

SITE AUDIT REPORT

**251 & 280-282 Captain Cook Drive,
Kurnell NSW**

Prepared for: Besmaw Pty Ltd

Date: November 2023

Project Number: E064

Audit Number: JE105

Site Audit Report

251 & 280-282 Captain Cook Drive, Kurnell NSW

Prepared for:

Besmaw Pty Ltd

Prepared by:

| | |
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Contents

| | | |
|----------|---|-----------|
| 1 | Introduction..... | 1 |
| 1.1 | Background to the Audit..... | 1 |
| 1.2 | Details of the Audit..... | 2 |
| 1.3 | Scope of the Audit..... | 2 |
| 2 | Site Description | 5 |
| 2.1 | Surrounding Site Use | 5 |
| 2.2 | Site Inspections | 5 |
| 3 | Site History | 7 |
| 3.1 | Auditor’s Opinion..... | 8 |
| 4 | Conceptual Site Model..... | 9 |
| 4.1 | Auditor’s Opinion..... | 10 |
| 5 | Stratigraphy and Hydrogeology | 11 |
| 5.1 | Stratigraphy | 11 |
| 5.2 | Hydrogeology..... | 12 |
| 5.3 | Auditor’s Opinion..... | 13 |
| 6 | Evaluation of Site Investigations | 15 |
| 6.1 | Quality Assurance and Quality Control..... | 16 |
| 6.2 | Environmental Quality Criteria..... | 23 |
| 6.3 | Evaluation of Soil Analytical Results | 24 |
| 6.4 | Evaluation of Groundwater and Surface Water Analytical Results..... | 25 |
| 6.5 | Auditor’s Opinion..... | 28 |
| 7 | Records Relating to VENM Importation | 30 |
| 7.1 | Activities Prior to Pollution Control Approval..... | 31 |
| 7.2 | Environmental Management Plan..... | 32 |
| 7.3 | Annual Reports and Independent Audits | 32 |
| 7.3.1 | Pre-Inspection and Material Inspection | 32 |
| 7.3.2 | Inspection on Delivery..... | 34 |
| 7.3.3 | Importation of Other Materials..... | 35 |
| 7.3.4 | Other issues..... | 35 |
| 7.4 | EPA Regulation..... | 35 |
| 7.5 | Auditors Opinion..... | 35 |
| 8 | Water Quality Monitoring Data..... | 37 |
| 8.1 | Monitoring Locations | 37 |
| 8.2 | Sampling Methodology | 38 |
| 8.3 | Evaluation of Results..... | 38 |
| 8.3.1 | QA/QC..... | 38 |
| 8.3.2 | Ammonia | 39 |
| 8.3.3 | AOX Compounds..... | 40 |
| 8.3.4 | TPH/BTEX & PAHs | 40 |
| 8.3.5 | Pesticides | 41 |
| 8.3.6 | Phenols | 41 |
| 8.3.7 | Metals | 41 |
| 8.4 | Groundwater Quality Assessment | 42 |

| | | |
|-----------|---|-----------|
| 8.5 | Auditor’s Opinion | 42 |
| 9 | Breen Landfill..... | 44 |
| 9.1.1 | Summary of Landfill Operations | 44 |
| 9.1.2 | Groundwater | 44 |
| 9.1.3 | Hazardous Ground Gas | 45 |
| 9.2 | Auditor’s Opinion | 45 |
| 10 | Assessment of Risk | 47 |
| 10.1 | PFAS | 49 |
| 10.2 | Auditors Opinion..... | 49 |
| 10.3 | Off-Site Migration Issues | 49 |
| 11 | Compliance with Regulatory Guidelines and Directions | 50 |
| 12 | Conclusions and Recommendations | 51 |
| 13 | Other Relevant Information | 52 |

Tables

| | | |
|-------------|---|----|
| Table 4.1: | Summary of AEC & PCOC..... | 9 |
| Table 4.2: | Potential Contamination Sources (ESA)..... | 9 |
| Table 5.1: | Stratigraphy | 11 |
| Table 5.2: | Summary of Licensed Groundwater Bores | 13 |
| Table 6.1: | Summary of Site Investigations..... | 15 |
| Table 6.2: | QA/QC – Sampling and Analysis Methodology Assessment | 16 |
| Table 6.3: | QA/QC – Field and Lab Quality Assurance and Quality Control | 20 |
| Table 6.4: | Evaluation of Soil Analytical Results – Summary Table (mg/kg) | 24 |
| Table 6.5: | Groundwater & Surface Water Analytical Results (µg/L) | 26 |
| Table 6.6: | Groundwater Analytical Results – PFAS (µg/L) | 27 |
| Table 7.1: | Summary of Rehabilitation | 30 |
| Table 8.1: | Summary of Rehabilitation | 38 |
| Table 10.1: | Evaluation of Qualitative Risk Assessment..... | 47 |

Appendices

APPENDIX A

Attachments

APPENDIX B

Correspondence Relevant to the Audit

APPENDIX C

Selected Monitoring Results Tables & Graphs

APPENDIX D

Site Audit Statement

Abbreviations

| | |
|-------------------------------------|--|
| AOX | Adsorbable Organically Bound Halogens |
| B(a)P TEQ | Benzo(a)pyrene Toxicity Equivalent Quotient |
| bgs | below ground surface |
| BH | Borehole |
| BOD | Biological Oxygen Demand |
| BTEX | Benzene, Toluene, Ethylbenzene, Xylenes |
| C₆-C₁₀ | Hydrocarbon chain-length fraction |
| CLM Act | NSW Contaminated Land Management Act 1997 |
| COPC | Chemical of potential concern |
| DO | Dissolved Oxygen |
| DP | Deposited Plan |
| EC | Electrical Conductivity |
| EIL | Ecological investigation level |
| EPA | NSW Environment Protection Authority |
| ESL | Ecological screening level |
| HIL | Health-based Investigation Level |
| HSL | Health-based Screening Level |
| LEP | Local Environment Plan |
| µg/L | micrograms per litre |
| m | Metre |
| mg/kg | milligrams per kilogram |
| MW | Monitoring Well |
| NATA | National Association of Testing Authorities |
| NEPM | National Environment Protection (Assessment of Site Contamination) Measure |
| OCP | Organochlorine Pesticide |
| OPP | Organophosphorus Pesticide |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PCB | Polychlorinated Biphenyl |
| PID | Photoionisation Detector |
| POEO Act | NSW Protection of the Environment Operations Act (1997) |
| PQL | (Laboratory) Practical Quantitation Limit |
| QA/QC | Quality Assurance / Quality Control |
| RPD | Relative Percent Difference |
| TOC | Total Organic Carbon |
| TPH | Total Petroleum Hydrocarbons |
| TRH | Total Recoverable Hydrocarbon |
| UST | Underground Storage Tank |
| VOCs | Volatile Organic Compounds |

1 Introduction

A site contamination audit has been conducted in relation to the site located at 251 & 280-282 Captain Cook Drive, Kurnell NSW (the site).

The site is irregular in shape and is described as Lot 2 (North) DP1030269 (16Ha) and Lot 2 (South) DP559922 (160Ha), hereinafter referred to as Lot 2 North and Lot 2 South. The two lots are separated by Captain Cook Drive.

Lot 2 North is currently operating as a horse stables. Lot 2 South is an active sand quarry, and the mined area has exposed the underlying groundwater aquifer (dredge pond).

Lot 2 South currently operates under two separate Environmental Protection Licences (EPLs) issued by the NSW Environmental Protection Agency (EPA) for sand extraction (EPL 3629) and land rehabilitation (EPL 5658).

Sand extraction occurs to a level of -10mAHD, which is 15m below the surface level at Captain Cook Drive, and rehabilitation of the void (which commenced in 1996) is being progressively undertaken using imported Virgin Excavated Natural Material (VENM) and potential acid sulfate soils (PASS). PASS is subject to a licence condition (E1) requiring all PASS to satisfy all the requirements of VENM, except that it contains sulfidic soils.

For the purposes of this report, reference to VENM is made with reference to EPL5658 and includes PASS subject to condition E1. Reference to non-VENM material is material that may not meet the requirements for classification as VENM (or PASS subject to condition E1) as defined in EPL5658.

1.1 Background to the Audit

The sand extraction is reportedly nearing the end of its life and Besmaw Pty Ltd (Besmaw), the landowner, is developing a master plan for potential future use of the rehabilitated site for employment, residential and recreational and tourism purposes.

The planning pathway has been complex and is not documented in this audit. A summary of matters relating to the request for a site audit is provided below.

In 2017, Besmaw initiated a Department of Planning, Industry and Environment (DPIE now known as DPE¹) led process to review and amend State Environmental Planning Policy (Kurnell Peninsula) 1989 (SEPP Kurnell Peninsula) to re-zone the site (*the proposal*). A scope of works for technical studies was issued by the DPIE on 25 September 2017 to inform the master planning process.

The following reports were prepared and submitted to DPE to address contaminated land matters as follows:

- Preliminary site investigation (PSI) prepared by Coffey Services Australia Pty Ltd (Coffey). The PSI was reportedly commissioned to “...address the DPIE scope of works relating to contaminated land management.” The PSI was a desk based preliminary assessment of contamination and environmental risk.
- An environmental site assessment (ESA) was prepared by Harwood Environmental Consultants (HEC). HEC reported that the ESA was “...required by the Department’s SEPP Kurnell Project Control Group (PCG) as part of the SEPP amendment.” The ESA included limited soil and groundwater sampling, to assess the contamination status of the areas of the site not subject to VENM importation.

In assessing the proposal, DPE requested comments from the EPA regarding air, water, noise, and contaminated land issues. However, only the matters concerning contaminated land are pertinent to the audit. A copy of a letter from the EPA contaminated land specialist team to DPE, documenting advice on how to proceed with determining the extent of contaminated land on the site is included in Appendix B. The EPA advice was based on review of the PSI, ESA, and a land rehabilitation history/summary, and identified the following key issues:

¹ Department of Planning and Environment

- The investigations undertaken to date only cover a small proportion of the proposed development site (i.e. areas outside the sand mining area). The rest of the proposed development area is subject to sand extraction and VENM infilling.
- The sand extraction areas of the site are located directly adjacent to an operational landfill (Breen Resources EPL 4608). Landfill gas migration onto the site has not been considered.
- The proposed development is located within 250m of a landfill
- The development is located within a sensitive location.

On this basis, EPA concluded that engagement of an auditor, to review the investigations and documentation, was warranted and recommended that:

Besmaw should engage a NSW accredited site auditor to undertake an audit for the site which determines whether:

- a) the PSI and ESA have appropriately assessed the potential for contamination to exist at the site;*
- b) the conclusions of the PSI and ESA are appropriate; and*
- c) further investigations are needed to confirm whether the site is suitable for the proposed uses. This should include consideration:*
 - of any risks posed by the landfill operation located just west of the site, including risks from potential landfill gas generation; and*
 - whether the records held by Besmaw in relation to the importation of VEMN to the site, such as the Annual Environmental Reports, Independent Environmental Audit reports and any other records Besmaw hold, are sufficient to not require further contamination assessments to the sand extraction and rehabilitation areas of the site.*

This audit has been commissioned in response to the above recommendations.

1.2 Details of the Audit

| | |
|--------------------------------|---|
| Name of Site Auditor | Dr Julie Evans |
| Auditor's Accreditation Number | 1003 |
| Auditor's Contact Details | Envirocene Pty Ltd Level 2, 29 Kiora Road, Miranda NSW 2225 Email: jevans@envirocene.com.au |
| Audit number | JE105 |
| Person requesting the Audit | Mr Duncan McComb on behalf of Besmaw Pty Ltd |
| Purpose of the Audit | The site audit was conducted to provide an independent review by an EPA Accredited Auditor to determine the appropriateness of an investigation plan i.e., a "Site Audit" as defined in Section 4 "Definitions" of the NSW Contaminated Land Management Act 1997 (the CLM Act). |
| Type of Audit | The audit was commissioned in response to a recommendation from EPA (Appendix B). The audit is not currently required by legislation and is non-statutory. |

The auditor has been assisted by Jennifer Neill (auditors assistant). Tasks included inspection of contract files (at Besmaw head office) and assistance in writing the SAR.

1.3 Scope of the Audit

The audit has been undertaken in respect of contaminated land management issues in response to a request from the EPA (Appendix B). The scope of the audit is listed below:

- Review of the following reports (these have collectively been referred to as "the investigation reports"):
 - Preliminary Environmental Site Assessment Lot 4 Captain Cook Drive, Kurnell, NSW. 24 June 2001. Coffey. (referenced as the PESA).

- Stage 1 – Preliminary Site Investigation, 251 and 280-282 Captain Cook Drive, Kurnell Peninsula, NSW. Dated 2 November 2023 (and an earlier version dated 10 February 2020). Coffey Services Australia Pty Ltd (Coffey). (referenced as the *PSI*)
- Environmental Site Assessment Lot 2 North and Lot 2 South, 280-282 and 251 Captain Cook Drive, Kurnell Peninsula, NSW. 27 February 2020. Harwood Environmental Consultants. (referenced as the *ESA*).
- Proposed Amendment to SEPP (Kurnell Peninsula) 1989 - Flooding and Water Management: Groundwater Flow, 280-282 and 251 Captain Cook Drive, Kurnell NSW. February 2020. Coffey. (referenced as the *Groundwater Flow Assessment*).
- Proposed Amendment to SEPP (Kurnell Peninsula) 1989 – Flooding and Water Management: Groundwater Quality, 251, 280-282 Captain Cook Drive, Kurnell Peninsula NSW. February 2020. Coffey. (referenced as the *Groundwater Quality Assessment*).
- Assessment of PFAS Levels at Besmaw Land Holdings, 280-282 Captain Cook Dr, Kurnell NSW. 7 October 2021. JBS&G. (referenced as the *PFAS Assessment*).
- September 2023 – Additional Groundwater Sampling and Testing and Lot 8 Monitoring Well Audit. 8 November 2023. Tetra Tech Coffey.
- Besmaw holds a large amount of information generated to demonstrate compliance with EPL5658 (and earlier pollution control licence 5658). This audit does not assess compliance with or otherwise comment on operational matters related to EPL 5658. However, the following has been considered in determining whether records held by Besmaw are sufficient to not require further contamination assessment of the sand extraction and rehabilitation areas.
 - Lot 2 DP559922, Kurnell Peninsula Water Quality Monitoring of Dredge Pond. Report prepared by Coffey. February 1997. (Coffey, 1997)
 - Annual Environmental Reports prepared by ERM (AER 1999-2018)
 - Independent Environmental Audit Reports prepared by Coffey (IEA 1999, 2002-2018).
 - Assessment of Compliance with EPL 5658: February 2018 to January 2019 prepared by Coffey (Coffey 2019).
 - Independent Environmental Audit Reports prepared by Zoic Environmental (Zoic 2019-2021).
 - Independent Environmental Audit Reports prepared by Geosyntec Consultants (Geosyntec 2022-2023).
 - Environmental Management Plan for the Reinstatement of Sand Extraction Sites Lot 2 DP559922 Kurnell Peninsula. Prepared by ERM. Version dated October 1996. (EMP, 1996)
 - Environmental Management Plan for the Reinstatement of Sand Extraction Sites Lot 2 DP559922 Kurnell Peninsula. Prepared by ERM. Version dated January 1999. (EMP, 1999)
 - Environmental Management Plan, Reinstatement of Sand Extraction Holt Land Rehabilitation Centre, Kurnell. Prepared by ERM. Version dated August 2020. (EMP, 2020)
 - A selection² of individual contract records held by Besmaw for VENM source sites. Hard copies of the records, held at the Besmaw head office, were inspected by the auditor on 18 April 2023 and by the auditor’s representative (J Neill) on 18 April 2023, 2-3 May 2023, and 9 May 2023.
 - Environmental Protection Licence (EPL) 5658 (including associated notices and annual returns) publicly available³ at <https://apps.epa.nsw.gov.au/prpoeoapp/>.
 - Notice Issued to Besmaw Pty Ltd by NSW EPA Under S65 of the Waste Minimisation & Management Act (1995). File BA1636. Dated 11 July 1996.

² Two contracts per year were selected at random from a list of contracts supplied by Besmaw.

³ The information was accessed between 15 May-7 June 2023.

- Notice Issued to Besmaw Pty Ltd by NSW EPA Under S65 of the Waste Minimisation & Management Act (1995). File BA1636. Dated 18 July 1996.
- Pollution Control Approval No. 2783 for reinstatement of sand extraction site with clean excavated natural material. Dated 6 February 1997. Issued by NSW EPA under Pollution Control Act 1970.
- Pollution Control Licence (5658) issued by NSW EPA under Pollution Control Act 1970. Dated 7 February 1997.
- Compliance Monitoring Data (2017-2023). Publicly available⁴ at <https://www.holtestate.com.au/epl-hlrc>
- Technical Review of Groundwater Monitoring Network and Data – Besmaw Pty Limited. Environmental Protection Licence Number: 5658. Report prepared for the NSW Dept of Environment and Conservation by Ian Grey Groundwater Consulting Pty Limited. July 2006.
- Proposed Review Process for Water Quality Results for EPL5658 Monitoring, Holt Land Rehabilitation Centre, Kurnell NSW. Letter Prepared for Besmaw Pty Ltd by Coffey. 4 July 2014.
- “*Timeline for Delivery of VENM Approval*”, pdf document provided to the auditor by Besmaw.

The following reports have not been formally reviewed as part of the scope for this audit but have been referred to as an additional line of evidence to confirm reported geological, hydrogeological and groundwater quality conditions and to establish the significance of potential off-site contamination sources:

- Environmental Impact Statement for the Kurnell Sand Extraction Proposal. October 2004. Prepared by R.W. Corkery & Co Pty Ltd. Specialist consultant study (Volume 2, Part 8) Groundwater Assessment Prepared by Peter Dundon and Associates Pty Ltd. Dated June 2002 and Addendum dated October 2004. (*Rocla Groundwater Assessment*)
- Environmental Impact Statement Captain Cook Drive, Kurnell, Breen Resource Management Facility (and Appendices). 8 July 2021. Ethos Urban. Publicly available at majorprojects.planningportal.nsw.gov.au

The audit has been undertaken to address contaminated land matters and does not include operational compliance, compliance with EPL 5658 & EPL 3629, demolition of buildings, geotechnical, salinity, flooding & coastal hazards (including sea level rise), heritage or planning issues.

⁴ The information was accessed on 2 June 2023.

2 Site Description

Site location and identification details are listed below. A site location plan is included in Appendix A.

| | |
|-----------------------|---|
| Street Address | 251 & 280-282 Captain Cook Drive, Kurnell NSW 2231 |
| Identifier | Lot 2 DP1030269 and Lot 2 DP559922 |
| Local Government Area | Sutherland Shire Council |
| Owner | Besmaw Pty Ltd |
| Site Area | Lot 2 North: Lot 2 DP1030269 (16Ha) Lot 2 South: Lot 2 DP559922 (160Ha) |
| Zoning | DM - deferred matter State Environmental Planning Policy Amendment (Land Use Zones) 2023 |

NOTE: Lot 2 North was previously part of a larger parcel of land identified as Lot 4 DP712157 (Appendix A). It is understood that⁵ Lot 4 was subdivided into two lots (Lot 1 & 2 DP1030269) to allow dedication of land in support of a previous planning proposal (Sydney Destination). Lot 1 DP1030269 is now reserved as part of Towra Point Nature Reserve.

2.1 Surrounding Site Use

The site is located on the Kurnell Peninsula and surrounding use is summarised below:

- West: Operational landfill (Breen landfill), currently licensed for resource recovery and waste disposal by application to land (EPL4608) and resource recovery and waste storage (EPL20697).
- South: Bate Bay and Boat Harbour (Tasman Sea) are located immediately south of the site both of which are popular recreational areas.
- North: Towra Point Nature Reserve (which includes a Ramsar listed wetland) is located to the north and is a protected marine sanctuary under the NSW Fisheries Management Act 1994.
- East: Lot 8 (vacant) and industrial land-use including the former Phillips ICI/Bayer site, The Sydney Desalination Plant and the former Abbott Australasia site. The Caltex Bulk Fuel Terminal (formerly Ampol Oil Refinery) is located approximately 900m further to the north-east.

2.2 Site Inspections

A site inspection (of the Lot 4 site area) was undertaken by Coffey as part of the PESA, on 15 May 2001.

- The site was reported to be characterised by rolling sand dunes which are stabilised by dense vegetation and low-lying swamps, with many areas inaccessible due to vegetation.
- The stables were reported to consist of a row of galvanised iron stables, an office block, a small galvanised iron storage shed (containing 40L plastic containers of diesel and unleaded petrol), and a large galvanised iron workshop containing horse feed and maintenance equipment. An abandoned vehicle and trailer were noted to the east of the stables.
- Weed control was reportedly undertaken by Besmaw on an irregular basis using glyphosate, although this was not stored on site.
- A "layer of tar" was reportedly observed beneath a Bitou Bush in the north-eastern corner of Lot 4. The tar was described as a mixture of asphalt, estuarine shells and soil covered by dense vegetation. The location was not identified on a site plan, but site photographs were provided. Coffey noted this appeared to be an isolated dumping incident.

Coffey conducted a site inspection on 31 January 2018 and reported the following in the PSI:

Lot 2 South:

⁵ Mr Duncan McComb, personal communication, 20 April 2023.

- Sand extraction was occurring by hydraulic dredging within the south-eastern portion of the site.
- Rehabilitation with imported VENM (regulated under EPL5658) was occurring within the western portion of the site.
- Two (12,000L and 11,500L) diesel Above Ground Storage Tanks (ASTs) were present on site, used for refuelling equipment associated with the sand extraction and rehabilitation activities. The ASTs were in bunded enclosures and in good condition with no evidence of spillages or leakages. Some empty containers were observed within the concrete bund, and minor oily staining was present on the base of the bunded area. The diesel is distributed around the site via small transfer tanks fitted to water trucks which also refuel earthmoving equipment. A fuel trailer was observed on site which is used to refuel the sand dredging barge.
- Maintenance of equipment used in land rehabilitation activities, occurs on a purpose-built concrete pad having a shallow sump for containment of any minor accidental spillage of fuel or oil. Lubricants are stored in 20L containers within the AST bunded area.
- Boat Harbour Cabins are located within the south-eastern corner of the site, multiple buildings are present, mainly small enclosures which have been built onto caravans. These enclosures consisted mostly of corrugated iron sheeting and ply wood building materials.
- Weed control was reportedly undertaken across both Lot 2 North and Lot 2 South, and Coffey reported that Glyphosate is predominantly used and a herbicide solution is applied using a manual spray pack directly onto weeds. Broad area spray application of herbicide does not occur.

Lot 2 North:

- Multiple small buildings associated with the stables were present, with building materials consisting predominantly of corrugated iron sheeting. Some possible asbestos containing material was observed on one of the buildings. Open horse exercise enclosures were present with the natural underlying sand exposed at the surface.
- The remaining area of the Lot consisted of gently sloping grassed land, with horse jumps and a small stockpile of manure. A section of land within the eastern portion of the lot was fenced off and vegetated. Dense vegetation is present within the south-eastern portion of the site.
- A small amount of building rubble (fragments of wood and tiles) was observed near the site entrance and car park.
- The ground surface was observed to be natural sand dunes, with fragments of seashells and wood present on the surface.

These conditions were confirmed during a site inspection conducted by HEC and reported in the ESA.

The observations reported by the consultants are generally consistent with observations made by the site auditor during site visits on 6 December 2022 (Lot 2 South) and 26 October 2023 (Lot 2 North). Lot 2 North was predominantly cleared and grassed with some evidence of filling above natural ground level observed along the fence line (roughly 100-200mm above natural ground level). The area to the north (outside the Lot 2N area) was heavily vegetated. No evidence of the dumped tar was observed, but based on the site inspection and site photographs, this was likely located outside the current Lot 2N site area.

3 Site History

The site history is primarily documented in the PESA and PSI. The auditor has also referred to publicly available documents held by Sutherland Shire Council and EPA public registers⁶.

Site history, for the purposes of contaminated land assessment, is undertaken to determine sources of potential contamination and only post colonisation use is relevant. This began in 1861 when Thomas Holt, who owned most of the Kurnell Peninsula, began to clear and cultivate the area for grazing. Removal of the vegetation destabilized the sand dunes which began to migrate progressively north and north-west. The grazing was unsuccessful, and the site and surrounds remained vacant until sand mining commenced on Lot 2 South in 1968. Rehabilitation of the voids reportedly commenced in 1996 (refer to section 7).

Residential structures in the vicinity of Boat Harbour were first noted on the 1955 aerial photograph and have steadily increased in number over the years. The area currently consists mainly of temporary structures such as cabins, shacks, and caravans.

Lot 2 North remained undeveloped until the 1970's when the horse stables were built. A boundary fence (2m high chain wire) was erected in the early 2000s to enclose Lot 2 North and this was followed by progressive clearance of vegetation and establishment of grassed paddocks. During this period, a product of the adjacent sand mining called "*sand overs*" (because it was oversized for builders' sand), composed of calcified sand and shell fragments, was reportedly used to aid the establishment of vegetation (such as grasses). Anecdotal evidence, documented in the PESA also suggests that fill was imported to reduce ground compaction within the horse-training oval.

Aerial photographs viewed by the auditor on the "Shire Maps" website⁷ confirm that an extensive program of filling has occurred across much of the Lot 2 North between 2001-2016. Stockpiles, trucks, and land disturbance were noted on various aerial photographs, consistent with the reported placement of "*sand overs*" across the site.

Anecdotal information from an existing employee (Darren Floyd) who had first hand knowledge of the stables and surrounding land was reported in the PSI. Mr Floyd reported that during fencing of Lot 2 N, some fly tipping and dumping of vehicles was observed in the heavily vegetated areas of the former Lot 4 area. The cars and rubbish were removed and disposed off-site at that time and that this would have included the dumped asphalt/tar.

Reported site history for the surrounding area included:

- A former notice (VRA) and site audit statement issued for **Abbott Australasia Pty Ltd**, Captain Cook Drive (Lot 1 in DP225973 and part of Lot 102 in DP1027438), located approximately 177m north-east of the site. The VRA, for remediation of soil and groundwater, indicates that the site was contaminated by various substances including, toluene, ethylbenzene, xylenes, VHCs, heavy metals (cadmium, chromium, and nickel), PAHs, TPH and Codeine. The contamination was associated with a former waste disposal area, located on the eastern side of the factory complex, where filter cake residues and drums were buried up until the 1980s. The site audit statement (2003/02) issued by Ross McFarland following completion of remediation certifies that the requirements of the VRA have been addressed. Both the VRA and SAS are publicly available on the EPA public register.
- **Breen landfill** (EPL4608): The PSI referenced POEO public register records and noted multiple licence variations, a s.91 Clean up notice, compliance audit and a penalty notice. The history of the Breen landfill is further discussed in section 9.
- **Continental Carbon** located at 145-161 Sir Joseph Banks Drive and **Chevron International Technical Centre**, Sir Joseph Banks Drive.
- **Caltex Refinery** established in 1956.
- The **former Phillips ICI/Bayer site** (260 Captain Cook Drive and also referred to as Lot 6). The PESA stated that the site was previously used for the manufacturing of synthetic rubber and carbon black, although more recently has been used for light manufacturing, stockpiles of building materials and recycling. The PSI identified that the site has been notified to the NSW EPA (regulation under CLM Act not required).

⁶ <https://www.epa.nsw.gov.au/licensing-and-regulation/public-registers>

⁷ <https://www.sutherlandshire.nsw.gov.au/plan-and-build/Planning-considerations/shire-maps>

Although the reported history of the **former Phillips ICI/Bayer site** was limited, publicly available records held by Council⁸ indicates that a site audit statement (PWH_NSW_044a) has been issued for the site. A copy was not available for review, but a copy of a letter from the NSW EPA (Appendix B) confirmed that extensive investigation, remediation, and validation works have been conducted at the site. The works were conducted to investigate and/or remediate a range of contaminants at the site, including cyclohexane, styrene, ethyl benzene, heavy end petroleum hydrocarbons, polycyclic aromatic hydrocarbons, polychlorinated biphenyls and asbestos. The EPA determined that the residual contamination at the site was not significant enough to warrant regulation under the CLM Act because:

- Investigation and validation results indicate that any residual contamination in soil would not pose an unacceptable risk to human health under the current and approved use of the site;
- There are no current human exposure pathways to residual contamination in groundwater as it is understood that groundwater is not extracted for beneficial use at the site; and
- Groundwater monitoring results indicate that the offsite migration of cyclohexane in groundwater does not pose an unacceptable risk to the down gradient sensitive environment of Quibray Bay.

Residual contamination in groundwater at the site is identified through a Groundwater Management Plan (GMP), which states that groundwater is not to be extracted at the site for any use other than monitoring. The GMP or monitoring data were not available for review.

The Rocla EIS Groundwater Assessment Addendum (for Lot 8) include a summary of previous investigations on Lot 8. This identified elevated hydrocarbon concentrations (primarily cyclohexane) in groundwater monitoring bores located adjacent to the Lot 6 boundary. Cyclohexane was reportedly among the reagents and waste products associated with former industrial activities conducted on Lot 6. Soil remediation works were reportedly undertaken on Lot 6 in 2002 although no details were reported. The highest concentration of cyclohexane (19,392 µg/L) was measured in MW4 in September 2004 suggesting that a source was still present at that time.

The groundwater Assessment Addendum also reported consistently elevated concentrations ammonia in groundwater. This was believed to be derived either from a sewage treatment plant on Lot 6, a licensed sewer pipeline to Potter Point (discharge) or an unidentified landfill source. Concentrations of more than 50 mg/L have been reported in MW9, located on Lot 8 (Appendix A) with a reported increasing trend over time.

3.1 Auditor's Opinion

The site history reported in the PSI relied primarily on anecdotal information and not all the information (for example historical land titles) required by NEPM (2013) was provided. However, the history of the site has been confirmed through discussions with Besmaw, a private company of the Holt family and supplemented by review of additional information sources. On this basis, the reported site history is adequate for the purposes of identifying potential contamination issues at the site.

⁸ [DA14/1397 Statement of Environmental Effects \(Planning Ingenuity\)](#)

4 Conceptual Site Model

Areas of environmental concern (AEC) and potential contaminants of concern (PCOC) identified in the PSI have been tabulated in Table 4.1 below. Locations of the AECs are shown on plans included in Appendix A.

| Table 4.1: Summary of AEC & PCOC | |
|--|---|
| AEC | PCOC |
| AEC1 (stables): Hazardous building materials (weathering of current/former buildings) & historic pesticide use. Near surface soil in vicinity of current and former structures. | metals (zinc and lead) and/or asbestos, OCP/OPPs |
| AEC2: (Boat Harbour Cabins) Hazardous building materials (weathering of current/former buildings) & historic pesticide use (under buildings). Near surface soils in the vicinity of former and current site structures. | metals (zinc and lead) and/or asbestos, OCP/OPPs |
| AEC3: Weed control undertaken at the site using herbicides including Glyphosate. Accidental spillage of a quantity of concentrated herbicide at the chemical storage area where spray solutions are prepared. Soil and groundwater potentially affected. | Herbicides |
| AEC4 (Lot 2 South): Rehabilitation of the sandmining void. Potential leaching of naturally occurring metals and changes in pH (in groundwater) due to placement of VENM/PASS, although Coffey noted generally low mineralised deposits in the greater Sydney region. Potential for importation of non-VENM material. Groundwater potentially affected. | Heavy metals, acidity |
| AEC5: Storage and use of fuels. Near surface soils in the vicinity of the 2 x ASTs (diesel) within Lot 2 South and in localised areas across the site from potential leaks / spillages associated with refuelling and transport of fuels. Soil and groundwater potentially affected. | TRH, naphthalene |
| AEC6: Potential off-site sources (1) Breen landfill & (2) industrial properties east of the site. Groundwater potentially affected. | Heavy metals, TRH, PAH, Volatile organic compounds, nutrients (including ammonia) |

A preliminary CSM was developed and documented in the PSI. Exposure pathways and receptors were identified for each AEC, although Coffey identified a low likelihood for soil and/or groundwater contamination and concluded that widespread contamination was unlikely to be present at the site. No data gaps were identified, and Coffey concluded that additional assessment was not warranted.

Nevertheless, intrusive site investigations were undertaken by HEC (the ESA). The investigation was based on a CSM that identified potential sources of contamination outside the sandmining and rehabilitation area, although mechanisms of contamination and potentially affected media were not discussed.

The potential contamination sources and COPC identified in the ESA are listed in Table 4.4.

| Table 4.2: Potential Contamination Sources (ESA) | | |
|---|---|---|
| Source | Area | COPC |
| Hazardous building materials | Lot 2 North within the immediate vicinity of the buildings (stables). | HEC identified a list of COPC although these were not assigned to individual sources/areas. |
| Uncontrolled fill | | |
| Pesticide use | Lot 2 South within the workshop and office area | |

| Source | Area | COPC |
|---------------------------------------|--|--|
| Storage of fuel in above ground tanks | Lot 2 South within the immediate vicinity of the AST area. | Soil: Metals, TRH/BTEX, PAHs, OCPs/OPPs and asbestos. Groundwater: Metals, VOCs nutrients (including ammonia), TRH/BTEX & PFAS compounds. |

4.1 Auditor's Opinion

The AEC & PCOC identified in the PSI is generally consistent with the reported site history, site operations and site inspections, except for the following issues which have been further discussed in later sections of this SAR:

- Potential sources of per- and poly-fluoroalkyl substances (PFAS) were not discussed and PFAS was not identified as a COPC. Notwithstanding this, PFAS compounds were analysed (in groundwater) during the ESA. In addition, an investigation of PFAS in groundwater (JBS&G, 2021) was undertaken, at the request of the NSW EPA in response to reports made by Sutherland Shire Council (SSC) to the EPA regarding detection of PFAS compounds in the local area. The assessment included sampling and analysis of groundwater at seven groundwater monitoring points within the site, to determine levels of per- and poly-fluoroalkyl substances (PFAS) in groundwater.
- The program of filling across Lot 2 North, to aid establishment of vegetation was undertaken using a quarried "sand overs". This is not considered to be a potential contamination source, nevertheless HEC identified uncontrolled fill as a potential contamination source and sampling was undertaken to confirm conditions.
- Maintenance of haul roads and temporary roads using crushed tile, brick and concrete has reportedly occurred in the past on the Lot 2 South area. This may also include the Boat Harbour access road.
- The asphalt/tar material, historically observed on the former Lot 4, was likely associated with historical fly-tipping in heavily vegetated areas of the former Lot 4 site area. There is no evidence that this was located within the current Lot 2N site area, and fly-tipped material was reportedly removed during the vegetation clearance program.
- The ESA did not provide adequate justification for the limited investigation areas and was based on a flawed CSM that did not consider all potential contamination sources at the site.
- Changes in groundwater chemistry (such as metals and acidity) due to placement of VENM/PASS is to be expected. This is regulated by EPL5658 and is not addressed by this audit. COPC and affected media for the rehabilitation area will depend on review of records held by Besmaw in relation to importation of material to the site.

5 Stratigraphy and Hydrogeology

A summary of the site stratigraphy and hydrogeology reported in the investigation reports (as defined in section 1.3) has been compiled as follows.

5.1 Stratigraphy

The site is reported to be underlain by Holocene marine deposits including marine quartz sand, minor shell content, interdune (swale) silt and fine sand and medium to fine marine quartz sand with podsols, overlying and interfingering with swamp and estuarine sands and peat (Botany Sand) underlain by Hawksbury Sandstone. Sandstone bedrock is reported to range between -10mAHD in the vicinity of Captain Cook Drive and up to approximately -22mAHD further south.

The PSI described surface soils⁹ as follows:

- Lot 2 North: The surface soils were described as topsoil consisting of silty sand and sand, light brown to dark brown with inclusions of organic material, dead grass, mulch, sea shells, trace fine gravels in places. No odours or staining indicative of possible contamination were observed.
- Lot 2 South: outside sandmining areas (natural) silty sand / sand, light brown to dark brown, fine to medium grained with inclusions of sea shells, some dead roots and grass in places, no odour or staining observed.
- Lot 2 South: sandmining rehabilitation areas gravelly clay, silty clay and gravelly sand, medium plasticity clays, trace gravels, inclusions of organic material, dead roots, grass and mulch in places, no odours or staining observed.

The ESA included boreholes drilled within Lot 2 North (in the vicinity of the horse stables) and within Lot 2 South (office & workshop area), three testpits were also excavated within the horse training oval during the PESA. The sub-surface profile, encountered during these investigations is summarised in Table 5.1.

| Depth (mbgl) | Subsurface Profile |
|--|--|
| 0.0 – 1.5 | <p>Lot South (office & workshop area) FILL: sand, brown/yellow with inclusions of sandstone, brick & gravel. Some clay noted with depth.</p> <p>Depth of fill not delineated in SB2, SB3, SB4, SB5, SB6, SB7, SB8 & SB10 (boreholes terminated at 1mbgl).</p> <p>Lot 2 North (AEC 1): SB12 – FILL: sand with gravel, some terracotta fragments (to a depth of 0.4m); SB13 – FILL: sand with gravel, dark brown; SB17 - FILL: silty gravel, blue/grey (to a depth of 0.15m); Topsoil logged at SB18 (0.5m).</p> <p>Within the horse training oval sand was encountered to 0.1m underlain by FILL (0.1-0.4m) comprising low plasticity black-brown clay, with inclusions of brick, sandstone, reinforced bar, and trace fly mesh.</p> |
| 0.0 (in areas where no fill logged) to depth (maximum depth of investigation 6mbgl). | <p>SAND: yellow, coarse grained. Peat layers noted on Lot 2 North (Botany Sands)</p> <p>Acid sulphate odour noted at 5m (MW01).</p> |

mbgl – metres below ground level

The Acid Sulfate Soil (ASS) Port Hacking Map issued by Land and Water Conservation (1:250,000) identified the area of Lot 2 South to be within an area of 'Disturbed Terrain' which includes filled areas, and areas which have been mined or dredged. However, EPL5658 permits potential acid sulfate soils (PASS) to be placed in the dredge pond. Lot 2 North has a high probability for acid sulfate soils to exist, with a potentially adverse environmental impact if acid sulfate soils are disturbed by activities within one metre below the ground surface.

