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Preliminary Investigation of Contamination

Proposed Georges Cove Marina

Prepared for Benedict Industries Pty Ltd | 28 July 2015

Planning + Environment + Acoustics

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Preliminary Investigation of Contamination

Final

Report J14149RP1 | Prepared for Benedict Industries Pty Ltd | 28 July 2015

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Table of Contents

Table of Contents *(Cont'd)*

Table of Contents *(Cont'd)*

Appendices

Tables

Figures

Figures

Photographs

1 Introduction

Benedict Industries Pty Ltd (Benedict Industries) (who are acting for the landowner, Tanlane Pty Ltd (Tanlane)) propose to construct and operate a marina and related facilities on part of Lot 7 in DP 1065574 (referred to as "Lot 7" hereafter), 146 Newbridge Road, Moorebank, in the Liverpool City Council Local Government Area (LGA).

The marina is proposed to be developed on the southern portion (approximately 13 ha) of Lot 7 (which is approximately 22 ha in total). This preliminary investigation (PI) addresses the contamination potential of this southern portion of Lot 7 which is referred to as the "marina site" (shown in Figure 1.1).

Lot 7 (ie the combined northern section and marina site) has been used for sand extraction, dredging and recycling operations. The marina site itself largely comprises a dredge pond created by extractive industry operations. These activities have been undertaken by entities controlled by Benedict Industries in accordance with relevant regulatory requirements including development consents, environmental protection licences and other permits.

The extractive industries on Lot 7 are reaching the end of their economic life. The marina development will utilise an existing sand extraction dredge pond (approximately 6 ha) within the marina site as the basis for forming the final marina basin. This will largely remove the need to import fill to restore the landform following the closure of the quarry as is permitted by the existing quarry planning approval.

Environmental monitoring has been undertaken on the marina site since 1993 and parameters related to potential contamination were considered in various technical assessments. Surface water samples were also collected in the northern portion of Lot 7 and from the Georges River. However, the previous frequency of sampling and the analytical suites do not allow a complete assessment of the current potential site contamination, consistent with the requirements of cl 7(2) of SEPP 55. In addition, the potential for contamination migration from the landfill to the immediate north, south and west, has not been considered in previous assessments.

This PI report has been prepared to satisfy the requirements of cl 7(2) of SEPP 55. The PI was undertaken in May to July 2015, and encompassed a desktop review of all available historic information, a site inspection and a field investigation program assessing soil, dredge pond sediment and dredge pond surface water. The investigation was undertaken in accordance with the *Guidelines for Consultants Reporting on Contaminated Sites* (OEH 2011).

1.1 Development application

Development consent for the Georges Cove Marina was granted to Tanlane by the Sydney West Joint Regional Planning Panel (JRPP) on 22 August 2014 (JRPP Reference Number 2012SYW035). The proposed Marina was recommended for approval by Liverpool City Council after a lengthy assessment process.

The validity of the consent was challenged in 2015 by the proposal's sole objector, Moorebank Recyclers, in the NSW Land and Environment Court. The court ruled in favour of the objector, declaring that the Consent was invalid because the application did not include a PI. As a result of this decision, this PI report has been prepared and will be submitted to Liverpool City Council and the Sydney West Joint Regional Planning Panel as part of a new development application for the Georges Cove Marina development.

1.2 Objectives

Extractive industry has been conducted at the marina site since approximately 1993. Table 1 in the *Managing Land Contamination Planning Guidelines, SEPP 55–Remediation of Land* (Department of Urban Affairs and Property, and Environment Protection Authority (DUAP/EPA) 1998) identifies "extractive industries" as a potential contaminating activity. Therefore "the applicant for development consent must carry out the investigation required by subclause (2) and must provide a report on it to the consent authority" (cl 7(3) of SEPP 55). "The consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines" (cl 7(2) of SEPP 55). This PI report has been prepared to meet these requirements. It was prepared in accordance with the Office of Environment and Heritage *Guidelines for Consultants Reporting on Contaminated Sites* (OEH 2011).

As per Section 3.4.1 of the *Guidelines for Consultants Reporting on Contaminated Sites* the main objectives of a PI is to "to identify any past or present potentially contaminating activities, provide a preliminary assessment of any site contamination and, if required, provide a basis for a more detailed investigation" OEH (2011).

The proposed development was previously referred to the NSW Environmental Protection Authority (EPA). The EPA issued *General Terms of Approval* which specified that prior to any earthworks or dredging, the applicant must conduct:

1. acid sulfate soil (ASS) management testing;

2. sampling and analysis of sediment in the existing dredge ponds; and

3. sampling of the marina lake water prior to break-through to the Georges River.

This PI addresses item two. Acid sulfate soil and the marina basin water quality monitoring and management will be undertaken as part of the construction phase of works.

1.3 Scope of works

Works completed for this PI allow further understanding of the current contamination status of the marina site. This was achieved via a desktop review of publically available records, historic monitoring results, and a supplementary field program comprising of a site inspection and sampling. The specific tasks completed included:

- review of local and state planning databases (notably NSW Land and Property Information (LPI)), for the historical titles, historical aerial photographs, development controls and planning policies, heritage items and land use zoning;

- review of geologic and topographic maps, the Commonwealth Scientific and Industrial Research Organisation (CSIROs) Acid Sulfate Soils database and NSW Office of Water bore register to assess the environmental setting and likely subsurface conditions;

- review of local, national and federal databases maintained by the NSW EPA, WorkCover NSW and the Commonwealth Department of Environment;

- review of historical investigation reports for the marina site and adjacent areas;

- completion of a site inspection and screening-level environmental sampling program, comprising collection of:
    - ten soil samples from nine test pits;
    - six dredge pond sediment samples;
    - three dredge pond surface water samples;
    - laboratory analysis of the primary and quality control samples for a range of contaminants of potential concern (COPC);
- analysis of the desktop, field observation and analytical data, and preparation of this report.

The study undertaken in accordance with the Contaminated Land Planning Guidelines, and was performed in general accordance with relevant guidelines made or endorsed under Section 105 of the *Contaminated Land Management Act 1997 (*CLM Act*)* including:

- *Guidelines for Consultants Reporting on Contaminated Sites* (OEH 2011); and
- *National Environment Protection (Assessment of Site Contamination) Measure (NEPM)*, Schedule *B2 Guideline on Site Characterisation* (NEPC 2013b).

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Marina site location and boundary

Georges Core Marina Development
Preliminary Investigation of Contamination

Figure 1.1

2 Site identification

2.1 Site identification

Table 2.1 details the marina site identification particulars.

Table 2.1 Site identification

Site particulars	
Street number, name and suburb	146 Newbridge Road, Moorebank
Lot number and Deposited Plan number	Southern portion of Lot 7 DP 1065574
Local council	Liverpool City Council
Parish	Holsworthy
County	Cumberland
Coordinates	N312058, E6243188
Site owner	Tanlane Pty Ltd
Site occupier	Benedict Industries Pty Ltd
Current zoning	RE1 Public Recreation and RE2 Private Recreation
Current land use	Sand quarrying
Site area	13 ha

Notes: Data provided by Liverpool City Council.

2.2 Currently approved site activities and zoning

In 1993, the Land and Environment Court granted consent for the extraction of sand from Lot 7 via dredging and dry extraction methods. The approval required the rehabilitation of Lot 7 on cessation of extractive industries with the importation and processing of waste materials permitted to fill empty cells to return these areas to their natural landform. The excavated areas were to be filled with the imported fill materials to natural floodplain levels, then have the topsoil replaced and be grassed for use as grazing land. No dredge ponds would remain that could be utilised to form a marina basin. Hence, even the "rehabilitation" required by the 1993 consent would not make the marina site suitable for the purpose of a marina. Rather, the rehabilitation was to make the land suitable for use for the purpose of grazing land.

The marina site is zoned as Private Recreation (RE1) and Recreation (RE2). The development of a marina and related recreational facilities is expressly permitted with consent within these zones.

The marina site contains a large dredge pond (approximately 6 ha) and tailings from the sand washery consisting of sand fines. Sand extraction by dredge has taken place to maximum depths of approximately 15 m in places. The disposal of virgin excavated natural materials (VENM) is permitted within the current Environmental Protection Licence (EPL).

Final restoration of the marina site has not commenced and the dredge pond created from the sand extraction operations remain. The 1993 consent and EPL (number 4612) permit the restoration of Lot 7 back to natural surface levels via the importation of fill materials. Approval of the marina proposal will remove this need within the marina site. It is expected that final extraction operations will be completed within three months (ie by September 2015).

Development consent for the proposed marina is required under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and pursuant to the provisions of the Liverpool Local Environmental Plan (LEP) 2008 and Development Control Plan (DCP) 2008.

3 Site history

3.1 Historic land ownership

The historical titles were obtained from the LPI. The details are summarised in Table 3.1.

Table 3.1 Historical land ownership

Year	Proprietor
1947-1954	Anthony Francis Brady, dairyman and Mary Agnes Brady, wife
1954-1960	Anthony Francis Brady
1960-1997	Echo Dairies Pty Ltd
1997-current	Tanlane Pty Ltd

Source: LPI (2015)

3.2 Aerial imagery

Historical aerial imagery was obtained from the LPI, at roughly 10 year intervals. Review of aerial imagery of the marina site and surrounds is documented in Table 3.2. The photographs are provided in Appendix A.

Table 3.2 Review of aerial imagery

Year	Marina site	Surrounds (200 m radius)
1951	Mostly cleared of vegetation (bare surfaces), no discernable developments	Cleared vegetation to the north and south Georges River to the east Vegetation to the west, with unsealed tracks
1961	Unchanged from above	Cleared vegetation to the north and south, with a building to the north Quarry appears to the west Agricultural plots to the north-west, with unsealed tracks
1970	Unchanged from above	Unchanged from above
1978	Unchanged from above	Unchanged from above with the exception of the size of the quarry to the west has increased Residential development to the far north-west appears
1986	Unchanged from above	Unchanged from above Plot to the north completely cleared Development to the far north appears, Flower Power Gardening Centre.
1998	Two large dams appear in the centre of marina site	Unchanged from above

Table 3.2 Review of aerial imagery

Year	Marina site	Surrounds (200 m radius)
2005	Dam areas increased, taking up approximately 70% of the marina site	Unchanged from above with the exception of the size of the quarry to the west has increased Landfill activity and a recycling centre (stockpiles and small development) evident to the immediate north
2015	The northern extent of the dams has increased, the southern extent has decreased. Overall, the surface water takes up approximately 60% of the marina site	Unchanged from above with the exception of the quarry to the west, which has been replaced by residential properties Land to the north remains cleared

Source: LPI 2015

3.3 Land use

The aerial photography and historical land ownership confirms that the land has been used for vegetable farming prior to 1965 and as a dairy from 1960 to 1972.

The previous EIS (Benedict Industries 2012) notes that prior to the grant of the 1993 consent and issue of the EPL, a small quantity of VENM was used to assist in restoring landforms on the marina site. The source and the exact location of the VENM fill is unknown. It is also understood that one to two metres of topsoil has also been stripped and sold from the marina site. This is consistent with observations made during the PI. However, fill material including anthropogenic debris was observed in several test pits, see Section 8.2.1).

There is also evidence to suggest that parts of the marina site were used as a landfill between 1972 and 1993, likely for construction and demolition waste. Approximately 1,000 tonnes of potential ASS (PASS) has been disposed of on marina site (pers comms Mark Morris, Production Manager, 29 May 2015).

Development consent was granted in 1993 to the current owners, Tanlane, to extract sand by dredging and fill the dredged void with 'clean fill' back to natural ground level. This required the surrender of the 1972 land-filling consent that permitted the use of Lot 7 as a landfill. Since the sand dredging consent was issued in 1993, Tanlane have indicated that there has been no waste deposited onto the proposed marina site, and that in 1992 stockpiles of waste were removed.

Manufacturing and industrial processes have not occurred on the marina site. There is no evidence of underground storage tanks (USTs) in the marina site. Benedict personnel indicated that fuel and chemicals for use in the recycling operations are stored on the northern portion of Lot 7 (ie north of the marina site). It is our understanding that there is no chemical or fuel storage on marina site, which is consistent with the results of a search of the WorkCover NSW stored chemical information database. There is a bio-septic sewerage system on the northern portion of Lot 7, approximately 300 m to the north of the marina site.

3.3.1 Waste recycling facility to the north

The northern portion of Lot 7 has been used for the purpose of landfill. Land-filling is listed in Table 1 of the C*ontaminated Land Planning Guidelines* (DUAP/EPA 1998) as an activity with the potential to cause contamination. As with the marina site, the historical land uses of the north adjacent land included vegetable farming prior to 1965 and use as a dairy from 1960 to 1972. The northern portion of Lot 7 was used as a landfill between 1972 and 1990. It is not known if land-filling occurred continuously.

The northern portion of Lot 7 (ie the north adjacent property) is currently used as a waste disposal and recycling centre. The waste described on the current EPL is waste tyres, wood waste, paper waste, plaster board, building and demolition waste, asphalt waste and general waste. There is some resource recovery and waste storage at the waste recycling facility.

Although the landfill is not on the marina site, it was considered as a potential off-site source of contamination that might adversely affect the site given the groundwater flow direction. This area was rezoned to permit residential development and landfill activities are no longer taking place.

3.4 Development controls and planning policies

The Planning Certificate for Lot 7, under section 149 of the EP&A Act, specifies the development controls and planning policies that apply to the land, including contamination issues (provided in Appendix B).

There was no reference to contamination issues or site audits applicable to the Lot 7, therefore no matters arising under Section 59(2) of the CLM Act (contamination matters requiring the notification of local council). There are no items of environmental heritage within the Lot 7. However Lot 7 is identified as "containing environmentally significant land" under Division 2 Other Provisions of the Liverpool LEP 2008.

3.5 NSW EPA contaminated land register

The EPA's *Contaminated Land Public Record of Notice*, under Section 58 of the CLM Act, contains a list of sites for which the EPA has issued regulatory notices under the CLM Act. It includes the details of current and former regulatory notices issued. A site listing indicates that the notifiers consider the site to be contaminated and warrant reporting to EPA. A site will be on the contaminated land record of notices only if the EPA has issued a regulatory notice under the CLM Act.

A search of this register did not indicate current or historical regulatory notices issued for the marina site or surrounding properties (approximately 500 m radius).

To the east of marina site (approximately 100 m) was a former Boral brick quarry, which ceased operations in 2003. A search indicated that the formal Boral brick quarry was the subject of a remediation program to facilitate rezoning for the Georges Fair residential development. Details regarding the nature and extent of contamination, and remediation on the former Boral quarry site were not readily available. However, it has been assumed that, in keeping with standard contaminated land legislation and guidelines in NSW, the land use suitability assessment would have included a requirement to demonstrate negligible risk from contamination to surrounding properties.

3.6 Sites notified to the NSW EPA

The EPA's list of contaminated sites notified to the EPA under Section 60 of the CLM Act provides an indication of the management status of that particular site. Properties are required to be notified to the EPA under Section 60 of the CLM Act if there is reason to suspect the land is contaminated, and one or more of the notification triggers in the Duty to Report guidelines exist at the site. Upon receipt of a Section 60 notification, the EPA assesses the contamination status of the site to determine whether the contamination is significant enough to warrant regulation by the EPA.

A search of this register did not indicate notification of the marina site or surrounding properties (approximately 500 m radius).

3.7 NSW EPA POEO public register (environmental protection licences)

Benedict Industries holds a current EPL (license number 4612) for the marina site (and off-site areas), with resource recovery and waste storage as the scheduled activities (Appendix C). Additional activities relate to:

- crushing, grinding or separating; and
- extractive activities (land and water based).

A license variation was issued (Notice Number 1046512) to Maron Investments Pty Ltd (trading as Benedict Reclamations) in May 2005. The EPL includes the storage/disposal of VENM, including PASS under water, on the marina site and lists monitoring requirements. Approximately 1,000 tonnes of PASS has been disposed of on-site.

3.8 WorkCover NSW stored chemical information database

WorkCover NSW maintains a database of bulk storages of different chemical classes (including USTs and dangerous goods) above certain thresholds. In particular, the presence of USTs is often, but not always, documented in the stored chemical information database. An application for a database search for Lot 7 was submitted and concluded that there are no records of stored chemicals at the marina site.

4 Site condition and surrounding environment

4.1 Site condition and signs of contamination

A site inspection was performed on 29 May by Philip Towler and Lange Jorstad (Principal Environmental Scientists) and Sean Cassidy (Hydrogeologist) to assess the current site condition and to provide a visual assessment of potential contamination sources. The marina site is mostly occupied by stockpiles and the main dredge pond (see Photograph 4.1 and 4.2, and Figure 4.1). Un-paved access roads connect a workshop to the north with the marina site. There is dense vegetation on the eastern boundary of the marina site, along the Georges River western bank. Dense vegetation, predominantly grasses and medium sized trees, surrounds the marina site to the south and west.

Discarded pipes, assumed to be associated with dredging operations, are located along the western boundary of the dredge pond, with isolated occurrences of rubbish observed across the marina site. There were no hydrocarbon stains or odours noted during the site inspection.

A number of large stockpiles were observed on the marina site during the inspection. According to Benedict personnel, these consist of soil and overburden from on-site dredging activities. The stockpiles in the centre/north of Lot 7, to the north of marina site, typically cover an area of 10-20 $m^2$and are 2 to 3 m tall. The stockpiles onsite to the east of the dredge pond are smaller (ie >3 m^2) (see Photograph 4.2).

There is a large mound (as opposed to a temporary stockpile) measuring approximately 140 m by 60 m, and 10 m high across the south-west corner of the marina site. The mound, originally constructed of fill, stripping and overburden, is now vegetated with grasses and small shrubs. Discussions with Mark Morris of Benedict Industries indicate that the mound has been in its present location for approximately five years and has remained largely unchanged, although it is intended to remove this mound in preparation for the proposed marina development (pers. comm. Mark Morris July 2015).

Photograph 4.1 **Site condition – 29 May 2015**

Photograph 4.2 **Stockpile at the eastern end of the marina site, adjacent to the dredge pond**

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Approximate location of stockpiles

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Preliminary Investigation of Contamination

Figure 4.1

4.2 Meteorology

Site temperature and rainfall data were obtained from the Bureau of Meteorology. Temperature data was obtained from the Bankstown Airport station: 066137. The warmest months are in summer (mean maximum temperature of 28°C) and the coolest months are in winter (mean maximum temperature of 17°C).

Rainfall data were obtained from the Milperra Bridge Georges River monitoring station: 066168. The average monthly rainfall is 53 mm and there is some slight variation between seasons. Rainfall is typically highest in summer (average 79 mm/month) and lowest in winter (34 mm/month).

4.3 Soil and geology

The *Soil Landscape Map of Penrith, Soil Landscape Series Sheet 9030*, Scale 1:100,000 prepared by the Soil Conservation Service of NSW (Hazelton et al. 1989), indicates that the marina site is located within the "Richmond Landscape Area" and typically consists of clays, clay loams, sands and ironstone nodules.

Geologically the marina site in located in the middle of the Permo-Triassic Sydney Basin on the Cumberland Plain. The geology of the Sydney basin comprises thick stratigraphical sequences of Permian and Triassic sedimentary rocks including sandstone, siltstone and shale formations (with interbedded coal seams in the lower Permian sequence with deposition occurring between 210 and 290 million years ago).

Reference to the *Geological Map of Penrith*, scale 1:100,000 (1991) shows the marina site is situated on Quaternary aged deposits of medium grained sand, clay and silt. Within the Georges River floodplain the Quaternary deposits are underlain by Tertiary quartzose sands and clays.

The underlying Triassic Wianamatta Group, Mittagong Formation, Hawkesbury Sandstone and Narrabeen Group are shown to be steeply folded at the marina site, such that the Wianamatta Group outcrops to the west, and the Hawkesbury Sandstone outcrops to the east of Georges River. These porous rock units comprise quartz sandstone and carbonaceous claystones and siltstones, with shale and laminate lenses (Geoscience Australia, Australian Stratigraphic Units database).

4.3.1 Drilling observations

Six monitoring wells were installed around the marina site in 1994 by Dames and Moore (Dames and Moore 1994a). Four monitoring wells (originally labelled BS1 to BS4, now renamed monitoring points: MP1 to MP4) were located along the riparian buffer between the project area and the river, one well was located to the south of the marina site (BS5) and was later decommissioned and replaced by a well on the western side of the project area (MP5) and the final well was located to the north of the existing dredge pond (MP6). Monitoring point MP6 has since been destroyed.

Sequences of fine to coarse sands, silty sands, silts and sandy silts with thin gravel lenses overlying shale bedrock were recorded in the borehole logs. A generally finer grained lithology comprising sandy silts and silty sands predominated in the two boreholes on the western side of the marina site. The thickness of the unconsolidated sediments was reported to range from 11 to 17 m, thickest adjacent to the Georges River and thinning towards the north and west (Dames and Moore 1994a). The reported lithology is consistent with deposition in an alluvial environment.

4.4 Hydrology

Surface water runoff on the marina site predominantly drains towards the dredge pond. A small portion of the marina site, to the east of the dredge pond, could drain towards the adjacent Georges River.

Flood potential at the current low-lying marina site is considered to be high due to the adjacent Georges River. The results of a flood study (Worley Parsons 2010) that included a numerical flood model indicated that:

- in a 20 year average reoccurrence interval (ARI) flood, the impact of the planned development on flood hazard will be negligible except on the western side of the marina site where the proposed development will increase the ground level, eliminating the flood hazard; and
- in a 100 year ARI flood, the impact of the planned development on flood hazard will be negligible.

The proposed development is anticipated to have a negligible impact on the behaviour of flooding in the flood storage area in the south-west of the marina site and negligible impacts on adjacent properties. The marina will not increase the flood hazard category.

4.5 Hydrogeology

The unconsolidated deposits beneath the marina site are considered to form a single, unconfined aquifer. Groundwater levels are shallow, typically 2-3 m below ground level, and are in hydraulic connection with the river tidal levels (Dames and Moore 1994a).

The measured permeability in the monitoring wells adjacent to Georges River ranged from 12 to 47 m/day averaging 30 m/day, while permeabilites of less than 1 m/day were measured in the finer sediments on the western side of the marina site (Dames and Moore 1994a). Horizontal flow is expected to dominate due to the relatively impermeable underlying Wianamatta Group Shales.

Dames and Moore (1994a) inferred that there was an overall flow of groundwater in a south-easterly direction towards the Georges River. They concluded that groundwater flows in the zone adjacent to the river were likely to be influenced by the intrusion of brackish/saline river water at depth, with fresh water flows towards the river concentrated in the shallow zone at approximately 5-6 m depth. Groundwater at depth adjacent to the Georges River can be influenced by relatively higher salinity water from the adjacent creek.

A search of the NSW Office of Water registered bore database did not identify registered bores at the marina site or within a radius of 400 m around the site.

4.6 Acid sulfate soils

The project area has been identified on the Liverpool LEP (2008) Acid Sulfate Soils (ASS) map (class 1, 2, 4, and 5), and reference to the Atlas of ASS indicates there is a high probability for ASS. The ASS Atlas is a dataset of available national ASS mapping and ASS qualification inferred from surrogate datasets, prepared by CSIRO Land and Water.

The creation of a channel between the marina basin and the Georges River will require the removal of the existing soils between the dredge pond and the river. These soils have the potential to be ASS and may require classification and appropriate management. An ASS management plan will be prepared and implemented.

4.7 Surrounding land uses

The surrounding land uses are shown in Figure 4.2 and are discussed below.

4.7.1 North

The area north of the marina site (the northern portion of Lot 7), also owned by Benedict Industries, is a licensed waste recycling facility, and historically operated as a landfill. This land is also utilised as a workshop for the dredging operation and recycling facility. The land has been rezoned, and a residential estate is planned for the northern portion of Lot 7 DP 1065574. This land is bounded to the far north by Newbridge Road (a six lane Roads and Maritime Service (RMS) Class 1 Road) with industrial land uses to the north of Newbridge Road.

As described in Section 3.3.1, land-filling previously occurred on the northern portion of Lot 7. Although the landfill is outside the marina site boundary, landfill leachate generated from the interaction of water and waste material has the potential to enter groundwater and migration to adjacent properties. Accordingly, the potential for landfill leachate from the northern portion of Lot 7 to adversely affect the marina site was considered during this PI.

The commercial gardening centre “Flower Power” is located to the north-west of the northern portion of Lot 7.

4.7.2 East

The marina site is bounded by the Georges River to the east. There is expansive recreational open space within the Bankstown LGA on the eastern side of the Georges River. This area is characterised by open grasslands with some rural sheds, outbuildings and three to four residential dwellings.

4.7.3 South

The south adjacent property comprises undeveloped, vegetated land (Wurrungwuri Reserve) that is zoned Environmental (E2) within the Liverpool LEP (2008). There is a golf course and other recreational facilities beyond. The land to the south of the marina facility is proposed to be developed into a materials recycling centre.

At the current golf course location land-filling was undertaken between 1972 and 1979 by Collex, following an approval from the Metropolitan Waste Disposal Authority and the State Pollution Control Commission. The landfill was licensed to accept non-putrescible wastes (eg builders’ rubble). Vegetation and other organic biodegradable materials may have been accepted at the landfill as they were considered as non-putrescible when land-filling was operating. As with the landfill in the northern portion of Lot 7, the potential for leachate from the landfill on the south adjacent property to adversely affect the marina site (via migration in groundwater) was considered during the PI.

4.7.4 West

The adjacent property to the west hosts the Georges Fair residential estate comprising 960 approved houses which are nearing completion. Prior to the housing development, this land was used as a brick works by Boral.

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Surrounding landuse

Georges Core Marina Development
Preliminary Investigation of Contamination

Figure 4.2

5 Basis for assessment

5.1 Potential contamination sources

Based on the review of available information and a site inspection, the following potential contaminating sources were identified at the marina site and surrounds:

- historic land use as dairy;
- the introduction of fill, the source and quality is uncertain;
- operation and storage of quarry machinery;
- potential for acid generation and metal mobilisation from the disturbance of ASS;
- potential for contaminants to absorb onto dredge pond sediments;
- storm water discharges at the marina site; and
- the operation of a landfills in the vicinity of the marina site, which has the potential to affect the site via migration and discharge of landfill leachate and gas.

Quarrying is listed as a potentially contaminating activity in the *Planning Guidelines for Contaminated Land* (DUAP/EPA 1998). In addition the land to the north, which is hydraulically upgradient, has been used as a landfill and presents a contamination risk. There are visible signs of rubbish on marina site as well as storm water discharge to the Georges River downgradient of the dredge pond.

No asbestos has been recorded on the marina site, nor are there any contamination issues noted on the planning certificate. The EPA contaminated lands registers and WorkCover database do not indicate any site contamination.

5.2 Contaminants of potential concern

The COPC are detailed in Table 5.1. The PI analytical suites have been aligned with the COPC based on the potentially contaminating activities, also outlined in Table 5.1.

