Baseline Contamination Study

Bermagui Sporting Clays

10 July 2020

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CONTENTS

List of Tables

Acronyms and Abbreviations

Name	Description
ACM	Asbestos Containing Material
AHD	Australian Height Datum
AMG	Australian Map Grid
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
ASS	Acid Sulfate Soils
B[a]P	Benzo[a]pyrene
BSC	Bermagui Sporting Clays
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CLM	Contaminated Land Management Act 1997
CoPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
DP	Deposited Plan
DPI	Department of Primary Industries
DSI	Detailed Site Investigation
EPL	Environment Protection License
ESA	Environmental Site Assessment
m	Metre
m AHD	Metres Above Australian Height Datum
m bgl	Metres Below Ground Level
MGA	Map Grid of Australia
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NSW EPA	New South Wales Environment Protection Authority
OCP	Organochlorine Pesticides
OPP	Organophosphorus Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
POEO Act	Protection of the Environment Operations Act 1997
RAP	Remedial Action Plan
SAQP	Sampling and Analysis Quality Plan
SC NSW	Sporting Clays NSW
TRH	Total Recoverable Hydrocarbons

EXECUTIVE SUMMARY

ERM was engaged by Sporting Clays New South Wales (SC NSW) to undertake a Baseline Assessment of the Site identified as the Bermagui Sporting Clays (BSC) club grounds located at Lot 101, Murrah River Road Bermagui NSW 2546.

Information provided to ERM indicated that the Site has been used as a venue for sporting clays (a competitive shotgun shooting sport) competition since 1998 when the club was formed. Under current approvals the site is permitted to shoot for up to twelve days per year.

In 2013 the BSC submitted an application to Council to modify their existing DA to enable an additional twelve days shooting days per year for the purpose of training new and inexperienced shooters. As part of the DA process Council required BSC to undertake a baseline contamination assessment of potential contamination resulting from shooting activities undertaken within the Site to be undertaken.

The overarching objectives for this Baseline Assessment were therefore to assess the concentrations of contaminants of potential concern (CoPCs) and determine the potential for complete 'source-pathway-receptor' linkages (SPR linkages) resulting from the shooting activities undertaken on the property.

To achieve the objectives outlined above, ERM completed a scope of works which included the sampling and analysis of soil, sediment and surface water for a range of potential contaminants of concern from a total of 65 locations both on and off-site.

Laboratory analysis of collected surface soil samples generally returned concentrations of all CoPCs less than the limit of reporting and/or the adopted screening criteria with only two exceptions: one being for lead and the other for benzo[a]pyrene, with both samples being located within the central portion of the site away from the site boundary. Further statistical assessment of the on-site data sets indicated that these localised impacts were not significant.

Given the fact that the exceedances of screening values that were detected are both located within the high use areas of the site and the expected "fall zone" of clay targets and shot, there is no evidence that significant migration of these impacts has occurred with concentrations outside of the likely fall zone rapidly decreasing outside of this inner area and toward the site boundary.

The preliminary Conceptual Site Model (CSM) developed during the planning of the assessment was updated based on field observations and laboratory analysis of collected surface soil, surface water and sediment samples collected during this investigation.

Based on the results of the refined CSM, it is the opinion of ERM that there are no complete Source-Pathway-Receptor (SPR) linkages and therefore that the historical and current land use practices (sporting clay shooting) pose no significant contamination risks to identified human health and ecological receptors. In addition, despite the club being operational for some 30 years there is no evidence of significant migration of lead impacts from the higher impact areas within the core of the site toward the site boundary.

Given that no complete SPR linkages have been identified (and that the club is already operating in line with the Draft Environmental Guidelines for Shooting Ranges prepared by Sporting Clays Australia) specific measures that may need to be undertaken to mitigate potential contamination of the Site and adjoining lands and waterways have not been identified.

1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by Sporting Clays NSW (SC NSW) to undertake a Baseline Contamination Assessment (Baseline Assessment) of the site identified as the Bermagui Sporting Clays (BSC) club grounds located at Lot 101, Murrah River Road Bermagui NSW 2546 (the Site).

- The Site locality and site layout, including property boundaries, are shown on Figure 1 (*Appendix A*).

1.1 Background

The Site occupies an area of approximately 24 hectares (ha) of mostly heavily vegetated land with several gullies and drainage lines crossing the property located in the upper reaches of the Murrah River Catchment.

Information provided to ERM indicates that the Site has been used as a venue for the completion of sporting clays competition shooting since 1998 when the club formed. Under current approvals the site is permitted to shoot for up to twelve days per year.

In 2013 BSC submitted an application to Bega Valley Shire Council (Council) to modify their existing development application (DA) to enable an additional twelve days shooting days per year for the purpose of training new and inexperienced shooters. As part of the DA process Council required the Club to undertake a baseline contamination assessment of potential contamination resulting from shooting activities undertaken within the Site.

1.2 Objectives

The overarching objectives for this Baseline Assessment were therefore to assess the concentrations of contaminants of potential concern (CoPCs) and determine the potential for complete ‘source-pathway-receptor’ linkages (SPR linkages) resulting from the shooting activities undertaken on the property.

Where results of the assessment indicated the presence of a complete SPR linkage, a secondary objective of this baseline assessment was to identify specific measures that may need to be undertaken to mitigate potential contamination of the Site and adjoining lands and waterways.

2. SCOPE OF WORKS

To achieve the objectives outlined above, ERM completed the following scope of works in general accordance with the requirements of the ERM (2020) SAQP (Appendix C):

- A review of previous investigations relating to the Site and its surroundings, focussing on completing a quality control assessment to consider the validity or otherwise of the data generated by those assessments;
- preparation of a Health and Safety Plan (HASP) and associated Job Hazard Analyses (JHA) for the required scope of works;
- pre-field activities including obtaining Dial before You Dig plans, review of available utility plans and utility clearance and mark out of drilling locations using a qualified underground utilities service locator;
- the collection, field screening and subsequent laboratory analysis of surface soil samples from 56 onsite and offsite locations,
- the excavation of 3 soil bores to a maximum depth of 0.5 metres below ground level (m bgl) via a hand auger and subsequent collection, field screening and analysis of soil samples to assess the potential for potential deeper contamination impacts;
- the collection and subsequent laboratory analysis of co-located surface water and sediment samples from six offsite creek and dam locations (noting the number of surface water and sediment locations were limited by those proposed in the SAQP given the prevailing dry conditions at the time of the assessment); and
- preparation of this Baseline Contamination Assessment report.

3. SITE IDENTIFICATION

The site identification information is presented within the table below:

Table 3.1 Project Site Identification

Item	Description
Site Address	Lot 101 Murrah River Road, Bermagui NSW 2546
Legal Description	Lot 1 of DP1172182
Local Government Area	Bega Valley Shire Council
Current Land Use	Recreational - Sporting Clay Shooting
Proposed Land Use	Ongoing recreational use – Sporting Clay Shooting
Geographical Co-Ordinates	36º30'39"S 150º01'31" E (Approximate centre of Site)
Site Location and Site Layout	Figure 1 and Figure 2

3.1 Site Setting, Surrounding Environment and Site History

The following table summarises the site setting information.

Table 3.2 Project Site Identification and Condition

Item	Description
Surrounding Land use & Environment	The land uses surrounding the site include: ■ **North:** Murrah State Forest. ■ **South:** Agricultural land, Arnolds Gully and the Murrah River. ■ **East:** Murrah State Forest. ■ **West:** Privately owned forest
Site Elevation	Between 90 and 35 m Australian Height Datum (AHD) generally sloping from north west to south east
Topography	As outlined above, the site generally slopes from the north west to south east Regional topography is generally comprised of undulating hills with a general slope towards the east in the direction of the Pacific Ocean. The main area utilised by the club is located on a ridge in the centre of the site which contains the club house and facilities.
Hydrology	At the time of this assessment, the Site was covered by trees / forest with several dirt tracks facilitating access through the Site. A number of gullies and ephemeral drainage lines were also identified within the site. Two main drainage lines are known to flow towards the Murrah River. ■ During the site inspection and sampling works, surface water was not noted to be present within the site boundaries, however based on the topography of the site during periods of rainfall it is anticipated that surface water within the western portion of the Site would either infiltrate the site surface or drain into an adjacent surface water dam (located approximately 2 km upstream from the Murrah River). ■ Surface waters within the eastern portion of the Site would either infiltrate the Site surface or flow offsite in the direction of Arnolds Gully and ultimately the Murrah River.