⁹ Based on conditions encountered during a separate salinity assessment. A copy of the report was not provided to the auditor for review.

5.2 Hydrogeology

The PESA summarised hydrogeology, by reference to previous groundwater studies undertaken in surrounding areas¹⁰, as follows:

- An aquifer system exists in the estuarine and aeolian sands of the area. The water table typically occurs at approximately 1.5 m to 2.5 m beneath the ground surface with a seasonal groundwater level fluctuation in the order of 1 m. After extensive rainfall in mid-1990 depth to groundwater in the area was as little as 0.2 m in some places. Groundwater flow [beneath Lot 2 North] is likely to be generally northwards and north-westward towards the wetlands on the fringes of Quibray Bay.

The PSI and ESA reproduced hydrogeology reported in the Rocla EIS (2004) (prepared for the adjacent Lot 8 site located off-site). A summary is provided below:

- Groundwater occurs at shallow depths beneath the project area (0.5-3.5m below ground level) and forms a mound beneath the more elevated parts near the centre of Kurnell peninsula, with flow towards the north towards Quibray Bay and to the south towards Bate Bay.
- Seasonal variations in groundwater level may range between 0.7m and more over short terms and 1.3m and more over longer periods. The potential sources of aquifer recharge are rainfall and surface run off from local catchment areas.
- Underlying sands have moderate hydraulic conductivity ranging between 50-100m/day¹¹ at shallow depths and 1-10m/day at depths close to the Hawkesbury sandstone bed rock lying at -3 to -24mAHD. Depth to bedrock generally increases from east to west across the site.
- The aquifer within the underlying sands at the site is unconfined and is exposed within the dredge pond.
- The groundwater was reported close to neutral pH with median total dissolved solids (TDS) content below 500 mg/L. Some higher TDS (up to 2530 mg/L), and elevated levels of nutrients (nitrate and ammonia concentrations above the ANZECC 2000 freshwater ecosystem guidelines) were reported and were believed to be due to the exposure of the water table in low-lying swampy areas which contain decaying vegetation and subject to higher rates of evapotranspirative losses.

Hydrogeology was not documented in the JBS&G PFAS groundwater investigation.

The groundwater quality assessment also referred to the Rocla EIS but qualified this as conditions "*prior to sand mining*".

The groundwater flow assessment (Coffey, 2020) was prepared to "*...assess current and likely future groundwater flow directions for the site under the draft masterplan*".¹² The assessment was based on a hydrogeological model initially developed by Coffey in 2007 to allow appraisal of groundwater conditions (in the context of future development) following rehabilitation of the sandmining area. Two model outputs are described in the report (1) groundwater levels and flow between February-August 2003 (used to calibrate the model) and (2) predicted groundwater levels after rehabilitation of the sand mining void. Groundwater contour plots for each of the two scenarios are reproduced in Appendix A.

Key features (as reported by Coffey) are summarised below:

- Base case (calibration) contours calculated for the period February-August 2003: Water in the dredge pond was predicted to flow to the north and northwest beneath Lot 2 North to seep into Quibray Bay and to the south beneath the foreshore sand dune to seep into Bate Bay. However, the dredge pond, which is effectively an exposed groundwater table, has locally affected groundwater flow and groundwater from the area immediately east of Lot 2 South was predicted to flow to the west and southwest to seep into the dredge pond.
- Modelled groundwater levels and flow for the rehabilitated Lot 2 South: The model predicts that groundwater from the area immediately east of Lot 2 South is not affected by the rehabilitated landform. The groundwater divide is predicted to be re-established and groundwater beneath the

¹⁰ The reports are referenced in the PESA and were not made available to the auditor for review.

¹¹ The Groundwater Quality Assessment reported hydraulic conductivity to be in the range 5-50m/day at shallow depths.

¹² Masterplan refers to a Masterplan Design Statement (version February 2020 B, prepared by PTW Architects in association with McIntosh & Phelps for Besmaw) that was prepared in support of a proposed SEPP amendment and land use zones.

rehabilitated area is likely to flow to the northwest beneath Lot 2 North to seep into Quibray Bay and south beneath the foreshore sand dune to seep into Bate Bay.

This is consistent with conditions reported in the Rocla EIS¹³ in which groundwater flow on Lot 8 was described "Over the western and south-western part of the [Lot 8] Site, the water table gradient falls to the south-west, due to the influence of the ponds on the adjacent Lot 2, whereas from the eastern part of Lot 8 and beneath Lot 6, there is a pronounced gradient to the north."

A search of licensed groundwater bores within 500m radius of the site was reported in the PSI. A summary is provided in Table 5.2 below. Location of the bores is shown in Attachment A.

| Location | Bore Details as Reported in the PSI) | Auditor Comments |
|----------|--|---|
| On-site | Groundwater bores within Lot 2 South monitored in compliance with EPL 5658 (BORE 1, BORE 2, BBH4B, BBH7, BBH8, BBH9C and BBH10). | Many of the on-site monitoring bores no longer exist due to sand extraction. |
| On-site | GW107770 Water supply bore used by occupants at Boat Harbour Village (reported by Coffey as non-potable use). GW107771 (Stock Watering) Lot 2 North: horse stables. GW109383 (Industrial) Lot 2 South: plant nursery | A search of the licence details for GW107770 ¹⁴ does not include an intended purpose and the non-potable supply could not be confirmed. Beneficial groundwater use is assumed to include stock watering, industrial (irrigation) and domestic (including drinking water). |
| Off-site | GW10467 to GW104278 (Monitoring/Active) reportedly installed during contamination assessment – no additional details available. GW101128 (Monitoring/Active) – no details available | These wells are located on adjacent Lot 8 and may be associated with the ongoing GMP associated with the former ICI/Bayer site contamination. |
| Off-site | GW026617, GW075060 & GW075061 (Monitoring). Reported to be on a developed industrial site. | These wells are located within the former Abbotts Australasia site (now known as Dicker Data). |
| Off-site | GW103445 (Monitoring/Active) Breen landfill site | Monitoring bore, likely to be associated with EPL monitoring requirements on adjacent Breen landfill site. |

5.3 Auditor's Opinion

Lot 2 North has not been subject to sand mining and the underlying lithology (within the vicinity of the stables) comprises predominantly natural soils with fill around buildings and within the horse training oval to provide a trafficable surface. The investigations were limited to the vicinity of the stables and the nature and extent of any fill outside this area has not been determined. Natural soils reported on the Lot 2 North site were reported to contain organic material, mulch, seashells and trace gravel consistent with the reported importation of "sand overs" to support revegetation.

Lot 2 South has been subject to sandmining and rehabilitation. The investigations to date have focussed on the workshop & office area and within this area geology comprises fill material (primarily sand with inclusions of sandstone, brick and in some cases terracotta tile fragments, underlain by natural soils (sand). The fill material is expected to extend to other trafficable areas of the site including haul roads and the Boat Harbour access road.

¹³ Volume 2 Part 8 Groundwater Assessment (section 2.5).

¹⁴ Checked by the auditor at <https://realtimedata.waternsw.com.au/> on 25May23.

The reported hydrogeology in the PESA, PSI and ESA relies on a groundwater assessment reported for the adjacent Lot 8 site in 2004, which essentially describes the natural groundwater flow regime that existed prior to commencement of sandmining activities.

The dredge pond (being an exposed groundwater table) is likely to affect groundwater flow conditions and some localised groundwater flow from the east is predicted to seep into the dredge pond.

The effects of the dredge pond in respect to groundwater flow from the western boundary, adjacent to the Breen landfill site, were not discussed. Predicted groundwater contours (Appendix A) show a relatively flat hydraulic gradient in this area due to the influence of sandmining voids.

Following rehabilitation (backfilling), the groundwater model generally predicts a return to conditions reported in the PSI, being a groundwater divide across the site with components of flow northwest towards Quibray Bay and south to Bate Bay.

The significance of local groundwater flow changes due to the presence of the dredge pond is of particular importance when assessing the long-term water quality monitoring dataset (section 8) and risks from off-site contamination sources.

6 Evaluation of Site Investigations

A summary of the intrusive site investigations is provided Table 6.1.

| Table 6.1: Summary of Site Investigations | | |
|---|---|--|
| Investigations & Objective | Field Investigations | Analytical Suite |
| <p>PESA (Coffey, 2001)</p> <p>The PESA was undertaken to assess the potential for contamination and to determine if investigations are required.</p> <p>Some limited soil sampling (in the horse training oval) was undertaken to assess the potential for fill in this area.</p> | <p>Lot 2 North: Limited soil sampling within the horse training oval (Appendix A). Four testpits excavated with soil sampling and analysis undertaken from Testpit 3 and 4.</p> | <p>Soil: Metals, TPH, PAHs and OCPs.</p> |
| <p>PSI (Coffey, 2020/2023)</p> <p>The PSI was undertaken to provide a preliminary contamination assessment of the suitability of the site for possible future land uses.</p> <p>Coffey also stated that the PSI addresses specific matters requested by DPIE to address the master planning process:</p> <ol style="list-style-type: none"> 1. Site history (aerial photos, land titles & EPA records) and site walkover. 2. A list of Areas of Environmental Concern (AEC) and assessment of the need for further investigations, using a risk approach (high, medium and low) with respect to its contamination potential. | <p>N/A</p> | <p>N/A</p> |
| <p>ESA (HEC, 2020)</p> <p>The objective was "...to provide a limited assessment of the current state of soil at the site and to assess groundwater, surface water and bore water at the site in the location of areas of environmental concern. Also, to determine if the site is suitable for ongoing commercial/industrial use."</p> | <p>Lot 2 North: Ten soil bores (SB11-SB20) targeted locations around buildings (stables) (AEC 1) (Appendix A). Sampling of bore water (via tap).</p> <p>Lot 2 South: Ten bores (SB1-SB10) targeted locations within offices & workshop area (AEC 3 & AEC 5) (Appendix A).</p> <p>Installation of one groundwater monitoring well (MW01) in the vicinity of the ASTs.</p> <p>Sampling of groundwater from existing bore BBH8 (EPL monitoring bore).</p> <p>Surface water sample collected from dredge pond (SW01).</p> | <p>Soil: Metals, TRH/BTEX, PAHs, OCPs/OPPs and asbestos.</p> <p>Groundwater: Metals, nutrients, ammonia, TRH/BTEX & PFAS compounds.</p> <p><u>VOCs were identified as a COPC, but analysis of VOCs was not undertaken. This was addressed by additional investigations as discussed below.</u></p> |

| Table 6.1: Summary of Site Investigations | | |
|--|--|---|
| Investigations & Objective | Field Investigations | Analytical Suite |
| <p>PFAS Assessment (JBS&G, 2021)</p> <p>The PFAS assessment was undertaken to quantify levels of PFAS compounds in groundwater on the site (in response to a request from council).</p> | <p>Groundwater sampling from seven existing groundwater monitoring wells (BH01, BH02, BBH4B, BH07, BBH8, BBH9C & BBH10)</p> | <p>Groundwater: PFAS compounds.</p> |
| <p>Additional Groundwater Sampling (Coffey, 2023)</p> <p>The report addressed the following objectives:</p> <ul style="list-style-type: none"> - Identify the source of ammonia in groundwater through further monitoring and investigation. - Assess the groundwater around the perimeter of the site and within rehabilitated areas (to include VOCs). <p>Hazardous ground gas monitoring, and investigations of groundwater conditions adjacent to Lot 6/Lot 8 were identified as objectives to be addressed by future field work.</p> | <p>Investigations included:</p> <p>Groundwater sampling from five existing groundwater monitoring bores: BBH3 (located within backfilled void), BBH8, BBH9C, BORE 1 & BORE 2.</p> <p>Audit of existing bores along eastern boundary.</p> <p>Installation of a single gas monitoring well (no sampling or location reported).</p> | <p>Inorganic compounds (ammonia, BOD, COD, major anions/cations), dissolved methane, cyanide, volatile organic compounds (VOCs), PCBs, TRH, PAHs & OCPs.</p> <p>In addition to the above suite, BBH3 was analysed for heavy metals.</p> |

6.1 Quality Assurance and Quality Control

The Auditor's assessment of the overall quality of the data by review of the above referenced reports follows in Tables 6.2 and 6.3 below.

| Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment | |
|--|---|
| Sampling and Analysis Plan and Sampling Methodology | Auditor's Opinion |
| <p>Data Quality Objectives (DQO)</p> <p>Except for the ESA (discussed below), DQOs were not documented, although data quality was reviewed against documented data quality indicators.</p> <p>ESA: DQOs were documented in accordance with the seven-step process outlined in NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme. Predetermined DQIs for data quality were also reported.</p> <p>The study boundaries were restricted to the extent of the soil sampling (stables on Lot 2 North and offices & workshop area on Lot 2 South). Notwithstanding this, HEC defined the decision rule as <i>"If concentrations of COPC are less than the criteria for commercial/industrial use then the site will be seen as suitable for continued commercial/industrial use."</i></p> | <p>The DQO's presented by HEC are not considered appropriate for the purpose of determining site suitability, because they are based on a flawed CSM that does not adequately identify all potential contamination sources at the site. However, the DQOs are considered adequate for the purpose of determining the potential for contamination to exist (within the restricted study boundaries).</p> <p>Although DQOs were not identified in the PESA and PFAS Assessment, project objectives were clearly stated, and sampling strategies were developed to achieve them.</p> <p>DQOs were not defined in the Additional Groundwater Sampling Report (Coffey 2023).</p> |
| <p>Data Quality Objectives (DQO)</p> <p>The PESA was undertaken to assess the potential for contamination and to determine if investigations are required. DQOs were not discussed although some limited soil sampling (in</p> | <p>Although DQOs were not identified in the PESA and PFAS Assessment, project objectives were clearly stated, and sampling strategies were developed to achieve them.</p> |

| Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment | |
|---|--|
| Sampling and Analysis Plan and Sampling Methodology | Auditor’s Opinion |
| <p>the horse training oval) was undertaken to assess the potential for fill in this area. The data quality was reviewed against documented data quality indicators.</p> <p>ESA: DQOs were documented in accordance with the seven-step process outlined in NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme. The objective was “...to provide a limited assessment of the current state of soil at the site and to assess groundwater, surface water and bore water at the site in the location of areas of environmental concern. Also, to determine if the site is suitable for ongoing commercial/industrial use.” Predetermined DQIs for data quality were also reported.</p> <p>The study boundaries were restricted to the extent of the soil sampling (stables on Lot 2 North and offices & workshop area on Lot 2 South). Notwithstanding this, HEC defined the decision rule as “If concentrations of COPC are less than the criteria for commercial/industrial use then the site will be seen as suitable for continued commercial/industrial use.”</p> <p>JBS&G (2021) was undertaken to quantify levels of PFAS compounds in groundwater on the site. Project specific DQO’s were not documented, although data quality was reviewed against documented data quality indicators.</p> | <p>The DQO’s presented by HEC are not considered appropriate for the purpose of determining site suitability, because they are based on a flawed CSM that does not adequately identify all potential contamination sources at the site. However, the DQOs are considered adequate for the purpose of determining the potential for contamination to exist (within the restricted study boundaries).</p> |
| <p>Soil Sampling pattern, density, and depths:</p> <p>Investigation locations were placed on a judgmental sampling grid (Table 6.1). Other than the horse training oval, there was limited discussion on how individual sampling locations were sited.</p> <p>PESA: Testpits were positioned to target fill within the horse training oval.</p> <p>ESA: Soil investigation locations were limited to the immediate vicinity of the stables (Lot 2 North) and within the offices & workshop area (Lot 2 South). Soil samples were analysed for metals, TRH/BTEX and PAHs from surface (0.1-0.3m) and near surface locations to a maximum depth of 0.8m. OPP/OPPs were analysed in surface samples.</p> <p>Within the offices & workshop area (lot 2 South) samples were analysed from fill material and the underlying natural material was not sampled.</p> <p>Most of the soil samples from Lot 2 North were analysed in natural material.</p> | <p>Sampling was undertaken using a judgmental sampling pattern and the minimum number of sampling points documented in EPA (2022)¹⁵ is not applicable. Sampling density is dependent on the site history, AECs, and investigation objectives.</p> <p>Information to support the individual sampling locations was not reported in the ESA and the sampling density (for the purposes of site suitability) could not be assessed. Nevertheless, the targeted sampling pattern is adequate to assess whether there are significant contamination issues associated with the investigation areas.</p> <p>Soil samples were analysed for the COPC related to uncontrolled fill, storage of fuel (ASTs), pesticide use and weathering of hazardous building materials.</p> |

¹⁵ NSW EPA (2022) Sampling Design Part 1 – Application. Contaminated Land Guidelines.

| Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment | |
|--|---|
| Sampling and Analysis Plan and Sampling Methodology | Auditor’s Opinion |
| <p>Groundwater Sampling Locations: Groundwater sample locations and analytes are listed in Table 6.1. Only one new monitoring well was installed (MW01), placed to target the AST area. Remaining groundwater sampling locations utilised existing monitoring wells that form part of the EPL monitoring network.</p> | <p>Groundwater sampling adequately targeted the AST. Groundwater within the backfilled mass was assessed by sampling BBH3. Down gradient of the rehabilitated area:</p> <ul style="list-style-type: none"> – Groundwater along the northern boundary was addressed by sampling of BBH8 and bore water (at the stables). – Groundwater flow along the southern boundary was assessed by sampling BBH9C. <p>PFAS sampling locations were acceptable.</p> |
| <p>Monitoring Well Construction: The new monitoring well (MW01) was installed to a 6mbgl, with a screened interval of 3 m placed in gravel. Wells were constructed of 50 mm uPVC. A bentonite seal of 1m thickness was placed 0.5m above the screen and the well backfilled to the ground surface. The well was reportedly developed after installation although details were not reported. The SWL (4mbgl) intersects the screened interval. Construction details of the existing monitoring wells was not provided.</p> | <p>The new well installation was acceptable. The absence of well construction details for the existing wells is significant and has been considered when interpreting the data.</p> |
| <p>Monitoring Well Construction: The new monitoring well was installed to a 6mbgl, with a screened interval of 3 m placed in gravel. Wells were constructed of 50 mm uPVC. A bentonite seal of 1m thickness was placed 0.5m above the screen and the well backfilled to the ground surface. The well was reportedly developed after installation although details were not reported. The SWL (4mbgl) intersects the screened interval. Construction details of the existing monitoring wells was not provided.</p> | <p>The new well installation was acceptable. The absence of well construction details for the existing wells has been considered when interpreting the data.</p> |
| <p>Sample Collection Method: Boreholes were drilled using solid flight augers. Soil samples were collected directly from the auger flights, with external material removed prior to collecting the sample. Soil samples from the testpits were collected directly from the sides of the testpits by hand (using latex gloves). Samples (for asbestos analysis) were not collected as outlined in NEPM (2013) (Schedule B1).</p> | <p>Sample collection from the auger flights is not ideal as it can result in loss of volatiles and sample cross contamination. Cross contamination was minimised by removing external material although reported soil concentrations (for volatile compounds) must be considered as indicative only and may underestimate the actual concentrations present. This is not considered to be of great significance in the context of the reported site history and CSM. The collection of samples from boreholes for asbestos analysis is not ideal as it can lead to false negative results. The above issues have been considered when interpreting the dataset.</p> |

| Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment | |
|--|--|
| Sampling and Analysis Plan and Sampling Methodology | Auditor's Opinion |
| <p>Surface & Groundwater Collection Method:</p> <p>Groundwater samples were collected by HEC using a low flow peristaltic pump with dedicated LDPE sample tubing. HEC reported that a bailer and temperature probe was present in monitoring well BBH8. These were removed immediately prior to sampling, although HEC noted that this could be a source of PFAS in the well. The equipment was later removed (for an undisclosed amount of time) and the well resampled with PFAS concentrations reported at an order of magnitude lower than the initial sampling round. Surface water was collected directly from the water source (dredge pond).</p> <p>Bore water was collected directly from the tap (near the stables). Water was allowed to run for around 3minutes prior to collection of the sample. During the PFAS assessment, JBS&G collected groundwater samples using HydraSleeves (no purge sampling). Field notes report that the monitoring wells contained existing bailers and presumably these were removed prior to sampling. The HydraSleeves were left for one hour to allow equilibration before the sample was removed although JBS&G did not discuss why this was an appropriate time to allow for equilibration. JBS&G did not report if HydraSleeves were LDPE or HDPE.</p> <p>During the additional groundwater sampling, Coffey initially used a combination of bailers and HydraSleeves. The time for equilibration of the HydraSleeves was not reported. The HydraSleeve allowed collection of both a deep and shallow groundwater sample from BBH8.</p> | <p>Groundwater monitoring reported in the ESA is adequate, noting that cross contamination from existing bailers and/or dataloggers in the well was addressed by additional sampling rounds.</p> <p>During the PFAS Assessment, the HydraSleeve (no purge sampling) deployment time of one hour, whilst not ideal, is adequate because the sample would most likely have been collected from below the zone disturbed by installation of the sampler. However, the existing bailers in the wells (presumably removed prior to sampling) may be a source of PFAS, which is particularly significant because of the no-purge sampling method.</p> <p>If LDPE HydraSleeves were used this could also be an additional source of PFAS.</p> <p>There is insufficient information included in the Additional Groundwater Assessment to determine whether groundwater samples collected using HydraSleeves were acceptable.</p> <p>The above issues have been considered when interpreting the dataset.</p> |
| <p>Decontamination procedures:</p> <p>Soil: Sampling equipment (including augers) were cleaned with detergent and rinsed with tap water and then de-ionised water prior to sampling and between sampling events to prevent cross contamination. New gloves were reportedly used for each new sample.</p> <p>Groundwater: Dedicated sampling equipment (HDPE tubing & disposable filters) was used for each well. New gloves were reportedly used for each new sample. HEC reported decontamination of the interface probe using Decon 90. Decontamination during PFAS sampling reported by JBS&G reported use of Liquinox soap (which is suitable for PFAS sampling).</p> | <p>Acceptable noting that the PFAS concentrations in groundwater reported by HEC may be affected by use of Decon 90 for equipment decontamination.</p> |
| <p>Sample handling and containers:</p> <p>Samples were placed into prepared and preserved sampling containers provided by the laboratory</p> | <p>Acceptable.</p> |

| Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment | |
|--|---|
| Sampling and Analysis Plan and Sampling Methodology | Auditor's Opinion |
| <p>and chilled during storage and subsequent transport to the labs.</p> <p>The laboratories reported that appropriate sample containers had been used.</p> <p>Groundwater samples to be analysed for heavy metals were field filtered using 0.45µm Millipore filter units and acidified.</p> <p>Groundwater sampling for PFAS was managed to ensure no cross contamination from sampling equipment. A PFAS sampling checklist was completed by JBS&G and appended to the PFAS investigation report.</p> | |
| <p>Chain of Custody (COC):</p> <p>Completed chain of custody forms were provided in the reports.</p> | Acceptable |
| <p>Detailed description of field screening protocols and calibration:</p> <p>Soil: Field screening for volatiles was reportedly undertaken by HEC using a PID at the time of sampling, although the methodology was not reported, and an equipment calibration certificate was not provided. No field screening for volatile compounds was reported by Coffey.</p> <p>Groundwater: Field parameters were measured during well sampling and development. The reports indicated that calibration had been undertaken prior to use and calibration certificates from the equipment supplier were provided.</p> | <p>Although the reported PID screening was not adequately documented, this is not a significant non-conformance in the context of the site history and conditions encountered.</p> <p>Measurement of groundwater field parameters was acceptable.</p> |
| <p>Sampling logs:</p> <p>Soil logs are provided within the reports, indicating sample depth, PID readings and lithology. The logs report no indications of contamination although some fill was encountered.</p> <p>Groundwater field sampling records were provided, indicating SWL, field parameters, methodology and observations.</p> | Acceptable |

| Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control | |
|--|--|
| Field and Lab QA/QC | Auditor's Opinion |
| <p>Field quality control samples:</p> <p>Soil (Coffey): no quality control samples were included.</p> <p>Soil (HEC): trip spikes, rinsate blanks, field intra-laboratory and inter-laboratory duplicates were undertaken in accordance with the frequency set out in NEPM (2013).</p> <p>Groundwater (HEC) field intra-laboratory and inter-laboratory duplicates, trip spike and trip blank were undertaken in accordance with the frequency set out in NEPM (2013).</p> | <p>Although some of the field QC was limited, the data has been considered within a multiple line of evidence and, on this basis is acceptable for the purpose of the audit.</p> |

| Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control | |
|---|--|
| Field and Lab QA/QC | Auditor's Opinion |
| <p>Groundwater (JBS&G) rinsate blanks, field intra-laboratory and inter-laboratory duplicates were undertaken in accordance with the frequency set out in NEPM (2013). No trip blanks were analysed as volatile compounds were not included in the assessment.</p> <p>Groundwater (Coffey) field quality control samples were limited to one intra-laboratory duplicate and two rinsate samples (collected from interface probe).</p> | |
| <p>Field quality control samples:</p> <p>Soil (Coffey): no quality control samples were included.</p> <p>Soil (HEC): trip spikes, rinsate blanks, field intra-laboratory and inter-laboratory duplicates were undertaken in accordance with the frequency set out in NEPM (2013).</p> <p>Groundwater (HEC) field intra-laboratory and inter-laboratory duplicates, trip spike and trip blank were undertaken in accordance with the frequency set out in NEPM (2013).</p> <p>Groundwater (JBS&G) rinsate blanks, field intra-laboratory and inter-laboratory duplicates were undertaken in accordance with the frequency set out in NEPM (2013). No trip blanks were analysed as volatile compounds were not included in the assessment.</p> | Acceptable noting that the Coffey investigation has been used within a multiple line of evidence and has not been solely relied on. |
| <p>Field quality control results:</p> <p>The results of field quality control samples were generally within appropriate limits. The following exceptions were noted:</p> <ul style="list-style-type: none"> RPDs for the HEC intra-laboratory groundwater duplicate sample for nitrogen (63%), copper (67%), nickel (40%) and zinc (76%). The check laboratory results were acceptable and given the relatively low concentrations reported were assessed as meeting the DQIs. | Acceptable |
| <p>NATA registered laboratory and NATA endorsed methods:</p> <p>Laboratories used included: ALS, Envirolab and Eurofins. Laboratory certificates were NATA stamped.</p> | Acceptable |
| <p>Analytical methods:</p> <p>Analytical methods were included in the laboratory test certificates. Both Envirolab and Eurofins provided brief method summaries of in-house NATA accredited methods used based on USEPA and/or APHA methods (excluding asbestos) for extraction and analysis in accordance with the NEPM (2013). Laboratory analytical results for asbestos were not included in the ESA report and details of the analytical method are not available.</p> | <p>The reported analytical methods are acceptable.</p> <p>Asbestos results have been assessed within a multiple lines of evidence approach to assess the significance of the exceedance, accounting for the history of the site and frequency of the occurrence.</p> |
| <p>Holding times:</p> <p>Review of the COCs and laboratory certificates indicate that the holding times had been met. The consultants also reported that holding times had been met.</p> | Acceptable |
| <p>Practical Quantitation Limits (PQLs):</p> <p>The PQLs were less than the screening criteria for the contaminants of concern except for the following:</p> | The results have been assessed using a multiple lines of evidence approach accounting for these issues. |

| Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control | |
|--|---|
| Field and Lab QA/QC | Auditor's Opinion |
| <ul style="list-style-type: none"> Asbestos: Laboratory certificates for asbestos results are not available and detection limit cannot be assessed. Cadmium, copper, and zinc (PQLs marginally above 99% level for aquatic ecosystems) PAHs: B(a)P, anthracene and phenanthrene (above 99% protection level for aquatic ecosystems) PFOS detection limit was above the most conservative 99% ecological protection level (0.00023µg/L) during the ESA (0.01µg/L) and PFAS Assessment (0.001µg/L). <p>PFOS was only reported <PQL in BBH8 (during the ESA). This well was resampled during the PFAS Assessment (using a lower detection limit) and PFOS was detected >PQL.</p> | |
| <p>Laboratory quality control samples:</p> <p>Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks, internal standards, and duplicates were undertaken by the laboratory at the frequencies required by the NATA accreditation.</p> | Acceptable |
| <p>Laboratory quality control results:</p> <p>The results of laboratory quality control samples were within appropriate limits.</p> | Acceptable |
| <p>Data Quality Indicators (DQI) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy):</p> <p>HEC conducted a formal QA/QC evaluation against the five category areas and concluded that the data is of suitable quality for assessing the site.</p> <p>JBS&G and Coffey did not undertake formal QA/QC data evaluations against the five category areas. They did, however, undertake an assessment of data reliability based on the QA/QC undertaken.</p> <p>Coffey (2001) concluded that <i>"The primary objective of the QA/QC review is to determine the quality of the data provided. The review suggests that the analytical data adequately represent the concentrations of the contaminants tested at the sampling locations."</i></p> <p>JBS&G concluded that <i>"On the basis of the assessment of QA/QC the generated data is considered to be reliable and can be used to characterise levels of PFAS constituents in groundwater at the time of the assessment."</i></p> <p>Coffey (2023) concluded that <i>"...the analytical data was acceptable for the purpose of this assessment."</i></p> | An assessment of the data quality with respect to the five DQI category areas (completeness, comparability, representativeness, precision, accuracy) presented in NEPM (2013) Schedule B2 has been undertaken by the auditor and is summarised below. |

A summary of the data quality review is provided below:

- Sufficient soil samples have been collected within the limited investigation areas, although the quality of the fill within the backfilled (rehabilitated areas) has not been assessed. Groundwater sampling has focussed on the rehabilitated portion of the site and has assessed boundary conditions and one location within the rehabilitated area, although some data gaps still exist with respect to dissolved metals in groundwater along the southern boundary.
- There is some doubt over the representativeness of the data. Soil samples were collected directly from the auger, causing potential loss of volatiles and false negative results for asbestos. Some potential

cross-contamination issues were identified in relation to the groundwater sampling (PFAS). The omission of monitoring well construction details for the existing wells is of concern, particularly as some stratification of ammonia has been reported in monitoring well BBH8.

- The PFAS investigation data may not be comparable between monitoring rounds due to the potential cross-contamination issues and different PQLs reported by the laboratories.
- Generally, the precision and accuracy of the laboratory analysis was acceptable. The QC data evaluation was found to be within acceptable limits, and although some minor RPD exceedances were noted in the field QC results these were not considered to be significant and do not indicate any significant bias in the results. Laboratory analysis was NATA accredited, and documentation was correct except for missing analytical certificates for asbestos sampling.

On the basis of the above review, the investigation dataset (when viewed in isolation) is not sufficient for determining whether the site is suitable for the proposed use. Nevertheless, the data when used within a multiple lines of evidence framework, is sufficient to assess whether there are any significant contamination issues that would preclude progression of the planning process and future redevelopment of the site.

6.2 Environmental Quality Criteria

The Auditor has assessed the results against Tier 1 criteria from National Environmental Protection Council (NEPC) *National Environmental Protection (Assessment of Site Contamination) Measure 1999*, as Amended 2013 (NEPM, 2013). Other guidance has been adopted where NEPM (2013) is not applicable, or criteria are not provided.

Although the current use is commercial industrial, proposed future use includes residential and the auditor has assessed the **soil** data provided with reference to Tier 1 (screening) criteria from the following:

- Human Health Assessment
 - Health Based Investigation Levels (HIL A)
 - Soil Health Screening Levels (HSL A) for Vapour Intrusion. The most conservative criteria were adopted i.e., assumed depth to source < 1 m and sand.
 - Asbestos sampling was not undertaken in accordance with NEPM (2013) and the HSLs for asbestos are not applicable. Asbestos has been considered within a multiple lines of evidence approach with asbestos detections considered to exceed the criteria of no asbestos detected.
- Terrestrial Ecological Assessment
 - Ecological Screening Levels (ESL Urban Residential) assuming coarse soil.
 - Ecological Investigation Levels (EIL Urban Residential). In the absence of site-specific soil data on pH, clay content, cation exchange capacity and background concentrations, the EILs were calculated using the most conservative soil-specific added contaminant limits (ACL) for aged contaminants and added background concentration (ABC) referenced from Olszowy et al (1995) (25percentile background concentration for high traffic, old suburbs in NSW).
- Management Limits (ML Residential/Open Space) assuming coarse soil.
- Aesthetics
 - The Auditor has considered the need for remediation based on the 'aesthetic' contamination as outlined in the NEPM (2013).

The Auditor has assessed the **groundwater** data provided with reference to Tier 1 (screening) criteria from the following:

- Human Health Assessment: Beneficial groundwater use is assumed to include stock watering, industrial (irrigation) and domestic (including drinking water)¹⁶.

¹⁶ Refer to section 5.2 for details.

- NEPM (2013) Groundwater Health Screening Levels (HSL A) for vapour intrusion (sand, 2 to <4 m)
- NHMRC and NRMCC (2011) *Australian Drinking Water Guidelines* (ADWG) for potable use, or where HSLs are not applicable.
- ADWG (2011) criteria with a factor of 10 for recreational use (for non-volatiles).
- PFAS NEMP Version 2.0 (2020) Human health guideline values for drinking water and recreational water quality.
- ANZECC (2000) guidelines for livestock drinking water and irrigation were also referenced.
- Ecological Assessment: The site is located within a sensitive location adjacent to a Ramsar listed wetland and protected marine sanctuary and the 99% level of protection for marine water from the following sources was adopted:
 - ANZG 2018¹⁷ default guideline values (DGV) for protection of aquatic ecosystems.
 - PFAS NEMP Version 2.0 (2020) Ecological water quality guideline values (for PFOS and PFOA)

The environmental quality criteria referenced by the Auditor are consistent with those adopted by the consultants in the investigation reports except for the following:

- The ESA referenced GILs from ANZG (2018) at the 95% level of protection (slightly-moderately disturbed systems)
- A commercial/industrial exposure scenario was applied in the ESA, a based on the assumption of continued commercial/industrial use.
- The ESA referenced PFAS National Environmental Management Plan (NEMP) 2018 marine 95% level for ecological and did not include assessment of drinking water or recreational use.

The auditor has considered these discrepancies when assessing the conclusions made in the consultant's reports noting that justification for the use of 95% protection levels was not documented by the consultants, and in the absence of such arguments, the 99% is applicable given the documented sensitive location.

6.3 Evaluation of Soil Analytical Results

The results of investigations undertaken outside the rehabilitation area, have been assessed against the environmental quality criteria and are summarised in Table 6.4. Soil sampling locations are shown on plans included in Appendix A.

| Analyte | FILL (outside rehabilitation area) | | | NATURAL | | | n > Screening Criteria | Comments |
|--|------------------------------------|----------------|---------|----------------|----------------|---------|------------------------|----------|
| | No. of Samples | No. of Detects | Maximum | No. of Samples | No. of Detects | Maximum | | |
| BTEX | 27 | <PQL | <PQL | 12 | <PQL | <PQL | None | - |
| F1 (TRH C ₆ -C ₁₀ minus BTEX) | 27 | <PQL | <PQL | 12 | <PQL | <PQL | None | - |
| F2 (TRH >C ₁₀ -C ₁₆ minus naphthalene) | 27 | <PQL | <PQL | 12 | <PQL | <PQL | None | - |
| TRH C ₆ -C ₁₀ | 27 | <PQL | <PQL | 12 | <PQL | <PQL | None | - |
| TRH >C ₁₀ -C ₁₆ | 27 | <PQL | <PQL | 12 | <PQL | <PQL | None | - |

¹⁷ <http://waterquality.gov.au/anz-guidelines>

Table 6.4: Evaluation of Soil Analytical Results – Summary Table (mg/kg)

| Analyte | FILL (outside rehabilitation area) | | | NATURAL | | | n > Screening Criteria | Comments |
|---------------------------------------|------------------------------------|----------------|---------|----------------|----------------|---------|------------------------|---|
| | No. of Samples | No. of Detects | Maximum | No. of Samples | No. of Detects | Maximum | | |
| TRH >C ₁₆ -C ₃₄ | 27 | 4 | 170 | 12 | <PQL | <PQL | None | Detects in fill only @ SB02, SB05, SB11 & SB17. |
| TRH >C ₃₄ -C ₄₀ | 27 | 1 | 180 | 12 | <PQL | <PQL | None | Detect in fill @ SB05 |
| Naphthalene | 27 | <PQL | <PQL | 12 | <PQL | <PQL | None | - |
| Benzo(a)pyrene | 19 | <PQL | <PQL | 10 | <PQL | <PQL | None | - |
| Benzo(a)pyrene TEQ | 19 | <PQL | <PQL | 10 | <PQL | <PQL | None | - |
| Total PAHs | 19 | <PQL | <PQL | 10 | <PQL | <PQL | None | - |
| Arsenic | 27 | 27 | 9.6 | 12 | 12 | 9.6 | None | - |
| Cadmium | 27 | <PQL | <PQL | 12 | <PQL | <PQL | None | - |
| Chromium | 27 | 23 | 17 | 12 | 4 | 7.5 | None | - |
| Copper | 27 | 16 | 28 | 12 | <PQL | <PQL | None | - |
| Lead | 27 | 21 | 33 | 12 | 1 | 9.6 | None | - |
| Mercury | 27 | <PQL | <PQL | 12 | <PQL | <PQL | None | - |
| Nickel | 27 | 5 | 12 | 12 | <PQL | <PQL | None | - |
| Zinc | 27 | 25 | 150 | 12 | 7 | 35 | None | - |
| OCP/OPPs | 10 | <PQL | <PQL | 3 | <PQL | <PQL | None | - |

NC No criteria available/used

- no comment required

<PQL Less than the practical quantitation limit

The ESA reported "...concentrations of all analytes were below the human health and ecological assessment criteria and therefore suitable for the current land use." and "Asbestos was not detected in any sample."

The fill identified within the investigation areas is typified by higher ranges of chromium, copper, lead, and zinc. Minor concentrations of TRH have been detected in surface soils on Lot 2 South, in the vicinity of workshop and AST area (SB2 & SB5) and on Lot 2 North in parking areas (SB11 & SB17).

As discussed in section 6.1, although no asbestos has been observed or detected in the soil samples, the asbestos sampling may not be representative of conditions at the site and the potential for asbestos has not been fully assessed.