Table 5.1 Potential for site contamination

Potential areas of concern	Rationale/details	Potential contaminants
Fill and soil at the marina site	Potential for soil on the land concerned to be impacted by: - current and historic stockpiling; - operation and storage of quarry plant; - filling (with potential for materials to be imported from unknown sources); and -past dairying activities.	metals TPH/TRH BTEX PAH pesticides

Table 5.1 Potential for site contamination

Potential areas of concern	Rationale/details	Potential contaminants
Dredge pond sediment	Potential for the dredge pond water to be impacted by: - operation of the quarry; and - surface water and groundwater discharges containing contaminants.	metals TPH/TRH BTEX PAH pesticides nutrients
Dredge pond water	Potential for the dredge pond water to be impacted by: - storm water discharges containing surface based contaminates; and - discharge of groundwater impacted by the landfill upgradient.	dissolved metals TPH/TRH BTEX PAH nutrients
Groundwater	Potential for groundwater to be impacted by: - current and historic stockpiling; - operation and storage of quarry material; - filling (with potential for materials to be imported from unknown sources); - past dairying activities; and - leachate from the adjacent historic landfills.	dissolved metals TPH/TRH BTEX PAH nutrients

Acronyms: total petroleum hydrocarbons (TPH); total recoverable hydrocarbons (TRH); polycyclic aromatic hydrocarbons (PA); benzene, toluene, ethyl benzene and xylenes (BTEX).

5.3 Assessment criteria

The individual assessment criteria are included in the summary tables in Appendix D. An overview of the assessment criteria is provided below for each medium assessed in the PI.

5.3.1 Soil

The *National Environmental Protection (Assessment of Site Contamination) Measure* (NEMP) *Schedule B1: Guideline on Investigation Levels for Soil and Groundwater* (NEPC 2013a) presents health-based and ecological investigation and screening levels for soil, groundwater and vapour. These guidelines are applied to determine the human health and ecological risks associated with the presence of site contamination. Different soil investigation levels are provided for different land uses (with different contamination exposure assumptions) including:

- low density residential with garden/accessible soil (ie home grown produce), also includes childcare centres and schools;
- high density residential with minimal opportunities for soil access (ie fully to permanently paved yard spaces);
- public open space (ie parks and playgrounds); and
- commercial/industrial (ie shops, offices and factories).

The future land is to be used for a marina and potentially residential units, with public open space. The residential with garden/accessible *soil* health investigation levels (HIL B) have been adopted in this PI and are considered to be an applicable and conservative approach for the multiple land uses proposed (Table 1A (1), NEPM 2013).

The complex mixtures of aliphatic and aromatic compounds that comprise petroleum hydrocarbon products can present human health risks from exposure via inhalation of vapours and direct contact with affected soils. Therefore, the soil health screening levels (HSL) for vapour intrusion from shallow sand material into a residential setting were adopted to assess risk to humans (HSL A&B, Table 1A (3)).

The assessment criteria also consider environmental risks, and thus ecological investigation levels (EILs) and ecological screening levels (ESLs) have been included to assess risk to terrestrial ecosystems in urban and open spaces above coarse sediment (the most conservative option) (Table 1B (5 and 6)).

Investigation and screening levels are intended for use as Tier 1 screening levels, and to trigger consideration of an appropriate site-specific risk-based assessment approach or appropriate risk management options where they are exceeded.

5.3.2 Dredge pond sediment

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* in 2000 (the *Water Quality Guidelines*) (ANZECC/ARMCANZ 2000) provide numerical values and narrative statements that are applied to assess water quality and water quality objectives that support and maintain a designated water use or environmental values. The comparison of water quality results to the guideline values is recognised as industry best practice, and promotes a holistic approach to water management.

The *Water Quality Guidelines* include Interim Sediment Quality Guidelines (ISQG) (Table 3.5.1 ANZECC/ARMCANZ 2000), which are specific to enclosed systems potentially receiving contaminants. Sediments are important, both as a source and sink of dissolved contaminants, and can provide a source of bioavailable contaminants for benthic biota. The guidelines are applicable to slightly to moderately conditions, and results have been compared to the low and high trigger values. The low and high values correspond to the effects range low and median.

5.3.3 Dredge pond water

The *Water Quality Guidelines* have been used to assess the dredge pond water quality. The application of the guidelines takes into consideration the environment type, value and existing condition as well as the level of change that is considered acceptable. The environmental values of the dredge pond water are considered to be aquatic ecosystem with recreational use. Assessment criteria are provided for freshwater and marine aquatic ecosystems (Table 3.4.1, ANZECC/ARMCANZ 2000).

With the adoption of the freshwater and marine aquatic ecosystem trigger values, different grades of environmental value are considered. The environment is assessed to be highly disturbed, however the more conservative protection values for slightly to moderately disturbed (generally for the protection of 95% of species) have been adopted.

Trigger values for freshwater and marine water species are different, with freshwater trigger values generally lower for metals, non-metallic inorganics, phenols and xylenols than for marine water. While marine water trigger values are lower for total petroleum hydrocarbons and pesticides. The comparison of results for the dredge pond water samples with both fresh and marine water guideline values is considered warranted for this assessment as the dredge pond water is expected to interact with the Georges River which is estuarine and has highly variable electrical conductivity/total dissolved solids (EC/TDS) concentrations.

Default trigger values for the physiochemical stressors (ie EC and ammonia) for South-east Australia for have been adopted. These trigger values are derived from ecosystem data for unmodified or slightly-modified ecosystems; there is no distinction of values based on the level of ecosystem condition. Therefore, the adoption of these default trigger values is conservative for both the dredge pond and Georges River given they receives substantial storm water runoff contribution from an urban, industrial catchment.

The *Guidelines for Managing Risks in Recreational Water* (NHMRC 2008) assesses the risks to recreational uses of water (eg water used for water skiing or swimming) from physical and chemical stressors. With regard to assessing the human health hazards associated with chemicals in a recreational use context, Section 9.3.2 of the guidelines recommends adopting a multiplier of the *Australian Drinking Water Guidelines* (NHMRC/NRMMC 2011) criteria to account for the difference in the assumed water ingestion volume in a recreational context. The guidelines recommend that the *Australian Drinking Water Guidelines* criterion is multiplied by 10, with the assumption that water ingested during recreational activity is approximately 10% (200 mL) of that assumed for daily drinking water intake (2 L).

6 Sampling and analysis plan and sampling method

6.1 Sampling, analysis and data quality objectives

A site inspection was undertaken on 29 May 2015 by the two principal reviewers (Dr Lange Jorstad and Dr Philip Towler) and the hydrogeologist in charge of the field program (Sean Cassidy) to identify representative sampling locations suitable for the PI determined based on site history. A further objective of the site inspection was to gain an overall understanding of the existing site condition relative to the proposed final landform. The objectives of the PI sampling program were to gain further insight into the contamination status of soil, sediment and dredge pond surface water at the marina site, in accordance with the requirements of SEPP 55 (the *Planning Guidelines for Contaminated Land* (DUAP/EPA 1998)).

The sampling program was carried out on 3 June 2015 by a hydrogeologist (Sean Cassidy) and environmental scientist (Louis Pearse–Hawkins).

6.2 Sampling rationale

Sampling was undertaken from three mediums: shallow soil, dredge pond sediment and dredge pond surface water. The sampling locations are shown in Figure 6.1. Groundwater, storm water and Georges River water samples were not collected in conjunction with this PI as recent monitoring results (from 2014) were available for these locations.

The investigation locations for the soil test pits and collection of dredge pond sediment samples were selected to provide broad spatial coverage of the marina site, and to address areas of limited data coverage from previous investigations.

The design of the sampling program employed judgemental (targeted) sampling locations to strategically assess upgradient contamination sources and their influence of downgradient receptors, as well as the final proposed landform of the marina.

Samples collected to the north of the dredge pond (TP-7 and TP-8) were targeted to assess potential impacts to soil quality from the operations on the north adjacent property. Testpits TP-3, TP-4 and TP-6 along the western boundary targeted imported fill material to the west of marina site. Testpits in the southern end of the marina site (TP-1, TP-2, TP-4 and TP-5) were selected based on the final landform and sampling locations to the east assessed soil suitability to the adjacent Georges River. To the extent practicable, soil, sediment and surface water sampling locations were clustered to allow a basic spatial comparison across the three media.

A number of intentional exclusions and constraints were considered in the design of the preliminary investigation, as follows:

- A number of stockpiles, including the large fill mound, were present across the marina site. These were intentionally excluded from the preliminary investigation as the intention is for off-site disposal of the material to prepare the landform for construction, at which time validation soil samples will be collected from the stockpile footprints.

- Dredge pond sediment samples were collected from the shore of the pond using a long-reach excavator. Accordingly, sediment sample collection locations were limited by the shoreline access and the reach of the excavator.

- Surface water samples were collected from close to the shore of the pond. Accordingly, the sample locations were limited by the reach of the sampling equipment from the shoreline. Given that a suction dredge was operating in the pond in the days preceding, and during, the investigation, the pond water was likely to be well mixed, and likely contained a greater than usual suspended sediment load due to the disturbance from dredging operations.

6.2.1 Groundwater, storm water and Georges River surface water

WaterTest have collected groundwater, Georges River surface water and stormwater samples on behalf of Benedict Industries for a number of years. Four quarterly monitoring events were undertaken in 2014. The quarterly analytical suite included analysis for physical properties and metals, while the biannual events had an expanded suite that also included total petroleum hydrocarbon (TPH).

The WaterTest sampling results were considered sufficient to inform the PI and therefore no additional groundwater, Georges River surface water or storm water samples were collected. WaterTest have provided laboratory reports for the period of monitoring 1998-2014, and confirm that groundwater samples are collected from purged monitoring wells. As the WaterTest sampling methodology was not able to be observed during this PI, it has been assumed that the methodology is acceptable, and that the supplied data are reliable and suitable for interpretive use.

6.2.2 Soil and dredge pond sediment sampling method

Prior to any ground disturbance, the investigation locations were cleared of underground services by reference to service maps (obtained through the 'Dial Before You Dig Service'), site plans and the use of a Telstra-accredited service locator using radio-detection.

The excavation of the testpits was undertaken using an excavator with a 600 mm bucket; testpits in the areas where the least contamination was anticipated were completed first. Fresh soil samples were collected directly from the bucket at the top of each identified soil horizon, specifically at the following locations:

- at all fill/soil interface and/or 0.5 m bgl, and 2 m bgl or until testpit completion; and

- at the natural material just below the fill / natural interface.

Any field observations of visual or olfactory evidence of potential soil contamination, including the presence of anthropogenic material (eg debris, ash, asbestos-cement sheeting) during excavation were recorded. The testpits were back filled with the excavated material once the samples were collected.

Soil samples were immediately placed in new sampling jars with a Teflon-lined lid provided by the laboratory, ensuring that the headspace within the sampling jar was minimised. The individuals undertaking sampling wore new disposable gloves at each location.

The shovel used to collect soil from the bucket was decontaminated between sampling events by rinsing with phosphate-free detergent and potable water. A clean pair of disposable gloves was worn when collecting each sample. The sampling procedures and protocols were undertaken in accordance with the NEPM 2013 (Schedule B2).

6.2.3 Dredge pond water sampling method

Dredge pond water sampling locations were sited close to soil and sediment sampling locations. This allowed the potential for basic spatial correlations of contaminants to be explored.

Surface water samples were collected using a 10 L rinsed PVC bucket attached to a rope. The rope was extended to a minimum distance of 1 m from the bank, allowing a representative sample to be collected.

Physiochemical parameters (listed in Table 6.1) were measured in the field using a calibrated YSI water quality meter.

6.3 Laboratory analytes

The soil, surface water and dredge pond sediment samples were submitted in an ice filled esky to the NATA-accredited analytical laboratory Australian Laboratory Services (ALS). Chain of custody documentation accompanied the soil samples at all times and the samples were delivered to the laboratory within the required holding times.

The laboratory analytical methods are described in the laboratory reports, included in Appendix E.

Table 6.1 details the laboratory analytes for the PI sampling event.

Table 6.1 Laboratory analytes

Medium and analytes class	Analytes
Soil and dredge pond sediment	
Physiochemical parameters	EC and pH
Metals	As, Cd, Cr, Cu, Hg, Fe, Pb, Ni and Zn
Nutrients	NH_3 and total organic carbon (TOC); *only for dredge pond sediment*
TPH and TRH	TRH/TPH C_6–C_{40}, total and recoverable fractions
BTEX	benzene, toluene, ethyl benzene, m&p and o-xylene, and naphthalene
PAH	acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(a)pyrene (TEQ NEPM B1), benzo(a) anthracene, benzo(b&j)fluoranthene, benzo(g.h.i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a.h)anthracene, fluoranthene, fluorene, phenanthrene, indeno(1.2.3-cd)pyrene, pyrene, total PAH and carcinogenic PAHs (as BaP TEQ)
Polychlorinated biphenyls	total polychlorinated biphenyls (PCBs)
Pesticides	alpha-BHC, hexachlorobenzene (HCB), beta-BHC, gamma-BHC, delta-BHC, heptachlor, aldrin, heptachlor epoxide, trans-chlordane, total chlordane (sum), alpha-endosulfan, cis-chlordane, dieldrin, 4.4`-DDE, endrin, beta-endosulfan, endosulfan (sum), 4.4`-DDD, endrin aldehyde, endosulfansulfate, 4.4`-DDT, endrin ketone, methoxychlor, sum of Aldrin + dieldrin, sum of DDD + DDE + DDT, dichlorvos, demeton-S-methyl, monocrotophos, dimethoate, diazinon, chlorpyrifos-methyl, parathion-methyl, malathion, fenthion, chlorpyrifos, parathion, pirimphos-ethyl, chlorfenvinphos, bromophos-ethyl, fenamiphos, prothiofos, ethion, carbophenothion and azinphos methyl
Dredge pond water	
Physiochemical parameters	temperature, EC, pH, dissolved oxygen and redox
Metals	As, Cd, Cr, Cu, Fe, Hg, Pb, Ni and Zn
Nutrients	NH_3 as N
TPH and TRH	TRH/TPH C_6–C_{40}, total and recoverable fractions
BTEX	benzene, toluene, ethyl benzene, m&p- and o-xylene
PAH	acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(a)pyrene (TEQ NEPM B1), benzo(a) anthracene, benzo(b&j)fluoranthene, benzo(g.h.i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a.h)anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, indeno(1.2.3-cd)pyrene, pyrene and total PAH

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Preliminary investigation sampling locations

Georges Core Marina Development

Preliminary contaminated land assessment

Figure 6.1

7 Quality assurance and quality control

Specific field quality assurance (QA) methods and quality control (QC) measures were employed to validate the reliability of the data for interpretive use and as the basis for decisions. The QA/QC program was completed in accordance with standard industry environmental protocols, including:

- NEPM (2013b), *Schedule B2 Guideline on Site Characterisation*;
- Australian Standard 4482.1 2005 (*Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil*); and
- Australian New Zealand Standard 5667.1:1998 *Water Quality–Sampling*.

7.1 Field quality assurance and quality control

The field QA/QC measures included the following measures which prevent to cross contamination, and ensure full data collection:

- Record keeping: records of field activities, observations, sample locations (including duplicates) and field parameters.
- Sample collection, handing and preservation: the soil jars and groundwater bottles were appropriately labelled and stored in ice-cooled chests, and were delivered to the laboratory within the appropriate handling times and with completed chain of custody documentation (included in Appendix E).
- Dedicated equipment and decontamination: dedicated sampling equipment and decontamination between sampling locations was used to avoid cross-contamination. A new pair of gloves was worn at each sampling location.
- A duplicate or blind intra-laboratory sample was collected to measure the precision of the analytical procedure. Duplicate samples were collected for all mediums and had the same analytical suite as the primary sample.

7.1.1 Relative percentage difference

Laboratory precision using duplicate samples was assessed via the relative percentage difference (RPD). The RPD is calculated by:

$$\text{RPD} = \frac{(C1 - C2)}{\left(\frac{C1+C2}{2}\right)} x100\%$$

where C1 is the primary sample concentration and C2 is the duplicate sample concentration

The RPD% calculations are presented in Appendix D. According to Australian Standard AS4482.1-2005, typical RPD values for soils and groundwater range from 30 to 50% while an RPD within the range of 50% is considered to show acceptable agreement. Conversely, data is considered to have poor agreement where an RPD is outside this 50% range.

In instances where either the primary or duplicate sample results were below the laboratory LOR, half the LOR was applied. There were no RPD exceedances above 50% from the applicable primary sample. The results show acceptable agreement between the primary and duplicate samples.

7.2 Laboratory quality assurance and quality control

ALS Environmental conducts its own internal quality control program. This involves analysis of groundwater duplicates for the same parameters for the laboratory to assess the repeatability of the analytical procedures. In addition, standard solutions were analysed by the laboratory for the same parameters as the water samples, to check instrument accuracy. The laboratory QC report sheets are presented in Appendix E. The laboratory reports also include details on the surrogates and spikes used by the laboratory, and the instrument detection and practical quantification limits.

Based on the laboratory QA/QC results the analytical data presented by ALS Environmental is considered to be reliable. No instances of laboratory QA/QC results failing to meet ALS acceptance criteria were reported.

7.3 Quality assurance and quality control data evaluation

Based on the review of the data completeness and comparability, and the PI field and laboratory QA/QC procedures and results the analytical results are considered to be representative of actual conditions, and suitable for interpretive use.

The sample collection, documentation, handling, storage and transportation procedures utilised in this investigation are of an acceptable standard.

The analytical results provided by the laboratory are deemed reliable and complete based on:

- the results of field and laboratory QA/QC samples demonstrating adequate level of precision and accuracy;
- laboratory detection limits are less than the adopted assessment criteria; and
- samples were analysed for a range of contaminants with testing undertaken within the recommended holding times.

8 Results

8.1 Historic results

The marina site has been the subject of several technical reports including *Hydrological Investigation for Pollution Control Approval (*Dames and Moore 1994a), and *Report on Ground Water Sampling* (Dames and Moore 1994b). Environmental Protection Licence (number 4612) requires the regular ongoing sampling of groundwater monitoring wells in the site monitoring network that was set up as part of the works completed by Dames and Moore.

Environmental monitoring at the marina site commenced in 1993, in conjunction with the commencement of sand mining. Regular groundwater monitoring (as opposed to periodic monitoring) has been ongoing since 1998. An overview of the previous environmental site assessments is detailed in Table 8.1, with the locations shown in Figure 8.1.

Table 8.1 Previous contamination assessments

Reference	Sample type and number	Number of sampling events and period
Laboratory reports (Watertest)	5/6 x groundwater 1 x dredge pond water 2 x Georges River water 1 x stormwater	Frequent intervals between 1998–2014 (inclusive), with varying analytical suites
Worley Parsons (2010) & Marine Pollution Research (2010)	4 x groundwater 1 x dredge pond water 2 x Georges River water	Four events in 2006 (same results reported by different consultants)
Dames and Moore (1994b)	6 x groundwater	Five events in 1993
Unpublished (2015)	3 x soil 1 x dredge pond sediment	One event in 2015

8.1.1 Soil and dredge pond sediment

The following soil and dredge pond sediment conditions are reported with reference to unpublished soil (from three testpits) and sediment (one sample) site sampling undertaken in 2015:

- arsenic, chromium, copper, lead, nickel, mercury and zinc concentrations were reported above the laboratory limit of reporting (LOR), although the mercury value was low (0.07 mg/kg for soil and 0.08 mg/kg for dredge pond sediment). There were no exceedances of the applicable guidelines (NEPM HIL B and ISQG);
- all TRH and BTEX compounds were below the applicable laboratory LOR;

- the PAH results for benzo(a)pyrene, benzo(a)pyrene (TEQ) and total PAH were above the laboratory LOR at the western soil sampling location (TP3) and in the pond sediment; although the results were below the relevant guideline limits (NEPM 2013 HIL B);
- concentrations of organochlorine pesticides (OCPs), including DDT, were below the laboratory LOR, with the exception of aldrin+dieldrin, which was slightly above the laboratory LOR;
- total PCBs and total phenol concentrations were below the laboratory LOR; and
- no asbestos was reported at any of the four sampling locations where it was tested.

8.1.2 Storm water

Storm water samples have been collected from a storm water drain on the northern boundary of the northern portion of Lot 7 between 1998 and 2015. The storm water does not collect water from Lot 7, rather it collects influent from the local urban catchment to the north of Lot 7, including the recycling centre, and Newbridge Road. The following conditions are noted from the laboratory reports:

- pH conditions were neutral, ranging from 7-7.5, and electrical conductivity conditions were highly variable ranging from fresh to marginal (150-20,000 µS/cm);
- TDS were generally low, the maximum concentration was 880 mg/L;
- dissolved metal concentrations were typically below the laboratory LOR;
- nutrient concentrations were often above the laboratory LOR. Ammonia concentrations were higher in 2014 than earlier years with frequent exceedances of the ammonia guideline value for south-eastern Australian lowland rivers (0.02 mg/L), with a maximum concentration of 10 m/L (January 2015);
- TPH fractions (all fractions) were above the laboratory LOR on four occasions. The maximum TPH concentration was 20,000 µg/L (C_{15}-C_{28} fraction, in 2001), during this same sampling event the C_{10}-C_{14} fraction concentration was 11,000 µg/L;
- there were BTEX compounds detected in 2000, 2001 and 2010;
- the PAHs 2-methlynaphthalene, acenaphthene, fluorene and phenanthrene were detected at concentrations slightly above the LOR in 2001 and 2000;
- the phenol 2.4-dimethylpheonol concentration was slightly above the laboratory LOR on one occasion in 2001; and
- OCP concentrations were not reported above the LOR.

8.1.3 Dredge pond surface water

The following conditions are inferred from laboratory reports, and from Marine Pollution Research (2010) and Worley Parsons (2010) in regards to the dredge pond water:

- electrical conductivity ranged from 7,200–15,800 µS/cm, and conditions were marginal (in accordance with the classification system provided by the Australian Water Resources Council (1998), see the Glossary under 'salinity'). Electrical conductivity results exceed the ANZECC/ARMCANZ 2000 (south-eastern Australia low lying rivers) upper guideline limit (2,200 µS/cm);
- pH conditions ranged from 6.8-8, and overall conditions were slightly alkaline;
- both TOC and TDS were generally high, with TOC often >30 mg/L and TDS ranging between 6,750-9,670 mg/L;
- dissolved metal concentrations were often were below the laboratory LOR; iron, nickel and zinc concentrations were the exceptions;
- nutrient concentrations were typically low (<1 mg/L) until 2009. Ammonia concentrations generally increased from 2009 onwards. The maximum reported ammonia concentration was 12.6 mg/L (June 2015) and concentrations often exceeded 3 mg/L after 2009. Overall, the ammonia concentrations exceeded the ammonia guideline value for south-eastern Australian lowland rivers (0.02 mg/L);
- TPH (C_{15}–C_{28}) concentrations were slightly above the laboratory LOR once in 2000 and once again in 2011. The highest concentration was 770 µg/L (C_{15}-C_{28}, 2011); and
- phenols, OCPs, BTEX and PAH concentrations were below the laboratory LORs.

8.1.4 Georges River

Surface water quality in the Georges River has been monitored at two locations, upstream (MP8) and downstream (MP9) of the dredge pond. The results for both the upstream and downstream locations were typically comparable (ie did not reflect degradation of river water quality associated with quarrying operations). The following conditions are inferred from the laboratory reports, and the Marine Pollution Research (2010) and Worley Parsons (2010) reports:

- electrical conductivity was highly variable, ranging from brackish to marine quality (7,390-36,000 µS/cm). Electrical conductivity values have consistently exceeded the ANZECC/ARMCANZ 2000 (south-eastern Australia low lying rivers (ANZECC/ARMCANZ 2000)) upper guideline limit (2,200 µS/cm). Comparison of EC upstream and downstream indicates an increase in EC moving downstream.
- pH conditions were approximately neutral, ranging from 7.0-7.5;

- TDS concentrations ranged from 4,800-20,100 mg/L;
- dissolved metal results were typically below the laboratory LOR;
- nitrate concentrations were low (average 0.2 mg/L), but exceeded the guideline value for south-east Australian lowland rivers (0.015 mg/L). Ammonia concentrations were typically below the laboratory LOR and the maximum concentration was 1 mg/L. There were no statistically significant differences in nutrient concentrations between upgradient and downgradient monitoring locations;
- phenol concentrations were below the laboratory LOR;
- TPH concentrations exceeded the laboratory LOR twice (190 µg/L, C_{15}-C_{28} in 2000, at MP8 and 180 µg/L, C_{15}-C_{28} in 2009, ay MP9); and
- PAH concentrations were all below the laboratory LOR.