Item	Description
Geology, Soils and Acid Sulfate Soils	According to NSW Geology Plus (*accessed 30 June 2020*) the site is underlain by Ordovician sedimentary rocks, which are comprised of dominantly interbedded quartz-rich sandstone, siltstone and mudstones. Approximately 200 m to the south and south east of the site is the Murrah River Flats, this area is underlain by Quaternary alluvial deposits, which are comprised of mud, silt, sand and gravel deposited by river (alluvial) systems.
Hydrogeology	Information from NSW Department of Primary Industries' and the Bureau of Meteorology groundwater bore database (http://www.bom.gov.au/water/groundwater/explorer/map.shtml) did not identify the presence of any registered bores within the site or immediately surrounding area. Given the location of the majority of the site on an elevated ridge, it is considered likely that groundwater beneath the Site is likely to be present in deeper aquifers within underlying fractured bedrock, off site to the east and south east, groundwater is likely to be present within shallow aquifers located within quaternary alluvial materials surrounding Arnolds Gully and the Murrah River.
Site History & Current Site Usage	Information provided by the client indicated that prior to formation of Bermagui Sporting Clays in 1998 and commencement of their usage of the Site for sporting clays shooting, the Site was native bushland and was used for limited agricultural (grazing) purposes. This is supported by review of available aerial photography and observations made during the site inspection and sampling works. No indications of other historical land uses or other potentially contaminating activities (such as illegal dumping) were noted during ERM's works on site. Information provided by SC NSW regarding the shooting activities undertaken at the site was as follows: *"Shooting commenced in the area of the gun club in 1998 when the club formed and obtained its DA from Bega Valley Shire Council (BVSC) in 1999, allowing it to shoot on 12 days each year. This shooting was mostly along a ridge on the southern boundary of the club's land and outside the present property boundary. The club purchased its land in 2012 and has since directed its shooting activities so that lead shot does not enter adjacent land. No shooting has been undertaken within the property boundary adjacent to the north-eastern and eastern boundaries."*

4. PREVIOUS INVESTIGATIONS

This Baseline Assessment was undertaken in consideration of the following previous reports:

- Bermagui Field and Game (2013) Soil and Water Sampling and Analysis (BFG 2013); and
- Bradshaw Geoscience Consulting (2019) Soil sampling analysis for lead contamination adjacent to the Bermagui Gun Club, Ref No 2019-001, 1st August 2019 (BGC 2019).

A summary of previous investigations is presented below.

Table 4.1 Summary of Previous Investigations

Report	Summary
BFG 2013	BFG undertook sampling at four locations within the Site including the collection of samples from a control site (where no shooting had been undertaken) to establish background levels of lead in surface soils, and within two areas of the site where shooting had occurred over the past 15 years to assess the potential for elevated lead concentrations. ■ Results of the assessment indicates that soil pH was between 5.2 – 5.3 pH and that lead concentrations in soil ranged from 15 mg/kg to 30 mg/kg which was considered indicative of background concentrations. ■ Laboratory analysis of a surface water sample collected from onsite drainage lines returned a concentration of 0.3 ug/L, being less that the adopted ANZECC Guidelines for protection of aquatic ecosystems in Fresh and Marine water environments (3.4 ug/L and 4.4 ug/L, respectively); ■ BFG concluded that concentrations of lead were not detected above the natural variability of background lead levels and that lead (in any form) is not being significantly transported from the portions of the site utilised for shooting purposes.
BGC 2019	BGC undertook an assessment of properties located adjacent to the Site to assess the potential for offsite migration of lead to be occurring. In undertaking the assessment BGC collected four soil samples in total (two targeted samples and two baseline samples). Analytical laboratory results of the collected samples returned lead concentrations of 97 and 162 ppm within targeted samples and 21 and 22 ppm within collected baseline samples. Based on the results of the investigation, BCG concluded that lead contamination is not being contained to the boundaries of the Site as lead concentrations are elevated on the property adjacent to the Site and that lead concentrations were therefore, in BCG's view, observed to have increased since the 2013 study. In undertaking a review of the BCG assessment ERM notes the following: ■ The sample collection methodology and sample density were not in accordance with regulatory guideline criteria (ASC NEPM and /or the NSW EPA requirements for reporting on contaminated sites). ■ Collected samples were submitted to ALS Geochemistry laboratory instead of ALS Environmental laboratory. ERM notes that ALS Geochemistry are not NATA accredited for the required analysis. ■ Results from collected samples were compared to ANZECC 1999 guidelines which are applicable to water, not soil. ■ The conclusions relating to the distribution of lead in soils both on and offsite were based on a limited data set.

5. DATA QUALITY OBJECTIVES

The ASC NEPM recommends that DQOs be implemented during the assessment of potentially contaminated sites. The DQO process described in the ASC NEPM outlines seven distinct steps to outline the project goals, decisions, constraints and an assessment of the project uncertainties and how to address these when they arise.

The site will be assessed against criteria suitable for the protection of human health and ecological receptors, as discussed in Section 6.

5.1 Step 1: State the Problem

The objective of the investigation is to assess the presence and extent of potential contamination associated with the operation of a shooting range as described within the Conceptual Site Model (CSM) presented within the ERM (2020) SAQP. As such, the primary objectives of the investigation were to:

- Assess the extent of potential contamination in soil, sediment and surface water above applicable assessment criteria;
- Assess the potentially complete pathways to on-site and off-site receptors;
- Identify potential unacceptable human health and ecological risks and recommend remedial actions if appropriate.

5.2 Step 2: Identify the Decisions

The decisions to be made based on the proposed scope of work and objectives are:

- Do contaminant concentrations in soil meet the adopted investigation criteria suitable for the protection of human health (recreational land use on-site, public open space and rural / residential land use off-site), and ecological receptors?
- Do contaminant concentrations in sediment and/or surface water indicate potential migration of contamination from soil?
- Is the data collected during this investigation sufficient to provide an assessment of the environmental condition and extent of any existing contamination to environmental media to support risk based decision making?
- Do soil impacts represent a potential risk to identified human health under a recreational land use scenario (on-site, continuation of shooting range use), public open space and rural residential land use (off-site), and ecological receptors?
- What management and/or remedial actions are best suited to mitigate potential risk to human health and the environment?

5.3 Step 3: Identify Inputs to the Decisions

The inputs required to make the above decisions are as follows:

- Identification of representative sampling locations;
- Identification of contaminants of potential concern (COPCs);
- Field screening data (eg soil type and characteristics);
- Direct observation of environmental variables including visual disturbance, colour, odours and staining in soil;
- Laboratory analytical results for the COPCs;
- Field and laboratory quality assurance/quality control data (refer to *Section 6* for further details); and
- Adopted screening levels outlined in *Section 6*.

5.4 Step 4: Define the Study Boundaries

The spatial boundaries are shown on *Figure 2, Appendix A*.

The temporal period of the investigation will be from the date of commencement (May 2020) until the date of completion of the current works which are anticipated to be completed by July 2020 and as such temporal variability will not be assessed as part of this assessment.

- ERM notes that based on the nature of the land uses undertaken within the Site and potential source, pathway, receptor linkages identified within the preliminary CSM, consideration of potential temporal variability is not required for the purposes of this assessment.

5.5 Step 5: Develop a Decision Rule

Laboratory analytical data will be assessed against the screening levels identified in *Section 6*.

Table 5.1 Decision Rules

DECISION REQUIRED TO BE MADE	DECISION RULE
1. Is data acquired of acceptable quality for interpretive purposes?	Have appropriate controls and operating procedures been used, specifically: ■ Consistent sampling methods including appropriate decontamination procedures; ■ Analytical techniques, both standardised method and detection limits appropriate to assessment criteria for different laboratories and for the same laboratories over time; and ■ Relevant QA/QC parameters tested. If the criteria stated above are satisfied, the decision is Yes. If the criteria are not satisfied, the decision is No.
2. Has a sufficiently robust CSM been established?	Interpretation of the available field observations has enabled the key source-pathway-receptor (SPR) linkages to be adequately defined in terms of the proposed land use and in accordance with the guidance established per the standards outlined in ASC NEPM (NEPC, 1999). The CSM allows risk driving pathways to be established and appropriate application of selected assessment criteria. ■ If the criteria stated above are satisfied, the decision is Yes. If the criteria are not satisfied, the decision is No.
3. Is the data obtained sufficient to achieve the stated objectives?	If there are exceedances of the adopted screening levels (for protection of receptors identified in the CSM for the relevant land use), are there sufficient data inputs to establish whether SPR linkages are presently complete, or may be complete in the future? ■ If yes, the decision is Yes. Otherwise, the decision is No.
4. Is there sufficient data (quantity and distribution) to provide preliminary identification and delineation of source areas?	Does the data set allow statistical and qualitative assessment of identified screening level exceedances to enable a preliminary delineation of associated source areas per the guidance available in ASC NEPM (NEPC, 1999)? ■ If yes, the decision is Yes. Otherwise, the decision is No.

