediment from flowing through the outlet structure and into the nearby waterways. This method has been suggested given the high sediment loads predicted during construction and the highly erodible soils present in the project area.

Basins were designed in the feasibility study to be utilised during construction and converted afterwards into permanent basins. The basin size was determined based on the design guidelines outlined in the Soils and Construction Guide Volume 1, 4th Edition (March 2004). The basin type was selected based on the soils present which include Type D and F soils. Type D soils are dispersible soils and characteristically more than 10% of the soil is dispersive and turbidity control is essential. Type F soils are fine-grained soils and characteristically more than 33% of soils are finer than 0.2mm and no more than 10% of the soil is dispersive.

A typical cross section of the type of basin suggested is shown in Figure 6-1.

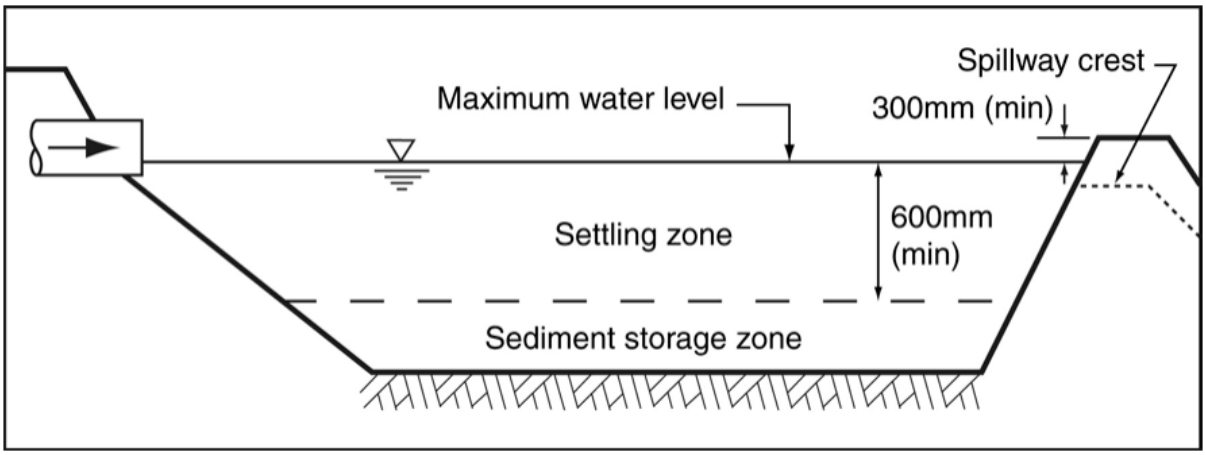


Figure 6-1 Typical cross section of wet earthern basin for Type D and F soils

The feasibility study suggested the two basins were constructed as detailed in Figure 6-2 below. This is a conservative estimate of the total footprint sizes of each basin based on the total disturbed area during construction.

Figure 6-2 Approximate basin footprint sizes

Permitted the sediment basins as described in detail in the feasibility study are implemented during the construction phase, sedimentation is not anticipated to enter the nearby waterways and impact upon the nearby Ramsar wetland. During design of the sediment basins reference should be made to the feasibility study, in particular the assumptions to ensure adequate design and effectiveness of the sediment basins.

6.7 EPBC Act 1999 controlled action

In August 2019 the proposal was deemed to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The following summaries the controlled action aspects:

- Under section 75 of the EPBC Act the proposed action (the proposal) is a controlled action.
- The proposed action may have a significant impact on a listed wetland of international importance (a Ramsar wetland), in the proposals case, that is Kooragang Nature Reserve to the east of the proposal.
- The potential presence of contaminants in soils may have a significant impact.
- The likely presence of acid sulfate soils (ASS) may have a significant impact.

In the opinion of Aurecon, the likelihood of an impact on the Ramsar wetland (Kooragang Nature Reserve) is minor given the distance (greater than 2.5km) and so long as the avoidance, mitigation, and management measures recommended in this report are implemented. **Figure 6-1** indicates the boundary of the Ramsar wetland compared to the proposal area.

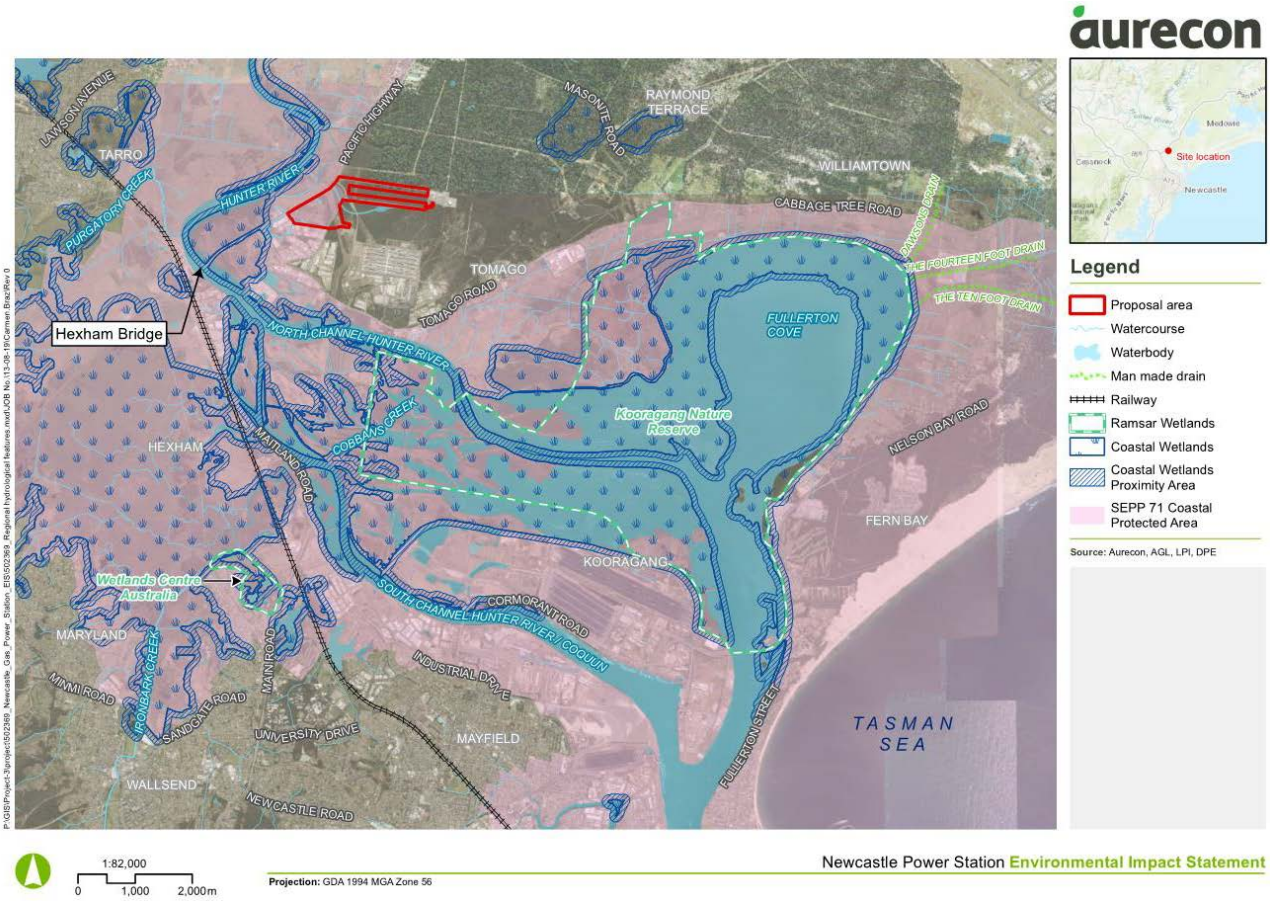


Figure 6-3 EPBC Act 1999 Controlled action map of Ramsar wetland location

7 Mitigation

7.1 Proposal soil and contamination mitigation

This section describes potential soil and contamination proposed mitigation for both construction and operational phases of the proposal.

7.1.1 General environmental management (construction and operational phases)

The construction phase of the proposal has the potential to impact upon the surrounding environment, as such, a Construction Environmental Management Plan (CEMP) would be prepared, which would identify all reasonable foreseeable risks associated to earthworks/ground disturbance during the construction phase of the proposal. This will include mitigating the risk of generating soil and water contamination, as well as mitigating any human and ecological health risks.

A site-specific Sediment and Erosion Control Plan (ESCP) will be implemented as part of CEMP, for both the construction and operational phases of the proposal. This plan would provide mitigation to minimise the risk of erosion and prevent sediment migration. To help minimise the risk of generating a potential soil erosion hazard, the implemented plan would, therefore, include appropriate temporary and permanent control measures including drainage channels and sediment retention basins. This would apply to all areas likely to be impacted and will address the appropriate sediment basins as well as elaborate on management of wet weather events.

To minimise soil erosion, heavy trucks and machinery would need to adhere to the designated paved or gravel tracks that would be constructed. This will minimise the destabilisation of soils. Furthermore, vegetation removal is to be restricted as far as practicable (where removal is to occur – anticipated to require ecologist supervision).

For the operation phase of the proposal (post construction), an Operational Environmental Management Plan (OEMP) would be prepared and implemented. This would be specific to the activities of the operational power station and associated environmental risks. It would also cover when soils or groundwater need to be disturbed as part of repair/upgrade works (e.g. repairing services or adding capacity for generation).

During both the construction and operational phase of the proposal, there is a potential for minor spills and incidents that have the ability to contaminate soil with fuel, oil and chemicals. A control plan would be implemented that would capture any potential run-off from site (to be consolidated into either the CEMP or OEMP). As part of the plan, NSW EPA would need to be notified if any significant chemical spills have occurred.

As part of the NSW WHS Regulation 2017, a full Hazardous Materials pre-demolition survey would need to be undertaken of the residential property that is currently located within the proposal area. The removal of asbestos containing materials would need to comply with the required legislation, including appropriate controls, to minimise the potential adverse health and environmental impacts associated with them. The contractor would be required to remove the materials off site and dispose of them at appropriate waste disposal facilities.

7.1.2 Waste management (construction and operational phases)

Waste management guidance during construction would be covered in the CEMP and a construction waste management plan (CWMP). It may be possible to reuse the generated fill soils/spoil on-site, however, excess fill may be removed following a NSW EPA Waste Classification Guideline (2014) independent classification of the material to be disposed. This would include testing the fill for any possible contaminants that may be found, including construction demolition and related waste, asbestos waste, tyre waste as well as anything that is considered to be ‘special waste’ by the NSW EPA, in which case it would be removed under the appropriate NSW guidelines and POEO Act 1997.

Waste facilities would also be required during the construction phase for the proposal personnel to dispose of their general waste as well as recyclable material. These would then be required to be disposed of at appropriate land fill site and recycling facilities.

Human waste would also be generated during the construction phase, as such, an on-site sewage system in accordance with the requirements of the Port Stephens Council On-site Sewage Management Technical Manual would be constructed. Amenities drains, and sewage would be collected and trucked off site or treated via a standalone septic treatment system. Hunter Water Corporation have determined that the only sewerage system that exists currently is at the industrial estate to the south and that there are no plans to extend the sewerage to the proposal area. Sewage and construction waste water would be transported off-site for treatment at wastewater collection facilities. The facility would be determined in consultation with the EPA and addressed in the CEMP.

As part of the ongoing operational phase, the proposal would need to have an operational waste management plan (OWMP) that would encompass various aspects of waste produced by the facility including human generated. This plan would incorporate appropriate waste disposal facilities such as rubbish and recycling bins which will be emptied at adequate intervals.

All waste generated for offsite disposal would be classified in accordance with the NSW EPA *Waste Classification Guidelines* (2014). All waste related documentation such as waste classifications, trucking, transfer and disposal documentary evidence would be held by the proponent for a minimum of 7 years from the date the waste is generated during construction of the proposal.

7.1.3 Acid sulfate soil (construction and operational phases)

The proposal is located within an area that contains or is likely to contain ASS that can generate acid when disturbed and exposed to atmospheric oxygen. Activities that may oxidise ASS include excavating for footings, piling, trenching and use of HDD. Excavated/disturbed ASS would need be managed appropriately and may require treatment with lime or another safe neutralising agent to reduce acidity prior to site disposal or beneficial reuse. Where shallow groundwater is disturbed/dewatered through excavation, it may oxidise previously inundated soils in an anoxic environment and expose them to atmospheric oxygen and therefore cause acidity build up in the soils and groundwater.

The oxidation of exposed ASS is not instantaneous in heavy clays, as such, there may be an inherited risk of overturned and stockpiled soil exposed to wet weather, to create acidic run-off. It is therefore important to mitigate the risks carried with the wet-weather events and stockpiles. ASS of a course nature (sands) can start to oxidise immediately and they have a higher risk of generating acidity and release this acidity readily via rainfall or groundwater rising into the acidified soils.

A proposal specific ASSMP would be prepared for both the construction and operational phase, which would detail the acidic characteristics or the soil (sulfidic and non sulfidic) and appropriate treatment and/or disposal requirements. It will also include sediment/runoff control and monitoring requirements. The ASSMP would be prepared in accordance with the Port Stephens LEP 2013.

7.1.4 Environmental management plans

As part of the proposal, there would be a need to undertake various precautions and implement several environmental management plans to mitigate the potential risks associated with the soils and the possible contaminants within the proposal area. These management plans are outlined in **Table 7-1** and would be completed in accordance with the appropriate standards and legislation.

Table 7-1 Environmental management plans throughout the construction and operational phases

Management plan	Description
Construction and Operation Environmental Management Plans (CEMP and OEMP)	These plans will outline the environmental risks, mitigation proposed (including PPE and engineering measures), monitoring requirements, contingency planning and responsibilities.
Acid Sulfate Soil Management Plan (ASSMP)	As there is potential for acid sulfate soil to be generated (primarily excavation or HDD activities), an acid sulfate soil management plan should be prepared. As the water table may be lowered (through dewatering), the management plan would need to cover this aspect of the work and mitigation to be placed to minimise oxidation of potential acid sulfate soils. The management plan would need to be implemented in accordance with the requirements as set out by the Port Stephens Council LEP, 2013.
Erosion and Sediment Control Plan (ESCP)	A Sediment and Erosion Control Plan will need to be prepared in accordance with the Landcom: Managing Urban Stormwater Volume 1 (2004, Blue Book).
Construction Waste Management Plan (CWMP)	Waste management plan would be implemented throughout the construction phase of the project and would be done in accordance with the NSW EPA guidelines.
Operational Waste Management Plan (OWMP)	A waste management plan would be implemented throughout the operational phase of the project and would be done in accordance with the NSW EPA guidelines. Under section 143 of the *Protection of the Environment Operations Act* 1997, the proponent must dispose of the waste generated on site in a lawful manner. This would be applicable to both, the construction and operational phase of the proposal. Transportation of the waste would also be done in a lawful manner, with tracking where required (such as asbestos containing wastes).

Contingency and monitoring strategies (inspections, dust monitoring, air monitoring, etc) would be included within the above management plans to be prepared and as described in other specialist technical studies for the proposal.

The above management plans would help to ensure the proposal works will be in accordance with relevant federal and NSW legislation and guidance, through both the construction and operational phases.

7.1.5 Summary of potential construction environmental issues and mitigation

During the construction phase of the proposal, there is potential for adverse environmental impacts, as such certain controls must be implemented to mitigate any potential risks. Potential impacts and proposed controls are outlined in **Table 7-2**.

Table 7-2 Potential construction phase issues and proposed mitigation

Source of potential impact	Impact	Proposed mitigation
Earthworks including stockpiling	Earthworks will involve the removal of topsoil and vegetation, destabilising the soil and generating dust. Sediment erosion and potential for pollutants to move off site.	Mitigation would be outlined within the Construction Environmental Management Plan (CEMP). Mitigation will include items such as the following: ■ Dust suppression would be implemented throughout the construction phase of the project – the use of a mist/spray and limiting certain tasks once a wind threshold is reached ■ A description of minimum PPE and additional PPE where required (e.g. respirators) ■ Avoid contact with soil, sediment, groundwater and surface water where possible (or where adequate PPE is in place) ■ Fuel spill protocols – spill kits to be available and relevant workers to be trained on response protocols ■ Geofabric would be used on stockpiles throughout the course of construction ■ Appropriate sediment basins to be constructed for management of stormwater/runoff ■ A description of monitoring required (dust as well as certain contaminants) ■ An Erosion and Sediment Control Plan (ESCP) may be attached as an appendix to the CEMP
Heavy vehicle movement	Heavy vehicle movement across the soil has the potential to destabilise the soil.	Heavy vehicles and machinery to only use allocated tracks to minimise soil erosion.
Removal of vegetation	Land clearing has the potential of destabilising the soil, promoting erosion of the area.	Limit vegetation removal as far as practicable. The level of vegetation removal is to be determined as part of the EIS approval, and the anticipated removal protocol is for an ecologist to be present.
Pollution associated with construction	Oil and fuel and chemical spills associated with machinery. Waste from construction	Mitigation would be outlined within the CWMP and WMS to will include items such as: ■ Fuel spill protocols – spill kits to be available and relevant workers to be trained on response protocols ■ Chemical containment plan and reporting of any spills ■ Provide adequate waste disposal bins on site
Acid sulfate soil	There is potential of encountering acid sulfate soils which may generate acid and further contamination to the area.	Mitigation to be outlined within an acid sulfate management plan. Mitigation to include the following: ■ Recommended liming rates for generated ASS ■ A description of the maximum onsite residency time for untreated ASS ■ A description of an emergency response protocol (i.e. where acidic runoff is generated) ■ A description of the management/stockpiling requirements for each of the scenarios to generate ASS (i.e. excavation or HDD) ■ Steps to minimise groundwater dewatering (potentially oxidising unoxidised ASS)

Source of potential impact	Impact	Proposed mitigation
Water degradation	Construction related works have the potential to degrade surface and groundwater.	Mitigation would be outlined within the CEMP and will include items such as. ■ A stormwater capture strategy - appropriate sediment basins to be constructed for management of stormwater runoff ■ Water treatment requirements (e.g. for turbidity) will also be outlined (if applicable) ■ A description of disposal/reuse options will also be described (e.g. reuse for irrigation or disposal to stormwater or sewer)
Disturbance of contaminated soils and/or groundwater	Impact to the health of construction workers or nearby members of community Impact to ecological health (e.g. nearby aquatic ecosystems in local creek or river).	Mitigation would be outlined within the CEMP. A description of mitigation is described for the "earthworks" source of potential impact item. Where highly impacted soil and/or groundwater is impacted, a site-specific remediation action plan (RAP) may be required to manage the material. This will include management requirements that are above those outlined within the CEMP. It may be specific to the selected remediation technique and detail the requirements of a specialist remediation contractor.
Hazardous Materials within the Residential Property	Based on the age of the residential property on site, there is a strong potential of the building containing hazardous materials such as asbestos, lead containing paint and PCBs.	Complete a pre-demo hazardous materials survey, and based on the findings, implement the required controls for removing the identified materials (including licensed asbestos removalists). This will include implementing additional PPE such as Tyvek suits, P3 respirators and additional asbestos fibre air monitoring.

7.1.6 Summary of potential operational environmental issues and mitigation

During the operational phase of the proposal, there is potential for adverse environmental impacts, as such certain controls must be implemented to mitigate any potential risks. Potential impacts and proposed controls are outlined in **Table 7-3**.

Operation of the power station would likely result in generation of solid wastes that are captured from air pollution environmental controls or chemical wastes. Chemical wastes could be considered potential land contamination issues. Additionally, due to the increased traffic to the area, storage of fuels as well as human activity and additional wastes generated, there may be some pollution risks. These risks would be addressed by preparing and adhering to a waste management plan that would oversee the management of various forms of wastes to be generated.

Table 7-3 Potential operational phase issues and proposed mitigation

Source of potential impact	Impact	Proposed mitigation
Accidental oil, fuel or chemical spill	Ground contamination may occur through accidental spills of oil, fuel and chemicals associated with the Power Station	Mitigation would be outlined within the Operational Environmental Management Plan (OEMP). It will include spill-related mitigation such as the following ■ Fuel/chemical spill protocols – spill kits to be available and relevant workers to be trained on response protocols. ■ A formal reporting procedure - any spills to be reported on the Spill Register ■ A register of all hazardous chemicals kept on site is to be maintained and updated regularly ■ Appropriate recorded spill capture points (i.e. bunding, collection sump, etc)
Heavy vehicle movement	Heavy vehicle movement across the soil has the potential to destabilise the soil	Mitigation would be outlined within the OEMP Heavy vehicles and machinery to only use allocated tracks
Removal of vegetation	Land clearing has the potential of destabilising the soil, promoting erosion of the area	Limit vegetation removal as far as practicable. Depending on the nature and scope of vegetation approval, council or state approval may be required. As a minimum, the removal protocol will likely require an ecologist to be present.
Acid sulfate soil	There is potential of encountering acid sulfate soils which may generate acid and further contamination to the area	Mitigation would be outlined within an acid sulfate management plan. Mitigation to include the following: ■ Recommended liming rates for generated ASS ■ A description of the maximum onsite residency time for untreated ASS ■ A description of an emergency response protocol (i.e. where acidic runoff is generated) ■ A description of the management/stockpiling requirements for each of the scenarios to generate ASS (i.e. excavation or HDD) ■ Steps to minimise groundwater dewatering (potentially oxidising unoxidised ASS)
Water degradation	Construction related works have the potential to degrade surface and groundwater	Mitigation would be outlined within the OEMP and will include items such as: ■ A stormwater capture strategy - appropriate sediment basins or stormwater drainage infrastructure to be constructed for management of stormwater runoff ■ Water treatment requirements (e.g. for turbidity) will also be outlined (if applicable) ■ A description of disposal/reuse options will also be described (e.g. reuse for irrigation or disposal to stormwater or sewer)
Effluent discharge	Due to the increase of human occupancy to the area, appropriate sewage system must be in place	Construction of appropriate sewage systems to accommodate increased human occupancy to the area. Maintenance requirements of effluent-related infrastructure to be provided within OEMP.
Waste generated on site	Waste generated by human occupancy	Waste management plan including types of waste to be generated and appropriate disposal facilities

Source of potential impact	Impact	Proposed mitigation
Storm water system	As the natural landscape will change, there is a potential risk of altering the natural drainage system Water used by the plant is not to be discharged back into the environment	Mitigation as per the “water degradation” source of potential impact item.
Disturbance of contaminated soils and/or groundwater	Impact to the health of construction workers or nearby members of community Impact to ecological health (e.g. nearby aquatic ecosystems in local creek or river)	Mitigation would be outlined within the OEMP. The mitigation will be similar to the CEMP, but mitigation will be specific to the activities of an operational site (e.g. installing new underground services or excavating new footings).

8 Residual impact

Based on a review of environmental information available for the proposal area (including reported contaminant concentrations), desktop study and site inspection, the following relates to potential residual impacts (with mitigation in place) relating to the SEARs environmental requirements outlined in **Table 1-1**:

- In relation to the construction phase, with adequate mitigation in place (including adhering to the documents specified in the plans outlined in **Table 7-2**), there is a low risk of residual impacts.
- In relation to the operation phase, with adequate mitigation in place (including adhering to the documents specified in the plans outlined in **Table 7-3**), there is also a low risk of residual impacts.

All management plans outlined in **Table 7-1**Error! Reference source not found. would include contingency approaches, in the unlikely event of an incident with proposed mitigation in place. This would help to ensure that appropriate management and response measures would be in place, in the event of an incident occurring.

9 Monitoring

Further monitoring is likely required to prepare the management plans specified in Section 7 and **Table 7-1Error! Reference source not found.**. Monitoring of groundwater, surface water and other aspects are discussed in their respective specialist technical studies for the proposal.