8.1.5 Groundwater

The following groundwater conditions are reported by Dames and Moore (1994b) and Marine Pollution Research (2010), with reference to the groundwater laboratory reports:

- electrical conductivity ranged from 500-21,500 µs/cm. Groundwater salinity is variable across the marina site and is considered to be mostly fresh to brackish;
- pH was 2.6-8.7 (mean 6.6), and overall conditions are acidic to slightly alkaline. The lower end of the pH range is very acidic and was observed on a number of occasions; whether this can be attributed to ASS or equipment malfunction is unknown;
- TDS concentrations ranged from 3,000 to <10,000 mg/L;
- TOC concentrations were highly variable over time. The highest TOC concentrations were historically reported at MP5, located on the western (up hydraulic gradient) boundary of the marina site. Peak historical concentrations at MP5 were >300 mg/L, and often exceeded the concentrations at other wells by one to two orders of magnitude. With the exception of MP5, no clear spatial or temporal trend was apparent from the historical TOC dataset;
- nitrate and ammonia concentrations in groundwater were typically reported above the laboratory LOR, with ammonia the predominant nitrogen species. Temporal trends in ammonia concentration varied at different groundwater monitoring wells. The highest historical concentrations were reported at MP5, located on the western (up hydraulic gradient) boundary of the marina site. The maximum ammonia concentration at MP5 was 68 mg/L (July 2011), with concentrations >10 mg/L frequently reported. The ammonia concentration at MP2, MP3 and MP4 generally increased from 2011 onwards and the maximum concentration at these wells was 8.2 mg/L. Groundwater ammonia concentrations at all monitoring wells typically exceeded the ammonia guideline value for south-eastern Australian lowland rivers (0.02 mg/L);

- all dissolved metals, with the exception of mercury, were reported above the laboratory LOR at least once. Iron, copper, manganese, barium, chromium, nickel and aluminium concentrations were consistently above the laboratory LOR, with iron and aluminium concentrations higher relative to other metals;

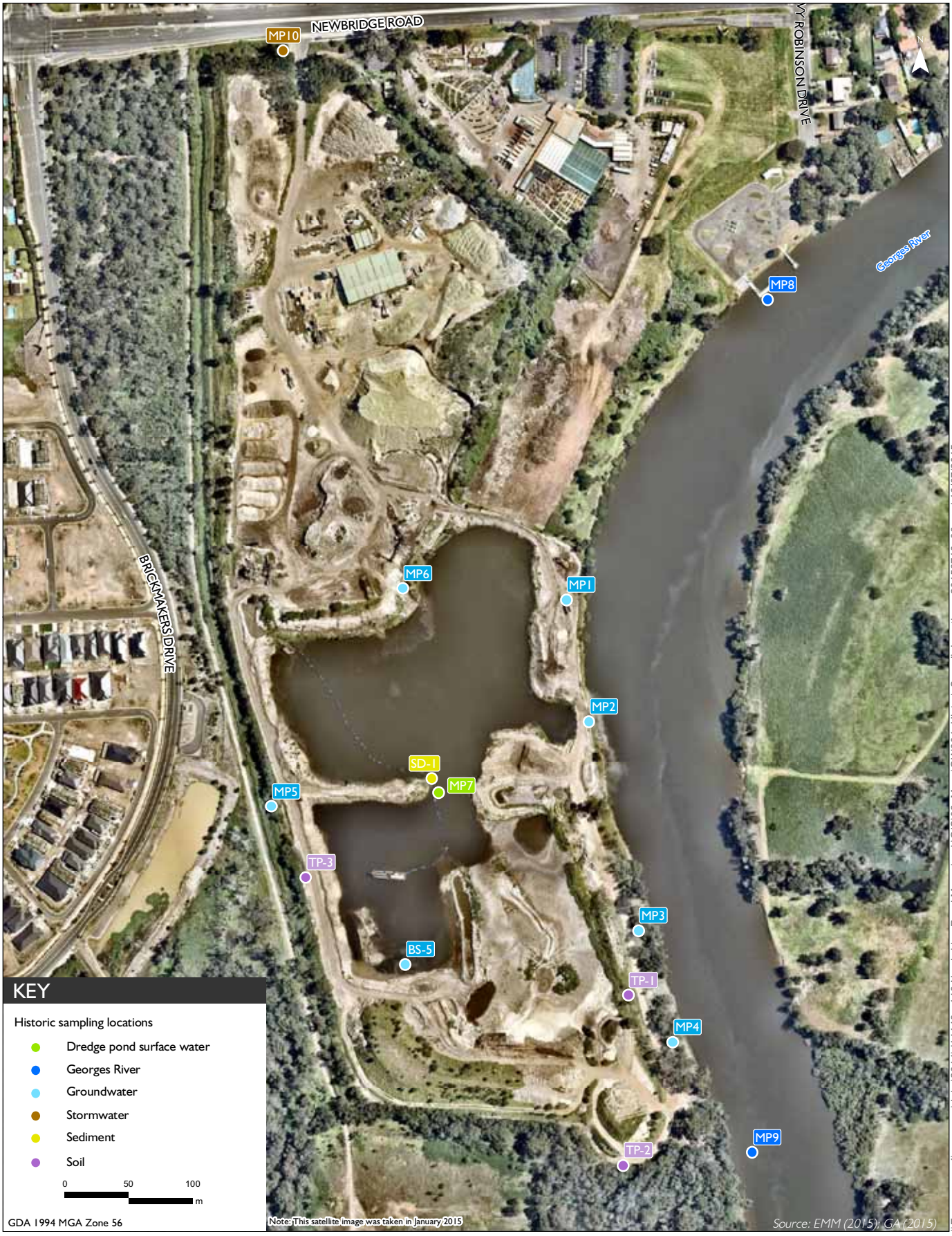
- TPH fractions (C_{10}-C_{14}, C_{15}-C_{28}, C_{29}-C_{36}) were reported above the LOR in groundwater periodically between 1999 and 2011, particularly at monitoring wells MP1 and MP5. The maximum reported concentration was 1,020 µg/L (C_{15}-C_{28}, MP5, January 2007). There have been no groundwater TPH concentrations reported above the laboratory LOR since 2011. The historic groundwater results are tabulated in Summary Table 1;

- toluene (a BTEX compound) was reported above the laboratory LOR in one monitoring well (BS-5, which was located within the current footprint of the dredge pond and was destroyed during the progression of sand mining) in the southern end of the marina site during two sampling events in 1993 (61 µg/L on both occasions). Toluene was below the laboratory LOR during the subsequent three sampling events at this location. The potential toluene source was not previously assessed, and no obvious sources could be identified based on the site history;

- DDT was reported above the LOR in one well (BS-2 now MP2) in the north-eastern corner of the marina site during one sampling event;

- 2-methlypheonol was detected at the LOR in one well (BS5)—in the southern end of the marina site on one occasion (in 1993). It was not detected in the subsequent sampling event; and

- PAHs, OCPs and PCBs were reported above the LOR in the historical dataset.



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Historic sampling locations

Georges Core Marina Development

Preliminary contaminated land assessment

Figure 8.1

8.2 Preliminary investigation sampling results

The results from the June 2015 field sampling are outlined in this section. Summary tables with guidelines values are included in Appendix D and the laboratory reports are included in Appendix E.

8.2.1 Soil

In total, 21 soil samples were collected from nine test pits across the marina site (see Figure 6.1). This included a shallow (<0.5 m below ground level (bgl)) and deep (2 m bgl) sample from each testpit, totalling 18 samples. Three QC samples were also obtained from TP-7 (QA.1), TP-8 (QA.3) and TP-4 (QA.4). Of the 21 soil samples collected, 11 samples were analysed by the laboratory, including all nine shallow samples, one deep sample (from TP-9), and one QA sample (QA.1).

i Field observations

The soil excavated from each testpit typically comprised fill overlying brown to light grey, moderate plasticity clay and dark sandy loam. Road base and debris, including plastic and pipe fragments, were present in the fill layer at TP-3, TP-5 and TP-6. The fill extended to 2 m bgl at TP-5 but was typically 0.5 m deep at TP-3 and TP-6. Dark organic matter was observed at TP-7 in the top 0.2 m. Light brown organic matter was observed at TP-8 for the entire depth of the testpit, and at TP-2 and TP-4 in the top 0.5 m. The location and thickness of fill and organic matter appears to vary widely across the marina site. The southern extent of the marina site is undeveloped land and is dominated by dense medium sized vegetation, and this is likely to contribute to the organic matter observed at TP-2 and TP-4.

ii Laboratory results

The following conclusions are drawn from the laboratory soil results:

- the pH was neutral to slightly alkaline, with a mean of 7 pH units. Testpits TP-2 and TP-4 had relatively lower pH (4 and 4.8 pH units, respectively);
- all metal concentrations, with the exception of cadmium, were reported above the applicable laboratory LOR. However, overall metal concentrations were below the applicable assessment criteria (NEPM 2013: HIL B and EIL (there is only an EIL for arsenic));
- TPH/TRH concentrations were only reported above the laboratory LOR at TP-3, as follows:
  - TPH (C_{15}-C_{28} and C_{29}-C_{36}) concentrations of 120 mg/kg and 140 mg/kg, respectively; and
  - TRH (>C_{16}-C_{34} and >C_{34}-C_{40}) concentrations of 210 mg/kg and 110 mg/kg, respectively;

  The TRH concentrations were below the applicable HSL and ESL assessment criteria (no assessment criteria are available for TPH);
- all (benzene, toluene, ethyl benzene, xylene and naphthalene) BTEXN concentrations were below the applicable laboratory LORs;
- one or more PAHs concentrations were detected above the laboratory LOR at TP-3, TP-5 and TP-6. The detected PAH concentrations were below the applicable assessment criteria, with the exception of benzo(a)pyrene at TP-3 (0.8 mg/kg) which exceeded the ESL criterion; and
- all pesticide and PCB concentrations were below the laboratory LOR.

8.2.2 Dredge pond sediment

Six dredge pond sediment samples were collected from strategic locations across the dredge pond (see Figure 8.1). Samples were obtained from the base of the dredge pond at varying depths 2-4m below the water level. Samples were generally composed of fine grey to dark grey silt and were odourless.

The following conclusions are drawn from the laboratory dredge pond sediment results:

- the pH was alkaline with a mean pH of 8.2;
- ammonia (as N) concentrations ranged from 2–49 mg/L and averaged 20 mg/kg; there is no guideline value for ammonia in sediments;
- the metals concentrations were below the LOR or the applicable ANZECC/ARMCANZ (2000) ISQG low trigger values, with the following exceptions:
  - SD-1: lead (90 mg/kg) and mercury (0.2 mg/kg) concentrations exceeded the ISQG-low trigger value (50 mg/kg for lead and 0.15 mg/kg for mercury), but were below the applicable ISQG high values;
  - SD-5: copper (96 mg/kg), lead (268 mg/kg), zinc (316 mg/kg) and mercury (0.5 mg/kg) exceeded the relevant ISQG-low trigger values. The lead concentration also exceeded the ISQG high value.
- the TRH concentrations were below the LOR, with the following exceptions (no ISQG trigger values are available for petroleum hydrocarbon fractions):
  - SD-1: TRH (>C_{16}-C_{34}) concentration was 190 mg/kg;
  - SD-5: TRH (>C_{16}-C_{34} and >C_{34}-C_{40}) concentrations were 490 mg/kg and 340 mg/kg, respectively;
  - SD-6: TRH (>C_{16}-C_{34}) concentration was 200 mg/kg;
- all BTEXN compound concentrations were below the applicable laboratory LORs;
- one or more PAH concentrations (including fluoranthene, pyrene, benz(a)anthracene, chrysene, benzo(b+j)fluoranthene, benzo(k)fluoranthene and benzo(a)pyrene) were above the applicable laboratory LOR at SD-1, SD-5 and SD-6, but were all below the ISQG-Low trigger values, where available; and
- pesticides and PCBs were all below the laboratory LOR (analysed at SD-3 and SD-6 only).

8.2.3 Dredge pond surface water

Three dredge pond surface water samples (with one additional QC sample) were collected from the north, east and south-west sides of the dredge pond within less than five meters of soil and sediment sampling locations and approximately 2 m from the bank.

The following conclusions are drawn from the laboratory and field dredge pond surface water results:

- pH was neutral to slightly alkaline with an mean pH of 7.6 (from both field and laboratory testing);
- the mean EC was 7,350 µS/cm, indicating the water was slightly saline;
- dissolved metal concentrations were below the applicable laboratory LOR for cadmium, chromium and lead. Arsenic, copper, iron and nickel concentrations were reported above the LOR; however were all below the ANZECC/ARMCANZ (2000) trigger values for the protection of 95% of both freshwater and marine species (where available). Only the zinc concentration (0.01 mg/L at QA5/WAT-1) marginally exceeded the ANZECC/ARMCANZ (2000) trigger value for 95% protection of freshwater species (0.008 mg/L); although this result was below the trigger value for the 95% protection of marine water species (0.015 mg/L);
- ammonia (as N) concentrations ranged from 12 to 13 mg/L. These concentrations exceed the ammonia guideline value for south-eastern Australian lowland rivers (0.02 mg/L). Historic dredge pond water ammonia concentrations have been increasing since 2009, prior to this the average ammonia result was 0.5 mg/L; and
- TPH/TRH, BTEXN and PAH concentrations were all below the laboratory LOR.

9 Site characterisation

Historic and recent site investigations have assessed the contamination status of groundwater, dredge pond water, Georges River surface water, soils and dredge pond sediment. The key investigation outcomes with regard to the current contamination status of the marina site are discussed in the following sections. The features of the proposed marina development have been superimposed on the investigation locations in Figure 9.1 to provide future land use context.

9.1 Soil

The PI identified a layer of fill material in portions of the marina site (notably, adjacent to material recycling activities on the northern marina site boundary, along the western marina site boundary and to the immediate south of the dredge pond). The fill averages about 0.5 m thick, but is greater than 2 m thick in one location (TP-5, adjacent to the large fill mound). Observations of anthropogenic debris were reported in the fill profile at TP-3, TP-5, TP-6 and TP-7.

The soil analytical results indicated only a single exceedance of the soil assessment criteria, which was a marginal exceedance of the NEPM ESL for benzo(a)pyrene in the fill sample collected from TP-3. Low concentrations of non-volatile range TRH and PAHs were also reported in fill samples from three locations (TP-3, TP-5 and TP-6). However, aside from the marginal ESL exceedance at TP-3 (0.8 mg/kg) all concentrations were below the relevant health and ecological assessment criteria for the proposed land use.

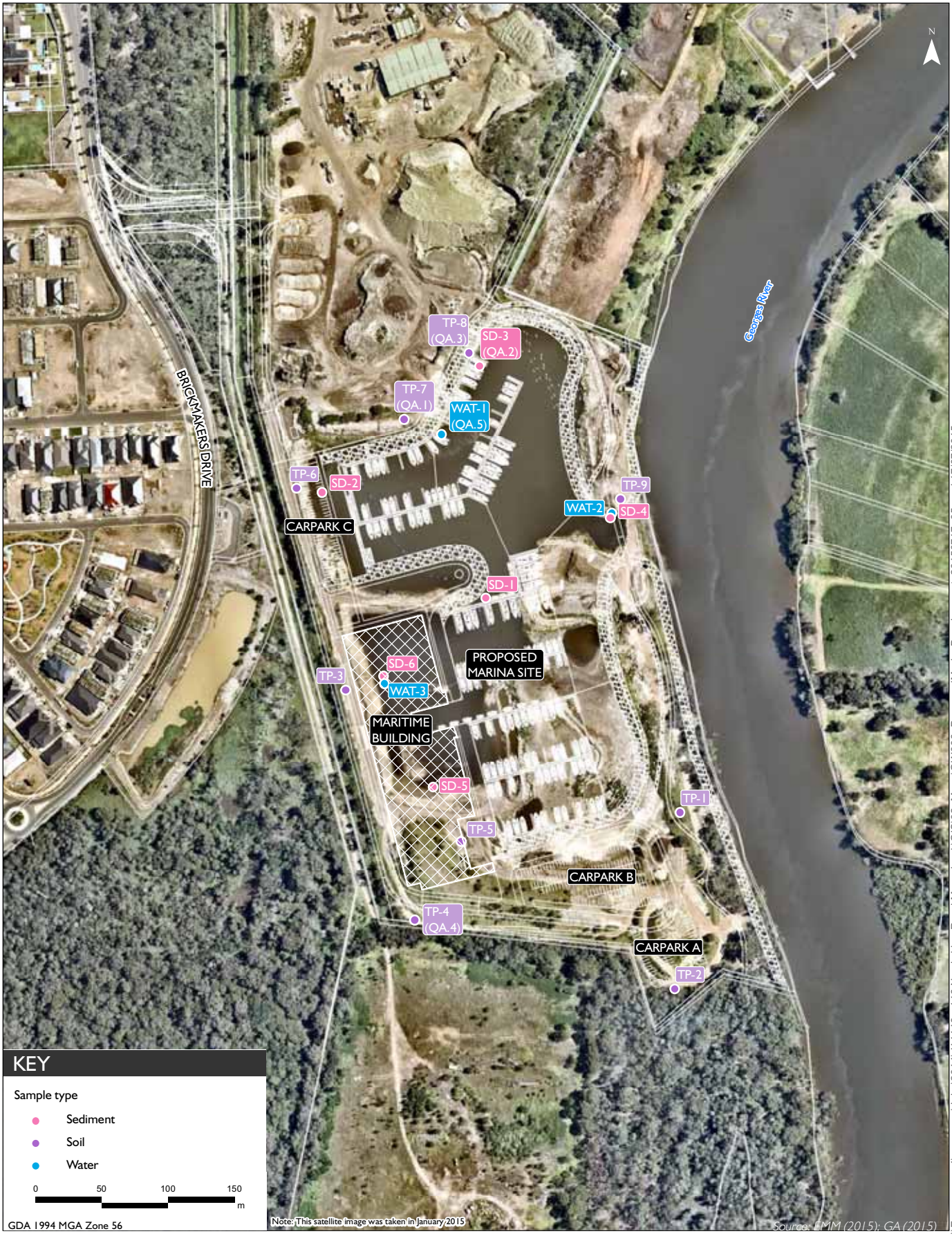
The proposed marina development (Figure 9.1) will consist predominantly of parking lots, buildings and roadways along the western and southern marina site boundaries. Accordingly, ecological values are considered to be of low relevance in areas that will be beneath sealed surfaces with the future development.

Similarly, the potential aesthetic soil impacts posed by anthropogenic debris in the fill material are considered to be of limited relevance as the majority of the existing fill will either be below sealed surfaces or building footprints, or will be removed from the marina site to prepare the landform for development. The geotechnical suitability of the fill material may be a relevant consideration for the development, but is outside the scope of this PI.

Accordingly, the results of the PI indicated that chemical quality of soil was consistent with the proposed future land use, subject to validation of the footprints of stockpiles and the fill mound following removal.

9.1.1 Potential acid sulfate soils

Reference to the LEP and ASS map indicates that the marina site is considered to have a high probability for acid sulfate soils; in addition PASS has been disposed in the dredge pond. Actual ASS could be present based on historically acidic groundwater results. There was no visual confirmation of ASS during the PI sampling program. This will need to be considered during the construction phase when there is greater potential for soil oxygenation. Acid sulfate soil management techniques are discussed in Section 10.2.2.



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EMM

Sampling locations and proposed development location

Georges Core Marina Development
Preliminary contaminated land assessment
Figure 9.1

9.2 Dredge pond sediments

The analytical results for the dredge pond sediments indicated exceedances of ISQG-low trigger values for two or more metals at two locations (SD-1 and SD-5), with the lead concentration at SD-5 also exceeding the ISQG-high trigger value. While the source of the metals in these locations can not be confirmed, the results are consistent with metals accumulating as a result of the surrounding fill material being washed into the pond during rain events.

Upon the completion of the proposed marina development the location of SD-5 will be beneath a building footprint (Figure 9.1). Accordingly, it is presumed that this area will be filled to accommodate the future construction, and the ecological exposure and bioavailability assumptions upon which the ISQG were derived will no longer be relevant in this location. Given it is in an urban catchment adjacent to a historic landfill and material recycling facility, when location SD-5 is excluded, the sediment quality results generally reflect limited chemical impact and thus contamination potential.

Ammonia concentrations in the sediment were elevated in samples SD-1 and SD-5 relative to the other locations in the pond, as were the TOC concentrations. Ammonia in sediments is typically from bacterial decomposition of natural and anthropogenic organic matter accumulated in sediment. However, it is also commonly associated with landfill leachate and leaching of fertilizers.

Based on the results of the PI, the sediment quality results are not considered to indicate an unacceptable risk with regard to the future operation of a commercial marina.

9.3 Dredge pond water

The PI dredge pond water analytical results indicated that water quality generally met the assessment criteria (subject to the exceptions discussed below). All organic analyte concentrations were below the laboratory LORs and metals concentrations were generally below the LOR or below the assessment criteria (with the exception of a marginal exceedance of the zinc criterion in blind duplicate sample QA5).

Electrical conductivities in the dredge pond water samples were relatively consistent at approximately 7300 µs/cm, which is similar to the lower range EC values from historical monitoring of Georges River (as discussed in Section 8.1). It is likely that a strong hydraulic connection exists between the Georges River and the adjacent alluvial deposits, and that the salinity of water in the dredge pond will generally represent a mixture of river water and fresher groundwater discharge.

The only notable issue identified from the PI surface water analytical results were elevated ammonia concentrations. The dredge pond water ammonia concentrations have been generally increasing since 2009. The maximum concentration of 12.6 mg/L was measured in the PI sampling event. The dredge pond ammonia concentrations are similar to groundwater concentrations, suggesting groundwater exchange with the dredge pond water.

In the weeks preceding the PI, a suction dredge was operating in the pond to remove the accumulated fines in anticipation of the marina development. It is likely that the disturbance caused by the continuous suction dredging in the pond had resulted in a significant load of suspended fines in the water column. This may have included ammonia-enriched sediments (as discussed in Section 9.2). Another potentially contributing ammonia source considered was landfill leachate from the former landfills to the north and south of the marina site, mobilised via groundwater.

While the specific ammonia source(s) is currently uncertain, the pond water results suggest that standard sediment management measures may be appropriate for any significant future disturbance of sediments (eg sediment traps), to prevent potential impacts to the Georges River once the marina entrance channel is established.

9.4 Groundwater

Groundwater sampling indicates variable EC conditions and low dissolved metal concentrations, such that there were no metal exceedances of the ANZECC/ARMCANZ (2000) trigger values for the protection of 95% freshwater and marine species in recent sampling events.

9.4.1 Petroleum hydrocarbons in groundwater

Total petroleum hydrocarbon TPH concentrations in groundwater (predominantly in non-volatile carbon ranges) were frequently reported above the laboratory LOR in the historical monitoring dataset and toluene was reported on two occasions in 1993. Hydrocarbon impacted groundwater is likely to have originated from off-site sources as no current or historical site activities or practices associated with TPH and BTEXN contamination were identified during the PI.

Another consideration is that the TPH analytical method does not effectively discriminate between petroleum and non-petroleum hydrocarbon sources (for example, by-products from the decomposition of natural organic material). In the absence of a clear source of petroleum hydrocarbon contamination, it is possible that historical TPH detections could have been influenced by non-petroleum dissolved organic carbon in groundwater, which was reported at elevated concentrations in some wells (particularly MP1 and MP5) over the historical monitoring period (refer to Section 9.4.2).

There have been no TPH detections in groundwater since 2011, and the historical detections were below the equivalent most conservative HSL A&B criteria for vapour intrusion from groundwater. In addition, no BTEX detections in groundwater have been reported since the isolated toluene detections in 1993 (which were also below the current HSL A&B criterion). Accordingly, volatile and non-volatile petroleum hydrocarbon compounds are not considered to be COPC for the site.

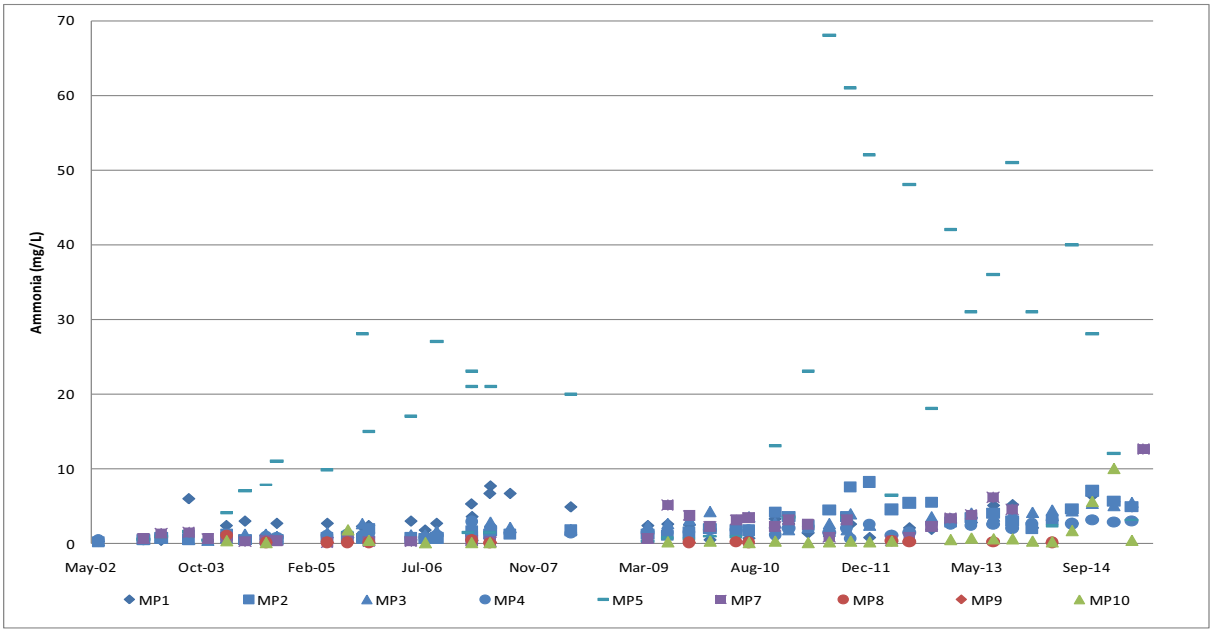
9.4.2 Ammonia in groundwater

The monitoring and sampling results indicate that groundwater at the marina site is enriched with ammonia and concentrations typically exceed the ANZECC/ARMCANZ (2000) trigger values for the protection of 95% of freshwater and marine species. Since 2002, concentrations of ammonia results at MP5 have fluctuated, while at the other monitoring wells, ammonia concentrations have increased since 2009. The source of the high ammonia concentrations is unknown, but is likely to be offsite, with possibly a separate source influencing MP5.

The elevated ammonia concentrations in the groundwater and dredge pond (shown in Figure 9.2 and 9.3, using two different scales) are not considered to represent a risk to human health at the proposed marina development based on the lack of health-based assessment criteria for ammonia in water, and the limited exposure scenarios associated with the proposed future land use (ie ingestion of groundwater and pond water is unlikely in the context of a commercial marina).

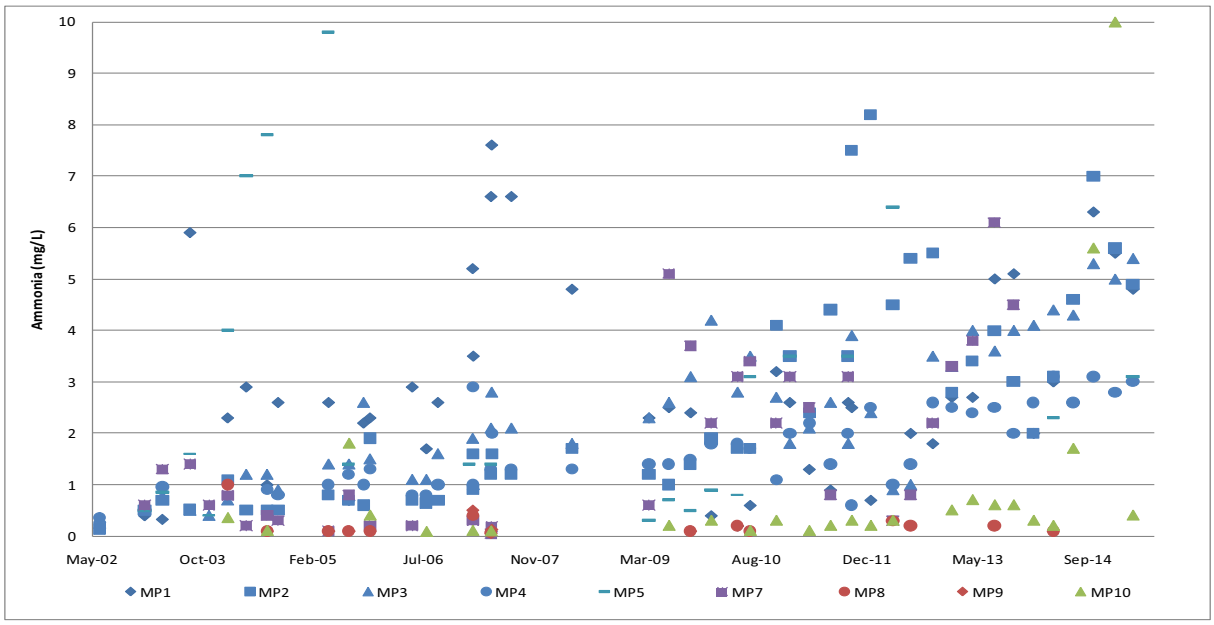
However, the ammonia concentration in groundwater and the dredge pond exceed ANZECC/ARMCANZ (2000) trigger values for the protection of 80% of species for freshwater (2.3 mg/L) and for marine water (1.7 mg/L) and therefore represent a potential risk to the aquatic receiving environment. The highest ammonia concentrations have historically been reported at MP5, and a general increasing concentration trend is evident in groundwater and the dredge pond from approximately 2009 onwards. The source of the ammonia is uncertain. However, the elevated concentrations at MP5 suggest a potential off-site source. The elevated ammonia and TOC concentrations in groundwater at MP5, and to a lesser extent the other monitoring wells, are characteristic of a landfill leachate source.