5.6 Step 6: Specify the Performance or Acceptance Criteria

The acceptable limits on decision errors applied during the review of the results will be based on the Data Quality Indicators (DQIs) of precision, accuracy, representativeness, comparability and completeness in accordance with the requirements of the ASC NEPM (NEPC, 1999).

The potential for significant decision errors will be minimised by:

- Completing a robust QA/QC assessment of the validation data and application of the probability that 95% of data will satisfy the DQIs, therefore a limit on the decision error would be 5% that a conclusive statement may be incorrect;
- Assessing whether appropriate sampling and analytical density has been achieved for the purposes of providing an established status of conditions; and
- Selection of appropriate screening levels that reflect the relevant on-site and off-site land uses and environmental values. Refer to *Section 6* for adopted screening levels.

5.7 Step 7: Optimise the Design for Obtaining Data

This SAQP was developed based on a review of existing information and land use (recreational; shooting range). Should field screening data gathered during this assessment indicate that the objectives of this SAQP may not be met, the sampling design (including sampling pattern, type of samples and analytes) may be adjusted accordingly (subject to client approval).

If more significant changes to the SAQP are required, these changes will be documented and discussed with relevant stakeholders

6. ASSESSMENT CRITERIA

Based on the preliminary conceptual site model developed during preparation of the SAQP investigation data was assessed against relevant published Australian guideline values sourced from the following:

- ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia
- Australian Drinking Water Guidelines (ADWG), National Health and Medical Research Council (NHMRC) (2011).
- CSIRO (2013) *Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines*
- NEPC (2013) *National Environment Protection (Assessment of Site Contamination) Measure 1999,* Schedule B1 - Guideline on Investigation Levels for Soil and Groundwater;

The adopted screening values and the results of this screening level assessment are presented in the summary tables in *Appendix B.*

7. INVESTIGATION METHODOLOGY

Works were generally undertaken in accordance with the ERM (2020) SAQP. ERM notes that due to site conditions during completion of investigation works, the following modifications to the proposed sampling works were noted:

- The collection of a smaller number of surface water and sediment samples and additional soil samples due to observed conditions at the site;
- modification to the proposed sample collection methodology due to site conditions varying from those expected (lack of surface water etc.) within onsite drainage lines. ERM notes that where surface waters were not present, additional surface soil locations were sampled to assess potential residual contamination within onsite drainage lines. ERM notes that the above minor modifications from the ERM (2020) SAQP are not considered to have affected the overall suitability of the collected data set. A summary of the investigation methodology is presented within the below table.

Item	Description
Service Location	Prior to the commencement of any intrusive investigation works, service maps, DBYD searches and service provider minimum clearance requirements were used to assess for the presence of underground services and overhead power lines.
Soil Investigation Works	Soil investigation works were undertaken from 26 - 28 May 2020 and involved the following. ■ Surface materials (leaves etc.) were cleared from sampling locations. Surface soil samples were generally collected from near surface (0.1 m to 0.2 m) via hand tools (stainless steel trowel). Soil sampling locations requiring collection of deeper samples were advanced via hand augering to the required depth of investigation works. ■ Soil samples were collected as grab samples from surface materials or from the hand auger head and were directly packed into appropriately labelled, clean screw cap jars supplied by the analytical laboratory. ■ Collected samples were packed into a chilled cooler with ice and transported under CoC conditions to an analytical laboratory NATA accredited for the required analysis ■ Investigation locations are presented in **Figure 2**.
Soil Logging	■ Soil logging was conducted by a suitably qualified and experienced ERM environmental scientist ■ Boreholes were logged, and the following information was recorded in the field: soil/rock type, colour, grain size, sorting, angularity, inclusions, moisture conditions, staining and odour.
Surface Water / Sediment Sampling	■ Surface water and sediment samples were collected from drainage lines located within and adjacent to the Site. ■ Samples were collected directly from surface water and sediment and placed directly into the laboratory supplied sampling. containers using a gloved hand with surface water samples collected directly into the laboratory supplied containers by submerging below the water surface to a depth of at least 10 cm (where practicable and safe). ■ Samples were collected to minimise disturbance to sediment to avoid excess sediment load in the surface water sample, this included the collection of surface water sample prior to the sediment sample being collected. ■ Collected samples were packed into a chilled cooler on ice and transported under CoC conditions to an analytical laboratory NATA accredited for the required analysis.
QC Samples	■ Quality control samples were collected in line with the DQOs and DQIs presented above and included duplicate / replicate samples, trip blank and rinsate samples.
Decontamination	■ Decontamination of all non-dedicated sampling equipment was undertaken in accordance with ERMs Standard Operating Procedures.

7.1 Surface Soil Investigation Locations

The location of collected surface soil samples from Areas of Potential Environmental Concern (APECs) identified within the ERM (2020) SAQP were recorded using a handheld GPS (Garmin Inreach and / or Apple iPhone smartphone) are illustrated on Figure 2 and summarised within the below table.

Table 7.1 Summary of Soil Investigation Locations by APEC

APEC	Description	Investigation Locations	Location ID
1	Outside fall zones/buffer	Five investigation locations: ■ All surface soil samples	■ SS01, SS02, SS03, SS33 and SS34
2	Indirect/incidental impact areas	Ten investigation locations: ■ All surface soil samples	■ SS14, SS15, SS26, SS28, SS32, SS36, SS37, SS38, SS55 and SS50
3	Impact zones/fall areas	Twenty-five investigation locations: ■ Twenty-two surface soil samples ■ Three shallow soil bores	■ SS04, SS05, SS06, SS07, SS08, SS09, SS10, SS11, SS12, SS23, SS16, SS17, SS18, SS19, SS20, SS21, SS22, SS23, SS24, SS25, SS41,SS42 and SS43 ■ BH01, BH02 and BH03
4	Offsite	Five investigation locations: ■ All surface soil samples	■ SS46, SS47, SS48, SS49 and SS53
5	Drainage lines and perimeter	Ten investigation locations: ■ All surface soil samples	■ SS27, SS29, SS30, SS31, SS35, SS39, SS40, SS51, SS52 and SS54

7.2 Sediment and Surface Water Investigation Locations

The location of collected surface water and sediment samples are illustrated on Figure 2 and summarised within the below table.

Table 7.2 Summary of Sediment and Surface Water Investigation

Site Area	Sediment / Surface Water Investigation Location	Location ID
Murrah River, upstream	■ 2 Sediment Samples ■ 2 Surface Water Samples	■ SED01 and SED02 ■ SW01 and SW02
Arnolds Gully	■ 2 Sediment Samples ■ 2 Surface Water Samples	■ SED05 and SED06 ■ SW05 and SW06
Murrah River and Arnolds Gully convergence point	■ 1 Sediment Sample ■ 1 Surface Water Sample	■ SED03 ■ SW03
Murrah River, downstream	■ 1 Sediment Sample ■ 1 Surface Water Sample	■ SED04 ■ SW04

8. INVESTIGATION RESULTS

8.1 Soil Investigation

8.1.1 Field Observations

The locations of collected surface soil samples are illustrated on Figure 2 and a photographic log detailing the general condition of the site during the investigation works is provided in *Appendix E*.

During investigation works the site was observed to be primarily covered in native vegetation with a number of unsealed access tracks present throughout the Site. During surface soil sampling, the following observations were made:

- Surface soils were general comprised of topsoil which consisted of weathered bedrock silty sands;
- within low-lying areas, such as drainage lines and gullies, surface soils generally comprised sandy gravelly silts and clays that was moist and rich in organic matter; and
- during sample collection works, field screening with a calibrated PID returned concentrations ranging from 0.2 ppm – 3.7ppm (SS12 and SS13) which are not considered to be indicative of anthropogenic contamination.

8.1.2 Soil Analytical Results

Analytical results from collected surface soil samples are presented in *Tables 1-3* in *Appendix B*.

Laboratory analysis of the vast majority of collected surface soil samples returned concentrations of all CoPCs less than LOR and/or the adopted screening criteria. The isolated exceptions to this were as follows:

- Lead which exceeded the adopted recreational screening criteria within sample SS43_0.2.
- Benzo(a)pyrene was detected at a concentration marginally exceeding the relevant Ecological Screening Level (ESL) for Urban Residential and Public Open Space within sample BH03_0.2.

A slightly elevated (in comparison to other sample results) leachable lead concentration within sample SS16_0.2 was identified. It is noted that these results do not correlate directly with the total concentrations measured. As discussed previously, there are no registered groundwater bores in the vicinity of the Site and groundwater beneath the site is likely to be present in deeper fractured bedrock. Groundwater impacts to potential receptors would therefore be most likely to occur via groundwater discharges to nearby surface water bodies. ERM notes that these measured concentrations are therefore considered more representative of actual exposure scenarios than the measured leachate concentrations.