Monitoring will involve the following specifically for soils and contamination aspects of the proposal during construction and operation:

- Monitoring of baseline surface water and groundwater data prior to construction to understand natural wetting and drying cycles and potential for acidity generation and other constituents from ASS within the proposal area.
- Further assessment of identified contamination AECs prior to construction to determine remedial actions.
- Further assessment of the extent of ASS would likely be required (as well as an assessment of dewatering activities that may result in oxidation of ASS). The further assessment is to define known ground disturbance risks for ASS based on the proposal engineering designs.
- Hazardous materials (HAZMAT) asbestos and lead paint surveys of any buildings or structures within the proposal area prior to demolition.
- Monitoring to be detailed in proposal construction environmental management plans.

It is proposed that any further assessment proposed above is undertaken at a later development stage (i.e. not as part of this EIS approval process). It is deemed that the collated background information and current dataset and provides an adequate understanding of soil and contamination conditions for EIS determination purposes.

10 Conclusions

Based on the desktop review of available information, historical aerial imagery, previous reports provided and proposal area inspection by Aurecon, the following conclusions regarding soil and contamination aspects for the proposal area are made:

General

- Potential impacts of the proposal are typical of large scale power generation construction projects and would be managed with the implementation of proposal specific environmental management plans, adherence to industry standards for earthworks and construction activity and handling and storage of chemicals and contaminated materials.
- The earthworks and site preparation would alter the current topography, landscape and visual amenity. Measures to mitigation and manage soil and contamination land degradation, will be collated in environmental management plans to be approved prior to the proposal construction works and operation of the power station.

Contamination

- The potential for significant widespread contamination to be present throughout the proposal area as a result of past and present land use activities, is considered to be low to moderate, most commonly due to historical land filling/presence of surface wastes, buildings that may have contained asbestos, legacy regional and industrial precinct contamination issues, waterways impacted by contamination discharges and industrial land uses with formerly poor waste management practices.
- There are several localised areas that pose potential human health or ecological risk that require further assessment during proposal development and potential management or remediation. The existing proposal area contamination dataset (typically previous ground investigation reports) shows elevated concentrations are localised and are not representative of broad/site wide gross contamination.
- Confirmation of ground conditions and assessment of contamination for moderate risk AECs (illegal surface dumping) should be considered as part of future geotechnical and concurrent contamination investigations when power station engineering designs and preferred options are known.
- Where considered required, further characterisation of wastes that require removal/management and Remedial Action Plans (RAPs) should be prepared to manage contamination risks prior to proposal area construction activities commencing. Typically, these activities should be undertaken during early works construction.
- Assessment of waste/spoil quality for trenching/ground disturbance will be required to ensure that waste classifications are known prior to excavation occurring to a high level of confidence for materials management purposes for the proposal.
- Low contamination risk sites should be assessed concurrently with any future geotechnical investigations to inform engineering designs. Where no further intrusive ground investigations are undertaken prior to future construction, the proposal construction environmental management plan (CEMP) must have an unexpected finds protocol (UFP) for incidental potential contamination finds during earthworks for the proposal.
- Aurecon note there is deemed to be a LOW residual environmental risk where the plans are prepared and implemented.
- Further assessment is likely required to adequately prepare the recommended management plans. This will include HAZMAT audits, lead paint surveys, further assessment of identified areas of contamination and asbestos for building fabric and structures to be demolished.

Soils and ASS

- The potential for ASS is moderate to high throughout most of the proposal within low lying areas and drainage lines. Management and mitigation measures should be taken during construction/excavation to limit generation of acid by oxidation which may impact the environment, groundwater and durability of structures (design life) through generation of acidic surface water or groundwater. Management of these

issues should be addressed through an appropriate acid sulfate soil management plan (ASSMP) during construction.

- Based on the information review, there are no major geotechnical constraints in the proposal area. However, normal engineering design and practice are to be implemented in accordance with relevant Australian Standards and their engineering design principals.
- Both the construction and operational phases of the proposal have the potential to impact upon the surrounding environment. As such, the following management plans should be prepared and implemented to mitigate any potential risk:
    - Construction and Operation Environmental Management Plans (CEMP and OEMP).
    - Acid Sulfate Soil Management Plan.
    - Sediment and Erosion Control Plan.
    - Construction Waste Management Plan.
    - Operational Waste Management Plan.

11 References

- Aurecon 2019: *Newcastle Power Station, Surface water hydrology specialist study.*
- Aurecon 2019a: *Newcastle Power Station, Flood Modelling Report.*
- Aurecon 2019b: *Newcastle Power Station, Soils and contamination specialist study.*
- Aurecon 2018, *Newcastle 250 MW Gas Fired Power Station Concept Design Report.*
- Coffey 2011, *Environmental Assessment – Newcastle Gas Storage Facility Project, Volume 1: Main Report.*
- Environmental Strategies (ES) 2017, *Phase 1 Preliminary Environmental Site Assessment – Tomago Development Site, NSW.*
- Landcom (2004): *Managing Urban Stormwater: Soils and construction – Volume 1 (4th Edition).*
- URS 2002, *Environmental Impact Statement - Tomago Gas Fired Power Station, Volume 1: Main Report.*
- NEPC 1999a National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013) Schedule B1: Guideline on Investigation Levels for Soil and Groundwater, National Environmental Protection Council, April 2013, Canberra.
- NEPC 1999b, National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013) Schedule B2 Appendix C: Assessment of Data Quality, National Environmental Protection Council, April 2013, Canberra.
- NSW EPA, 1995. *Contaminated Sites Sampling Design Guidelines*.
- NSW EPA, 2007 *Guidelines for the Assessment and Management of Groundwater Contamination.*
- NSW EPA, 2011. *Guidelines for Consultants Reporting on Contaminated Sites.*
- NSW EPA, 2012. *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases.*
- NSW EPA, 2014. *Waste Classification Guidelines – Part 1: Classifying Waste, Part 4: Acid sulfate soils and Addendum to Part 1.*
- NSW EPA, 2015. Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997.
- NSW EPA, 2017. *Guidelines for the NSW Site Auditor Scheme (Third Edition)*.
- Acid Sulfate Soils Management Advisory Committee, 1998. *Acid Sulfate Soils Manual.*
- Acid Sulfate Soils Management Advisory Committee, 1998. *Acid Sulfate Soils Assessment Guidelines.*
- Queensland Department of Natural Resources, Mines and Energy, Indooroopilly, Queensland. 2004. *Acid Sulfate Soils Laboratory Methods Guidelines.*
- Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (ANZG), 2018. *Guidelines for Fresh and Marine Water Quality: Water Quality Management Framework.*
- DECC, 2008. *Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries).*
- DECCW, 2010. *Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water.*
- NSW OEH, 2012. *The land and soil capability assessment scheme: Second approximation.*
- CSIRO, 2008. *Guidelines for Surveying Soil and Land Resources.*
- CSIRO, 2009. *Australian Soil and Land Survey Handbook.*
- DLWC, 2002. *Soil and Landscape Issues in Environmental Impact Assessment.*
- DLWC, 2002. *Site investigations for Urban Salinity.*
- Australian Geomechanics Society, 2007. *Landslide risk management guidelines presented in Australian Geomechanics Society*.

Appendix A – Soil landscape reports

be BERESFIELD

Landscape—undulating low hills and rises on Permian sediments in the East Maitland Hills region. Slope gradients 3–15%, local relief to 50 m, elevation is 20–50 m. Partially cleared tall open-forest.

Landscape Variant—bea—steeper upper slopes (15–<25%).

Soils—moderately deep (<120 cm), moderately well to imperfectly drained Yellow Podzolic Soils (Dy2.21), Brown Podzolic Soils (Db1.21) and brown Soloths (Db2.41) occur on crests with moderately deep (<120 cm), well-drained Red Podzolic Soils (Dr2.21) and red Soloths (Dr2.41) on upper slopes, moderately well to imperfectly drained brown Soloths (Db2.41, Db1.41) and yellow Soloths (Dy3.41) on sideslopes and deep (>200 cm), imperfectly to poorly drained Yellow Podzolic Soils (Dy2.21), yellow Soloths (Dy2.41, Dy3.41) and Gleyed Podzolic Soils (Dg2.41) on lower slopes.

Qualities and Limitations—high foundation hazard, water erosion hazard, Mine Subsidence District, seasonal waterlogging and high run-on on localised lower slopes, highly acid soils of low fertility.

LOCATION

Undulating low hills and rises on Permian sediments in the East Maitland Hills region in the centre-west of the area, including Beresfield and East Maitland. Type location is south-west of Beresfield (Area reference 3 **71*****E, 63 **66*****N).

LANDSCAPE

Geology and Regolith

Permian Tomago Coal Measures—shale, mudstone, sandstone, coal, tuff and clay.

Permian Mulbring Siltstone—siltstone, claystone, thin sandstone, and limestone.

Small areas of Permian Waratah Subgroup also occur—cross-laminated grey brown sandstone.

Topography

Undulating low hills and rises. Local relief is 10–50 m. Elevation is 20–50 m. Slopes are 3–15%. Crests are broad (250–400 m). Sideslopes are long and gently inclined (350–750 m), with some very long footslopes up to 2 000 m long. Occasional short, steep sideslopes occur, with common terracetting. Drainage lines are deeply incised and narrow (2–3 m). Rock outcrop is generally absent.

Vegetation

Partially cleared tall open-forest comprising *Eucalyptus maculata* (spotted gum), *E. fibrosa* (broad-leaved ironbark), *E. punctata* (grey gum), *E. oblonga* (narrow-leaved stringybark), *E. eugenioides* (thin-leaved stringybark) and *E. paniculata* (grey ironbark). Understorey vegetation contains *Bursaria spinosa* (blackthorn), paperbarks including *Melaleuca nodosa,* and wattles, including *Acacia falcata.*

Eucalyptus tereticornis (forest red gum) occurs on some lower slopes.

In drainage lines, *Melaleuca styphelioides, Backhousia myrtifolia* (grey myrtle), *Alphitonia excelsa* (red ash) and *Lantana camera* (lantana) are common.

Land Use

Urban centres occur at East Maitland, Beresfield and some northern suburbs of Newcastle. Small areas have been cleared for grazing or poultry farming.

Existing Land Degradation

Disturbed areas suffer considerable erosion. Unsealed tracks which are poorly maintained exhibit minor gully erosion. Moderate to severe rill erosion may occur on exposed batters, occasionally batter collapse may occur due to tunnel erosion of subsoils. Moderate sheet erosion occurs where vegetative cover has been removed.

Minor salt scalds occur on some lower slopes.

Landscape Variants

Areas marked as **bea** on the map have steeper slopes (15–<25%); otherwise, they have similar landscape features to Beresfield soil landscape.

SOILS

Dominant Soil Materials

be1—Friable brownish black loam (topsoil—A_1 horizon)

Colour	brownish black (10YR 2/2, 10YR 2/3), occasionally black (10YR 2/1) or dark brown (10YR 3/3)
Texture	sandy loam to loam fine sandy or silt loam
Structure	weak, fine (10–20 mm) sub-angular blocky peds which part easily to <2 mm crumb peds
Fabric	rough ped
Field pH	moderately acid to neutral (pH 5.5–7.0)
Exposed condition	often friable, may be firm when dry
Permeability	highly permeable
Coarse fragments	gravel-sized platy ironstone and sub-angular sandstone generally few, but may be abundant. Very few fine charcoal fragments may occur
Roots	common to abundant, in-ped, fine
Type location	John Renshaw Drive, 200 m ENE of intersection with Minmi Road (Grid Ref. 3 **72**40*E, 63 **68**45*N). Soil Data System card 33, 0–10 cm

be2—Hardsetting dull yellowish brown sandy loam (topsoil—A_2 horizon)

Colour	dull yellowish brown (10YR 4/3) to dark brown (10YR 3/3, 7.5YR 3/3). Dry colour is often bleached dull yellow orange (10YR 7/2, 10YR 6/3). Few small rusty mottles may occur down root traces
Texture	ranges from sandy loam through clay loam to fine sandy clay loam
Structure	massive, rarely a weak to moderate (5–10 mm) sub-angular blocky ped occurs
Fabric	earthy, rarely rough ped
Field pH	moderately to slightly acid (pH 5.5–6.0)
Exposed condition	massive appearance, hardsetting and brittle when dry
Permeability	moderate
Coarse fragments	few to common gravel-sized tabular ironstone fragments may occur, occasionally in the form of a stone line at the base of this material. Few to common conglomerate pebbles and very few charcoal fragments may occur
Roots	few to common, fine
Type location	John Renshaw Drive, 200 m ENE of intersection with Minmi Road (Grid Ref. 3 **72**40*E, 63 **68**45*N). Soil Data System card 33, 10–15 cm

be3—Pedal brown plastic mottled clay (subsoil—B_2 horizon)

Colour	brown (7.5YR 4/4, 7.5YR 4/6), dark brown (7.5YR 3/3, 10YR 5/4), bright yellowish brown (10YR 6/6) and yellowish brown (10YR 5/6, 2.5Y 5/3) common, but ranging to greyish yellow brown (10YR 4/2) and dull yellowish brown (10YR 5/3, 10YR 4/3). Few to common red/grey/orange mottles occur
Texture	dominantly medium clay, ranging from light-medium to heavy plastic clay, occasionally fine sandy clay
Structure	strong, dense (10–20 mm) angular blocky peds. A 50–100 mm prismatic or angular blocky macrostructure is generally present
Fabric	smooth ped
Field pH	moderately to slightly acid (pH 5.0–6.0)
Exposed condition	when dry, fine 1–2 mm fragments form on the surface and cracking evident. When wet, a surface mulch is formed
Permeability	slow
Coarse fragments	common to many angular and sub-angular ironstone fragments may occur
Roots	few, fine, ex-ped
Type location	John Renshaw Drive, 200 m ENE of intersection with Minmi Road (Grid Ref. 3 **72**40*E, 63**68**45*N). Soil Data System card 33, 15–120 cm

be4—Reddish brown plastic pedal clay (subsoil—B_2, B_3 horizons)

Colour	reddish brown (5YR 4/6, 2.5YR 4/6), dull reddish brown (5YR 4/4), red/grey mottles may be common
Texture	medium to heavy plastic clay
Structure	primary 20–50 mm angular blocky peds which part easily to 10–20 mm angular blocky or polyhedral peds. A 100–200 mm prismatic macrostructure may occur
Fabric	smooth ped
Field pH	strongly to slightly acid (pH 4.5–6.0)
Exposed condition	when dry, fine (1–2 mm) fragments form on the surface. Cracking 2–5 cm in width common. Upon wetting, a surface mulch forms. Consistence is moderately firm to very firm when dry, weak and labile when moist
Permeability	slow to moderate
Coarse fragments	sub-angular and tabular ironstone fragments may occur and be common to many
Roots	few, ex-ped
Other	clay skins (cutans) abundant
Type location	John Renshaw Drive at Black Hill Road turnoff (Grid Ref. 3 **67**40*E, 63 **67**20*N). Soil Data System card 23, 40–85 cm

be5—Gleyed "puggy" silty clay (subsoil—B_2, B_3, C horizons)

Colour	dull yellow orange (10YR 7/2, 10YR 6/4), light grey (10YR 7/1), light yellow (2.5YR 7/3) occur. Red/orange/grey mottling may occur and be common
Texture	commonly silty clay, but ranging from sandy clay to light-medium clay
Structure	large (100–200 mm) prismatic peds part easily to 20–50 mm angular blocky or sub-angular blocky peds. Structure strong when dry, but massive when wet
Fabric	smooth ped
Field pH	moderately acid to neutral (pH 5.0–7.0)
Exposed condition	1–2 mm surface fragments form. When abundant tabular ironstones are present, surface condition is gravelly
Permeability	slow
Coarse fragments	few to abundant gravel-sized sub-angular tabular ironstone fragments, which may be stratified
Roots	few to absent, fine (<2 mm)
Type location	John Renshaw Drive at Black Hill Rd turnoff (Grid Ref. 3 **67**4**E, 63 **67**2**N). Soil Data System card 23, 85– 144 cm

Occurrence and Relationships

Moderately well-drained crests. 5–15 cm friable brownish black loam **(be1)** overlies 5–30 cm of hardsetting dull yellowish brown sandy clay loam **(be2)**, which in turn overlies 40–105 cm pedal brown plastic mottled clay **(be3)**. Soil boundaries are clear to sharp. Total soil depth is <120 cm [moderately well-drained Yellow Podzolic Soils (Dy2.21) and Brown Podzolic Soils (Db1.21, Db2.41)].

Sideslopes. 5–10 cm **be1** overlies 10–30 cm **be2** and commonly 16–65 cm **be3.** These materials may in turn be underlain by 25–80 cm of reddish brown plastic pedal clay **(be4)** and, in turn, often >200 cm gleyed "puggy" silty clay **(be5).** Where disturbed, **be1** has often been lost to erosion and **be2** is exposed at the surface. Soil boundaries are clear to abrupt. Total soil depth is >200 cm [moderately well-drained brown Soloths (Db2.41, Db1.41), some yellow Soloths (Dy3.41)].

On better drained upper slopes. Up to 10 cm **be1** overlies 10–35 cm **be2**, then 35–>80 cm **be4**, which in turn overlies <115 cm **be5.** Soil boundaries are abrupt to clear. Total soil depth is >120 cm [well-drained Red Podzolic Soils (Dr2.21) and some red Soloths (Dr2.41)].

On some lower slopes and more poorly drained flat low crests. Up to 10 cm **be1** overlies 10–30 cm **be2** which is underlain by 140–>400 cm **be5.** Soil boundaries are abrupt. Total soil depth is >200 cm [imperfectly drained Yellow Podzolic Soils (Dy2.21), yellow Soloths (Dy2.41, Dy3.41) and some poorly drained Gleyed Podzolic Soils (Dg2.41)].

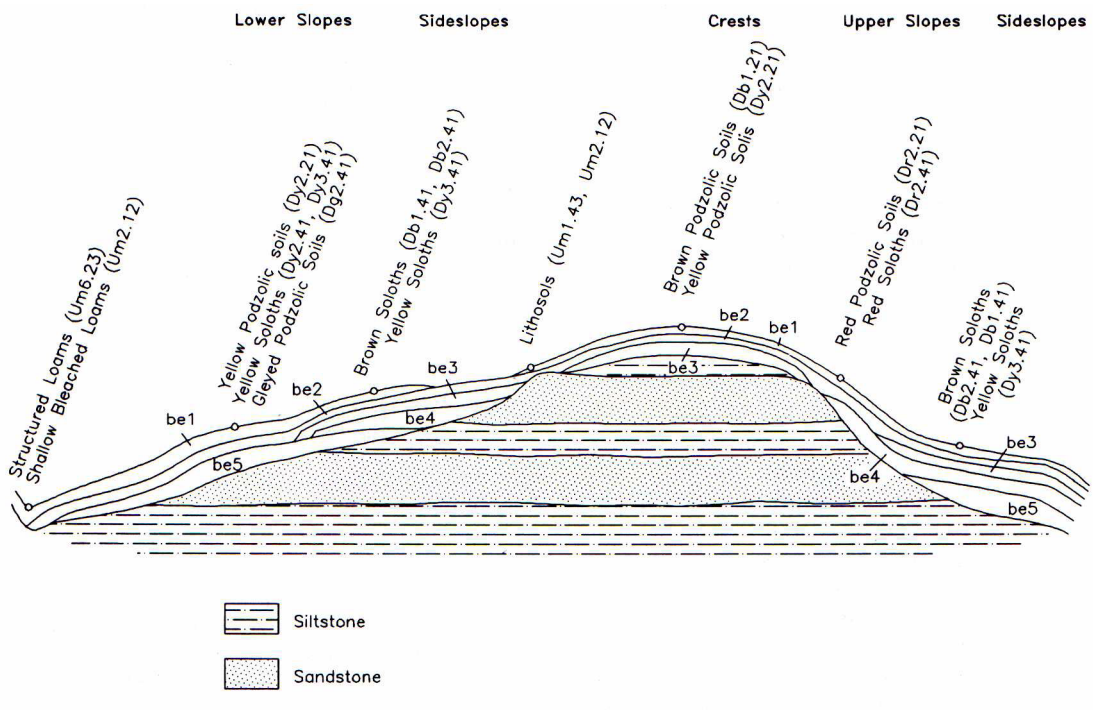
Drainage lines. 15–>180 cm **be1** occurs [imperfectly drained Structured Loams (Um6.23), some Earthy Loams (Um5.52)]. Occasionally, **be1** is underlain by 15 cm **be2.** Soil boundaries are clear. Total soil depth is 30–>180 cm [poorly drained Bleached Loams (Um2.12)].

Where sandstone outcrops occur. Up to 10 cm **be1** overlies 18–30 cm **be2.** Boundaries are clear. Total soil depth is <100 cm [rapidly drained Lithosols (Um1.43, Um2.12)].

QUALITIES AND LIMITATIONS

Landscape Limitations

Foundation hazard
Steep slopes (localised)
High run-on (localised)



■ *Schematic cross-section of Beresfield soil landscape illustrating the occurrence and relationship of the dominant soil materials.*

Water erosion hazard
Seasonal waterlogging (localised, lower slopes)
Rock outcrop (localised)
Mine Subsidence District

Landscape Limitations—bea

Steep slopes (localised)
Mass movement hazard
High foundation hazard
Water erosion hazard
Mine Subsidence District
High run-on

Soil Limitations

be1	Very strong acidity
	High potential aluminium toxicity
	Stoniness (localised)
	High erodibility
	Low fertility
be2	Hardsetting surface
	Strong acidity
	High potential aluminium toxicity
	Stoniness
	Low fertility
be3	High plasticity
	Moderate shrink-swell potential
	Low permeability
	Very strong acidity
	High aluminium toxicity potential
	Low fertility
	Stoniness (localised)
be4	High plasticity
	Very strong acidity
	Very high potential aluminium toxicity
	Low permeability
	Moderate shrink-swell potential
	Sodicity/dispersion
	Stoniness (localised)
	Low fertility
be5	High erodibility
	Low wet bearing strength
	Very strong acidity
	High potential aluminium toxicity
	Low fertility
	Stoniness (localised)
	Very low permeability
	High sodicity/dispersion
	High salinity

Fertility

Soil Materials as Plant Growth Media. Soil material suitability as growth media is moderate **(be1)** to low **(be2**, **be3**, **be4**, **be5)**. All soil materials are strongly to very strongly acid, with high potential aluminium toxicity . Topsoil **be1** is friable when moist and has moderate organic matter, but high phosphorus sorption.

Soil Profile Fertility. Soil profile suitability as a plant growth medium is low. Soil volumes available for root penetration are moderate.

Erodibility

	K factor	Non-concentrated flows	Concentrated flows	Wind
be1	0.028	moderate	high	V low
be2	0.033	moderate	moderate	V low
be3	0.017	low	high	V low
be4	0.018	low	moderate	V low
be5	0.048	high	high	V low

Erosion Hazard

	Non-concentrated flows	Concentrated flows	Wind
grazing	low	mod-high	slight
cultivation	high	extreme	low-mod
urban	mod-high	high	slight

Foundation Hazard

Generally high foundation hazard due to moderate to high shrink-swell (reactive) and highly plastic subsoils. Topsoil depth is 5–50 cm. Total soil depth is <120–>200 cm.

Urban Capability

Generally moderate limitations for urban development due to high foundation hazard.

Rural Capability

Generally moderate limitations for cultivation and low limitations for grazing.