The potential ecological risk is not likely to be increased by the proposed development as it is likely that ammonia enriched groundwater and dredge pond water is currently exchanged with the Georges River. However, further investigation and/or an ecological risk assessment is warranted to evaluate the source(s) of ammonia in groundwater and to quantify the potential risk to the environment.



MP1, MP2, MP3, MP4, MP5 = groundwater, MP7 = dredge pond, MP8, MP9 = Georges River, MP10 = storm water

Figure 9.2 Groundwater, dredge pond water, Georges River surface water and storm water ammonia results



MP1, MP2, MP3, MP4, MP5 = groundwater, MP7 = dredge pond, MP8, MP9 = Georges River, MP10 = storm water

Figure 9.3 Groundwater, dredge pond water, Georges River surface water and storm water ammonia results (reduced scale)

9.5 Site characterisation summary

Previous investigations and monitoring results reported sporadic occurrences of organic analytes at low concentrations in storm water, groundwater, soil and sediment (refer to discussion in Sections 8 and 9). Low concentrations of non-volatile TRH and PAHs were detected in a small number of soil and sediment samples during this PI. However, all recent and historical reported concentrations were below the adopted site assessment criteria, and do not indicate that significant organic contamination sources are present at the marina site.

The PI did not identify contamination issues that are considered to present an unacceptable risk to human and/or environmental health in the context of the proposed future land use. Recent sampling did not identify any exceedances of the NEPM (2013) human health based guideline values. A small number of ecological assessment criteria exceedances were reported. The ecological exceedances are considered to present a low and acceptable risk in the context of the operation of a commercial marina. While not considered to impact the proposed future land use, the ammonia concentrations in groundwater and dredge pond water warrant further assessment to identify the source of ammonia impact and to determine if they present an ecological risk.

10 Conclusions and recommendations

A marina is proposed to be developed on the marina site and this PI report forms part of the development application in accordance with cl 7(2) of SEPP 55 and has been prepared in accordance with the *Guidelines for Consultants Reporting on Contaminated* (OEH 2011).

The marina site is located adjacent to the Georges River, in Western Sydney, is dominated by a dredge pond created by quarry activities that commenced in 1993. Prior to quarrying activities, the marina site was used for vegetable farming and as a dairy. Some disposal of waste (largely dredge tailings, bricks/masonry placed on access roads and some waste types that cannot be verified) occurred within the marina site. Land-filling previously occurred in the vicinity of the marina site on adjoining areas of land.

Regular (at least quarterly) environmental monitoring has been undertaken at the marina site since 1993. However, the previous frequency of sampling and the analytical suites resulted in data gaps with regard to assessing the current contamination status of the marina site, in a manner consistent with the requirements of cl 7(2) of SEPP 55. Further, the potential for contamination migration from the landfill to the immediate north, south and west, has not been considered in previous assessments.

A PI, comprising a desktop review and strategic sampling program, was undertaken in May to July 2015 to address data gaps and determine the overall site condition to provide an assessment of site contamination. A detailed appraisal of the marina sites current and historic sampling results have been the basis for this assessment into potential site contamination.

10.1 Contamination status

The results of historic and recent sampling indicated that the land is contaminated under the definition of contaminated land in Section 145A Part 7A of the EP&A Act:

> Contaminated land means land in, on or under which any substance is present at a concentration above the concentration at which the substance is normally present in, on or under (respectively) land in the same locality, being a presence that presents a risk of harm to human health or any other aspect of the environment.

However the PI results indicated that contaminants were limited in number and extent at the marina site. Recent sampling did not identify any exceedances of the NEPM human health guideline values. A small number of exceedances of ecological assessment criteria were identified, that were either considered to be irrelevant, or present a low and acceptable risk, in the context of the proposed future land use.

Accordingly, the PI did not identify contamination issues that would preclude the proposed future land use as a proposed marina development as well as for high-density residential dwellings with minimal opportunities for soil access. However, the conclusions in this report are subject to the limitations and spatial constraints of the investigation, including:

- No conclusion is made regarding to the condition of the stockpiles or the large fill mound present on the marina site, or for the contamination status of the soil beneath these features. The stockpiles will be removed prior to the commencement of the development and sampling at these locations is recommended after the stockpiles have been removed. It is considered unlikely that gross contamination will be encountered within or under the mound or stockpiles that would render the site unsuitable for the proposed uses, from a contamination perspective, given the implementation of the recommended measures in Section 10.2.

- Uncontrolled fill material is an inherently heterogeneous material, and was characterised at a screening level consistent with a PI. While the contamination status of the fill material assessed as part of this PI was generally acceptable for the proposed land use and evidence of gross contamination was not encountered, this does not preclude the potential presence of undocumented and undiscovered contamination between investigation locations, or in the areas excluded from this investigation (eg stockpiles and the fill mound). This uncertainty can be effectively managed through the construction environmental management plan (CEMP) for the development which will include an unexpected finds protocol as described in the recommendations below. Based on the results of this PI, it is considered unlikely that gross contamination will be encountered on the marina site that will render the site unsuitable for the proposed uses given the implementation of the recommended measures in Section 10.2.

- Characterisation for ASS was not performed as part of the PI, beyond reference to planning level maps and databases regarding the likelihood of encountering ASS. However with the implementation of widely applied ASS monitoring and management measures as recommended in Section 10.2, the site will be suitable for the proposed uses if ASS is encountered.

- The source of the ammonia enriched groundwater and dredge pond water is uncertain. However, the ammonia enriched groundwater is not considered to represent a risk to human health and the potential ecological risk is not likely to be increased by the proposed development. Accordingly, while the ammonia concentrations are not considered to be incompatible with the proposed future land uses, further investigation is recommended to clarify the ammonia source(s) and whether it presents an actual ecological risk.

10.2 Recommendations

Based on the results of this PI, the following recommendations are made:

- Any material in the stockpiles or fill mound present at the marina site that is proposed for on-site reuse should be characterised for land use suitability relative to the appropriate land use criteria in the NEPM.

  Any material proposed for off-site disposal or reuse should be characterised for waste classification in accordance with the NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste*, or with regard to a relevant resource recovery order and exemption issued under the POEO Act. Upon removal, validation sampling of the footprints of the stockpiles and fill mound should be performed to confirm the suitability of the underlying soils for the proposed land use.

- Given the inherent heterogeneity of fill material present at the marina site, the CEMP for the development should include an unexpected finds protocol with clear instructions for identifying and managing potential undiscovered contamination issues during development. In particular, although no evidence of asbestos containing material (ACM) was encountered during the PI, ACM is commonly associated with uncontrolled fill material in Australia and the potential presence of ACM should be proactively assessed during any civil works involving disturbance of fill material at the marina site.

- Current ammonia concentrations in groundwater and the dredge pond water are considered to be a potential ecological risk (but not a human health risk). The source(s) of ammonia causing enrichment in the groundwater and dredge pond water should be investigated. This could comprise additional field work and/or data requests from Council. An ecological risk assessment may also be considered to determine if the ammonia concentrations in groundwater present an unacceptable ecological risk. The results of these investigations and the ecological risk assessment could be presented to Liverpool City Council prior to the start of construction.

- It is understood that modification of the dredge pond to form the marina basin will be completed (marina banks formed and rock armouring in place) before the entrance channel entrance is opened. Entrance channel construction will commence on the landward (western) side of the basin wall prior to breaking through the banks to the river. In consideration of the elevated ammonia concentrations encountered in the dredge pond water during the PI, the following recommendations are proposed for the marina entrance channel construction:

    - Testing of the water quality in the basin prior to breaking through the banks to the river. The bank should only be opened if the water quality in the basin is similar to, or better than, that in the Georges River.

    - The inclusion of sediment booms across the interface between the dredge pond and Georges River when the bank is finally opened.

    - If required, the soils immediately adjacent to the proposed channel and any soils displaying potential for ASS should be treated for ASS or replaced to prevent the long-term drainage of acid from soils. Management would typically be applied to river banks and possibly stockpiles, and could comprise covering soil to reduce oxygen availability, controlling water movement, and/or increasing alkalinity via the introduction of lime (as described in the *Guidelines: Site Contamination–Acid Sulfate Soil Materials* (EPA 2007)).

- The groundwater flow direction should be confirmed from the collection of groundwater level data.

- Construction phase water quality monitoring should be undertaken, including for ammonia and dissolved metal concentrations, in the dredge pond surface water, dredge pond sediment and Georges River surface water.

- ASS characterisation is warranted in accordance with Section 7.7 of the Liverpool LEP 2008, and if necessary a detailed ASS management plan should be prepared as part of the CEMP.

10.3 Summary

This PI report forms part of the development application for the proposed Georges Cove Marina in accordance with clause 7(2) of SEPP 55 and has been prepared in accordance with the *Guidelines for Consultants Reporting on Contaminated* (OEH 2011).

Clause 7 of SEPP 55 and the findings of this PI are summarised in Table 10.1.

Table 10.1 SEPP 55 Clause 7: Contamination and remediation to be considered in determining development application

	Clause	Preliminary investigation finding
(1)	A consent authority must not consent to the carrying out of any development on land unless:	
(a)	it has considered whether the land is contaminated, and	There is minor soil contamination of the land and there are elevated ammonia concentrations in the groundwater.
(b)	if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and	The marina site is suitable for the proposed future land use as a proposed marina development as well as for use for high-density residential dwellings with minimal opportunities for soil access in its contaminated state, or will be suitable for these uses with minor remediation that may be the outcome of the recommended investigations.
(c)	if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.	Implementation of the measures recommended in Section 10.2 (including remediation if required), will ensure that the land will be suitable for the proposed uses.
(2)	Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subclause (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines.	This report describes the findings of the PI and was prepared in accordance with the contaminated land planning guidelines.
(3)	The applicant for development consent must carry out the investigation required by subclause (2) and must provide a report on it to the consent authority. The consent authority may require the applicant to carry out, and provide a report on, a detailed investigation (as referred to in the contaminated land planning guidelines) if it considers that the findings of the preliminary investigation warrant such an investigation.	This report will be provided to Liverpool City Council and the consent authority, the Sydney West Joint Regional Planning Panel. While further investigations regarding ammonia in groundwater are recommended in Section 10.2, a "Detailed Contamination Assessment" of the marina site as a whole has not been recommended.
(4)	The land concerned is:	
(a)	land that is within an investigation area,	This PI considers the whole of the marina site as the land concerned.
(b)	land on which development for a purpose referred to in Table 1 to the contaminated land planning guidelines is being, or is known to have been, carried out,	Extractive industry (as listed in Table 1 to the contaminated land planning guidelines) has been conducted at the marina site since approximately 1993.
(c)	to the extent to which it is proposed to carry out development on it for residential, educational, recreational or child care purposes, or for the purposes of a hospital—land:	The proposed uses of the site includes recreational land and may, in the future, include residential.

Table 10.1 SEPP 55 Clause 7: Contamination and remediation to be considered in determining development application

	Clause	Preliminary investigation finding
(i)	in relation to which there is no knowledge (or incomplete knowledge)as to whether development for a purpose referred to in Table 1 to the contaminated land planning guidelines has been carried out, and	See 4(b).
(ii)	on which it would have been lawful to carry out such development during any period in respect of which there is no knowledge (or incomplete knowledge).	See 4(b).

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Glossary of Terms

Acid sulfate soils (ASS)	Term applied to soils, sediment or rock in the environment that contains elevated concentrations of metal sulfides (principally pyrite (FeS_2) or monosulfides in the form of iron sulfide (FeS)), which generate acidic conditions when exposed to oxygen.
Acidity	Base neutralising capacity.
Alkalinity	Acid neutralising capacity.
Alluvium	Unconsolidated sediments (clays, sands, gravels and other materials) deposited by flowing water. Deposits can be made by streams on river beds, floodplains, and alluvial fans.
Alluvial aquifer	Permeable zones that store and produce groundwater from unconsolidated alluvial sediments. Shallow alluvial aquifers are generally unconfined aquifers.
Aquatic ecosystem	The stream channel, lake or estuary bed, water, and (or) biotic communities and the habitat features that occur therein.
Aquifer	Rock or sediment in a formation, group of formations, or part of a formation that is saturated and sufficiently permeable to transmit economic quantities of water.
Aromatic	In organic chemistry aromaticity is used to describe an unusually stable nature of some flat rings or atoms. Such structures typically contain a number of double bonds which are difficult to break.
Average recurrence interval (ARI)	The long term average number of years between the occurrence of a flood as big as (or larger than) the selected event.
Biphenol	Organic compounds with phenolic derivative
Bore	A structure drilled below the surface to obtain water from an aquifer or series of aquifers.
BTEXN – benzene, toluene, ethyl benzene, xylene, naphthalene	Monocyclic aromatic hydrocarbons, unsaturated hydrocarbon ring systems containing one or more six-member rings.
Concentration	The amount or mass of a substance present in a given volume or mass of sample, usually expressed as microgram per litre (water sample) or micrograms per kilogram (sediment sample).
Conceptual model	A simplified and idealised representation (usually graphical) of the physical hydrogeologic setting and the hydrogeological understanding of the essential flow processes of the system. This includes the identification and description of the geologic and hydrologic framework, media type, hydraulic properties, sources and sinks, and important aquifer flow and surface-groundwater interaction processes.
Contamination	Contamination is the presence of a non-natural compound in soil or water, or unwanted compound in chemicals or other mixtures.
Dichlorodiphenyltichloroethane (DDT)	Organochloride used as an insecticide.
Discharge	The volume of water flowing in a stream or through an aquifer past a specific point in a given period of time.
Discharge area	An area in which there are upward or lateral components of flow in an aquifer.
Electrical conductivity (EC)	A measure of a fluid's ability to conduct an electrical current and is an estimation of the total ions dissolved. It is often used as a measure of water salinity, see 'salinity' for classification.
Fluvial	Pertaining to a river or stream.
Fluvial deposit	A sedimentary deposit consisting of material transported by suspension or laid down by a river or stream.

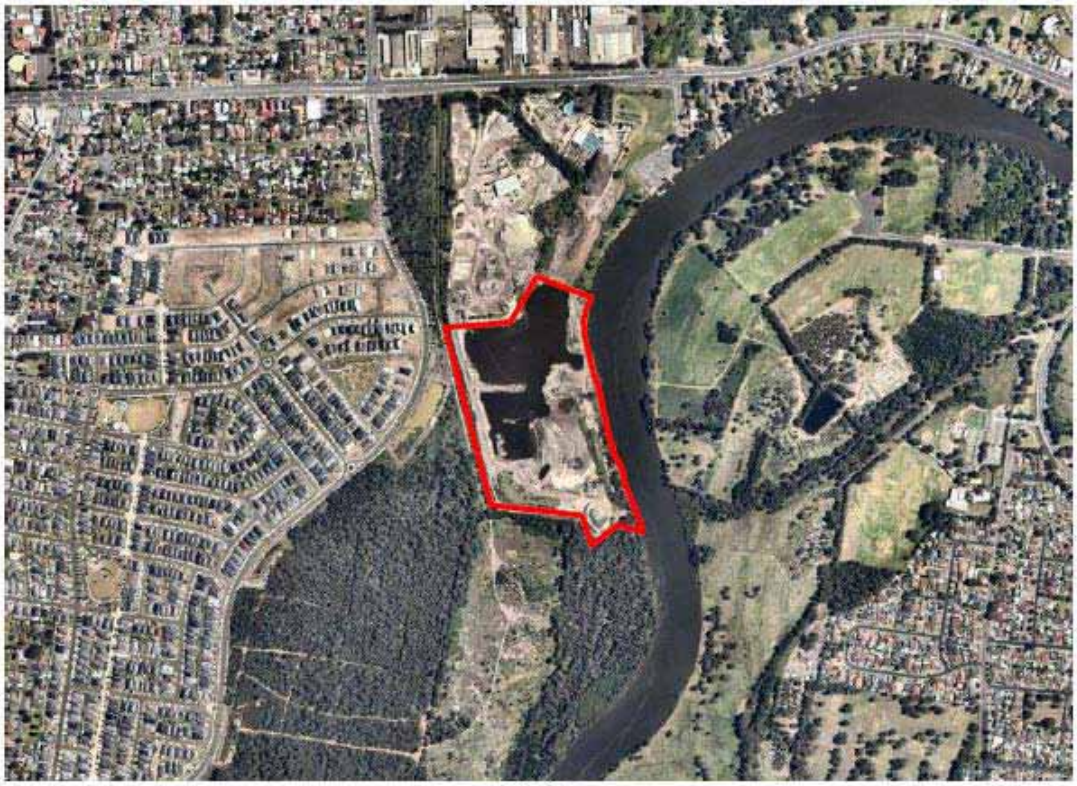
Groundwater	The water contained in interconnected pores or fractures located below the water table in the saturated zone.
Groundwater flow	The movement of water through openings in sediment and rock within the zone of saturation.
Groundwater system	A system that is hydrogeologically more similar than different in regard to geological province, hydraulic characteristics and water quality, and may consist of one or more geological formations.
Hydraulic conductivity	The rate at which water of a specified density and kinematic viscosity can move through a permeable medium (notionally equivalent to the permeability of an aquifer to fresh water).
Hydraulic gradient	The change in total hydraulic head with a change in distance in a given direction.
Hydrocarbon	Organic compound consisting entirely of hydrogen and carbon.
Hydrogeology	The study of the interrelationships of geologic materials and processes with water, especially groundwater.
Hydrology	The study of the occurrence, distribution, and chemistry of all surface waters.
Infiltration	The flow of water downward from the land surface into and through the upper soil layers.
Micro Siemens per centimetre (µS/cm)	A measure of water salinity commonly referred to as EC (see also electrical conductivity). Most commonly measured in the field with calibrated water quality meter.
Monitoring bore/well	A non-pumping bore, is generally of small diameter that is used to measure the elevation of the water table and/or water quality. Bores generally have a short well screen against a single aquifer through which water can enter.
Organochlorine pesticide (OCP)	Chlorinated hydrocarbons commonly associated with agriculture and mosquito control in the 1940s–1960s, includes DDT.
Permeability	The property or capacity of a porous rock, sediment, clay or soil to transmit a fluid. It is a measure of the relative ease of fluid flow under unequal pressure. The hydraulic conductivity is the permeability of a material for water at the prevailing temperature.
Permeable material	Material that permits water to move through it at perceptible rates under the hydraulic gradients normally present.
Permian	Geological time, 250 to 299 million years ago.
pH	Provides a measure on a scale from 0 to 14 of the acidity or alkalinity of a solution (where 7 is neutral, greater than 7 is alkaline and less than 7 is acidic).
Phenols	A class of chemical compounds consisting of a hydroxyl group (-OH) bonded directly to an aromatic hydrocarbon group. Phenolic compounds are synthesized industrially and naturally. Phenols are typically associated with the chemical industry.
Polycyclic aromatic hydrocarbons (PAHs)	Hydrocarbons, organic compounds containing only carbon and hydrogen, comprised of multiple, fused aromatic rings. Typically found in fossil fuels (oil and coal) and tar.
Polynuclear aromatic hydrocarbons	A subset of PAHs that have fused aromatic rings.
Porosity	The proportion of open space within an aquifer, comprised of intergranular space, pores, vesicles and fractures.
Quaternary	The most recent geological period extending from approximately 2.5 million years ago to the present day.
Recharge	The process which replenishes groundwater, usually by rainfall infiltrating from the ground surface to the water table and by river water reaching the water table or exposed aquifers. The addition of water to an aquifer.

Recharge area	A geographic area that directly receives infiltrated water from surface and in which there are downward components of hydraulic head in the aquifer. Recharge generally moves downward from the water table into the deeper parts of an aquifer then moves laterally and vertically to recharge other parts of the aquifer or deeper aquifer zones.
Salinity	The concentration of dissolved salts in water, usually expressed in EC units or milligrams of total dissolved solids per litre (mg/L TDS).
Salinity classification (Australia Water Resources' Council 1988)	Fresh water quality – water with a salinity <800 µS/cm. Marginal water quality – water that is more saline than freshwater and generally EC is between 800 and 1,600 µS/cm. Brackish quality – water that is more saline than freshwater and generally EC is between 1,600 and 4,800 µS/cm. Slightly saline quality – water that is more saline than brackish water and generally EC is between 4,800 and 10,000 µS/cm. Moderately saline quality – water that is more saline than brackish water and generally EC is between 10,000 and 20,000 µS/cm. Saline quality – water that is almost as saline as seawater and generally EC is greater than 20,000 µS/cm. Seawater quality – water that is generally around 55,000 µS/cm.
Saturated zone	The zone in which the voids in the rock or soil are filled with water at a pressure greater than atmospheric pressure. The water table is the top of the saturated zone in an unconfined aquifer.
Screen	A type of bore lining or casing of special construction, with apertures designed to permit the flow of water into a bore while preventing the entry of aquifer or filter pack material.
Semi-confined formation	An aquifer overlain by a low-permeability layer that permits water to slowly flow through it. During pumping, recharge to the aquifer can occur across the leaky confining layer – also known as a leaky artesian or leaky confined aquifer.
Standing water level (SWL)	The height to which groundwater rises in a bore after it is drilled and completed, and after a period of pumping when levels return to natural atmospheric or confined pressure levels.
Storativity	The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. It is equal to the product of specific storage and aquifer thickness. In an unconfined aquifer, the storativity is equivalent to specific yield.
Stratigraphy	The depositional order of sedimentary rocks in layers.
Surface water-groundwater interaction	This occurs in two ways: (1) streams gain water from groundwater through the streambed when the elevation of the water table adjacent to the streambed is greater than the water level in the stream; and (2) streams lose water to groundwater through streambeds when the elevation of the water table is lower than the water level in the stream.
Tertiary	Geologic time at the beginning of the Cainozoic era, 65 to 2.5 million years ago, after the Cretaceous and before the Quaternary.
Total dissolved solids (TDS)	A measure of the salinity of water, usually expressed in milligrams per litre (mg/L). See also EC.
Total Petroleum/Recoverable Hydrocarbons	Any mixture of hydrocarbons that are found in crude oil, which is used to make petroleum products.
Transmissivity	The rate at which water of a prevailing density and viscosity is transmitted through a unit width of an aquifer or confining bed under a unit hydraulic gradient. It is a function of properties of the liquid, the porous media, and the thickness of the porous media.
Triassic	Geologic time, following the Permian period, 250 to 200 million years ago.

Unconfined formation	Also known as a water table aquifer. An aquifer in which there are no confining beds between the zone of saturation and the surface. The water table is the upper boundary of an unconfined aquifer.
Unsaturated zone	That part of an aquifer between the land surface and water table. It includes the root zone, intermediate zone and capillary fringe.
Virgin excavated natural material (VENM)	Natural material (ie clay, gravel, sand) that have been excavated and is not contaminated with anthropogenic chemicals or does not contain any sulfidic ores or other wastes.
Water quality	Term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.
Water quality data	Chemical, biological, and physical measurements or observations of the characteristics of surface and ground waters, atmospheric deposition, potable water, treated effluents, and waste water and of the immediate environment in which the water exists.
Water table	The top of an unconfined aquifer. It is at atmospheric pressure and indicates the level below which soil and rock are saturated with water.

Appendix A

Historic aerial imagery



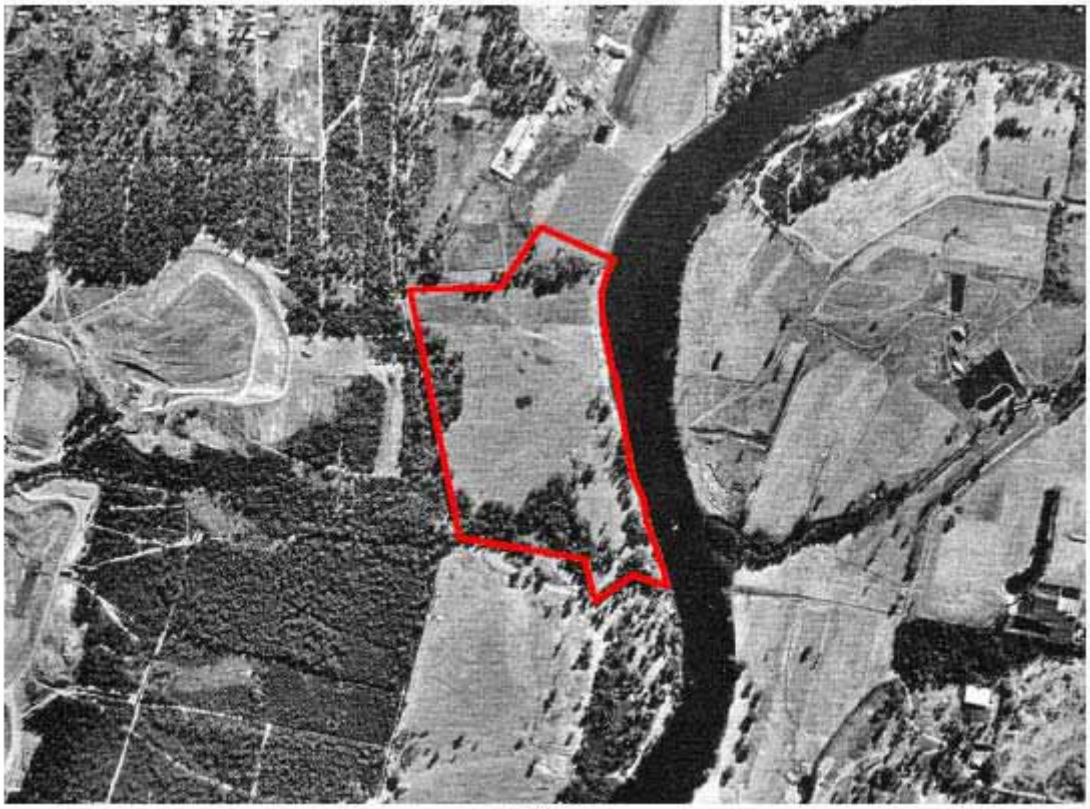
2015

2005

1998

1986

1978



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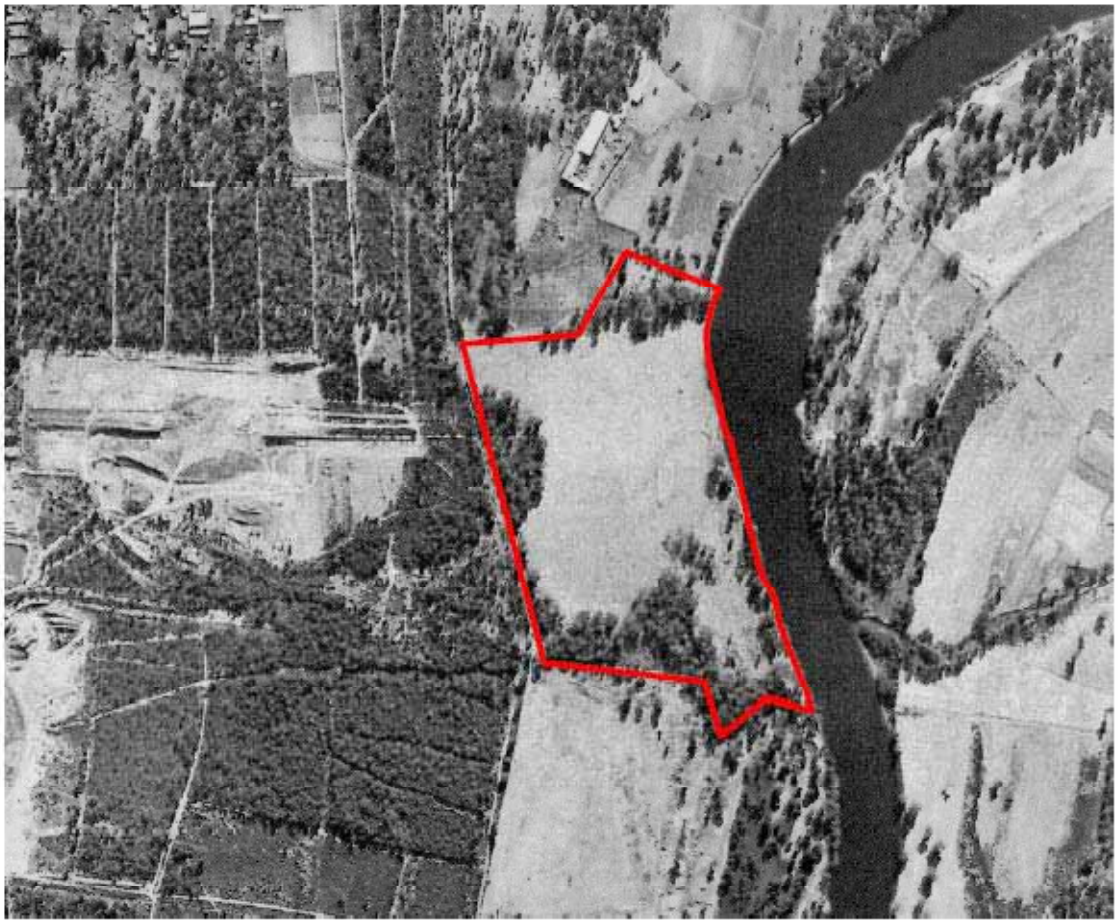