Due to the isolated exceedance of lead and B(a)P identified within two of the surface soil samples analysed, ERM undertook an assessment of the 95% upper confidence limit (95% UCL) of the arithmetic mean in accordance with Section 3.2.1 of Schedule B1 to the ASC NEPM (2013). As outlined in the ASC NEPM, the 95% UCL of the arithmetic mean provides a 95% confidence level that the true population mean will be less than, or equal to, this value and was undertaken to provide a better estimation of the actual concentrations The results of the 95% UCL calculations (completed using the US EPA's ProUCL software – refer Appendix G) indicated that the 95% UCL's of the arithmetic means for both lead and B(a)P were less than the adopted assessment criteria with the following calculated 95% UCL values for on-site soils only:

- Lead – 169.1 mg/kg
- B(a)P – 0.662 mg/kg (noting that this is based on a relatively small dataset with a large number of non-detects).

ERM notes that as the 95% UCL average for each analyte is below the relevant screening value, none of the individual concentrations detected are more than 250% above the screening value, and that the standard deviation is less than 50% of the screening value the potential risks to identified receptors is considered low and acceptable.

It is also noted that the limited exceedances of screening values that have been identified are located within the high use areas of the site and the expected "fall zone" that was identified during the planning stage of the assessment as having a higher risk of potential impacts. There is no evidence that significant migration of these observed impacts has occurred with lead concentrations outside of the "fall zone" rapidly decreasing in samples located outside of this area.

8.2 Surface Water and Sediment Investigation

8.2.1 Field Observations

The location of collected surface water and sediment samples are illustrated on Figure 2 and a photographic log detailing the condition of the site during the investigation works is provided in *Appendix E*.

The following observations were made during sampling of surface water:

- During surface water and sediment sampling within the Murrah River approximately 0.2 m of water was present at sample locations with the water clarity being noted as clear;
- During surface water and sediment sampling within Arnolds Gully it was observed that there was approximately 0.5 – 1 m of water at the sample locations with the water being noted as turbid.

Surface water field quality parameters collected during sampling works are presented in *Table 7.1* below.

Table 8.1 Surface Water Field Quality Parameters

Sample ID	Temp (°C)	DO[1] (ppm[2])	Electrical Conductivity (µs/cm)	pH	Redox (mV)
SW01	12.4	0.78	421.6	8.15	-163.9
SW02	11.2	5.65	554.3	7.88	-40.0
SW03	10.6	6.16	9,864	7.16	-42.7
SW04	12.1	5.52	40,062	8.03	5
SW05	12.2	5.19	32,881	7.66	-34.9
SW06	11.3	6.83	37,558	7.58	-5.9

1 - dissolved oxygen

2 - parts per million

8.2.2 Surface Water and Sediment Analytical Results

Surface water analytical results are presented in *Tables 3 and 4* and sediment analytical results are presented in *Tables 6 and 7* in *Appendix B*. Laboratory certificates are provided in *Appendix F*.

Laboratory analysis of collected surface water and sediment samples generally returned concentrations of all CoPCs less than LOR and / or the adopted screening criteria.

The measured concentrations of lead in surface water slightly exceeded the most conservative adopted screening value (99% protection for freshwater ecosystems) in several samples including the sample collected from SW01 which was the upstream control sample collected from the Murrah River. The identified minor exceedances of this screening value are not therefore considered to be indicative of site derived impacts.

ERM notes that the LOR for B[a]P in surface water was higher than the adopted drinking water criterion. However as all PAHs in collected water samples were less than LOR, this is not considered to affect the overall reliability of the collected data set.

8.3 Quality Assurance and Quality Control – Data Usability

A review of the laboratory QA/QC data was completed by ERM. The QA/QC review indicated that results are generally within the relevant DQI acceptance screening values for the analyses conducted with the exception of the following minor exceedances of the adopted RPD acceptability screening values:

SS09 and D01_20200526 returned a RPD value of 67% for lead. ERM notes that as the concentrations of both samples were significantly less than the adopted screening criteria, this minor non-conformance is considered unlikely to have affected the suitability of the overall data set.

ERM notes that samples SS40 / Do1_20200527, BH101_0.5 / D01_2000528 and SS23 / T01_20200526 also exceeded the adopted RPD acceptance criteria for total organic carbon. As samples were collected from heterogeneous topsoil materials containing residual organic matter (leaves etc.) it is the opinion of ERM that this minor non-conformance is unlikely to have affected the overall quality of the collected data set.

9. REFINED CONCEPTUAL SITE MODEL

Based on the information obtained as part of this investigation, the preliminary CSM outlining key sources, pathways and receptors presented within the ERM (2020) SAQP has been refined and is presented within the following sections.

9.1 Potential Sources of Contamination

The potential primary sources of contamination are associated with the operation of a sporting clay club shooting range. Based on the site history and background data reviewed and ERMs professional experience, the COPCs associated with the use of the Site for sporting clays competition are considered to include the following:

Potential Source	COPC	Comment
Operation of a sporting clay club shooting range	Metals (lead, arsenic, antimony)	■ Shotgun loads used in sporting clays competition predominantly utilise up to 28 grams of lead (with up to 6% antimony and trace 0.1 -0.2% arsenic) shot with each pellet being 2 to 2.5 mm in diameter. Metals (Pb, Sb, As) are therefore the COPCs. The potential for lead impacts is likely to be higher in areas where targets are shot on or close to the ground.
	Polycyclic Aromatic Hydrocarbons (PAHs)	■ Clay targets utilised on site may have historically been manufactured with products containing concentrations of PAHs. The concentrations of PAHs are likely to have decreased to lower levels over time, and it is understood that these products have not been used in more recent years.

9.2 Potential Pathways

The primary potential exposure pathways of concern at the Site are:

- Inhalation of contaminated dust (from soils);
- Dermal contact and / or incidental ingestion with contaminated surface water and soils / sediments;
- Transport of contamination through surface water flows and transport of contamination to underlying groundwater aquifers; and
- Transport of contaminants through mechanical transport (e.g. overland flow/ erosion and transport of soil/sediments).

9.3 Potential Receptors

The identified potentially sensitive human and ecological receptors have been identified as:

- Current and future visitors and users of the shooting range;
- Workers carrying out installation or maintenance works within the site; Off-site residents (noting the nearest residence is located approximately 950 m south of the site boundary); and
- Off-site freshwater aquatic ecosystems and down gradient estuarine ecosystems.

It is noted that given the absence of registered groundwater bores on or in the vicinity of the Site, groundwater users were not considered to be a valid potential receptor.

9.4 Refined Conceptual Site Model

Table 9.1 Preliminary Conceptual Site Model

Potential Sources	Potential Pathways	Potential Receptors	Complete, Potentially Complete or Incomplete SPR linkage	Comment
Lead and benzo-a-pyrene impact due to operation of a sporting clay club shooting range	Inhalation of contaminated dust	■ Current and future land users; and ■ Workers carrying out installation or maintenance works within the site.	■ Incomplete – no significant source present	■ Results of site investigation works including field observations made during sample collection and analytical results from collected surface soils, surface water and sediments which returned concentrations less than LOR and / or measured background concentrations. ■ Results of the investigation indicate that there are no complete SPR linkages and therefore it is the opinion the historical and current land use practices (sport shooting) poses a low risk of harm to identified human health and ecological receptors.
	Dermal contact and/or incidental ingestion of contaminated soils	■ Current and future land users; and ■ Workers carrying out installation or maintenance works within the site.	■ Incomplete – no significant source present	
	Dermal contact and/or incidental ingestion with contaminated surface waters	■ Current and future land users; and ■ Workers carrying out installation or maintenance works within the site.	■ Incomplete – no significant source present	
	Transport of contaminated sediments by surface water flows	■ Off-site human and ecological sensitive receptors	■ Incomplete - no evidence for significant contaminant transport off-site	
	Overland transport of contaminants through mechanical transport	■ Current and future land users; and ■ Workers carrying out installation or maintenance works within the site.	■ Incomplete pathway - no evidence for significant contaminant transport off-site	

10. CONCLUSIONS

ERM was engaged by SC NSW to undertake a Baseline Assessment of the Site. ERM notes that this Baseline Assessment was undertaken in general accordance with ERM (2020) Sampling and Analysis Quality Plan (SAQP) which outlined the required Data Quality Objectives (DQO's) and field investigation methodology for this assessment.

Information provided to ERM indicated that the Site has been used as a venue for sporting clays competition shooting since 1998 when the club formed. Under current approvals the site is permitted to shoot for up to twelve days per year.