Sustainable Land Management Recommendations

Care should be taken that topsoil loss is minimised by maintaining a permanent protective ground cover. If exposure of the hardsetting **be2** occurs, increased runoff and erosion will result. Incorporation of organic matter, and fertilisers, including phosphorus and lime, may be beneficial for pasture establishment. Areas of salt scalding should be fenced off to exclude stock and sown with salt tolerant grass species. Drainage or diversion of surface water may also be required. The Department (SCS) can provide advice on the management of areas effected by land degradation.

Soil Conservation Earthworks

Generally moderate limitations for earthworks due to high shrink-swell subsoils **(be4)** and highly aggregated subsoils **(be3)**. Localised limitations include shallow soils and imperfectly drained soils. Soils tested have earthworks categories J for **be1**, B for **be2** and **be5**, C for **be3** and G for **be4**. Soils are often highly dispersible and further testing is recommended prior to undertaking earthworks.

mf MILLERS FOREST

Landscape—extensive alluvial plain on recent sediments in the Hunter Plain region in the centre of the sheet. Elevation is 6–<3 m, local relief is <1 m, slope gradients are <1%. Cleared tall open-forest.

Soils—deep (>150 cm), imperfectly to poorly drained Prairie Soils (Gn3.21, Gn3.23).

Qualities and Limitations—flood hazard, permanently high watertables, seasonal waterlogging and foundation hazard, low wet bearing strength soils.

LOCATION

Extensive alluvial floodplain/delta on recent sediments in the Lower Hunter Plain region in the centre of the area. Typical locations include Millers Forest, Motto Farm and the broad plains along the lower reaches of the Williams River at Nelsons Plains. Type location is at Millers Forest (Area reference 3 **79*****E, 63 **74*****N).

LANDSCAPE

Geology and Regolith

Quaternary Holocene alluvial sediment—predominantly clay, silt and sand from overbank deposition of the lower Hunter and Williams Rivers, which overlies estuarine mud deposits at depth (Roy 1993).

Topography

Extensive alluvial plain, 4–6 km in width. Slope gradients are commonly <1%. Elevation is <3–6 m. Local relief is <1 m. Common landform elements are backswamps, ox-bows and constructed levees.

Vegetation

Cleared tall open-forest containing *Casuarina glauca* (swamp oak), *Melaleuca styphelioides* (prickly-leaved paperbark), *Cupaniopsis anacardioides* (tuckeroo) and occasional *Eucalyptus amplifolia* (cabbage gum). *Aegiceras corniculatum* (river mangrove) occurs on riverbanks. *Phragmites australis* (common reed) often grows in shallow water.

Land Use

Predominantly beef cattle grazing on improved kikuyu pastures, for which this landscape has been extensively drained. Some horse grazing and stud farms occur. Lucerne and vegetable cropping occur at Millers Forest.

Existing Land Degradation

Topsoil compaction by stock in poorly drained areas is common.

Included Soil Landscapes

Small areas of Hexham Swamp soil landscape have been included as poorly drained backswamps.

SOILS

Dominant Soil Materials

mf1—Well-structured brownish black silty clay loam (topsoil—A horizon)

Colour	brownish black (7.5YR 3/2, 10YR 3/2, 7.5YR 2/3, 10YR 2/3), occasionally dark brown (7.5YR 3/3, 10YR 3/3) or black (10YR 2/1)
Texture	silty clay loam, but ranging from fine sandy clay loam to silty clay
Structure	moderate to occasionally strong, 10–20 mm sub-angular blocky or polyhedral peds which part easily to 5–10 mm crumb or polyhedral peds
Fabric	commonly smooth ped, occasionally rough ped
Field pH	commonly slightly acid (pH 5.5–6.0), but ranging to neutral (pH 7.0)

Coarse fragments	absent
Roots	few to many, well branched, fibrous and in-ped
Permeability	moderate
Exposed condition	commonly firm to hardsetting when dry, occasionally self-mulching
Type location	East of Woodberry (Grid Ref. 3 **7**70**E, 63 **6**98**N). Soil Data System card 290, 0–45 cm

mf2—Well-structured brown silty clay (subsoil—B horizon)

Colour	ranges from brownish black (10YR 3/2, 7.5YR 3/2, 10YR 2/3, 10YR 2/2) to dark brown (7.5YR 3/3, 7.5YR 3/4, 10YR 3/4) and rarely dull yellowish brown (10YR 4/3). Few to occasionally common orange mottles occur, often down root channels
Texture	commonly silty clay, but ranging to medium clay
Structure	moderate to strong, 20–50 mm angular or sub-angular blocky peds which may part to 5–10 mm polyhedral peds. Occasionally, a 50–100 mm prismatic or angular blocky ped occurs
Fabric	smooth ped, clay skins are common on ped faces
Field pH	moderately acid to moderately alkaline (pH 5.5–9.5)
Coarse fragments	few to common ironstone nodules occur
Roots	few to many, fine, predominantly in-ped
Permeability	low
Exposed condition	forms fine surface mulch (2–5 mm aggregates), weak, labile moist consistence
Type location	East of Woodberry (Grid Ref. 3 **7**70**E, 63 **6**98**N). Soil Data System card 290, 45–>120 cm

Associated Soil Materials

Weakly structured brown sandy clay loam. This is a brown to dark brown sandy clay loam to fine sandy clay loam with weak sub-angular blocky peds. It occurs as a topsoil (A horizon) on levee deposits.

Grey saturated plastic clay (bf2). See Bobs Farm soil landscape for full description.

Occurrence and Relationships

Commonly. 10–55 cm well-structured brownish black silty clay loam **(mf1)** overlies >120 cm well-structured brown silty clay **(mf2)**, which is underlain at depth by **bf2**. Soil boundaries are clear to gradual. Total soil depth is >150 cm [imperfectly to poorly drained Prairie Soils (Gn3.23, Gn3.21, some Gn3.52, Gn3.42, Gn4.31) and some Brown Clays (Uf6.42, Uf6.31) where heavier topsoils occur].

Where levees occur. More than 60 cm weakly structured brown sandy clay loam occurs [Alluvial Soils (Um6.12)].

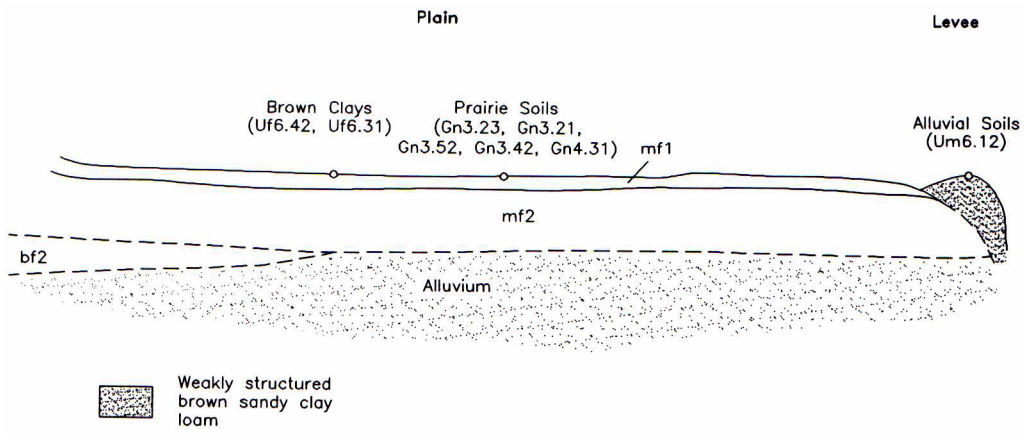
QUALITIES AND LIMITATIONS

Landscape Limitations

Flood hazard
Permanently high watertables
Seasonal waterlogging
Foundation hazard
Waterlogging (localised)

Soil Limitations

mf1	Low wet bearing strength Seasonally hardsetting surfaces
mf2	Low wet bearing strength Sodicity/dispersion Low permeability Salinity (localised, at depth) Potential acid sulphate soils at depth (below 1.5 m AHD)



■ *Schematic cross-section of Millers Forest soil landscape illustrating the occurrence and relationship of the dominant soil materials.*

Fertility

Soil Materials as Plant Growth Media. Suitability as growth media is high **(mf1)** to low **(mf2)**. Topsoil **(mf1)** is well structured with high organic matter content, high nutrient storage capacity, moderate to very high exchangeable cations and very high water retention capacity, but high phosphorus sorption. Subsoil **(mf2)** is well structured with moderate nutrient storage capacity and very high water retention capacity; however, it is seasonally waterlogged, with localised salinity.

Soil Profile Fertility. Suitability as a growth medium is moderate to high for deep, imperfectly to poorly drained Prairie Soils.

Erodibility

	K factor	Non-concentrated flows	Concentrated flows*	Wind
mf1	0.023	moderate	moderate	V low
mf2	0.036	moderate	mod-high	V low

Erosion Hazard

	Non-concentrated flows	Concentrated flows	Wind
grazing	low	low	slight
cultivation	low	moderate	slight
urban	low	moderate	slight

*Concentrated flows include channelled flows and wave erosion in this soil landscape.

Foundation Hazard

High foundation hazard due to flood hazard, also permanently high watertables. Topsoil depth is 10–50 cm. Total soil depth is >150 cm.

Urban Capability

Generally high limitations for urban development.

Rural Capability

Generally low limitations for cultivation and grazing.

Sustainable Land Management Recommendations

Cultivation should be undertaken only when soils are cohesive and friable. If too wet or too dry, soils are prone to structural degradation. Drains should not be excavated below 1.5 m AHD before investigations have been undertaken into potential acid sulphate soils.

Soil Conservation Earthworks

Moderate limitations for earthworks due to permanently high watertables. Soils tested have earthworks categories J for **mf1** and A for **mf2**.

sb SHOAL BAY

Landscape—Pleistocene sandsheets and low dunes on the Tomago Coastal Plain. Slope gradients generally <15%, local relief <10 m, elevation <15 m. Partially cleared tall open-forest.

Landscape Variant—sba—steep high dunes.

Landscape Variant—sbb—areas of dry heath which appear to be burnt regularly.

Landscape Variant—sbc—poorly drained Pleistocene sandsheets.

Soils—deep (>300 cm), well-drained Podzols (Uc2.3), with deep (>300 cm), imperfectly drained Humus Podzols (Uc2.33) on low rises and deep (>300 cm), poorly drained Humus Podzols (Uc 5.13) on poorly drained flats and depressions.

Qualities and Limitations—wind erosion hazard, ground water pollution hazard, steep slopes (localised), foundation hazard (localised, swamps), permanent waterlogging (localised, swamps), permanent high watertables (localised, swampy depressions), seasonal waterlogging (localised, low lying swales), acid sandy non-cohesive soils with very low fertility.

LOCATION

Well-drained Pleistocene sandsheets and dunes, and some poorly drained sandsheets on the Tomago Coastal Plain north of Fullerton Cove/Tilligerry Creek and south of Medowie, Grahamstown Lake and Port Stephens. This landscape occurs mainly on land managed by the Hunter District Water Board. Type location is along Richardson Road (Area reference 3 **91*****E, 63 **73*****N).

LANDSCAPE

Geology and Regolith

Pleistocene aeolian sandsheets and low dunes composed of quartz sands.

Topography

Gently inclined sandsheets to elongated, low undulating dunes. Slope gradients generally <15%. Local relief generally <10 m and elevation <15 m. Dunes are usually well drained, but minor swampy areas may occur in depressions. The dunes taper from a broad western end to a fine eastern point.

Vegetation

Extensively cleared (sand mining) to uncleared open-forest and woodland with a tall shrub understorey. A tall dry heath/scrubland is present in exposed areas (north-east area) which are regularly burnt **(sbb)**. Common species of the open-forest and woodland include *Eucalyptus pilularis* (blackbutt), *Angophora costata* (smooth-barked apple), *E. gummifera* (red bloodwood), occasionally *E. signata* (scribbly gum), with an understorey which contains *Banksia serrata* (old man banksia), *Leptospermum laevigatum* (coastal tea-tree), *Acacia longifolia* (sydney golden wattle), *Persoonia lanceolata* (lance-leaf geebung), *Persoonia levis* (broad-leaf geebung), *Pteridium esculentum* (bracken), *Imperata cylindrica* (blady grass), *Pimelea linifolia* spp. *linifolia* (slender rice flower), *Actinotus helianthi* (flannel flower), *Dillwynia retorta* (eggs and bacon), *Xanthorrhoea australis* (grass tree), *Macrozamia communis* (burrawang), *Epacris microphylla* (coral heath). *Eucalyptus robusta* (swamp mahogany) and *Melaleuca quinquenervia* (broad-leaved paperbark) occur in poorly drained areas.

In exposed areas trees are rarely present and the dry heath/shrub understorey predominates **(sbb)**. The species composition is similar to the understorey of the forest/woodland except *Banksia serrata* (old man banksia) appears to be replaced by *Banksia aemula* (wallum banksia).

On poorly drained sandsheets **(sbc)**, cleared to uncleared closed *Melaleuca* spp. (paperbark) swamp forest occurs.

Land Use

Predominantly water supply areas (Hunter District Water Board), sand mining (RNZ mines), military (weapons range) and more recently a site for heavy industry (Alcan aluminium refinery).

Landscape Variants

Areas mapped **sba** are steep to rolling dunes, slopes 15–>25%. These dunes mainly have an east to west alignment except for the far west where they trend more north-west–south-east (Thom *et al*. 1992). Relief is up to 40 m and elevation is usually 10–50 m.

Areas mapped **sbb** are dry heath which appear to be burnt regularly.

Areas mapped **sbc** are poorly drained Pleistocene sandsheets. Slopes <3%, local relief <2 m and elevation generally between 2 m and 6 m. Watertables are often close to the surface (<70 cm). Small isolated permanently wet areas occur. Deep (>300 cm), imperfectly drained Humus Podzols (Uc2.20, Uc2.33) on rises with Humus Podzols (Uc5.13) in very poorly drained areas. On the map landscape variant **sbc** has been placed in the Swamp Landscapes grouping.

SOILS

Dominant Soil Materials

sb1—Brownish grey loose sand (topsoil—A_1 horizon)

Colour	commonly brownish grey (10YR 4/1), ranges from brownish black (10YR 2/3) to brownish grey (10YR 6/1)
Texture	loamy sand
Structure	single-grained
Fabric	sandy
Field pH	strongly to slightly acid (pH 4.0–6.0)
Coarse fragments	few to very few gravel-sized charcoal fragments
Roots	common
Exposed condition	loose
Permeability	high
Type location	Hunter District Water Board land on crest of dune 500 m south-west of Richardson Road (Grid Ref. 3 **94**55*E, 63 **73**30*N). *Soil Landscapes of the Port Stephens 1:100 000 Sheet* Soil Data System card 77, 0–30 cm

sb2—Loose bleached light grey sand (subsoil—A_2 horizon)

Colour	commonly bleached light grey (10YR 7/1, 10YR 8/1)
Texture	sand
Structure	single-grained
Fabric	sandy
Field pH	strongly to slightly acid (pH 4.0–6.0)
Coarse fragments	absent
Roots	common on surface, becoming few with depth
Exposed condition	loose
Permeability	high
Type location	Hunter District Water Board land on crest of dune 500 m south-west of Richardson Road (Grid Ref. 3 **94**55*E, 63 **73**30*N). *Soil Landscapes of the Port Stephens 1:100 000 Sheet* Soil Data System card 77, 30–>275 cm

sb3—Coherent organic- and iron-stained sand (subsoil—Bhs horizon)

Colour	commonly a combination of brownish black (10YR 2/2, 10YR 3/2) or dark brown (10YR 3/3) organic- stained sand with inclusions (20–50 %) of dull yellow orange (10YR 6/4) iron-stained sand. Often the black organic sand occurs as pipes in the iron stained sand
Texture	sand to loamy sand
Structure	single-grained, massive in patches
Fabric	sandy, occasionally earthy
Field pH	strongly to slightly acid (pH 4.5–6.0)
Coarse fragments	absent
Roots	few
Exposed condition	loose to very hardsetting dependent on amount of cementation by organic and iron compounds
Permeability	high to moderate
Other	organic matter often appears to form pipes which are often infilled with **sb2** material
Type location	batter at The Parading Ground, Nelson Bay Road (Grid Ref. 3 **94**30*E, 63 **70**30*N). *Soil Landscapes of the Port Stephens 1:100 000 Sheet* Soil Data System card 71, 250–>700 cm

Associated Soil Materials

Massive organic pan (Bh horizon)—tn4. A black sand to sandy loam, massive, with localised very dense cemented patches, hard iron nodules or cemented iron sands is occasionally present at the base of this material. It occurs as subsoil (Bh horizon) on poorly drained sand plains of landscape variant **sbc**.

Occurrence and Relationships

Generally. Soils are uniform and consist of 10–40 cm of brownish grey loose sand **(sb1)** which overlies 60–>270 cm of bleached loose sand **(sb2)** which overlies >150 cm of coherent organic and iron impregnated sand **(sb3)** [well-drained Podzols (Uc2.3)]. The soil boundaries are sharp and total soil depth >300 cm. **sb2** often appears as pipes in **sb3**. At The Parading Ground deep pipes of cemented organic sand have **sb2** material in the core of the pipe.

Areas mapped as sbc—Sandy rises. Up to 15 cm of **sb1** overlies 40–100 cm **sb2**. **sb2** overlies 40–>100 cm of massive organic pan **(tn4)** [imperfectly drained Humus Podzols (soft pan Uc2.20), hard pan (Uc2.33)]. Total soil depth exceeds 300 cm and the boundaries between the soil materials are sharp.

Poorly drained flats and depressions. Up to 30 cm **sb1** directly overlies 40–>100 cm **tn4** [Humus Podzols (Uc5.13)]. Total soil depth >300 cm and the boundaries between the soil materials are sharp.

QUALITIES AND LIMITATIONS

Landscape Limitations—sb and sbb

High wind erosion hazard
Non-cohesive soils
Steep slopes (localised)
Ground water pollution hazard

Landscape Limitations—sba

High wind erosion hazard
Non-cohesive soils
Steep slopes
Ground water pollution hazard
Foundation hazard (localised)

Landscape Limitations—sbc

Seasonal waterlogging
High watertables
Non-cohesive soils
Ground water pollution hazard
Moderate foundation hazard

Soil Limitations

sb1 High erodibility
High permeability
Very strong acidity
Very low fertility
Very low available water-holding capacity

sb2 High erodibility
High permeability
Strong acidity
Very low fertility
Very low available water-holding capacity

sb3 Very strong acidity
Very low fertility
Very low available water-holding capacity

Fertility

Soil Materials as Plant Growth Media. Low to moderate suitability as growth media, with low to very low nutrient and water storage capacities and exchangeable cations. All soil materials are strongly to very strongly acid.

Soil Profile Fertility. Suitability as a growth medium is moderate for deep, well-drained Podzols if irrigated and treated with regular inputs of fertiliser.

Erodibility

	K factor	Non-concentrated flows	Concentrated flows	Wind
sb1	0.000	very low	high	moderate
sb2	0.009	very low	very high	high
sb3	0.000	very low	high	moderate

Erosion Hazard

	Non-concentrated flows	Concentrated flows	Wind
grazing	slight	high	high
cultivation	slight	high	extreme
urban	slight	very high	V high

Foundation Hazard

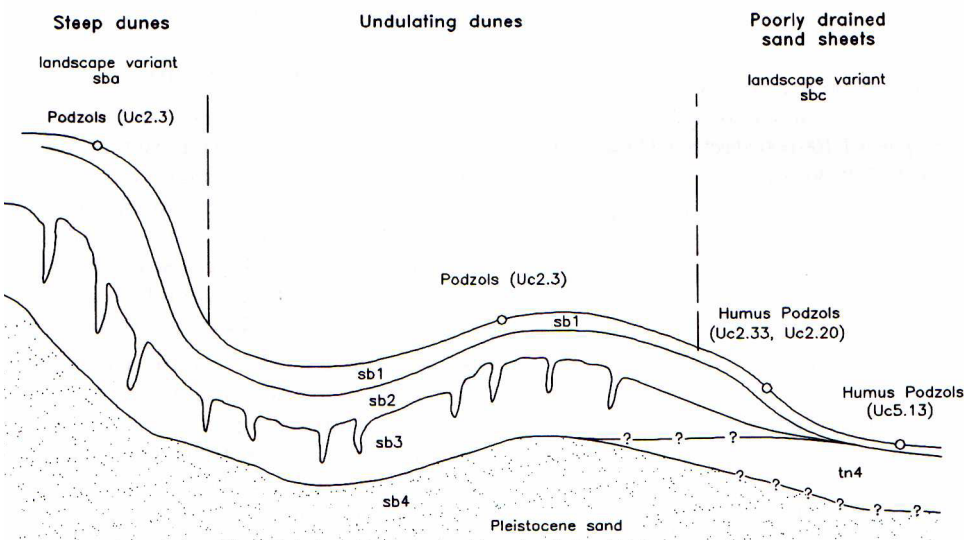
Generally low hazard, but localised high hazard on steeper slopes **(sba)** and swampy areas **(sbc)**.

Urban Capability

Generally moderate limitations for urban development except for steep (>25%) slopes on **sba** and **sbc**, which have high limitations for urban development.

Rural Capability

Generally high degree of limitations for cultivation and grazing due to the sensitive nature of the dunes which are easily predisposed to wind erosion. The area is best retained under indigenous native timber.



■ *Schematic cross-section of Shoal Bay soil landscape illustrating the occurrence and relationship of the dominant soil materials.*

Sustainable Land Management Recommendations

To prevent wind erosion, it is important to maintain sufficient ground cover. Fertilisers may be necessary to establish good cover. Protective fences around critical vegetated areas and weed control may be necessary.

Soil Conservation Earthworks

Not suitable, due to highly pervious soil materials.

tn TEA GARDENS

Landscape—Pleistocene beach ridges on the Tomago Coastal Plain. Local relief <1 m, slopes <5%, elevation 5–8 m. Uncleared dry and wet heath.

Landscape Variant—tna—Pleistocene sandsheets with wet heath forest.

Landscape Variant—tnb—Pleistocene sandsheets with wet heath and sedgeland.

Soils—deep (>200 cm), well-drained Humus Podzols (Uc2.33) on ridges with deep (>200 cm), poorly drained Peaty/Humus Podzols (Uc2.33) in swales and deep (>200 cm), very poorly drained Acid Peats (O) in swamps.

Qualities and Limitations—permanently high watertables, seasonal waterlogging, ground water pollution hazard, strongly to extremely acid soils of low fertility.

LOCATION

Extensive Pleistocene beach ridges and sandsheets on the Tomago Coastal Plain. Bordered by the interbarrier depression of Tilligerry Creek to the south and by Grahamstown Lake and Medowie to the north (Area reference 3 **89*****E, 63 **71*****N).

LANDSCAPE

Geology and Regolith

Pleistocene beach ridges and sandsheets consisting of marine and aeolian quartz sands.

Topography

Pleistocene beach ridges and sandsheets. The beach ridge plain **(tn)** generally follows the coastal alignment with NE–SW orientation and occurs north of Moffats Swamp. The beach ridge plain slopes slightly seaward at 1:400 (0.25%) (Thom *et al*. 1992). Aeolian reworking of the sand plain **(tna** and **tnb)** has occurred. These areas consist of broad, irregular sandy rises and aeolian deflation basins. Local relief of the sand plain rarely exceeds 1 m and slope gradients <5%. Elevation is generally 5–8 m ASL, but near the interbarrier depression elevations as low as 2 m ASL can occur. The ridges are generally well drained, but the swales are seasonally waterlogged and the watertable is generally <100 cm below the surface.

Vegetation

Generally uncleared low woodland and dry heath on rises with wet heath, sedge **(tnb)** and wet heath forest **(tna)** in poorly drained areas. The difference between wet heath **(tnb)** and wet heath forest communities **(tna)** appears to be fire related with the wet heath occurring in areas which are more frequently burnt.