6.4 Evaluation of Groundwater and Surface Water Analytical Results

Groundwater monitoring (ESA) was completed on 12 December 2019, with a second round of monitoring (BBH8 for metals and PFAS) completed on 21 January 2020. Additional groundwater monitoring was completed by Coffey between 5-29 September 2023. The PFAS assessment was completed on 28 August 2021. Monitoring locations are shown in plans included in Appendix A.

The analytical results are summarised in Table 6.5 and 6.6.

| Analyte | SW01* | MW01 | Bore water | BBH8** | BBH3 | BBH9C | Bore 1 | Bore 2 | n > Screening Criteria |
|--|--------------|-------------|-------------------|---------------|-------------|--------------|---------------|---------------|--|
| TRH C ₆ -C ₁₀ (F1) | <PQL | <PQL | <PQL | <PQL | <PQL | | | | None |
| TRH >C ₁₀ -C ₁₆ (F2) | <PQL | <PQL | <PQL | <PQL | <PQL | | | | None |
| TRH >C ₁₆ -C ₃₄ | <PQL | <PQL | <PQL | <PQL | <PQL | | | | None |
| TRH >C ₃₄ -C ₄₀ | <PQL | <PQL | <PQL | <PQL | <PQL | | | | None |
| BTEX | <PQL | <PQL | <PQL | <PQL | <PQL | <PQL | <PQL | <PQL | None |
| Naphthalene | <PQL | <PQL | <PQL | <PQL | <PQL | | | | None |
| Benzo(a)pyrene | <PQL | <PQL | <PQL | <PQL | <PQL | | | | None |
| Anthracene | <PQL | <PQL | <PQL | <PQL | <PQL | | | | None |
| Fluoranthene | <PQL | <PQL | <PQL | <PQL | <PQL | | | | None |
| Phenanthrene | <PQL | <PQL | <PQL | <PQL | <PQL | | | | None |
| VOCs | | | | <PQL | <PQL | <PQL | <PQL | <PQL | None |
| Halogenated VOCs | | | | <PQL | <PQL | <PQL | <PQL | <PQL | None |
| OCPs | - | - | - | - | <PQL | | | | None |
| PCBs | - | - | - | - | <PQL | | | | None |
| Phenols | - | - | - | - | <PQL | | | | None |
| Cyanide (total) | - | - | - | - | <PQL | | | | None |
| Cadmium | <PQL | <PQL | <PQL | <PQL | <PQL | | | | None |
| Chromium | <PQL | <PQL | <PQL | <PQL | 3 | | | | None |
| Lead | <PQL | <PQL | <PQL | <PQL | 5 | | | | None |
| Mercury | <PQL | <PQL | <PQL | <PQL | <PQL | | | | None |
| Arsenic | 2 | 9 | 27 | 10 | 10 | - | - | - | Results exceed 99% protection level (marine). Bore water marginally exceeds drinking water guideline. |
| Copper | 11 | 2 | 19 | 2 | 22 | - | - | - | Results exceed 99% protection level (marine). Concentrations below drinking water guidelines. |
| Nickel | 3 | 2 | 9 | 2-5 | 14 | - | - | - | |
| Zinc | 21 | 20 | 78 | 23-33 | 73 | - | - | - | |

| Analyte | SW01* | MW01 | Bore water | BBH8** | BBH3 | BBH9C | Bore 1 | Bore 2 | n > Screening Criteria |
|-------------------|-------|------|--------------|---------------------|-------------|--------------|---------------|--------|---|
| Ammonia | 20 | 200 | 2,200 | <PQL - 1,730 | 1600 | 2,000 | 11,000 | 880 | Results in bold exceed 99% protection level (marine) in bore water, BB. |
| Dissolved methane | - | - | - | - | <PQL | - | - | - | - |

* SW01 collected from surface water (dredge pond).

**BBH8 was sampled by both HEC and Coffey. Range for results reported by HEC (12 December 2019 & 21 January 2020) and Coffey 29 September 2023 (shallow and deep samples).

| Report (Sampling Date) | Location | Concentration (PFAS (µg/L)) | | | Comments |
|--|------------|-----------------------------|--------------|-----------------|--|
| | | PFOA | PFOS + PFHxS | PFOS | |
| ESA (Dec 19) | SW01 | <0.01 | 0.09 | 0.08 | Dredge pond |
| | Bore water | <0.01 | 0.09 | 0.09 | Bore water at stables exceeds drinking water criteria. |
| | MW1 | <0.01 | 0.04 | 0.02 | - |
| | BBH8 | 0.03 | 0.25 | 0.15 | Sample not representative. Potential cross-contamination issues. |
| ESA (Jan 20) | BBH8* | <0.01 | 0.02 | <0.01 | BBH8 analysed during both the ESA and PFAS Assessment. |
| PFAS Assessment (Oct 21) | BBH8 | 0.022 | 0.039 | 0.006 | |
| | BH01 | 0.018 | 0.044 | 0.023 | - |
| | BH02 | 0.021 | 0.038 | 0.014 | - |
| | BBH4B | 0.001 | 0.012 | 0.010 | - |
| | BH07 | 0.002 | 0.015 | 0.009 | - |
| | BBH9C | 0.002 | 0.007 | 0.006 | - |
| | BBH10 | 0.003 | 0.019 | 0.010 | - |
| NEMP 2.0 Screening Criteria | | | | | |
| Interim ecological (marine) 99% protection level | | 19 | - | 0.00023 | |
| Human Health (Drinking water) | | 0.56 | 0.07 | - | |
| Human Health (Recreational) | | 10 | 2 | - | |

*Well resampled due to elevated PFOS concentrations in first sampling round. The consultant noted that this may have been cross-contamination from a datalogger and bailer present in the well prior to sampling.

Groundwater and the dredge pond water was found to exceed the screening criteria for copper, nickel, zinc, arsenic, ammonia and some PFAS compounds.

The ESA reported exceedances of dissolved metals and ammonia to be consistent with historical data.

Detections of PFAS compounds reported by HEC were only compared to the 95% protection level (ecological criteria) and no exceedances were identified. The PFAS Assessment identified exceedances of the 99% ecological protection level but concluded that “... levels of PFAS across the site were found to be very low and consistent with anticipated background levels within an urban environment. The levels of PFAS indicates that the site does not contain a significant source of PFAS, or otherwise does not pose a significant PFAS contamination risk to the surrounding area.”

Based on the results of the additional groundwater monitoring undertaken in 2023, historical ammonia concentration trends in Bore 1 and Bore 2 (June 2021-June 2022), and published ammonia concentrations for BH22 (located on the Breen Landfill site), Coffey reported that:

- *The highest concentration of ammonia was 11 mg/L in Bore1. Bore2 reported 9.2 mg/L ammonia in December 2022.*
- *The presence of ammonia at BBH9C and BBH8 may be due to dispersion through unmined sand at the north and south ends of the site, with the most likely primary source being the landfill to the west.*
- *...groundwater flow is strongly influenced by the presence of a buffer zone of natural sand beneath Lindum Road and adjacent properties so that migration of impacted groundwater from the Breen land into the site should be minor. Bore1 and Bore2 are installed in the remaining natural sand buffer zone which is 25m wide and is present along the western, northern and eastern boundaries of Lot 2 South. A wider buffer zone remains across the southern boundary of Lot 2 South. The ammonia impact in groundwater at Bore1 and Bore2 has almost certainly been impacted by infiltration of leachate from the surface of the Breen land adjacent to Lindum Road. Thus, the results from Bore1 and Bore2 are not evidence of migration of contaminants from the Breen land into the backfilled area of Lot 2 South.*
- *The reported concentrations of volatile hydrocarbon compounds (non-halogenated and halogenated) collected from locations along the western boundary BBH8 (shallow and deep), BBH9C, BORE1 and BORE2; and the central remediated area of the site (BBH3) reported concentrations less than the laboratory reporting limit (0.001mg/L).*
- *Concentrations of heavy metals reported for one sample from BBH3 were generally higher than concentrations reported in dredge pond water, however, the difference was small in magnitude.*
- *Analytical results indicate that the source of ammonia contamination is more likely from off-site and of shallow rather than deeper origin.*
- *...imported material used to backfill the dredge pond within the Besmaw site is not the source of ammonia in groundwater.*

Coffey recommended that monitoring wells BBH3, BBH8 (shallow and deep) and BBH9C be added to the regular quarterly water quality monitoring schedule with measurement of pH and EC and sampling and analysis for ammonia (as N).

6.5 Auditor’s Opinion

Fill has been identified across most of the office & workshop area and in some localised areas of Lot 2 North. No significant soil contamination issues have been identified although the potential for asbestos in fill material has not been fully assessed.

Imported material (“sand overs”) used to support revegetation of the Lot 2 North site was a quarried product (EPL3629) and poses a low risk of contamination.

Pesticides were not detected in surface soils across the site, noting that areas under buildings have not been assessed.

Hydrocarbon compounds were generally not detected in soil or groundwater in the vicinity of the AST except for some minor TRH detected in surface soils, and significant contamination issues are unlikely.

Dissolved metals (arsenic, copper, nickel, and zinc) have been identified in groundwater and the dredge pond water above the screening criteria across most of the sampling locations. Chromium and lead were also detected in BBH3, although these were only marginal detections this could be simply due to importation of VENM. Further monitoring is required to assess the significance of these detections.

The monitoring data has identified elevated ammonia concentrations, and I agree that the data reported to date suggests that there may be a source of ammonia along the western boundary. However, in my opinion, insufficient evidence has been presented in the Coffey (2023) to support clear conclusions in this

regard and further monitoring is required to confirm the source and significance of the elevated ammonia concentrations in groundwater.

PFOS concentrations exceeded the ecological criteria (99% protection) in all the groundwater samples analysed. The reported concentrations do not appear to be significantly different between the sampling locations although some cross-contamination issues have been identified (due to bailers being left in wells). The sum of PFOS + PFHxS compounds also exceed the drinking water guidelines, in the dredge pond (SW01) and bore water sample (at the stables). The bore is licensed for stock purposes and is not used as a drinking water supply.

The 99% ecological protection level for PFOS is extremely low and (as stated in the NEMP) may be above ambient background levels. However, the *PFAS Assessment* did not provide a range of the expected background concentrations for the local area or provide any supporting evidence/data to support this.

The groundwater results have been further considered in the context of the water quality monitoring data (relating to EPL5658) in later sections of this SAR.

7 Records Relating to VENM Importation

The EPA has requested that the site audit consider:

"whether the records held by Besmaw in relation to the importation of VEMN to the site, such as the Annual Environmental Reports, Independent Environmental Audit reports and any other records Besmaw hold, are sufficient to not require further contamination assessments to the sand extraction and rehabilitation areas of the site."

A summary of the rehabilitation activities and available information sources is provided in Table 7.1.

| Date | Activity | Information Source |
|------------------|--|--|
| 28 Jun 96 | First load of material received at the site for the purposes of land rehabilitation. | <i>Timeline for Delivery of VENM Approval</i> (pdf document provided by Besmaw) Contract files held at Besmaw offices. |
| 11 Jul 96 | NSW EPA & council conducted inspection of the site and observed material being tipped at the site. S65 notice issued under Waste Minimisation & Management Act (WM&M Act 1996) stop further deliveries and cease waste facility operations until consent from EPA obtained | S65 Notices dated 11 Jul 96 & 18 Jul 96 Fax from EPA (dated 12 Aug 96) documenting results of solid samples (SS1-SS6) and water samples (D3, M1, UM3 & U2). A copy of the fax was appended to the Coffey Water Quality Monitoring Report (dated February 1997). |
| 12 Jul 96 | EPA investigations including sampling of material. | |
| 18 Jul 96 | S65 notice issued under WM&M Act (1996) to provide name, address & description of waste delivered and details of any sampling or testing of the waste. | |
| Jul 96 to Oct 96 | Environmental Management Plan (EMP) developed for the rehabilitation activities to ensure only "Clean Excavated Natural Material" (CENM) accepted. | <i>Timeline for Delivery of VENM Approval</i> (pdf document provided by Besmaw) EMP (1996) |
| 10 Oct 96 | Application for a Pollution Control Licence (and EMP) lodged with NSW EPA. | Copy of lodgement fax provided to auditor (Appendix B). Fax confirms draft EMP was reviewed by NSW EPA and comments incorporated into the final version of the EMP (1996). |
| 14 Oct 96 | Deliveries of material commenced using process documented in the EMP (dated 1996). | Contract files held at Besmaw offices. |
| 25 Oct 96 | Dredge pond water sampled by Coffey. | |
| Feb 97 to Feb 98 | Approval for reinstatement of sand extraction site with CENM issued under Pollution Control Act (1970) and licence 5658 issued requiring compliance with the EMP. Only CENM as defined in the WMMR (1996) could be accepted at the premises. | Pollution Control Approval 2783 (dated 6 Feb 97) and Pollution Control Licence 5658 (dated 7 Feb 97 to 7 Feb 98). Water Quality Monitoring Report prepared by Coffey dated February 1997. |
| Feb 98 to Feb 99 | Licence 5658 issued under the Pollution Control Act (1970). A copy of the licence for the period Feb 98-Feb 99 was not available for review but reference is made to it in AR (1999). | First annual report (AER, 1999) and first independent environmental audit (IEA, 1999). |
| Feb 99 to Feb 00 | Licence 5658 issued under the Pollution Control Act (1970) requiring compliance with | Copy of licence 5658 (7 Feb 99 -7 Feb 00) |

| | | |
|---|--|--|
| | the EMP. Only <u>VENM</u> as defined in the WMMR (1996) could be accepted at the premises. | Contract files held at Besmaw offices. AER (2000). <i>IEA (2000) not available for review.</i> |
| POEO Act commenced operation on 1 July 1999 | | |
| Feb 00 to Feb 01 | This was within a transitional period for enforcement of the POEO Act (1997). Details of licensing during this period are not available although annual reporting references Pollution Control Licence No 5658 (7 February 2000 to 7 February 2001). | AER (2001). Contract files held at Besmaw offices. Record of annual returns POEO Public Register. <i>Copy of IEA (2001) not available.</i> <i>Copy of licence not available for review.</i> |
| Feb 01 to Feb 18 | Environment Protection Licence (EPL) 5658 issued under the POEO Act (1997) Licence condition L5.3(a) <u>only VENM as defined in the Waste Guidelines may be accepted</u> at the premises. Special conditions included to allow PASS where the material met the requirements of VENM (other than being classified as PASS). Compliance with EMP removed but replaced with condition E2 requiring that licensee develop and implement a <i>VENM Verification Procedure</i> . Minimum requirements for this are listed in the EPL. | AER (2002-2018). IEA (2002-2018) Contract files held at Besmaw offices. Record of Annual returns on POEO Public Register. Published compliance monitoring data (2017-2023) |
| Feb 18 to Feb 23 | Licence variations (listed on EPA website) the most significant being 10 Mar 08 following a review of the groundwater monitoring regime. | From 2019 only a single compliance report/IEA was prepared for each reporting period. This included Assessment of Compliance Report (Coffey 2019), IEA (Zoic 2020-21) & IEA (Geosyntec 2022-2023) Contract files held at Besmaw offices. Record of Annual returns on POEO Public Register. Published compliance monitoring data (2017-2023) |

A summary of information from the above referenced information sources relating to VENM selection and placement has been compiled as follows.

7.1 Activities Prior to Pollution Control Approval

Besmaw advised that deliveries of material for rehabilitation of the sandmining void commenced on 28 June 1996. This was confirmed by inspection of Besmaw (hard copy) files. Records held in the files indicate that pre-screening of source sites commenced on 7 June 1996 to ensure that material was clean (uncontaminated) excavated natural material. There was evidence that Besmaw had reviewed the source site information and conducted source site inspections to assess whether material on potential source sites met this definition. Of note was correspondence from Besmaw to potential suppliers stating that only uncontaminated natural material was to be accepted at the site and that source sites would be subject to inspection by Besmaw prior to issue of a contract for delivery of material.

The first record of a contract being issued was for a source site located at Cnr Poplar St & Pelican St, Surrey Hills. The material was described as shale (uncontaminated excavated natural material). Records indicate 124 loads were delivered to the site between 28 June to 10 July 1996. Clay and shale (described as uncontaminated natural excavated material) was also reportedly delivered from Gurrier Street, Miranda between 2-8 July 1996.

The site was inspected by EPA on 11 July 1996 and resulted in issue of a s65 notice to cease deliveries until consent from EPA was obtained. Investigations were conducted by the EPA on 12 July 1996 and included sampling of the imported material and the dredge pond water. Besmaw advised that no concerns were identified by the EPA. Results of the EPA sampling confirm this.

An application for a pollution control approval and licence was prepared. This included an environmental management plan (EMP), that was developed to ensure that only "Clean Excavated Natural Material"

(CENM¹⁸) was used in the rehabilitation. A draft version of the EMP was reviewed and commented on by the EPA before the application (including the EMP) was lodged on 10 October 1996. A copy of a fax confirming lodgement is included in Appendix B.

The EMP was implemented at the site and deliveries recommenced on 14 October 1996. The EPA issued a pollution control approval and on 7 February 1997 a pollution control licence (5658) was issued with a condition requiring compliance with the EMP.

7.2 Environmental Management Plan

The EMP documented processes to manage the rehabilitation activities including selection and placement of material; water management; odour control; dust and air quality control; noise; traffic management; training; complaints management; communication; and audits and inspections.

The aspects of the EMP relevant to this audit are (1) selection and placement of material (VENM) and (2) water quality monitoring data, and particularly data on dredge pond water quality during VENM placement.

The EMP required annual reporting to assess compliance with the EMP and licence, the first of which was prepared by ERM in 1999. Besmaw also commissioned independent environmental audits, the first of which was prepared by Coffey in 1999.

Following issue of EPL5658 under the POEO Act (1997) compliance with the EMP was no longer conditioned in the licence and was replaced with detailed licence conditions of which condition E2 required development and implementation of a *VENM verification procedure* and condition M2 detailed water quality monitoring requirements.

Nevertheless, as a matter of due diligence, Besmaw continued to implement the EMP at the site and has continued to commission yearly review documented in annual reports (AER) and independent environmental audits (IEA) as a matter of due diligence.

The EMP has been progressively revised and updated to reflect changes in legislation, operations, and licensing. A record of the updates and amendments is included in the most recent version of the EMP (2020), listing revisions in 2001, 2008, 2013, 2014, 2018 & 2020. Of these revisions, only the most recent (2020) version was made available to the auditor. The most significant revision was in 2013 when the EMP was updated to include standard operating procedures (SOPs).

PASS was included in the licence from 2001 but was only permitted where the material met the requirements of VENM other than being classified as PASS and other specific requirements including pH testing on arrival and placement of the PASS below the water table within 24hrs of excavation. These requirements were incorporated into the EMP in 2001.

7.3 Annual Reports and Independent Audits

The annual reports assessed compliance with the EMP and licence by review of documentation (such as contract files, registers, and internal audits), a site inspection and interviews with site management, staff and personnel. The independent audits were based on review of the relevant annual report and a site inspection.

A summary of the key findings in relation to the VENM selection and placement is discussed below. Water quality monitoring is discussed in section 8.

7.3.1 Pre-Inspection and Material Inspection

The EMP process for pre-inspection and acceptance of VENM requires:

- pre-contract review by application and questionnaire (completed by supplier)
- validation of the source site (by inspection undertaken by Besmaw Environmental Officer or Site Officer).

¹⁸ The Waste Minimisation and Management Regulation (1996) in force at the time referred to CENM as natural material (such as clay, soil or rock) that is not contaminated or mixed with any other type of waste. Following changes in legislation, later revisions of the EMP replaced the term CENM with "virgin excavated natural material" (VENM).

After commencement of the POEO Act, the licence required development and implementation of a VENM verification procedure and included specified procedures for (1) pre-acceptance validation (2) verification at time of acceptance and (3) a program of inspection and audit of deliveries.

Earlier annual reports (up until around 2007) reported that the *VENM Verification Procedure* was addressed by implementation of the EMP. Although in later years the annual reports tended to view the EMP more as a manual of operating procedures to facilitate compliance with the licence condition.

Each potential source of VENM was assigned a unique contract number (CN) and documentation generated as part of the pre-inspection and validation process was held in individual project files generated for each potential source. These contract files are kept at Besmaw's head office and were inspected as part of the annual reporting process.

The first annual report (AER, 1999) prepared by ERM, documented review of 5% of individual source site contract files from each year (18 from 1998, 5 from 1997 and 2 from 1996) and reported that "...the pre-evaluation procedure for assessing natural material is being followed, which suggests all material being placed in the dredge pond is virgin excavated natural material.". ERM concluded compliance with the EMP & licence conditions although, development of a register for recording deliveries of odorous and non-contracted material was recommended. This was consistent with the findings and conclusions of the second AER (2000).

The IEA (1999), prepared by Coffey, confirmed controls were in place and observed to be followed in compliance with licence conditions. However, Coffey noted that the EMP process for pre-acceptance validation relied heavily on the technical ability of Besmaw staff to identify potentially contaminated fill (prior to contract) and recommended that the effectiveness of pre-contractual assessment of fill (including contamination) be documented through periodic confirmatory sampling, possibly as part of the three-monthly internal audit procedure. This recommendation was not implemented.

From 2000 up to around 2007, the annual reports and independent audits confirmed that the EMP process was being implemented and reported that VENM importation was being controlled through pre-evaluation and on-site checking procedures. During this time imported material was generally sourced from residential sites and deemed to be low risk. There are ongoing references in the annual reports to Besmaw having a proactive attitude towards managing environmental responsibility and resolving non-compliance issues. Unacceptable material was noted to occasionally and inadvertently be accepted at the site, but the annual reporting confirmed that a process was implemented to remove this from site.

As the rehabilitation progressed, although the annual reports still reported that the pre-contract review and validation procedures were being followed and compliance with the EMP and licence, potential issues with the VENM verification process were identified and recommendations for improvement were provided. These issues became more evident as the proportion of industrial/commercial source sites increased. By 2018 ERM reported (AER, 2018) that the volume of VENM accepted at the site had almost doubled in each of the past two years.

A summary of the key issues raised in the annual reports (2000-2015) in relation to the material pre-screening and acceptance (by review of approximately 10% of individual contract files per year) follows:

- The pre-screening of sites relied heavily on source sites accurately self-identifying material as VENM.
- The EMP classified source sites depending on the potential for contamination. Sites with no potential contamination issues were identified as class I and no sampling was required. Sites were identified as class II & III where potential for contamination was identified, and sampling was required. In earlier versions of the EMP source sites were classified by reference to a list of potentially contaminating activities. The annual reporting noted that this list had a narrow interpretation of industrial/commercial sites and could potentially underestimate potential contamination risk.
- In some cases, sites were re-classified to class I (no sampling required) following removal of potentially contaminated material. ERM identified some contracts where removal of fill and/or contamination (prior to classifying underlying material as VENM) was based on inadequate contamination reports or was based solely on visual inspection.
- The EMP requirement for sampling was replaced in later iterations of the EMP by review of geotechnical or contamination reports. This relied on the technical expertise of Besmaw staff and in some cases ERM identified contracts where the source site or neighbouring site history could cause contamination and was not supported by investigations and/or VENM documentation.
- The issue of reliance on the technical expertise of Besmaw staff in assessing potential contamination issues on source sites was often raised in the annual reports and many of the recommendations for improvement in this area included training of site inspection officers to help them identify where the

site may be affected by issues which are not visible to the naked eye, such as land contamination and to assist in interpreting contamination reports.

- Recommendations for revision of SOPs to ensure a proper process for assessing commercial or industrial source sites in the absence of any contamination reports were also made. In some later years ERM also recommended that non-residential sites accepted over previous year be reviewed to confirm non-VENM has not been inadvertently accepted and that controls at source sites are documented in the file.

In 2016 ERM recommended that Besmaw (1) request that suppliers provide a formal VENM assessment report or contamination assessment for all commercial/industrial source sites and (2) provide more comprehensive documentation in the contract files to demonstrate how commercial/ industrial source sites have been assessed where contamination reports indicate the presence of potential contamination.

The 2017 annual report identified a non-compliance regarding assessment of VENM due to gaps in documentation for the identification and accurate assessment of contamination risks at source sites with ERM stating *"ERM did not identify clear evidence that non-VENM was accepted, but likewise does not have evidence that the process was adequately employed to ensure only VENM was accepted."*

The IEA reports were generally in agreement with the issues and recommendations provided in the annual reports except for the following in response to the ERM recommendation for formal VENM assessment:

Coffey (IEA, 2016) "Given the low incidence of rejected loads and the quality of VENM observed at HLRC Kurnell, Coffey considers that current staff are competent for the tasks that they are required to perform. Coffey does not agree with the alternate approach principally because there is not a clearly defined form of "VENM classification". The reliability of any such VENM classification is considered to be low and would not reduce the scope on assessment performed by Besmaw Inspection Officers."

Coffey (IEA, 2017) "[Coffey] Does not disagree with ERM recommendations relating to VENM but argues that a risk-based approach is more robust. Besmaw review the source site assessment process for complex non-residential sites and PASS sites using a risk based approach to identify key aspects of risk to Besmaw's operations, and review relevant assessment and site inspection forms to ensure that information about identified key risks and related controls is included."

In 2019, the process of annual reporting and independent audit was by an audit of compliance against the licence conditions. The first compliance audit was prepared by Coffey (2019) and concluded that *"...the requirements for pre-acceptance validation listed in Condition E2.1(1) of EPL 5658 were adequately addressed and relevant information was included in the source site record held at Besmaw's North Sydney office."* Coffey also noted that operational staff at the HLRC site demonstrated a strong compliance culture.

Zoic (later known as Geosyntec) prepared independent audit reports (2020-2023) that generally concluded compliance with the licence except for one non-conformance (2021) relating to a waste classification for VENM, in which a detection of B(a)P in natural material should have been rejected and further sampling undertaken to confirm material was free of contamination prior to delivery to the site.

Zoic/Geosyntec recommended that in order to provide a greater degree of certainty that material is confirmed as VENM before a source site is approved, at least one sample be collected from sites where there is no documentation regarding contamination testing. The sample should be analysed for a broad environmental suite, given that contaminants such as organochlorine pesticides used historically on residential sites or heavy metals which are unable to be identified from a visual assessment.

Zoic/Geosyntec reported in the subsequent IEA that Besmaw had considered the recommendation for chemical testing this was not practical for residential sites. Geosyntec advised that although testing was "best practice", the detailed inspection process currently implemented was considered sufficient to meet requirements of the POEO Act with respect to VENM in small residential sites, but recommended testing be undertaken for all larger residential or commercial/industrial sites.

7.3.2 Inspection on Delivery

The annual reports and independent audits confirm that a process of inspection on importation to the site, at the weighbridge and at the tip face has been systematically implemented throughout the rehabilitation period.

The inspections rely on visual indicators of contamination such as odours and inclusions of non-VENM material such as concrete, brick, wood, wire etc. Where these issues are observed at the weighbridge, the load is rejected, and the truck refused entry. Rejected load registers were inspected as part of the annual reporting and demonstrated a zero-tolerance culture, with evidence of loads being rejected for the presence of brick, concrete or other demolition rubble/debris.

The material is also inspected at the tip face prior to placement in the dredge pond and if non-VENM material is observed at this stage, the material is segregated, and the supplier contacted to remove the material.

Some minor amounts of non-VENM items such as concrete, wire, wood, bricks etc. are sometimes observed in the tipped material (and the truck has left the site). In these cases, ERM reported that the non-VENM is removed and placed in a skip bin for disposal to a licensed facility. An audit of the non-VENM material was undertaken (and reported in the 2002 AER). Over the audit period approximately 1.5 tonnes of material was identified from approximately 48,000 tonnes delivered, and ERM calculated this to represent 0.003%w/w of material delivered.

7.3.3 Importation of Other Materials

Limited quantities of non-VENM have reportedly been imported and stockpiled on the site for site maintenance. This included:

- Topsoil for revegetation purposes: This was first documented in the 2000 AR, which stated that the topsoil was used on the frontal dune and at the front of the site and was subject to regular random laboratory testing, although results were not reported. Drilling slurry (noted to be from drilling in sandstone with a low percentage of bentonite) and shell mixture (generated from the dredging operations) was also reportedly used on the frontal dune area after drying. By 2001, the AR reported that the topsoil included bricks, concrete and tiles etc. and was passed through a screen. The topsoil was reportedly used on-site and the bricks, tiles, concrete etc were used for on-site road maintenance.
- Material for temporary road maintenance: The first licence (issued under the Pollution Control Act) included a condition (W12) that "*Temporary road surfaces must be maintained with selected materials such as blue metal, sandstone or recycled crushed concrete/bricks to minimise dust.*" Use of broken roof tiles (and in some instances crushed concrete) on temporary roads is documented in the annual reports until 2010 when it was reported that the practice had ceased, and road surfaces were maintained by application of crushed sandstone.

7.3.4 Other issues

The earlier annual reports identified some minor issues relating to the diesel re-fuelling area. Specifically, ERM observed that the bund was not sealed, and a small diesel spillage had occurred. Installation of new bunding was confirmed in the 2002 AR.

7.4 EPA Regulation

The EMP was first implemented at the site in October 1996 and the rehabilitation activities have been licenced by the EPA since 7 February 1997.

A record of annual returns for EPL5658 from February 2000 is published on the POEO Register. A few non-conformances were reported none of which resulted in any EPA action and generally related to minor omissions of some water quality monitoring actions, except for the VENM verification procedure (in the 2021-22 reporting period).

The EPA has previously advised (Appendix B) that "*EPA reviews of the annual returns for the EPL and risk-based licensing inspections have not identified any concerns with compliance with the EPL, which indicates that the sand extraction areas may not be subject to gross contamination.*"

7.5 Auditors Opinion

The annual reports and independent audits demonstrate that a process for pre-acceptance, inspection, and validation of VENM has been consistently implemented at the site since October 1996. A small amount of material (reportedly clean excavated natural material) was imported prior to this time, although EPA investigations and sampling did not identify any issues.

The annual reports and independent audits have generally concluded compliance with the process noting some minor non-conformances and recommendations for improvement, particularly relating to industrial/commercial source sites and sites where fill material is removed prior to VENM classification.

Tip face inspections have identified some non-VENM material although this was reported to be relatively minor. Review of contract records show evidence of consistent inspection and rejection of material where evidence of non-VENM material is observed.

The annual reporting and independent audits have consistently reported that Besmaw operational staff and management demonstrate a strong compliance culture, and this has also been evident in the auditor's review of Besmaw records.

However, the annual reporting has raised some doubt over the robustness of the VENM assessment process. Inspections of material (both at source sites and on importation) have focused on visual indicators (such as evidence of bricks, concrete and other demolition rubble) or odours and review of supporting contamination reports has relied on the technical ability of Besmaw staff. Regular testing of material is not undertaken to confirm the assessment process. This was consistent with findings from audit of the contract files.

In summary, there is sufficient evidence to suggest that putrescible or biodegradable material has not been accepted at the site and as such the potential for generation of gas and leachate is expected to be low. However, some material affected by chemical contamination issues that cannot be identified by inspection or odours, may potentially have been accepted at the site. This would relate primarily to commercial/industrial source sites. The extent and significance of this in relation to whether further contaminated land assessment is required, has been assessed by review of the water quality monitoring data (section 8).

8 Water Quality Monitoring Data

Changes in both the dredge pond water and groundwater chemistry due to emplacement of VENM/PASS is to be expected and is regulated by EPL5658. However, the water quality monitoring data provides an additional line of evidence in determining whether the records held by Besmaw in relation to importation of material are sufficient to not require further contamination assessments.

The EMP required analysis of both the dredge pond and groundwater for pH, EC, BOD, TOC, metals, ammonia, alkalinity, sulphate, chloride, TPH, PAH, metals, phenols, OCP, AOX and phenoxyacid herbicides. This was reflected in EPL5658, when monitoring requirements were specifically conditioned in the licence (rather than requiring compliance with the EMP). EPL5658 has been subject to several variations, the most significant (in relation to the water quality monitoring program) being in March 2008 when groundwater monitoring parameters were reduced to include only conductivity, ammonia (as N), SWL, total organic carbon (TOC) & pH.

In issuing the variation, EPA took into consideration the findings of a technical review of monitoring data prepared by Ian Grey Groundwater Consulting (IGGC) and advised that *"...given that the landfilling at this premises is being undertaken with virgin natural excavated material only under the water table the EPA is proposing an increased suite of monitoring in the surface waters of the dredge pond and a decreased suite of monitoring for the groundwater bores."* A copy of a letter from the NSW EPA, dated 14 November 2007 is included in Appendix B.

The IGGC scope included review of the licence annual return (2005-2006), the EMP (1999), and a (reportedly incomplete) electronic record of monitoring results (1996-2004). Based on this data IGGC concluded *"Results of dredge pond monitoring at the site do not show any clear impact on pond water quality as a result of landfill activities, except perhaps slightly elevated aluminium and low levels of TPH. Groundwater quality in the monitoring bores is also good, although aluminium and TPH are again present, and while ammonia levels are low there is some evidence of an increasing trend. The current data do not indicate any substantial impact on water quality from landfill activities."*

8.1 Monitoring Locations

The water quality monitoring program included sampling of both the dredge pond and groundwater monitoring bores. A summary of the monitoring locations is provided below:

- **Dredge pond sampling:** commenced in Oct 96 (required by EMP). Three samples collected along two transects (composited) and at two depths shallow and deep. The monitoring locations changed progressively as rehabilitation works progressed. The dredge pond water quality will also be affected by surface water run-off. Coffey reported (IEA, 1999) that local groundwater flow was inferred to be towards the dredge pond from all filled areas and the dredge pond effectively served as a downgradient sampling location.
- **Bore 1 (BH1) & Bore 2 (BH2):** These monitoring wells were installed during the early phases of rehabilitation in 1998 on the western site boundary immediately adjacent to the Breen landfill. They are reportedly screened across two different depths. In 2003 Bore 1 and Bore 2 were deleted from EPL 5658 and BH1 & BH2 were added to the EPL. Besmaw confirmed that the changes to the EPL merely reflect a name change for existing monitoring wells from Bore 1 to BH1 and Bore 2 to BH2.
- **BBH8 & BBH9:** installed & added to the EPL 5658 in Mar 08. These two groundwater monitoring wells are located on the northern and southern boundaries of Lot 2 South (Appendix A). The wells were presumably installed to assess the northerly and southerly groundwater flow components downgradient of the sandmining rehabilitation area.
- **BBH9C:** In 2015 BBH9 was deleted from EPL5658 and BBH9C added. The monitoring well is in a similar location to the previous BBH9.
- **BBH4B, BBH7 & BBH10:** Added to EPL 5658 in Nov 19 to target the southern and north-eastern boundaries of the site. BBH4B & BBH10 are located along the southern boundary. The groundwater flow in this area may be locally affected by the exposed groundwater table in the dredge pond. BBH7 is located along the north-eastern site boundary and given the location of the dredge pond, is likely to represent groundwater flow onto the site.
- **RWB:** return water basin. This location was added to the licence in 2015 to assess water quality within the return water basin used for the dredging operations. It is understood that the RWB is not connected to the main dredge pond.

8.2 Sampling Methodology

Sampling methodology is reported to be undertaken in accordance with Besmaw SOP-H-01. Version 05 (effective October 2018) is included in the EMP (2020). Key aspects are summarised below:

- Groundwater sampling from monitoring wells was undertaken using new disposable bailers. Wells were reportedly purged (until dry or minimum 2 well volumes) Groundwater parameters were measured during purging.
- Surface water samples collected using a Van Dorn sampler (to allow sampling from pre-determined depths).
- Sample bottles filled directly from the bailer. Samples for volatiles filled with no head space.
- Samples were placed in laboratory supplied containers. Samples for metals were field filtered and preserved before transport to the laboratory.
- QC samples include, field duplicate (intra-laboratory), equipment rinsate, trip spike and trip blank samples to be collected. NATA accredited laboratory required.
- Decontamination of water level meter and water quality meter is required.
- Calibration of equipment is documented.

Details of the monitoring well installation are not available although depths and length of screened interval are documented in SOP-H_01 as follows:

| Piezometer | Nominal borehole diameter (mm) | Casing diameter (mm) | Screen Interval (m below ground level) |
|-------------------|---------------------------------------|-----------------------------|---|
| BORE 1 (BH1) | 100 | 50 | 1.0 to 15.0 |
| BORE 2 (BH2) | 100 | 50 | 1.0 to 15.0 |
| BBH1 | 100 | 50 | 12.0 to 15.0 |
| BBH4B | 200 | 50 | 1.0 to 12.0 |
| BBH8 | 100 | 50 | 1.0 to 15.0 |
| BBH9C | 200 | 50 | 1.0 to 12.0 |

8.3 Evaluation of Results

Compounds included in the compliance monitoring dataset that may be indicative of non-VENM placement include AOX (an indicator of halogenated organic compounds), OCP/OPPs, PAHs & TPH/BTEX. Dissolved metals may also be an indicator although this is difficult to establish because metals could also be present in VENM due to natural concentrations.

The auditor has considered water quality monitoring data from the following information sources:

- Dredge Pond Monitoring Results (Coffey, 1997): First round of dredge pond sampling results (Oct 1996).
- Annual Report (AR, 1999): Monitoring results for the period 1996-1998.
- Annual Report (AR, 2018): Complete set of monitoring data for the period 1998-2017 including results tables (with statistical summary), graphs of data and analysis of trends (Mann-Kendall).
- Annual Report (AR, 2008): Analytical results tables (including AOX results for the period 2004-2007), and graphs of data.
- Published compliance monitoring data for the years 2017-2023.