In 2013 the BSC submitted an application to Council to modify their existing DA to enable an additional twelve days shooting days per year for the purpose of training new and inexperienced shooters. As part of the DA process Council required BSC to undertake a baseline contamination assessment of potential contamination resulting from shooting activities undertaken within the Site to be undertaken.

The overarching objectives for this Baseline Assessment was therefore to assess the concentrations of contaminants of potential concern (CoPCs) and determine the potential for complete 'source-pathway-receptor' linkages (SPR linkages) resulting from the shooting activities undertaken on the property.

To achieve the objectives outlined above, ERM completed the following scope of works in accordance with the requirements of the ERM (2020) SAQP:

- A review of previous investigations relating to the Site and its surroundings, focussing on completing a quality control assessment to consider the validity or otherwise of the data generated by those assessments;
- the collection, field screening and subsequent laboratory analysis of surface soil samples from both onsite and offsite locations,
- the excavation of soil bores to 0.5 metres below ground level (m bgl) via a hand auger and subsequent collection, field screening and analysis of soil samples to assess the potential for deeper contamination impacts;
- the collection, field screening and subsequent laboratory analysis of surface water and sediment samples from offsite creek and river locations; and
- preparation of this Baseline Contamination Assessment report including refinement of the preliminary CSM outlined within the ERM (2020) SAQP.

Results of the investigation indicated the following:

- The site was observed to be primarily covered in native vegetation with a number of unsealed access tracks present throughout the Site. During investigation works, the Murrah River was identified to contain approximately 0.2 m of water with the water clarity being noted as clear. Arnolds Gully was observed to contain approximately 0.5 – 1 m of water with the water clarity being noted as turbid.Laboratory analysis of collected surface water and sediment samples generally returned concentrations of all CoPCs less than LOR and / or the adopted screening criteria.
- The measured concentrations of lead in surface water slightly exceeded the most conservative adopted screening value (99% protection for freshwater ecosystems) in several samples including the sample collected from SW01 which was the upstream control sample collected from the Murrah River. The identified minor exceedances are not therefore considered to be related to site derived impacts.

- Laboratory analysis of collected surface soil samples generally returned concentrations of all CoPCs less than the LOR and or the adopted screening criteria with only two exceptions, being lead within samples collected from SS43 (exceeding the adopted recreational criteria) and B(a)P within sample BH03_0.2 which exceeded the adopted ESLs.
- Due to the isolated exceedances of lead and B(a)P within surface soil samples, ERM undertook an assessment of the 95% upper confidence limit (95% UCL) of the arithmetic mean. The results of the 95% UCL calculations indicated that lead and B(a)P were less than the adopted assessment criteria as follows:
  - Lead – 169.1 mg/kg
  - B(a)P – 0.662 mg/kg.
- ERM notes that as the 95% UCL of the arithmetic mean for each analyte was below the adopted screening valueand that none of the individual concentrations reported were more than 250% of the adopted screening values the risks to identified receptors is considered low and acceptable.
- The assessment also identified that the limited impacts that are present are located within the high use areas of the site and the expected “fall zone” that was identified during the planning stage of the assessment as having a higher risk of potential impacts, there is little evidence that significant migration of these impacts has occurred with lead concentration outside of the likely fall zone rapidly decreasing in samples located outside of this area and toward the site boundary.

The preliminary CSM detailed within the ERM (2020) SAQP was updated based on field observations and laboratory analysis of collected surface soil, surface water and sediment samples collected during this investigation.

Based on the results of the refined CSM, it is the opinion of ERM that there are no complete pathways for identified potential SPR linkages and therefore it is the opinion of ERM that the historical and current land use practices (sporting clay shooting) poses no significant risks to identified human health and ecological receptors. In addition, despite the club being operational for some 30 years there is no evidence of significant migration of lead impacts from the higher impact areas within the core of the site toward the site boundary.

Given that no complete SPR linkages have been identified (and that the club is already operating in line with the Draft Environmental Guidelines for Shooting Ranges prepared by Sporting Clays Australia) specific measures that may need to be undertaken to mitigate potential contamination of the Site and adjoining lands and waterways have not been identified.

11. REFERENCES

- ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia
- AS 4482.2 - Guide to the Sampling and Investigation of Potentially Contaminated Soil, Part 2: Volatile Substances, Australian Standard (1999).
- AS 4482.1 - Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil, Part 2: Non-volatile and Semi-volatile compounds, Australian Standard (2005).
- Australian Drinking Water Guidelines (ADWG), National Health and Medical Research Council (NHMRC) (2011).
- Bradshaw Geoscience Consulting (2019) Soil sampling analysis for lead contamination adjacent to the Bermagui Gun Club, Ref No 2019-001, 1st August 2019 (BCG 2019); and
- Bermagui Field and Game (2013) Soil and Water Sampling and Analysis (BFG 2013).
- CSIRO (2013) *Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines*
- ERM (2020) Sampling and Analysis Quality Plan, Bermagui Sporting Clays Baseline Contamination Study: Sampling Analysis and Quality Plan, 22nd May 2020 (ERM 2020).
- National Environmental Protection Council (NEPC) (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999
- NSW Environment Protection Authority (EPA) (2020) Consultants Reporting on Contaminated Land, Contaminated Land Guidelines.
- NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme (3rd edition)

12. STATEMENT OF LIMITATIONS

This report was prepared in accordance with the scope of work outlined within this report and subject to the applicable cost, time and other constraints. ERM performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental profession. ERM makes no warranty concerning the suitability of the Site for any purpose or the permissibility of any use, development or re-development of the Site.

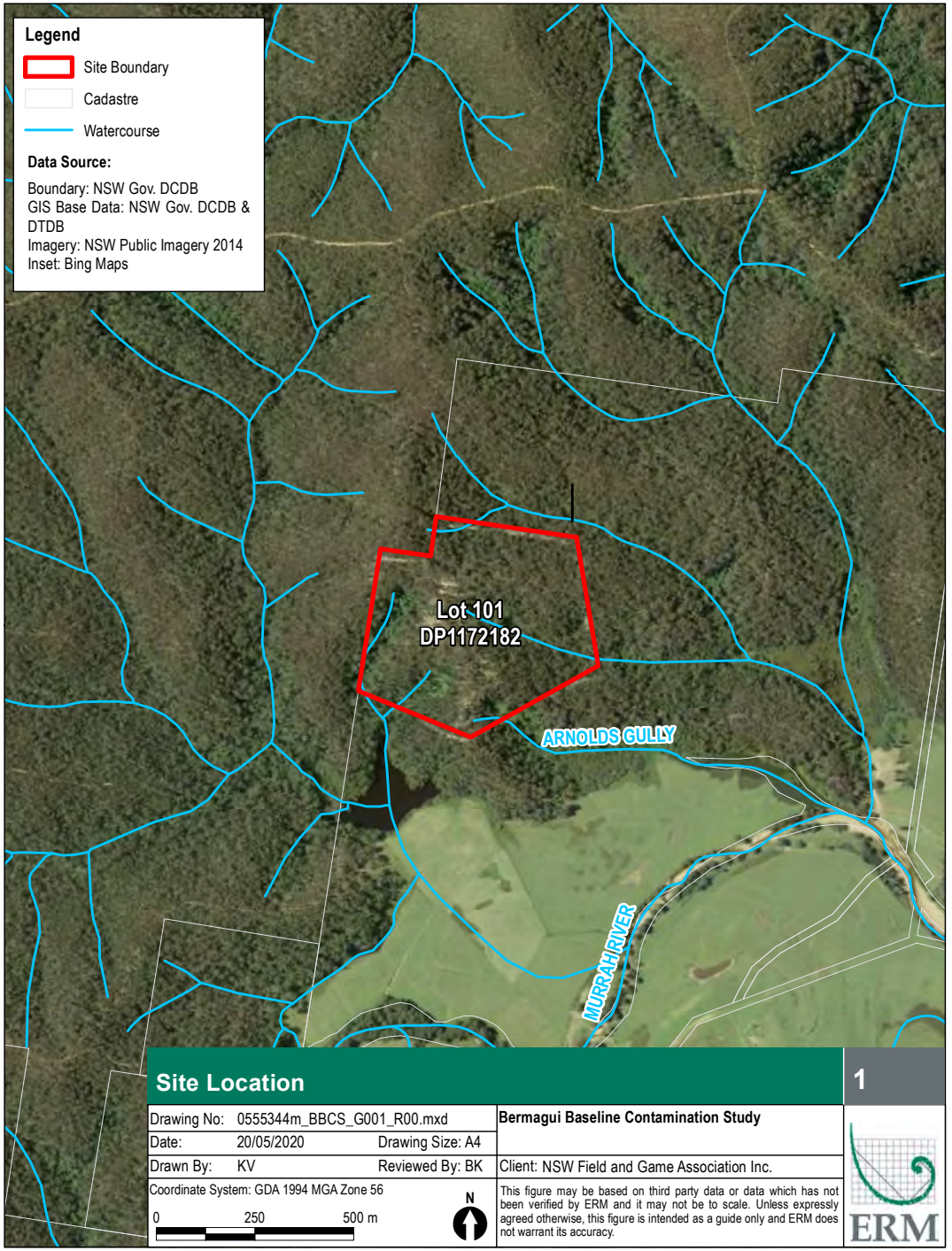
Except as otherwise stated, ERM's assessment is limited strictly to identifying specified environmental conditions associated with the subject Site and does not evaluate structural conditions of any buildings on the subject Site. Lack of identification in the report of any hazardous or toxic materials on the subject Site should not be interpreted as a guarantee that such materials do not exist on the Site.