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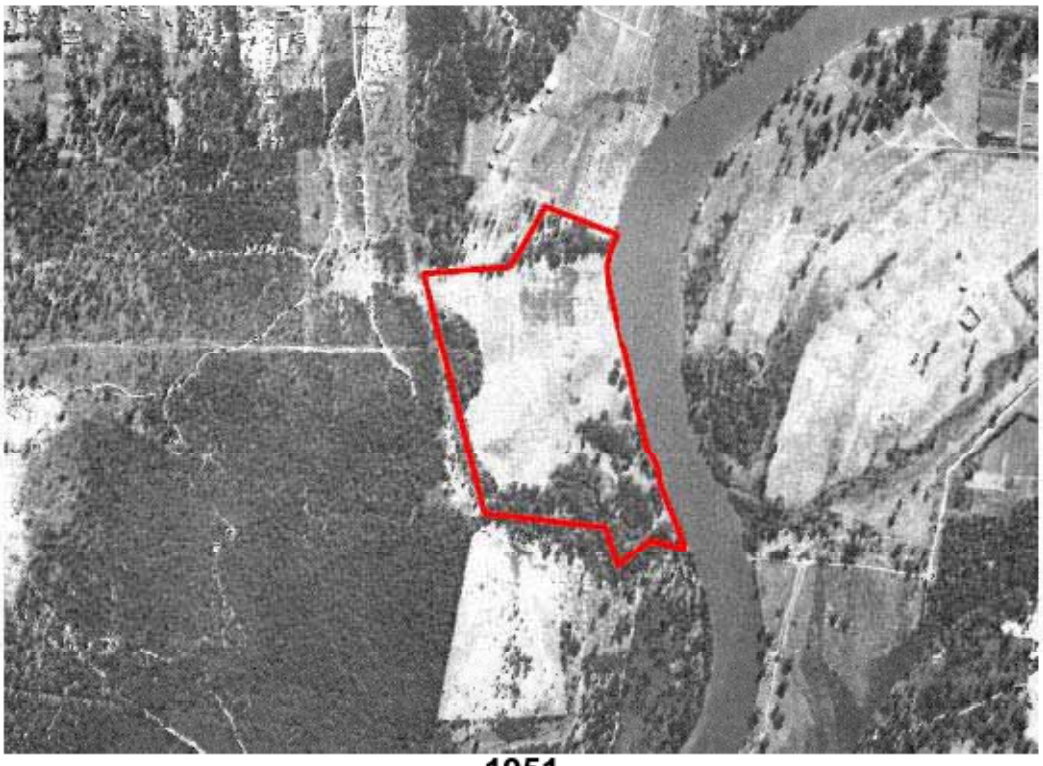

1951

Appendix B

Site planning certificate

Liverpool city council
creating our future together

PLANNING CERTIFICATE UNDER SECTION 149
ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

Ref.: EMAIL
Ppty: 165788

Cert. No.: 5911
Page No.: 1

Applicant:
GEOTECHNIQUE P/L
PO BOX 880
PENRITH NSW 2751

Receipt No.: 3000825
Receipt Amt.: 133.00
Date: 09-Apr-2015

Property Desc: **146 NEWBRIDGE ROAD, MOOREBANK NSW 2170**
LOT 7 DP 1065574

PART A
PRESCRIBED INFORMATION PROVIDED PURSUANT TO SECTION 149(2) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

NOTE: The following information is provided pursuant to Section 149(2) of the Environmental Planning and Assessment Act (EP&A Act) 1979 as prescribed by Schedule 4 of the Environmental Planning and Assessment Regulation (EP&A Regulation) 2000 and is applicable to the subject land as of the date of this certificate.

The Environmental Planning and Assessment Amendment Act 1997 commenced operation on the 1 July 1998. As a consequence of this Act the information contained in this certificate needs to be read in conjunction with the provisions of the Environmental Planning and Assessment (Amendment) Regulation 1998, Environmental Planning and Assessment (Further Amendment) Regulation 1998 and Environmental Planning and Assessment (Savings and Transitional) Regulation, 1998.

(1) Names of relevant planning instruments and DCPs

(1) The name of each environment planning instrument that applies to the carrying out of Development on the land is/are listed below: -

Local Environmental Plans (LEPs)

Liverpool Local Environmental Plan 2008

State Environmental Planning Policies (SEPPs)

State Environmental Planning Policy No. 1 – Development Standards
State Environmental Planning Policy No. 19 – Bushland in Urban Areas
State Environmental Planning Policy No. 21 – Caravan Parks
State Environmental Planning Policy No. 30 – Intensive Agriculture
State Environmental Planning Policy No. 32 – Urban Consolidation (Redevelopment of Urban Land)
State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
State Environmental Planning Policy No. 44 – Koala Habitat
State Environmental Planning Policy No. 50 – Canal Estate Development
State Environmental Planning Policy No. 55 – Remediation of Land
State Environmental Planning Policy – (Exempt and Complying Development Codes) 2008
State Environmental Planning Policy No. 62 – Sustainable Aquaculture
State Environmental Planning Policy No. 64 – Advertising and Signage
State Environmental Planning Policy No. 65 – Design Quality of Residential Flat Development
State Environmental Planning Policy – (Building Sustainability Index: BASIX) 2004
State Environmental Planning Policy – (Infrastructure) 2007
State Environmental Planning Policy – (Mining, Petroleum Production and Extractive Industries) 2007
State Environmental Planning Policy – (Miscellaneous Consent Provisions) 2007
State Environmental Planning Policy – (Affordable Rental Housing) 2009
State Environmental Planning Policy – (State and Regional Development) 2011
State Environmental Planning Policy – (Housing for Seniors or People with a Disability) 2004

Deemed State Environmental Planning Policies (Deemed SEPPs)

Greater Metropolitan Regional Environmental Plan No. 2 – Georges River Catchment

This plan aims to preserve and protect and to encourage the restoration or rehabilitation of regionally significant sensitive natural environments, to preserve, enhance and protect the freshwater and estuarine ecosystems within the Catchment and to ensure that development achieves the environmental objectives for the Catchment.

(2) The name of each proposed environmental planning instrument that will apply to the carrying out of development on the land and that is or has been the subject of community consultation or on public exhibition under the Act (unless the Director-General has notified the council that the making of the proposed instrument has been deferred indefinitely or has not been approved).

Draft Local Environmental Plans (LEPs)

Not Applicable

Draft State Environmental Planning Policies (SEPPs)

Draft State Environmental Planning Policy (Competition) 2010

(3) The name of each development control plan that applies to the carrying out of development on the land.

Liverpool Development Control Plan 2008 (as amended).

(4) In this clause, proposed environmental planning instrument includes a planning proposal for a LEP or a draft environmental planning instrument.

2. ZONING AND LAND USE UNDER RELEVANT LOCAL ENVIRONMENTAL PLANS

For each environmental planning instrument or proposed instrument referred to in clause 1 (other than a SEPP or proposed SEPP) that includes the land in any zone (however described):

Liverpool Local Environmental Plan 2008

(a) Identity of the zone

R3 Medium Density Residential

(b) The purpose for which the instrument provides that development may be carried out

within the zone without the need for development consent

Home-based child care; Home occupations

(c) The purposes for which the instrument provides that development may not be carried out within the zone except with development consent.

Attached dwellings; Bed and breakfast accommodation; Boarding houses; Building identification signs; Business identification signs; Child care centres; Community facilities; Dwelling houses; Educational establishments; Environmental facilities; Environmental protection works; Exhibition homes; Exhibition villages; Flood mitigation works; Group homes; Home businesses; Home industries; Hostels; Hotel or motel accommodation; Multi dwelling housing; Neighbourhood shops; Places of public worship; Public administration buildings; Recreation areas; Residential care facilities; Respite day care centres; Roads; Secondary dwellings; Semi-detached dwellings; Seniors housing; Shop top housing

(d) The purposes for which the instrument provides that development is prohibited within the zone

Any development not specified in (b) or (c).

(a) The Identity of the zone

B6 Enterprise Corridor

(b) The purposes for which the instrument provides that development may be carried out within the zone without the need for development consent.

Home-based child care; Home occupations

(c) The purposes for which the instrument provides that development may not be carried out within the zone except with development consent.

Building identification signs; Business identification signs; Business premises; Car parks; Commercial premises; Community facilities; Crematoria; Depots; Educational establishments; Entertainment facilities; Environmental facilities; Environmental protection works; Flood mitigation works; Function centres; Garden centres; Hardware and building supplies; Helipads; Home businesses; Hotel or motel accommodation; Information and education facilities; Landscaping material supplies; Light industries; Liquid fuel depots; Multi dwelling housing; Passenger transport facilities; Places of public worship; Plant nurseries;

Public administration buildings; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Registered clubs; Roads; Service stations; Serviced apartments; Shop top housing; Storage premises; Transport depots; Vehicle repair stations; Veterinary hospitals; Warehouse or distribution centres

(d) The purposes for which the instrument provides that development is prohibited within the zone

Any development not specified in item (b) or (c)

(a) The Identity of the zone
SP2 Infrastructure - Drainage

(b) The purposes for which the instrument provides that development may be carried out within the zone without the need for development consent.

Nil

(c) The purposes for which the instrument provides that development may not be carried out within the zone except with development consent.

The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose; Environmental protection works; Roads

(d) The purposes for which the instrument provides that development is prohibited within the zone

Any other development not specified in item (b) or (c)

(a) The Identity of the zone

RE1 Public Recreation

(b) The purposes for which the instrument provides that development may be carried out within the zone without the need for development consent.

Environmental protection works; Home occupations

(c) The purposes for which the instrument provides that development may not be carried out within the zone except with development consent.

Boat sheds; Building identification signs; Business identification signs; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Child care centres; Community facilities; Entertainment facilities; Environmental facilities; Flood mitigation works; Information and education facilities; Kiosks; Marinas; Mooring pens; Places of public worship; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Respite day care centres; Roads; Water recreation structures

(d) The purposes for which the instrument provides that development is prohibited within the Zone

Any development not specified in item (b) or (c)

(a) The Identity of the zone

RE2 Private Recreation

(b) The purposes for which the instrument provides that development may be carried out within the zone without the need for development consent.

Environmental protection works; Home occupations

(c) The purposes for which the instrument provides that development may not be carried out within the zone except with development consent.

Animal boarding or training establishments; Boat sheds; Building identification signs; Business identification signs; Camping grounds; Car parks; Caravan parks; Cemeteries; Charter and tourism boating facilities; Child care centres; Community facilities; Entertainment facilities; Environmental facilities; Flood mitigation works; Function centres; Hotel or motel accommodation; Information and education facilities; Kiosks; Landscaping material supplies; Marinas; Mooring pens; Places of public worship; Plant nurseries; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Registered clubs; Respite day care centres; Roads; Stock and sale yards; Veterinary hospitals; Water recreation structures

(d) The purposes for which the instrument provides that development is prohibited within the zone

Any other development not specified in item (b) or (c)

(e) whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling-house on the land and, if so, the minimum land dimensions so fixed,

The land's dimensions (when considered in isolation) are not such as to prohibit the erection of a dwelling house on the land. However, Liverpool Local Environmental Plan 2008 prohibits the erection of a dwelling house within a zone(s) that applies to the land

(f) whether the land includes or comprises critical habitat

The land does not include or comprise critical habitat.

(g) whether the land is in a conservation area (however described)

Land is not located in a Conservation Area.

(h) whether an item of environmental heritage (however described) is situated on the land

No item of Environmental Heritage is situated on the land.

2A. Zoning and land use under State Environmental Planning Policy (Sydney Region Growth Centres) 2006

Not Applicable

3. COMPLYING DEVELOPMENT

(1) The extent to which the land is land on which complying development may be carried out under each of the codes for complying development because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4) and 1.19 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.

Complying development under the General Housing Code may be carried out on part of this land.

Complying development under the General Development Code may be carried out on part of this land.

Complying development under the Rural Housing Code may be carried out on part of this land.

Complying development under the Fire Safety Code may be carried out on part of this land.

Complying development under the Housing Alterations Code may be carried out on part of this land.

Complying Development under the Commercial and Industrial Alterations Code may be carried out on part of this land.

Complying Development under the Commercial and Industrial (**New** Buildings and Additions) Code may be carried out on part of this land.

Complying Development under the Subdivisions Code may be carried out on part of this land.

Complying Development under the Demolition Code may be carried out on part of this land.

(2) The extent to which complying development may not be carried out on that land because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4) and 1.19 of that Policy and the reasons why it may not be carried out under those clauses.

Not Applicable

Complying development may not be carried out on part of the land because of the following provisions;

Part of the land is excluded being land that is reserved for a public purpose in an environmental planning instrument.

Part of the land is excluded being land identified on an Acid Sulfate Soils Map as being Class 1 or Class 2.

Part of the land is excluded being land that is identified in a foreshore area.

Part of the land is excluded being land that is identified in an environmental planning instrument as being within an area that is environmentally sensitive.

(3) If the council does not have sufficient information to ascertain the extent to which complying

development may or may not be carried out on the land, a statement that a restriction applies to the land, but it may not apply to all of the land, and that council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

Not Applicable

4. Coastal Protection Act 1979

There has been no notification from the Department of Public Works that the land is subject to the operation of Section 38 or 39 of the Coastal Protection Act, 1979.

4A Certain information relating to beaches and coasts

(1) In relation to a coastal council—whether an order has been made under Part 4D of the Coastal Protection Act 1979 in relation to temporary coastal protection works (within the meaning of that Act) on the land (or on public land adjacent to that land), except where the council is satisfied that such an order has been fully complied with.

Not Applicable

(2) In relation to a coastal council:

(a) whether the council has been notified under section 55X of the Coastal Protection Act 1979 that temporary coastal protection works (within the meaning of that Act) have been placed on the land (or on public land adjacent to that land), and

(b) if works have been so placed—whether the council is satisfied that the works have been removed and the land restored in accordance with that Act.

Not Applicable

4B Annual charges under Local Government Act 1993 for coastal protection services that relate to existing coastal protection works

In relation to a coastal council—whether the owner (or any previous owner) of the land has consented in writing to the land being subject to annual charges under section 496B of the Local Government Act 1993 for coastal protection services that relate to existing coastal protection works (within the meaning of section 553B of that Act).

Not Applicable

5. Mine Subsidence

Whether or not the land is proclaimed to be a mine subsidence district within the meaning of section 15 of the Mine Subsidence Compensation Act 1961.

The land is not a mine subsidence district.

6. Road Widening and Road Realignment

Whether or not the land is affected by any road widening or road realignment under:

(a) Division 2 of Part 3 of the Roads Act 1993, or
(b) any environmental planning instrument, or
(c) any resolution of the council.

The land is not affected by any road widening or road realignment.

7. Council and Other Public Authority Policies on Hazard Risk Restrictions

The policies applying to the land from Council and other Public Authorities regarding hazard risk restrictions is/are outlined below: -

(a) Council Policy – Other Risks

Land Slip

The land is not affected by a policy adopted by the Council, or any other public authority and notified to the council for the express purpose of its adoption being referred to in a planning certificate that restricts the development of the land because of the likelihood of land slip.

Bushfire

The land is affected by the *Rural Fires Act 1997* that restricts the development of the land because of the likelihood of bushfire.

Tidal Inundation

The land is not affected by a policy adopted by the Council, or any other public authority and notified to the council for the express purpose of its adoption being referred to in a planning certificate that restricts the development of the land because of the likelihood of tidal inundation.

Subsidence

The land is not affected by a policy adopted by the Council, or any other public authority and notified to the council for the express purpose of its adoption being referred to in a planning certificate that restricts the development of the land because of the likelihood of subsidence.

Acid Sulfate Soil

The land is affected by Liverpool Local Environmental Plan 2008 that restricts the development of the land because of the likelihood of acid sulphate soils class 1.

The land is affected by Liverpool Local Environmental Plan 2008 that restricts the development of the land because of the likelihood of acid sulphate soils class 2.

The land is affected by Liverpool Local Environmental Plan 2008 that restricts the development of the land because of the likelihood of acid sulphate soils class 4.

The land is affected by Liverpool Local Environmental Plan 2008 that restricts the development of the land because of the likelihood of acid sulphate soils class 5.

Other Risks
The land is not affected by a policy adopted by the Council, or any other public authority and notified to the council for the express purpose of its adoption being referred to in a planning certificate that restricts the development of the land because of the likelihood of any other risk.

(b) Public Authority Policies
The land is not affected by a policy adopted by any other public authority and notified to the Council for the express purpose of its adoption by that authority being referred to in the planning certificates issued by the Council, that restricts the development of the land because of the likelihood of land slip, bushfire, flooding, tidal inundation, subsidence, acid sulphate soils or any other risk.

7A. Flood Related Development Controls Information
Whether or not development on that land or part of the land for purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) is subject to flood related development controls.

(1) Whether or not development on that land or part of the land for purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) is subject to flood related development controls.

Part of the land is affected by flood inundation and therefore flood related development controls apply to the land.

(2) Whether or not development on that land or part of the land for any other purpose is subject to flood related development controls.

All of the land is affected by flood inundation and therefore flood related development controls apply to development or any other purpose.

(3) Words and expressions in this clause have the same meanings as in the instrument set out in the Schedule to the Standard Instrument (Local Environmental Plans) Order 2006.

8. Land Reserved for Acquisition

Whether or not any environmental planning instrument or proposed environmental planning instrument referred to in clause 1 makes provision in relation to the acquisition of the land by a public authority, as referred to in section 27 of the Act.

An environmental planning instrument or proposed environmental planning instrument applying to the land makes provision for all or part of the land to be acquired by a public authority.

9. Contribution Plans

The name of each contribution plan applying to the land is/are outlined below: -

Liverpool Contributions Plan 2009

9A Biodiversity certified land

If the land is biodiversity certified land (within the meaning of Part 7AA of the Threatened Species Conservation Act 1995), a statement to that effect.

The land is not biodiversity certified land within the meaning of Part 7AA of the Threatened Species Conservation Act (1995).

10. Bio banking agreements

If the land is land to which a bio banking agreement under Part 7A of the Threatened Species Conservation Act 1995 relates, a statement to that effect (but only if the council has been notified of the existence of the agreement by the Director-General of the Department of Environment, Climate Change and Water).

The land is not land to which a biobanking agreement under part 7A of the *Threatened Species Conservation Act 1995* relates.

11. Bushfire Prone Land

Part of the land is bushfire prone land as defined in the Environmental Planning and Assessment Act 1979.

12. Property Vegetation Plans

If the land is land to which a property vegetation plan under the Native Vegetation Act 2003 applies, a statement to that effect (but only if the council has been notified of the existence of the plan by the person or body that approved the plan under that Act).

The land is not land to which a property vegetation plan relates, as all land in the Liverpool Local Government Area is excluded from the operation of the *Native Vegetation Act 2003.*

13. Orders under Trees (Disputes Between Neighbours) Act 2006

Whether an order has been made under the Trees (Disputes Between Neighbours) Act 2006 to carry out work in relation to a tree on the land (but only if the council has been notified of the order).

Council has not been notified of an order made under the Trees (Disputes Between Neighbours) Act 2006 to carry out work in relation to a tree on the land.

14. Directions under Part 3A

If there is a direction by the Minister in force under section 75P (2) (c1) of the Act that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the Act does not have effect, a statement to that effect identifying the provision that does not have effect.

No such direction applies to the land.

15. Site Compatibility Certificates and Conditions for Seniors Housing

If the land is land to which State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 applies:

(a) a statement of whether there is a current site compatibility certificate (seniors housing), of which the council is aware, in respect of proposed development on the land and, if there is a certificate, the statement is to include:

(i) the period for which the certificate is current, and
(ii) that a copy may be obtained from the head office of the Department of Planning, and

Council is not aware of a current site compatibility certificate (seniors housing) on the land

(b) a statement setting out any terms of a kind referred to in clause 18 (2) of that Policy that have

been imposed as a condition of consent to a development application granted after 11 October 2007 in respect of the land.

There have been no such terms imposed as a condition of consent to development on the land.

16. Site Compatibility Certificates for Infrastructure

A statement of whether there is a valid site compatibility certificate (infrastructure), of which the council is aware, in respect of proposed development on the land and, if there is a certificate, the statement is to include:

(a) the period for which the certificate is valid, and
(b) that a copy may be obtained from the head office of the Department of Planning.

Council is not aware of a current site compatibility certificate (infrastructure) on the land.

17. Site compatibility certificates and conditions for affordable rental housing

(1) A statement of whether there is a current site compatibility certificate (affordable rental housing), of which the council is aware, in respect of proposed development on the land and, if there is a certificate, the statement is to include:

(a) the period for which the certificate is current, and
(b) that a copy may be obtained from the head office of the Department of Planning.

Council is not aware of a current site compatibility certificate (affordable rental housing) on the land.

(2) A statement setting out any terms of a kind referred to in clause 17 (1) or 38 (1) of State Environmental Planning Policy (Affordable Rental Housing) 2009 that have been imposed as a condition of consent to a development application in respect of the land.

There have been no such terms imposed as a condition of consent to development on the land.

18. Paper subdivision information

(1) The name of any development plan adopted by a relevant authority that applies to the land or that is proposed to be subject to a consent ballot.

No such plan applies to the land.

(2) The date of any subdivision order that applies to the land.

No subdivision order applies to the land

(3) Words and expressions used in this clause have the same meaning as they have in Part 16C of this Regulation.

19. Site verification certificates

A statement of whether there is a current site verification certificate, of which the council is aware, in respect of the land and, if there is a certificate, the statement is to include:

(a) the matter certified by the certificate, and

Council is not aware of a current site verification certificate on the land.

Note. A site verification certificate sets out the Director-General's opinion as to whether the land concerned is or is not biophysical strategic agricultural land or critical industry cluster land—see Division 3 of Part 4AA of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

(b) the date on which the certificate ceases to be current (if any), and

Not Applicable

(c) that a copy may be obtained from the head office of the Department of Planning and Infrastructure.

Not Applicable

Note. The following matters are prescribed by section 59 (2) of the Contaminated Land Management Act 1997 as additional matters to be specified in a planning certificate:

(a) that the land to which the certificate relates is significantly contaminated land within the meaning of that Act—if the land (or part of the land) is significantly contaminated land at the date when the certificate is issued,

Not Applicable

(b) that the land to which the certificate relates is subject to a management order within the meaning of that Act—if it is subject to such an order at the date when the certificate is issued,

Not Applicable

(c) that the land to which the certificate relates is the subject of an approved voluntary management proposal within the meaning of that Act—if it is the subject of such an approved proposal at the date when the certificate is issued,

Not Applicable

(d) that the land to which the certificate relates is subject to an ongoing maintenance order within the meaning of that Act—if it is subject to such an order at the date when the certificate is issued,

Not Applicable

(e) that the land to which the certificate relates is the subject of a site audit statement within the meaning of that Act—if a copy of such a statement has been provided at any time to the local authority issuing the certificate.

Not Applicable

Note. Section 26 of the Nation Building and Jobs Plan (State Infrastructure Delivery) Act 2009 provides that a planning certificate must include advice about any exemption under section 23 or authorisation under section 24 of that Act if the council is provided with a copy of the exemption or authorisation by the Co-ordinator General under that Act.

No such exemption or authorisation applies to the land.

PART B
ADDITIONAL INFORMATION PROVIDED PURSUANT
TO SECTION 149(5) OF THE ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979

1. Threatened Species Conservation Act

It is advisable for any application intending to purchase and/or develop land within the Liverpool Local Government Area to approach Council to ascertain if the requirements of the Threatened Species Act, 1995 are likely to apply to their land.

If the land has native vegetation of any sort (ie trees, shrubs, ground covers etc), has recently been cleared or is vacant land, it may have impediments to development under the Threatened Species Act, 1995.

Enquiries should be directed to Council's Infrastructure and Environment Department on 1300 362 170.

2. Tree Preservation Provision
The land is subject to a tree preservation provision.

3. Controlled Access Road
The land does not have a boundary to a controlled access road.

4. Other Information in Relation to Water
The property is identified as flood prone and is within the high risk flood category. High Flood Risk Category means land below the 1% Annual Exceedence Probability flood that is either subject to high hydraulic hazard or where there are significant evacuation difficulties *(see Section 1 Clause 3 of the 149 Certificate for the relevant Development Control Plan for controls relating to flood prone land)*. For further information on flood risk contact Council on 1300 362 170.

5. Sydney Water Corporation
Nil

6. Foreshore Building Line
A building line has been set by Council and this excludes development on flood prone land between the building line adopted by Council and the street alignment.

7. Contaminated Land
Nil

8. Airport Noise Affectation
Badgerys Creek Airport
Nil

9. Airport Acquisition
Nil

10. Environmentally Significant Land
Environmentally Significant Land
The subject property is identified as containing environmentally significant land under Division 2 Other Provisions of the Liverpool Local Environmental Plan 2008.

(1) The objectives of this clause are as follows:

(a) to maintain bushland, wetlands and wildlife corridors of high conservation value,

(b) to identify areas of significance for revegetation to connect to or buffer bushland, wetlands and wildlife corridors,
(c) to protect rare and threatened native flora and native fauna,
(d) to ensure consideration of the significance of vegetation, the sensitivity of the land and the impact of development on the environment prior to the giving of any development consent.

(2) Before determining an application to carry out development on environmentally significant land, the consent authority must consider such of the following as are relevant:

(a) the condition and significance of the vegetation on the land and whether it should be substantially retained in that location,
(a) the importance of the vegetation in that particular location to native fauna,
(b) the sensitivity of the land and the effect of clearing vegetation,
(c) the relative stability of the bed and banks of any waterbody that may be affected by the development, whether on the site, upstream or downstream,
(d) the effect of the development on water quality, stream flow and the functions of aquatic ecosystems (such as habitat and connectivity),
(e) the effect of the development on public access to, and use of, any waterbody and its foreshores.