8.3.1 QA/QC

Not all information required by NEPM (2013) is reported/available, and it is not clear what QA/QC procedures were implemented prior to October 2018, however, in the context of the audit objective, which is to establish trends and indicators of non-VENM placement, the QA/QC is adequate. The following issues noted in AER's and IEAs reported prior to implementation of the SOP have been considered by the auditor:

- Cross-contamination (TPH) has historically been reported (IEA, 2004) as a possible issue due to the use of plastic buckets for sampling and decanting into sample bottles. This was documented prior to implementation of the SOP and was rectified by introduction of stainless-steel sampling equipment.
- Use of buckets and decanting into sample bottles and composite sampling (for dredge pond sampling) may cause loss of volatile compounds.
- Possible cross-contamination of dredge pond samples from the outboard motor attached the boat (used for sampling) was reported and in April 2010, a water sample identified as "BOAT" was analysed. Elevated concentrations of TPH (C₆-C₉ 240µg/L) were detected and was also associated with the maximum recorded naphthalene and BTEX concentrations. In the 2011 IEA, Coffey reported a change of sampling procedure so that dredge pond samples were collected away from the influence of the exhaust from the outboard motor. Presumably samples collected before 2011 may be influenced to some degree by this issue.
- Some monitoring wells have been destroyed or replaced in locations close to the original wells. Whilst not ideal, for the purposes of the audit, where this occurs, the auditor has assumed this represents a continuous record. Similarly dredge pond sampling locations have been consistently changed as rehabilitation progresses.
- Over the monitoring period laboratory limits of reporting have changed and in some cases trends and reported detections are simply a result of lower detection limits.
- In 2008, EPL5658 was amended to require reporting of ammonia as nitrogen. Prior to this time, in some cases it was not clear how ammonia results were being reported.
- The laboratory reporting of TPH fractions over the monitoring period is not consistent, due to the changes in TPH/TRH assessment following implementation of the revised NEPM in 2013.
- The monitoring wells (in most cases) are screened across a large vertical interval that targets the extent of the sandmining void. This would generally not be acceptable where point sources are being assessed, however, in the context of the audit objectives, the well construction is sufficient to provide an insight into the quality of groundwater in hydraulic connection with the sandmining rehabilitation area.

8.3.2 Ammonia

Ammonia has been consistently analysed in the dredge pond and groundwater monitoring bores since 1996 and there is a large volume of data available. However, reporting of ammonia (as N) has not been consistent and because of this a complete analysis of trends is not available in the annual reports. The auditor has estimated yearly averages of ammonia in groundwater and the dredge pond (Appendix C). This and does not account for potential errors in reporting different forms of ammonia and as hard copy data tables were used, it may also be subject to transcription error. Nevertheless, this summary is adequate for the purposes of the audit, as an aid in assessing overarching trends.

Ammonia was initially detected in the dredge pond (Oct 1996) with the range <50-76µ/L and average yearly ammonia concentrations have typically fluctuated around this range, although a maximum concentration of 800µ/L was recorded in 2011.

Groundwater has typically reported higher ammonia concentrations compared to the dredge pond and although in general this has been attributed to natural background conditions, spikes or "pulses" of ammonia are sometimes exhibited, that quickly pass through the system. This is particularly evident in Bore 1/BH1 & Bore 2/BH2 (2005/2006), in BBH8 (2017/2019) and more recently in BH1/BH2 (2022/2023) when concentrations were reported to be an orders of magnitude higher than those detected in the dredge pond.

In 2006 Coffey reported (IEA, 2006) that "*Concentrations of ammonia in surface waters and groundwater indicate that ammonia contamination is likely to be associated with an off-site source because the concentrations of ammonia are higher in groundwater than they are in surface waters. Natural attenuation of ammonia may be due to dilution of groundwater mixing with existing surface waters in the dredge ponds or may be due to biological oxidation of ammonia (a nutrient), or a combination of both processes.*"

At that time only Bore 1/BH1 & Bore 2/BH2 were reportedly present on site, and sand mining voids were evident on both the adjacent Breen site and Besmaw site. Groundwater flow at the time would have been complex, although it is likely that the two pits were hydraulically connected.

Two years later, ERM reported (AER, 2008) that concentrations in Bore 2/BH2 "...could be indicative of possible leaching from the Western boundary" and recommended that Besmaw obtain specialist advice on the source of the ammonia.

Following installation of BBH8, ERM reported (AR 2009) that *"...it seems likely that the ammonia source is not related to the rehabilitation works, however this has not been assessed by a hydrogeological investigation"* and reiterated the previous recommendation to obtain specialist advice on the source of the ammonia. This recommendation was also included in the 2010 AER.

By 2010 Coffey stated (IEA, 2010) that *"...further assessment of ammonia is not warranted because the site is not a source of ammonia and water flow is away from the site."* No supporting evidence was presented or cited to support this conclusion.

In 2017, ammonia concentrations had again started to increase in BBH8 and ERM (AR, 2017) recommended further assessment of the source of ammonia. Coffey (IEA, 2017) agreed that ammonia concentrations fell outside the expected range (in BBH8) and stated that *"The source of ammonia is certainly not the dredge pond water and given the location of BBH8 is likely to be off-site. Coffey recommends no action other than review of routine monitoring results."*

Ammonia concentrations in monitoring well BBH7 possibly represent groundwater seeping into the dredge pond from the eastern site boundary and concentrations are reported to be consistent with concentrations reported in the dredge pond water.

The most recent monitoring data (2022/2023) shows another sharp increase in ammonia concentrations at BH1/BH2 (compared to the dredge pond sampling results) and potentially increasing trends in BBH8B and BBH9C. As discussed in section 6, Coffey later attributed the source of ammonia as infiltration of leachate from the surface of the Breen Landfill.

8.3.3 AOX Compounds

AOX was required as part of the EMP monitoring requirements, but results are only available for the period 2004-2008. Results are reported in the 2008 AR and are included in Appendix B.

AOX (X = Cl, Br, I) is a sum parameter for describing the organic halogen compound load in water. AOX covers a large group of substances from simple volatile substances such as trichloromethane (chloroform), to complex organic molecules such as dioxins/furans. Most of these compounds do not occur naturally, and many compounds are toxic.

AOX compounds were reported in both the dredge pond water and groundwater (BH1 & BH2) ranging from 12µg/L to 88µg/L. The dataset is limited, and trends were not evident.

Coffey (IEA, 2006, 2007 & 2008) identified elevated concentrations of AOX as an issue of environmental concern and noted that, as chlorinated phenols and OCPs have not been detected, the AOX concentrations may be associated with the presence of chlorinated alkane and/or chlorinated alkene compounds, commonly used as industrial solvents and degreasers.

Coffey considered ANZECC (2000) guidelines for individual compounds from the chlorinated alkane and chlorinated alkene groups, which were generally orders of magnitude above detected concentrations, but specifically identifying the low reliability guidelines for TCE of 70µg/L. Based on this, Coffey concluded *"...the presence of AOX at elevated concentrations in surface water and groundwater at the site does not appear to be attributable to on-site operations and does not appear to represent a risk of harm to the adjacent marine ecosystems."*

The basis for this conclusion was not elaborated on by Coffey in the relevant IEA reports. Analysis of AOX was removed from EPL5658 in 2008.

Recent monitoring undertaken by Coffey in 2023 (Additional Groundwater Sampling) did not detect VOCs in groundwater sampled from within the backfilled void (BBH3) or potential downgradient flow directions (BBH8, BBH9c, Bore 1/BH1 & Bore 2/BH2).

8.3.4 TPH/BTEX & PAHs

TPH has been analysed in boreholes (Bore 1/BH1 & Bore 2/BH2) up until 2008. TPH has been consistently analysed in the dredge pond water since monitoring commenced, and results are reported up to 2018 (appended to the 2018 AR). Compliance monitoring data for the dredge pond water after 2018 is published on the Holt HLRC website (results <PQL).

Lighter fraction petroleum hydrocarbons (C₆-C₉) were detected (marginally above the PQL) in dredge water at three sampling locations in Oct 1996 and at all sampling locations in Sept 1997 but have since not been detected in the groundwater or dredge pond water. The exception being a sample labelled as "BOAT" which was undertaken to assess cross-contamination from the outboard engine used for sampling.

Heavier chain fractions (C₁₀-C₁₄ & C₁₅-C₂₈) have occasionally been detected in the dredge pond water and in groundwater (BH1/BH2) (Appendix C). The maximum 1680µg/L was detected in dredge pond water in Dec 2009 and the elevated concentrations were attributed to cross-contamination from the outboard engine of the boat. This was also the last reported detection of TPH.

Detections in groundwater (BH1/BH2), appeared to correlate with reported detections in dredge pond water, but interestingly also correlated to the reported peaks in ammonia concentrations observed in BH1/BH2.

BTEX was added to EPL5658 in 2008 and data is available for dredge pond sampling 2008-2023 results were generally >PQL except for marginal detections of toluene (max 3µg/L) between 2013-2015. Maximum recorded concentrations of BTEX were reported in the sample labelled BOAT.

PAHs have been analysed in groundwater (BH1 & BH2) until 2008 and in dredge water from 1996- present. PAH compounds have consistently been reported as <PQL except for naphthalene detections reported in dredge pond water sampled in Dec 09 (range 2.2-2.7µg/L). Naphthalene was also reported in the sample BOAT as discussed above. No borehole sampling data is available (over the sampling period) to assess if TPH detections were also evident in the groundwater.

8.3.5 Pesticides

OCPs were analysed in groundwater (Bore 1/BH1 & Bore 2/BH2) until 2008 and OPPs until 2003. Dredge pond water has been consistently analysed for OCPs/OPPs except for the period 2003-2005. PAC (phenoxy acid herbicides) were analysed in dredge pond water & groundwater between 2002-2007.

OCP's/OPPs & PAC have not been reported above the PQL during the monitoring period.

8.3.6 Phenols

Over the years phenolic compounds have been variously reported as phenol, phenols & total phenolics. Limited data on individual chlorinated phenolic compounds have been reported (5 analyses). Phenols have been reported <PQL except for the following:

- Phenol was detected (marginally above the PQL) in BH2 (groundwater) and a shallow dredge water sample in Feb 2000.
- Total phenolics were detected in the dredge pond water in Dec 2013 (range 20-70µg/L) although individual phenolic compounds were not reported.

8.3.7 Metals

As noted above, increases in metals may be associated with importation of VENM due to natural mineralisation, nevertheless results have been considered with reference to the Mann-Kendall data assessment of trends included in the 2018 AR. In summary:

Arsenic has consistently been detected in both the groundwater (Bore 1/BH1 & Bore 2/BH2) and dredge pond water and concentrations generally fluctuate around 2-10µg/L. The results are consistent with arsenic concentrations reported in the dredge pond in Oct 1996 (<7-9.3µg/L). Arsenic is generally considered to be at natural background levels representative of the Kurnell Peninsula.

Cadmium has been reported above the detection limit in around 20% of the samples analysed, although most detections were reported following changes in the laboratory detection limits as monitoring progressed. Detections have generally fluctuated around 0.1-0.3µg/L with no apparent trend.

Chromium (total) has been reported above the detection limit around 30% of the samples analysed. Concentrations generally fluctuate around <PQL-20µg/L in the dredge pond, apart from Aug 2000 (91µg/L) and Feb 2001 (73µg/L) and groundwater concentrations generally fluctuate around <PQL-6µg/L. No trends are evident. Speciation of chromium was reported from 2008 (due to changes in EPL5658) and only one detection of chromium VI detection was reported (31µg/L) associated with dredge pond water sampling in Dec 2010.

Copper has been reported above the detection limit in around 40% of the samples analysed and concentrations generally fluctuate around <PQL-2µg/L with occasional detections up to 4µg/L. The exception being elevated results in BH2 (200-16µg/L) during 2003 & 2004.

Lead has generally been reported <PQL with only 6% of results reported above the detection limit. Detections generally fluctuate around 1-2µg/L although a detection of 15µg/L (dredge pond) and 11µg/L (BH2) reported in 2001.

Zinc is usually detected in the dredge pond and groundwater. Detections generally fluctuate around 1-5µg/L, although a detection of 280µg/L was reported in a dredge pond sample in Dec 2011.

Cobalt, mercury, and nickel were generally not detected, or reported isolated detections marginally above the detection limit and no apparent trends. Manganese is usually detected with no apparent trends.

Aluminium has consistently been detected in both the groundwater and dredge pond water with no apparent trends, although concentrations are comparable to those reported in Oct 1996. ERM (AR, 2000) reported that the aluminium may be due to the presence of clay particles in the water, which have higher aluminium concentration naturally occurring sands in the area.

8.4 Groundwater Quality Assessment

The *groundwater quality assessment* prepared by Coffey in 2020 relied on the water quality monitoring dataset for the period 2013-2017. The objective of the report was to "...provide groundwater quality assessment for the site based on the trends generated from analytical results from 2013 to 2017 in the context of potential risks posed to groundwater quality by possibly contaminating activities on or around the site." Coffey did not elaborate on why only data from 2013 to 2017 was included in the assessment.

The following data from the period 2013-2017 was considered by Coffey:

- Groundwater (Bore 1/BH1, Bore 2/BH2, BBH8, BBH9C & BBH4B): ammonia (as N), EC & pH.
- Dredge Pond & RWB: ammonia (as N), EC, pH, TRH/BTEX, alkalinity, metals, major ions, phenolics, PAHs, OPCP/OPPs.

Coffey reported that samples were collected following Besmaw procedure SOP-H-01 and reported that "Based on the assessment of the field and laboratory quality control results for sampling events between 2013 and 2017, Coffey considers that the results from each sampling round were representative of the conditions at the sampling locations at the time of sampling."

Trends were analysed by Coffey using statistics (Mann-Kendall) and compared data against ANZECC/ARMCANZ (2000) guidelines for protection of aquatic ecosystems (fresh and marine) at the 95% protection level (slightly to moderately disturbed system).

Coffey reported "...minor fluctuations in some water quality parameters and chemical concentrations. This observation is consistent with Coffey's assessment of low risk for potential impact to the environment due to historical activities on the site."

Interestingly a probably increasing trend for ammonia (in BBH8B) was reported but not discussed by Coffey.

8.5 Auditor's Opinion

Ammonia concentrations in the dredge pond have remained stable and are likely to represent ambient background ranges, although there is evidence of a source of ammonia in groundwater along the western boundary of the site.

The presence of AOX compounds may be indicative of non-VENM placement, although I tend to agree with Coffey that the reported concentrations are relatively low and are unlikely to represent significant contamination issues. This is supported by recent groundwater sampling results (discussed in section 6) during which volatile organic compounds and volatile halogenated compounds were not detected.

The TPH results are generally low and are not consistently detected. Some fluctuations in the concentrations of TPH were detected in the dredge pond, and whilst these may be indicative of non-VENM placement it is not systemic and is complicated by cross-contamination issues and poor sampling methodology (potentially causing loss of volatiles). Recent groundwater sampling (discussed in section 6) did not detect hydrocarbons (as TRH) in groundwater.

No significant trends were identified for metals, and concentrations have generally fluctuated.

Arsenic concentrations are stable and consistent with initial sampling results reported in 1996. The reported concentration ranges have been attributed to ambient background concentrations in the Kurnell Peninsula, although this has not been supported by data and there is no clear evidence that this is the case.

Concentrations of arsenic, copper, nickel, and zinc were reported to exceed the ecological criteria in groundwater and dredge pond water during the investigations (section 6). These may represent a slight

increase over concentrations initially reported in the dredge pond in 1996 but are not necessarily indicative of non-VENM placement and could simply be a result of natural mineralisation in VENM.

9 Breen Landfill

In determining whether further investigations are required, the EPA has requested that any risks posed by the “*landfill located just west of the site*” including risks from potential landfill gas generation are considered.

Breen has recently prepared an Environmental Impact Statement (EIS) to support an application (SSD-10412) for a new resource recovery facility and waste disposal facility. The EIS and associated documents are publicly available on the NSW planning portal¹⁹. A qualitative assessment of this publicly available information sourced primarily from the contamination status report²⁰ and groundwater impact assessment²¹ appended to the EIS, has been undertaken to determine whether there is sufficient information to assess the potential risks of migration of hazardous ground gas or leachate from the Breen landfill onto the Besmaw site.

9.1.1 Summary of Landfill Operations

Breen began landfilling activities in 1990 in voids left from sand mining. The voids (to depths of -23mAHD) were reportedly filled to groundwater level with natural material, followed by installation of a clay liner. The site was then progressively filled with non-putrescible waste (EPL4608).

Current site facilities are shown on site plans included in the EIS.

The EIS refers to DA269/90 being a consent applying across the Breen site for the establishment of a depot to receive excavated materials and selected demolition materials (including bricks, tiles, and concrete spall), and for the restoration of the land by application of the materials to the land. The earliest available copy of EPL4608²² (dated 23 December 2013) permits VENM (but not PASS), waste tyres, paper/cardboard, glass, plastic, rubber, plasterboard, ceramics, bricks, concrete, metal, building & demolition waste, asphalt waste, ferric sludge, dredge spoil and soils (that do not exceed CT1 thresholds and other limits set in the licence) for waste disposal (application to land).

The audit has focused on the area that includes landfill cell B10, leachate pond, the newly constructed B11 and the area subject to the EIS (herein referred to as the proposal site), being the land located directly adjacent to the Besmaw site. Aerial photographs show a dredge pond extended across this area and up to the boundary with the Besmaw site sometime between 2000 and 2007 and was rehabilitated by 2010. At the time when the EIS was being prepared (2021), cell B10 was current, and a new waste cell (B11) was under construction. The new waste cell was reported to have a geosynthetic clay liner (GCL) and B10 is reportedly lined with clay. Both waste cells are reported to have a leachate collection system. Leachate is collected in leachate ponds, which are lined and are designed as evaporation ponds.

Cross sections are available in the EIS, showing the inferred landfill conditions.

Information in the EIS includes a proposed capping plan that suggests current landfilling activities will not extend beyond B11. Nonetheless it appears that an area adjacent to the Besmaw site boundary has been subject to sandmining and rehabilitation, although no records are available for review to confirm this.

9.1.2 Groundwater

Groundwater elevations and contour plans were included in the GHD groundwater impact assessment. Groundwater was noted to primarily discharge to Quibray Bay, although GHD reported that “*As the groundwater flows cross the eastern site boundary it intersects with the Besmaw property trading as Holt Land Rehabilitation Centre (Besmaw). There is ongoing construction works on this property and as such the depth to groundwater is expected to vary until becoming exposed in the Besmaw property’s surface water body (approximately 500 m east).*”

Two infiltration points (3 & 4) are marked on the “current site facilities plan” included in the EIA. GHD noted these to be infiltration ponds. IP3 is reportedly connected to a drain running from the leachate ponds and IP4 is reportedly connected to a drainage line running from landfill cell B11. The infiltration pond water

¹⁹ <https://www.planningportal.nsw.gov.au/major-projects/projects/breen-resource-recovery-facility>

²⁰ Breen Resources Facility – EIS Contamination Status Report. GHD. April 2021.

²¹ Breen Resources Facility – EIS Groundwater Impact Assessment. GHD. April 2021.

²² Notice No: 1516655 for licence variation NSW EPA POEO Public Register <https://apps.epa.nsw.gov.au/prpoeoapp>

elevations were noted to be of similar levels to surrounding groundwater suggesting that they have a high degree of connection and that they are likely to be a surface expression of groundwater.

Based on a review of historical data from the network of monitoring wells and leachate monitoring points (for the period 2006-2020) GHD reported:

- *Leachate has been characterised by elevated concentrations of dissolved salts, nutrients (notably ammonia – up to 830 mg/L in LW06 in 2017), some petroleum hydrocarbons (little or no BTEX, but up to 23 mg/L TRH in LW06 (mostly heavy end in the C16-C34 fraction). No other organic contaminants (where analysed) have been detected.*
- *Groundwater within the vicinity of the proposal site (BH15, BH20, BH22 & BH23) and located to the east of the landfill cells is characterised by slightly elevated ammonia concentrations (max 1.8mg/L in BH23) although concentrations of ammonia in wells located along the eastern boundary (BH15 & BH22) were in the range 0.02-0.5mg/L.*

More recent groundwater monitoring results²³ for ammonia in BH15, BH20, BH22 & BH23 (2020-2023) shows a pulse of ammonia in BH22 with a maximum of 12mg/L reported in October 2022 and this has more recently decreased to 2.5mg/L (Jun 2023). The elevated ammonia was not detected in surrounding wells until Jun 2023 (BH20 6.5mg/L).

9.1.3 Hazardous Ground Gas

GHD reviewed historical gas monitoring data for leachate wells installed in the landfilled areas (LW01-LW06) and quarterly perimeter gas monitoring (BH4A, BH8B, BH12A, BH13A & BH18). The results are appended to the contamination status report (noting that only results for methane and flow rate were available for the perimeter monitoring rounds).

Methane, carbon dioxide and hydrogen sulphide were detected in the leachate wells with maximums of 63.6% v/v, 34.7% v/v & 460ppmv respectively and flow rates were reported up to 13.4 L/hr (LW06). GHD concluded that ground gases are present within the landfilled areas²⁴ at concentrations that require management actions and mitigation as part of the site closure plan.

Within the perimeter monitoring wells, methane was detected at the limit of reporting of 0.1% on a few occasions and borehole flow rates ranged from -0.7 L/hr to 1.3 L/hr. Based on this data, GHD concluded that off-site migration of ground gas under current conditions was unlikely to pose an unacceptable risk. However, capping of the landfilled areas may result in changed ground gas conditions. GHD also noted that the extent of potential ground gas impacts in the eastern portion of the site (adjacent to the Besmaw site), while unlikely, are not well understood.

9.2 Auditor's Opinion

Leachate generated from historical landfilling activities on the Breen site is reported to be impacting groundwater and migrating in a generally northerly direction. I tend to agree with GHD, that based on the data reported in the EIS, groundwater in the eastern portion of the Breen landfill site has generally been found to have relatively low ammonia concentrations and does not appear to have been significantly impacted by migration of leachate from the landfilled areas. However, the EIS/GHD reports used monitoring data for the period 2006-2020 and did not include consideration of the more recent elevated concentrations of ammonia detected in BH22. The recent spike in ammonia in BH22 is consistent with a spike in ammonia concentrations at Bore 1/BH1 & Bore 2/BH2 (located on the Besmaw site), albeit with a slight delayed response time and lower concentrations (compared to BH22).

The slight mounding of groundwater identified by GHD (in 2020) in BH22, may be related to the infiltration pond noted to be present in the vicinity of this well. This suggests that the infiltration ponds may represent a source of ammonia to groundwater, although this is not conclusive and, as noted in section 6, further monitoring would be required to determine if this is the case.

The presence of landfill gas within the waste cells is not disputed and the EIS acknowledges that gas mitigation measures will be incorporated into the final cap design. The monitoring has focussed on migration risks across the northwestern boundary and although I agree that the perimeter monitoring reported in the EIS supports a low risk of gas migration (from the landfill cells), there are no perimeter

²³ <https://consultingearth.com.au/results/breen-resources/>

²⁴ *Landfilled areas* has been taken to mean the constructed cells located above the backfilled sandmining voids.

monitoring wells located between waste cell B10 and the eastern site boundary (adjacent to the Besmaw site) to confirm this. The Besmaw site boundary is located some 400-500m from cell B10 and, as reported in the PSI, the existing site conditions (no buildings or hardstanding in sandy soil) are such that landfill gas is likely to vent to the surface. Under these conditions, migration of landfill gas across the eastern site boundary is unlikely, although changes to site conditions (such as capping, installation of hardstanding and buildings or operational change on the Breen landfill site) will affect this.

DA269/90 permitted excavated material and selected demolition materials to be used to rehabilitate the sandmining void that extends up to the eastern boundary immediately adjacent to the Besmaw site. No evidence of significant leachate impacts has been identified in this area and the risk of gas generation from this material is low, although this should be confirmed by monitoring.

The landfill operations are regulated by the EPA under the POEO Act and will continue during the post-closure period until sufficient evidence has been provided to the EPA that the landfill is stable and non-polluting including matters such as leachate and gas migration. Changes to the operational activities associated with the landfill cells and closure will be captured by regulation under the POEO Act through the existing EPLs.

10 Assessment of Risk

The PSI concluded that "A qualitative assessment of environmental risk associated with identified potential environmental concerns found low risk levels which did not warrant additional assessment."

The groundwater quality assessment (Coffey, 2020) also included a qualitative analysis of potential risk to groundwater quality from site activities and concluded that "The potential risk to groundwater quality posed by current and historical activities on the site and development under the draft masterplan is low; and Assessment of water quality indicators for dredge pond water and for groundwater obtained by regular monitoring during the past five years indicates that no site-specific assessment is warranted at this time."

The auditor's evaluation of the qualitative risk assessment presented in both the PSI and groundwater quality assessment follows in Table 10.1 below.

| AEC | Likelihood of Impact & Risk (as reported by Coffey) | Auditor Comments |
|---|---|--|
| AEC1: Lot 2 North | <p>Low likelihood of soil contamination.</p> <p>Low risk of groundwater impacts.</p> <p><i>Nevertheless, Coffey noted requirement for targeted assessment of building footprints after demolition and removal.</i></p> | <p>Limited investigations in the vicinity of the stables have not identified any significant contamination issues, although the potential for asbestos has not been fully assessed. I agree with the low risk assessment subject to further assessment prior to redevelopment to confirm:</p> <ul style="list-style-type: none"> - Potential for asbestos in fill material. - Pesticides and asbestos associated with building footprint. - Low risk due to importation of <i>sand overs</i>. |
| AEC2: Boat Harbour Cabins | <p>Low to medium likelihood of soil contamination. Near surface soils in vicinity of cabins potentially affected.</p> <p><i>Nevertheless, Coffey noted a requirement for targeted assessment of building footprints after demolition and removal.</i></p> | <p>Targeted sampling following demolition required to confirm low risk.</p> |
| AEC3: Weed control | <p>Low likelihood of soil contamination.</p> <p><i>Nevertheless, Coffey noted a requirement for targeted assessment of soil in building footprints (and contingency for groundwater assessment) after demolition and removal noted by Coffey.</i></p> | <p>Intrusive investigations did not include herbicides, although audit of Besmaw records indicates a strong operational compliance culture. I agree that the risk of significant contamination due to storage and use of Glyphosate for weed control is low and acceptable.</p> |
| AEC4: Rehabilitation of the sandmining void. | <p>Low likelihood of importation of non-VENM soils or poor management of PASS.</p> <p>Coffey also reported that "<i>...imported material used to backfill the dredge pond within the Besmaw site is not the source of ammonia in groundwater.</i>"</p> | <p>The audit has identified the potential for some non-VENM placement, although there is sufficient documentation to demonstrate that the risk of gas and leachate generation from this material is low and acceptable.</p> <p>The groundwater investigations have identified ammonia and some dissolved metals in groundwater downgradient of the site. Changes in groundwater chemistry (such as metals and acidity) due to</p> |

| | | |
|---|--|--|
| | | <p>placement of VENM/PASS is expected and is subject to regulation under EPL5658.</p> <p>Overall, based on the groundwater monitoring results reviewed to date, the risk of significant contamination issues due to importation of non-VENM material is low subject to:</p> <ul style="list-style-type: none"> - Implementation of a program of groundwater monitoring within backfilled areas to establish trends in groundwater quality post-rehabilitation. - Assessment of the final rehabilitated landform to confirm the low contamination risk. Depths of investigation should be commensurate with the final development scenario. - Continued regulation of imported VENM. |
| <p>AEC5: Storage and use of fuels.</p> | <p>Low to occasional likelihood.</p> <p>Low risk due to operational environmental management regulated by EPL5658.</p> | <p>Intrusive investigations have been undertaken in this area and no significant contamination issues have been identified.</p> |
| <p>AEC6: Potential off-site sources Breen landfill</p> | <p>A low likelihood was reported in the PSI based on the groundwater flow direction and 25m sand buffer zone around the perimeter of the site (to provide a vent for possible hazardous ground gas).</p> <p>Nevertheless, Coffey has identified the Breen landfill as the most likely primary source for recent increases in ammonia in groundwater.</p> <p>Coffey recommended inclusion of monitoring locations BBH3, BBH8 (shallow and deep) and BBH9C be added to the regular quarterly water quality monitoring schedule (pH/EC and sampling and analysis for ammonia (as N)).</p> | <p>I agree that the risk of migration of hazardous ground gas across the eastern site boundary from the Breen landfill under the current site conditions is low, although changes (such as capping, hardstanding or future development) could affect this assessment.</p> <p>There is evidence of a source of ammonia along the western boundary of the site. I agree that further monitoring is required. Future assessment must also consider matters such as the groundwater geochemistry, consideration of groundwater trends for a longer duration (i.e. entire data set), monitoring well construction (and effects of long and short screened interval on the concentrations reported), groundwater flow direction (including localised effects of groundwater seepage into dredge pond), rainfall and standing water level changes correlated to analytical results and trends (particularly important in relation to the infiltration ponds and ponding of water along the western boundary).</p> <p>The Breen site is subject to an EPL, and operational changes and off-site leachate and gas migration issues will be captured by regulation under the POEO Act.</p> <p>Nevertheless, monitoring on the Besmaw site is required to confirm conditions at completion of the rehabilitated landform.</p> |
| <p>AEC6: Potential off-site sources. Industrial properties to the east.</p> | <p>Low likelihood of unacceptable residual contamination.</p> | <p>Groundwater flows in north easterly flow direction across Lot 6 & 8 and some localised groundwater flow from the east is predicted to seep into the dredge pond. Remediation of contamination on Lot 6 was subject to a site audit and a SAS issued. Residual groundwater contamination is managed by a GMP. The presence of a GMP & SAS infers that risks from migration of residual contamination are likely to be low, although no documentation was available to confirm this.</p> |

10.1 PFAS

JBS&G stated that *"With respect to the EPA (2021) request, the groundwater data as collected during this assessment indicates that the site does not contain a significant source of PFAS, or otherwise does not pose a significant PFAS contamination risk to the surrounding area."*

10.2 Auditors Opinion

There is evidence that temporary haul roads have in the past, been maintained with crushed brick, tile and concrete. This practice is not currently undertaken and there are no records available. If these materials were sourced from construction and demolition waste, there is a potential that asbestos may have been present. This may also apply to the Boat Harbour access road.

PFAS concentrations do not appear to be significantly different between sampling locations although some cross-contamination issues have been identified (due to bailers being left in wells). There is no clear evidence that the site is a significant source of PFAS compounds, but further assessment of the background concentrations in the surrounding area is required to confirm this. Nevertheless, the concentrations of PFAS compounds detected in groundwater are unlikely to represent a significant source and based on the results to date are unlikely to preclude future development of the site.

In summary, based on review of the information listed in section 1, and consistent with the conclusions of the PSI and Groundwater Quality Assessment, in my opinion, there is a low risk of significant contamination issues that would preclude development of the site, however, further investigations are required to confirm whether the site is suitable for the proposed use.

10.3 Off-Site Migration Issues

Elevated concentrations of dissolved metals and ammonia have been detected in groundwater and may potentially be migrating off-site.

There is no clear evidence that the ammonia detected in groundwater is due to on-site operations. Possible off-site sources of contamination include the former Phillips/ICI/Bayer site to the east (former sewage treatment plant, leaking sewerage infrastructure or unidentified landfill source) and the Breen landfill.

Ammonia in groundwater is currently monitored to address compliance with EPL5658 and will continue until the licence is surrendered. It is recommended that further investigation of the source of ammonia is undertaken.

Dissolved metals (and changes to groundwater geochemistry) as a result of importation of VENM/PASS is expected and is an operational matter regulated by EPL5658.

Monitoring of contaminants (other than nitrogen/ammonia) in groundwater is not routinely undertaken as part of the licence conditions. In terms of assessing site suitability, a regular program of monitoring will be required to establish groundwater quality trends within the backfilled areas and at downgradient locations.

11 Compliance with Regulatory Guidelines and Directions

The Auditor has used guidelines currently approved by the EPA under section 105 of the NSW *Contaminated Land Management Act 1997*.

The investigation reports were generally prepared in accordance with the NSW EPA (2020) Consultants Reporting on Contaminated Land. Exceptions and departures have been addressed by the auditor in this SAR.

Compliance with regulation, licences and approvals issued under the POEO Act in reference to the current operations (sandmining and rehabilitation) falls outside the scope of this audit.

With reference to the importation of *sand overs* onto the Lot 2 North site. These materials are defined as quarried products, extracted under EPL 3629 and are not considered to be a waste²⁵.

12 Conclusions and Recommendations

The investigation reports (when considered in the context of records held by Besmaw) have adequately assessed the potential for contamination to exist at the site and I am satisfied that the site is unlikely to be affected by significant contamination issues that would preclude development of the site or progression of the planning process.

However, the site is still subject to sandmining and rehabilitation which is predicted to continue for at least the next 5-10 years. Further investigations, following completion of the rehabilitation are required to confirm site suitability for the proposed future development.

Subject to continued regulation of the rehabilitation and annual environmental audits, it is recommended that further investigations include (but not be limited to) the following:

- Soil sampling within the final rehabilitated landform to confirm the reported low risk status. Depths of the investigation should be commensurate with the final development proposal and likely exposure scenarios.
- Investigations (post demolition) in the footprint of the stables (and associated buildings) to assess potential for pesticides and asbestos. This should also include assessment of asbestos in areas of fill on Lot 2 North. Some limited sampling of grassed areas should also be undertaken to confirm the low contamination risk from importation of *sand overs*.
- Targeted sampling of surface soils in the vicinity of the Boat Harbour Cabins (following demolition) and Boat Harbour access road.
- Assessment of groundwater quality around the perimeter of the site and within the final rehabilitated landform. The analytical suite must be sufficient to assess potential contamination due to placement of non-VENM material. This will require progressive implementation of a program of groundwater monitoring within rehabilitated areas to allow assessment of trends in groundwater quality post-rehabilitation.
- Additional monitoring and assessment to confirm the source of ammonia in groundwater.
- Assessment of hazardous ground gas along the western site boundary by implementation of a hazardous ground gas monitoring program. This must consider future changes in site conditions due to the proposed development and any operational changes associated with the adjacent Breen landfill.
- Assessment of groundwater quality along the eastern boundary of the site adjacent to Lot 6 & 8.
- Assessment of PFAS compounds in groundwater within the surrounding area to establish ambient concentrations.

The above recommendations for further investigation and monitoring have been made to ensure that sufficient data is available at the completion of the rehabilitation to support conclusions regarding site suitability (from a contaminated land perspective). The audit conclusions and recommendations do not address or otherwise comment on matters relating to EPL regulation, monitoring and compliance.

Based on the information reviewed to date, if contamination issues are encountered as a result of the additional investigations, I do not believe that they would preclude development of the site, and if remediation is required, I believe that this can be reasonably and practically incorporated into the development approval process.

In my opinion, additional site investigations undertaken before completion of the rehabilitation are unlikely to contribute any substantial new findings that would contradict the conclusions of the PSI and DSI, noting that some of the recommended groundwater monitoring will need to commence during the rehabilitation to determine trends.

It is recommended that future investigations are subject to a site audit to certify that the site is suitable for the proposed use and that this be conditioned on any future development approval.

13 Other Relevant Information

This Audit was conducted on the behalf of Besmaw Pty Ltd for the purpose of assessing the suitability and appropriateness of investigations, i.e., a "Site Audit" as defined in the CLM Act (1997).

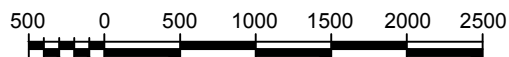
This summary report may not be suitable for other uses. The consultant reports listed in Section 1 of this SAR included limitations. The Audit must also be subject to those limitations. The Auditor has prepared this document in good faith but is unable to provide certification outside of areas over which the Auditor had some control or is reasonably able to check.

The Auditor has relied on the documents referenced in Section 1 of the Site Audit Report in preparing the Auditors' opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change.