This assessment is based on Site inspection conducted by ERM personnel, sampling and analyses described in the report, and information provided by Bermagui Sporting Clays or other people with knowledge of the Site conditions. All conclusions and recommendations made in the report are the professional opinions of the ERM personnel involved with the project and, while normal checking of the accuracy of data has been conducted, ERM assumes no responsibility or liability for errors in data obtained from such sources, regulatory agencies or any other external sources, nor from occurrences outside the scope of this project.

ERM is not engaged in environmental consulting and reporting for the purpose of advertising, sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity or investment purposes.

ERM PREPARED THIS REPORT FOR THE SOLE AND EXCLUSIVE BENEFIT AND USE OF BERMAGUI SPORTING CLAYS. NOTWITHSTANDING DELIVERY OF THIS REPORT BY ERM OR BERMAGUI SPORTING CLAYS TO ANY THIRD PARTY, UNLESS OTHERWISE EXPRESSLY AGREED, ANY COPY OF THIS REPORT PROVIDED TO A THIRD PARTY IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY, WITHOUT THE RIGHT TO RELY AND ERM DISCLAIMS ALL LIABILITY TO SUCH THIRD PARTY TO THE EXTENT PERMITTED BY LAW. ANY USE OF THIS REPORT BY A THIRD PARTY IS DEEMED TO CONSTITUTE ACCEPTANCE OF THIS LIMITATION.

APPENDIX A FIGURES



Site Location

1

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Coordinate System: GDA 1994 MGA Zone 56