The drier ridges and sandy rises with relatively good site drainage consist a dry heath community with low forms of *Eucalyptus gummifera* (red bloodwood), *Banksia aemula* (wallum banksia), *Persoonia* spp. (geebung), and *Pteridium esculentum* (bracken).

Poorly drained swales and deflation basins contain wet heath or wet heath forest community. Common species of the wet heath include *Banksia oblongifolia*, *Melaleuca nodosa*, *Melaleuca linariifolia* ssp. *linariifolia*, *Melaleuca styphelioides* (prickly-leaved paperbark), *Xanthorrhoea fulva* (grass tree), *Callistemon citrinus* (red bottlebrush), *Hakea teretifolia* (dagger hakea), *Leptospermum polygalifolium* (yellow tea-tree), *Bauera rubioides* (dog rose), *Woolsia pungens* (woolsia), *Persoonia* spp. (geebung), *Petrophile sessilis* (prickly conesticks), *Isopogon anemonifolius* (broad-leaf drumsticks), *Melaleuca thymifolia* (thyme honey-myrtle), *Boronia parviflora* (swamp boronia), and *Epacris* spp. (heath). Herb layer may contain *Blandiflora grandiflora* (northern christmas bells) and *Restio complanatus* (flat cord-rush) and sundews.

The wet heath forest appears to have a wet heath understorey but with a well-developed tree canopy which can contain *Angophora costata* (smooth-barked apple), *Eucalyptus robusta* (swamp mahogany), *Melaleuca*

quinquenervia (broad-leaved paperbark), with the odd *Eucalyptus punctata* (grey gum). *Eucalyptus signata* (scribbly gum) is common in some areas.

Land Use

The major land use is water supply and the majority of this soil landscape is managed by the Hunter District Water Board. Sand mining has occurred north-west of Williamtown. The other main land use is for military purposes including an air force weapons range and a parachute drop zone. Small urban areas occur at Motto Farm and Tomago, light industrial areas occur along the Pacific Highway and Masonite Road.

Existing Land Degradation

Minor wind erosion occurs on exposed areas when soils are dry.

Landscape Variants

Areas mapped **tna** have similar soils and landscape features to **tn** but appear to have been reworked by wind action producing irregular low sandy rises and broad deflation basins and swales. The vegetation type is predominantly a wet heath forest.

Landscape variant **tnb** is very similar to **tna** except the predominant vegetation is wet heath and sedge. It is thought **tnb** occurs in more exposed areas with a higher fire frequency.

SOILS

Dominant Soil Materials

tn1—Sandy peat (O horizon)

Colour	black (10YR 1.7/1)
Texture	sandy peat to organic loam
Structure	fibrous to strong, 2–5 mm polyhedral
Fabric	fibrous to porous, rough-faced
Field pH	moderately acid (pH 5.0)
Coarse fragments	few charcoal fragments
Roots	many fine, common coarse
Exposed condition	soft
Permeability	high
Type location	Hunter District Water Board on edge of swamp 1 km south of weapons range (Grid Ref. 3 **98**45*E, 63 **74**10*N). *Soil Landscapes of the Port Stephens 1:100 000 Sheet* Soil Data System card 247, 0–35 cm

tn2—Brownish black to brownish grey loose loamy sand (topsoil—A_1 horizon)

Colour	brownish black (10YR 3/1) to brownish grey (10YR 4/1, 10YR 5/1, 10YR 6/1)
Texture	loamy sand to sandy loam when organic matter is high
Structure	single-grained, occasionally weak sub-angular blocky (5–20 mm) peds
Fabric	sandy
Field pH	moderately to slightly acid (pH 5.0–5.5)
Coarse fragments	absent, occasionally few charcoal fragments
Roots	common
Exposed condition	loose
Permeability	very high
Type location	drain on Lemon Tree Passage Road 700 m south of Emu Hill (Grid Ref. 4 **02**00*E, 63 **74**10*N). *Soil Landscapes of the Port Stephens 1:100 000 Sheet* Soil Data System card 204, 0–35 cm

tn3—Bleached loose sand (shallow subsoil—A_2 horizon)

Colour	greyish yellow brown (10YR 5/1) moist, often bleached light grey (10YR 7/1, 10YR 8/1) dry
Texture	sand which often gets coarse and gritty with depth
Structure	single-grained
Fabric	sandy
Field pH	moderately to slightly acid (pH 5.0–6.5)
Coarse fragments	absent
Roots	few
Exposed condition	loose
Permeability	very high
Type location	drain on Lemon Tree Passage Road 700 m south of Emu Hill (Grid Ref. 4 **02**00*E, 63 **74**10*N). *Soil Landscapes of the Port Stephens 1:100 000 Sheet* Soil Data System card 204, 35–52 cm

tn4—Massive organic pan (Bh horizon)

Colour	black (10YR 1.7/1, 10YR 2/1) to brownish black (10YR 2/3), occasionally dark brown (10YR 3/3) to brown (10YR 4/4). Dull yellow orange (10YR 6/4) inclusions or iron-stained sands may occur at the base of this material
Texture	coarse loamy sand to sand, occasionally sandy loam
Structure	massive, with localised very dense cemented patches, hard iron nodules or cemented iron sands are occasionally present at the base of this material
Fabric	earthy
Field pH	moderately to slightly acid (pH 5.0–6.0)
Coarse fragments	iron nodules occasionally present at the base
Roots	absent
Exposed condition	often very hardsetting but occasionally soft
Permeability	slow when cemented, highly permeable when soft
Type location	drain on Lemon Tree Passage Road 700 m south of Emu Hill (Grid Ref. 4 **02**00*E, 63 **74**10*N). *Soil Landscapes of the Port Stephens 1:100 000 Sheet* Soil Data System card 204, 52–65 cm

tn5—Coarse smelly saturated mottled sand (substrate—C horizon)

Colour	brown (10YR 4/4), dull yellowish brown (10YR 5/4) or dull yellow orange (10YR 7/3) with pale brown organic mottles
Texture	coarse, fine gravelly sand
Structure	loose
Fabric	sandy
Field pH	strongly acid to neutral depending on salinity (pH 4.5–7.0)
Coarse fragments	fine shelly fragments
Roots	few
Exposed condition	loose
Permeability	very high
Other	iron content of this material can be quite high
Type location	drain on Lemon Tree Passage Road 700 m south of Emu Hill (Grid Ref. 4 **02**00*E, 63 **74**10*N). *Soil Landscapes of the Port Stephens 1:100 000 Sheet* Soil Data System card 204, 65–>140 cm

tn6—Saturated brownish black massive coarse light sandy clay loam (topsoil—A_1 horizon)

Colour	brownish black (10YR 2/2)
Texture	light sandy clay loam
Structure	appears massive in saturated state
Fabric	earthy
Field pH	slightly acid (pH 6.0)
Coarse fragments	absent
Roots	common
Exposed condition	soft and puggy in wet state, expect hardsetting when dry
Permeability	moderate to high
Type location	1 km south of weapons range on Hunter District Water Board land (Grid Ref. 3 **98**45*E, 63 **74**10*N). *Soil Landscapes of the Port Stephens 1:100 000 Sheet* Soil Data System card 247, 35–60 cm

Occurrence and Relationships

Rises. Up to 35 cm of brownish black or brownish grey loamy sand **(tn2)** overlies up to 130 cm of bleached loose sand **(tn3)** which in turn overlies 15–1 000 cm of massive organic pan **(tn4)** [well-drained Humus Podzols (Uc2.3)]. Coarse smelly mottled saturated sand **(tn5)** occurs below **tn4.** Total soil depth exceeds 200 cm and boundaries between soil materials are sharp. Watertable, 50–200 cm depth

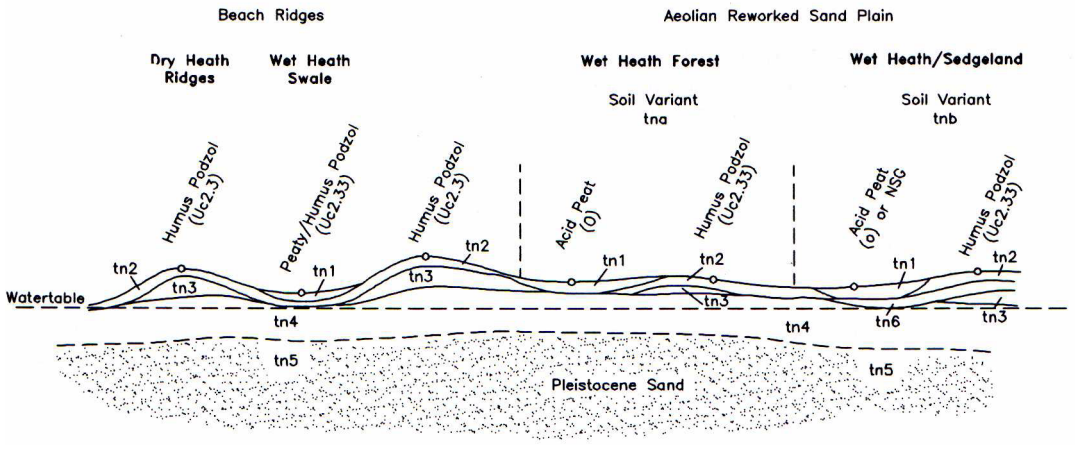
Swales, basins and poorly drained areas. Up to 30 cm of black sandy peat **(tn1)** overlies 10–30 cm **tn2**. **tn2** overlies >50 cm **tn4** (poorly drained Peaty/Humus Podzols (Uc2.33)] Watertable generally <50 depth. Total soil depth >200 cm and the boundary between the soil materials is sharp.

In exposed drier areas the depth of **tn1** is often thin due to ignition by fires.

In swampy areas **tn2** is absent and up to 40 cm **tn1** overlies **tn4** [very poorly drained Acid Peats (O)].

Occasionally in swampy areas which appear to have been subject to sheet flow (e.g., sides of large deflation basins), up to 10–40 cm of brownish black coarse light sandy clay loam **(tn6)** occurs below 10–40 cm **tn1** and above various depths of **tn4** [poorly drained Acid Peats (O) or NSG].

Soil Mechanics (1970) undertook many deep boreholes through the Tomago sand beds. Their results show that **tn4** is occasionally indurated and its total range is 0–18 m depth while a typical range is 0.5 m–10 m depth.



■ *Schematic cross-section of Tea Gardens soil landscape illustrating the occurrence and relationship of the dominant soil materials.*

QUALITIES AND LIMITATIONS

Landscape Limitations

Wind erosion hazard (localised, dry sandy ridges)
Non-cohesive soil (localised)
Foundation hazard
Permanent high watertables
Seasonal waterlogging
Permanent waterlogging (localised, depressions)
Ground water pollution hazard
Possible potential acid sulphate soils (localised)

Soil Limitations

tn1 Organic soils
Extreme acidity
High potential aluminium toxicity
Low fertility

tn2 Low wet bearing strength
High erodibility
High permeability
Extreme acidity
High potential aluminium toxicity
Low fertility

tn3 Low wet bearing strength
High erodibility
High permeability
Very strong acidity
High potential alumunium toxicity
Very low fertility
Low available water-holding capacity

tn4 Low permeability (localised)
Strong acidity
High potential aluminium toxicity
Very low fertility

tn5 Low wet bearing strength
High permeability
Strong acidity
High potential aluminium toxicity
Very low fertility

tn6 Organic soils
Extreme acidity
High potential aluminium toxicity
Low fertility
Low available water-holding capacity

Fertility

Soil Materials as Plant Growth Media. Soil material suitability as growth media is generally low, due to infertile, rapidly permeable soils of low water-holding capacity.

Soil Profile Fertility. Moderate suitability as a growth medium for deep, well-drained Humus Podzols, low suitability as a growth medium for deep, poorly drained peaty Humus Podzols and Acid Peats. Soil volumes for root penetration are high in well-drained sites, but limited by high watertables in poorly drained areas.

Erodibility

	K factor	Non-concentrated flows	Concentrated flows	Wind
tn1	peaty	very low	high	moderate
tn2	0.016	low	very high	high
tn3	0.018	low	very low	high
tn4	pan	very low	moderate	low
tn5	0.013	low	high	moderate
tn6	peaty	low	low	low

Erosion Hazard

	Non-concentrated flows	Concentrated flows	Wind
grazing	slight	slight	high
cultivation	slight	moderate	V high
urban	slight	moderate	V high

Foundation Hazard

Generally low; however, waterlogged swales have a high foundation hazard.

Urban Capability

Generally moderate limitations for urban development.

Rural Capability

Generally high limitations for cultivation and grazing.

Sustainable Land Management Recommendations

To prevent wind erosion, it is important to maintain sufficient ground cover. Fertilisers may be necessary to establish good cover. Protective fences around critical vegetated areas and weed control may also be necessary.

Soil Conservation Earthworks

Not suitable, due to highly pervious soil materials.

Appendix B – Previous ground investigation data

Summary of Results Compared to Adopted Assessment Criteria

				EW_EPA8100_LL	Metals																					Inorganics		BTEX							TRH					TPH						
			Temperature	PURGE VOLUME	Total PAH (18)	Arsenic	Arsenic (Filtered)	Boron	Boron (Filtered)	Cadmium	Cadmium (Filtered)	Chromium (III+VI)	Chromium (III+VI) (Filtered)	Copper	Copper (Filtered)	Lead	Lead (Filtered)	Mercury	Mercury (Filtered)	Nickel	Nickel (Filtered)	Selenium	Selenium (Filtered)	Zinc	Zinc (Filtered)	Redox	Dissolved Oxygen	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	C6-C10	C6-C10 less BTEX (F1)	C10-C16	C16-C34	C34-C40	TRH C37-C40	C6 - C9	C10 - C14	C15 - C28	C29-C36	>C10 - C36 (Sum of total)	C10 - C40 (Sum of total)
			°C	L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mV	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL					0.1	1	1	5	5	0.1	0.1	1	1	1	1	1	1	0.05	0.05	1	1	1	1	5	5			0.5	0.5	0.5	1	0.5	1.5	3	50	50	60	500	500	200	40	50	200	200	450	650
NEPM 2013 B1 Table 1C GILs, Fresh Waters(A)						13	13	370	370	0.2	0.2	1	1	1.4	1.4	3.4	3.4	0.06	0.06	11	11	5	5	8	8			950				350														
NEPM 2013 B1 Table 1C GILs, Marine Waters(A)										0.7	0.7	4.4	4.4	1.3	1.3	4.4	4.4	0.1	0.1	7	7			15	15			500																		
Location_Code	Field_ID	Sampled_Date_Time																																											
T_1_ESMW01	T_1_ESMW01	15/12/2015	-	-	-	<1	<1	-	-	<0.1	<0.1	2	<1	<1	<1	1	<1	<0.05	<0.05	2	<1	-	-	30	28	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_1_ESMW01	T_1_ESMW01_1_6_10 Dec 15	10/12/2015	20.3	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	124.7	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW04	T_5_ESMW04	10/12/2015	-	-	-	12	5	-	-	0.2	0.1	8	<1	17	<1	18	1	<0.05	<0.05	33	31	-	-	130	130	-	-	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	330	<200	<450	<650
T_5_ESMW04	T_5_ESMW04_1_8_10 Dec 15	10/12/2015	19.9	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	85.6	1.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05	15/12/2015	-	-	-	7	4	-	-	1	0.8	8	1	50	42	31	19	0.05	<0.05	88	81	-	-	650	500	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_5_ESMW05	T_5_ESMW05_1_4_09 Dec 15	9/12/2015	19.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	121	1.54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW06	T_5_ESMW06	9/12/2015	-	-	-	13	7	-	-	2.2	2.1	9	<1	27	17	45	33	0.09	<0.05	150	140	-	-	870	780	-	-	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_5_ESMW06	T_5_ESMW06_1_5_09 Dec 15	9/12/2015	18.4	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	282.6	2.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_6_SD01	T_6_SD01_1_16 Nov 15	16/11/2015	25.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	115.1	5.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_6_SW01	T_6_SW01	16/11/2015	-	-	<0.1	2	1	42	36	<0.1	<0.1	2	<1	4	5	5	2	0.07	<0.05	3	3	2	<1	54	43	-	-	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_ESMW07	T_ESMW07	10/12/2015	-	-	-	3	3	-	-	0.1	0.1	2	<1	2	3	13	11	<0.05	<0.05	43	42	-	-	99	99	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_ESMW07	T_ESMW07_1_3_10 Dec 15	10/12/2015	17.7	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	414.2	0.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08	15/12/2015	-	-	-	<1	<1	-	-	<0.1	<0.1	3	<1	1	<1	2	<1	<0.05	<0.05	2	2	-	-	15	11	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_ESMW08	T_ESMW08_1_6_10 Dec 15	10/12/2015	17.4	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	235.9	0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09	15/12/2015	-	-	-	3	3	-	-	0.1	<0.1	1	<1	5	5	7	7	<0.05	<0.05	45	41	-	-	97	56	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_ESMW09	T_ESMW09_1_4_10 Dec 15	10/12/2015	17.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	254.9	1.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10	15/12/2015	-	-	-	8	5	-	-	0.4	0.4	11	6	33	27	32	22	<0.05	<0.05	96	110	-	-	200	270	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	210	<200	<450	<650
T_ESMW10	T_ESMW10_1_5_09 Dec 15	9/12/2015	18.7	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	249	5.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_SW02	T_SW02	16/11/2015	-	-	1.3	3	2	98	73	<0.1	<0.1	4	1	11	2	9	1	0.11	0.07	9	4	<1	<1	99	170	-	-	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_SW02	T_SW02_1_17 Nov 15	17/11/2015	17.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-14	1.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Statistical Summary																																														
Number of Results			10	8	2	10	10	2	2	10	10	10	10	10	10	10	10	10	10	10	10	2	2	10	10	10	10	10	10	10	10	4	4	10	10	10	10	10	10	10	10	10	10	10
Number of Detects			10	8	1	8	8	2	2	6	5	10	3	9	7	10	8	4	1	10	9	1	0	10	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Minimum Concentration			17.4	3	<0.1	<1	<1	42	36	<0.1	<0.1	1	<1	<1	<1	1	<1	<0.05	<0.05	2	<1	<1	<1	15	11	-14	0.36	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
Minimum Detect			17.4	3	1.3	2	1	42	36	0.1	0.1	1	1	1	2	1	1	0.05	0.07	2	2	2	ND	15	11	ND	0.36	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	210	ND	ND	ND
Maximum Concentration			25.1	8	1.3	13	7	98	73	2.2	2.1	11	6	50	42	45	33	0.11	0.07	150	140	2	<1	870	780	414.2	5.97	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	330	<200	<450	<650
Maximum Detect			25.1	8	1.3	13	7	98	73	2.2	2.1	11	6	50	42	45	33	0.11	0.07	150	140	2	ND	870	780	414.2	5.97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	330	ND	ND	ND
Average Concentration			19	5.3		5.2	3.1			0.42	0.38	5	1.2	15	10	16	9.7	0.047	0.03	47	45			224	209	187	2.4	0.25	0.25	0.25	0.5	0.25	0.75	1.5	25	25	30	250	250	100	20	25	134	100	225	325
Median Concentration			18.55	5.5	0.675	3	3	70	54.5	0.1	0.075	3.5	0.5	8	4	11	4.5	0.025	0.025	38	36	1.25	0.5	99	114.5	180.3	1.755	0.25	0.25	0.25	0.5	0.25	0.75	1.5	25	25	30	250	250	100	20	25	100	100	225	325
Standard Deviation			2.3	1.6		4.6	2.2			0.69	0.65	3.6	1.7	17	14	15	11	0.032	0.014	50	49			292	249	123	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77	0	0	0
Number of Guideline Exceedances			0	0	0	1	0	0	0	4	3	10	3	8	7	8	5	3	1	7	6	0	0	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	1	0	0	0	4	3	10	3	8	7	8	5	3	1	7	6	0	0	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Summary of Results Compared to Adopted Assessment Criteria

			MAH									PAH/Phenols																		VOCs															
			1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	1-Methylnaphthalene	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo(a) pyrene	Benzo(b+k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	IPAHs (Sum of total)	Phenanthrene	Pyrene	2-Nitropropane	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.1	0.01	0.01	100	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NEPM 2013 B1 Table 1C GILs, Fresh Waters(A)																										16							6500										
NEPM 2013 B1 Table 1C GILs, Marine Waters(A)																										50							1900										
Location_Code	**Field_ID**	**Sampled_Date_Time**																																										
T_1_ESMW01	T_1_ESMW01	15/12/2015	-	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	0.02	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_1_ESMW01	T_1_ESMW01_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW04	T_5_ESMW04	10/12/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.06	0.05	0.12	<0.01	0.03	0.02	<0.01	<0.02	<0.01	0.02	<0.01	0.07	<0.01	<0.01	<0.5 - 0.14	0.8	0.32	0.06	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_5_ESMW04	T_5_ESMW04_1_8_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05	15/12/2015	-	-	-	-	-	-	-	-	-	<0.01	0.01	0.1	0.02	0.09	0.17	0.14	0.18	0.08	0.19	0.02	0.56	<0.01	0.09	<0.5 - 0.03	2.5	0.3	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05_1_4_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW06	T_5_ESMW06	9/12/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.03	0.03	<0.01	<0.01	<0.01	0.01	<0.02	<0.04	<0.02	0.02	<0.01	0.02	<0.01	<0.01	<0.02	0.1	0.03	0.03	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_5_ESMW06	T_5_ESMW06_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_6_SD01	T_6_SD01_1_16 Nov 15	16/11/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_6_SW01	T_6_SW01	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_ESMW07	T_ESMW07	10/12/2015	-	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW07	T_ESMW07_1_3_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08	15/12/2015	-	-	-	-	-	-	-	-	-	<0.01	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09	15/12/2015	-	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09_1_4_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10	15/12/2015	-	-	-	-	-	-	-	-	-	0.03	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	0.03	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_SW02	T_SW02	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	0.02	0.05	0.14	0.21	0.08	0.06	0.01	0.29	<0.01	0.09	<0.02	1.3	0.08	0.27	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_SW02	T_SW02_1_17 Nov 15	17/11/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Statistical Summary																																											
Number of Results			4	4	4	4	4	4	4	4	4	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Number of Detects			0	0	0	0	0	0	0	0	0	3	5	2	1	3	4	2	2	2	4	2	4	0	2	2	4	6	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	0.01	0.1	0.02	0.02	0.01	0.14	0.18	0.08	0.02	0.01	0.02	ND	0.09	ND	0.1	0.02	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.06	0.11	0.12	0.02	0.09	0.17	0.14	0.21	0.08	0.19	0.02	0.56	<0.01	0.09	0.14	2.5	0.32	0.5	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	0.11	0.12	0.02	0.09	0.17	0.14	0.21	0.08	0.19	0.02	0.56	ND	0.09	0.14	2.5	0.32	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.016	0.027	0.026	0.0065	0.018	0.028	0.033	0.048	0.021	0.032	0.007	0.097	0.005	0.022	0.042	0.5	0.08	0.089	50	0.5	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Median Concentration			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.005	0.0075	0.005	0.005	0.005	0.005	0.005	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.05	0.025	0.005	50	0.5	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Standard Deviation			0	0	0	0	0	0	0	0	0	0.019	0.034	0.045	0.0047	0.027	0.052	0.057	0.078	0.031	0.058	0.0048	0.19	0	0.036	0.068	0.82	0.12	0.17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AGL Macquarie
15107
Tomago Development Site