It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

APPENDIX A

Attachments

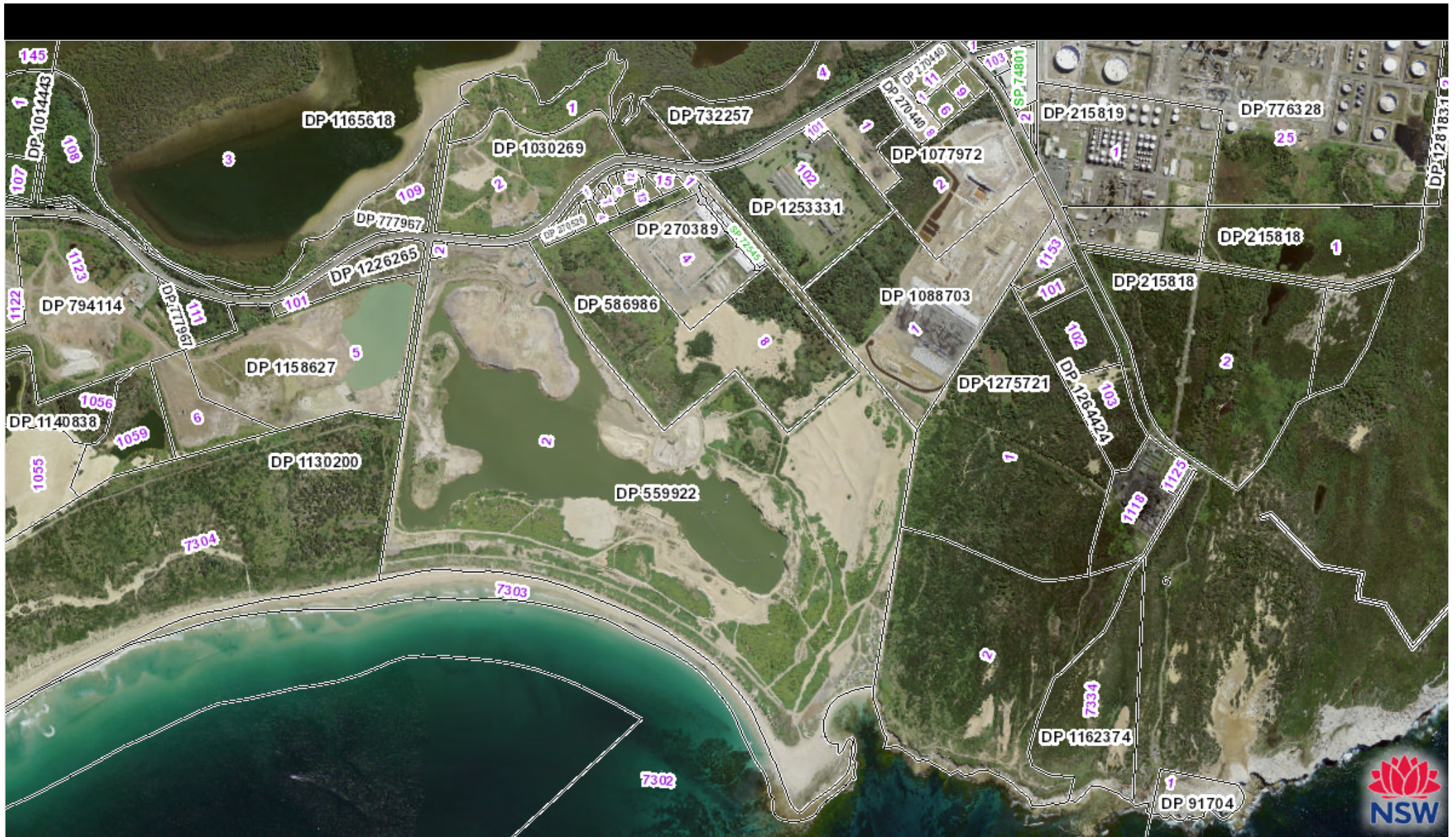


Scale (metres) 1:50000

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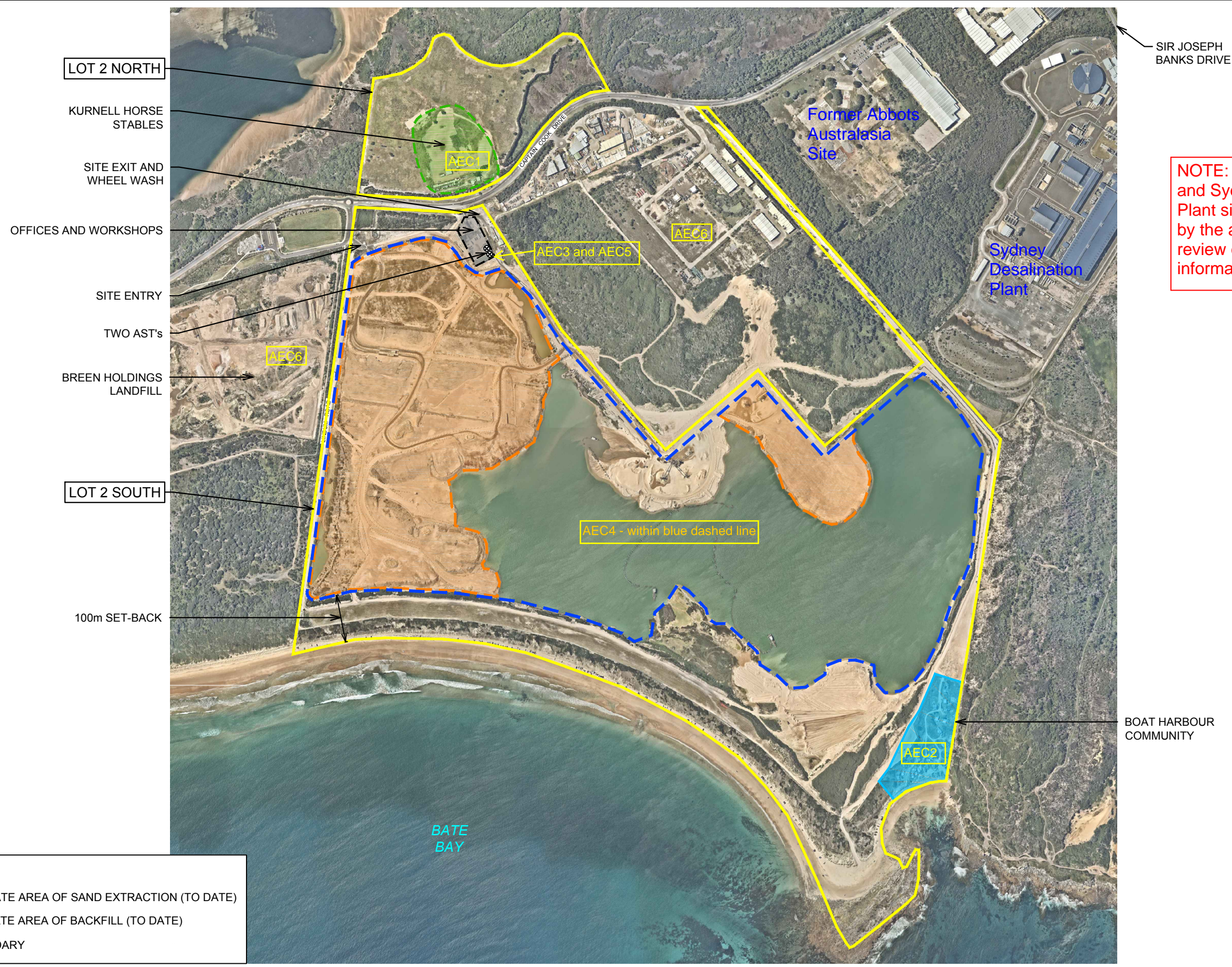
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| drawn | JS / AW | | client: | BESMAW PTY LTD | | |
| approved | - | | project: | STAGE 1 - PRELIMINARY SITE INVESTIGATION KURNELL PENINSULA, NSW | | |
| date | 28 / 02 / 18 | | title: | SITE LOCALITY PLAN | | |
| scale | AS SHOWN | | project no: | 754-SYDENE211738-R01 | figure no: | FIGURE 1 |
| original size | A4 | | rev: | A | | |



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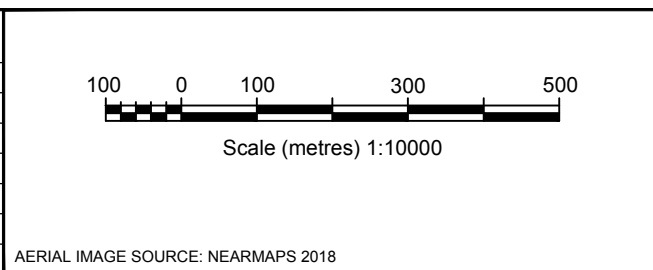
NOTE: Abbot Australasia and Sydney Desalination Plant site locations added by the auditor based on review of site history information in June 2023.



LEGEND

- - - APPROXIMATE AREA OF SAND EXTRACTION (TO DATE)
- - - APPROXIMATE AREA OF BACKFILL (TO DATE)
- SITE BOUNDARY

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| approved | - |
| date | 28 / 02 / 18 |
| scale | AS SHOWN |
| original size | A3 |



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| client: | BESMAW PTY LTD | | |
| project: | STAGE 1 - PRELIMINARY SITE INVESTIGATION KURNELL PENINSULA, NSW | | |
| title: | SITE LAYOUT PLAN AND AREAS OF ENVIRONMENTAL CONCERN | | |
| project no: | 754-SYDEN211738-R01 | figure no: | FIGURE 2 |
| rev: | A | | |



NOTE: Abbot Australasia and Continental Carbon site locations added by the auditor based on review of site history information in June 2023.



| | | | |
|---|--------------------|---|-----------------|
| Coffey Geosciences Pty Ltd ACN 056 335 516 | | Geotechnical Resources Environmental Technical Project Management | |
| Drawn | KME/SW | BESMAW PTY LTD PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT | FIGURE 2 |
| Approved | <i>[Signature]</i> | | |
| Date | 24/06/2001 | | |
| Scale | AS SHOWN | | |
| AERIAL PHOTOGRAPH OF SITE - 1996 | | Job no: E12494/1 | |



- Active model boundary
- Calculated Groundwater Contour
- 0.5 Calculated Groundwater Level (mAHD)
- BBH3 (1.22) Coffey Piezometer (Calculated Groundwater Level mAHD)

| | | | |
|---|-----------|---|---------------------|
| Coffey Geosciences Pty Ltd ACN 056 335 516 | | Resources Environmental Technical Project Management | |
| Drawn | RHJ | BESMAW PTY LTD KURNELL SAND QUARRY AND REMEDIATION SITE GROUNDWATER MODEL CALIBRATION CALCULATED GROUNDWATER LEVEL CONTOURS - 18 AUGUST 2003 | FIGURE 8 |
| Approved | RJB | | |
| Date | July 2006 | | |
| Scale | NTS | | |
| | | | job no: E12518/1-BO |



- Active model boundary
- Modelled Groundwater Contour
- 0.5 Modelled Groundwater Level (mAHD)
- Remaining Pond Area
- Filled Area

| | | | |
|-----------------------------------|-----------|--|---|
| Coffey Geosciences Pty Ltd | | ACN 056 335 516 | Geotechnical Resources Environmental Technical Project Management |
| Drawn | RHJ | BESMAW PTY LTD KURNELL SAND QUARRY AND REMEDIATION SITE GROUNDWATER MODEL STUDY PREDICTED GROUNDWATER LEVEL CONTOURS - 18 AUGUST 2003 (POSSIBLE DEVELOPMENT SCENARIO) | |
| Approved | RJB | | |
| Date | July 2006 | | |
| Scale | NTS | | |
| | | | FIGURE 12 |
| | | | job no: E12518/1-B0 |

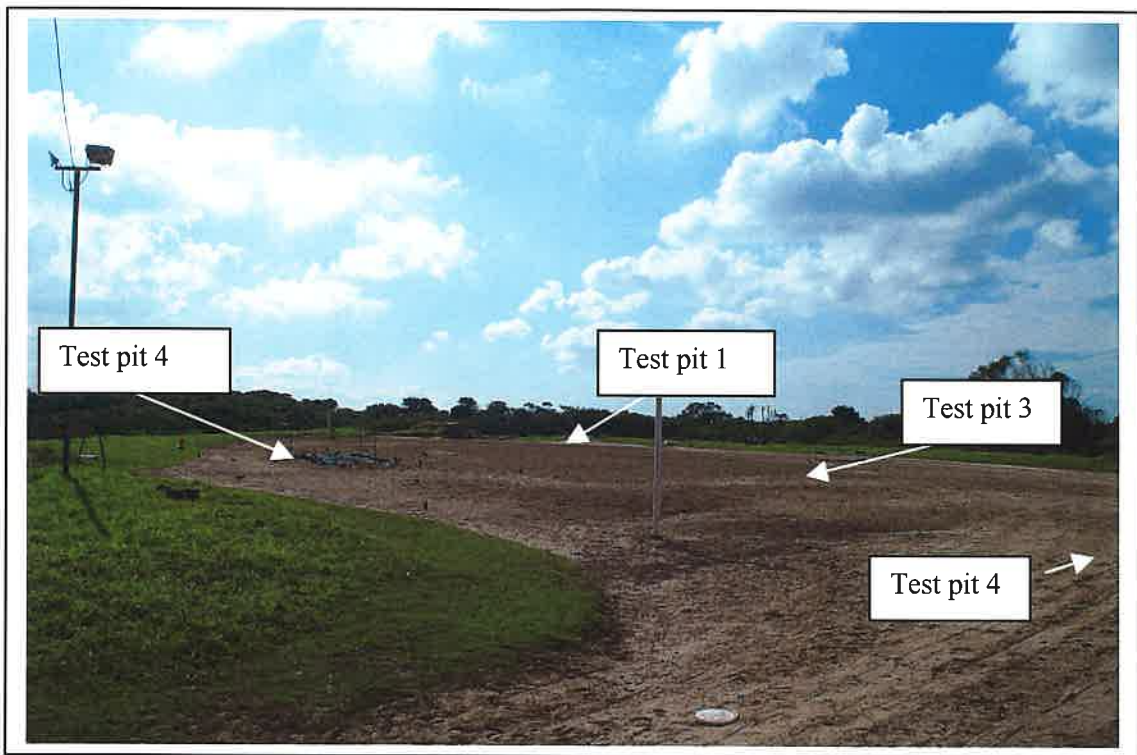


Plate 6 Horse training oval at the equestrian centre on Lot 4 showing approximate position of excavated test pits; view looking north-east.

| | | | |
|---|--------------------|---|-------------------------|
| Coffey Geosciences Pty Ltd ACN 056 335 516 | | Geotechnical Resources Environmental Technical Project Management | |
| Drawn | KME | Besmaw Pty Ltd Preliminary Environmental Site Assessment Horse training oval at the equestrian centre. | Drawing no: |
| Approved | <i>[Signature]</i> | | Plate 6 |
| Date | 24/06/2001 | | Job no: E12494-1 |
| Scale | NA | | |



Base map: Nearmap.com.au, September 1, 2019

● Proposed soil bore location

● Actual soil location

Existing groundwater bore to be sampled - location TBC



Figure 1: Sample Locations – Lot 2 North

19066
280-282 and 251 Captain Cook Drive,
KURNELL PENINSULA, NSW



Base map: Nearmap.com.au, September 1, 2019

- Soil bore location
- New groundwater monitoring location
- Existing groundwater monitoring well location
- Surface water sampling location



Figure 2: Sample Locations – Lot 2 South

19066
280-282 and 251 Captain Cook Drive,
KURNELL PENINSULA, NSW



| BBH8 | Concentration |
|--------------|---------------|
| Analyte | (ug/L) |
| PFOA | 0.022 |
| PFOS | 0.006 |
| PFOS + PFHxS | 0.039 |

| BBH7 | Concentration |
|--------------|---------------|
| Analyte | (ug/L) |
| PFOA | 0.002 |
| PFOS | 0.009 |
| PFOS + PFHxS | 0.015 |

| BH01 | Concentration |
|--------------|---------------|
| Analyte | (ug/L) |
| PFOA | 0.018 |
| PFOS | 0.023 |
| PFOS + PFHxS | 0.044 |

| BH02 | Concentration |
|--------------|---------------|
| Analyte | (ug/L) |
| PFOA | 0.021 |
| PFOS | 0.014 |
| PFOS + PFHxS | 0.038 |

| BBH9C | Concentration |
|--------------|---------------|
| Analyte | (ug/L) |
| PFOA | 0.002 |
| PFOS | 0.006 |
| PFOS + PFHxS | 0.007 |

| BBH4B | Concentration |
|--------------|---------------|
| Analyte | (ug/L) |
| PFOA | 0.001 |
| PFOS | 0.01 |
| PFOS + PFHxS | 0.012 |

| BBH10 | Concentration |
|--------------|---------------|
| Analyte | (ug/L) |
| PFOA | 0.003 |
| PFOS | 0.01 |
| PFOS + PFHxS | 0.019 |

Legend

- Approximate Site Boundary
- + Monitoring Well



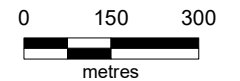
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Version: L01 Rev C Date 7/10/2021

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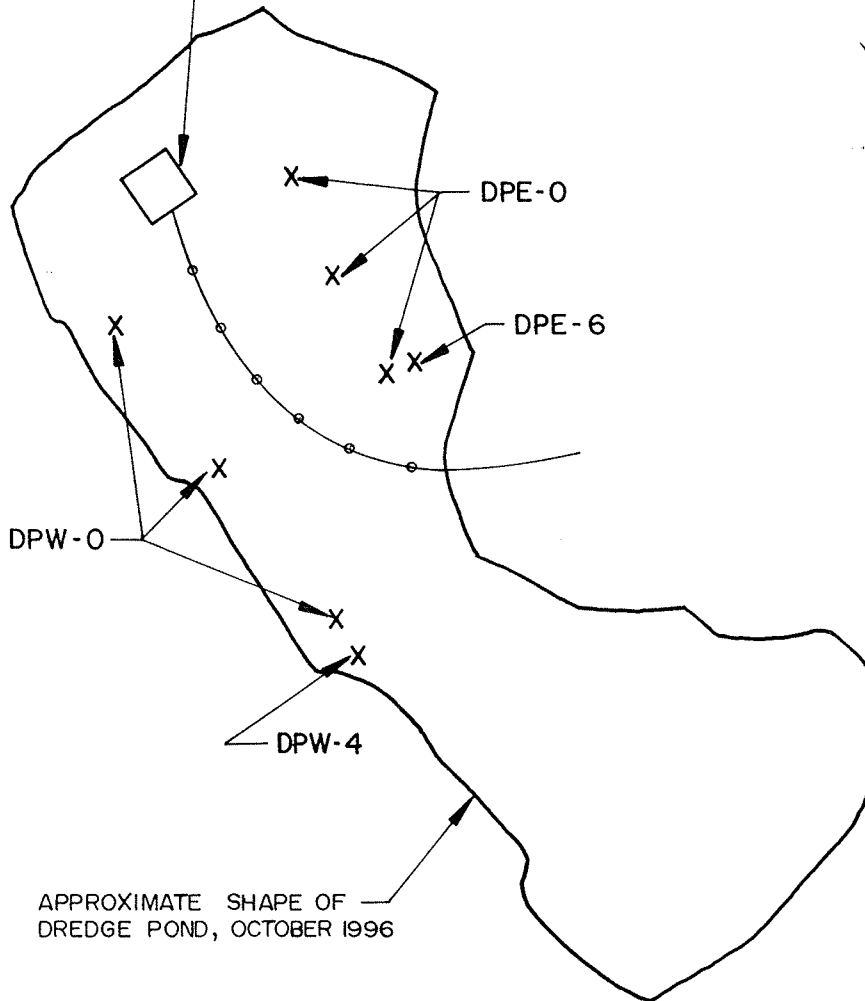
Coord. Sys. GDA 1994 MGA Zone 56

**Captain Cook Drive,
Kurnell, NSW**

SUMMARY OF PFAS LEVELS

FIGURE 3

APPROXIMATE LOCATION
OF DREDGE AT TIME
OF SAMPLING



APPROXIMATE SHAPE OF
DREDGE POND, OCTOBER 1996

LEGEND

- X SAMPLING LOCATION
- DPE EAST SIDE OF DREDGE
- DPW WEST SIDE OF DREDGE
- 0 0m WATER DEPTH (3 x COMPOSITES)
- W 4m WATER DEPTH (SINGLE SAMPLES)

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ACN 003 692 019

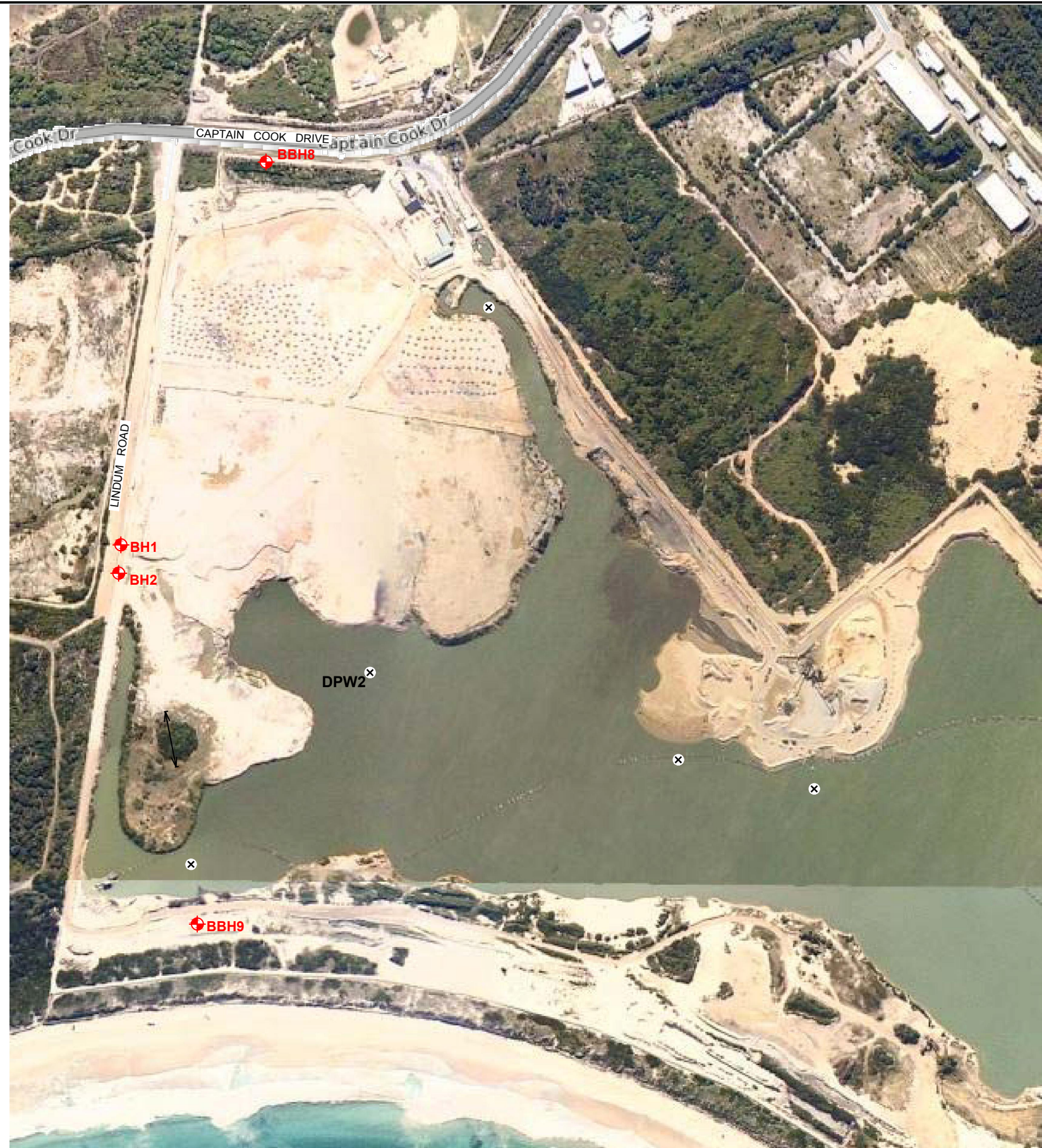
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| drawn: | AW/MOD |
| approved: | <i>[Signature]</i> |
| date: | 6-2-97 |
| scale: | ~ 1:3000 |

**BESMAW PTY LTD
REFILLING DREDGE PONDS
WATER SAMPLING LOCATIONS
OCTOBER 1996**



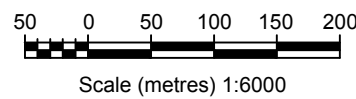
FIGURE 3

Job no. E2040/1



LEGEND

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AERIAL IMAGE SOURCE: NEARMAPS 2012

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| scale | AS SHOWN |
| original size | A3 |



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|-------------|--|------------|----------|
| client: | BESMAW PTY LTD | | |
| project: | GROUNDWATER ASSESSMENT 280-282 CAPTAIN COOK DRIVE, KURNELL PENINSULA, NSW | | |
| title: | SAMPLING POINTS BEFORE 2015 | | |
| project no: | 754-SYDEN211738-R03 | figure no: | FIGURE 2 |
| rev: | A | | |

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LOT 2 NORTH

LOT 2 SOUTH

SIR JOSEPH BANKS DRIVE



LEGEND

- APPROXIMATE AREA OF SAND EXTRACTION (TO DATE)
- APPROXIMATE AREA OF BACKFILL (TO DATE)
- SITE BOUNDARY
- ◆ PROPOSED WATER QUALITY MONITORING LOCATION
- ◆ APPROXIMATE LOCATION OF CURRENT MONITORING NETWORK PIEZOMETER

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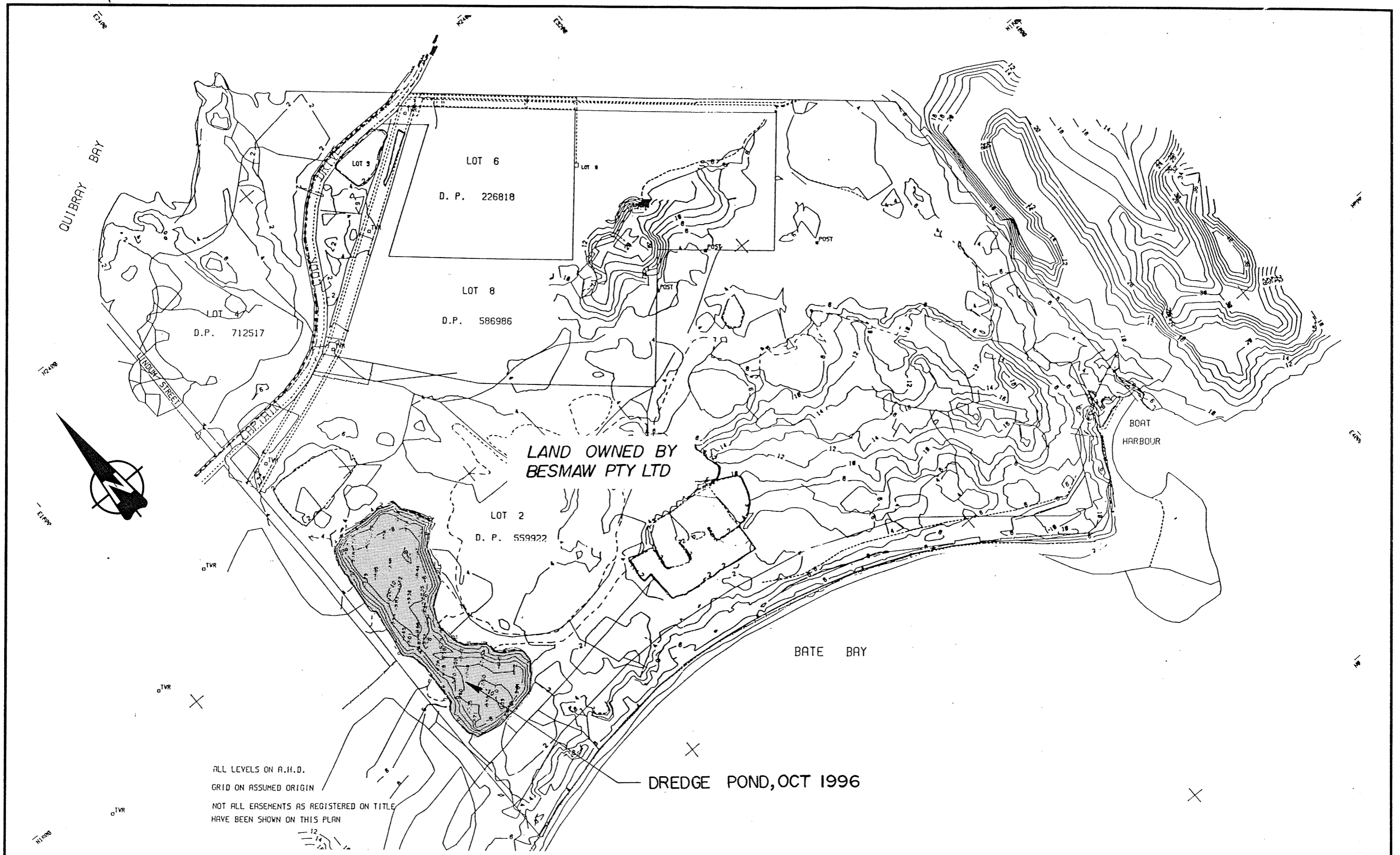
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AERIAL IMAGE SOURCE: NEARMAPS 2018

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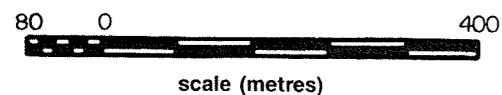
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| project: | STAGE 1 - PRELIMINARY SITE INVESTIGATION KURNELL PENINSULA, NSW | | |
| title: | CURRENT EPL MONITORING LOCATIONS FOR LOT 2 SOUTH | | |
| project no: | 754-SYDENE211738-R01 | figure no: | FIGURE 3 |
| rev: | A | | |



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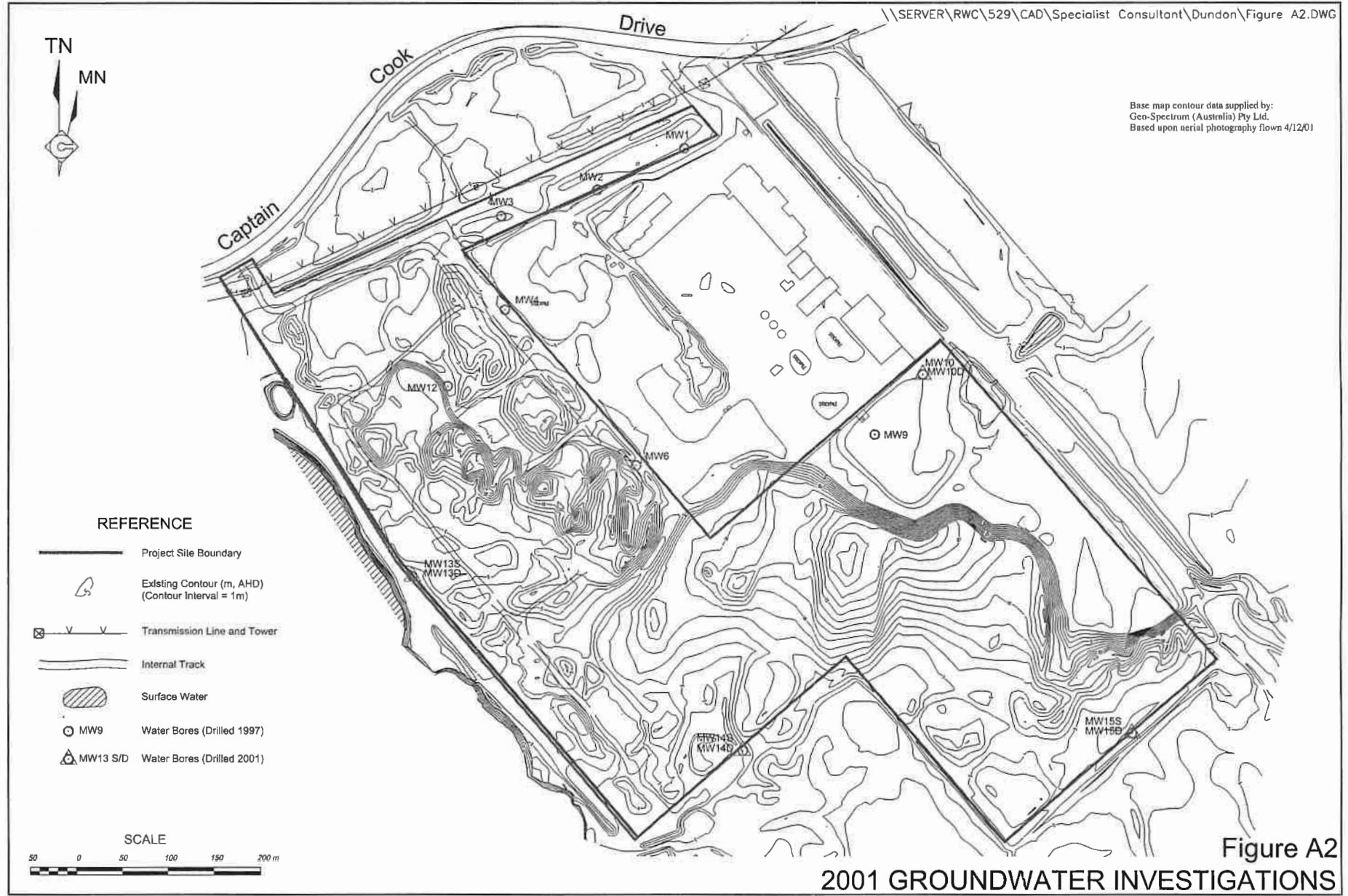
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| | | | | | | AW/MOD |
| | | | | | | <i>AW</i> |
| | | | | | | 6-2-97 |

BESMAW PTY LTD
REFILLING DREDGE PONDS
DREDGE POND LOCATION



FIGURE 2

job no. E2040/1

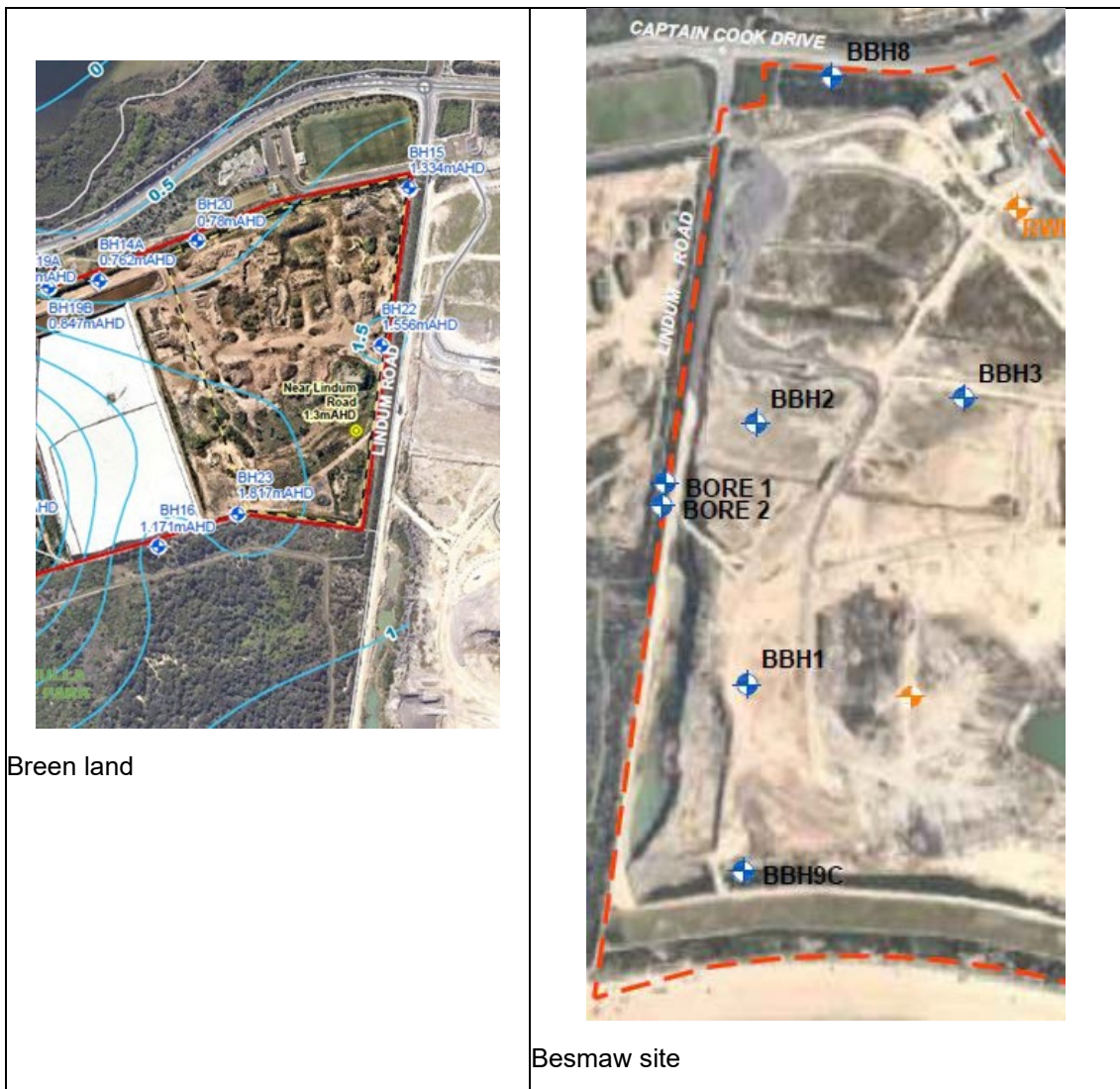


5. WATER QUALITY DISCUSSION

5.1 AMMONIA IN GROUNDWATER

With reference to Table 2 and Chart 1, the reported concentrations of ammonia are consistent with natural occurrence, except for samples along the western site boundary. The highest concentration of ammonia was 11 mg/L in Bore1. Bore2 reported 9.2 mg/L ammonia in December 2022. The default guideline value (DGV marine, 95% species protection) is 0.91 mg/L. These results are not attributable to ammonia in dredge pond water, which mostly reported concentrations less than the laboratory reporting limit (0.01mg/L), with a maximum concentration of 0.04mg/L for sample DPC(8) in December 2021. The presence of ammonia at BBH9C and BBH8 may be due to dispersion through unmined sand at the north and south ends of the site, with the most likely primary source being the landfill to the west.

Recent changes in operations at the Breen landfill and recycling centre immediately to the west of the site are a likely source of ammonia, as a component of landfill leachate. In support of Breen’s SSD application, the report Groundwater Impact Assessment, Breen Resources Facility – EIS (GHD, April 2021) was submitted and is accessible on the NSW Government Major Projects web site. Coffey extracted information related to groundwater quality and flow at the eastern end of the Breen land which is adjacent to the site, as illustrated below.



APPENDIX B

**Correspondence Relevant to
the Audit**





Robin Ward
DPE Planning Delivery & Local Government

By email: robin.ward@planning.nsw.gov.au

Dear Robin

Thank you for meeting with us regarding the Kurnell Peninsula, specifically with regards to contamination.

Our Contaminated Land specialist team has put together the following advice regarding how to proceed with determining the extent of contaminated land on site.

I understand there may be some additional questions with regards to air, noise and water and we are happy to field those as required.

If you have any further questions about this issue, please contact Jacqueline Ingham, Unit Head Strategic Planning Unit, on 02 9995 5795 or at jacqueline.ingham@epa.nsw.gov.au.

Kind regards

A handwritten signature in black ink that reads 'Justin Hillis'.

Justin Hillis
Senior Policy and Programs Officer
Strategic Planning Unit



EPA Advice for Contaminated Land – Kurnell Peninsula SEPP Amendment Proposal

| | |
|---------------------|---|
| Project name | Kurnell Peninsula SEPP Amendment Proposal - 251, 278 and 280-282 Captain Cook Drive, Kurnell (the Site) |
|---------------------|---|

Documents Reviewed

- Stage 1 – Preliminary Site Investigation, 251 and 280-282 Captain Cook Drive, Kurnell Peninsula, NSW (Coffey, February 2020) (PSI)
- Environmental Site Assessment, Lot 2 North and Lot 2 South, 280-282 and 251 Captain Cook Drive, Kurnell Peninsula, NSW (HEC, February 2020) (ESA)
- Besmaw Land Rehabilitation History/summary – November 2022 (Urbis, November 2022)

Background

Besmaw, the site owners of 251, 278 and 280-282 Captain Cook Drive, Kurnell (the Site), located to the Kurnell Peninsula, are seeking an amendment to the existing *State Environmental Planning Policy (Precincts—Central River City) 2021* (Central River City SEPP) and the *Sutherland Shire Local Environment Plan 2015* (SSLEP) to rezone the Site from current uses including sand extraction and rehabilitation to development of the land for employment, residential and recreational and tourism purposes. The draft proposal seeks to permit dwellings, multi-dwelling housing, and residential apartment buildings which are currently prohibited on the site.