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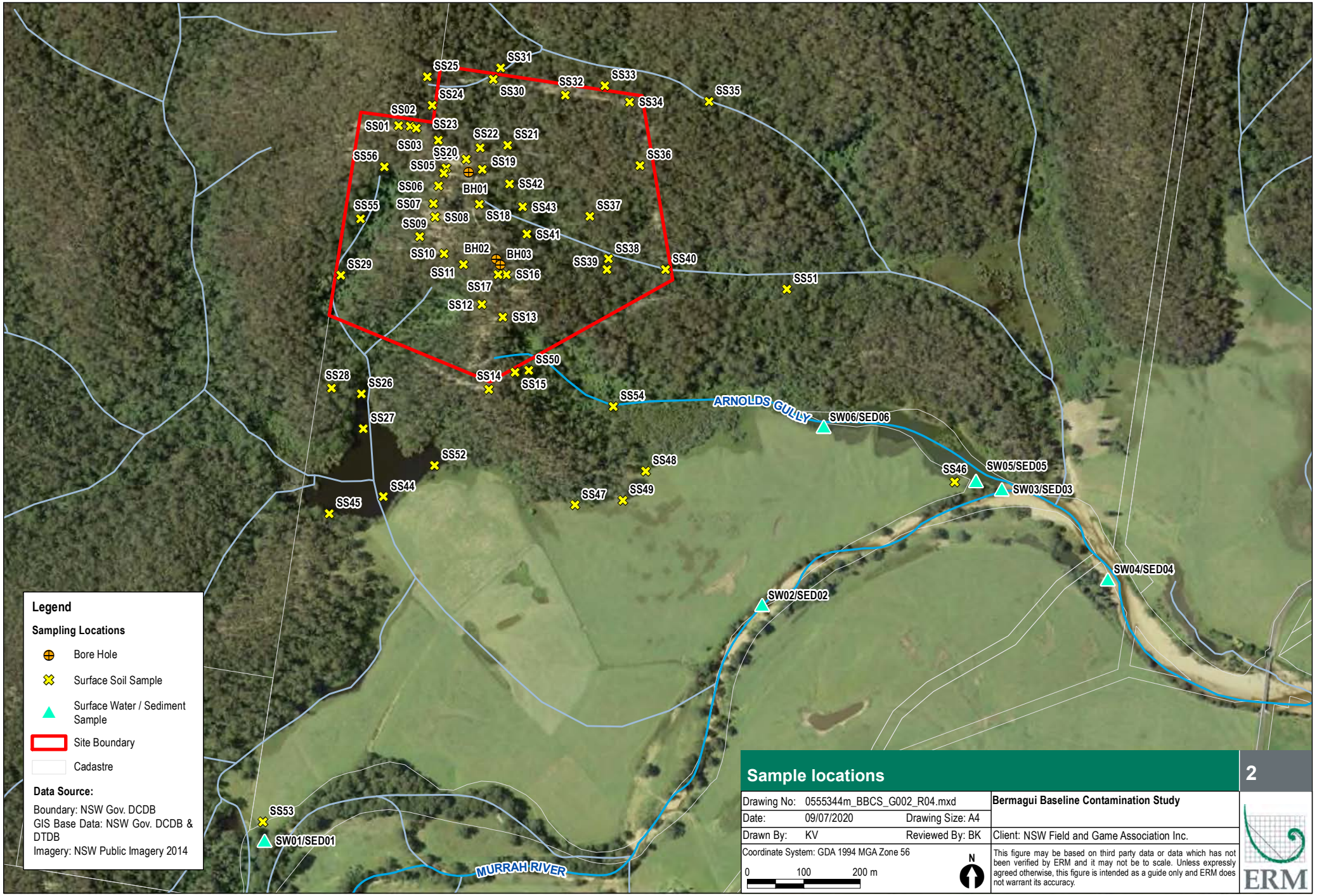
ERM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SS31
SS24
SS30
SS32
SS33
SS34
SS35
SS02
SS01
SS23
SS22
SS21
SS03
SS20
SS19
SS56
SS05
SS36
SS06
BH01
SS42
SS55
SS07
SS43
SS37
SS09
SS08
SS18
SS41
SS10
BH02
BH03
SS38
SS39
SS40
SS29
SS11
SS16
SS51
SS17
SS12
SS13
SS50
SS28
SS14
SS15
SS26
SS54
ARNOLDS GULLY
SW06/SED06
SS27
SS52
SS48
SS46
SW05/SED05
SS44
SS47
SS49
SW03/SED03
SS45
SW04/SED04
SW02/SED02
SS53
SW01/SED01
MURRAH RIVER
Legend
Sampling Locations
Bore Hole
Surface Soil Sample
Surface Water / Sediment Sample
Site Boundary
Cadastre
Data Source:
Boundary: NSW Gov. DCDB
GIS Base Data: NSW Gov. DCDB & DTDB
Imagery: NSW Public Imagery 2014
Sample locations
2
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Bermagui Baseline Contamination Study
Date: 09/07/2020
Drawing Size: A4
Drawn By: KV
Reviewed By: BK
Client: NSW Field and Game Association Inc.
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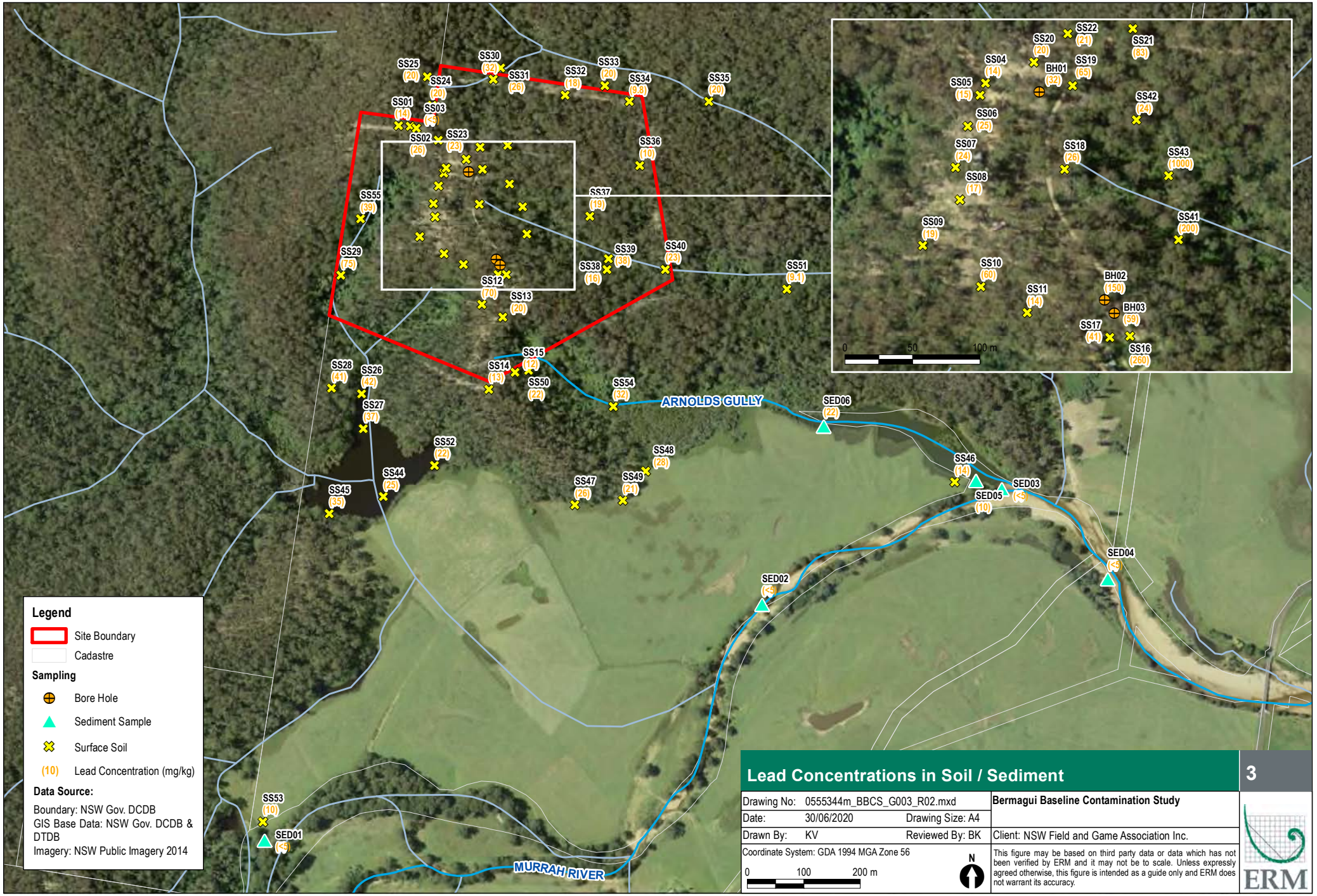
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
ERM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SS02 (26)
SS03 (<5)
SS23 (23)
SS24 (20)
SS25 (20)
SS30 (32)
SS31 (26)
SS32 (18)
SS33 (20)
SS34 (9.8)
SS35 (20)
SS36 (10)
SS37 (19)
SS38 (16)
SS39 (38)
SS40 (25)
SS51 (9.4)
SS55 (39)
SS29 (75)
SS12 (70)
SS13 (20)
SS15 (12)
SS14 (13)
SS50 (22)
SS54 (32)
SS28 (41)
SS26 (42)
SS27 (37)
SS52 (22)
SS44 (25)
SS45 (35)
SS48 (28)
SS47 (26)
SS49 (21)
SS46 (14)
SED06 (22)
SED03 (<5)
SED05 (10)
SED04 (<5)
SED02 (<5)
SS53 (10)
SED01 (<5)
ARNOLDS GULLY
MURRAH RIVER
SS22 (21)
SS21 (83)
SS20 (20)
SS04 (14)
SS19 (65)
BH01 (32)
SS05 (15)
SS42 (24)
SS06 (25)
SS07 (24)
SS18 (26)
SS43 (1000)
SS08 (17)
SS41 (200)
SS09 (19)
SS10 (60)
BH02 (150)
SS11 (14)
BH03 (59)
SS17 (41)
SS16 (260)
0 50 100 m
Legend
Site Boundary
Cadastre
Sampling
Bore Hole
Sediment Sample
Surface Soil
(10) Lead Concentration (mg/kg)
Data Source:
Boundary: NSW Gov. DCDB
GIS Base Data: NSW Gov. DCDB & DTDB
Imagery: NSW Public Imagery 2014
Lead Concentrations in Soil / Sediment
3
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Date: 30/06/2020
Drawing Size: A4
Drawn By: KV
Reviewed By: BK
Coordinate System: GDA 1994 MGA Zone 56
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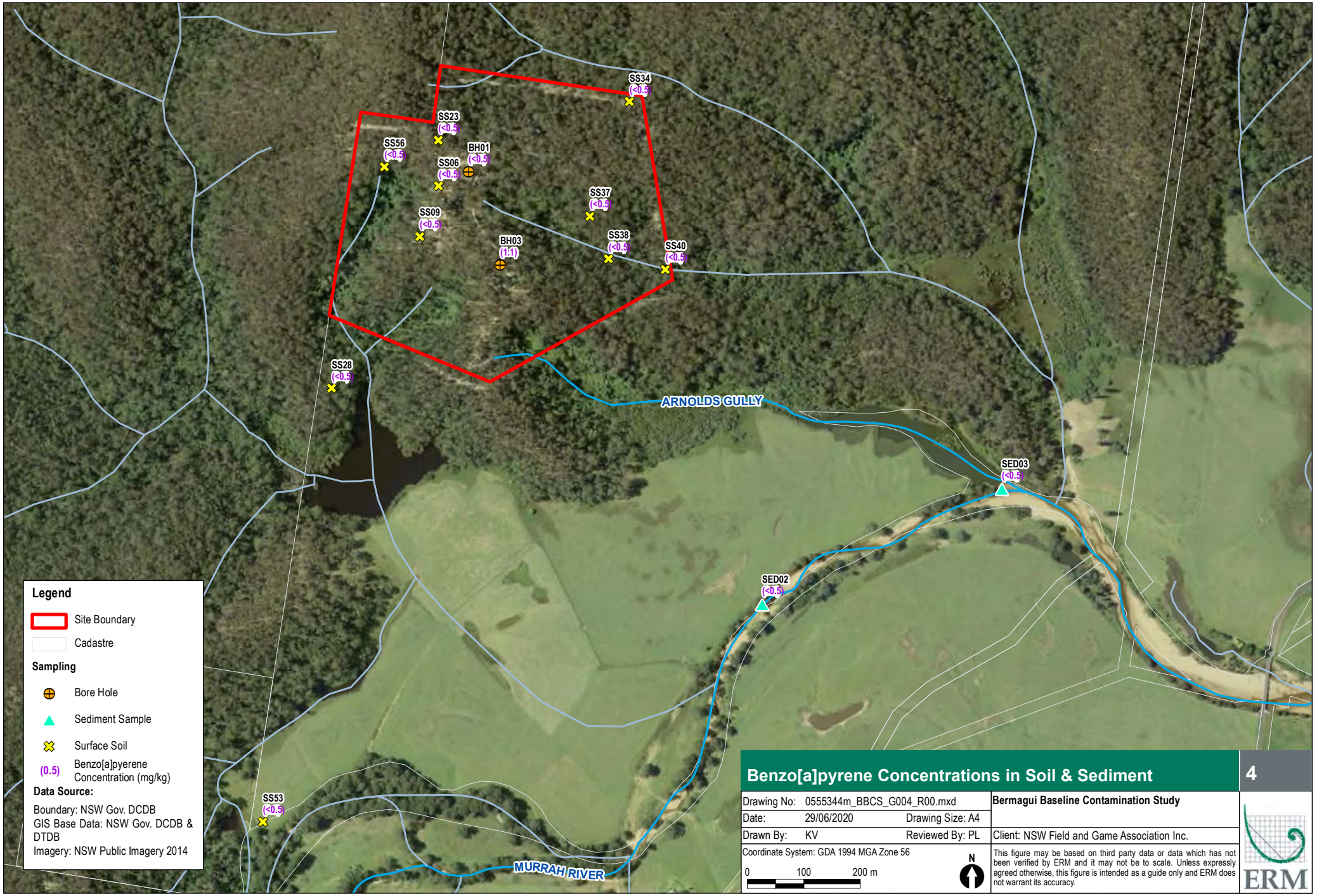
Bermagui Baseline Contamination Study
Client: NSW Field and Game Association Inc.
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
ERM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SS23 (<0.5)
SS56 (<0.5)
BH01 (<0.5)
SS06 (<0.5)
SS37 (<0.5)
SS09 (<0.5)
BH03 (1.1)
SS38 (<0.5)
SS40 (<0.5)
SS28 (<0.5)
ARNOLDS GULLY
SED03 (<0.5)
SED02 (<0.5)
SS53 (<0.5)
MURRAH RIVER
Legend
Site Boundary
Cadastre
Sampling
Bore Hole
Sediment Sample
Surface Soil
(0.5) Benzo[a]pyrene Concentration (mg/kg)
Data Source:
Boundary: NSW Gov. DCDB
GIS Base Data: NSW Gov. DCDB & DTDB
Imagery: NSW Public Imagery 2014
Benzo[a]pyrene Concentrations in Soil & Sediment
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Reviewed By: PL
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N
Bermagui Baseline Contamination Study
Client: NSW Field and Game Association Inc.
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
ERM