Summary of Results Compared to Adopted Assessment Criteria

Environmental Strategies
PROVIDING BENEFITS

			Chlorinated Hydrocarbons																						Halogenated Hydrocarbons					Halogenated Benzenes									Field		Solvents						
			1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Hexachlorobutadiene	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride	1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Chlorobenzene	Conductivity (Field)	pH (Field)	Methyl Ethyl Ketone	2-hexanone (MBK)	4-Methyl-2-pentanone	Acetone	Acrylonitrile	Allyl chloride	Carbon disulfide
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	uS/cm	pH_Units	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L
EQL			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	0.5	5	0.5	0.5	0.5	4	0.5	0.5	0.5	0.5	0.5	0.3	0.5	10	5	5	1	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5			10	5	5	0.01	0.5	0.002	2
NEPM 2013 B1 Table 1C GILs, Fresh Waters(A)																													3	85	160	260	60													
NEPM 2013 B1 Table 1C GILs, Marine Waters(A)																														20															
Location_Code	Field_ID	Sampled_Date_Time																																													
T_1_ESMW01	T_1_ESMW01	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_1_ESMW01	T_1_ESMW01_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	293	5.22	-	-	-	-	-	-	-
T_5_ESMW04	T_5_ESMW04	10/12/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	-	-	<10	<5	<5	<0.01	<0.5	<0.002	<2
T_5_ESMW04	T_5_ESMW04_1_8_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7763	4.76	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05_1_4_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8335	4.29	-	-	-	-	-	-	-
T_5_ESMW06	T_5_ESMW06	9/12/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	-	-	<10	<5	<5	<0.01	<0.5	<0.002	<2
T_5_ESMW06	T_5_ESMW06_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,513	4.12	-	-	-	-	-	-	-
T_6_SD01	T_6_SD01_1_16 Nov 15	16/11/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	129.9	7.82	-	-	-	-	-	-	-
T_6_SW01	T_6_SW01	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	-	-	<10	<5	<5	<0.01	<0.5	<0.002	<2
T_ESMW07	T_ESMW07	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW07	T_ESMW07_1_3_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9046	3.87	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1701	4.35	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09_1_4_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7186	4.13	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16,768	3.87	-	-	-	-	-	-	-
T_SW02	T_SW02	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	-	-	<10	<5	<5	<0.01	<0.5	<0.002	<2
T_SW02	T_SW02_1_17 Nov 15	17/11/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	483.8	7.23	-	-	-	-	-	-	-
Statistical Summary																																														
Number of Results			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	10	10	4	4	4	4	4	4	4
Number of Detects			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	0	0	0	0	0	0	0
Minimum Concentration			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	129.9	3.87	<10	<5	<5	<0.01	<0.5	<0.002	<2
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	129.9	3.87	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	16768	7.82	<10	<5	<5	<0.01	<0.5	<0.002	<2
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16768	7.82	ND	ND	ND	ND	ND	ND	ND
Average Concentration			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	2.5	0.25	2.5	0.25	0.25	0.25	2	0.25	0.25	0.25	0.25	0.25	0.15	0.25	5	2.5	2.5	0.5	0.25	0.25	0.25	0.25	0.15	0.25	0.25	0.25	0.25	6422	5	5	2.5	2.5	0.005	0.25	0.001	1
Median Concentration			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	2.5	0.25	2.5	0.25	0.25	0.25	2	0.25	0.25	0.25	0.25	0.25	0.15	0.25	5	2.5	2.5	0.5	0.25	0.25	0.25	0.25	0.15	0.25	0.25	0.25	0.25	7474.5	4.32	5	2.5	2.5	0.005	0.25	0.001	1
Standard Deviation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5694	1.4	0	0	0	0	0	0	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Summary of Results Compared to Adopted Assessment Criteria

			MTBE	Vinyl acetate
			mg/L	µg/L
EQL			0.002	10
NEPM 2013 B1 Table 1C GILs, Fresh Waters(A)				
NEPM 2013 B1 Table 1C GILs, Marine Waters(A)				
Location_Code	**Field_ID**	**Sampled_Date_Time**		
T_1_ESMW01	T_1_ESMW01	15/12/2015	-	-
T_1_ESMW01	T_1_ESMW01_1_6_10 Dec 15	10/12/2015	-	-
T_5_ESMW04	T_5_ESMW04	10/12/2015	<0.002	<10
T_5_ESMW04	T_5_ESMW04_1_8_10 Dec 15	10/12/2015	-	-
T_5_ESMW05	T_5_ESMW05	15/12/2015	-	-
T_5_ESMW05	T_5_ESMW05_1_4_09 Dec 15	9/12/2015	-	-
T_5_ESMW06	T_5_ESMW06	9/12/2015	<0.002	<10
T_5_ESMW06	T_5_ESMW06_1_5_09 Dec 15	9/12/2015	-	-
T_6_SD01	T_6_SD01_1_16 Nov 15	16/11/2015	-	-
T_6_SW01	T_6_SW01	16/11/2015	<0.002	<10
T_ESMW07	T_ESMW07	10/12/2015	-	-
T_ESMW07	T_ESMW07_1_3_10 Dec 15	10/12/2015	-	-
T_ESMW08	T_ESMW08	15/12/2015	-	-
T_ESMW08	T_ESMW08_1_6_10 Dec 15	10/12/2015	-	-
T_ESMW09	T_ESMW09	15/12/2015	-	-
T_ESMW09	T_ESMW09_1_4_10 Dec 15	10/12/2015	-	-
T_ESMW10	T_ESMW10	15/12/2015	-	-
T_ESMW10	T_ESMW10_1_5_09 Dec 15	9/12/2015	-	-
T_SW02	T_SW02	16/11/2015	<0.002	<10
T_SW02	T_SW02_1_17 Nov 15	17/11/2015	-	-
Statistical Summary				
Number of Results			4	4
Number of Detects			0	0
Minimum Concentration			<0.002	<10
Minimum Detect			ND	ND
Maximum Concentration			<0.002	<10
Maximum Detect			ND	ND
Average Concentration			0.001	5
Median Concentration			0.001	5
Standard Deviation			0	0
Number of Guideline Exceedances			0	0
Number of Guideline Exceedances(Detects Only)			0	0

Summary of Results Compared to Adopted Assessment Criteria

					EW_EPA8100_LL	Metals																					Inorganics		BTEX							TRH					TPH						
			Temperature	PURGE VOLUME	Total PAH (18)	Arsenic	Arsenic (Filtered)	Boron	Boron (Filtered)	Cadmium	Cadmium (Filtered)	Chromium (III+VI)	Chromium (III+VI) (Filtered)	Copper	Copper (Filtered)	Lead	Lead (Filtered)	Mercury	Mercury (Filtered)	Nickel	Nickel (Filtered)	Selenium	Selenium (Filtered)	Zinc	Zinc (Filtered)	Redox	Dissolved Oxygen	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	C6-C10	C6-C10 less BTEX (F1)	C10-C16	C16-C34	C34-C40	TRH C37-C40	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	C10 - C40 (Sum of total)
			°C	L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mV	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL					0.1	1	1	5	5	0.1	0.1	1	1	1	1	1	1	0.05	0.05	1	1	1	1	5	5			0.5	0.5	0.5	1	0.5	1.5	3	50	50	60	500	500	200	40	50	200	200	450	650
NEPM 2013 B1 Table 1C (ii)(L), Drinking Water(R)						10	10	4000	4000	2	2	50	50	2000	2000	10	10	1	1	20	20	10	10					1	800	300			600													
Location_Code	**Field_ID**	**Sampled_Date_Time**																																												
T_1_ESMW01	T_1_ESMW01	15/12/2015	-	-	-	<1	<1	-	-	<0.1	<0.1	2	<1	<1	<1	1	<1	<0.05	<0.05	2	<1	-	-	30	28	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_1_ESMW01	T_1_ESMW01_1_6_10 Dec 15	10/12/2015	20.3	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	124.7	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW04	T_5_ESMW04	10/12/2015	-	-	-	12	5	-	-	0.2	0.1	8	<1	17	<1	18	1	<0.05	<0.05	13	11	-	-	130	130	-	-	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	330	<200	<450	<650
T_5_ESMW04	T_5_ESMW04_1_8_10 Dec 15	10/12/2015	19.9	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	85.6	1.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05	15/12/2015	-	-	-	7	4	-	-	1	0.8	8	1	50	42	31	19	0.05	<0.05	88	81	-	-	650	500	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_5_ESMW05	T_5_ESMW05_1_4_09 Dec 15	9/12/2015	19.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	121	1.54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW06	T_5_ESMW06	9/12/2015	-	-	-	13	7	-	-	2.2	2.1	9	<1	27	17	45	33	0.09	<0.05	150	140	-	-	870	780	-	-	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_5_ESMW06	T_5_ESMW06_1_5_09 Dec 15	9/12/2015	18.4	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	282.6	2.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_6_SD01	T_6_SD01_1_16 Nov 15	16/11/2015	25.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	115.1	5.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_6_SW01	T_6_SW01	16/11/2015	-	-	<0.1	2	1	42	36	<0.1	<0.1	2	<1	4	5	5	2	0.07	<0.05	3	3	2	<1	54	43	-	-	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_ESMW07	T_ESMW07	10/12/2015	-	-	-	3	3	-	-	0.1	0.1	2	<1	2	3	13	11	<0.05	<0.05	43	42	-	-	99	99	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_ESMW07	T_ESMW07_1_3_10 Dec 15	10/12/2015	17.7	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	414.2	0.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08	15/12/2015	-	-	-	<1	<1	-	-	<0.1	<0.1	3	<1	1	<1	2	<1	<0.05	<0.05	2	2	-	-	15	11	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_ESMW08	T_ESMW08_1_6_10 Dec 15	10/12/2015	17.4	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	235.9	0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09	15/12/2015	-	-	-	3	3	-	-	0.1	<0.1	1	<1	5	5	7	7	<0.05	<0.05	45	41	-	-	97	56	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_ESMW09	T_ESMW09_1_4_10 Dec 15	10/12/2015	17.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	254.9	1.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10	15/12/2015	-	-	-	8	5	-	-	0.4	0.4	11	6	33	27	32	22	<0.05	<0.05	96	110	-	-	200	270	-	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	<50	<50	<60	<500	<500	<200	<40	<50	210	<200	<450	<650
T_ESMW10	T_ESMW10_1_5_09 Dec 15	9/12/2015	18.7	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	249	5.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_SW02	T_SW02	16/11/2015	-	-	1.3	3	2	98	73	<0.1	<0.1	4	1	11	2	9	1	0.11	0.07	9	4	<1	<1	99	170	-	-	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
T_SW02	T_SW02_1_17 Nov 15	17/11/2015	17.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-14	1.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Statistical Summary																																														
Number of Results			10	8	2	10	10	2	2	10	10	10	10	10	10	10	10	10	10	10	10	2	2	10	10	10	10	10	10	10	10	4	4	10	10	10	10	10	10	10	10	10	10	10
Number of Detects			10	8	1	8	8	2	2	6	5	10	3	9	7	10	8	4	1	10	9	1	0	10	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Minimum Concentration			17.4	3	<0.1	<1	<1	42	36	<0.1	<0.1	1	<1	<1	<1	1	<1	<0.05	<0.05	2	<1	<1	<1	15	11	-14	0.36	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650
Minimum Detect			17.4	3	1.3	2	1	42	36	0.1	0.1	1	1	1	2	1	1	0.05	0.07	2	2	2	ND	15	11	ND	0.36	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	210	ND	ND	ND
Maximum Concentration			25.1	8	1.3	13	7	98	73	2.2	2.1	11	6	50	42	45	33	0.11	0.07	150	140	2	<1	870	780	414.2	5.97	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	330	<200	<450	<650
Maximum Detect			25.1	8	1.3	13	7	98	73	2.2	2.1	11	6	50	42	45	33	0.11	0.07	150	140	2	ND	870	780	414.2	5.97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	330	ND	ND	ND
Average Concentration			19	5.3		5.2	3.1			0.42	0.38	5	1.2	15	10	16	9.7	0.047	0.03	47	45			224	209	187	2.4	0.25	0.25	0.25	0.5	0.25	0.75	1.5	25	25	30	250	250	100	20	25	134	100	225	325
Median Concentration			18.55	5.5	0.675	3	3	70	54.5	0.1	0.075	3.5	0.5	8	4	11	4.5	0.025	0.025	38	36	1.25	0.5	99	114.5	180.3	1.755	0.25	0.25	0.25	0.5	0.25	0.75	1.5	25	25	30	250	250	100	20	25	100	100	225	325
Standard Deviation			2.3	1.6		4.6	2.2			0.69	0.65	3.6	1.7	17	14	15	11	0.032	0.014	50	49			292	249	123	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77	0	0	0
Number of Guideline Exceedances			0	0	0	2	0	2	0	1	1	0	0	0	0	5	4	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	2	0	0	0	1	1	0	0	0	0	5	4	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Summary of Results Compared to Adopted Assessment Criteria

Environmental Strategies
PROVIDING BENEFITS

MAH

Location_Code	Field_ID	Sampled_Date_Time	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NEPM 2013 B1 Table 1C GILs, Drinking Water(B)									30	
T_1_ESMW01	T_1_ESMW01	15/12/2015	-	-	-	-	-	-	-	-	-
T_1_ESMW01	T_1_ESMW01_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-
T_5_ESMW04	T_5_ESMW04	10/12/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_5_ESMW04	T_5_ESMW04_1_8_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05	15/12/2015	-	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05_1_4_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-
T_5_ESMW06	T_5_ESMW06	9/12/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_5_ESMW06	T_5_ESMW06_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-
T_6_SD01	T_6_SD01_1_16 Nov 15	16/11/2015	-	-	-	-	-	-	-	-	-
T_6_SW01	T_6_SW01	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_ESMW07	T_ESMW07	10/12/2015	-	-	-	-	-	-	-	-	-
T_ESMW07	T_ESMW07_1_3_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08	15/12/2015	-	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09	15/12/2015	-	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09_1_4_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10	15/12/2015	-	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-
T_SW02	T_SW02	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_SW02	T_SW02_1_17 Nov 15	17/11/2015	-	-	-	-	-	-	-	-	-
Statistical Summary											
Number of Results			4	4	4	4	4	4	4	4	4
Number of Detects			0	0	0	0	0	0	0	0	0
Minimum Concentration			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Median Concentration			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Standard Deviation			0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0

PAH/Phenols

Location_Code	Field_ID	Sampled_Date_Time	1-Methylnaphthalene	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(b+k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Pyrene
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.1	0.01	0.01
NEPM 2013 B1 Table 1C GILs, Drinking Water(B)									0.01											
T_1_ESMW01	T_1_ESMW01	15/12/2015	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	**0.02**	<0.01
T_1_ESMW01	T_1_ESMW01_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW04	T_5_ESMW04	10/12/2015	**0.06**	**0.05**	**0.12**	<0.01	**0.03**	**0.02**	<0.01	<0.02	<0.01	**0.02**	<0.01	**0.07**	<0.01	<0.01	<0.5 - 0.14	**0.8**	**0.32**	**0.06**
T_5_ESMW04	T_5_ESMW04_1_8_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05	15/12/2015	<0.01	**0.01**	**0.1**	**0.02**	**0.09**	**0.17**	**0.14**	**0.18**	**0.08**	**0.19**	**0.02**	**0.56**	<0.01	**0.09**	<0.5 - 0.03	**2.5**	**0.3**	**0.5**
T_5_ESMW05	T_5_ESMW05_1_4_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW06	T_5_ESMW06	9/12/2015	**0.03**	**0.03**	<0.01	<0.01	<0.01	**0.01**	<0.02	<0.04	<0.02	**0.02**	<0.01	**0.02**	<0.01	<0.01	<0.02	**0.1**	**0.03**	**0.03**
T_5_ESMW06	T_5_ESMW06_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_6_SD01	T_6_SD01_1_16 Nov 15	16/11/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_6_SW01	T_6_SW01	16/11/2015	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01
T_ESMW07	T_ESMW07	10/12/2015	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01
T_ESMW07	T_ESMW07_1_3_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08	15/12/2015	<0.01	**0.11**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01
T_ESMW08	T_ESMW08_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09	15/12/2015	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01
T_ESMW09	T_ESMW09_1_4_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10	15/12/2015	**0.03**	**0.04**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	**0.03**	<0.01
T_ESMW10	T_ESMW10_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_SW02	T_SW02	16/11/2015	<0.01	<0.01	<0.01	<0.01	**0.02**	**0.05**	**0.14**	**0.21**	**0.08**	**0.06**	**0.01**	**0.29**	<0.01	**0.09**	<0.02	**1.3**	**0.08**	**0.27**
T_SW02	T_SW02_1_17 Nov 15	17/11/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Statistical Summary																				
Number of Results			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Number of Detects			3	5	2	1	3	4	2	2	2	4	2	4	0	2	2	4	6	4
Minimum Concentration			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01
Minimum Detect			0.03	0.01	0.1	0.02	0.02	0.01	0.14	0.18	0.08	0.02	0.01	0.02	ND	0.09	ND	0.1	0.02	0.03
Maximum Concentration			0.06	0.11	0.12	0.02	0.09	0.17	0.14	0.21	0.08	0.19	0.02	0.56	<0.01	0.09	0.14	2.5	0.32	0.5
Maximum Detect			0.06	0.11	0.12	0.02	0.09	0.17	0.14	0.21	0.08	0.19	0.02	0.56	ND	0.09	0.14	2.5	0.32	0.5
Average Concentration			0.016	0.027	0.026	0.0065	0.018	0.028	0.033	0.048	0.021	0.032	0.007	0.097	0.005	0.022	0.042	0.5	0.08	0.089
Median Concentration			0.005	0.0075	0.005	0.005	0.005	0.005	0.005	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.05	0.025	0.005
Standard Deviation			0.019	0.034	0.045	0.0047	0.027	0.052	0.057	0.078	0.031	0.058	0.0048	0.19	0	0.036	0.068	0.82	0.12	0.17
Number of Guideline Exceedances			0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0

VOCs

Location_Code	Field_ID	Sampled_Date_Time	2-Nitropropane	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			100	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NEPM 2013 B1 Table 1C GILs, Drinking Water(B)											30				3	
T_1_ESMW01	T_1_ESMW01	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_1_ESMW01	T_1_ESMW01_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW04	T_5_ESMW04	10/12/2015	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_5_ESMW04	T_5_ESMW04_1_8_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05_1_4_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW06	T_5_ESMW06	9/12/2015	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_5_ESMW06	T_5_ESMW06_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_6_SD01	T_6_SD01_1_16 Nov 15	16/11/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_6_SW01	T_6_SW01	16/11/2015	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_ESMW07	T_ESMW07	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW07	T_ESMW07_1_3_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09_1_4_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_SW02	T_SW02	16/11/2015	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
T_SW02	T_SW02_1_17 Nov 15	17/11/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Statistical Summary																
Number of Results			4	4	4	4	4	4	4	4	4	4	4	4	4	4
Number of Detects			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration			<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration			50	0.5	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Median Concentration			50	0.5	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Standard Deviation			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0

Summary of Results Compared to Adopted Assessment Criteria

Environmental Strategies
PROVIDING BENEFITS

	Chlorinated Hydrocarbons																				Halogenated Hydrocarbons					Halogenated Benzenes									Field		Solvents								
	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Hexachlorobutadiene	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride	1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Chlorobenzene	Conductivity (Field)	pH (Field)	Methyl Ethyl Ketone	2-hexanone (MBK)	4-Methyl-2-pentanone	Acetone	Acrylonitrile	Allyl chloride	Carbon disulfide	MTBE	Vinyl acetate
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	uS/cm	pH_Units	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L
EQL	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	0.5	5	0.5	0.5	0.5	4	0.5	0.5	0.5	0.5	0.5	0.3	0.5	10	5	5	1	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5			10	5	5	0.01	0.5	0.002	2	0.002	10
NEPM 2013 B1 Table 1C GIL, Drinking Water(B)						1								4	0.7		50			0.3		1				10	30	1500		40				300										
T_1_ESMW01	T_1_ESMW01	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_1_ESMW01	T_1_ESMW01_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	293	5.22	-	-	-	-	-	-	-	-
T_5_ESMW04	T_5_ESMW04	10/12/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	-	-	<10	<5	<5	<0.01	<0.5	<0.002	<2	<0.002	<10
T_5_ESMW04	T_5_ESMW04_1_8_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7763	4.76	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_5_ESMW05	T_5_ESMW05_1_4_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8335	4.29	-	-	-	-	-	-	-	-
T_5_ESMW06	T_5_ESMW06	9/12/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	-	-	<10	<5	<5	<0.01	<0.5	<0.002	<2	<0.002	<10
T_5_ESMW06	T_5_ESMW06_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,513	4.12	-	-	-	-	-	-	-	-
T_6_SD01	T_6_SD01_1_16 Nov 15	16/11/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	129.9	7.82	-	-	-	-	-	-	-	-
T_6_SW01	T_6_SW01	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	-	-	<10	<5	<5	<0.01	<0.5	<0.002	<2	<0.002	<10
T_ESMW07	T_ESMW07	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW07	T_ESMW07_1_3_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9046	3.87	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW08	T_ESMW08_1_6_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1701	4.35	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW09	T_ESMW09_1_4_10 Dec 15	10/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7186	4.13	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10	15/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_ESMW10	T_ESMW10_1_5_09 Dec 15	9/12/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16,768	3.87	-	-	-	-	-	-	-	-
T_SW02	T_SW02	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	-	-	<10	<5	<5	<0.01	<0.5	<0.002	<2	<0.002	<10
T_SW02	T_SW02_1_17 Nov 15	17/11/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	483.8	7.23	-	-	-	-	-	-	-	-
Statistical Summary																																												
Number of Results			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	10	10	4	4	4	4	4	4	4	4
Number of Detects			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	0	0	0	0	0	0	0	0
Minimum Concentration			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	129.9	3.87	<10	<5	<5	<0.01	<0.5	<0.002	<2	<0.002	<10
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	129.9	3.87	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	16768	7.82	<10	<5	<5	<0.01	<0.5	<0.002	<2	<0.002	<10
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16768	7.82	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration			0.25	0.25	0.25	0.25	0.25	0.25	0.25	2.5	0.25	2.5	0.25	0.25	0.25	2	0.25	0.25	0.25	0.25	0.25	0.15	0.25	5	2.5	2.5	0.5	0.25	0.25	0.25	0.25	0.15	0.25	0.25	0.25	0.25	6422	5	5	2.5	2.5	0.005	0.25	0.001	1	0.001	5
Median Concentration			0.25	0.25	0.25	0.25	0.25	0.25	0.25	2.5	0.25	2.5	0.25	0.25	0.25	2	0.25	0.25	0.25	0.25	0.25	0.15	0.25	5	2.5	2.5	0.5	0.25	0.25	0.25	0.25	0.15	0.25	0.25	0.25	0.25	7474.5	4.32	5	2.5	2.5	0.005	0.25	0.001	1	0.001	5
Standard Deviation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5694	1.4	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances			0	0	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

EQL		
NEPM 2013 B1 Table 1C GILs: Drinking Water(8)		
Location_Code	**Field_ID**	**Sampled_Date_Time**
T_1_ESMW01	T_1_ESMW01	15/12/2015
T_1_ESMW01	T_1_ESMW01_1_6_10 Dec 15	10/12/2015
T_5_ESMW04	T_5_ESMW04	10/12/2015
T_5_ESMW04	T_5_ESMW04_1_8_10 Dec 15	10/12/2015
T_5_ESMW05	T_5_ESMW05	15/12/2015
T_5_ESMW05	T_5_ESMW05_1_4_09 Dec 15	9/12/2015
T_5_ESMW06	T_5_ESMW06	9/12/2015
T_5_ESMW06	T_5_ESMW06_1_5_09 Dec 15	9/12/2015
T_6_SD01	T_6_SD01_1_16 Nov 15	16/11/2015
T_6_SW01	T_6_SW01	16/11/2015
T_ESMW07	T_ESMW07	10/12/2015
T_ESMW07	T_ESMW07_1_3_10 Dec 15	10/12/2015
T_ESMW08	T_ESMW08	15/12/2015
T_ESMW08	T_ESMW08_1_6_10 Dec 15	10/12/2015
T_ESMW09	T_ESMW09	15/12/2015
T_ESMW09	T_ESMW09_1_4_10 Dec 15	10/12/2015
T_ESMW10	T_ESMW10	15/12/2015
T_ESMW10	T_ESMW10_1_5_09 Dec 15	9/12/2015
T_SW02	T_SW02	16/11/2015
T_SW02	T_SW02_1_17 Nov 15	17/11/2015