The sand extraction operation is reportedly nearing the end of its life. Where sand mining has been exhausted to date, it is understood the site has been "rehabilitated" with Virgin Excavated Natural Material (VENM) which in effect has meant the infilling of voids with material imported to the Site from elsewhere.

In December 2020 the EPA were asked to comment on the proposal and provided comments in regard to air quality, water quality, noise and contaminated land. For contaminated land, the advice given to the Department of Planning and Environment (DPE) at the time is summarised below:

- Only a preliminary site investigation (PSI) had been undertaken, and only for a part of the proposed development area. While the PSI considered that based on the findings the site is suitable for proposed future land uses, the EPA considered that contamination management will need to be considered holistically across the entire area covered by the proposed Kurnell SEPP amendment. Detailed site investigations (DSI) were recommended prior to development and occupation.
- A contaminated land site auditor should be engaged to provide increased certainty to planning authorities on the nature and extent of contamination and the suitability of a site for a specific use.
- No evidence has been provided on the quality, quantity, or tracking of material imported and used to backfill the sand quarrying operations. It appears that rehabilitation of the site with imported VENM started between 1994 and 2001, however EPA regulation of the site for the emplacement of VENM did not commence until 2000.

In October 2022 the EPA met with the site owners, their consultants and DPE to discuss the EPA's previous advice on contaminated land. At the meeting it was requested that CLAA reconsider the previous advice given, in particular with regard to the need for DSIs across the Site and the need for a site auditor to be engaged. The site owners considered that, as only certified VENM had been introduced to the site, the fact the Site was subject to a voluntary environmental audit and the PSI did not identify any contamination concerns demonstrated that the risk of contamination at the site was low.

Key Findings

The investigations undertaken to date only cover a small proportion of the proposed development site

The PSI outlines the findings from a targeted investigation by Coffey in 2001 to Lot 2 North of the site, which is currently used for horse stabling. The Coffey 2001 report identified that fill had been imported to the area of land being used for horse stables and soil results found no contamination above guideline criteria. The ESA, completed in 2020, also targeted Lot 2 North (the horse stables) and also an office/workshop area known as Lot 2 South, which forms part of the operations for the sand extraction activities and works to fill the voids with VENM. The ESA investigation found, from limited soil sampling, the concentrations of all analytes were below the human health and ecological assessment criteria and therefore suitable for the current land use (i.e. commercial/industrial use). Groundwater was also tested as part of the ESA from a single installed well and an existing bore – this found the presence of ammonia (as N), copper, zinc and nickel at concentrations above ecological criteria. PFAS was also detected in groundwater. The ESA did not conclude on the likely source of the contaminants noted.

While the two areas assessed did not identify any major contamination risks, it is apparent from the draft masterplan that these areas only cover a very small footprint of the overall proposed development.

The rest of the proposed development area is subject to sand extraction and VENM infilling

There is reluctance on the part of the site owners to undertake detailed site investigations to the areas of the site which have been used for sand extraction as the void areas have reportedly been filled with VENM since June 1996. The EPA notes that records suggest that Environment Protection Licence (EPL) 5658 was first issued to Besmaw for "Rehabilitation of Sand Quarry" in February 2000 and that the words "VENM Only" were added to the EPL as part of a licence variation in November 2003. CLAA could not substantiate that only VENM was brought to infill the voids prior to this date. The site owners have reportedly undertaken monitoring at the site since October 1996 and began undertaking yearly Independent Environmental Audits (IEA) of the process to rehabilitate the site with VENM since 1999 onwards. EPA reviews of the annual returns for the EPL and risk-based licensing inspections have not identified any concerns with compliance with the EPL, which indicates that the sand extraction areas may not be subject to gross contamination.

However, it is important to note that the site is subject to commercial/industrial land use and the EPA (and communities) expectation is that any land where there will be a change to a more sensitive land use should be subject to appropriate considerations around contamination.

The sand extraction areas of the site are located directly adjacent to an operational landfill

To the west of the site is Breen Resources Pty Ltd landfill (EPL 4608), which has held a licence to operate since June 2001. The presence of the landfill is considered briefly in the PSI, almost entirely in relation to the potential for groundwater to migrate from the landfill onto the site. The PSI states that groundwater flow on the Breen landfill site is "expected to be towards the north and south" but no further information is provided on any investigations undertaken to demonstrate this. The PSI does not discuss the potential for landfill gas to migrate from the landfill to the site.

Landfill gas migration onto the site has not been considered

The PSI describes the Breen site as a "former inert landfill" which may be why landfill gas has not been discussed as a possible concern, however the Breen site is still licensed to receive and land apply waste currently. The Breen landfill does not accept putrescible waste, but does take building and demolition waste, which therefore could include some timber, green waste and other biodegradable materials, as well as contaminated soils. According to the Assessment and Management of Hazardous Ground Gases guidelines (NSW EPA, 2020), inert waste landfills have been known to produce landfill gas, albeit at a lower rate than putrescible waste landfills. Also the guidelines say building and demolition waste frequently contains plasterboard (gyprock) waste, which may generate hydrogen sulfide under anaerobic conditions, hydrogen may be generated when

acidic groundwater reacts with galvanised iron roofing, guttering and pipe waste and that a wide range of trace gases may also be present from inert waste landfills

The EPA notes that the Breen Resources EPL licence conditions identifies that the site has a network of gas monitoring bores, which have not been considered as part of the investigations to date.

The proposed development site is located with 250m of a landfill

CLAA also notes that Landfilling – EIS Guideline (Department of Urban Affairs and Planning, 1996) recommends that landfills should not generally be situated within 250 metres of environmentally sensitive areas, such as a residential zone, to protect the amenity of residential areas. Therefore, conversely, environmentally sensitive developments proposed within 250m of an existing landfill need to be carefully considered. The Breen Resources site is within 250 metres of the proposed development site, so it is important that DPE consider this as part of their considerations.

The Landfilling – EIS Guideline states that: "Some aspects of site investigations for inert waste landfills could be less rigorous than for solid waste landfills, but should still address all issues necessary to demonstrate site suitability". Therefore the guideline is considered relevant to the Breen Resources site.

The development site is located in a sensitive location

Bate Bay and Boat Harbour (Tasman Sea) are located immediately south of the site, both of which are popular recreational areas. Towra Point Nature Reserve (which includes a Ramsar listed wetland) is located just north-west of Lot 2. Quibray Bay, adjacent to Towra Point Nature Reserve is a protected marine sanctuary under the NSW *Fisheries Management Act 1994*.

CLAA consider that engagement of an auditor to review the existing investigations and documentation is warranted

Based on the limited contaminated land investigations which have been undertaken, including the intrusive investigation's lack of coverage of the sand extraction/rehabilitation areas which have occurred to date, the location of the landfill located just west of the proposed development and proposed sensitive land uses of the site, the EPA recommends that an accredited NSW site auditor be engaged to undertake an audit which determines whether:

- the PSI and ESA have appropriately assessed the potential for contamination to exist at the site;
- the conclusions of the PSI and ESA are appropriate; and
- and whether further investigations are needed to confirm whether the site is suitable for the proposed uses. This should include consideration of any risks posed by the landfill operation located just west of the site and whether the records held by Besmaw in relation to the importation of VEMN to the site since 1996 are sufficient to not require further contamination assessments to the sand extraction and rehabilitation areas of the site.

A review by a site auditor will provide increased certainty to DPE on whether the site is suitable for the proposed use and whether further investigations are warranted at the site. A Site Audit Statement providing an independent expert opinion on these matters will also provide confidence to the community that the issue of contamination has been appropriately considered.

Recommendations

1. Besmaw should engage a NSW accredited site auditor to undertake an audit for the site which determines whether:
 - a) the PSI and ESA have appropriately assessed the potential for contamination to exist at the site;

- b) the conclusions of the PSI and ESA are appropriate; and
- c) further investigations are needed to confirm whether the site is suitable for the proposed uses. This should include consideration:
 - of any risks posed by the landfill operation located just west of the site, including risks from potential landfill gas generation; and
 - whether the records held by Besmaw in relation to the importation of VEMN to the site, such as the Annual Environmental Reports, Independent Environmental Audit reports and any other records Besmaw hold, are sufficient to not require further contamination assessments to the sand extraction and rehabilitation areas of the site.

2. DPE Planning should:

- a) note the guideline *Landfilling – EIS Guideline* (Department of Urban Affairs and Planning, 1996) and that Breen Resources landfill site has been identified within 250 metres of the proposed development site.

Besmaw Land Rehabilitation History/summary – November 2022

TIMELINE

| | |
|------------------|--|
| 28 June 1996 | First delivery of VENM received |
| 11 July 1996 | EPA Inspection |
| 12 July 1996 | Deliveries ceased in order to prepare an application to the EPA |
| August 1996 | EPA water sampling following July inspection – No concerns identified |
| July to Oct 1996 | EMP developed to codify the procedures that ensured compliance |
| 11 October 1996 | Application for Pollution Control and Environmental Management Plan lodged |
| 14 October 1996 | Deliveries of VENM recommenced with EPA approval |
| 25 October 1996 | First Water Sampling conducted on site by Coffey– results issued in Feb 1997 |
| 7 February 1997 | Original EPL 5658 issued |
| February 1999 | First ERM Annual Environmental Report (reviewing '97 to '98 period) |
| March 1999 | First Audit of ERM Annual Environmental Report performed by Coffey |
| Feb 2000 onwards | Coffey and ERM audits and reports performed annually |

COMPLIANCE AND MONITORING

Between 1999 and 2018 ERM was commissioned by Besmaw to conduct yearly Environmental audits providing assessments of environmental performance and established environmental objectives to ensure compliance with EPL5658 (EPL) and the Environmental Management Plan (EMP) developed at that time by Mitchell McCotter (later became EMM) for Besmaw. The reports focused primarily on the management of material accepted on site and the monitoring of surface water and groundwater.

As a further check, Coffey was engaged to review the findings of the Annual Environmental Report and did so on a yearly basis from 1999 to 2018. In March 2019, Coffey conducted an Assessment of Compliance with the EPL and since 2020, Zoic/Gosyntec have conducted the annual Independent Environmental Audits for the site.

Some of the information contained in the audit reports is used to inform the EPL Annual Return.

Besmaw continues to operate strictly according to the EMP which is an internal control to ensure compliance with the EPL. The EMP describes Besmaw's processes for environmental management including extensive layers of control to confirm that material accepted at the site is VENM.

Initially the EPL required compliance with various parts of the EMP as a condition. This was varied in 2001 to incorporate the relevant conditions into the EPL itself. Besmaw continues to use the EMP as a voluntary management tool and conducts continuous improvement reviews to further enhance its effectiveness.

Besmaw has also developed a set of subsidiary Standard Operating Procedures that further detail various environmental requirements that staff use to guide their activities on a daily basis.

Testing results and annual returns are publicly available and demonstrate ongoing compliance and the lack of any contamination present on the site.

Our reference: DOC12/43333

Jamie Gilchrist
OnePath
Senior Manager, Commercial Mortgages
Level 11
347 Kent Street
Sydney NSW 2000

Dear Mr Gilchrist

260 Captain Cook Drive, Kurnell

I am writing to inform you of the outcome of the Environment Protection Authority's (EPA) assessment of residual contamination at the above site under the *Contaminated Land Management Act 1997* (CLM Act).

Based on reports provided to the EPA, we understand that extensive investigation, remediation and validation works have been conducted at the site. The works were conducted to investigate and/or remediate a range of contaminants at the site, including cyclohexane, styrene, ethyl benzene, heavy end petroleum hydrocarbons, polycyclic aromatic hydrocarbons, polychlorinated biphenyls and asbestos.

The results of investigation, remediation and validation works have been assessed against matters listed under section 12 of the CLM Act. It has been determined that there are no reasons to believe that residual contamination at the site is significant enough to warrant regulation under the CLM Act because:

- Investigation and validation results indicate that any residual contamination in soil would not pose an unacceptable risk to human health under the current and approved use of the site;
- There are no current human exposure pathways to residual contamination in groundwater as it is understood that groundwater is not extracted for beneficial use at the site; and
- Groundwater monitoring results indicate that the offsite migration of cyclohexane in groundwater does not pose an unacceptable risk to the down gradient sensitive environment of Quibray Bay.

We note that residual contamination in groundwater at the site is identified through a Groundwater Management Plan (GMP), which states that groundwater is not to be extracted at the site for any use other than monitoring. We understand that the GMP will continue to be implemented at the site until such time as is deemed appropriate for implementation to cease in accordance with the requirements of the site audit statement prepared for the site in 2009.

It is important that the GMP is noted on the title for Lot 4 DP270389 via a positive covenant under section 88B of the *Conveyancing Act 1919* and we understand that this will be finalised either by the current mortgagee in possession of the site or the new site owner if the site is sold in the near future. Please provide a copy of the covenant for our records when finalised.

Facsimile message

DOC 5

To David Taylor

Fax Number 9922 2652

From Gareth Thomas

Ref/Job Number 96123

Subject Besmaw Application for Pollution Control Approval

Date 10 October 1996

Level 1
 24 Falcon Street
 Crows Nest NSW 2065
 AUSTRALIA

PO Box 943
 Crows Nest NSW 2065
 AUSTRALIA

Telephone: 61 2 9906-1666

Facsimile: 61 2 9906-5375



**MITCHELL
 McCOTTER**

Page 1 of 1

Dear David,

Further to our earlier phone conversation I would like to confirm lodgement of the finalised Application for Pollution Control Approval together with the finalised Environmental Management Plan incorporating comments resulting from your review of the draft document provided in your letter to Phillip Holt of the 25th of September 1996.

Could you please confirm in writing that the current notices being applied to the premises at Kurnell have been lifted on lodgement of the application and requisite funds as agreed during today's conversation.

Please contact me if you have any queries.

Kindest Regards

G. Thomas
 Gareth Thomas

Noted [Signature]

CONFIDENTIALITY NOTICE

This transmission is intended only for the use of the addressee and is confidential. If you are not the addressee it may be unlawful for you to read, copy, distribute, disclose or otherwise use the information in this facsimile. If you are not the intended recipient, please telephone or fax us immediately.

Our reference : DOC07/46580
Contact : Ruth Owler, 9995 5586

20 NOV 2007

Mr Arthur Phillip Holt
Managing Director
Besmaw Pty Ltd
PO Box 1630
North Sydney NSW 2059

Attn: Mr Matthew Holt

Standard Post

14 November 2007

Dear Mr Holt

**Besmaw Pty Limited – Lot 2 Captain Cook Drive, Kurnell –
Environment Protection Licence (Licence no. 5658) –
Draft Licence Variation Notice (Notice no. 1080046)**

I refer to your correspondence dated 23 October 2007 relating to provision of an updated map of monitoring point locations at the above premises. I also refer to a report titled "Technical Review of Groundwater Monitoring Network and Data – Besmaw Pty Limited" ("the report") prepared by Ian Grey Groundwater Consulting Pty Limited and dated July 2006. Please find attached a copy of the report for your reference.

Please note that, although the Environment Protection Authority ("EPA") is now a part of the Department of Environment and Climate Change NSW ("DECC"), certain statutory functions and powers continue to be exercised in the name of the EPA.

The EPA has recently conducted a licence review as required under section 78 of the *Protection of the Environment Operations Act 1997*. As part of the review the recommendations of the report were also considered. The EPA is proposing changes to the licence to incorporate the recommendations of the report.

In addition the monitoring on the licence has been updated to reflect the standard EPA monitoring suite for groundwater and surface water monitoring at landfill sites. In applying the standard protocol for monitoring the EPA has also considered the topography of the site. The EPA's normal approach to environmental monitoring for landfills is to monitor for an increased suite of pollutants for the groundwater monitoring and a decreased suite of pollutants for the surface water monitoring on the licence. This is because usually any landfill leachate escaping the site will impact upon groundwater before surface waters.

The Department of Environment and Conservation NSW is now known as
the Department of Environment and Climate Change NSW

PO Box A290 Sydney South NSW 1232
59-61 Goulburn St Sydney NSW 2000
Tel: (02) 9995 5000 Fax: (02) 9995 5999
TTY (02) 9211 4723
ABN 30 841 387 271
www.environment.nsw.gov.au

Department of **Environment and Conservation** NSW



However, given that the landfilling at this premises is being undertaken with virgin natural excavated material only under the water table the EPA is proposing an increased suite of monitoring in the surface waters of the dredge pond and a decreased suite of monitoring for the groundwater bores.

Please find attached a draft licence variation notice (notice no. 1080046) which sets out the changes the EPA proposes to make to the licence.

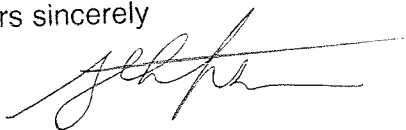
Before the notice can be finalised the following information is required from Besmaw Pty Limited:

- Easting and Northing co-ordinates for each monitoring location. The co-ordinates need to be in either GDA94 or WGS84 format,

Could you please review the draft notice and provide the above requested information, and any comments, to Manager Waste Operations, DECC, PO Box A290, Sydney South 1232 or via facsimile on 9995 5930 by not later than **Friday 7 December 2007**.

If you have any queries relating to the above please contact Ruth Owler on 9995 5586.

Yours sincerely



JULIAN THOMPSON
Unit Head Waste Operations
Environment Protection & Regulation
Department of Environment & Climate Change NSW

APPENDIX C

**Selected Monitoring Results
Tables & Graphs**

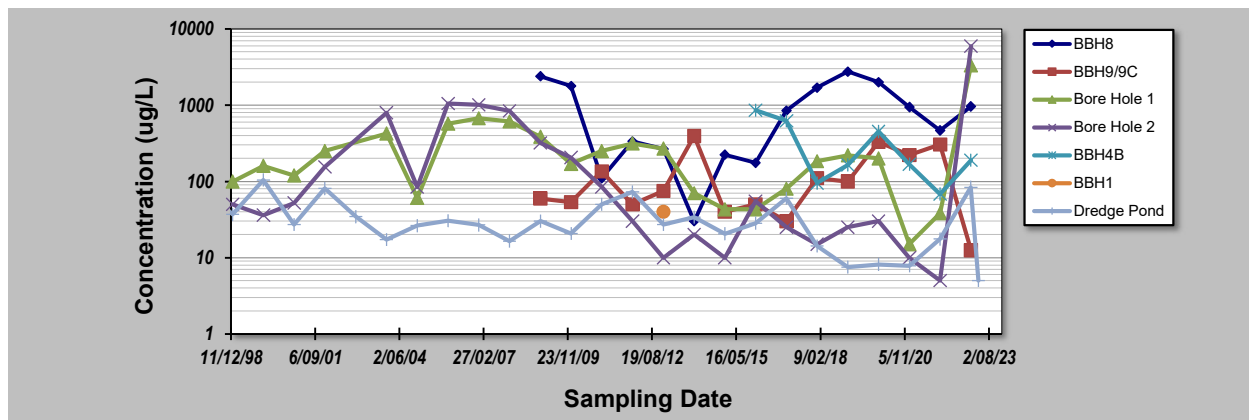


GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

| | |
|-----------------------------------|----------------------------------|
| Evaluation Date: 2-Jun-23 | Job ID: Besmaw |
| Facility Name: Besmaw HLRC | Constituent: Ammonia |
| Conducted By: JE | Concentration Units: ug/L |

| | | | | | | | |
|--------------------|-------------|----------------|--------------------|--------------------|--------------|-------------|--------------------|
| Sampling Point ID: | BBH8 | BBH9/9C | Bore Hole 1 | Bore Hole 2 | BBH4B | BBH1 | Dredge Pond |
|--------------------|-------------|----------------|--------------------|--------------------|--------------|-------------|--------------------|

| Sampling Event | Sampling Date | AMMONIA CONCENTRATION (ug/L) | | | | | | |
|-----------------------------|---------------|------------------------------|----------|-------------|-------------|--------|------|-------------|
| | | BBH8 | BBH9/9C | Bore Hole 1 | Bore Hole 2 | BBH4B | BBH1 | Dredge Pond |
| 1 | 31/12/96 | | | | | | | 20 |
| 2 | 31/12/97 | | | | | | | 85 |
| 3 | 31/12/98 | | | 100 | 50 | | | 36.75 |
| 4 | 31/12/99 | | | 160 | 36 | | | 104.38 |
| 5 | 31/12/00 | | | 120 | 52 | | | 27.2 |
| 6 | 31/12/01 | | | 250 | 155 | | | 81 |
| 7 | 31/12/02 | | | | | | | 34.5 |
| 8 | 31/12/03 | | | 425 | 795 | | | 17.25 |
| 9 | 31/12/04 | | | 61 | 84 | | | 26.2 |
| 10 | 31/12/05 | | | 570 | 1050 | | | 30.4 |
| 11 | 31/12/06 | | | 670 | 1010 | | | 26.8 |
| 12 | 31/12/07 | | | 610 | 840 | | | 16.45 |
| 13 | 31/12/08 | 2400 | 59.5 | 385 | 320 | | | 30.09 |
| 14 | 31/12/09 | 1780 | 53.5 | 170 | 205 | | | 20.75 |
| 15 | 31/12/10 | 110 | 135 | 250 | 85 | | | 49.82 |
| 16 | 31/12/11 | 335 | 50 | 315 | 30 | | | 72.41 |
| 17 | 31/12/12 | 266 | 75 | 270 | 10 | | 40 | 27.1 |
| 18 | 31/12/13 | 30 | 395 | 70 | 20 | | | 33.96 |
| 19 | 31/12/14 | 225 | 40 | 43 | 10 | | | 20.63 |
| 20 | 31/12/15 | 175 | 50 | 43 | 55 | 855 | | 28.33 |
| 21 | 31/12/16 | 845 | 30 | 80 | 25 | 625 | | 60 |
| 22 | 31/12/17 | 1700 | 110 | 185 | 15 | 95 | | 14.17 |
| 23 | 31/12/18 | 2750 | 100 | 220 | 25 | 165 | | 7.5 |
| 24 | 31/12/19 | 2000 | 330 | 200 | 30 | 450 | | 8.13 |
| 25 | 31/12/20 | 943 | 222 | 15 | 10 | 168 | | 7.81 |
| 26 | 31/12/21 | 465 | 305 | 38 | 5 | 68 | | 17.5 |
| 27 | 31/12/22 | 960 | 12.5 | 3340 | 5950 | 190 | | 83.75 |
| 28 | 31/03/23 | | | | | | | 5 |
| 29 | | | | | | | | |
| 30 | | | | | | | | |
| Coefficient of Variation: | | 0.90 | 0.93 | 1.85 | 2.69 | 0.88 | | 0.76 |
| Mann-Kendall Statistic (S): | | 15 | 8 | -44 | -91 | -10 | | -109 |
| Confidence Factor: | | 75.2% | 63.3% | 85.5% | 98.8% | 86.2% | | 99.2% |
| Concentration Trend: | | No Trend | No Trend | No Trend | Decreasing | Stable | | Decreasing |



Notes:

- At least four independent sampling events per well are required for calculating the trend. Methodology is valid for 4 to 40 samples.
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

DISCLAIMER: The GSI Mann-Kendall Toolkit is available "as is". Considerable care has been exercised in preparing this software product; however, no party, including without limitation GSI Environmental Inc., makes any representation or warranty regarding the accuracy, correctness, or completeness of the information contained herein, and no such party shall be liable for any direct, indirect, consequential, incidental or other damages resulting from the use of this product or the information contained herein. Information in this publication is subject to change without notice. GSI Environmental Inc., disclaims any responsibility or obligation to update the information contained herein.
GSI Environmental Inc., www.gsi-net.com

NOTE: Where data was reported <PQL this has been substituted by a value equal to half the PQL.

Levels of Adsorbable Organic Halogens

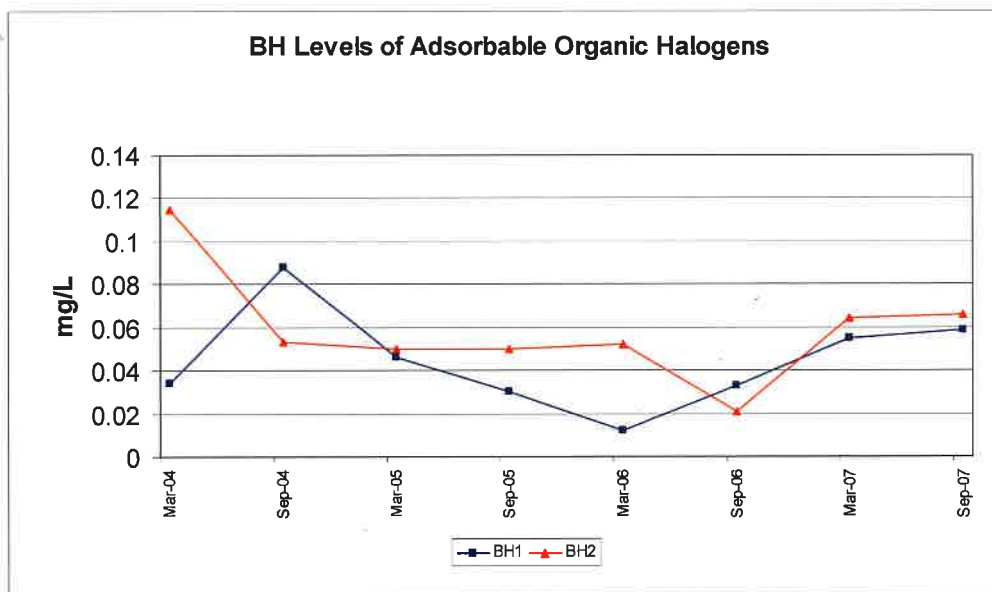
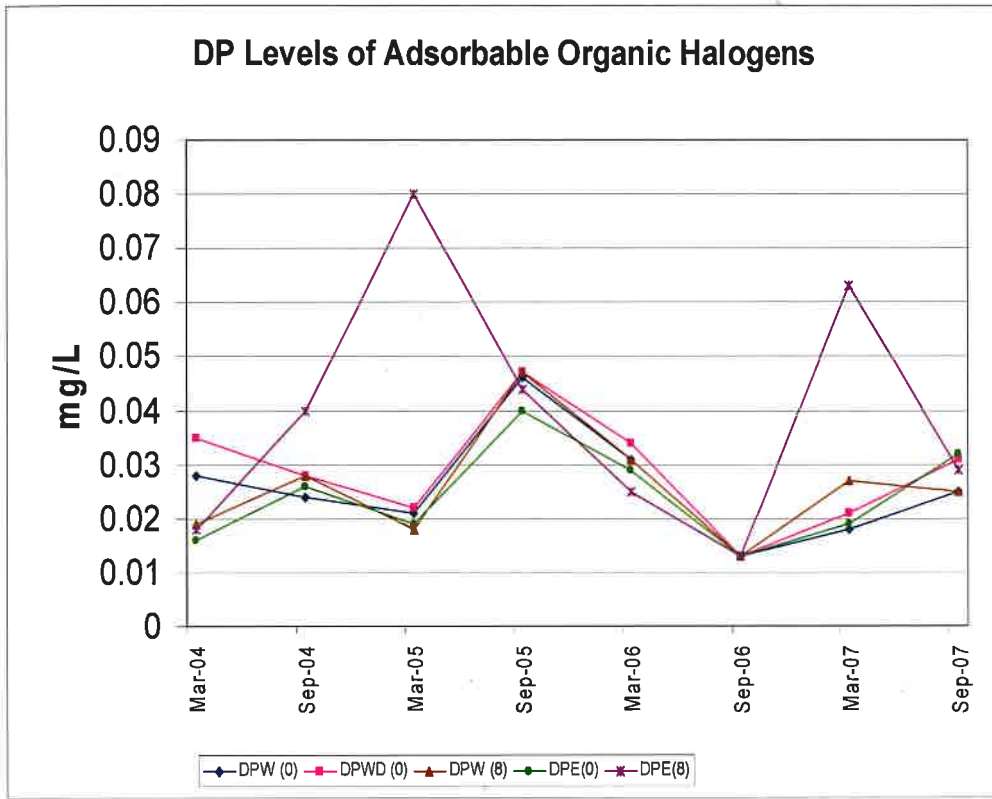
| | 2003 | | 2004 | | 2005 | | 2006 | | 2007 | | 2008 | |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-----|
| | Mar | Sep | Mar | Sep | Mar | Sep | Mar | Sep | Mar | Sep | Mar | Jun |
| DPW (0) | 0.028 | 0.024 | 0.021 | 0.046 | 0.031 | 0.013 | 0.018 | 0.025 | 0.018 | 0.025 | | |
| DPWD (0) | 0.035 | 0.028 | 0.022 | 0.047 | 0.034 | 0.013 | 0.021 | 0.031 | 0.021 | 0.031 | | |
| DPW (8) | 0.019 | 0.028 | 0.018 | 0.047 | 0.031 | 0.013 | 0.027 | 0.025 | 0.027 | 0.025 | | |
| DPE(0) | 0.016 | 0.026 | 0.019 | 0.04 | 0.029 | 0.013 | 0.019 | 0.032 | 0.019 | 0.032 | | |
| DPE(8) | 0.018 | 0.04 | 0.08 | 0.044 | 0.025 | 0.013 | 0.063 | 0.029 | 0.063 | 0.029 | | |
| BH1 | 0.034 | 0.088 | 0.046 | 0.03 | 0.012 | 0.033 | 0.055 | 0.059 | 0.055 | 0.059 | | |
| BH2 | 0.115 | 0.053 | 0.05 | 0.05 | 0.052 | 0.021 | 0.064 | 0.066 | 0.064 | 0.066 | | |

N.B.

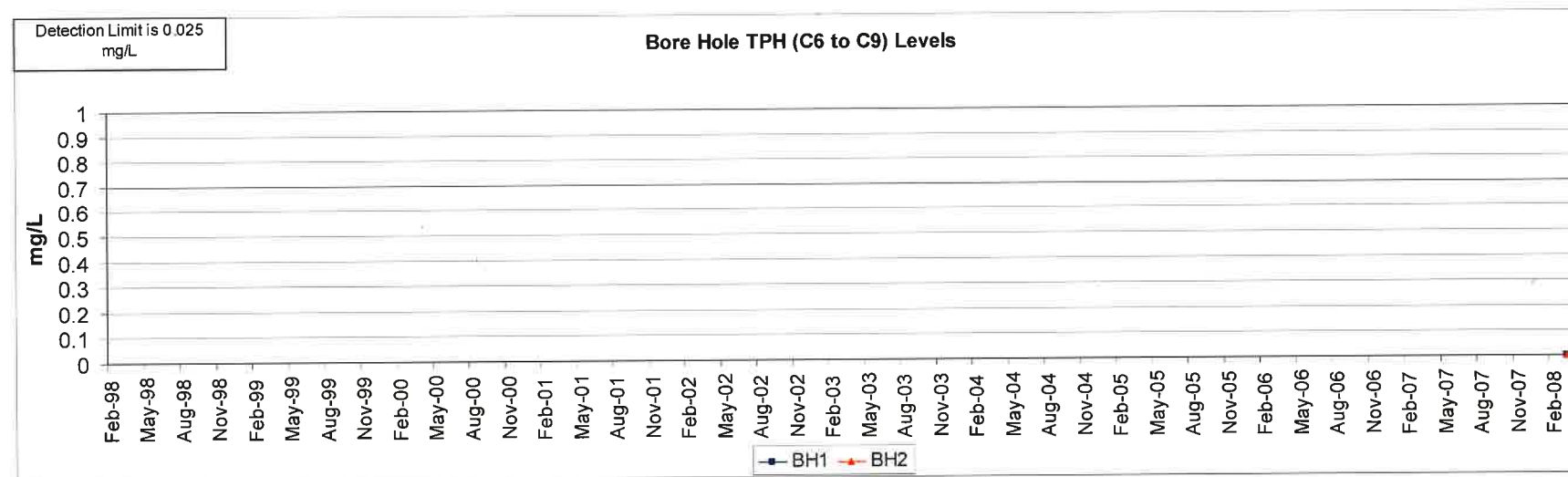
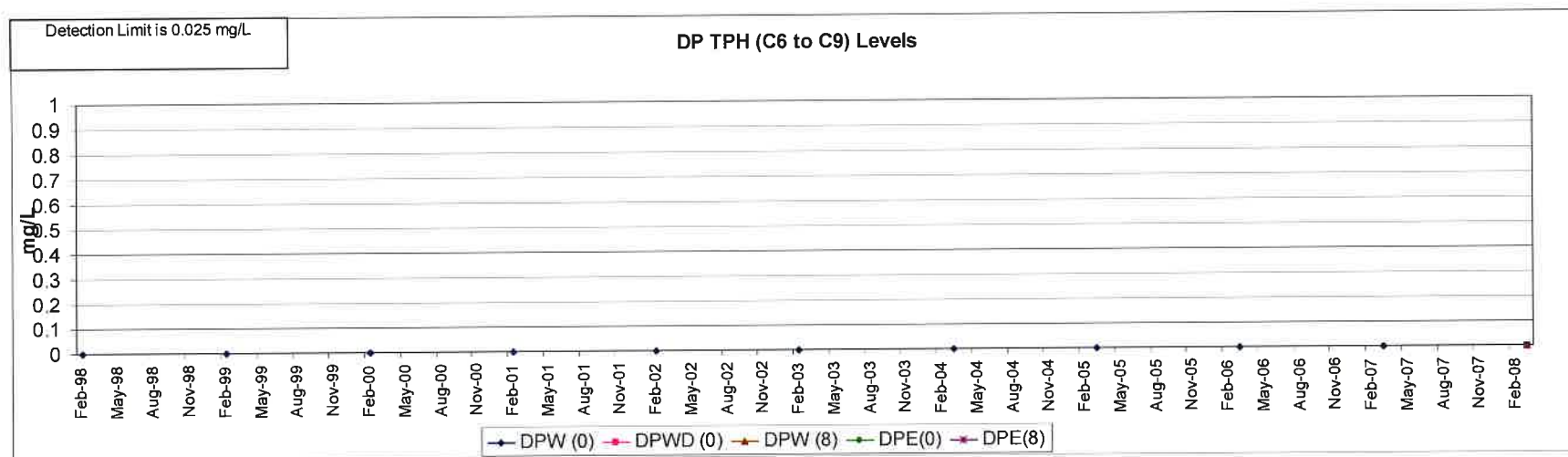
-All values are in mg/L

-Graphs are plotted from data on lines 7 to 14.