Further information in this regard is available from Council's Strategic Planning Department or the Liverpool Local Environmental Plan 2008.

11. Archaeological Management Plan
Nil

12. Unhealthy Building Land Proclamation
Nil

Jan McCredie
Acting Manager – Strategic Planning

For further information, please contact

CALL CENTRE – 1300 36 2170 Liverpool City Council

Appendix C

Environmental Protection Licence

Section 55 Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 4612

Licence Details	
Number:	4612
Anniversary Date:	15-January

Licensee

BENEDICT INDUSTRIES PTY LIMITED
PO BOX 431
FRENCHS FOREST NSW 1640

Licence Type

Premises

Premises

BENEDICT RECLAMATIONS
146 NEWBRIDGE ROAD
MOOREBANK NSW 2170

Scheduled Activity

Crushing, grinding or separating
Extractive activities

Fee Based Activity	Scale
Land-based extractive activity	> 50000 - 100000 T obtained
Crushing, grinding or separating	> 30000 - 100000 T processed
Water-based extractive activity	> 50000 - 100000 m3 obtained or moved

Region

Waste Operations (Sydney)
59-61 Goulburn Street
SYDNEY NSW 2000
Phone: 02 9995 5000
Fax: 02 9995 5999

PO Box A290 SYDNEY SOUTH
NSW 1232

Environment Protection Licence

Licence - 4612

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act); and
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

The EPA publication "A Guide to Licensing" contains information about how to calculate your licence fees.

The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

BENEDICT INDUSTRIES PTY LIMITED
PO BOX 431
FRENCHS FOREST NSW 1640

subject to the conditions which follow.

1 Administrative conditions

A1 What the licence authorises and regulates

A1.1 Not applicable.

A1.2 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity
Crushing, grinding or separating
Extractive activities

Fee Based Activity	Scale
Land-based extractive activity	> 50000 - 100000 T obtained
Crushing, grinding or separating	> 30000 - 100000 T processed
Water-based extractive activity	> 50000 - 100000 m3 obtained or moved

A1.3 Not applicable.

A2 Premises to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
BENEDICT RECLAMATIONS
146 NEWBRIDGE ROAD
MOOREBANK
NSW
2170
PART LOT 1 DP515738 LABELLED AS "LIC #4612" ON MAP TITLED "PLAN SHOWING CONTOURS AS AT JULY 1999 OVER LOT 1 DP515738 NEWBRIDGE ROAD MOOREBANK" AND DATED 19.7.99 SUBMITTED TO THE EPA ON 3.9.04.

A3 Other activities

A3.1 Not applicable.

A4 Information supplied to the EPA

A4.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
(a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
(b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

A4.2 The Landfill Environmental Management Plan (LEMP) prepared by Benedict Reclamations and submitted to the EPA on March 2000 is not to be taken as part of the documentation in A4.1, other than those parts specifically referenced in this licence.

2 Discharges to air and water and applications to land

P1 Location of monitoring/discharge points and areas

P1.1 Not applicable.

P1.2 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

P1.3 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

Environment Protection Licence

Water and land

EPA identification no.	Type of monitoring point	Type of discharge point	Description of location
1	Groundwater Quality Monitoring		Borehole labelled as "Monitoring point 1" on map titled "Location Plan" submitted to the EPA on 14 March 2003.
2	Groundwater Quality Monitoring		Borehole labelled as "Monitoring point 2" on map titled "Location Plan" submitted to the EPA on 14 March 2003.
3	Groundwater Quality Monitoring		Borehole labelled as "Monitoring point 3" on map titled "Location Plan" submitted to the EPA on 14 March 2003.
4	Groundwater Quality Monitoring		Borehole labelled as "Monitoring point 4" on map titled "Location Plan" submitted to the EPA on 14 March 2003.
5	Groundwater Quality Monitoring		Borehole with blue top on the western side of the boundary of the premises labelled as "Monitoring point 5" on map titled "Location Plan" submitted to the EPA on 14 March 2003.
7	Surface Water Quality Monitoring		Monitoring point in the dredge pond labelled as "Monitoring point 7" on map titled "Location Plan" submitted to the EPA on 14 March 2003.
8	Surface Water Quality Monitoring		Upstream monitoring point at the north eastern boudary of the premises labelled as "Monitoring point 8" on map titled "Location Plan" submitted to the EPA on 14 March 2003.
9	Surface Water Quality Monitoring		Downstream monitoring point at the south eastern boundary of the premises labelled as "Monitoring point 9" on map titled "Location Plan" submitted to the EPA on 14 March 2003.

EPA identification no.	Type of monitoring point	Type of discharge point	Description of location
10	Surface Water Quality Monitoring		Stormwater monitoring at north western boundary of the premises labelled as "Monitoring point 10" on map titled "Location Plan" submitted to the EPA on 14 March 2003.

3 Limit conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Load limits

L2.1 Not applicable.

L2.2 Not applicable.

L3 Concentration limits

L3.1 Not applicable.

L3.2 Not applicable.

L3.3 Not applicable.

L4 Volume and mass limits

L4.1 Not applicable.

L5 Waste

L5.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled "Waste" and meeting the definition, if any, in the column titled "Description" in the table below.

Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled "Activity" in the table below.

Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below.

Condition L5.1 does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	Virgin Excavated Natural Material	As defined in Schedule 1 of the POEO Act, as in force from time to time.	Backfilling of sand quarry	NA
NA		Any waste received on site that is below licensing thresholds in Schedule 1 of the POEO Act, as in force from time to time		NA

L6 Noise Limits

L6.1 Not applicable.

4 Operating conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.

This includes:
(a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
(b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O1.2 Waste(s) or material(s) must not be deposited within 40 metres of the Georges River.

O1.3 Waste(s) or material(s) must not be deposited within 10 metres of any other watercourse.

O1.4 The licensee must take all practical measures to control entry to the premises.

O1.5 There must be no incineration or burning of any material(s) at the premises.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
(a) must be maintained in a proper and efficient condition; and
(b) must be operated in a proper and efficient manner.

O3 Management of stormwater

O3.1 Surface drainage must be diverted away from any area where waste is being or has been landfilled.

O3.2 Any stormwater diversion pipelines that adjoin or pass through the fill must be constructed in such a manner that prevents the infiltration of contaminated seepage into the stormwater drainage system.

O4 Dust Control

O4.1 All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.

O5 Potentially offensive odour

O5.1 No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

O6 Process and management

O6.1 There must be at least two (2) persons nominated, and their telephone numbers, who will be available to the EPA on a 24 hours basis. These persons must have authority to shut down any activity, or to effect any control measure, as directed by an authorised officer of the EPA.

O6.2 At all times when the facility is open, a person who is responsible for control of the facility must be in attendance and their duties must include:-

- control of all employees working in or on the premises;
- supervision of any person entering the premises; and
- ensure compliance with the conditions of this licence.

O7 Closure plan

O7.1 The licensee must prepare and submit to the EPA within three months of acceptance of the last load of waste being landfilled a closure plan in accordance with section 76 of the Protection of the Environment Operations Act 1997.

O8 Pre-requisites for receipt of Virgin Excavated Natural Material (VENM)

O8.1 Before entering into an agreement to accept VENM for disposal the licensee must:

(a) Receive a written application containing the information listed in condition E3.1(1) from the consignor; and
(b) Take all reasonable care to verify the accuracy of the classification of the waste identified in the written application by the consignor.

O9 The Northern Boundary Fence

O9.1 The licensee must have a permanent fixed fence along the northern boundary of the premises.

5 Monitoring and recording conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
(a) in a legible form, or in a form that can readily be reduced to a legible form;
(b) kept for at least 4 years after the monitoring or event to which they relate took place; and
(c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
(a) the date(s) on which the sample was taken;
(b) the time(s) at which the sample was collected;
(c) the point at which the sample was taken; and
(d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

Water and Land

POINTS 1,2,3,4,5,7,8,9,10

Pollutant	Units of measure	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	milligrams per litre	Every 3 months	Grab sample
Aluminium	milligrams per litre	Every 6 months	Grab sample
Arsenic	milligrams per litre	Every 6 months	Grab sample
Barium	milligrams per litre	Every 6 months	Grab sample
Cadmium	milligrams per litre	Every 6 months	Grab sample
Chromium (total)	milligrams per litre	Every 6 months	Grab sample
Conductivity	microsiemens per centimetre	Every 3 months	Grab sample
Copper	milligrams per litre	Every 6 months	Grab sample
Iron	milligrams per litre	Every 6 months	Grab sample
Lead	milligrams per litre	Every 6 months	Grab sample
Manganese	milligrams per litre	Every 3 months	Grab sample
Mercury	milligrams per litre	Every 3 months	Grab sample
Nitrate + nitrite (oxidised nitrogen)	milligrams per litre	Every 3 months	Grab sample
Nitrogen (ammonia)	milligrams per litre	Every 3 months	Grab sample
Organochlorine pesticides	micrograms per litre	Every 6 months	Grab sample
Phenols	micrograms per litre	Every 6 months	Grab sample
Polycyclic aromatic hydrocarbons	micrograms per litre	Every 6 months	Grab sample
Selenium	milligrams per litre	Every 6 months	Grab sample
Total dissolved solids	milligrams per litre	Every 3 months	Grab sample
Total organic carbon	milligrams per litre	Every 3 months	Grab sample
Total petroleum hydrocarbons	micrograms per litre	Every 6 months	Grab sample
Zinc	milligrams per litre	Every 6 months	Grab sample
pH	pH	Monthly	Grab sample

M2.2 Requirement to calculate the chloride to sulphate ratio

M2.2.1 As an indicator of the potential for acidification the ratio of chloride to sulphate must also be calculated and reported to the EPA for each of the samples required by the above monitoring table.

M3 Testing methods - concentration limits

M3.1 Not applicable.

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M4 Recording of pollution complaints

M4.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M4.2 The record must include details of the following:
(a) the date and time of the complaint;
(b) the method by which the complaint was made;
(c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
(d) the nature of the complaint;
(e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
(f) if no action was taken by the licensee, the reasons why no action was taken.

M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

M5.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M5.3 Conditions M5.1 and M5.2 do not apply until 3 months after:
(a) the date of the issue of this licence or
(b) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.

M6 Requirement to monitor volume or mass

M6.1 Not applicable.

6 Reporting conditions

R1 Annual return documents

What documents must an Annual Return contain?

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
(a) a Statement of Compliance; and
(b) a Monitoring and Complaints Summary.
A copy of the form in which the Annual Return must be supplied to the EPA accompanies this licence. Before the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

Period covered by Annual Return

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:
(a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
(b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
(a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
(b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

Deadline for Annual Return

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

Notification where actual load can not be calculated

R1.6 Not applicable.

Licensee must retain copy of Annual Return

R1.7 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

Certifying of Statement of Compliance and signing of Monitoring and Complaints Summary

R1.8 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
(a) the licence holder; or
(b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R1.9 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

R2 Notification of environmental harm

Note: The licensee or its employees must notify the EPA of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
(a) where this licence applies to premises, an event has occurred at the premises; or
(b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
(a) the cause, time and duration of the event;
(b) the type, volume and concentration of every pollutant discharged as a result of the event;
(c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;

(d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
(e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
(f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
(g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Recording of fires

R4.1 The licensee must maintain a daily log and record the following data of fires at the site:
(a) Time and date when the fire was deliberately started or reported.
(b) Whether the fire was authorised by the licensee, and, if not, the circumstances which ignited the fire.
(c) The time and date that the fire ceased and whether it burnt out or was extinguished.
(d) The location of fire (eg. clean timber stockpile, putrescible garbage cell, etc).
(e) Prevailing weather conditions.
(f) Observations made in regard to smoke direction and dispersion.
(g) The amount of waste that was combusted by the fire.
(h) Action taken to extinguish the fire.

R4.2 The licensee or its employees or agents must notify the EPA in accordance with conditions R2.1 and R2.2 of all fires at the premises as soon as practical after becoming aware of the incident.

General conditions

G1 Copy of licence kept at the premises

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

Pollution studies and reduction programs

Odour Assessment

U1.1 Benedict must engage an independent qualified odour consultant to conduct a survey at the Premises. The purpose of the survey is to identify all potential odour sources at the Premises and to recommend suitable solution(s) to address the odour issue at the Premises.

Benedict must inform DECCW of the odour consultant details including company name, address and ABN before the commencement of the survey.

Benedict must engage an odour consultant by no later than Friday 25 February 2011.

The odour survey must be completed by no later than Friday 25 March 2011.

A copy of that report must be submitted to DECCW by no later than Friday 1 April 2011.

Benedict must also submit a response to the report on Friday 1 April 2011 identifying the recommendations Benedict will adopt to address odour at the premises including the proposed timeframes for works to be completed.

Special conditions

E1 Financial assurance

E1.1 A financial assurance, in favour of the EPA, in the amount of fifty thousand dollars ($50,000) must be maintained during the operation of the facility and thereafter until such time as the EPA is satisfied the premises are environmentally secure.

This assurance must be replenished to the full amount should the EPA have any reason to call up the financial assurance or any part thereof to correct environmental problems which have not been remedied by the occupier upon being given notice to do so.

Failure to maintain the assurance at the full amount will result in suspension of this licence.

This financial assurance shall be indexed to the Consumer Price Index (CPI). The EPA reserves the right to vary the magnitude of Index (CPI). The EPA reserves the right to vary the magnitude of the bank guarantee at any time depending upon any reassessment of possible cost(s) of rehabilitation of the premises.

E2 VENM Verification

E2.1 The licensee must develop and implement a VENM Verification Procedure designed to ensure that the only waste received at the premises is VENM. This procedure must include (but is not necessarily limited to) the following:

1) Pre-acceptance validation must be carried out prior to the licensee agreeing to accept VENM from all sources. This must incorporate a procedure for collection and recording of information about the waste including;

a) The location of the site from which the waste originates (the Waste Origin Site), its street address;
b) A short general description of the Waste Origin Site and any improvements on the site;
c) A brief history of activities of the site with particular reference to the commercial or industrial activities which may have resulted in the site becoming chemically contaminated;
d) Whether the Waste Origin Site has been the subject of contaminated site investigations and, if so, a summary of the findings of the investigations;
e) a brief description of the physical nature of the material(s) proposed to be transported from the Waste Origin Site to the premises;
f) Sufficient other background information or analysis data to satisfy the licensee that the material has been properly classified as VENM; and
g) An estimate of the total amount of VENM proposed to be received from a Waste Origin Site where such amounts are greater than 100 tonnes.

Note: The procedure should also include a mechanism whereby, having obtained the above information, the licensee diligently makes further inquiries as may be reasonably required, to satisfy itself that waste to be transported to the premises from the Waste Origin Site is VENM.

2) Verification at time of acceptance must provide reasonable assurance that the material is from a Waste Origin Site properly identified in accordance with the pre-acceptance Verification Procedure and is VENM from that site. The information obtained and recorded must include:

a) The date and time of entry of the transporting vehicle;
b) A description of the type or type of VENM in the load;
c) The weight of each load;
d) The identification details of the source of the VENM (the VENM supplier) and site of origin;
e) The details of the transporting vehicle including its registration number and driver;
f) Identification details of the company/individual which has employed or contracted the driver to transport VENM to the premises.

3) A program of inspection and audit of deliveries designed to evaluate the overall effectiveness of the above procedures and:

a) Is statistically designed to provide confidence that waste being transported to the premises from a Waste Origin Site has been properly classified as VENM;
b) Segregates, in a defined area, any load of waste which is the subject of inspection and/or sampling until such time as the results of the inspection and/or sampling are known; and
c) Segregates material which is found to be improperly classified as VENM in a discrete, defined area:

4) As soon as possible after becoming aware that any waste/material accepted at the premises is not VENM the licensee must;

a) Notify the EPA in writing;
b) Remove the material/waste from the premises and dispose of it at a facility licensed to take such waste; and

c) Implement a procedure to audit all further incoming loads from that Waste Origin Site prior to accepting any further waste, until such time as the results of such audits demonstrate that the Waste Origin Site's screening and assessment procedures have been corrected to prevent further mis-classification of waste.

E2.2 The licence must ensure that all VENM accepted at the premises has been assessed in accordance with the VENM Verification Procedure and is VENM.

E3 Other Waste Disposal

E3.1 Waste other than VENM must not be deposited in the water.

Dictionary

General Dictionary

In this licence, unless the contrary is indicated, the terms below have the following meanings:

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand

composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 1998.
flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997

regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste

Mr Greg Sheehy

Environment Protection Authority

(By Delegation)

Date of this edition - 18-Feb-2011

End Notes

1	Licence varied by notice 1004274, issued on 20-Feb-2001, which came into effect on 28-Feb-2001.
2	Licence varied by notice 1006603, issued on 24-Apr-2001, which came into effect on 17-May-2001.
3	Licence varied by notice 1014871, issued on 12-Mar-2002, which came into effect on 06-Apr-2002.
4	Licence varied by notice 1020599, issued on 17-Sep-2002, which came into effect on 12-Oct-2002.
5	Licence varied by notice 1031573, issued on 05-Dec-2003, which came into effect on 30-Dec-2003.
6	Licence varied by notice 1040259, issued on 03-Sep-2004, which came into effect on 28-Sep-2004.
7	Licence varied by notice 1046512, issued on 24-May-2005, which came into effect on 18-Jun-2005.
8	Licence varied by Change to schedule 1, issued on 07-May-2008, which came into effect on 07-May-2008.
9	Licence varied by notice 1093200, issued on 29-Oct-2008, which came into effect on 29-Oct-2008.
10	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
11	Licence varied by Correction to EPA Region data record., issued on 25-Jun-2010, which came into effect on 25-Jun-2010.
12	Licence varied by notice 1120628, issued on 18-Feb-2011, which came into effect on 18-Feb-2011.

Appendix D

Summary tables

Summary Table 1: historic TPH exceedances above laboratory LOR

Location	Date	C10 - C14 fraction	C15 - C28 fraction	C29 - C36 fraction	C10 - C36 fraction sum
BS1	28/09/1993	<LOR	44	408	36
BS1	13/10/1993	<LOR	50	217	142
BS1	24/11/1993	<LOR	86	288	38
MP1	22/07/1999	<LOR	285	67	352
MP1	20/07/2001	<LOR	270	107	532
MP1	28/02/2001	86	161	<LOR	247
MP1	20/07/2001	<LOR	270	107	377
MP1	24/07/2009	92	170	<LOR	262
MP1	13/01/2011	<LOR	140	<LOR	140
BS2	28/09/1993	<LOR	56	<LOR	56
BS2	27/10/1993	<LOR	79	29	108
BS2	24/11/1993	<LOR	45	<LOR	<LOR
MP2	13/01/2011	<LOR	140	<LOR	140
BS3	28/09/1993	<LOR	53	<LOR	53
BS3	24/11/1993	<LOR	86	<LOR	86
MP3	24/07/2009	<LOR	390	<LOR	390
MP3	13/01/2011	<LOR	120	<LOR	120
BS4	28/09/1993	<LOR	68	<LOR	68
BS4	27/10/1993	<LOR	56	<LOR	56
BS4	24/11/1993	<LOR	37	<LOR	37
MP4	24/07/2009	<LOR	320	<LOR	320
BS5	28/09/1993	<LOR	75	<LOR	75
BS5	13/10/1993	<LOR	73	32	<LOR
BS5	27/10/1993	28	129	44	<LOR
BS5	10/11/1993	<LOR	118	<LOR	<LOR
BS5	24/11/1993	<LOR	102	<LOR	<LOR
MP5	20/07/1999	<LOR	103	50	153
MP5	19/07/2000	50	266	97	153
MP5	28/02/2001	50	483	267	800
MP5	20/07/2001	<LOR	130	137	267
MP5	24/01/2007	180	1020	80	1280
BS6	28/09/1993	<LOR	90	<LOR	<LOR
BS6	13/10/1993	<LOR	89	31	<LOR
BS6	27/10/1993	<LOR	119	25	<LOR
BS6	10/11/1993	<LOR	81	<LOR	<LOR
BS6	24/11/1993	<LOR	142	<LOR	<LOR
MP6	13/07/2009	170	850	190	1210

Summary Table 2 Analytical Results - Soil

Analytes	units	NEPM HIL(B)	NEMP EIL (urban residential & open space)	NEPM HSL (A&B) 0-<1 m, sand	NEPM ESL (urban residential & open space - coarse)	LOR	TP-1 0.5M	TP-2 0.5M	TP-3 0.5M	TP-4 0.5M	TP-5 0.5M	TP-6 0.5M	TP-7 0.5M	TP-8 0.5M	TP-9 0.5M	TP-9 2M	QA.1
Laboratory parameters							3-Jun-15										
pH		-	-	-	-	0.1	7.7	4	7.1	4.8	7.5	8.3	7.8	7.5	7.8	-	7.6
Metals																	
Arsenic	mg/kg	500	100	-	-	5	<5	10	7	8	6	<5	10	6	<5	<5	6
Cadmium	mg/kg	150	-	-	-	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	500	-	-	-	2	12	11	18	16	33	3	21	8	10	4	11
Copper	mg/kg	30000	-	-	-	5	17	8	65	9	176	<5	22	67	14	<5	25
Iron	mg/kg	-	-	-	-	50	14200	28600	18300	37400	20600	3060	22800	14500	9200	2900	16900
Lead	mg/kg	1200	-	-	-	5	25	22	112	20	144	7	30	33	24	<5	33
Nickel	mg/kg	1200	-	-	-	2	4	<2	10	9	15	7	14	4	3	<2	12
Zinc	mg/kg	60000	-	-	-	5	37	8	217	25	309	21	61	71	43	<5	108
Mercury	mg/kg	120	-	-	-	0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
TPH																	
C6 - C9 Fraction	mg/kg	-	-	-	-	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C14 Fraction	mg/kg	-	-	-	-	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction	mg/kg	-	-	-	-	100	<100	<100	**120**	<100	<100	<100	<100	<100	<100	<100	<100
C29 - C36 Fraction	mg/kg	-	-	-	-	100	<100	<100	**140**	<100	<100	<100	<100	<100	<100	<100	<100
C10 - C36 Fraction (sum)	mg/kg	-	-	-	-	50	<50	<50	**260**	<50	<50	<50	<50	<50	<50	<50	<50
TRH																	
C6 - C10 Fraction	mg/kg	-	-	-	-	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 Fraction minus BTEX (F1)	mg/kg	-	-	-	180	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>C10 - C16 Fraction	mg/kg	-	-	-	-	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C16 - C34 Fraction	mg/kg	-	-	-	300	100	<100	<100	**210**	<100	100	<100	<100	<100	<100	<100	<100
>C34 - C40 Fraction	mg/kg	-	-	-	2800	100	<100	<100	**110**	<100	<100	<100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)		-	-	-	-	50	<50	<50	**320**	<50	100	<50	<50	<50	<50	<50	<50
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	-	-	110	120	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
BTEX		-	-	-	-												
Benzene	mg/kg	-	-	0.5	50	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	-	-	160	85	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	-	-	55	70	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylenes	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of BTEX	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes - Total	mg/kg	-	-	40	105	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene	mg/kg	-	170	-	-	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
PAH		-	-	-	-												
Naphthalene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	**1.1**	<0.5	<0.5	**0.6**	<0.5	<0.5	<0.5	<0.5	**0.8**
Anthracene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	**2.3**	<0.5	**0.7**	**0.9**	<0.5	<0.5	<0.5	<0.5	**1.2**
Pyrene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	**2.2**	<0.5	**0.8**	**0.8**	<0.5	<0.5	<0.5	<0.5	**1.2**
Benz(a)anthracene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	**0.9**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	**0.8**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	**0.8**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	mg/kg	-	-	-	0.7	0.5	<0.5	<0.5	**0.8**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Benzo(g.h.i)perylene	mg/kg	-	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of polycyclic aromatic hydrocarbons	mg/kg	400	-	-	-	0.5	<0.5	<0.5	8.9	<0.5	1.5	2.3	<0.5	<0.5	<0.5	<0.5	3.2
Benzo(a)pyrene TEQ (zero)	mg/kg	4	-	-	-	0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ (half LOR)	mg/kg	4	-	-	-	0.5	0.6	0.6	1.3	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (LOR)	mg/kg	4	-	-	-	0.5	1.2	1.2	1.6	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Total Polychlorinated biphenyls		-	-	-	-	0.05											
Total Polychlorinated biphenyls	mg/kg	1	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Pesticides																	
alpha-BHC	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Hexachlorobenzene (HCB)	mg/kg	15	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
beta-BHC	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
gamma-BHC	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
delta-BHC	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Heptachlor	mg/kg	10	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Aldrin	mg/kg	10	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Heptachlor epoxide	mg/kg		-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
trans-Chlordane	mg/kg		-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Total Chlordane (sum)	mg/kg	90	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
alpha-Endosulfan	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
cis-Chlordane	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Dieldrin	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
4.4`-DDE	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Endrin	mg/kg	20	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
beta-Endosulfan	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Endosulfan (sum)	mg/kg	400	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
4.4`-DDD	mg/kg	-	-	-	-	0.2	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Endrin aldehyde	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Endosulfan sulfate	mg/kg	-	-	-	-	0.2	-	-	-	-	<0.2	-	-	-	<0.2	<0.2	-
4.4`-DDT	mg/kg	-	180	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Endrin ketone	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.2	-	-	-	<0.2	<0.2	-
Methoxychlor	mg/kg	500	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Sum of Aldrin + Dieldrin	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Sum of DDD + DDE + DDT	mg/kg	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-
Dichlorvos	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Demeton-S-methyl	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Monocrotophos	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.2	-	-	-	<0.2	<0.2	-
Dimethoate	mg/kg	-	-	-	-	0.2	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Diazinon	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Chlorpyrifos-methyl	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Parathion-methyl	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.2	-	-	-	<0.2	<0.2	-
Malathion	mg/kg	-	-	-	-	0.2	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Fenthion	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Chlorpyrifos	mg/kg	340	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Parathion	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.2	-	-	-	<0.2	<0.2	-
Pirimphos-ethyl	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Chlorfenvinphos	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Bromophos-ethyl	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Fenamiphos	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Prothiofos	mg/kg	-	-	-	-	0.05	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Ethion	mg/kg	-	-	-	-	0.5	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Carbophenothion	mg/kg	-	-	-	-	0.5	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-
Azinphos Methyl	mg/kg	-	-	-	-	0.5	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-

National Environment Protection Council (NEPC) (Assessment of Site Contamination) Measure 1999 (as amended in 2013a), *Schedule B1 Guideline on Investigation Levels for Soil and Groundwater.*