Statistical Summary
Number of Results
Number of Detects
Minimum Concentration
Minimum Detect
Maximum Concentration
Maximum Detect
Average Concentration
Median Concentration
Standard Deviation
Number of Guideline Exceedances
Number of Guideline Exceedances(Detects Only)

		EW_EPA8100_LL	Metals																				BTEX							TRH					TPH							
		Total PAH (18)	Arsenic	Arsenic (Filtered)	Boron	Boron (Filtered)	Cadmium	Cadmium (Filtered)	Chromium (III+VI)	Chromium (III+VI) (Filtered)	Copper	Copper (Filtered)	Lead	Lead (Filtered)	Mercury	Mercury (Filtered)	Nickel	Nickel (Filtered)	Selenium	Selenium (Filtered)	Zinc	Zinc (Filtered)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	C6-C10	C6-C10 less BTEX (F1)	C10-C16	C16-C34	C34-C40	TRH C37-C40	C6 - C9	C10 - C14	C15 - C28	C29-C36	>C10 - C36 (Sum of total)	C10 - C40 (Sum of total)	1,2,4-trimethylbenzene
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		0.1	1	1	5	5	0.1	0.1	1	1	1	1	1	1	0.05	0.05	1	1	1	1	5	5	0.5	0.5	0.5	1	0.5	1.5	3	50	50	60	500	500	200	40	50	200	200	450	650	0.5
ANZECC 2000 FW 95%			13	13	370	370	0.2	0.2	1	1	1.4	1.4	3.4	3.4	0.6	0.6	11	11	11	11	8	8	950				350															
Recreational water quality and aesthetics			50	50	1000	1000	5	5	50	50	1000	1000	50	50	1	1	100	100	10	10	5000	5000	10																			
Site_ID	**SDG**	**Sample_Type**	**Field_ID**	**Sampled_Date_Time**																																							
15092_Tomago	SE146247-1	Normal	T_6_SW01	16/11/2015	<0.1	2	1	42	36	<0.1	<0.1	2	<1	4	5	5	2	0.07	<0.05	3	3	2	<1	54	43	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650	<0.5
15092_Tomago	SE146247-1	Normal	T_SW02	16/11/2015	1.3	3	2	98	73	<0.1	<0.1	4	1	11	2	9	1	0.11	0.07	9	4	<1	<1	99	170	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650	<0.5
Statistical Summary																																										
Number of Results		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Number of Detects		1	2	2	2	2	0	0	2	1	2	2	2	2	1	2	2	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration		<0.1	2	1	42	36	<0.1	<0.1	2	<1	4	2	5	1	0.07	<0.05	3	3	<1	<1	54	43	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650	<0.5
Minimum Detect		1.3	2	1	42	36	ND	ND	2	1	4	2	5	1	0.07	0.07	3	3	2	ND	54	43	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration		1.3	3	2	98	73	<0.1	<0.1	4	1	11	5	9	2	0.11	0.07	9	4	2	<1	99	170	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3	<50	<50	<60	<500	<500	<200	<40	<50	<200	<200	<450	<650	<0.5
Maximum Detect		1.3	3	2	98	73	ND	ND	4	1	11	5	9	2	0.11	0.07	9	4	2	ND	99	170	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration																																										
Median Concentration		0.675	2.5	1.5	70	54.5	0.05	0.05	3	0.75	7.5	3.5	7	1.5	0.09	0.0475	6	3.5	1.25	0.5	76.5	106.5	0.25	0.25	0.25	0.5	0.25	0.75	1.5	25	25	30	250	250	100	20	25	100	100	225	325	0.25
Standard Deviation																																										
Number of Guideline Exceedances		0	0	0	0	0	0	0	2	1	2	2	2	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)		0	0	0	0	0	0	0	2	1	2	2	2	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

					MAH								PAH/Phenols																	VOCs																
					1,3,5-trimethylbenzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	1-Methylnaphthalene	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo(a) pyrene	Benzo(b+k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Pyrene	2-Nitropropane	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,3-trichloropropane
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.1	0.01	0.01	100	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
ANZECC 2000 FW 95%																											16										6500					
Recreational water quality and aesthetics																			0.01																				0.3			
Site_ID	SDG	Sample_Type	Field_ID	Sampled_Date_Time																																								
15092_Tomago	SE146247-1	Normal	T_6_SW01	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15092_Tomago	SE146247-1	Normal	T_SW02	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	0.02	0.05	0.14	0.21	0.08	0.06	0.01	0.29	<0.01	0.09	<0.02	1.3	0.08	0.27	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Statistical Summary																																												
Number of Results					2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Number of Detects					0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.1	<0.01	<0.01	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Minimum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.05	0.14	0.21	0.08	0.06	0.01	0.29	ND	0.09	ND	1.3	0.08	0.27	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	0.02	0.05	0.14	0.21	0.08	0.06	0.01	0.29	<0.01	0.09	<0.02	1.3	0.08	0.27	<100	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Maximum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.05	0.14	0.21	0.08	0.06	0.01	0.29	ND	0.09	ND	1.3	0.08	0.27	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration																																												
Median Concentration					0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.005	0.005	0.005	0.005	0.0125	0.0275	0.0725	0.11	0.0425	0.0325	0.0075	0.1475	0.005	0.0475	0.01	0.675	0.0425	0.1375	50	0.5	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Standard Deviation																																												
Number of Guideline Exceedances					0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

					Chlorinated Hydrocarbons																								Halogenated Hydrocarbons					Halogenated Benzenes										Solve				
					1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Hexachlorobutadiene	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride	1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Chlorobenzene	Methyl Ethyl Ketone	2-hexanone (MBK)	4-Methyl-2-pentanone	Acetone	Acrylonitrile
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
EQL					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	0.5	5	0.5	0.5	0.5	4	0.5	0.5	0.5	0.5	0.5	0.3	0.5	10	5	5	1	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	10	5	5	0.01	0.5
ANZECC 2000 FW 95%																																10	170	160	260	60									
Recreational water quality and aesthetics						10							3										30	10																					
Site_ID	SDG	Sample_Type	Field_ID	Sampled_Date_Time																																										
15092_Tomago	SE146247-1	Normal	T_6_SW01	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<10	<5	<5	<0.01	<0.5
15092_Tomago	SE146247-1	Normal	T_SW02	16/11/2015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<10	<5	<5	<0.01	<0.5
Statistical Summary																																													
Number of Results					2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Number of Detects					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<10	<5	<5	<0.01	<0.5
Minimum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<10	<5	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<10	<5	<5	<0.01	<0.5
Maximum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration																																														
Median Concentration					0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	2.5	0.25	2.5	0.25	0.25	0.25	2	0.25	0.25	0.25	0.25	0.25	0.25	0.15	0.25	5	2.5	2.5	0.5	0.25	0.25	0.25	0.25	0.15	0.25	0.25	0.25	0.25	5	2.5	2.5	0.005	0.25
Standard Deviation																																													
Number of Guideline Exceedances					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

					nts			
					Allyl chloride	Carbon disulfide	MTBE	Vinyl acetate
					mg/L	µg/L	mg/L	µg/L
EQL					0.002	2	0.002	10
ANZECC 2000 FW 95%								
Recreational water quality and aesthetics								
Site_ID	**SDG**	**Sample_Type**	**Field_ID**	**Sampled_Date_Time**				
15092_Tomago	SE146247-1	Normal	T_6_SW01	16/11/2015	<0.002	<2	<0.002	<10
15092_Tomago	SE146247-1	Normal	T_SW02	16/11/2015	<0.002	<2	<0.002	<10
Statistical Summary								
Number of Results					2	2	2	2
Number of Detects					0	0	0	0
Minimum Concentration					<0.002	<2	<0.002	<10
Minimum Detect					ND	ND	ND	ND
Maximum Concentration					<0.002	<2	<0.002	<10
Maximum Detect					ND	ND	ND	ND
Average Concentration								
Median Concentration					0.001	1	0.001	5
Standard Deviation								
Number of Guideline Exceedances					0	0	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	0
Env Stds Comments								

Summary of Results Compared to Adopted Assessment Criteria

			Metals								Inorganics	BTEX							TRH						TPH						
			Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	% Moisture	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	C6-C10	C6-C10 less BTEX (F1)	C10-C16	2-NAPHTHALENE	C16-C34	C34-C40	TRH C37-C40	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	C10 - C40 (Sum of total)
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			3	0.3	0.3	0.5	1	0.01	0.5	0.5	5000	0.1	0.1	0.1	0.2	0.1	0.3	0.6	25	25	25	25	90	120	100	20	20	45	45	110	210
NSW EPA 2014 General Solid Waste (No Leaching)			100	20			100	4	40			10	288	600			1000									650			10,000	
NSW EPA 2014 Restricted Solid Waste (No Leaching)			400	80			400	16	160			40	1152	2400			4000									2600			40,000	
Location_Code	**Field_ID**	**Sampled_Date_Time**																													
T_4_SP01A	T_4_SP01A	10/11/2015	**3**	<0.3	**6.1**	**4.2**	**23**	**0.01**	**1.8**	**44**	**160,000**	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45	<110	<210
T_4_SP01B	T_4_SP01B	10/11/2015	<3	<0.3	**5.5**	**6.7**	**16**	<0.01	**4.3**	**59**	**230,000**	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45	<110	<210
T_6_SP02A	T_6_SP02A	10/11/2015	**4**	<0.3	**7.4**	**0.6**	**10**	<0.01	**0.6**	**9.9**	**140,000**	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45	<110	<210
T_6_SP02B	T_6_SP02B	10/11/2015	**3**	<0.3	**3.8**	**1.6**	**10**	**0.01**	**0.6**	**6.7**	**120,000**	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45	<110	<210
T_7_SP03A	T_7_SP03A	10/11/2015	**3**	**0.4**	**9**	**18**	**38**	**0.03**	**5.4**	**290**	**220,000**	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45	<110	<210
T_7_SP03B	T_7_SP03B	10/11/2015	**12**	**1**	**610**	**240**	**59**	**0.08**	**71**	**140**	**200,000**	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	**60**	**60**	**310**	<120	<100	<20	**43**	**250**	**89**	**380**	**380**
T_7_SP03C	T_7_SP03C	10/11/2015	**11**	**0.6**	**9.4**	**110**	**140**	**0.02**	**3.9**	**49**	**110,000**	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45	<110	<210
Statistical Summary																															
Number of Results			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects			6	3	7	7	7	5	7	7	7	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	1	1
Minimum Concentration			<3	<0.3	3.8	0.6	10	<0.01	0.6	6.7	110000	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45	<110	<210
Minimum Detect			3	0.4	3.8	0.6	10	0.01	0.6	6.7	110000	ND	ND	ND	ND	ND	ND	ND	ND	ND	60	60	310	ND	ND	ND	43	250	89	380	380
Maximum Concentration			12	1	610	240	140	0.08	71	290	230000	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	60	60	310	<120	<100	<20	43	250	89	380	380
Maximum Detect			12	1	610	240	140	0.08	71	290	230000	ND	ND	ND	ND	ND	ND	ND	ND	ND	60	60	310	ND	ND	ND	43	250	89	380	380
Average Concentration			5.4	0.37	93	54	42	0.023	13	86	168571	0.05	0.05	0.05	0.1	0.05	0.15	0.3	13	13	19	19	83	60	50	10	15	55	32	101	144
Median Concentration			3	0.15	7.4	6.7	23	0.01	3.9	49	160000	0.05	0.05	0.05	0.1	0.05	0.15	0.3	12.5	12.5	12.5	12.5	45	60	50	10	10	22.5	22.5	55	105
Standard Deviation			4.3	0.33	228	91	47	0.027	26	100	48452	0	0	0	0	0	0	0	0	0	18	18	100	0	0	0	12	86	25	123	104
Number of Guideline Exceedances			0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Comments

#1 Estimated Fibres <0.01

Summary of Results Compared to Adopted Assessment Criteria

			MAH									PAH	PAH/Phenols																				VOCs		
			1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	Benzo(b+j)fluoranthene	1-Methylnaphthalene	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo[a] pyrene	Benzo[e,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz[a,h]anthracene	Carcinogenic PAHs (as B[a]P TPE)	Carcinogenic PAHs (as B[a]P TPE, PEFx3)	Fluoranthene	Fluorene	Indeno[1,2,3-c,d]pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Pyrene	2-Nitropropane	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			0.1	0.1	0.1	0.1	0.8	0.1	0.1	10	1	1
NSW EPA 2014 General Solid Waste (No Leaching)										60									0.8																
NSW EPA 2014 Restricted Solid Waste (No Leaching)										120									2.5																
Location_Code	**Field_ID**	**Sampled_Date_Time**																																	
T_4_SP01A	T_4_SP01A	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	<10	<1	<1
T_4_SP01B	T_4_SP01B	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	<10	<1	<1
T_6_SP02A	T_6_SP02A	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	<10	<1	<1
T_6_SP02B	T_6_SP02B	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	<10	<1	<1
T_7_SP03A	T_7_SP03A	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	**0.2**	<0.1	**0.1**	**0.2**	<0.1	**0.3**	**0.3**	**0.3**	<0.1	<0.1	<0.1	**1.8**	<0.1	**0.3**	<10	<1	<1
T_7_SP03B	T_7_SP03B	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.8**	**0.2**	**0.2**	<0.1	<0.1	<0.1	**0.8**	**0.5**	**0.2**	**0.2**	**0.5**	<0.1	**0.7**	**0.8**	**1**	<0.1	<0.1	<0.1 - 0.1	**6.6**	**1.1**	**0.9**	<10	<1	<1
T_7_SP03C	T_7_SP03C	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.4**	<0.1	<0.1	<0.1	<0.1	<0.1	**0.3**	**0.2**	<0.1	**0.1**	**0.2**	<0.1	**0.3**	**0.4**	**0.3**	<0.1	<0.1	<0.1	**2.3**	**0.2**	**0.3**	<10	<1	<1
Statistical Summary																																			
Number of Results			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects			0	0	0	0	0	0	0	0	0	3	1	1	0	0	0	3	3	1	3	3	0	3	3	3	0	0	1	3	2	3	0	0	0
Minimum Concentration			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	<10	<1	<1
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2	0.2	0.2	ND	ND	ND	0.2	0.2	0.2	0.1	0.2	ND	0.3	0.3	0.3	ND	ND	ND	1.8	0.2	0.3	ND	ND	ND
Maximum Concentration			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	0.2	0.2	<0.1	<0.1	<0.1	0.8	0.5	0.2	0.2	0.5	<0.1	0.7	0.8	1	<0.1	<0.1	0.1	6.6	1.1	0.9	<10	<1	<1
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	0.8	0.2	0.2	ND	ND	ND	0.8	0.5	0.2	0.2	0.5	ND	0.7	0.8	1	ND	ND	0.1	6.6	1.1	0.9	ND	ND	ND
Average Concentration			0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.23	0.071	0.071	0.05	0.05	0.05	0.21	0.16	0.071	0.086	0.16	0.05	0.24	0.3	0.26	0.05	0.05	0.054	1.8	0.22	0.24	5	0.5	0.5
Median Concentration			0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.15	0.05	0.05	0.05	0.05	0.4	0.05	0.05	5	0.5	0.5
Standard Deviation			0	0	0	0	0	0	0	0	0	0.28	0.057	0.057	0	0	0	0.28	0.17	0.057	0.056	0.17	0	0.22	0.24	0.35	0	0	0.0094	2.3	0.39	0.31	0	0	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Comments

#1 Estimated Fibres <0.01

Summary of Results Compared to Adopted Assessment Criteria

			Chlorinated Hydrocarbons																																
			1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Hexachlorobutadiene	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	1	0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NSW EPA 2014 General Solid Waste (No Leaching)			200	600	26	24		14				10							10			120						172		10	14				4
NSW EPA 2014 Restricted Solid Waste (No Leaching)			800	24000	104	96		56				40							40			480						688		40	56				16
Location_Code	**Field_ID**	**Sampled_Date_Time**																																	
T_4_SP01A	T_4_SP01A	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
T_4_SP01B	T_4_SP01B	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
T_6_SP02A	T_6_SP02A	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
T_6_SP02B	T_6_SP02B	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
T_7_SP03A	T_7_SP03A	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
T_7_SP03B	T_7_SP03B	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
T_7_SP03C	T_7_SP03C	10/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Statistical Summary																																			
Number of Results			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration			0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.05	0.5	0.05	0.05	0.05	0.25	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Median Concentration			0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.05	0.5	0.05	0.05	0.05	0.25	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Standard Deviation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Comments

#1 Estimated Fibres <0.01

AGL Macquarie
15107
Tomago Development Site

Summary of Results Compared to Adopted Assessment Criteria

			PCBs										Halogenated Hydrocarbons					Halogenated Benzenes									Other	Solvents									
			Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	Arochlor 1268	Aroclor 1262	PCBs (Sum of total)	1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Chlorobenzene	Estimated Fibres	Methyl Ethyl Ketone	2-hexanone (MBK)	4-Methyl-2-pentanone	Acetone	Acrylonitrile	Allyl chloride	Carbon disulfide	MTBE	Vinyl acetate
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1	0.1	1	1	5	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100	10	5	1	10	0.1	0.1	0.5	0.1	10
NSW EPA 2014 General Solid Waste (No Leaching)																				86		150				2000		4000									
NSW EPA 2014 Restricted Solid Waste (No Leaching)																				344		600				8000		16000									
Location_Code	Field_ID	Sampled_Date_Time																																			
T_4_SP01A	T_4_SP01A	10/11/2015	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0[#1]	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
T_4_SP01B	T_4_SP01B	10/11/2015	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0[#1]	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
T_6_SP02A	T_6_SP02A	10/11/2015	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0[#1]	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
T_6_SP02B	T_6_SP02B	10/11/2015	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0[#1]	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
T_7_SP03A	T_7_SP03A	10/11/2015	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0[#1]	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
T_7_SP03B	T_7_SP03B	10/11/2015	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0[#1]	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
T_7_SP03C	T_7_SP03C	10/11/2015	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0[#1]	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
Statistical Summary																																					
Number of Results			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0
Minimum Concentration			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.05	0.5	0.5	2.5	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	5	2.5	0.5	5	0.05	0.05	0.25	0.05	5
Median Concentration			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.05	0.5	0.5	2.5	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	5	2.5	0.5	5	0.05	0.05	0.25	0.05	5
Standard Deviation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Comments

#1 Estimated Fibres <0.01

11/02/2016

AGL Macquarie
15107
Tomago Development Site

Summary of Results Compared to Adopted Assessment Criteria

	Asbestos	Metals										Inorganics		BTEX							TRH						TPH				
	Asbestos fibres	Arsenic	Boron	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Selenium	Zinc	% Moisture	Fluoride	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	C6-C10	C6-C10 less BTEX (F1)	C10-C16	F2-NAPHTHALENE	C16-C34	C34-C40	TRH C37-C40	C6 - C9	C10 - C14	C15 - C28	C29-C36
	-	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0	3	5	0.3	0.3	0.5	1	0.01	0.5	3	0.5	5000	0.5	0.1	0.1	0.1	0.2	0.1	0.3	0.6	25	25	25	25	90	120	100	20	20	45	45
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil		300	20000	90	300	17000	600	80	1200	700	30000																				
NEPM 2013 B1 Table 1A(1) HIL Res A Soil		100	4500	20	100	6000	300	40	400	200	7400																				
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand																															
0-1m														#1	#1	#1			#1			#1		#1							
1-2m														#1	#1	#1			#1			#1		#1							
2-4m														#1	#1	#1			#1			#1		#1							
>4m														#1	#1	#1			#1			#1		#1							
NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand																															
0-1m														0.5	160	55			40			45		110							
1-2m														0.5	220	#1			60			70		240							
2-4m														0.5	310	#1			95			110		440							
>4m														0.5	540	#1			170			200		#1							
NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse																					700		1000		2500	10000					
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																															
0-2m														50	85	70			105			180[#4]		170[#5]	300	2800					

Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg																												
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_0.1	10/11/2015	0.1	0[#2]	5	-	0.3	30	0.7	17	0.01	1	-	4.7	180,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_1.0	10/11/2015	1	-	7	-	<0.3	13	<0.5	9	<0.01	<0.5	-	2.5	210,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.1	10/11/2015	0.1	-	4	-	<0.3	10	6.3	27	0.02	1.6	-	64	210,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.5	10/11/2015	0.5	-	7	-	0.4	36	0.9	14	<0.01	1.4	-	9.2	300,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_0.1	10/11/2015	0.1	-	<3	-	0.4	7.3	13	29	0.01	3.5	-	100	220,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_1.0	10/11/2015	1	-	7	-	<0.3	18	<0.5	9	<0.01	<0.5	-	3.4	220,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_4_SP01A	T_4_SP01A	10/11/2015		0[#2]	3	-	<0.3	6.1	4.2	23	0.01	1.8	-	44	160,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_4_SP01B	T_4_SP01B	10/11/2015		0[#2]	<3	-	<0.3	5.5	6.7	16	<0.01	4.3	-	59	230,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_0.1	10/11/2015	0.1	0[#2]	6	-	<0.3	9.7	7.9	9	<0.01	1	-	10	180,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_2.0	10/11/2015	2	-	<3	-	<0.3	5.9	<0.5	4	<0.01	<0.5	-	2.4	190,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_0.1	10/11/2015	0.1	0[#2]	3	-	<0.3	6.5	12	9	0.02	10	-	41	160,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_2.0	10/11/2015	2	-	4	-	<0.3	12	4.5	7	<0.01	3.8	-	18	170,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_0.1	10/11/2015	0.1	0[#2]	4	-	<0.3	8	1.8	14	<0.01	0.8	-	9.6	170,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_1.4	10/11/2015	1.4	-	4	-	<0.3	8.2	0.7	9	<0.01	0.7	-	4	110,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_0.1	10/11/2015	0.1	0[#2]	3	-	<0.3	7.9	12	19	<0.01	5.9	-	56	110,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	720	<120	<100	<20	<20	460	320
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_1.0	10/11/2015	1	-	<3	-	<0.3	4.1	4.2	11	<0.01	3.1	-	21	160,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_0.1	10/11/2015	0.1	0[#2]	4	-	<0.3	11	9.2	16	<0.01	5.6	-	46	130,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<250	<250	7400	<1200	<1000	<20	<200	5100	2900
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_1.0	10/11/2015	1	-	<3	-	<0.3	7.2	<0.5	10	<0.01	0.8	-	3.6	310,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_6_SP02A	T_6_SP02A	10/11/2015		0[#2]	4	-	<0.3	7.4	0.6	10	<0.01	0.6	-	9.9	140,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_6_SP02B	T_6_SP02B	10/11/2015		0[#2]	3	-	<0.3	3.8	1.6	10	0.01	0.6	-	6.7	120,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_7_SP03A	T_7_SP03A	10/11/2015		0[#2]	3	-	0.4	9	18	38	0.03	5.4	-	290	220,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_7_SP03B	T_7_SP03B	10/11/2015		0[#2]	12	-	1	610	240	59	0.08	71	-	140	200,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	60	60	310	<120	<100	<20	43	250	89
15092_Tomago	SE145989-1	T_7_SP03C	T_7_SP03C	10/11/2015		0[#2]	11	-	0.6	9.4	110	140	0.02	3.9	-	49	110,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_0.1	10/11/2015	0.1	-	4	-	0.3	24	4.7	25	0.02	3.9	-	39	200,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_3.0	10/11/2015	3	-	<3	-	<0.3	24	0.5	8	0.02	0.9	-	3.2	180,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_0.1	17/11/2015	0.1	0[#2]	4	<5	0.6	24	11	38	0.02	6.6	<3	120	160,000	48	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	370	130	<100	<20	<20	190	280
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_2	17/11/2015	2	-	7	<5	<0.3	9.1	0.6	7	<0.01	<0.5	<3	2.4	190,000	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_2_SG01	T_2_SG01	17/11/2015		0[#2]	-	-	-	-	-	27	-	-	-	-	270,000	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG02	T_2_SG02	17/11/2015		0[#2]	-	-	-	-	-	40	-	-	-	-	270,000	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG03	T_2_SG03	17/11/2015		0[#2]	-	-	-	-	-	3	-	-	-	-	160,000	2.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG04	T_2_SG04	17/11/2015		0[#2]	-	-	-	-	-	15	-	-	-	-	210,000	2.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG05	T_2_SG05	19/11/2015		0[#2]	-	-	-	-	-	50	-	-	-	-	160,000	8.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_0.1	17/11/2015	0.1	0[#2]	5	<5	<0.3	6.7	3.9	10	<0.01	1.9	<3	20	150,000	2	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	69	54	940	<120	<100	<20	33	740	300
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_2	17/11/2015	2	-	<3	<5	<0.3	2.3	2.4	7	<0.01	<0.5	<3	2.1	110,000	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_0.5	16/11/2015	0.5	0[#2]	<3	<5	<0.3	13	0.6	12	<0.01	1.5	<3	3.3	210,000	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_2	16/11/2015	2	-	<3	<5	<0.3	8.4	0.6	2	<0.01	0.7	<3	2.2	200,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_0.1	16/11/2015	0.1	0[#2]	<3	<5	<0.3	11	4.8	27	0.01	2.3	<3	30	240,000	1.6	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_1	16/11/2015	1	-	6	<5	<0.3	19	<0.5	13	<0.01	1.2	<3	3.2	220,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_0.5	16/11/2015	0.5	0[#2]	4	<5	<0.3	15	0.6	14	<0.01	0.9	<3	3.9	250,000	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_2	16/11/2015	2	-	<3	<5	<0.3	4	1	6	<0.01	0.6	<3	5.3	190,000	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_0.5	18/11/2015	0.5	0[#2]	3	<5	<0.3	5.6	0.7	7	<0.01	<0.5	<3	3	190,000	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_1	18/11/2015	1	-	<3	<5	<0.3	4.2	0.6	5	0.01	<0.5	<3	1.4	150,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_0.1	16/11/2015	0.1	0[#2]	4	<5	0.3	19	2.9	18	0.02	2	<3	22	220,000	1.9	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_1	16/11/2015	1	-	4	<5	<0.3	24	0.7	11	<0.01	0.9	<3	3.3	210,000	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_0.1	18/11/2015	0.1	0[#2]	5	<5	<0.3	22	9.9	10	0.01	7.4	<3	27	290,000	0.7	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_1	18/11/2015	1	-	<3	<5	<0.3	6.4	9.7	6	<0.01	1.8	<3	5.8	300,000	0.7	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45

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Summary of Results Compared to Adopted Assessment Criteria

	Asbestos	Metals										Inorganics		BTEX							TRH						TPH				
	Asbestos fibres	Arsenic	Boron	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Selenium	Zinc	% Moisture	Fluoride	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	C6-C10	C6-C10 less BTEX (F1)	C10-C16	F2-NAPHTHALENE	C16-C34	C34-C40	TRH C37-C40	C6 - C9	C10 - C14	C15 - C28	C29-C36
	-	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0	3	5	0.3	0.3	0.5	1	0.01	0.5	3	0.5	5000	0.5	0.1	0.1	0.1	0.2	0.1	0.3	0.6	25	25	25	25	90	120	100	20	20	45	45
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil		300	20000	90	300	17000	600	80	1200	700	30000																				
NEPM 2013 B1 Table 1A(1) HIL Res A Soil		100	4500	20	100	6000	300	40	400	200	7400																				
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand																															
0-1m														#1	#1	#1			#1			#1		#1							
1-2m														#1	#1	#1			#1			#1		#1							
2-4m														#1	#1	#1			#1			#1		#1							
>4m														#1	#1	#1			#1			#1		#1							
NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand																															
0-1m														0.5	160	55			40			45		110							
1-2m														0.5	220	#1			60			70		240							
2-4m														0.5	310	#1			95			110		440							
>4m														0.5	540	#1			170			200		#1							
NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse																					700		1000		2500	10000					
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																															
0-2m														50	85	70			105			180[#4]		170[#5]	300	2800					

Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg																												
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_0.1	18/11/2015	0.1	[#2]	8	<5	<0.3	28	12	15	0.02	9.1	<3	34	350,000	1.2	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_1	18/11/2015	1	[#2]	<3	<5	<0.3	13	17	14	<0.01	3.8	<3	11	330,000	0.7	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_0.1	19/11/2015	0.1	[#2]	<3	<5	<0.3	2.2	5.8	9	<0.01	1.5	<3	32	78,000	3.4	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_1	19/11/2015	1	-	<3	<5	<0.3	2.3	<0.5	<1	0.01	0.9	<3	1.5	41,000	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.1	18/11/2015	0.1	[#2]	6	<5	0.5	20	21	63	0.05	11	<3	130	510,000	9.2	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	300	290	190	<120	<100	<20	49	400	<45
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.5	18/11/2015	0.5	-	<3	<5	<0.3	15	3.8	6	0.01	4.7	<3	11	180,000	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
15092_Tomago	SE146247-1	T_SG01	T_SG01	18/11/2015		[#2]	-	-	-	-	-	19	-	-	-	-	230,000	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG02	T_SG02	18/11/2015		[#2]	-	-	-	-	-	21	-	-	-	-	260,000	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG03	T_SG03	18/11/2015		[#2]	-	-	-	-	-	17	-	-	-	-	270,000	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG04	T_SG04	18/11/2015		[#2]	-	-	-	-	-	19	-	-	-	-	290,000	1.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG05	T_SG05	18/11/2015		[#2]	-	-	-	-	-	18	-	-	-	-	260,000	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG06	T_SG06	18/11/2015		[#2]	-	-	-	-	-	21	-	-	-	-	240,000	2.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG07	T_SG07	18/11/2015		[#2]	-	-	-	-	-	17	-	-	-	-	220,000	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG08	T_SG08	19/11/2015		[#2]	-	-	-	-	-	15	-	-	-	-	230,000	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG09	T_SG09	19/11/2015		[#2]	-	-	-	-	-	17	-	-	-	-	290,000	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG10	T_SG10	19/11/2015		[#2]	-	-	-	-	-	12	-	-	-	-	200,000	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Statistical Summary

Number of Results	40	47	22	47	47	47	62	47	47	22	47	62	33	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Number of Detects	40	30	0	10	47	41	61	20	40	0	47	62	25	0	0	0	0	0	0	0	0	0	3	3	6	1	0	0	3	6	5
Minimum Concentration	<0	<3	<5	<0.3	2.2	<0.5	<1	<0.01	<0.5	<3	1.4	41000	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45
Minimum Detect	ND	3	ND	0.3	2.2	0.5	2	0.01	0.6	ND	1.4	41000	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	60	54	190	130	ND	ND	33	190	89
Maximum Concentration	0	12	<5	1	610	240	140	0.08	71	<3	290	510000	48	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	300	290	7400	<1200	<1000	<20	<200	5100	2900
Maximum Detect	ND	12	ND	1	610	240	140	0.08	71	ND	290	510000	48	ND	ND	ND	ND	ND	ND	ND	ND	ND	300	290	7400	130	ND	ND	49	5100	2900
Average Concentration	0	3.8	2.5	0.22	25	12	19	0.012	4.1	1.5	32	208371	3.4	0.05	0.05	0.05	0.1	0.05	0.15	0.3	13	13	23	23	251	73	60	10	14	172	103
Median Concentration	0	4	2.5	0.15	9.4	3.8	14	0.005	1.5	1.5	10	205000	1.7	0.05	0.05	0.05	0.1	0.05	0.15	0.3	12.5	12.5	12.5	12.5	45	60	50	10	10	22.5	22.5
Standard Deviation	0	2.5	0	0.17	88	38	20	0.013	10	0	52	73174	8.3	0	0	0	0	0	0	0	0	0	46	44	1079	79	66	0	15	747	423
Number of Guideline Exceedances	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0

Env Stds Comments

#1:NL

#2:Moderate reliability. To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#3:Moderate reliability. To obtain F2 subtract napthalene from the >C10 - C16 fraction.

#4:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#5:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Data Comments

#1 Estimated Fibres <0.01

#2 Asbestos Detected No

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Summary of Results Compared to Adopted Assessment Criteria

								MAH								PAH	PAH/Phenols																			
								>C10 - C36 (Sum of total)	C10 - C40 (Sum of total)	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	Benzo(b+j)fluoranthene	1-Methylnaphthalene	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo(a) pyrene	Benzo[g,h,i]perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Carcinogenic PAHs (as B(a)P TPE)	Carcinogenic PAHs (as B(a)P TPE, PEFs3)	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Pyrene
								mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL								110	210	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			0.1	0.1	0.1	0.1	0.8	0.1	0.1
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil																														3						300		
NEPM 2013 B1 Table 1A(1) HIL Res A Soil																														3						300		
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand																																						
0-1m																																				#1		
1-2m																																				#1		
2-4m																																				#1		
>4m																																				#1		
NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand																																						
0-1m																																				3		
1-2m																																				#1		
2-4m																																				#1		
>4m																																				#1		
NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse																																						
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																																						
0-2m																											0.7											
Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg																																	
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_0.1	10/11/2015	0.1	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_1.0	10/11/2015	1	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.1	10/11/2015	0.1	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.1	<0.1	<0.2	<0.3	0.3	<0.1	<0.1	<0.1	1.2	<0.1	0.3
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.5	10/11/2015	0.5	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	0.1	<0.1	<0.1	<0.1	<0.8	<0.1	0.1
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_0.1	10/11/2015	0.1	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_1.0	10/11/2015	1	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_4_SP01A	T_4_SP01A	10/11/2015		<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_4_SP01B	T_4_SP01B	10/11/2015		<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_0.1	10/11/2015	0.1	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_2.0	10/11/2015	2	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_0.1	10/11/2015	0.1	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	<0.1	<0.1	<0.1	<0.1	0.1	0.7	0.5	0.2	0.2	0.5	<0.1	0.8	0.8	1.5	<0.1	0.2	<0.1	6.5	0.4	1.3
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_2.0	10/11/2015	2	<110	<210	-	-	-	-	-	-	-	-	-	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.1	<0.1	0.2	<0.1	0.3	0.4	0.5	<0.1	<0.1	<0.1	2.3	0.2	0.4
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_0.1	10/11/2015	0.1	<110	<210	-	-	-	-	-	-	-	-	-	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1	0.2	<0.1	0.2	<0.3	0.4	<0.1	<0.1	<0.1	1.7	0.1	0.4
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_1.4	10/11/2015	1.4	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_0.1	10/11/2015	0.1	780	780	-	-	-	-	-	-	-	-	-	36	0.1	<0.1	1	2.4	4.7	33	21	8.4	5.4	14	0.5	30	30	63	1	8.5	<0.1 - 0.3	280	33	49
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_1.0	10/11/2015	1	<110	<210	-	-	-	-	-	-	-	-	-	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	0.3	0.1	0.2	0.3	<0.1	0.4	0.5	0.7	<0.1	0.1	<0.1	3.3	0.3	0.6
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_0.1	10/11/2015	0.1	8100	8500	-	-	-	-	-	-	-	-	-	330	4.4	4.3	14	11	67	190	250	100	89	160	11	330	330	700	40	97	0.9 - 6.4	3200	510	600
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_1.0	10/11/2015	1	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	<0.1	<0.1	<0.1	0.2	0.4	0.8	0.7	0.2	0.3	0.5	<0.1	1	1	1.9	0.1	0.2	<0.1	9.3	1.2	1.7
15092_Tomago	SE145989-1	T_6_SP02A	T_6_SP02A	10/11/2015		<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_6_SP02B	T_6_SP02B	10/11/2015		<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_7_SP03A	T_7_SP03A	10/11/2015		<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.1	0.1	0.2	<0.1	0.3	0.3	0.3	<0.1	<0.1	<0.1	1.8	<0.1	0.3
15092_Tomago	SE145989-1	T_7_SP03B	T_7_SP03B	10/11/2015		380	380	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	0.2	0.2	<0.1	<0.1	<0.1	0.8	0.5	0.2	0.2	0.5	<0.1	0.7	0.8	1	<0.1	<0.1	<0.1 - 0.1	6.6	1.1	0.9
15092_Tomago	SE145989-1	T_7_SP03C	T_7_SP03C	10/11/2015		<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	0.2	<0.1	0.1	0.2	<0.1	0.3	0.4	0.3	<0.1	<0.1	<0.1	2.3	0.2	0.3
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_0.1	10/11/2015	0.1	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_3.0	10/11/2015	3	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_0.1	17/11/2015	0.1	470	470	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	13	<0.1	<0.1	0.3	<0.1	0.6	7.9	9.8	6.3	3.6	3.9	1.5	15	15	6.3	0.1	7.4	<0.1	69	2.4	6.1
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_2	17/11/2015	2	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_2_SG01	T_2_SG01	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG02	T_2_SG02	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG03	T_2_SG03	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG04	T_2_SG04	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG05	T_2_SG05	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_0.1	17/11/2015	0.1	1100	1100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	41	2.9	3.9	8.3	1.3	20	14	34	12	13	12	2.2	45	45	98	8.4	14	8.4 - 15	480	110	76
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_2	17/11/2015	2	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_0.5	16/11/2015	0.5	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_2	16/11/2015	2	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_0.1	16/11/2015	0.1	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_1	16/11/2015	1	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_0.5	16/11/2015	0.5	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_2	16/11/2015	2	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_0.5	18/11/2015	0.5	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_1	18/11/2015	1	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_0.1	16/11/2015	0.1	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_1	16/11/2015	1	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_0.1	18/11/2015	0.1	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_1	18/11/2015	1	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1

AGL Macquarie
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Tomago Development Site

Summary of Results Compared to Adopted Assessment Criteria

					MAH								PAH	PAH/Phenols																					
	>C10 - C36 (Sum of total)	C10 - C40 (Sum of total)	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	Benzo(b+j)fluoranthene	1-Methylnaphthalene	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz[a,h]anthracene	Carcinogenic PAHs (as B(a)P TPE)	Carcinogenic PAHs (as B(a)P TPE, PEFs3)	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Pyrene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	110	210	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			0.1	0.1	0.1	0.1	0.8	0.1	0.1
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil																								3						300		
NEPM 2013 B1 Table 1A(1) HIL Res A Soil																								3						300		
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand																																
0-1m																													#1			
1-2m																													#1			
2-4m																													#1			
>4m																													#1			
NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand																																
0-1m																													3			
1-2m																													#1			
2-4m																													#1			
>4m																													#1			
NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse																																
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																																
0-2m																			0.7													

Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg																																
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_0.1	18/11/2015	0.1	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_1	18/11/2015	1	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_0.1	19/11/2015	0.1	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_1	19/11/2015	1	<110	<210	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.1	18/11/2015	0.1	500	500	-	-	-	-	-	-	-	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.3	0.2	0.2	0.2	<0.1	0.4	0.5	0.7	<0.1	0.2	<0.1	3.2	0.3	0.6
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.5	18/11/2015	0.5	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
15092_Tomago	SE146247-1	T_SG01	T_SG01	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG02	T_SG02	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG03	T_SG03	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG04	T_SG04	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG05	T_SG05	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG06	T_SG06	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG07	T_SG07	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG08	T_SG08	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG09	T_SG09	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG10	T_SG10	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Statistical Summary

Number of Results	47	47	24	24	24	24	24	24	24	24	24	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Number of Detects	6	6	0	0	0	0	0	0	0	0	0	14	4	3	4	4	6	14	13	9	11	14	4	13	12	15	5	8	4	14	12	15			
Minimum Concentration	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1			
Minimum Detect	380	380	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1	0.1	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.2	0.3	0.1	0.1	0.1	0.9	1.2	0.1	0.1			
Maximum Concentration	8100	8500	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	330	4.4	4.3	14	11	67	190	250	100	89	160	11	330	330	700	40	97	15	3200	510	600			
Maximum Detect	8100	8500	ND	ND	ND	ND	ND	ND	ND	ND	ND	330	4.4	4.3	14	11	67	190	250	100	89	160	11	330	330	700	40	97	15	3200	510	600			
Average Concentration	289	341	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	9.1	0.21	0.23	0.55	0.36	2	5.3	6.8	2.8	2.4	4.1	0.37	9.1	9.1	19	1.1	2.8	0.38	87	14	16			
Median Concentration	55	105	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.15	0.05	0.05	0.05	0.05	0.4	0.05	0.05			
Standard Deviation	1182	1231	0	0	0	0	0	0	0	0	0	48	0.75	0.83	2.3	1.6	10	28	37	15	13	23	1.6	48	48	103	5.9	14	1.8	471	76	88			
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	4	0	0	0	0	10	2	0	0			
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	4	0	0	0	0	10	2	0	0			

Env Stds Comments

#1:NL

#2:Moderate reliability. To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#3:Moderate reliability. To obtain F2 subtract napthalene from the >C10 - C16 fraction.

#4:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#5:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Data Comments

#1 Estimated Fibres <0.01

#2 Asbestos Detected No

AGL Macquarie
15107
Tomago Development Site

Summary of Results Compared to Adopted Assessment Criteria

		VOCs		Chlorinated Hydrocarbons																																
		2-Nitropropane	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropane	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Hexachlorobutadiene	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL		10	1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	1	0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.1
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil																																				
NEPM 2013 B1 Table 1A(1) HIL Res A Soil																																				
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand																																				
0-1m																																				
1-2m																																				
2-4m																																				
>4m																																				
NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand																																				
0-1m																																				
1-2m																																				
2-4m																																				
>4m																																				
NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse																																				
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																																				
0-2m																																				
Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg																																
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_0.1	10/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_1.0	10/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.1	10/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.5	10/11/2015	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_0.1	10/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_1.0	10/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_4_SP01A	T_4_SP01A	10/11/2015		<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_4_SP01B	T_4_SP01B	10/11/2015		<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_0.1	10/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_2.0	10/11/2015	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_0.1	10/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_2.0	10/11/2015	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_1.4	10/11/2015	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_1.0	10/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_1.0	10/11/2015	1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_6_SP02A	T_6_SP02A	10/11/2015		<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_6_SP02B	T_6_SP02B	10/11/2015		<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_7_SP03A	T_7_SP03A	10/11/2015		<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_7_SP03B	T_7_SP03B	10/11/2015		<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_7_SP03C	T_7_SP03C	10/11/2015		<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_3.0	10/11/2015	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_0.1	17/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_2	17/11/2015	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG01	T_2_SG01	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG02	T_2_SG02	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG03	T_2_SG03	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG04	T_2_SG04	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG05	T_2_SG05	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_0.1	17/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_2	17/11/2015	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_0.5	16/11/2015	0.5	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_2	16/11/2015	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_0.1	16/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_1	16/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_0.5	16/11/2015	0.5	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_2	16/11/2015	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_0.5	18/11/2015	0.5	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_1	18/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_0.1	16/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_1	16/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_0.1	18/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_1	18/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

AGL Macquarie
15107
Tomago Development Site

Summary of Results Compared to Adopted Assessment Criteria

		VOCs			Chlorinated Hydrocarbons																														
		2-Nitropropane	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Hexachlorobutadiene	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL		10	1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	1	0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.1
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil																																			
NEPM 2013 B1 Table 1A(1) HIL Res A Soil																																			
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand																																			
0-1m																																			
1-2m																																			
2-4m																																			
>4m																																			
NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand																																			
0-1m																																			
1-2m																																			
2-4m																																			
>4m																																			
NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse																																			
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																																			
0-2m																																			
Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg																														
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_0.1	18/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_1	18/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_0.1	19/11/2015	0.1	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_1	19/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.1	18/11/2015	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.5	18/11/2015	0.5	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
15092_Tomago	SE146247-1	T_SG01	T_SG01	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG02	T_SG02	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG03	T_SG03	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG04	T_SG04	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG05	T_SG05	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG06	T_SG06	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG07	T_SG07	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG08	T_SG08	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG09	T_SG09	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG10	T_SG10	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Statistical Summary																																			
Number of Results		24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Number of Detects		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration		<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Minimum Detect		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration		<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Maximum Detect		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration		5	0.5	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.05	0.5	0.05	0.05	0.05	0.25	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Median Concentration		5	0.5	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.05	0.5	0.05	0.05	0.05	0.25	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Standard Deviation		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

#1:NL

#2:Moderate reliability. To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#3:Moderate reliability. To obtain F2 subtract napthalene from the >C10 - C16 fraction.