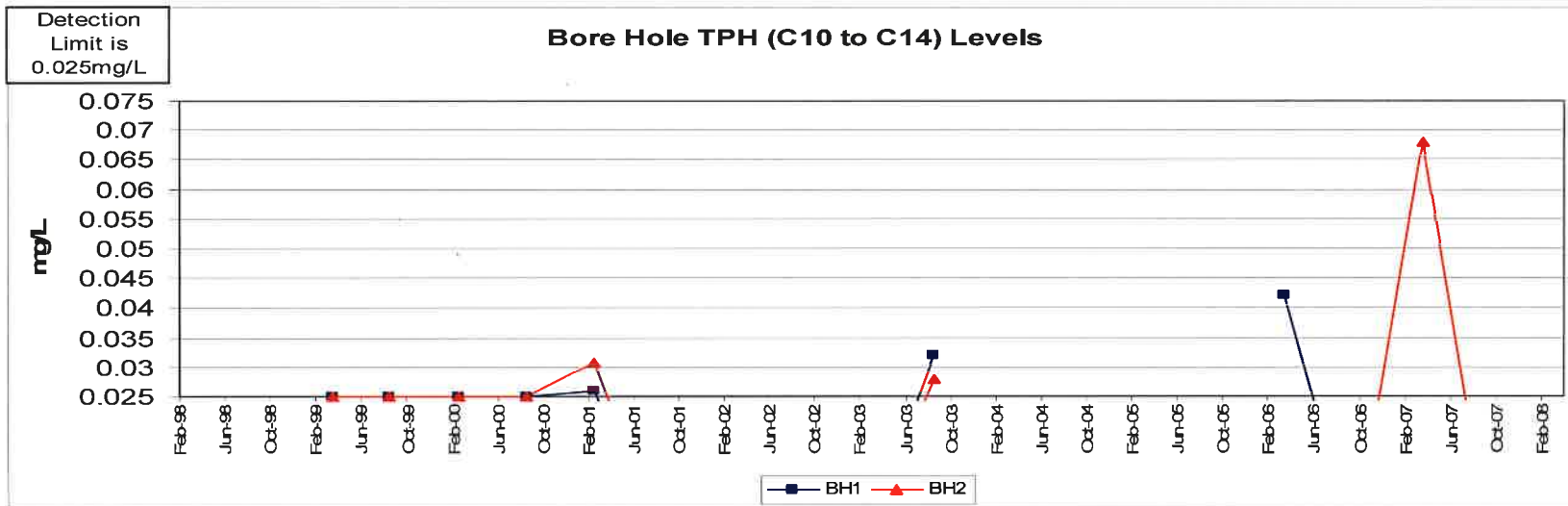
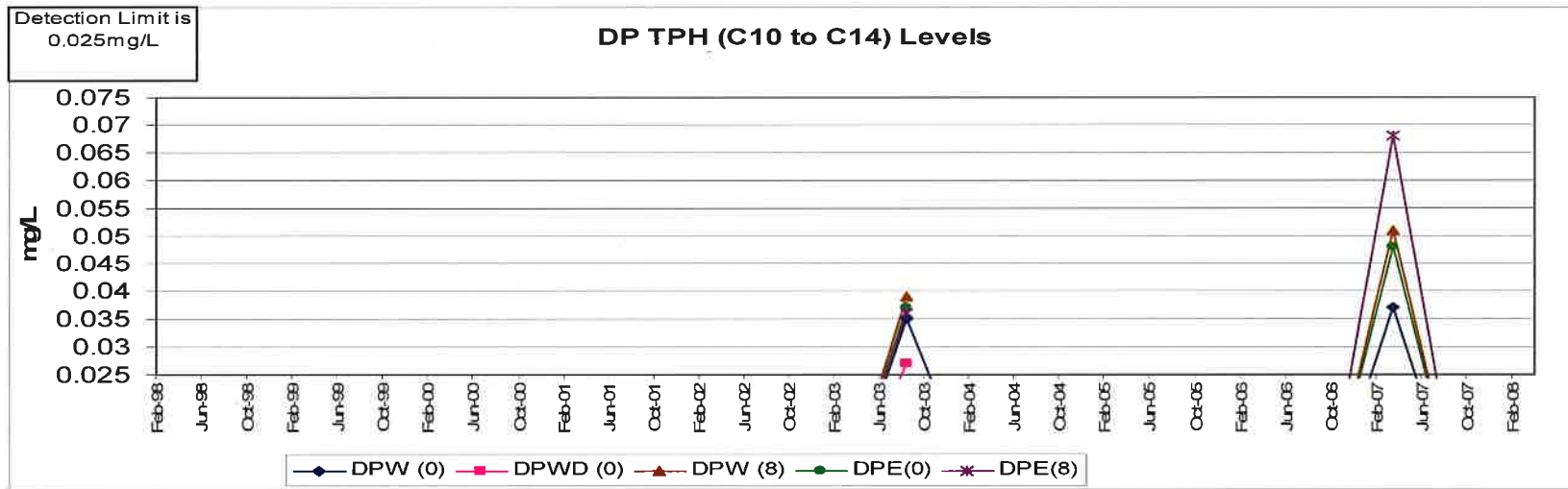
Absorbable Organic Halogens



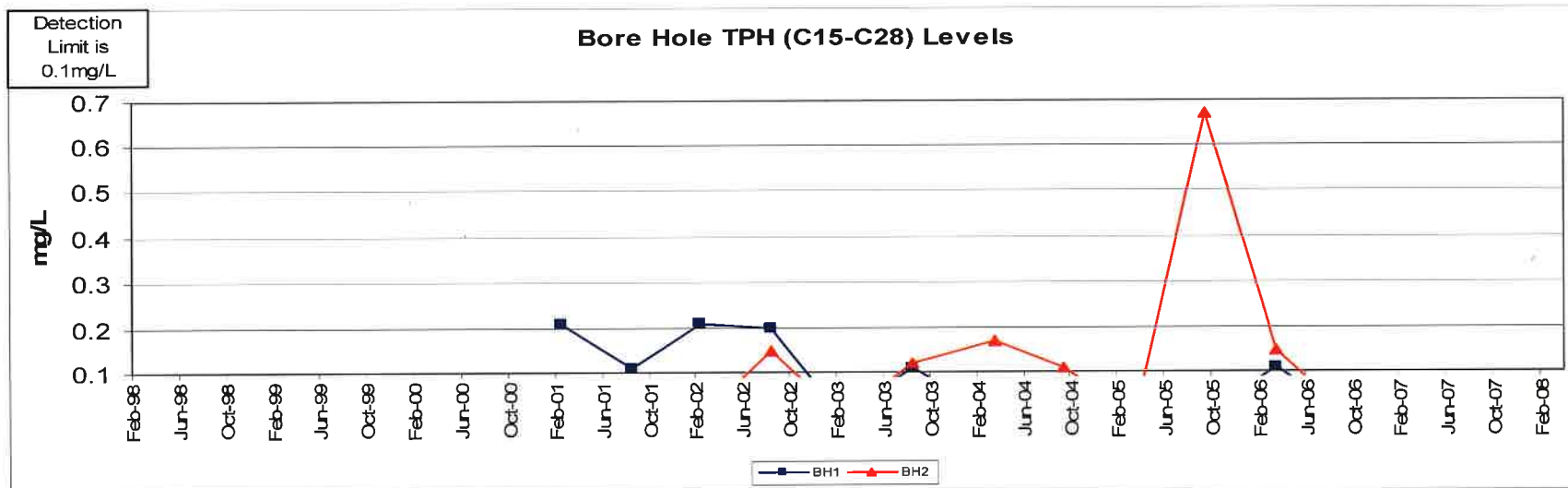
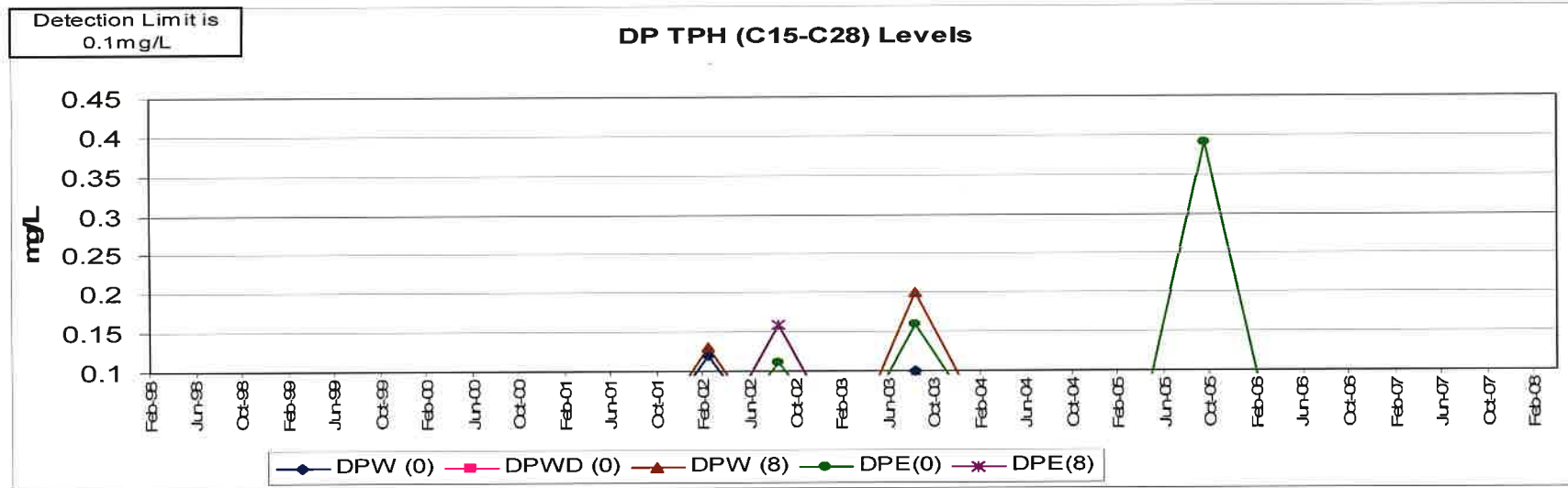
TPH (6 to 9) Levels



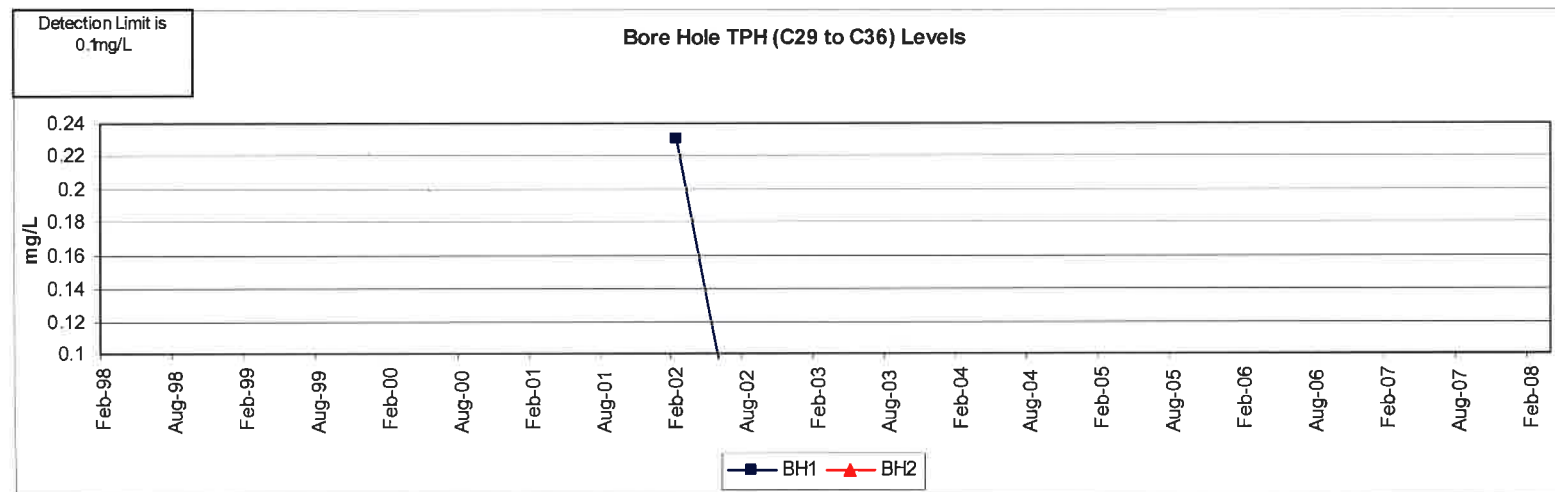
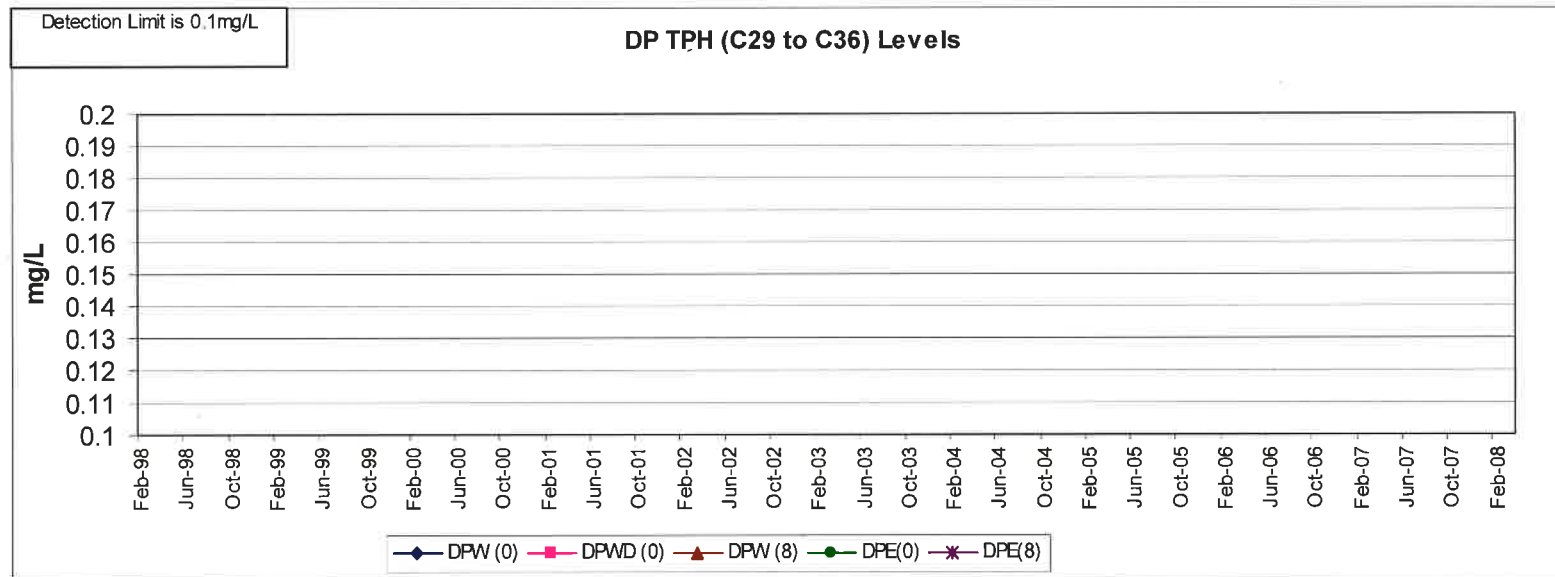
TPH (C 10 to C14) Levels