Summary Table 3 Analytical Results - Dredge Pond Sediment

Analytes	units	ISQG (low)	ISQG (high)	LOR	SD-1	SD-2	SD-3	SD-4	SD-5	SD-6	QA.2
Laboratory parameters					3-Jun-15						
pH		-		0.1	8.9	7.9	8.3	8	8.1	7.8	8.3
Metals											
Arsenic	mg/kg	20	70	5	<5	<5	<5	6	15	<5	<5
Cadmium	mg/kg	1.5	10	1	<1	<1	<1	<1	1	<1	<1
Chromium	mg/kg	80	370	2	13	<2	3	10	33	9	3
Copper	mg/kg	65	270	5	33	<5	16	26	96	21	6
Iron	mg/kg	-	-	50	9080	1660	2660	12200	31300	11800	2660
Lead	mg/kg	50	220	5	90	20	12	38	268	49	11
Nickel	mg/kg	21	52	2	8	<2	2	7	17	6	<2
Zinc	mg/kg	200	410	5	148	16	44	67	316	60	43
Mercury	mg/kg	0.15	1	0.1	0.2	<0.1	<0.1	<0.1	0.5	<0.1	<0.1
Nutrients											
Ammonia as N	mg/kg	-	-		45.1	2.4	10.2	7.8	48.6	8.1	-
Total organic carbon	%	-	-		1.75	0.32	0.66	1.15	1.92	1.04	-
TPH											
C6 - C9 Fraction	mg/kg	-	-	10	<10	<10	<10	<10	<10	<10	<10
C10 - C14 Fraction	mg/kg	-	-	50	<50	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction	mg/kg	-	-	100	**110**	<100	<100	<100	**180**	**120**	<100
C29 - C36 Fraction	mg/kg	-	-	100	**130**	<100	<100	<100	**460**	**120**	<100
C10 - C36 Fraction (sum)	mg/kg	-	-	250	**240**	<50	<50	<50	**640**	**240**	<50
TRH											
C6 - C10 Fraction	mg/kg	-	-	10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 Fraction minus BTEX (F1)	mg/kg	-	-	50	<10	<10	<10	<10	<10	<10	<10
>C10 - C16 Fraction	mg/kg	-	-	100	<50	<50	<50	<50	<50	<50	<50
>C16 - C34 Fraction	mg/kg	-	-	100	**190**	<100	<100	<100	**490**	**200**	<100
>C34 - C40 Fraction	mg/kg	-	-	50	<100	<100	<100	<100	**340**	<100	<100
>C10 - C40 Fraction (sum)	mg/kg	-	-	50	**190**	<50	<50	<50	**830**	**200**	<50
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	-	-		<50	<50	<50	<50	<50	<50	<50
BTEX		-	-	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzene	mg/kg	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylenes	mg/kg	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	mg/kg	-	-	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of BTEX	mg/kg	-	-	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Xylenes - Total	mg/kg	-	-	1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	mg/kg	160	2100								
PAH				0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	160	2100	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	44	640	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	mg/kg	16	500	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	mg/kg	19	540	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**3.6**	<0.5
Phenanthrene	mg/kg	240	1500	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	85	1100	0.5	**0.9**	<0.5	<0.5	<0.5	**2.2**	**4**	<0.5
Fluoranthene	mg/kg	-		0.5	**0.9**	<0.5	<0.5	0.5	**2.4**	**4.2**	<0.5
Pyrene	mg/kg	665	2600	0.5	<0.5	<0.5	<0.5	<0.5	**0.9**	**1.5**	<0.5
Benz(a)anthracene	mg/kg	261	1600	0.5	<0.5	<0.5	<0.5	<0.5	**0.9**	**1.4**	<0.5
Chrysene	mg/kg	384	2800	0.5	<0.5	<0.5	<0.5	<0.5	**0.9**	**1**	<0.5
Benzo(b+j)fluoranthene	mg/kg	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	-	-	0.5	<0.5	<0.5	<0.5	<0.5	**1.2**	**1.3**	<0.5
Benzo(a)pyrene	mg/kg	430	1600	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	mg/kg	-	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	mg/kg	63	260	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	mg/kg	-	-	0.5	**1.8**	<0.5	<0.5	0.5	**8.5**	**17**	<0.5
Sum of polycyclic aromatic hydrocarbons	mg/kg	-	-	0.5	<0.5	<0.5	<0.5	<0.5	1.4	1.6	<0.5
Benzo(a)pyrene TEQ (zero)	mg/kg	-	-	0.5	0.6	0.6	0.6	0.6	1.7	1.9	0.6
Benzo(a)pyrene TEQ (half LOR)	mg/kg	-	-	0.5	1.2	1.2	1.2	1.2	2	2.2	1.2
Benzo(a)pyrene TEQ (LOR)		-	-	0.05							
Total Polychlorinated biphenyls				0.05	-	-	<0.05	-	-	<0.05	<0.05
Total Polychlorinated biphenyls	mg/kg	23	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Pesticides											
alpha-BHC	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Hexachlorobenzene (HCB)	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
beta-BHC	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
gamma-BHC	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
delta-BHC	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Heptachlor	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Aldrin	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Heptachlor epoxide	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
trans-Chlordane	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Total Chlordane (sum)	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
alpha-Endosulfan	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
cis-Chlordane	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Dieldrin	mg/kg	0.02	8	0.05	-	-	<0.05	-	-	<0.05	<0.05
4.4`-DDE	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Endrin	mg/kg	0.02	8	0.05	-	-	<0.05	-	-	<0.05	<0.05
beta-Endosulfan	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Endosulfan (sum)	mg/kg	-	-	0.2	-	-	<0.05	-	-	<0.05	<0.05
4.4`-DDD	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Endrin aldehyde	mg/kg	-	-	0.2	-	-	<0.2	-	-	<0.2	<0.2
Endosulfan sulfate	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
4.4`-DDT	mg/kg	-	-	0.05	-	-	<0.2	-	-	<0.2	<0.2
Endrin ketone	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Methoxychlor	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Sum of Aldrin + Dieldrin	mg/kg	-	-	0.2	-	-	-	-	-	-	-

Sum of DDD + DDE + DDT	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Dichlorvos	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Demeton-S-methyl	mg/kg	-	-	0.05	-	-	<0.2	-	-	<0.2	<0.2
Monocrotophos	mg/kg	-	-	0.2	-	-	<0.05	-	-	<0.05	<0.05
Dimethoate	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Diazinon	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Chlorpyrifos-methyl	mg/kg	-	-	0.05	-	-	<0.2	-	-	<0.2	<0.2
Parathion-methyl	mg/kg	-	-	0.2	-	-	<0.05	-	-	<0.05	<0.05
Malathion	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Fenthion	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Chlorpyrifos	mg/kg	-	-	0.05	-	-	<0.2	-	-	<0.2	<0.2
Parathion	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Pirimphos-ethyl	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Chlorfenvinphos	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Bromophos-ethyl	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Fenamiphos	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Prothiofos	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Ethion	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Carbophenothion	mg/kg	-	-	0.05	-	-	<0.05	-	-	<0.05	<0.05
Azinphos Methyl	mg/kg	-	-	0.05	-	-	<0.06	-	-	<0.05	<0.05

Agriculture and Resource Management Council of Australia and New Zealand and the Australian and New Zealand Environment and Conservation Council (ANZECC/ARMCANZ) 2000 *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*

Summary Table 4 Analytical Results - Dredge Pond Surface Water

Analyte	unit	ANZECC/ARMCANZ 95% protection (freshwater)	ANZECC/ARMCANZ 95% protection (marine)	NHMRC 2008 Risks in Recreational Water	LOR	WAT-1	WAT-2	WAT-3	QA.5
Field parameters						3-Jun-15			
Temperature	°C	-	-	-		16	14.7	15.1	16
EC	uS/cm	125-2200*	-	-		7392	7314	7305	7392
pH	pH units	-	-	-		7.73	7.44	7.54	7.73
Dissolved oxygen	mg/L	-	-	-		4.76	9.78	8.81	4.76
Redox	mV	-	-	-		-49.4	-15.5	-27.6	-49.4
Laboratory parameters									
pH		-	-	-	0.01	7.7	7.76	7.78	7.33
Metals									
Arsenic	mg/L	0.013	ID	0.07		0.004	0.003	0.003	0.003
Cadmium	mg/L	0.0002	0.0055	-		<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	0.0044	0.5		<0.001	<0.001	<0.001	<0.001
Copper	mg/L	0.0014	0.0013	20		<0.001	0.001	0.001	0.001
Iron	mg/L	ID	ID	-		0.07	0.12	0.13	0.1
Lead	mg/L	0.0034	0.0044	0.1		<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.011	0.07	0.2		0.005	0.005	0.005	0.005
Zinc	mg/L	0.008	0.015	-		0.008	0.008	0.007	0.01
Nutrients									
Ammonia (as N)	mg/L	0.01*	0.01*	-	0.01	11.6	13.1	13.2	12.1
PAH									
Naphthalene	ug/L	16	70	-	1	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Acenaphthene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Fluorene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Phenanthrene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Anthracene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Fluoranthene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Pyrene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Chrysene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	ug/L	-	-	0.0001	0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	ug/L	-	-	-	1	<1.0	<1.0	<1.0	<1.0
Sum of polycyclic aromatic hydrocarbons	ug/L	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ (zero)	ug/L	-	-	-	0.5	<0.5	<0.5	<0.5	<0.5
TPH									
C6 - C9 Fraction		-	-	-	20	<20	<20	<20	<20
C10 - C14 Fraction		-	-	-	50	<50	<50	<50	<50
C15 - C28 Fraction		-	-	-	100	<100	<100	<100	<100
C29 - C36 Fraction		-	-	-	50	<50	<50	<50	<50
C10 - C36 Fraction (sum)		-	-	-	50	<50	<50	<50	<50
TRH									
C6 - C10 Fraction		-	-	-		<20	<20	<20	<20
C6 - C10 Fraction minus BTEX (F1)		-	-	-	20	<20	<20	<20	<20
>C10 - C16 Fraction		-	-	-	100	<100	<100	<100	<100
>C16 - C34 Fraction		-	-	-	100	<100	<100	<100	<100
>C34 - C40 Fraction		-	-	-	100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)		-	-	-	100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)		-	-	-	100	<100	<100	<100	<100
BTEX									
Benzene		0.95	0.7	0.01	1	<1	<1	<1	<1
Toluene		ID	ID	8	2	<2	<2	<2	<2
Ethylbenzene		ID	ID	3	2	<2	<2	<2	<2
meta- & para-Xylene		ID	ID	-	2	<2	<2	<2	<2
ortho-Xylene		0.35	ID	-	2	<2	<2	<2	<2
Total Xylenes		ID	ID	6	2	<2	<2	<2	<2
Sum of BTEX		-	-	-	1	<1	<1	<1	<1
Naphthalene		0.016	0.07	-	5	<5	<5	<5	<5

* = freshwater rivers

EMM
EMGA Mitchell McLennan

Agriculture and Resource Management Council of Australia and New Zealand and the Australian and New Zealand Environment and Conservation Council (ANZECC/ARMCANZ) 2000 *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*

National Health and Medical Research Council (NHMRC) 2008 Guidelines for Managing Risks in Recreational Water

Appendix E

Laboratory reports

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1523298**	Page	: 1 of 28
Amendment	: **1**		
Client	: **EMGA MITCHELL MCLENNAN**	Laboratory	: Environmental Division Sydney
Contact	: MR SEAN CASSIDY	Contact	:
Address	: Ground Floor Suite 1 20 Chandos Street St Leonards NSW 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scassidy@emgamm.com	E-mail	:
Telephone	: +61 02 9493 9500	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 9493 9599	Facsimile	: +61-2-8784 8500
Project	: GCM	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: J14149	Date Samples Received	: 03-Jun-2015 19:30
C-O-C number	: ----	Date Analysis Commenced	: 04-Jun-2015
Sampler	: SEAN CASSIDY	Issue Date	: 15-Jul-2015 11:08
Site	: ----		
		No. of samples received	: 43
Quote number	: ----	No. of samples analysed	: 27

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- EP066: Pozitive results on sample confirmed by re-extraction and re-analysis.
- This report has been amended and re-released to allow the reporting of additional analytical data.
- EP080: The trip spike and its control have been analysed for volatile TPH and BTEX only. The trip spike and control were prepared in the lab using reagent grade sand spiked with petrol. The spike was dispatched from the lab and the control retained.
- EP080: Sample TRIP SPIKE contains volatile compounds spiked into the sample containers prior to dispatch from the laboratory. BTEX compounds spiked at 20 ug/L.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP-1 0.5M	TP-2 0.5M	TP-3 0.5M	TP-4 0.5M	TP-5 0.5M
			Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit	ES1523298-001	ES1523298-003	ES1523298-005	ES1523298-007	ES1523298-009
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.7	4.0	7.1	4.8	7.5
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1	%	19.4	13.1	16.9	17.0	14.6
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	10	7	8	6
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	12	11	18	16	33
Copper	7440-50-8	5	mg/kg	17	8	65	9	176
Iron	7439-89-6	50	mg/kg	14200	28600	18300	37400	20600
Lead	7439-92-1	5	mg/kg	25	22	112	20	144
Nickel	7440-02-0	2	mg/kg	4	<2	10	9	15
Zinc	7440-66-6	5	mg/kg	37	8	217	25	309
Magnesium	7439-95-4	50	mg/kg	610	320	1800	550	1680
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.1	<0.1	0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	----	----	0.2
^ Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	----	----	----	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	----	----	----	<0.05
beta-BHC	319-85-7	0.05	mg/kg	----	----	----	----	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	----	----	----	----	<0.05
delta-BHC	319-86-8	0.05	mg/kg	----	----	----	----	<0.05
Heptachlor	76-44-8	0.05	mg/kg	----	----	----	----	<0.05
Aldrin	309-00-2	0.05	mg/kg	----	----	----	----	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	----	----	----	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	----	----	----	----	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	----	----	----	----	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	----	----	----	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	----	----	----	----	<0.05
Dieldrin	60-57-1	0.05	mg/kg	----	----	----	----	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	----	----	----	----	<0.05
Endrin	72-20-8	0.05	mg/kg	----	----	----	----	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP-1 0.5M	TP-2 0.5M	TP-3 0.5M	TP-4 0.5M	TP-5 0.5M
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1523298-001	ES1523298-003	ES1523298-005	ES1523298-007	ES1523298-009
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	----	----	----	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		----	----	----	----	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg		----	----	----	----	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	----	----	----	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	----	----	----	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg		----	----	----	----	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		----	----	----	----	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		----	----	----	----	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		----	----	----	----	<0.05
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg		----	----	----	----	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		----	----	----	----	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		----	----	----	----	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		----	----	----	----	<0.2
Dimethoate	60-51-5	0.05	mg/kg		----	----	----	----	<0.05
Diazinon	333-41-5	0.05	mg/kg		----	----	----	----	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		----	----	----	----	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		----	----	----	----	<0.2
Malathion	121-75-5	0.05	mg/kg		----	----	----	----	<0.05
Fenthion	55-38-9	0.05	mg/kg		----	----	----	----	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg		----	----	----	----	<0.05
Parathion	56-38-2	0.2	mg/kg		----	----	----	----	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		----	----	----	----	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg		----	----	----	----	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		----	----	----	----	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		----	----	----	----	<0.05
Prothiofos	34643-46-4	0.05	mg/kg		----	----	----	----	<0.05
Ethion	563-12-2	0.05	mg/kg		----	----	----	----	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		----	----	----	----	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		----	----	----	----	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP-1 0.5M	TP-2 0.5M	TP-3 0.5M	TP-4 0.5M	TP-5 0.5M
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1523298-001	ES1523298-003	ES1523298-005	ES1523298-007	ES1523298-009
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	**1.1**	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	**2.3**	<0.5	**0.7**
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	**2.2**	<0.5	**0.8**
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	**0.9**	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	**0.8**	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	**0.8**	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	**0.8**	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	**8.9**	<0.5	**1.5**
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	**1.0**	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**1.3**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.6**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	**120**	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	**140**	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	**260**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	>C10_C16	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	**210**	<100	**100**
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	**110**	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	**320**	<50	**100**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP-1 0.5M	TP-2 0.5M	TP-3 0.5M	TP-4 0.5M	TP-5 0.5M
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1523298-001	ES1523298-003	ES1523298-005	ES1523298-007	ES1523298-009
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	----	----	92.0
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	----	----	70.5
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	----	----	87.3
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		105	99.4	99.8	98.2	111
2-Chlorophenol-D4	93951-73-6	0.5	%		103	101	99.3	100	108
2.4.6-Tribromophenol	118-79-6	0.5	%		96.8	99.9	102	103	112
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		106	104	104	104	111
Anthracene-d10	1719-06-8	0.5	%		103	99.8	99.2	98.3	104
4-Terphenyl-d14	1718-51-0	0.5	%		96.6	94.2	94.5	94.0	103
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		105	110	119	112	111
Toluene-D8	2037-26-5	0.2	%		101	106	114	100	116
4-Bromofluorobenzene	460-00-4	0.2	%		91.3	93.5	94.1	85.3	96.6

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP-6 0.5M	TP-7 0.5M	TP-8 0.5M	TP-9 0.5M	TP-9 2M
			Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit	ES1523298-011	ES1523298-013	ES1523298-015	ES1523298-017	ES1523298-018
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.3	7.8	7.5	7.8	----
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1	%	5.2	12.1	8.1	14.8	19.5
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	10	6	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	3	21	8	10	4
Copper	7440-50-8	5	mg/kg	<5	22	67	14	<5
Iron	7439-89-6	50	mg/kg	3060	22800	14500	9200	2900
Lead	7439-92-1	5	mg/kg	7	30	33	24	<5
Nickel	7440-02-0	2	mg/kg	7	14	4	3	<2
Zinc	7440-66-6	5	mg/kg	21	61	71	43	<5
Magnesium	7439-95-4	50	mg/kg	180	2360	720	790	<50
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	----	----	----
^ Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	----	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	----	----	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	----	----	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	----	----	----	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	----	----	----	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	----	----	----	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	----	----	----	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	----	----	----	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	----	----	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	----	----	----	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	----	----	----	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	----	----	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	----	----	----	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	----	----	----	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	----	----	----	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	----	----	----	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP-6 0.5M	TP-7 0.5M	TP-8 0.5M	TP-9 0.5M	TP-9 2M
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1523298-011	ES1523298-013	ES1523298-015	ES1523298-017	ES1523298-018
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	----	----	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		----	----	----	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg		----	----	----	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	----	----	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	----	----	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg		----	----	----	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		----	----	----	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		----	----	----	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		----	----	----	<0.05	<0.05
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg		----	----	----	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		----	----	----	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		----	----	----	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		----	----	----	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg		----	----	----	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg		----	----	----	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		----	----	----	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		----	----	----	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg		----	----	----	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg		----	----	----	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg		----	----	----	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg		----	----	----	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		----	----	----	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg		----	----	----	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		----	----	----	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		----	----	----	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg		----	----	----	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg		----	----	----	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		----	----	----	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		----	----	----	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP-6 0.5M	TP-7 0.5M	TP-8 0.5M	TP-9 0.5M	TP-9 2M
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1523298-011	ES1523298-013	ES1523298-015	ES1523298-017	ES1523298-018
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		**0.6**	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		**0.9**	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		**0.8**	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		**2.3**	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	>C10_C16	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP-6 0.5M	TP-7 0.5M	TP-8 0.5M	TP-9 0.5M	TP-9 2M
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1523298-011	ES1523298-013	ES1523298-015	ES1523298-017	ES1523298-018
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	----	81.0	97.0
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	----	82.4	104
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	----	70.8	78.7
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		103	101	95.5	102	101
2-Chlorophenol-D4	93951-73-6	0.5	%		102	102	97.0	101	102
2.4.6-Tribromophenol	118-79-6	0.5	%		102	101	94.7	101	91.8
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		106	106	101	103	107
Anthracene-d10	1719-06-8	0.5	%		101	101	97.2	99.1	102
4-Terphenyl-d14	1718-51-0	0.5	%		97.5	98.0	94.2	97.0	102
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		116	122	109	104	104
Toluene-D8	2037-26-5	0.2	%		113	114	102	125	97.2
4-Bromofluorobenzene	460-00-4	0.2	%		96.9	98.8	85.8	118	81.6

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SD-1	SD-2	SD-3	SD-4	SD-5
			Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit	ES1523298-019	ES1523298-020	ES1523298-021	ES1523298-022	ES1523298-023
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.9	7.9	8.3	8.0	8.1
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1	%	32.2	21.6	21.4	20.8	49.5
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	6	15
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	1
Chromium	7440-47-3	2	mg/kg	13	<2	3	10	33
Copper	7440-50-8	5	mg/kg	33	<5	16	26	96
Iron	7439-89-6	50	mg/kg	9080	1660	2660	12200	31300
Lead	7439-92-1	5	mg/kg	90	20	12	38	268
Nickel	7440-02-0	2	mg/kg	8	<2	2	7	17
Zinc	7440-66-6	5	mg/kg	148	16	44	67	316
Magnesium	7439-95-4	50	mg/kg	1130	370	680	760	2800
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.2	<0.1	<0.1	<0.1	0.5
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	----	----	----
^ Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	----	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	----	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg	----	----	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg	----	----	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg	----	----	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg	----	----	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg	----	----	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	----	<0.05	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	----	----	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	----	----	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	----	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	----	----	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg	----	----	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	----	----	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg	----	----	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SD-1	SD-2	SD-3	SD-4	SD-5
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1523298-019	ES1523298-020	ES1523298-021	ES1523298-022	ES1523298-023
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	----	<0.05	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		----	----	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		----	----	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	----	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	----	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		----	----	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		----	----	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg		----	----	<0.2	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		----	----	<0.05	----	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg		----	----	<0.05	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		----	----	<0.05	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		----	----	<0.05	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		----	----	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg		----	----	<0.05	----	----
Diazinon	333-41-5	0.05	mg/kg		----	----	<0.05	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		----	----	<0.05	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		----	----	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg		----	----	<0.05	----	----
Fenthion	55-38-9	0.05	mg/kg		----	----	<0.05	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		----	----	<0.05	----	----
Parathion	56-38-2	0.2	mg/kg		----	----	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		----	----	<0.05	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		----	----	<0.05	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		----	----	<0.05	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		----	----	<0.05	----	----
Prothiofos	34643-46-4	0.05	mg/kg		----	----	<0.05	----	----
Ethion	563-12-2	0.05	mg/kg		----	----	<0.05	----	----
Carbophenothion	786-19-6	0.05	mg/kg		----	----	<0.05	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		----	----	<0.05	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SD-1	SD-2	SD-3	SD-4	SD-5
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1523298-019	ES1523298-020	ES1523298-021	ES1523298-022	ES1523298-023
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		**0.9**	<0.5	<0.5	<0.5	**2.2**
Pyrene	129-00-0	0.5	mg/kg		**0.9**	<0.5	<0.5	**0.5**	**2.4**
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**0.9**
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**0.9**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**0.9**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**1.2**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		**1.8**	<0.5	<0.5	**0.5**	**8.5**
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**1.4**
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**1.7**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**2.0**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		**110**	<100	<100	<100	**180**
C29 - C36 Fraction	----	100	mg/kg		**130**	<100	<100	<100	**460**
^ C10 - C36 Fraction (sum)	----	50	mg/kg		**240**	<50	<50	<50	**640**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	>C10_C16	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		**190**	<100	<100	<100	**490**
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	**340**
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		**190**	<50	<50	<50	**830**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SD-1	SD-2	SD-3	SD-4	SD-5
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1523298-019	ES1523298-020	ES1523298-021	ES1523298-022	ES1523298-023
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	102	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	97.4	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	73.3	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		102	99.0	101	98.9	102
2-Chlorophenol-D4	93951-73-6	0.5	%		102	99.4	102	98.9	99.0
2.4.6-Tribromophenol	118-79-6	0.5	%		109	90.5	93.7	91.3	109
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		105	104	105	101	103
Anthracene-d10	1719-06-8	0.5	%		98.8	99.7	101	97.3	98.7
4-Terphenyl-d14	1718-51-0	0.5	%		68.2	98.9	98.7	94.4	96.3
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		102	101	103	112	122
Toluene-D8	2037-26-5	0.2	%		90.8	99.0	96.6	112	106
4-Bromofluorobenzene	460-00-4	0.2	%		79.0	84.6	81.2	91.5	89.6