#4:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#5:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Data Comments

#1 Estimated Fibres <0.01

#2 Asbestos Detected No

Summary of Results Compared to Adopted Assessment Criteria

Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg	trans-1,3-dichloropropene	Vinyl chloride	2,4-DDT	4,4-DDE	a-BHC	Aldrin	b-BHC	Chlordane (cis)	gamma-Chlordane	d-BHC	DDD	DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	o,p-DDD	o,p'-DDE	trans-Nonachlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Diazinon	Dichlorvos	Dimethoate	Ethion
								Organochlorine Pesticides																								Organophosphorous Pesticides						
						mg/kg	mg/kg	mg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	100	100	100	100	100	0.1	100	100	100	200	200	200	100	200	100	100	100	100	100	100	0.1	0.1	0.1	0.2	0.2	0.2	0.5	0.5	0.5	0.2
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil																						20000				10000		400000						250				
NEPM 2013 B1 Table 1A(1) HIL Res A Soil																						10000				6000		300000						160				
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand																																						
0-1m																																						
1-2m																																						
2-4m																																						
>4m																																						
NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand																																						
0-1m																																						
1-2m																																						
2-4m																																						
>4m																																						
NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse																																						
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																																						
0-2m																																						
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_0.1	10/11/2015	0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_1.0	10/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.1	10/11/2015	0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.5	10/11/2015	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_0.1	10/11/2015	0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_1.0	10/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_4_SP01A	T_4_SP01A	10/11/2015		<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_4_SP01B	T_4_SP01B	10/11/2015		<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_0.1	10/11/2015	0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_2.0	10/11/2015	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_0.1	10/11/2015	0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_2.0	10/11/2015	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_1.4	10/11/2015	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_1.0	10/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_1.0	10/11/2015	1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_6_SP02A	T_6_SP02A	10/11/2015		<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_6_SP02B	T_6_SP02B	10/11/2015		<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_7_SP03A	T_7_SP03A	10/11/2015		<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_7_SP03B	T_7_SP03B	10/11/2015		<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_7_SP03C	T_7_SP03C	10/11/2015		<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_3.0	10/11/2015	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_0.1	17/11/2015	0.1	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_2	17/11/2015	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG01	T_2_SG01	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG02	T_2_SG02	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG03	T_2_SG03	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG04	T_2_SG04	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG05	T_2_SG05	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_0.1	17/11/2015	0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_2	17/11/2015	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_0.5	16/11/2015	0.5	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_2	16/11/2015	2	-	-	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_0.1	16/11/2015	0.1	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_1	16/11/2015	1	-	-	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_0.5	16/11/2015	0.5	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_2	16/11/2015	2	-	-	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_0.5	18/11/2015	0.5	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_1	18/11/2015	1	-	-	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_0.1	16/11/2015	0.1	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_1	16/11/2015	1	-	-	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_0.1	18/11/2015	0.1	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_1	18/11/2015	1	-	-	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2

Summary of Results Compared to Adopted Assessment Criteria

								Organochlorine Pesticides																								Organophosphorous Pesticides						
Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg	trans-1,3-dichloropropene	Vinyl chloride	2,4-DDT	4,4-DDE	a-BHC	Aldrin	b-BHC	Chlordane (cis)	gamma-Chlordane	d-BHC	DDD	DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	o,p-DDD	o,p'-DDE	trans-Nonachlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Diazinon	Dichlorvos	Dimethoate	Ethion
						mg/kg	mg/kg	mg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	100	100	100	100	100	0.1	100	100	100	200	200	200	100	200	100	100	100	100	100	100	0.1	0.1	0.1	0.2	0.2	0.2	0.5	0.5	0.5	0.2
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil																						20000				10000		400000						250				
NEPM 2013 B1 Table 1A(1) HIL Res A Soil																						10000				6000		300000						160				
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand																																						
0-1m																																						
1-2m																																						
2-4m																																						
>4m																																						
NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand																																						
0-1m																																						
1-2m																																						
2-4m																																						
>4m																																						
NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse																																						
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																																						
0-2m																																						
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_0.1	18/11/2015	0.1	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_1	18/11/2015	1	-	-	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_0.1	19/11/2015	0.1	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_1	19/11/2015	1	-	-	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.1	18/11/2015	0.1	-	-	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.5	18/11/2015	0.5	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
15092_Tomago	SE146247-1	T_SG01	T_SG01	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG02	T_SG02	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG03	T_SG03	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG04	T_SG04	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG05	T_SG05	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG06	T_SG06	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG07	T_SG07	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG08	T_SG08	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG09	T_SG09	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_SG10	T_SG10	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Statistical Summary

Number of Results	24	24	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.1	<0.1	<0.1	<100	<100	<100	<100	<100	<0.1	<100	<100	<100	<200	<200	<200	<100	<200	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration	0.05	0.05	0.05	50	50	50	50	50	0.05	50	50	50	100	100	100	50	100	50	50	50	50	50	50	0.05	0.05	0.05	0.1	0.1	0.1	0.25	0.25	0.25	0.1
Median Concentration	0.05	0.05	0.05	50	50	50	50	50	0.05	50	50	50	100	100	100	50	100	50	50	50	50	50	50	0.05	0.05	0.05	0.1	0.1	0.1	0.25	0.25	0.25	0.1
Standard Deviation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

#1:NL
#2:Moderate reliability. To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#3:Moderate reliability. To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#4:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#5:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Data Comments

#1 Estimated Fibres <0.01
#2 Asbestos Detected No

AGL Macquarie
15107
Tomago Development Site

Summary of Results Compared to Adopted Assessment Criteria

					PCBs											Pesticides			Halogenated Hydrocarbons					Halogenated Benzenes											Other
	Fenitrothion	Malathion	Methidathion	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	Arochlor 1268	Arocior 1262	PCBs (Sum of total)	Isodrin	Mirex	Parathion	1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Chlorobenzene	Hexachlorobenzene	Estimated Fibres
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	mg/kg
EQL	0.2	0.2	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1	0.1	0.1	0.2	0.1	1	1	5	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100	100
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil													1		20																10000	
NEPM 2013 B1 Table 1A(1) HIL Res A Soil													1		10																10000	
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand																																
0-1m																																
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NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand																																
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NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse																																
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																																
0-2m																																

Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg																																
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0[#1]
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_1.0	10/11/2015	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.1	10/11/2015	0.1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.5	10/11/2015	0.5	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_0.1	10/11/2015	0.1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_1.0	10/11/2015	1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_4_SP01A	T_4_SP01A	10/11/2015		-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0[#1]
15092_Tomago	SE145989-1	T_4_SP01B	T_4_SP01B	10/11/2015		-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0[#1]
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_0.1	10/11/2015	0.1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0[#1]
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_2.0	10/11/2015	2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_0.1	10/11/2015	0.1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0[#1]
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_2.0	10/11/2015	2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_0.1	10/11/2015	0.1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_1.4	10/11/2015	1.4	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_0.1	10/11/2015	0.1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_1.0	10/11/2015	1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_0.1	10/11/2015	0.1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_1.0	10/11/2015	1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
15092_Tomago	SE145989-1	T_6_SP02A	T_6_SP02A	10/11/2015		-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0[#1]
15092_Tomago	SE145989-1	T_6_SP02B	T_6_SP02B	10/11/2015		-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0[#1]
15092_Tomago	SE145989-1	T_7_SP03A	T_7_SP03A	10/11/2015		-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0[#1]
15092_Tomago	SE145989-1	T_7_SP03B	T_7_SP03B	10/11/2015		-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0[#1]
15092_Tomago	SE145989-1	T_7_SP03C	T_7_SP03C	10/11/2015		-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0[#1]
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_0.1	10/11/2015	0.1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_3.0	10/11/2015	3	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_0.1	17/11/2015	0.1	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	0[#1]
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_2	17/11/2015	2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG01	T_2_SG01	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_2_SG02	T_2_SG02	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_2_SG03	T_2_SG03	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_2_SG04	T_2_SG04	17/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_2_SG05	T_2_SG05	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_0.1	17/11/2015	0.1	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0[#1]
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_2	17/11/2015	2	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_0.5	16/11/2015	0.5	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	0[#1]
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_2	16/11/2015	2	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	-
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_0.1	16/11/2015	0.1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	0[#1]
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_1	16/11/2015	1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	-
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_0.5	16/11/2015	0.5	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	0[#1]
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_2	16/11/2015	2	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	-
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_0.5	18/11/2015	0.5	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	0[#1]
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_1	18/11/2015	1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	-
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_0.1	16/11/2015	0.1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	0[#1]
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_1	16/11/2015	1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	-
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_0.1	18/11/2015	0.1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	0[#1]
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_1	18/11/2015	1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	-

AGL Macquarie
15107
Tomago Development Site

Summary of Results Compared to Adopted Assessment Criteria

								PCBs									Pesticides			Halogenated Hydrocarbons					Halogenated Benzenes									Other
						Fenitrothion	Malathion	Methidathion	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	Arochlor 1268	Aroclor 1262	PCBs (Sum of total)	Isodrin	Mirex	Parathion	1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Chlorobenzene	Hexachlorobenzene	Estimated Fibres
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	mg/kg
EQL						0.2	0.2	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1	0.1	0.1	0.2	0.1	1	1	5	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100	100
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil																		1		20																10000	
NEPM 2013 B1 Table 1A(1) HIL Res A Soil																		1		10																10000	
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NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse																																				
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil																																				
0-2m																																				
Site_ID	**SDG**	**Location_Code**	**Field_ID**	**Sampled_Date_Time**	**Sample_Depth_Avg**																															
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_0.1	18/11/2015	0.1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	0[#1]
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_1	18/11/2015	1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	0[#1]
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_0.1	19/11/2015	0.1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	0[#1]
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_1	19/11/2015	1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	-
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.1	18/11/2015	0.1	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	0[#1]
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.5	18/11/2015	0.5	<0.2	<0.2	<0.5	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	-
15092_Tomago	SE146247-1	T_SG01	T_SG01	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_SG02	T_SG02	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_SG03	T_SG03	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_SG04	T_SG04	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_SG05	T_SG05	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#2]
15092_Tomago	SE146247-1	T_SG06	T_SG06	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_SG07	T_SG07	18/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_SG08	T_SG08	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_SG09	T_SG09	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#1]
15092_Tomago	SE146247-1	T_SG10	T_SG10	19/11/2015		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0[#2]
Statistical Summary																																				
Number of Results						19	19	19	27	27	27	27	27	27	27	27	27	27	19	19	19	24	24	24	24	24	24	24	24	24	24	24	24	24	19	40
Number of Detects						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40
Minimum Concentration						<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	<0
Minimum Detect						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration						<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.1	<0.1	<0.2	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<100	0
Maximum Detect						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration						0.1	0.1	0.25	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.05	0.05	0.1	0.05	0.5	0.5	2.5	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	50	0
Median Concentration						0.1	0.1	0.25	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.05	0.05	0.1	0.05	0.5	0.5	2.5	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	50	0
Standard Deviation						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

#1:NL

#2:Moderate reliability. To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#3:Moderate reliability. To obtain F2 subtract napthalene from the >C10 - C16 fraction.

#4:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#5:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Data Comments

#1 Estimated Fibres <0.01

#2 Asbestos Detected No

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Summary of Results Compared to Adopted Assessment Criteria

	Solvents									
	Methyl Ethyl Ketone	2-hexanone (MBK)	4-Methyl-2-pentanone	Acetone	Acrylonitrile	Allyl chloride	Carbon disulfide	MTBE	Vinyl acetate	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL	10	5	1	10	0.1	0.1	0.5	0.1	10	
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil										
NEPM 2013 B1 Table 1A(1) HIL Res A Soil										
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand										
0-1m										
1-2m										
2-4m										
>4m										
NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand										
0-1m										
1-2m										
2-4m										
>4m										
NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse										
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil										
0-2m										

Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg									
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_0.1	10/11/2015	0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_1_ESMW01	T_1_ESMW01_1.0	10/11/2015	1	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.1	10/11/2015	0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_2_ESMW02	T_2_ESMW02_0.5	10/11/2015	0.5	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_0.1	10/11/2015	0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_2_ESSB01	T_2_ESSB01_1.0	10/11/2015	1	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_4_SP01A	T_4_SP01A	10/11/2015		<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_4_SP01B	T_4_SP01B	10/11/2015		<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_0.1	10/11/2015	0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_5_ESMW03	T_5_ESMW03_2.0	10/11/2015	2	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_0.1	10/11/2015	0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_5_ESMW04	T_5_ESMW04_2.0	10/11/2015	2	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESMW06	T_5_ESMW06_1.4	10/11/2015	1.4	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB03	T_5_ESSB03_1.0	10/11/2015	1	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_5_ESSB04	T_5_ESSB04_1.0	10/11/2015	1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_6_SP02A	T_6_SP02A	10/11/2015		<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_6_SP02B	T_6_SP02B	10/11/2015		<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_7_SP03A	T_7_SP03A	10/11/2015		<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_7_SP03B	T_7_SP03B	10/11/2015		<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_7_SP03C	T_7_SP03C	10/11/2015		<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_0.1	10/11/2015	0.1	-	-	-	-	-	-	-	-	-
15092_Tomago	SE145989-1	T_ESSB05	T_ESSB05_3.0	10/11/2015	3	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_0.1	17/11/2015	0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE146247-1	T_2_ESSB02	T_2_ESSB02_2	17/11/2015	2	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG01	T_2_SG01	17/11/2015		-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG02	T_2_SG02	17/11/2015		-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG03	T_2_SG03	17/11/2015		-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG04	T_2_SG04	17/11/2015		-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_2_SG05	T_2_SG05	19/11/2015		-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_0.1	17/11/2015	0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE146247-1	T_5_ESMW05	T_5_ESMW05_2	17/11/2015	2	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_0.5	16/11/2015	0.5	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE146247-1	T_ESMW07	T_ESMW07_2	16/11/2015	2	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_0.1	16/11/2015	0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE146247-1	T_ESMW08	T_ESMW08_1	16/11/2015	1	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_0.5	16/11/2015	0.5	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE146247-1	T_ESMW09	T_ESMW09_2	16/11/2015	2	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_0.5	18/11/2015	0.5	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE146247-1	T_ESMW10	T_ESMW10_1	18/11/2015	1	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_0.1	16/11/2015	0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE146247-1	T_ESSB06	T_ESSB06_1	16/11/2015	1	-	-	-	-	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_0.1	18/11/2015	0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
15092_Tomago	SE146247-1	T_ESSB08	T_ESSB08_1	18/11/2015	1	-	-	-	-	-	-	-	-	-

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Summary of Results Compared to Adopted Assessment Criteria

					Solvents					
					Methyl Ethyl Ketone	2-hexanone (MBK)	4-Methyl-2-pentanone	Acetone	Acrylonitrile	Allyl chloride
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					10	5	1	10	0.1	0.1
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil										
NEPM 2013 B1 Table 1A(1) HIL Res A Soil										
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand										
0-1m										
1-2m										
2-4m										
>4m										
NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand										
0-1m										
1-2m										
2-4m										
>4m										
NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse										
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil										
0-2m										
Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg					
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_0.1	18/11/2015	0.1	<10	<5	<1	<10	<0.1
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_1	18/11/2015	1	-	-	-	-	-
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_0.1	19/11/2015	0.1	<10	<5	<1	<10	<0.1
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_1	19/11/2015	1	-	-	-	-	-
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.1	18/11/2015	0.1	-	-	-	-	-
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.5	18/11/2015	0.5	<10	<5	<1	<10	<0.1
15092_Tomago	SE146247-1	T_SG01	T_SG01	18/11/2015		-	-	-	-	-
15092_Tomago	SE146247-1	T_SG02	T_SG02	18/11/2015		-	-	-	-	-
15092_Tomago	SE146247-1	T_SG03	T_SG03	18/11/2015		-	-	-	-	-
15092_Tomago	SE146247-1	T_SG04	T_SG04	18/11/2015		-	-	-	-	-
15092_Tomago	SE146247-1	T_SG05	T_SG05	18/11/2015		-	-	-	-	-
15092_Tomago	SE146247-1	T_SG06	T_SG06	18/11/2015		-	-	-	-	-
15092_Tomago	SE146247-1	T_SG07	T_SG07	18/11/2015		-	-	-	-	-
15092_Tomago	SE146247-1	T_SG08	T_SG08	19/11/2015		-	-	-	-	-
15092_Tomago	SE146247-1	T_SG09	T_SG09	19/11/2015		-	-	-	-	-
15092_Tomago	SE146247-1	T_SG10	T_SG10	19/11/2015		-	-	-	-	-
Statistical Summary										
Number of Results						24	24	24	24	24
Number of Detects						0	0	0	0	0
Minimum Concentration						<10	<5	<1	<10	<0.1
Minimum Detect						ND	ND	ND	ND	ND
Maximum Concentration						<10	<5	<1	<10	<0.1
Maximum Detect						ND	ND	ND	ND	ND
Average Concentration						5	2.5	0.5	5	0.05
Median Concentration						5	2.5	0.5	5	0.05
Standard Deviation						0	0	0	0	0
Number of Guideline Exceedances						0	0	0	0	0
Number of Guideline Exceedances(Detects Only)						0	0	0	0	0

					Solvents					
					Allyl chloride	Carbon disulfide	MTBE	Vinyl acetate		
					mg/kg	mg/kg	mg/kg	mg/kg		
EQL					0.1	0.5	0.1	10		
NEPM 2013 B1 Table 1A(1) HIL Rec C Soil										
NEPM 2013 B1 Table 1A(1) HIL Res A Soil										
NEPM 2013 B1 Table 1A(3) Rec Soil HSL C for Vapour Intrusion, Sand										
0-1m										
1-2m										
2-4m										
>4m										
NEPM 2013 B1 Table 1A(3) Res Soil HSL A/B for Vapour Intrusion, Sand										
0-1m										
1-2m										
2-4m										
>4m										
NEPM 2013 B1 Table 1B(7) Management Limits, R/POS, coarse										
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil										
0-2m										
Site_ID	SDG	Location_Code	Field_ID	Sampled_Date_Time	Sample_Depth_Avg					
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_0.1	18/11/2015	0.1	<0.1	<0.5	<0.1	<10	
15092_Tomago	SE146247-1	T_ESSB09	T_ESSB09_1	18/11/2015	1	-	-	-	-	
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_0.1	19/11/2015	0.1	<0.1	<0.5	<0.1	<10	
15092_Tomago	SE146247-1	T_ESSB10	T_ESSB10_1	19/11/2015	1	-	-	-	-	
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.1	18/11/2015	0.1	-	-	-	-	
15092_Tomago	SE146247-1	T_SB07	T_SB07_0.5	18/11/2015	0.5	<0.1	<0.5	<0.1	<10	
15092_Tomago	SE146247-1	T_SG01	T_SG01	18/11/2015		-	-	-	-	
15092_Tomago	SE146247-1	T_SG02	T_SG02	18/11/2015		-	-	-	-	
15092_Tomago	SE146247-1	T_SG03	T_SG03	18/11/2015		-	-	-	-	
15092_Tomago	SE146247-1	T_SG04	T_SG04	18/11/2015		-	-	-	-	
15092_Tomago	SE146247-1	T_SG05	T_SG05	18/11/2015		-	-	-	-	
15092_Tomago	SE146247-1	T_SG06	T_SG06	18/11/2015		-	-	-	-	
15092_Tomago	SE146247-1	T_SG07	T_SG07	18/11/2015		-	-	-	-	
15092_Tomago	SE146247-1	T_SG08	T_SG08	19/11/2015		-	-	-	-	
15092_Tomago	SE146247-1	T_SG09	T_SG09	19/11/2015		-	-	-	-	
15092_Tomago	SE146247-1	T_SG10	T_SG10	19/11/2015		-	-	-	-	
Statistical Summary										
Number of Results					24	24	24	24		
Number of Detects					0	0	0	0		
Minimum Concentration					<0.1	<0.5	<0.1	<10		
Minimum Detect					ND	ND	ND	ND		
Maximum Concentration					<0.1	<0.5	<0.1	<10		
Maximum Detect					ND	ND	ND	ND		
Average Concentration					0.05	0.25	0.05	5		
Median Concentration					0.05	0.25	0.05	5		
Standard Deviation					0	0	0	0		
Number of Guideline Exceedances					0	0	0	0		
Number of Guideline Exceedances(Detects Only)					0	0	0	0		

Env Stds Comments

#1:NL

#2:Moderate reliability. To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#3:Moderate reliability. To obtain F2 subtract napthalene from the >C10 - C16 fraction.

#4:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#5:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Data Comments

#1 Estimated Fibres <0.01

#2 Asbestos Detected No

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Summary of Results Compared to Adopted Assessment Criteria

	Metals										Inorganics	BTEX							TRH						TPH							MAH									PAH	
	Arsenic	Boron	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Selenium	Zinc	% Moisture	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	C6-C10	C6-C10 less BTEX (F1)	C10-C16	F2-NAPHTHALENE	C16-C34	C34-C40	TRH C37-C40	C6 - C9	C10 - C14	C15 - C28	C29-C36	>C10 - C36 (Sum of total)	C10 - C40 (Sum of total)	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Isopropylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	Benzo(b+j)fluoranthene	1-Methylnaphthalene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	3	5	0.3	0.3	0.5	1	0.01	0.5	3	0.5	5000	0.1	0.1	0.1	0.2	0.1	0.3	0.6	25	25	25	25	90	120	100	20	20	45	45	110	210	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
ISQG-High	*70*		*10*	*370*	*270*	*220*	*1*	*52*		*410*																															
ISQG-Low	20		1.5	80	65	50	0.15	21		200																															
Location_Code Field_ID Sampled_Date_Time																																									
T_6_SD01 T_6_SD01 16/11/2015	3	<5	<0.3	4.6	1.7	9	<0.01	0.8	<3	10	260,000	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Statistical Summary																																									
Number of Results	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of Detects	1	0	0	1	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	3	<5	<0.3	4.6	1.7	9	<0.01	0.8	<3	10	260000	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Minimum Detect	3	ND	ND	4.6	1.7	9	ND	0.8	ND	10	260000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	3	<5	<0.3	4.6	1.7	9	<0.01	0.8	<3	10	260000	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<100	<20	<20	<45	<45	<110	<210	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Maximum Detect	3	ND	ND	4.6	1.7	9	ND	0.8	ND	10	260000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration																																									
Median Concentration	3	2.5	0.15	4.6	1.7	9	0.005	0.8	1.5	10	260000	0.05	0.05	0.05	0.1	0.05	0.15	0.3	12.5	12.5	12.5	12.5	45	60	50	10	10	22.5	22.5	55	105	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Standard Deviation																																									
Number of Guideline Exceedances	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#VALUE!	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
Number of Guideline Exceedances(Detects Only)	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#VALUE!	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####

Environmental Strategies

	PAH/Phenols																		
	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Carcinogenic PAHs (as B(a)P TPE)	Carcinogenic PAHs (as B(a)P TPE, PEFx3)	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Pyrene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			0.1	0.1	0.1	0.1	0.8	0.1	0.1
ISQG-High		0.5	0.64	1.1	1.6	1.6			2.8	0.26			5.1	0.54		2.1	45	1.5	2.6
ISQG Low		0.016	0.044	0.085	0.261	0.43			0.384	0.063			0.6	0.019		0.16	4	0.24	0.665

Location_Code	Field_ID	Sampled_Date_Time	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Carcinogenic PAHs (as B(a)P TPE)	Carcinogenic PAHs (as B(a)P TPE, PEFx3)	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Pyrene
T_6_SD01	T_6_SD01	16/11/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1

Statistical Summary

Statistical Summary	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Carcinogenic PAHs (as B(a)P TPE)	Carcinogenic PAHs (as B(a)P TPE, PEFx3)	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Pyrene
Number of Results	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration																			
Median Concentration	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.15	0.05	0.05	0.05	0.05	0.4	0.05	0.05
Standard Deviation																			
Number of Guideline Exceedances	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
Number of Guideline Exceedances(Detects Only)	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####

	VOCs			Chlorinated Hydrocarbons																				
	2-Nitropropane	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	10	1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	1
ISQG-High																								
ISQG Low																								

Location_Code	Field_ID	Sampled_Date_Time	2-Nitropropane	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane
T_6_SD01	T_6_SD01	16/11/2015	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1

Statistical Summary	2-Nitropropane	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane
Number of Results	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<10	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration																								
Median Concentration	5	0.5	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.05	0.5
Standard Deviation																								
Number of Guideline Exceedances	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
Number of Guideline Exceedances(Detects Only)	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####

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Summary of Results Compared to Adopted Assessment Criteria

												Halogenated Hydrocarbons					Halogenated Benzenes									Solvents								
			cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichloromethane	Hexachlorobutadiene	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride	1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Chlorobenzene	Methyl Ethyl Ketone	2-hexanone (MBK)	4-Methyl-2-pentanone	Acetone	Acrylonitrile	Allyl chloride	Carbon disulfide	MTBE	Vinyl acetate
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	1	5	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	10	5	1	10	0.1	0.1	0.5	0.1	10
ISQG-High																																			
ISQG-Low																																			
Location_Code	**Field_ID**	**Sampled_Date_Time**																																	
T_6_SD01	T_6_SD01	16/11/2015	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1 *	<0.1	<0.1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
Statistical Summary																																			
Number of Results			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of Detects			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration			<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<5	<1	<10	<0.1	<0.1	<0.5	<0.1	<10
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration																																			
Median Concentration			0.05	0.05	0.05	0.25	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.5	2.5	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	5	2.5	0.5	5	0.05	0.05	0.25	0.05	5
Standard Deviation																																			
Number of Guideline Exceedances			#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
Number of Guideline Exceedances(Detects Only)			#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####

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Lesotho, Mozambique,
Namibia, New Zealand, Nigeria,
Philippines, Qatar, Rwanda, Singapore, South Africa,
Swaziland, Tanzania, Thailand, Uganda,
United Arab Emirates, Vietnam, Zambia,