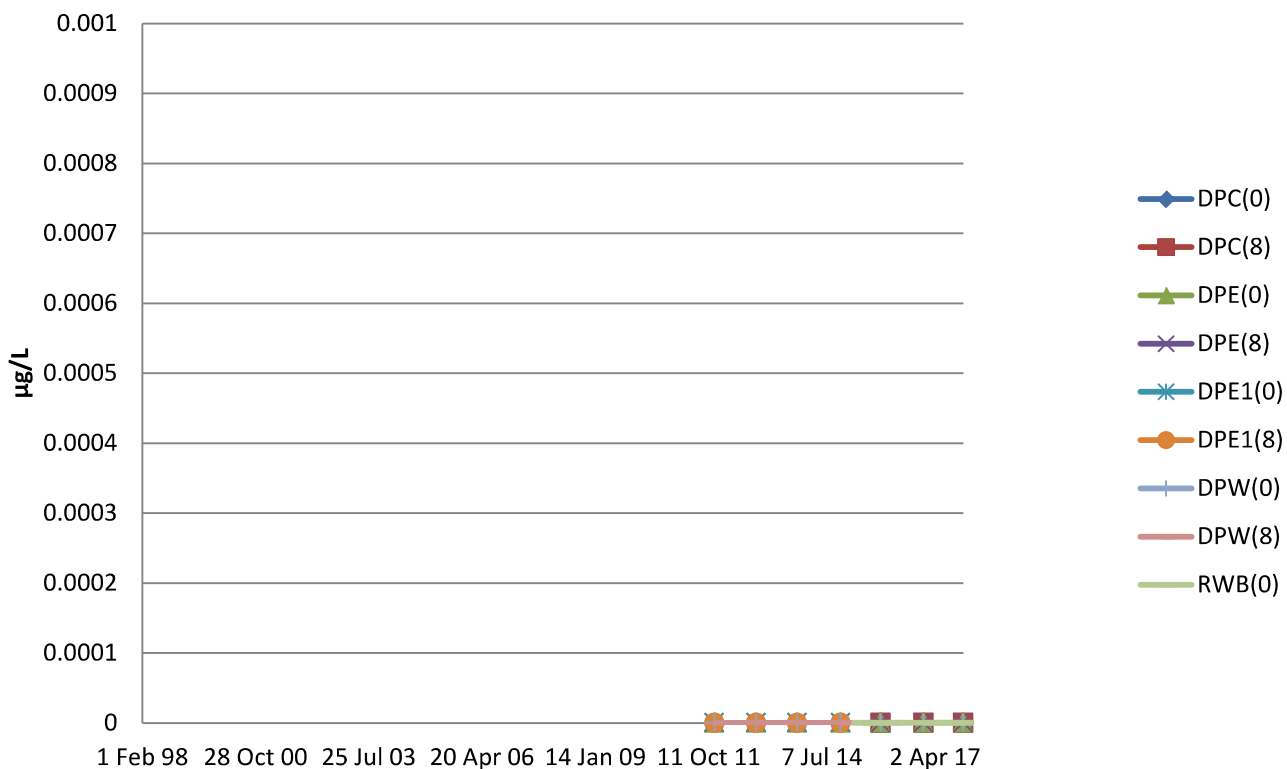
TPH (C15 to C28) Levels



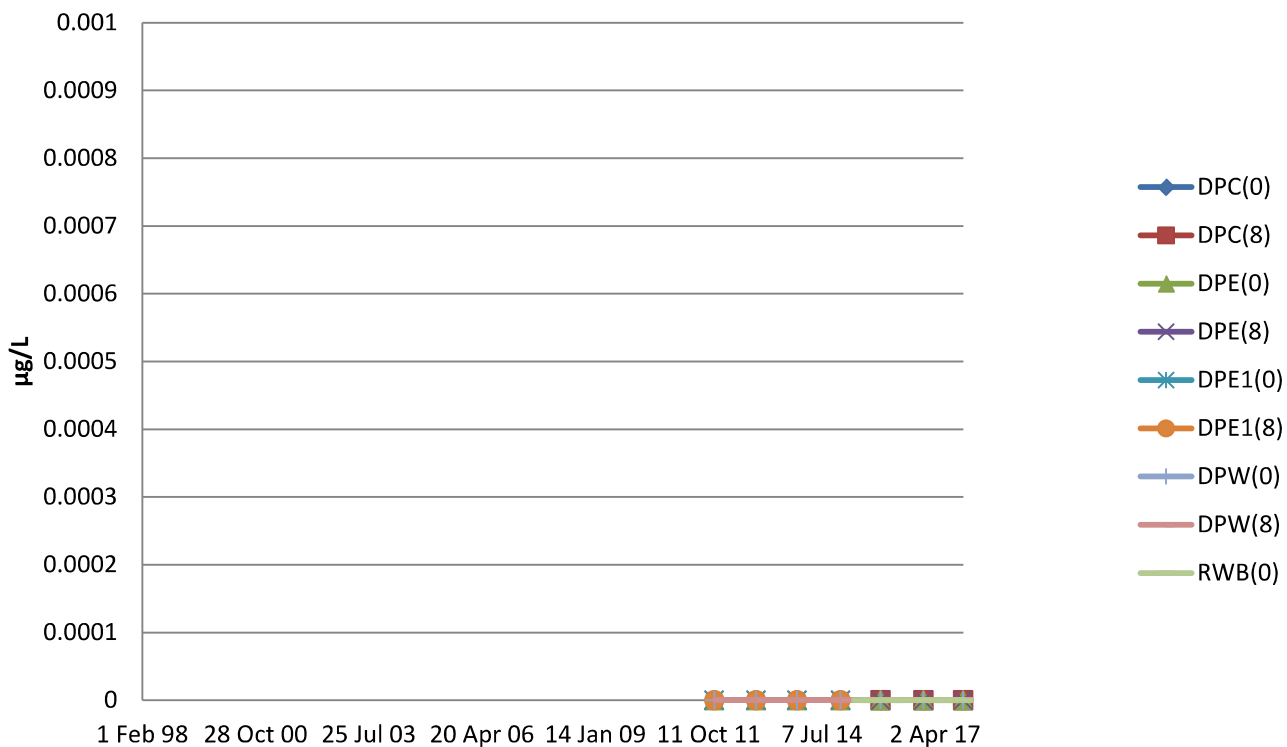
TPH (C29 to C36) Levels



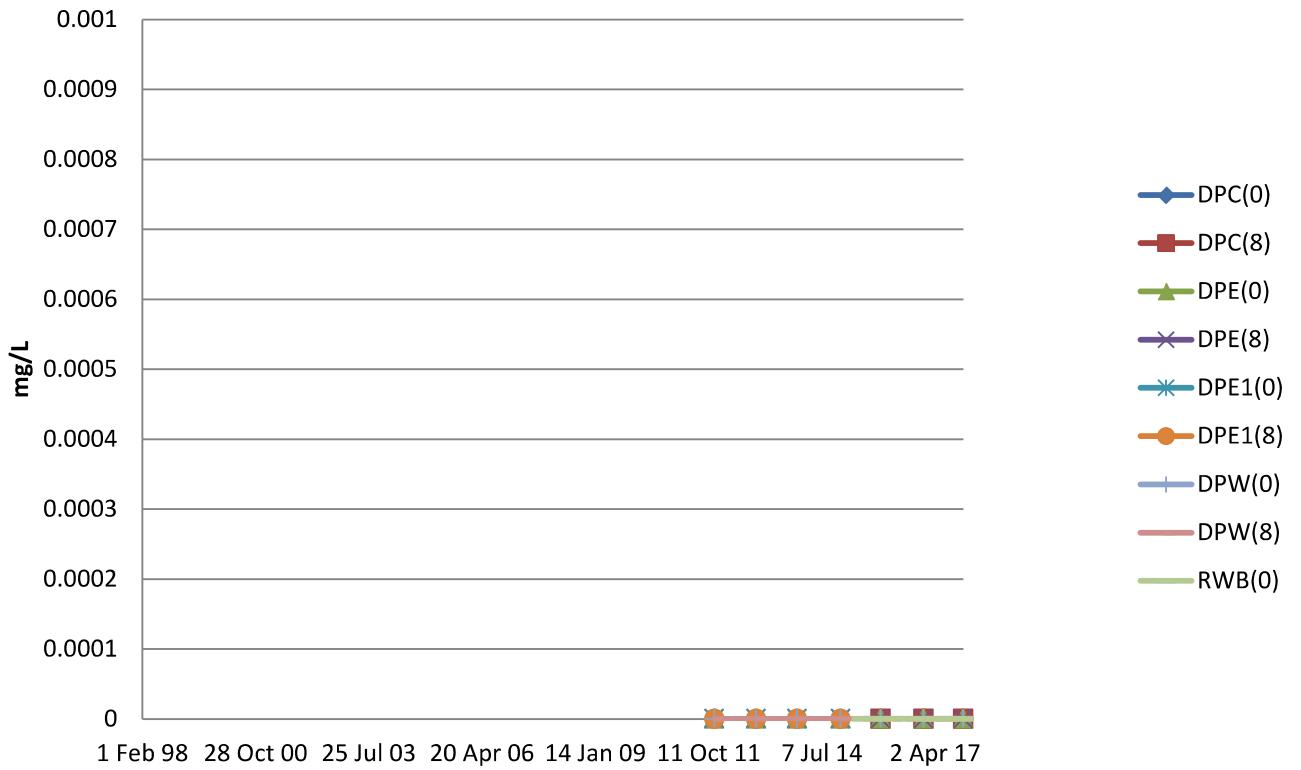
C6-C10 (minus BTEX) (F1)-T



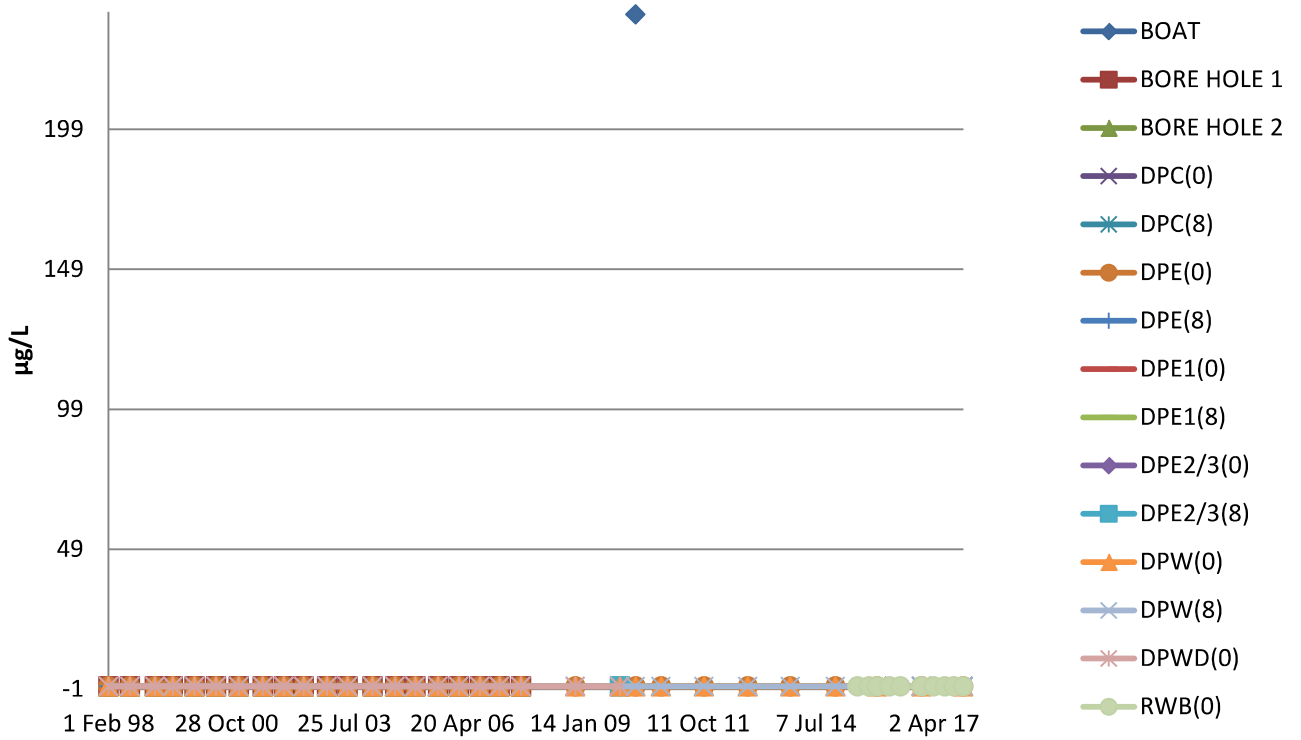
C6-C10-T



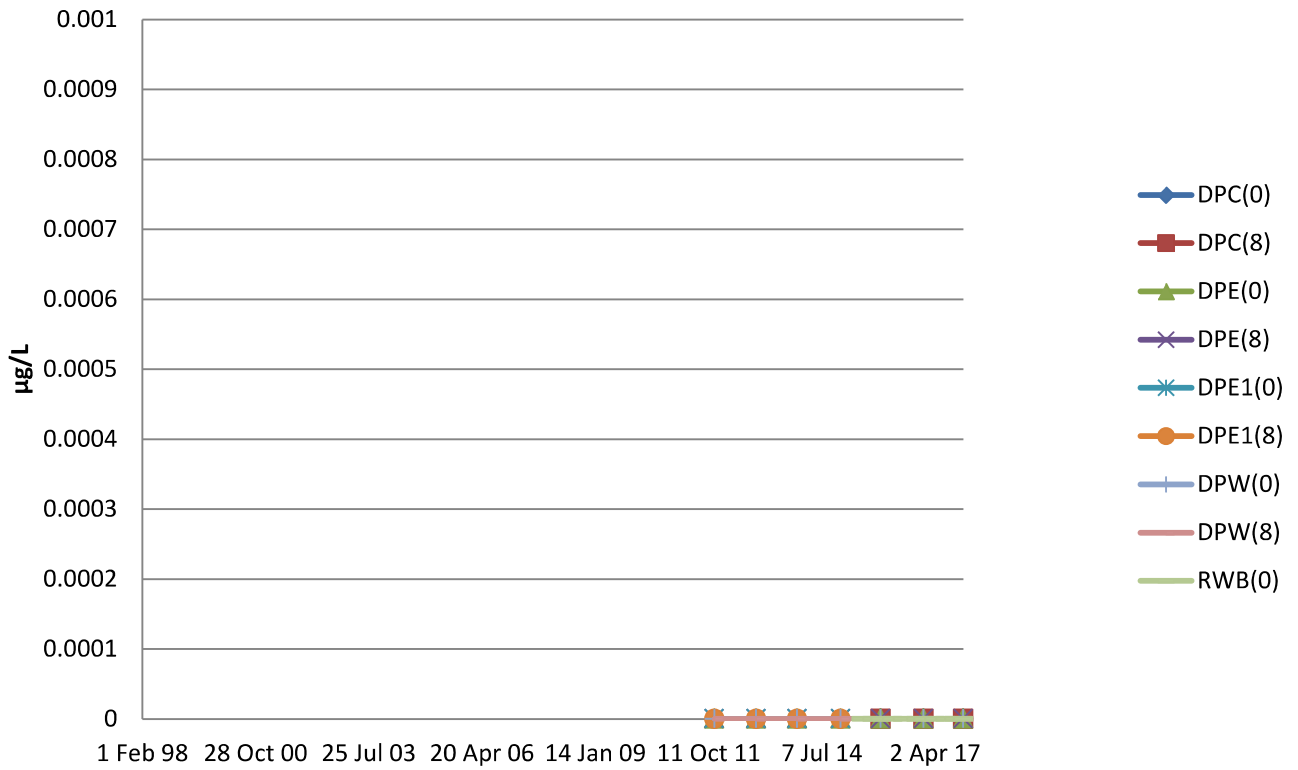
C34-C40-T



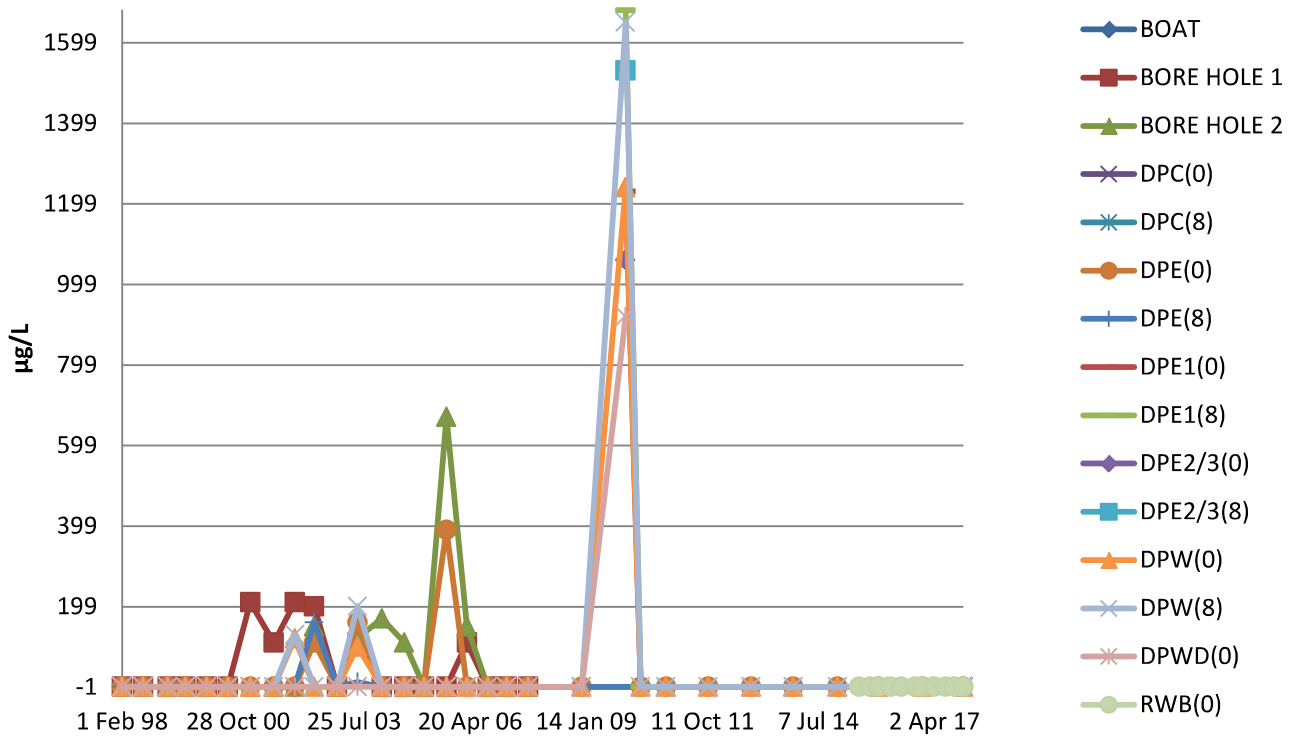
C6 - C9-T



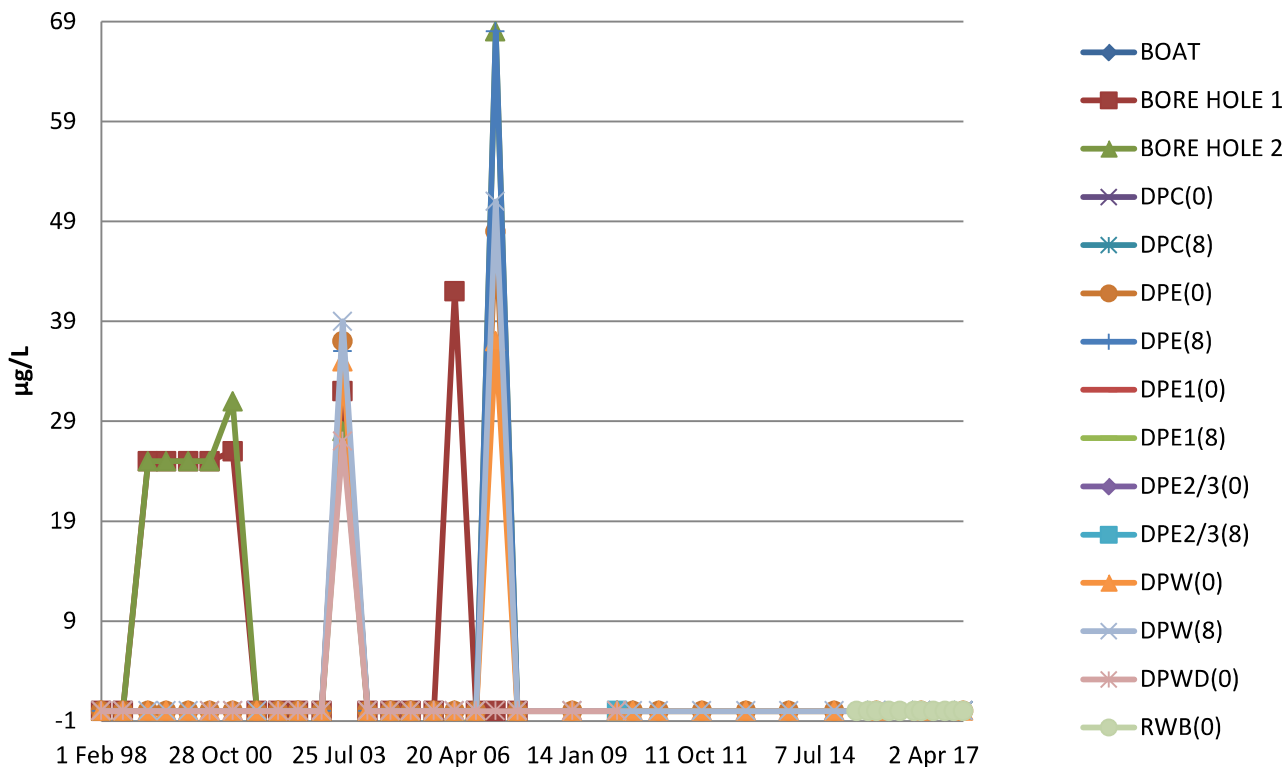
C10-C16-T



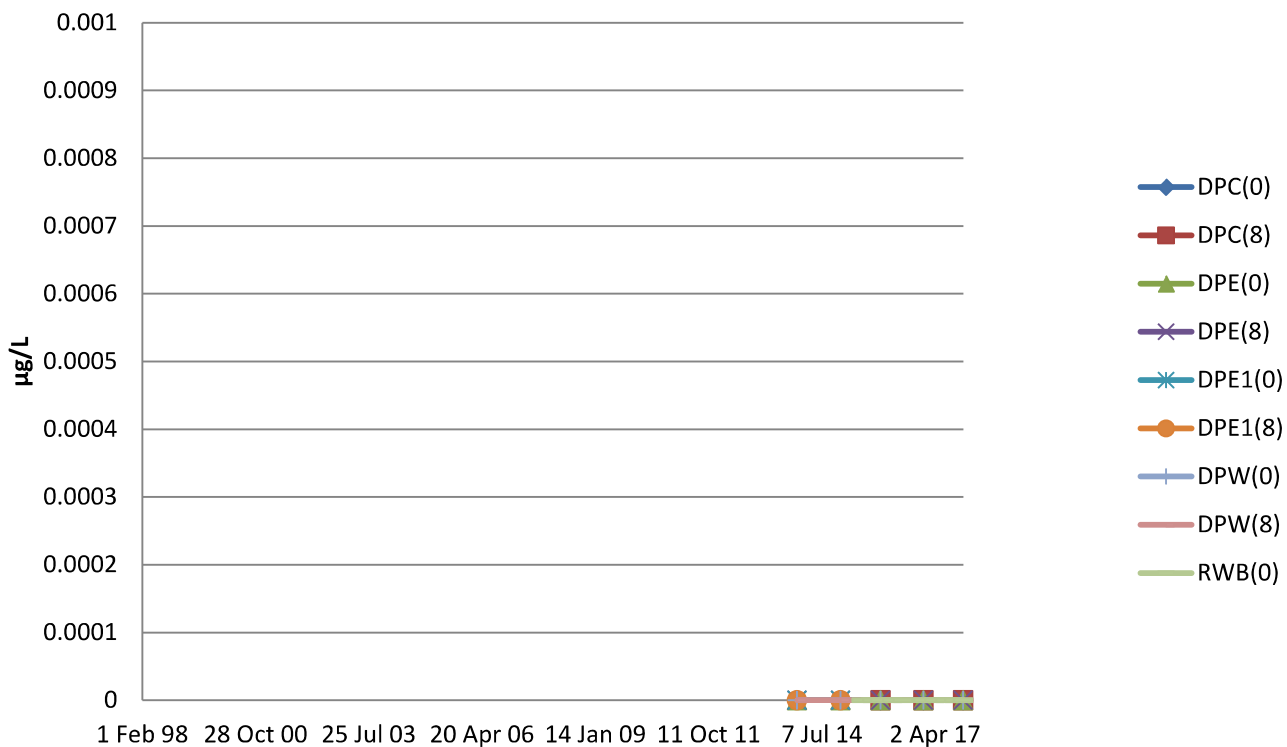
C15 - C28-T



C10 - C14-T

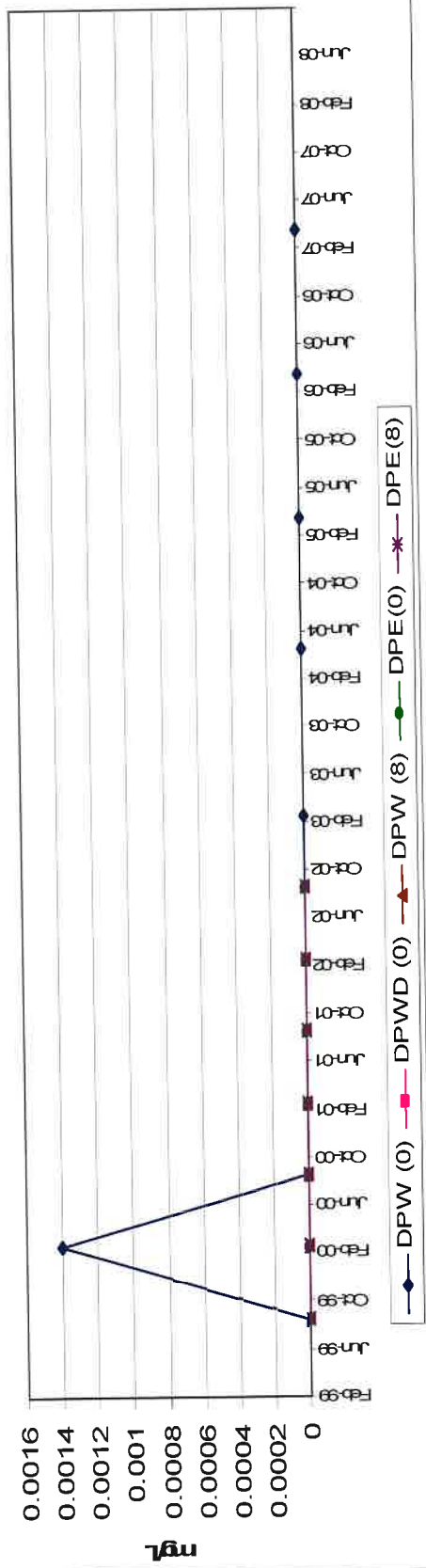


C10-C16 (minus Naphthalene) (F2)-T

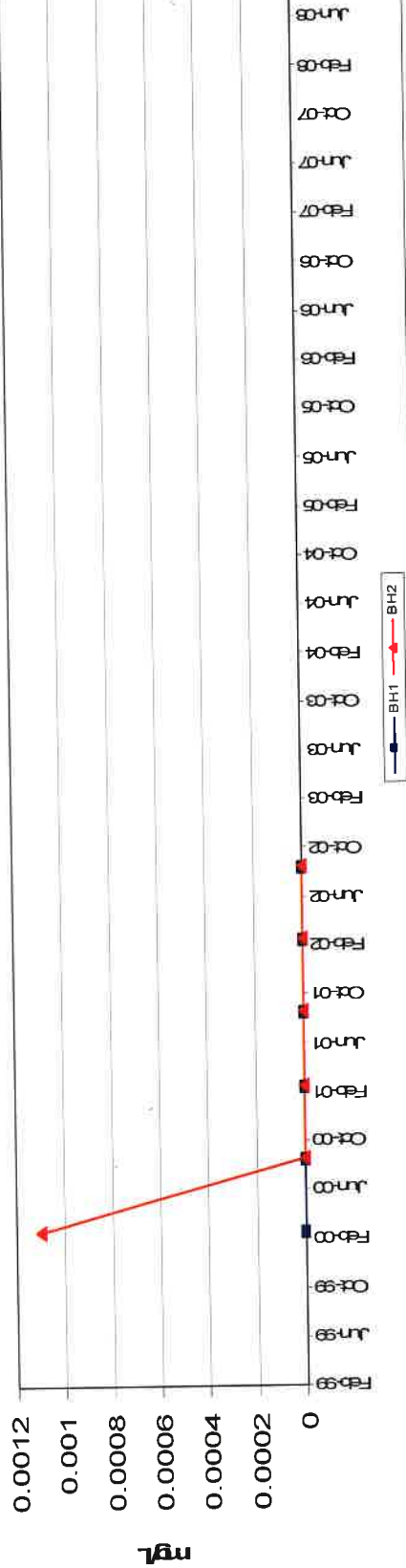


Phenol Levels

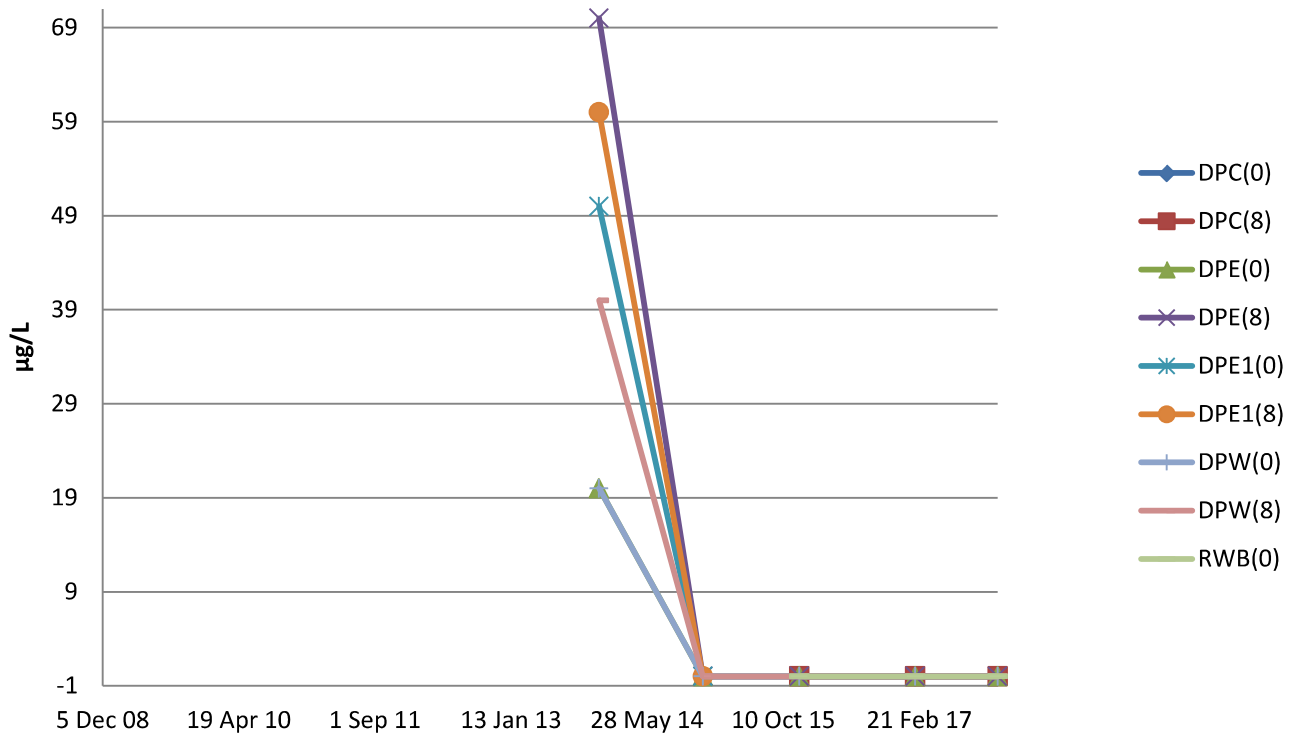
DP Phenol Levels



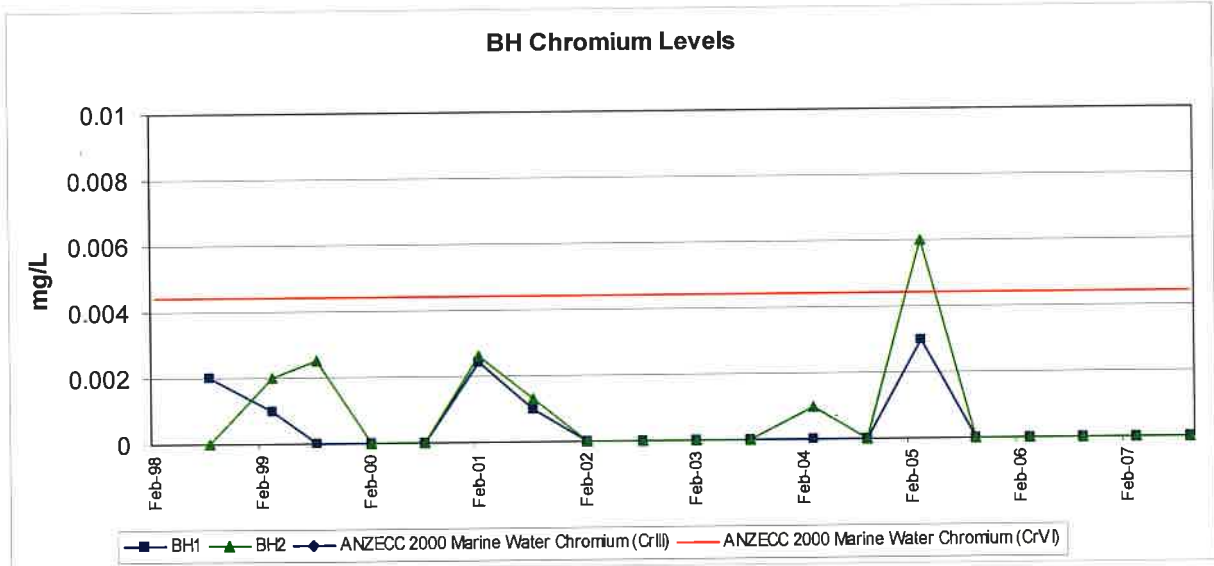
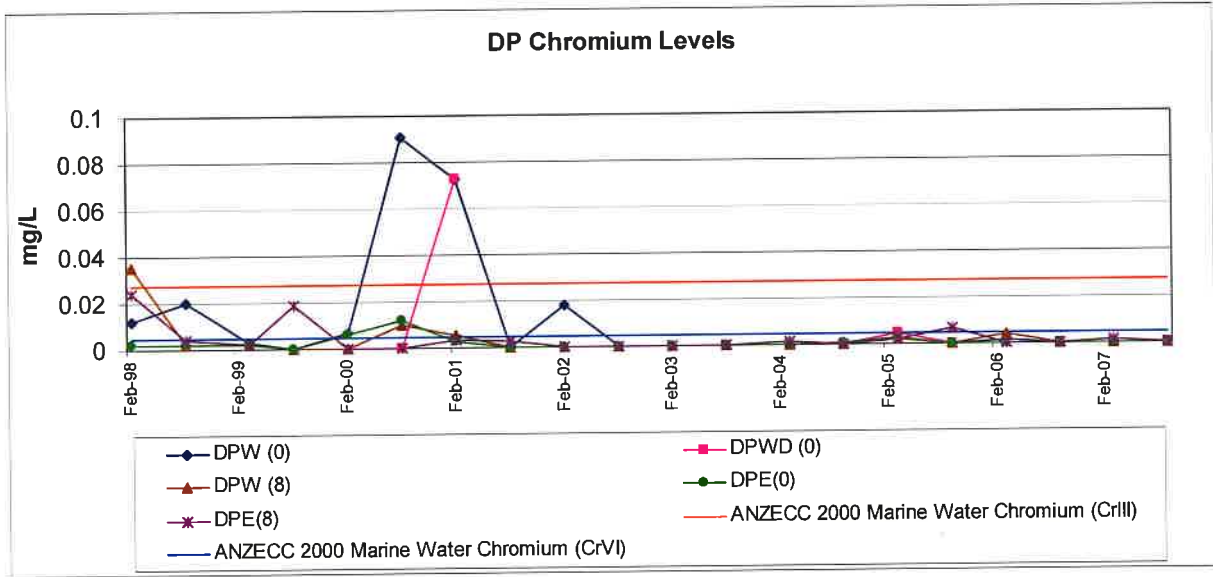
Bore Hole Phenol Levels



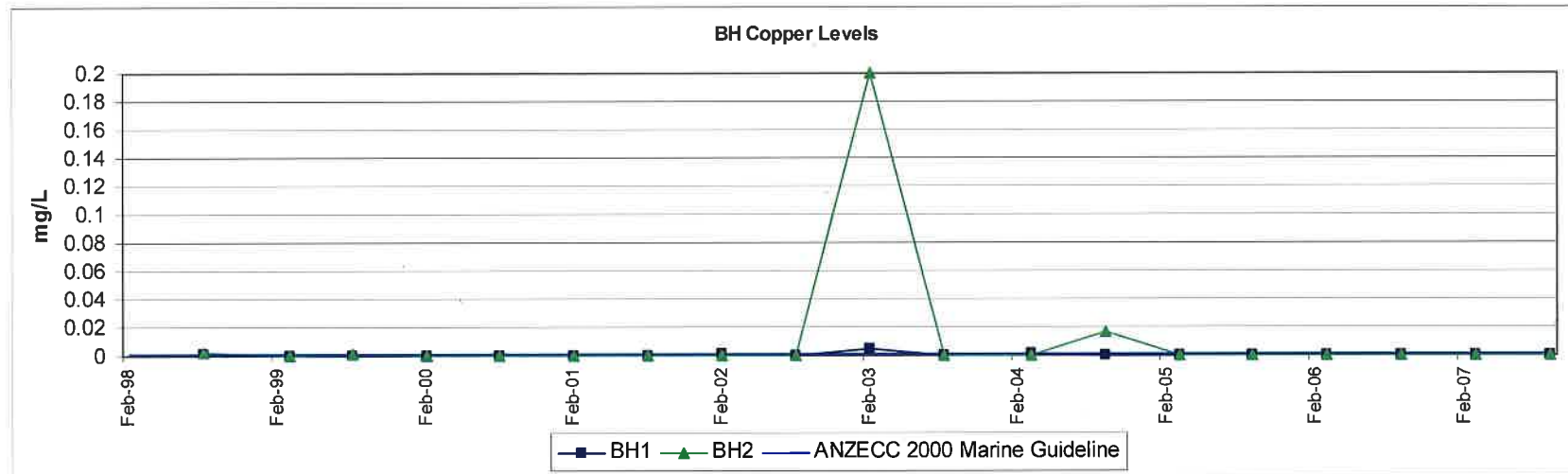
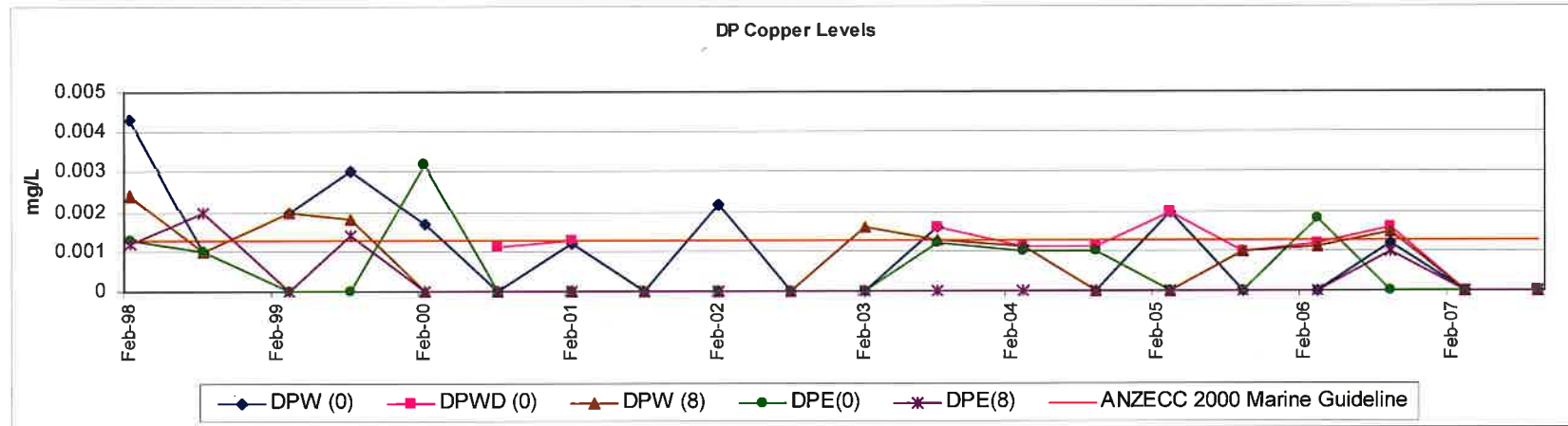
Phenolics Total-T



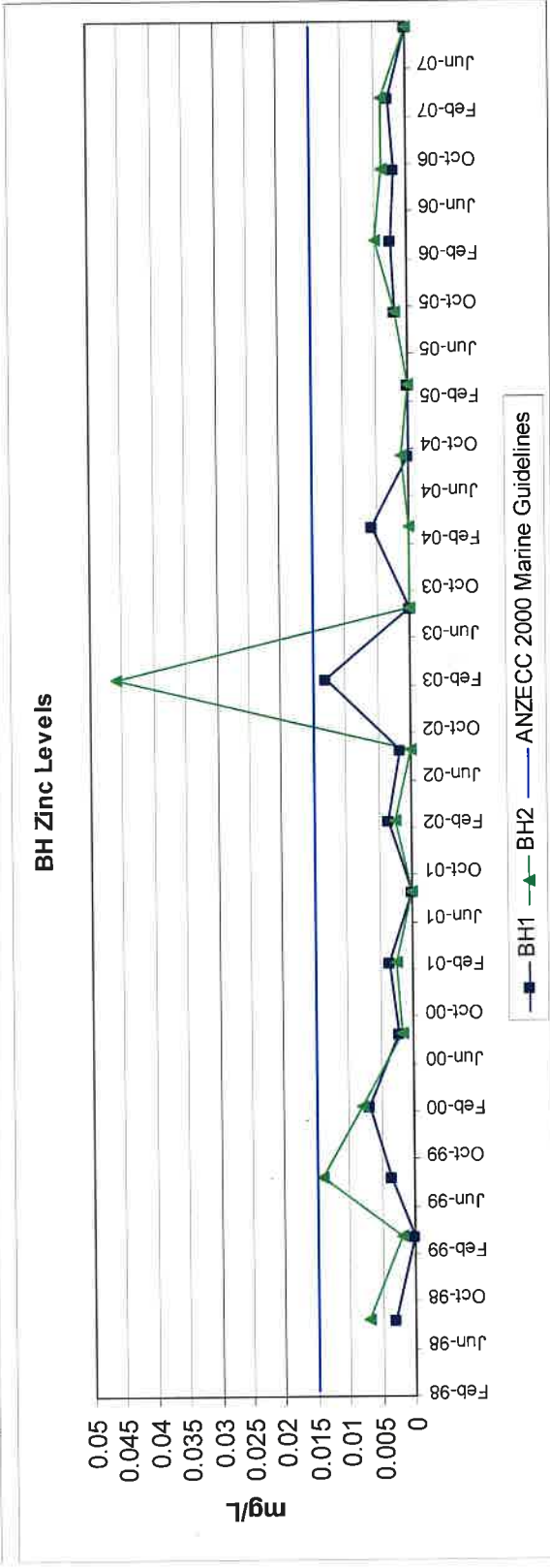
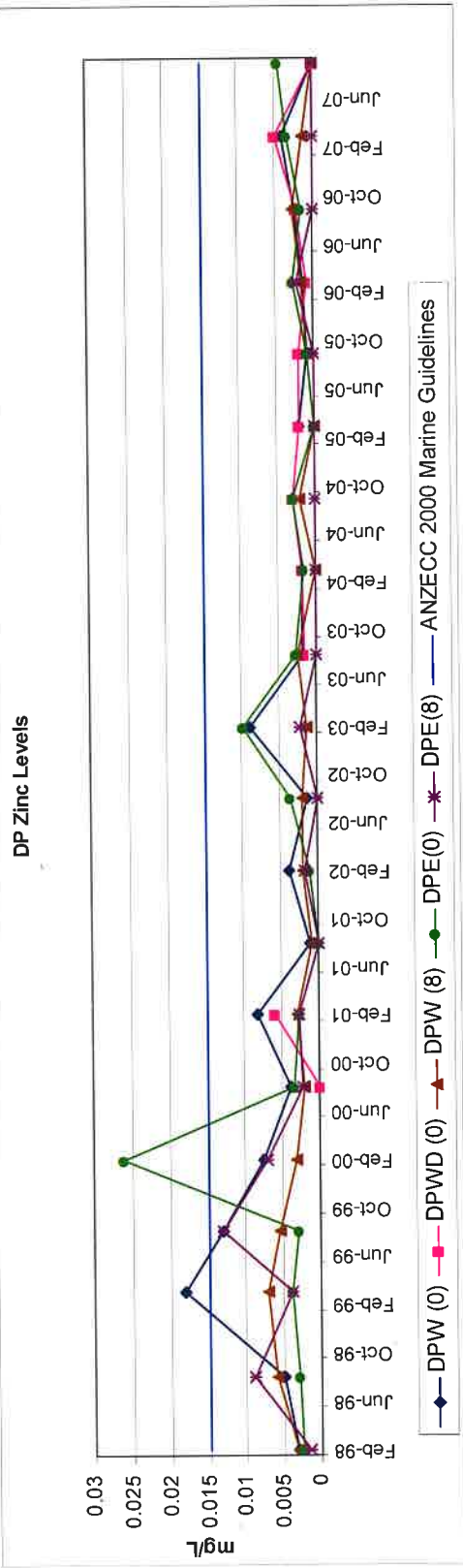
Chromium Levels



Copper Levels



Zinc Levels



APPENDIX D

Site Audit Statement



NSW Site Auditor Scheme

Site Audit Statement

A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the *Contaminated Land Management Act 1997* on 12 October 2017.

For information about completing this form, go to Part IV.

Part I: Site audit identification

Site audit statement no. JE105

This site audit is a:

- ~~statutory audit~~
 non-statutory audit

within the meaning of the *Contaminated Land Management Act 1997*.

Site auditor details

(As accredited under the *Contaminated Land Management Act 1997*)

Name: Julie Evans

Company: Envirocene Pty Ltd

Address: Level 2, 29 Kiora Road, Miranda NSW

Postcode: 2228

Phone: 0402 142050

Email: jevans@envirocene.com.au

Site details

Address: 251 & 280-282 Captain Cook Drive, Kurnell NSW

Postcode: 2231

Property description

(Attach a separate list if several properties are included in the site audit.)

Lot 2 DP1030269 and Lot 2 DP559922

Local government area: Sutherland Shire Council

Area of site (include units, e.g. hectares): 176 Ha

Current zoning: Deferred Matter (DM)

Regulation and notification

To the best of my knowledge:

~~the site is~~ the subject of a declaration, order, agreement, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*, as follows: (provide the no. if applicable)

Declaration no.

Order no.

Proposal no.

Notice no.

the site is not the subject of a declaration, order, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

To the best of my knowledge:

~~the site has~~ been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*

the site **has not** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*.

Site audit commissioned by

Name: Mr Duncan McComb

Company: Besmaw Pty Ltd

Address: PO Box 1630, North Sydney NSW

Postcode: 2059

Phone: 9923 1944

Email: dmccomb@besmaw.com.au

Contact details for contact person (if different from above)

Name: Francoise Michel

Phone: 9923 1944

Email: fmichel@besmaw.com.au

~~Nature of statutory requirements (not applicable for non-statutory audits)~~

- ~~Requirements under the *Contaminated Land Management Act 1997* (e.g. management order; please specify, including date of issue)~~

- ~~Requirements imposed by an environmental planning instrument (please specify, including date of issue)~~

- ~~Development consent requirements under the *Environmental Planning and Assessment Act 1979* (please specify consent authority and date of issue)~~

- ~~Requirements under other legislation (please specify, including date of issue)~~

Purpose of site audit

~~A1 To determine land use suitability~~

~~Intended uses of the land:~~

OR

~~A2 To determine land use suitability subject to compliance with either an active or passive environmental management plan~~

~~Intended uses of the land: Public recreation (multi-use sports stadium and associated landscaping)~~

OR

(Tick all that apply)

~~B1 To determine the nature and extent of contamination~~

B2 To determine the appropriateness of:

an investigation plan

a remediation plan

a management plan

~~B3 To determine the appropriateness of a **site testing plan** to determine if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*~~

~~B4 To determine the compliance with an approved:~~

~~**voluntary management proposal** or~~

~~**management order** under the *Contaminated Land Management Act 1997*~~

~~B5 To determine if the land can be made suitable for a particular use (or uses) if the site is remediated or managed in accordance with a specified plan.~~

~~Intended uses of the land:~~

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

Coffey

Harwood Environmental Consultants

JBS&G

Titles of reports reviewed:

Preliminary Environmental Site Assessment Lot 4 Captain Cook Drive, Kurnell, NSW. 24 June 2001. Coffey.

Stage 1 – Preliminary Site Investigation, 251 and 280-282 Captain Cook Drive, Kurnell Peninsula, NSW. 2 November 2023 (and earlier version dated 10 February 2020). Coffey. (the PSI)

Environmental Site Assessment Lot 2 North and Lot 2 South, 280-282 and 251 Captain Cook Drive, Kurnell Peninsula, NSW. 27 February 2020. Harwood Environmental Consultants. (the ESA).

Proposed Amendment to SEPP (Kurnell Peninsula) 1989 - Flooding and Water Management: Groundwater Flow, 280-282 and 251 Captain Cook Drive, Kurnell NSW. February 2020. Coffey.

Proposed Amendment to SEPP (Kurnell Peninsula) 1989 – Flooding and Water Management: Groundwater Quality, 251, 280-282 Captain Cook Drive, Kurnell Peninsula NSW. February 2020. Coffey.

Assessment of PFAS Levels at Besmaw Land Holdings, 280-282 Captain Cook Dr, Kurnell NSW. 7 October 2021. JBS&G. (PFAS Assessment).

September 2023 – Additional Groundwater Sampling and Testing and Lot 8 Monitoring Well Audit. 8 November 2023. Tetra Tech Coffey.

Other information reviewed, including previous site audit reports and statements relating to the site:

Besmaw holds a large amount of information generated to demonstrate compliance with EPL5658 (and earlier pollution control licence 5658). This audit does not assess compliance with or otherwise comment on operational matters related to EPL 5658. However, the following has been considered in determining whether records held by Besmaw are sufficient to not require further contamination assessment of the sand extraction and rehabilitation areas:

Lot 2 DP559922, Kurnell Peninsula Water Quality Monitoring of Dredge Pond. Report prepared by Coffey. February 1997. (Coffey, 1997)

Annual Environmental Reports prepared by ERM (AER 1999-2018)

Independent Environmental Audit Reports prepared by Coffey (IEA 1999, 2002-2018).

Assessment of Compliance with EPL 5658: February 2018 to January 2019 prepared by Coffey (Coffey 2019).

Independent Environmental Audit Reports prepared by Zoic Environmental (Zoic 2019-2021).

Independent Environmental Audit Reports prepared by Geosyntec Consultants (Geosyntec 2022-2023).

Environmental Management Plan for the Reinstatement of Sand Extraction Sites Lot 2 DP559922 Kurnell Peninsula. Prepared by ERM. Version dated October 1996. (EMP, 1996)

Environmental Management Plan for the Reinstatement of Sand Extraction Sites Lot 2 DP559922 Kurnell Peninsula. Prepared by ERM. Version dated January 1999. (EMP, 1999)

Environmental Management Plan, Reinstatement of Sand Extraction Holt Land Rehabilitation Centre, Kurnell. Prepared by ERM. Version dated August 2020. (EMP, 2020)

A selection of individual contract records held by Besmaw for VENM source sites. Hard copies of the records, held at the Besmaw head office, were inspected by the auditor on 18 April 2023 and by the auditor's representative (J Neill) on 18 April 2023, 2-3 May 2023 and 9 May 2023.

Environmental Protection Licence (EPL) 5658 (including associated notices and annual returns) publicly available at <https://apps.epa.nsw.gov.au/prpoeoapp/>.

Notice Issued to Besmaw Pty Ltd by NSW EPA Under S65 of the Waste Minimisation & Management Act (1995). File BA1636. Dated 11 July 1996.

Notice Issued to Besmaw Pty Ltd by NSW EPA Under S65 of the Waste Minimisation & Management Act (1995). File BA1636. Dated 18 July 1996.

Pollution Control Approval No. 2783 for reinstatement of sand extraction site with clean excavated natural material. Dated 6 February 1997. Issued by NSW EPA under Pollution Control Act 1970.

Pollution Control Licence (5658) issued by NSW EPA under Pollution Control Act 1970. Dated 7 February 1997.

Compliance Monitoring Data (2017-2023). Publicly available at <https://www.holtestate.com.au/epl-hlrc> (information was accessed on 2 June 2023).

Technical Review of Groundwater Monitoring Network and Data – Besmaw Pty Limited. Environmental Protection Licence Number: 5658. Report prepared for the NSW Dept of Environment and Conservation by Ian Grey Groundwater Consulting Pty Limited. July 2006.

Proposed Review Process for Water Quality Results for EPL5658 Monitoring, Holt Land Rehabilitation Centre, Kurnell NSW. Letter Prepared for Besmaw Pty Ltd by Coffey. 4 July 2014.

"Timeline for Delivery of VENM Approval", pdf document provided to the auditor by Besmaw.

Site audit report details

Title: Site Audit Report, 251 & 280-282 Captain Cook Drive, Kurnell NSW

Report no.: E064

Date: 29 November 2023

Part II: Auditor's findings

Please complete either Section A1, Section A2 or Section B, not more than one section.
(Strike out the irrelevant sections.)

- Use **Section A1** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **without the implementation** of an environmental management plan.
- Use **Section A2** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **with the implementation** of an active or passive environmental management plan.
- Use **Section B** where the audit is to determine:
 - (B1) the nature and extent of contamination, and/or
 - (B2) the appropriateness of an investigation, remediation or management plan¹, and/or
 - (B3) the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or
 - (B4) whether the terms of the approved voluntary management proposal or management order have been complied with, and/or
 - (B5) whether the site can be made suitable for a specified land use (or uses) if the site is remediated or managed in accordance with the implementation of a specified plan.

¹ For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

Section A1

~~I certify that, in my opinion:~~

~~The site is suitable for the following uses:~~

~~(Tick all appropriate uses and strike out those not applicable.)~~

- ~~Residential, including substantial vegetable garden and poultry~~
- ~~Residential, including substantial vegetable garden, excluding poultry~~
- ~~Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~
- ~~Day care centre, preschool, primary school~~
- ~~Residential with minimal opportunity for soil access, including units~~
- ~~Secondary school~~
- ~~Park, recreational open space, playing field~~
- ~~Commercial/industrial~~
- ~~Other (please specify):~~

OR

- ~~I certify that, in my opinion, the site is not suitable for any use due to the risk of harm from contamination.~~

Overall comments:

Section A2

I certify that, in my opinion:

Subject to compliance with the attached environmental management plan² (EMP), the site is suitable for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

- Residential, including substantial vegetable garden and poultry
 - Residential, including substantial vegetable garden, excluding poultry
 - Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
 - Day care centre, preschool, primary school
 - Residential with minimal opportunity for soil access, including units
 - Secondary school
 - Park, recreational open space, playing field
 - Commercial/industrial
 - Other (please specify):
-
-

EMP details

Title: _____

Author: _____

Date: _____ No. of pages: _____

EMP summary

This EMP (attached) is required to be implemented to address residual contamination on the site.

The EMP: (Tick appropriate box and strike out the other option.)

- requires operation and/or maintenance of **active** control systems³
- requires maintenance of **passive** control systems only³.

² Refer to Part IV for an explanation of an environmental management plan.

³ Refer to Part IV for definitions of active and passive control systems.

Purpose of the EMP:

Description of the nature of the residual contamination:

How the EMP can reasonably be made to be legally enforceable:

Overall comments:

Section B

Purpose of the plan⁴ which is the subject of this audit:

The objective of the PSI was to provide a preliminary contamination assessment of the suitability of the site for possible future land uses.

The objective of the ESA was to gain an understanding, through limited soil and groundwater sampling, of the contamination status of the areas of the Site not subject to VENM importation.

I certify that, in my opinion:

(B1)

- ~~The nature and extent of the contamination **has** been appropriately determined~~
- ~~The nature and extent of the contamination **has not** been appropriately determined~~

AND/OR (B2)

- The investigation, ~~remediation or management~~ plan **is** appropriate for the purpose stated above
- ~~The investigation, remediation or management plan **is not** appropriate for the purpose stated above~~

AND/OR (B3)

- ~~The site testing plan:
 - ~~**is** appropriate to determine~~
 - ~~**is not** appropriate to determine~~~~
- ~~if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*~~

AND/OR (B4)

- ~~The terms of the approved voluntary management proposal* or management order** (strike out as appropriate):
 - ~~**have** been complied with~~
 - ~~**have not** been complied with.~~~~
- ~~*voluntary management proposal no.:~~ _____
- ~~**management order no.:~~ _____

AND/OR (B5)

- ~~The site **can be made suitable** for the following uses:
(Tick all appropriate uses and strike out those not applicable.)
 - ~~Residential, including substantial vegetable garden and poultry~~~~

⁴ For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

- Residential, including substantial vegetable garden, excluding poultry
- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- Day care centre, preschool, primary school
- Residential with minimal opportunity for soil access, including units
- Secondary school
- Park, recreational open space, playing field
- Commercial/industrial
- Other (please specify):

IF the site is remediated/managed* in accordance with the following plan (attached):

*Strike out as appropriate

Plan title: _____

Plan author: _____

Plan date: _____ No. of pages: _____

SUBJECT to compliance with the following condition(s):

Overall comments:

The EPA have requested the audit to determine whether:

- a) the PSI and ESA have appropriately assessed the potential for contamination to exist at the site;
- b) the conclusions of the PSI and ESA are appropriate; and
- c) further investigations are needed to confirm whether the site is suitable for the proposed uses. This should include consideration:
 - of any risks posed by the landfill operation located just west of the site, including risks from potential landfill gas generation; and
 - whether the records held by Besmaw in relation to the importation of VEMN to the site, such as the Annual Environmental Reports, Independent Environmental Audit reports and any other records Besmaw hold, are sufficient to not require further contamination assessments to the sand extraction and rehabilitation areas of the site.

The investigation reports (when considered in the context of records held by Besmaw) have adequately assessed the potential for contamination to exist at the site and I am satisfied that the site is unlikely to be affected by significant contamination issues that would preclude development of the site or progression of the planning process.

However, the site is still subject to sandmining and rehabilitation which is predicted to continue for at least the next 5-10 years. Further investigations, following completion of the rehabilitation are required to confirm site suitability for the proposed future development.

Subject to continued regulation of the rehabilitation and annual environmental audits, it is recommended that further investigations include (but not be limited to) the following:

- Soil sampling within the final rehabilitated landform to confirm the reported low risk status. Depths of the investigation should be commensurate with the final development proposal and likely exposure scenarios.
- Investigations (post demolition) in the footprint of the stables (and associated buildings) to assess potential for pesticides and asbestos. This should also include assessment of asbestos in areas of fill on Lot 2 North. Some limited sampling of grassed areas should also be undertaken to confirm the low contamination risk from importation of sand overs.
- Targeted sampling of surface soils in the vicinity of the Boat Harbour Cabins (following demolition) and Boat Harbour access road.
- Assessment of groundwater quality around the perimeter of the site and within the final rehabilitated landform. The analytical suite must be sufficient to assess potential contamination due to placement of non-VENM material. This will require progressive implementation of a program of groundwater monitoring within rehabilitated areas to allow assessment of trends in groundwater quality post-rehabilitation.
- Additional monitoring and assessment to confirm the source of ammonia in groundwater.
- Assessment of hazardous ground gas along the western site boundary by implementation of a hazardous ground gas monitoring program. This must consider future changes in site conditions due to the proposed development and any operational changes associated with the adjacent Breen landfill.
- Assessment of groundwater quality along the eastern boundary of the site adjacent to Lot 6 & 8.
- Assessment of PFAS compounds in groundwater within the surrounding area to establish ambient concentrations.

The above recommendations for further investigation and monitoring have been made to ensure that sufficient data is available at the completion of the rehabilitation to support conclusions regarding site suitability (from a contaminated land perspective). The audit conclusions and recommendations do not address or otherwise comment on matters relating to EPL regulation, monitoring and compliance.

Based on the information reviewed to date, if contamination issues are encountered as a result of the additional investigations, I do not believe that they would preclude development of the site, and if remediation is required, I believe that this can be reasonably and practically incorporated into the development approval process.

In my opinion, additional site investigations undertaken before completion of the rehabilitation are unlikely to contribute any substantial new findings that would contradict the conclusions

of the PSI and DSI, noting that some of the recommended groundwater monitoring will need to commence during the rehabilitation to determine trends.

It is recommended that future investigations are subject to a site audit to certify that the site is suitable for the proposed use and that this be conditioned on any future development approval.

Part III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997*.

Accreditation no.: 1003

I certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997*, and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.

Signed: 

Date: 29 November 2023

Part IV: Explanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part I

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part II

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remediation plan or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use or uses of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A1 or Section A2 or Section B of Part II, **not** more than one section.

Section A1

In Section A1 the auditor may conclude that the land is *suitable* for a specified use or uses OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further investigation or remediation or management of the site was needed to render the site fit for the specified use(s). **Conditions must not be** imposed on a Section A1 site audit statement. Auditors may include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section A2

In Section A2 the auditor may conclude that the land is *suitable* for a specified use(s) subject to a condition for implementation of an environmental management plan (EMP).

Environmental management plan

Within the context of contaminated sites management, an EMP (sometimes also called a 'site management plan') means a plan which addresses the integration of environmental mitigation and monitoring measures for soil, groundwater and/or hazardous ground gases throughout an existing or proposed land use. An EMP succinctly describes the nature and location of contamination remaining on site and states what the objectives of the plan are, how contaminants will be managed, who will be responsible for the plan's implementation and over what time frame actions specified in the plan will take place.

By certifying that the site is suitable subject to implementation of an EMP, an auditor declares that, at the time of completion of the site audit, there was sufficient information

satisfying guidelines made or approved under the *Contaminated Land Management Act 1997* (CLM Act) to determine that implementation of the EMP was feasible and would enable the specified use(s) of the site and no further investigation or remediation of the site was needed to render the site fit for the specified use(s).

Implementation of an EMP is required to ensure the site remains suitable for the specified use(s). The plan should be legally enforceable: for example, a requirement of a notice under the CLM Act or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of the *Environmental Planning and Assessment Act 1979*.

Active or passive control systems

Auditors must specify whether the EMP requires operation and/or maintenance of active control systems or requires maintenance of passive control systems only. Active management systems usually incorporate mechanical components and/or require monitoring and, because of this, regular maintenance and inspection are necessary. Most active management systems are applied at sites where if the systems are not implemented an unacceptable risk may occur. Passive management systems usually require minimal management and maintenance and do not usually incorporate mechanical components.

Auditor's comments

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section B

In Section B the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or whether the terms of an approved voluntary management proposal or management order made under the CLM Act have been complied with, and/or whether the site can be made suitable for a specified land use or uses if the site is remediated or managed in accordance with the implementation of a specified plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement. The condition must not specify an individual auditor, only that further audits are required.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

Part III

In **Part III** the auditor certifies their standing as an accredited auditor under the CLM Act and makes other relevant declarations.

Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to

- the **NSW Environment Protection Authority**:
nswauditors@epa.nsw.gov.au or as specified by the EPA

AND

- the **local council** for the land which is the subject of the audit.