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SD-6	QA.1	QA.2	TRIP BLANK 1	TRIP SPIKE 1
			Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[29-May-2015]	[29-May-2015]
Compound	CAS Number	LOR	Unit	ES1523298-024	ES1523298-027	ES1523298-028	ES1523298-035	ES1523298-036
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.8	7.6	8.3	----	----
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1	%	30.7	15.2	21.3	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	6	<5	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg	9	11	3	----	----
Copper	7440-50-8	5	mg/kg	21	25	6	----	----
Iron	7439-89-6	50	mg/kg	11800	16900	2660	----	----
Lead	7439-92-1	5	mg/kg	49	33	11	----	----
Nickel	7440-02-0	2	mg/kg	6	12	<2	----	----
Zinc	7440-66-6	5	mg/kg	60	108	43	----	----
Magnesium	7439-95-4	50	mg/kg	810	2450	520	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	0.1	<0.1	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	----	----	----
^ Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	<0.05	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	----	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	----	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SD-6	QA.1	QA.2	TRIP BLANK 1	TRIP SPIKE 1
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[29-May-2015]	[29-May-2015]
Compound	CAS Number	LOR	Unit		ES1523298-024	ES1523298-027	ES1523298-028	ES1523298-035	ES1523298-036
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	----	<0.05	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	----	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	----	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	----	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	----	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	----	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	----	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	----	<0.2	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	----	<0.05	----	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg		<0.05	----	<0.05	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	----	<0.05	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	----	<0.05	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	----	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	----	<0.05	----	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	----	<0.05	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	----	<0.05	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	----	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg		<0.05	----	<0.05	----	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	----	<0.05	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	----	<0.05	----	----
Parathion	56-38-2	0.2	mg/kg		<0.2	----	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	----	<0.05	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	----	<0.05	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	----	<0.05	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	----	<0.05	----	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	----	<0.05	----	----
Ethion	563-12-2	0.05	mg/kg		<0.05	----	<0.05	----	----
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	----	<0.05	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	----	<0.05	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SD-6	QA.1	QA.2	TRIP BLANK 1	TRIP SPIKE 1
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[29-May-2015]	[29-May-2015]
Compound	CAS Number	LOR	Unit		ES1523298-024	ES1523298-027	ES1523298-028	ES1523298-035	ES1523298-036
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg		**3.6**	**0.8**	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg		**4.0**	**1.2**	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg		**4.2**	**1.2**	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		**1.5**	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg		**1.4**	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		**1.0**	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		**1.3**	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		**17.0**	**3.2**	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		**1.6**	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**1.9**	**0.6**	**0.6**	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**2.2**	**1.2**	**1.2**	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	**27**
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		**120**	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg		**120**	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		**240**	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	**30**
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	**15**
>C10 - C16 Fraction	>C10_C16	50	mg/kg		<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg		**200**	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		**200**	<50	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	**0.3**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SD-6	QA.1	QA.2	TRIP BLANK 1	TRIP SPIKE 1
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[29-May-2015]	[29-May-2015]
Compound	CAS Number	LOR	Unit		ES1523298-024	ES1523298-027	ES1523298-028	ES1523298-035	ES1523298-036
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**8.1**
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**0.8**
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**4.7**
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**1.8**
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	**15.7**
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**6.5**
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**75.0**	----	**92.0**	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**75.9**	----	**88.8**	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**70.2**	----	**73.1**	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**106**	**105**	**105**	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**105**	**103**	**102**	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**110**	**101**	**92.0**	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**106**	**106**	**104**	----	----
Anthracene-d10	1719-06-8	0.5	%		**101**	**103**	**99.0**	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**101**	**100**	**100**	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**83.7**	**97.6**	**111**	**107**	**105**
Toluene-D8	2037-26-5	0.2	%		**87.7**	**101**	**109**	**103**	**106**
4-Bromofluorobenzene	460-00-4	0.2	%		**77.8**	**79.4**	**97.1**	**85.0**	**90.6**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TSC 1	----	----	----	----
			Client sampling date / time	[29-May-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1523298-043	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	----	----	----	----	----
EA055: Moisture Content								
^ **Moisture Content (dried @ 103°C)**	----	1	%	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	----	----	----	----	----
Chromium	7440-47-3	2	mg/kg	----	----	----	----	----
Copper	7440-50-8	5	mg/kg	----	----	----	----	----
Iron	7439-89-6	50	mg/kg	----	----	----	----	----
Lead	7439-92-1	5	mg/kg	----	----	----	----	----
Nickel	7440-02-0	2	mg/kg	----	----	----	----	----
Zinc	7440-66-6	5	mg/kg	----	----	----	----	----
Magnesium	7439-95-4	50	mg/kg	----	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	----	----	----
^ **Total Polychlorinated biphenyls**	----	0.1	mg/kg	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	----	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	----	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	----	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	----	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	----	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	----	----	----	----
^ **Total Chlordane (sum)**	----	0.05	mg/kg	----	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	----	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	----	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	----	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	----	----	----	----	----
Endrin	72-20-8	0.05	mg/kg	----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TSC 1	----	----	----	----
			Client sampling date / time	[29-May-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1523298-043	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	----	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	----	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	----	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	----	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	----	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	----	----	----	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg	----	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	----	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	----	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	----	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	----	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	----	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	----	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	----	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	----	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	----	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	----	----	----	----	----
Ethion	563-12-2	0.05	mg/kg	----	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	----	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TSC 1	----	----	----	----
			Client sampling date / time	[29-May-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1523298-043	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	0.5	mg/kg	----	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	----	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	----	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	----	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	**44**	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	----	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	----	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	----	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	**50**	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	**21**	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	mg/kg	----	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	**0.4**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TSC 1	----	----	----	----
				Client sampling date / time	[29-May-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1523298-043	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
Toluene	108-88-3	0.5	mg/kg		**14.3**	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		**1.8**	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		**9.0**	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		**3.6**	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		**29.1**	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	mg/kg		**12.6**	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		----	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		----	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		----	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		----	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		----	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		----	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**78.1**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**91.3**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**106**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	WAT-1	WAT-2	WAT-3	QA.5	TRIP BLANK
			Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[02-Jun-2015]
Compound	CAS Number	LOR	Unit	ES1523298-029	ES1523298-030	ES1523298-031	ES1523298-034	ES1523298-041
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.70**	**7.76**	**7.78**	**7.33**	----
ED093F: Dissolved Major Cations								
Magnesium	7439-95-4	1	mg/L	**127**	**124**	**118**	**119**	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.004**	**0.003**	**0.003**	**0.003**	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	<0.001	**0.001**	**0.001**	**0.001**	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L	**0.005**	**0.005**	**0.005**	**0.005**	----
Zinc	7440-66-6	0.005	mg/L	**0.008**	**0.008**	**0.007**	**0.010**	----
Iron	7439-89-6	0.05	mg/L	**0.07**	**0.12**	**0.13**	**0.10**	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**11.6**	**13.1**	**13.2**	**12.1**	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluorene	86-73-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Anthracene	120-12-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Pyrene	129-00-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Chrysene	218-01-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
EP080/071: Total Petroleum Hydrocarbons								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WAT-1	WAT-2	WAT-3	QA.5	TRIP BLANK
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[02-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1523298-029	ES1523298-030	ES1523298-031	ES1523298-034	ES1523298-041
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	>C10_C16	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1	%		**29.1**	**25.4**	**24.1**	**27.6**	----
2-Chlorophenol-D4	93951-73-6	1	%		**59.1**	**53.9**	**51.4**	**58.8**	----
2.4.6-Tribromophenol	118-79-6	1	%		**74.1**	**71.1**	**54.8**	**65.8**	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1	%		**78.5**	**64.9**	**63.9**	**68.7**	----
Anthracene-d10	1719-06-8	1	%		**87.9**	**89.2**	**74.2**	**85.2**	----
4-Terphenyl-d14	1718-51-0	1	%		**77.4**	**74.2**	**64.3**	**72.8**	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**90.0**	**90.2**	**92.4**	**92.5**	**95.6**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WAT-1	WAT-2	WAT-3	QA.5	TRIP BLANK
				Client sampling date / time	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[03-Jun-2015]	[02-Jun-2015]
Compound	CAS Number	LOR	Unit		ES1523298-029	ES1523298-030	ES1523298-031	ES1523298-034	ES1523298-041
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**97.9**	**97.4**	**103**	**99.8**	**110**
4-Bromofluorobenzene	460-00-4	2	%		**99.9**	**96.8**	**101**	**98.2**	**110**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	TRIP SPIKE	----	----	----	----
			Client sampling date / time	[02-Jun-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1523298-042	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	----	----	----	----
ED093F: Dissolved Major Cations								
Magnesium	7439-95-4	1	mg/L	----	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	----	----	----	----	----
Copper	7440-50-8	0.001	mg/L	----	----	----	----	----
Lead	7439-92-1	0.001	mg/L	----	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	----	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	----	----	----	----	----
Iron	7439-89-6	0.05	mg/L	----	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	----	----	----	----	----
Acenaphthylene	208-96-8	1	µg/L	----	----	----	----	----
Acenaphthene	83-32-9	1	µg/L	----	----	----	----	----
Fluorene	86-73-7	1	µg/L	----	----	----	----	----
Phenanthrene	85-01-8	1	µg/L	----	----	----	----	----
Anthracene	120-12-7	1	µg/L	----	----	----	----	----
Fluoranthene	206-44-0	1	µg/L	----	----	----	----	----
Pyrene	129-00-0	1	µg/L	----	----	----	----	----
Benz(a)anthracene	56-55-3	1	µg/L	----	----	----	----	----
Chrysene	218-01-9	1	µg/L	----	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	----	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	----	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	----	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L	----	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L	----	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	----	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	----	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	TRIP SPIKE	----	----	----	----
				Client sampling date / time	[02-Jun-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1523298-042	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C6 - C9 Fraction	----	20	µg/L		----	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		----	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		----	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		----	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		----	----	----	----	----
>C10 - C16 Fraction	>C10_C16	100	µg/L		----	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		----	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		----	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		15	----	----	----	----
Toluene	108-88-3	2	µg/L		14	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		14	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		14	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		15	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L		29	----	----	----	----
^ Sum of BTEX	----	1	µg/L		72	----	----	----	----
Naphthalene	91-20-3	5	µg/L		17	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1	%		----	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1	%		----	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1	%		----	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1	%		----	----	----	----	----
Anthracene-d10	1719-06-8	1	%		----	----	----	----	----
4-Terphenyl-d14	1718-51-0	1	%		----	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		104	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	TRIP SPIKE	----	----	----	----
				Client sampling date / time	[02-Jun-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1523298-042	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**115**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**117**	----	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1523298**	Page	: 1 of 18
Amendment	: **1**		
Client	: **EMGA MITCHELL MCLENNAN**	Laboratory	: Environmental Division Sydney
Contact	: MR SEAN CASSIDY	Contact	:
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Project	: GCM	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: J14149	Date Samples Received	: 03-Jun-2015
C-O-C number	: ----	Date Analysis Commenced	: 04-Jun-2015
Sampler	: SEAN CASSIDY	Issue Date	: 15-Jul-2015
Site	: ----	No. of samples received	: 43
Quote number	: ----	No. of samples analysed	: 27

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out ir compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002 : pH (Soils) (QC Lot: 120769)									
ES1523277-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	6.2	6.1	0.00	0% - 20%
ES1523393-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.3	8.3	0.00	0% - 20%
EA055: Moisture Content (QC Lot: 120967)									
ES1523268-066	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	19.2	17.4	9.99	0% - 50%
ES1523298-017	TP-9 0.5M	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	14.8	15.4	4.33	0% - 50%
EA055: Moisture Content (QC Lot: 120968)									
ES1523298-028	QA.2	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	21.3	22.3	4.38	0% - 20%
ES1523363-007	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	10.3	10.8	4.25	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 121002)									
ES1521302-034	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	13	11	13.7	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	28	22	21.6	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	145	148	2.28	0% - 20%
		EG005T: Copper	7440-50-8	5	mg/kg	100	104	3.90	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	144	159	9.78	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	97	101	3.86	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	25200	26900	6.73	0% - 20%
ES1523242-006	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	9	9	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	9	9	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	9	10	0.00	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	20500	21500	4.45	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 121004)									
ES1523298-003	TP-2 0.5M	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	11	12	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	10	10	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	8	9	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	22	22	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	8	8	0.00	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	28600	25500	11.4	0% - 20%
ES1523298-020	SD-2	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005T: Total Metals by ICP-AES (QC Lot: 121004) - continued									
ES1523298-020	SD-2	EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	20	10	67.1	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	16	12	28.8	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	1660	1710	3.31	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 152692)									
ES1523298-001	TP-1 0.5M	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1523298-018	TP-9 2M	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 154017)									
ES1523298-019	SD-1	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	0.2	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 118124)									
ES1523298-009	TP-5 0.5M	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	0.2	0.2	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 118123)									
ES1523298-009	TP-5 0.5M	EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 118123)									
ES1523298-009	TP-5 0.5M	EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 118123) - continued									
ES1523298-009	TP-5 0.5M	EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 118122)									
ES1523298-018	TP-9 2M	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1523298-009	TP-5 0.5M	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 118122) - continued									
ES1523298-009	TP-5 0.5M	EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	0.7	0.9	22.2	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.8	0.9	22.2	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	1.5	1.8	18.2	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 118120)									
ES1523298-001	TP-1 0.5M	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1523298-019	SD-1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 118121)									
ES1523298-018	TP-9 2M	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1523298-009	TP-5 0.5M	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 118264)									
ES1523363-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1523360-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 118120)									
ES1523298-001	TP-1 0.5M	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1523298-019	SD-1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 118121)									
ES1523298-018	TP-9 2M	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	0.00	No Limit
ES1523298-009	TP-5 0.5M	EP071: >C16 - C34 Fraction	----	100	mg/kg	100	140	29.4	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 118121) - continued									
ES1523298-009	TP-5 0.5M	EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 118264)									
ES1523363-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1523360-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 118120)									
ES1523298-001	TP-1 0.5M	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1523298-019	SD-1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 118264)									
ES1523363-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1523360-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 118150)									
ES1523181-010	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.03	8.02	0.125	0% - 20%
ES1523263-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.76	7.79	0.386	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 120295)									
ES1523298-029	WAT-1	ED093F: Magnesium	7439-95-4	1	mg/L	127	124	2.10	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 120296)									
ES1523298-029	WAT-1	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.004	0.003	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.07	0.07	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 118885)									
ES1523251-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.04	38.8	No Limit
ES1523258-009	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	3.26	3.24	0.673	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 118887)									
ES1523298-031	WAT-3	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	13.2	12.4	5.91	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 119353)									
EB1520295-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1523298-029	WAT-1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 119857)									
ES1523341-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1523356-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 119353)									
EB1520295-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1523298-029	WAT-1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 119857)									
ES1523341-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1523356-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 119353)									
EB1520295-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1523298-029	WAT-1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 119353) - continued									
ES1523298-029	WAT-1	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP080: BTEXN (QC Lot: 119857)									
ES1523341-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1523356-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 121002)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	106	92	130
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	98.5	87	121
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	117	80	136
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	112	93	127
EG005T: Iron	7439-89-6	50	mg/kg	<50	8400 mg/kg	117	70	130
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	97.8	86	124
EG005T: Magnesium	7439-95-4	50	mg/kg	<50	2091 mg/kg	124	87	139
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	105	93	131
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	103	81	133
EG005T: Total Metals by ICP-AES (QCLot: 121004)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	109	92	130
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	103	87	121
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	120	80	136
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	105	93	127
EG005T: Iron	7439-89-6	50	mg/kg	<50	8400 mg/kg	120	70	130
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	105	86	124
EG005T: Magnesium	7439-95-4	50	mg/kg	<50	2091 mg/kg	128	87	139
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	109	93	131
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	108	81	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 152692)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	78.3	70	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 154017)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	77.9	70	105
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 118124)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	95.0	57	117
EP068A: Organochlorine Pesticides (OC) (QCLot: 118123)								
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	97.5	76	120
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	100	69	117
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	87.4	67	127
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	95.9	68	118
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	88.4	71	113
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	100	69	119
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	99.2	69	119
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	100	76	120

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 118123) - continued								
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	78.0	67	121
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	109	65	113
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	110	66	118
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.8	60	124
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.7	67	123
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	92.1	57	115
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	97.2	65	123
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	71	115
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.7	68	116
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	76.8	68	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	104	66	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	85.5	65	129
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	76.6	68	120
EP068B: Organophosphorus Pesticides (OP) (QCLot: 118123)								
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	76.2	42	126
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	83.6	68	116
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	104	67	123
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	85.2	70	118
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	94.3	68	114
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	85.7	55	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	93.7	64	128
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	94.6	73	117
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	86.0	56	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	88.4	64	124
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	89.4	70	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	101	64	120
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	71	115
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	83.6	70	120
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	102	54	122
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	96.0	68	122
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	94.2	69	123
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	88.6	69	115
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	92.6	68	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 118122)								
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	114	79	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	108	77	123
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	100	79	123
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	100	73	121
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	97.7	76	122

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 118122) - continued								
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	103	70	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	91.6	72	114
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	104	77	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	109	81	123
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	91.1	72	113
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	111	79	123
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	113	77	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	90.3	71	113
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	112	80	124
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	114	79	123
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	110	79	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 118120)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	110	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 118121)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	106	71	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	250 mg/kg	120	74	138
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	105	64	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 118264)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	99.6	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 118120)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	107	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 118121)								
EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	250 mg/kg	107	70	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	117	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	200 mg/kg	94.2	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 118264)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	95.3	68	128
EP080: BTEXN (QCLot: 118120)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	94.8	62	116
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	87.4	58	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	93.3	60	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	95.1	62	138
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	93.8	60	120
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	93.9	62	128
EP080: BTEXN (QCLot: 118264)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	96.4	62	116

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 118264) - continued								
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	110	58	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	110	60	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	114	62	138
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	112	60	120
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	112	62	128

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 120295)								
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	93.1	90	110
EG020F: Dissolved Metals by ICP-MS (QCLot: 120296)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.4	85	115
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	90.3	85	115
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.7	85	115
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.9	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	86.1	85	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	85.1	85	115
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.4	85	115
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	89.8	85	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 118885)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	106	90	114
EK055G: Ammonia as N by Discrete Analyser (QCLot: 118887)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	109	90	114
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 118128)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	95.7	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	102	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	90.9	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	89.4	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	84.2	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	79.1	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	91.9	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	86.9	62	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	77.7	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	92.0	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	106	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	106	64	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 118128) - continued								
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	95.7	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	85.8	59	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	99.2	63	116
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	98.2	63	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 118129)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	93.8	59	129
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	95.8	71	131
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	99.4	62	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 119353)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	78.9	75	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 119857)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	89.2	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 118129)								
EP071: >C10 - C16 Fraction	>C10_C16	100	µg/L	<100	2500 µg/L	91.8	59	131
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	99.3	74	138
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	102	67	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 119353)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	80.0	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 119857)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	90.9	75	127
EP080: BTEXN (QCLot: 119353)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	84.5	70	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	86.5	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	87.2	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	94.9	70	124
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	91.6	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	85.9	65	129
EP080: BTEXN (QCLot: 119857)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	93.4	70	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	92.3	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	91.8	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	85.7	70	124
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	90.5	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	89.2	65	129

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 121002)							
ES1523103-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	122	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	104	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	74.1	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	116	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	107	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	127	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	103	70	130
EG005T: Total Metals by ICP-AES (QCLot: 121004)							
ES1523298-005	TP-3 0.5M	EG005T: Arsenic	7440-38-2	50 mg/kg	116	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	101	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	108	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	109	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	106	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	103	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	84.2	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 152692)							
ES1523298-001	TP-1 0.5M	EG035T: Mercury	7439-97-6	5 mg/kg	93.0	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 154017)							
ES1523298-019	SD-1	EG035T: Mercury	7439-97-6	5 mg/kg	90.7	70	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 118124)							
ES1523298-009	TP-5 0.5M	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	104	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 118123)							
ES1523298-009	TP-5 0.5M	EP068: 4.4`-DDT	50-29-3	2 mg/kg	72.6	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	90.8	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	90.2	70	130
		EP068: Endrin	72-20-8	2 mg/kg	85.9	70	130
		EP068: gamma-BHC	58-89-9	0.5 mg/kg	82.4	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	78.6	70	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 118123)							
ES1523298-009	TP-5 0.5M	EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	86.7	70	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	97.8	70	130
		EP068: Diazinon	333-41-5	0.5 mg/kg	84.7	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	78.8	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP068B: Organophosphorus Pesticides (OP) (QCLot: 118123) - continued							
ES1523298-009	TP-5 0.5M	EP068: Prothiofos	34643-46-4	0.5 mg/kg	81.8	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 118122)							
ES1523298-009	TP-5 0.5M	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	95.6	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	106	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 118120)							
ES1523298-001	TP-1 0.5M	EP080: C6 - C9 Fraction	----	32.5 mg/kg	97.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 118121)							
ES1523298-009	TP-5 0.5M	EP071: C10 - C14 Fraction	----	523 mg/kg	103	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	101	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	122	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 118264)							
ES1523360-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	101	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 118120)							
ES1523298-001	TP-1 0.5M	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	96.2	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 118121)							
ES1523298-009	TP-5 0.5M	EP071: >C10 - C16 Fraction	>C10_C16	860 mg/kg	92.7	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	120	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	107	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 118264)							
ES1523360-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	96.2	70	130
EP080: BTEXN (QCLot: 118120)							
ES1523298-001	TP-1 0.5M	EP080: Benzene	71-43-2	2.5 mg/kg	82.1	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	87.0	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	87.6	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	79.1	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	86.6	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	90.1	70	130
EP080: BTEXN (QCLot: 118264)							
ES1523360-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	86.1	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	100	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	100	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	89.9	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	99.7	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	104	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 120296)							
ES1523298-030	WAT-2	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	116	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	99.2	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	103	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	104	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	92.7	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	100	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	105	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 118885)							
ES1523251-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	101	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 118887)							
ES1523298-031	WAT-3	EK055G: Ammonia as N	7664-41-7	1 mg/L	# Not Determined	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 119353)							
EB1520295-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	116	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 119857)							
ES1523341-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	111	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 119353)							
EB1520295-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	112	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 119857)							
ES1523341-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	110	70	130
EP080: BTEXN (QCLot: 119353)							
EB1520295-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	98.4	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	100	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	99.5	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	118	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	103	70	130
		EP080: Toluene	108-88-3	25 µg/L	102	70	130
EP080: BTEXN (QCLot: 119857)							
ES1523341-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	95.1	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	98.4	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	95.3	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	101	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	96.5	70	130
		EP080: Toluene	108-88-3	25 µg/L	90.7	70	130

ALS Environmental

QA/QC Compliance Assessment for DQO Reporting

Work Order	: **ES1523298**	Page	: 1 of 10
Amendment	: **1**		
Client	: **EMGA MITCHELL MCLENNAN**	Laboratory	: Environmental Division Sydney
Contact	: MR SEAN CASSIDY	Telephone	: +61-2-8784 8555
Project	: GCM	Date Samples Received	: 03-Jun-2015
Site	: ----	Issue Date	: 15-Jul-2015
Sampler	: SEAN CASSIDY	No. of samples received	: 43
Order number	: J14149	No. of samples analysed	: 27

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK055G: Ammonia as N by Discrete Analyser	ES1523298--031	WAT-3	**Ammonia as N**	7664-41-7	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved							
TP-1 0.5M,	TP-2 0.5M,	13-Jul-2015	01-Jul-2015	**12**	14-Jul-2015	01-Jul-2015	**12**
TP-3 0.5M,	TP-4 0.5M,						
TP-5 0.5M,	TP-6 0.5M,						
TP-7 0.5M,	TP-8 0.5M,						
TP-9 0.5M,	TP-9 2M,						
QA.1,	QA.2						
Soil Glass Jar - Unpreserved							
SD-1,	SD-2,	14-Jul-2015	01-Jul-2015	**13**	15-Jul-2015	01-Jul-2015	**13**
SD-3,	SD-4,						
SD-5,	SD-6						

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
WAT-1,	WAT-2,	----	----	----	04-Jun-2015	03-Jun-2015	**1**
WAT-3,	QA.5						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	4	0.00	10.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	0	5	0.00	10.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	4	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	0	5	0.00	5.00	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002 : pH (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
TP-1 0.5M, TP-2 0.5M, TP-3 0.5M, TP-4 0.5M, TP-5 0.5M, TP-6 0.5M, TP-7 0.5M, TP-8 0.5M, TP-9 0.5M, SD-1, SD-2, SD-3, SD-4, SD-5, SD-6, QA.1, QA.2	**03-Jun-2015**	**09-Jun-2015**	10-Jun-2015	✓	**09-Jun-2015**	09-Jun-2015	✓
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103)							
TP-1 0.5M, TP-2 0.5M, TP-3 0.5M, TP-4 0.5M, TP-5 0.5M, TP-6 0.5M, TP-7 0.5M, TP-8 0.5M, TP-9 0.5M, TP-9 2M, SD-1, SD-2, SD-3, SD-4, SD-5, SD-6, QA.1, QA.2	**03-Jun-2015**	**----**	----	----	**09-Jun-2015**	17-Jun-2015	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
TP-1 0.5M, TP-2 0.5M, TP-3 0.5M, TP-4 0.5M, TP-5 0.5M, TP-6 0.5M, TP-7 0.5M, TP-8 0.5M, TP-9 0.5M, TP-9 2M, SD-1, SD-2, SD-3, SD-4, SD-5, SD-6, QA.1, QA.2	**03-Jun-2015**	**09-Jun-2015**	30-Nov-2015	✓	**10-Jun-2015**	30-Nov-2015	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
TP-1 0.5M, TP-2 0.5M, TP-3 0.5M, TP-4 0.5M, TP-5 0.5M, TP-6 0.5M, TP-7 0.5M, TP-8 0.5M, TP-9 0.5M, TP-9 2M, QA.1, QA.2	**03-Jun-2015**	**13-Jul-2015**	01-Jul-2015	×	**14-Jul-2015**	01-Jul-2015	×
Soil Glass Jar - Unpreserved (EG035T)							
SD-1, SD-2, SD-3, SD-4, SD-5, SD-6	**03-Jun-2015**	**14-Jul-2015**	01-Jul-2015	×	**15-Jul-2015**	01-Jul-2015	×
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066)							
TP-5 0.5M, TP-9 0.5M, TP-9 2M, SD-3, SD-6, QA.2	**03-Jun-2015**	**04-Jun-2015**	17-Jun-2015	✓	**05-Jun-2015**	14-Jul-2015	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068)							
TP-5 0.5M, TP-9 0.5M, TP-9 2M, SD-3, SD-6, QA.2	**03-Jun-2015**	**04-Jun-2015**	17-Jun-2015	✓	**05-Jun-2015**	14-Jul-2015	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071)							
TP-1 0.5M, TP-2 0.5M, TP-3 0.5M, TP-4 0.5M, TP-5 0.5M, TP-6 0.5M, TP-7 0.5M, TP-8 0.5M, TP-9 0.5M, TP-9 2M, SD-1, SD-2, SD-3, SD-4, SD-5, SD-6, QA.1, QA.2	**03-Jun-2015**	**04-Jun-2015**	17-Jun-2015	✓	**05-Jun-2015**	14-Jul-2015	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
TP-1 0.5M,	TP-2 0.5M,	**03-Jun-2015**	**04-Jun-2015**	17-Jun-2015	✓	**05-Jun-2015**	14-Jul-2015	✓
TP-3 0.5M,	TP-4 0.5M,							
TP-5 0.5M,	TP-6 0.5M,							
TP-7 0.5M,	TP-8 0.5M,							
TP-9 0.5M,	TP-9 2M,							
SD-1,	SD-2,							
SD-3,	SD-4,							
SD-5,	SD-6,							
QA.1,	QA.2							
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
TP-1 0.5M,	TP-2 0.5M,	**03-Jun-2015**	**04-Jun-2015**	17-Jun-2015	✓	**05-Jun-2015**	17-Jun-2015	✓
TP-3 0.5M,	TP-4 0.5M,							
TP-5 0.5M,	TP-6 0.5M,							
TP-7 0.5M,	TP-8 0.5M,							
TP-9 0.5M,	TP-9 2M,							
SD-1,	SD-2,							
SD-3,	SD-4,							
SD-5,	SD-6,							
QA.1,	QA.2							
Soil Glass Jar - Unpreserved (EP080)								
TRIP BLANK 1,	TRIP SPIKE 1	**29-May-2015**	**04-Jun-2015**	12-Jun-2015	✓	**05-Jun-2015**	12-Jun-2015	✓
Soil Glass Jar - Unpreserved (EP080)								
TSC 1		**29-May-2015**	**05-Jun-2015**	12-Jun-2015	✓	**09-Jun-2015**	12-Jun-2015	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
WAT-1,	WAT-2,	**03-Jun-2015**	**----**	----	----	**04-Jun-2015**	03-Jun-2015	✗
WAT-3,	QA.5							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
WAT-1,	WAT-2,	**03-Jun-2015**	**----**	----	----	**09-Jun-2015**	01-Jul-2015	✓
WAT-3,	QA.5							
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
WAT-1,	WAT-2,	**03-Jun-2015**	**----**	----	----	**09-Jun-2015**	30-Nov-2015	✓
WAT-3,	QA.5							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
WAT-1, WAT-2, WAT-3, QA.5	**03-Jun-2015**	**----**	----	----	**05-Jun-2015**	01-Jul-2015	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
WAT-1, WAT-2, WAT-3, QA.5	**03-Jun-2015**	**05-Jun-2015**	10-Jun-2015	✓	**05-Jun-2015**	15-Jul-2015	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
WAT-1, WAT-2, WAT-3, QA.5	**03-Jun-2015**	**05-Jun-2015**	10-Jun-2015	✓	**07-Jun-2015**	15-Jul-2015	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
TRIP SPIKE	**02-Jun-2015**	**09-Jun-2015**	16-Jun-2015	✓	**09-Jun-2015**	16-Jun-2015	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
TRIP BLANK	**02-Jun-2015**	**09-Jun-2015**	16-Jun-2015	✓	**09-Jun-2015**	16-Jun-2015	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
WAT-1, WAT-2, WAT-3, QA.5	**03-Jun-2015**	**06-Jun-2015**	17-Jun-2015	✓	**06-Jun-2015**	17-Jun-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	2	19	**10.53**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	7	**14.29**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	7	**14.29**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	12	**16.67**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	2	19	**10.53**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	12	**8.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	12	**8.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	7	**14.29**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	12	**8.33**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	4	**25.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	4	**25.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	4	**0.00**	**10.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	0	5	**0.00**	**10.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	4	**25.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	4	**25.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	**25.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	4	**25.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	4	**25.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	**25.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	4	**25.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	4	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	0	5	**0.00**	**5.00**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3) (Method 103)
Moisture Content	EA055-103	SOIL	In-house. A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve.
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

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