APPENDIX B TABLES

					Metals		
					Antimony	Arsenic	Lead
					mg/kg	mg/kg	mg/kg
EQL					10	2	5
NEPM 2013 Table 1A(1) HILs Rec C Soil						**300**	**600**
Ecological Investigation Level (EIL) for urban residential and public open space						**100**	**1100**
Location	**Depth**	**Sample_Type**	**Sampled_Date-Time**	**Lab_Report_Number**			
SS01	0.1 - 0.2	Normal	26/05/2020	723044	<10	3.2	14
SS02	0.1 - 0.2	Normal	26/05/2020	723044	<10	5.6	26
SS03	0.1 - 0.2	Normal	26/05/2020	723044	<10	<2	<5
SS04	0.1 - 0.2	Normal	26/05/2020	723044	<10	9.3	14
SS05	0.1 - 0.2	Normal	26/05/2020	723044	<10	7	15
SS06	0.1 - 0.2	Normal	26/05/2020	723044	<10	4.5	25
SS07	0.1 - 0.2	Normal	26/05/2020	723044	<10	4	24
SS08	0.1 - 0.2	Normal	26/05/2020	723044	<10	4	17
SS09	0.1 - 0.2	Normal	26/05/2020	723044	<10	<2	19
SS10	0.1 - 0.2	Normal	26/05/2020	723044	<10	<2	60
SS11	0.1 - 0.2	Normal	26/05/2020	723044	<10	4.9	14
SS12	0.1 - 0.2	Normal	26/05/2020	723044	<10	16	70
SS13	0.1 - 0.2	Normal	26/05/2020	723044	<10	5.5	20
SS14	0.1 - 0.2	Normal	26/05/2020	723044	<10	5.2	13
SS15	0.1 - 0.2	Normal	26/05/2020	723044	<10	3.5	12
SS16	0.1 - 0.2	Normal	26/05/2020	723044	<10	8.8	260
SS17	0.1 - 0.2	Normal	26/05/2020	723044	<10	3.9	41
SS18	0.1 - 0.2	Normal	26/05/2020	723044	<10	3.7	26
SS19	0.1 - 0.2	Normal	26/05/2020	723044	<10	<2	65
SS20	0.1 - 0.2	Normal	26/05/2020	723044	<10	10	20
SS21	0.1 - 0.2	Normal	26/05/2020	723044	<10	2.9	83
SS22	0.1 - 0.2	Normal	26/05/2020	723044	<10	7.4	21
SS23	0.1 - 0.2	Normal	26/05/2020	723044	<10	6	23
SS24	0.1 - 0.2	Normal	26/05/2020	723044	<10	4.1	20
SS25	0.1 - 0.2	Normal	26/05/2020	723044	<10	4.7	20
SS26	0.1 - 0.2	Normal	27/05/2020	723044	<10	5.1	42
SS27	0.1 - 0.2	Normal	27/05/2020	723044	<10	6.5	37
SS28	0.1 - 0.2	Normal	27/05/2020	723044	<10	4.7	41
SS29	0.1 - 0.2	Normal	27/05/2020	723044	<10	4.9	75
SS30	0.1 - 0.2	Normal	27/05/2020	723044	<10	8.9	32
SS31	0.1 - 0.2	Normal	27/05/2020	723044	<10	7.4	26
SS32	0.1 - 0.2	Normal	27/05/2020	723044	<10	2.7	18
SS33	0.1 - 0.2	Normal	27/05/2020	723044	<10	5.7	20
SS34	0.1 - 0.2	Normal	27/05/2020	723044	<10	2.1	9.8
SS35	0.1 - 0.2	Normal	27/05/2020	723044	<10	11	20
SS36	0.1 - 0.2	Normal	27/05/2020	723044	<10	3.9	10
SS37	0.1 - 0.2	Normal	27/05/2020	723044	<10	11	19
SS38	0.1 - 0.2	Normal	27/05/2020	723044	<10	3.3	16
SS39	0.1 - 0.2	Normal	27/05/2020	723044	<10	2.9	38
SS40	0.1 - 0.2	Normal	27/05/2020	723044	<10	3.6	23
SS41	0.1 - 0.2	Normal	27/05/2020	723044	<10	3.4	200
SS42	0.1 - 0.2	Normal	27/05/2020	723044	<10	2.8	24
SS43	0.1 - 0.2	Normal	27/05/2020	723044	<10	5.4	**1000**
SS44	0.1 - 0.2	Normal	27/05/2020	723044	<10	3.9	25
SS45	0.1 - 0.2	Normal	27/05/2020	723044	<10	5.3	35
SS46	0.1 - 0.2	Normal	27/05/2020	723044	<10	2.9	14
SS47	0.1 - 0.2	Normal	27/05/2020	723044	<10	5.2	26
SS48	0.1 - 0.2	Normal	27/05/2020	723044	<10	7.5	28
SS49	0.1 - 0.2	Normal	27/05/2020	723044	<10	3.8	21
SS50	0.1 - 0.2	Normal	27/05/2020	724572	<10	7.2	22
SS51	0.1 - 0.2	Normal	27/05/2020	724572	<10	<2	9.1
SS52	0.1 - 0.2	Normal	27/05/2020	724572	<10	2.8	22
SS53	0.1 - 0.2	Normal	26/05/2020	724572	<10	<2	10
SS54	0.1 - 0.2	Normal	26/05/2020	724572	<10	<2	18
SS55	0.1 - 0.2	Normal	26/05/2020	724572	<10	4.2	39
SS56	0.1 - 0.2	Normal	28/05/2020	723044	<10	6.6	32
BH01	0.1 - 0.2	Normal	28/05/2020	723044	<10	4.8	32
BH01	0.4 - 0.5	Normal	28/05/2020	723044	<10	4.8	17
BH02	0.1 - 0.2	Normal	28/05/2020	723044	<10	6.8	130
BH02	0.2 - 0.3	Normal	28/05/2020	723044	<10	6.6	150
BH03	0.1 - 0.2	Normal	28/05/2020	723044	<10	8.6	59
BH03	0.4 - 0.5	Normal	28/05/2020	723044	<10	9.5	32

Statistical Summary

Number of Results	62	62	62
Number of Detects	0	55	61
Minimum Concentration	<10	<2	<5
Minimum Detect	ND	2.1	9.1
Maximum Concentration	<10	16	1000
Maximum Detect	ND	16	1000
Average Concentration	5	5.1	53
Median Concentration	5	4.75	23.5
Standard Deviation	0	2.9	130
Number of Guideline Exceedances	0	0	1
Number of Guideline Exceedances(Detects Only)	0	0	1

								Naphthalene	pH	TOC	Inorganics	PAH	PAH/Phenols														
								CEC	Naphthalene	pH (aqueous extract)	Fraction Organic Carbon	Moisture Content (dried @ 103°C)	Benzo(b&j)fluoranthene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a)pyrene TEQ (zero)	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total)
								mg/kg	mg/kg	pH Units	%	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL								0.05	0.5	0.1	0.1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NEPM 2013 Table 1A(1) HILs Res A Soil																			**3**									**300**
Ecological Screening Level (ESL) for urban residential and public open space																		**0.7**										
Field_ID	**LocCode**	**Sample_Type**	**Sampled_Date-Time**	**Lab_Report_Number**																								
BH01_0.2	BH01	Normal	28/05/2020	723875	4.6	<0.5	5.7	2.2	4.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH01_0.5	BH01	Normal	28/05/2020	723875	3	<0.5	5.5	1.4	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH03_0.2	BH03	Normal	28/05/2020	723875	7	<0.5	4.9	3.2	6.1	0.8	<0.5	<0.5	<0.5	0.7	1.1	1.4	0.7	1	0.7	<0.5	0.8	<0.5	0.6	<0.5	0.8	7.2
BH03_0.5	BH03	Normal	28/05/2020	723875	5	<0.5	5.1	2.1	6.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
D01_20200526	SS09	Field_D	26/05/2020	723875	13	<0.5	5.5	7.1	7.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
D01_20200527	SS40	Field_D	27/05/2020	723875	4.5	<0.5	4.7	6.4	20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
D01_20200528	BH01	Field_D	28/05/2020	723875	3.7	<0.5	5.5	0.9	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SS06	SS06	Normal	26/05/2020	723875	2.2	<0.5	5.5	1.2	5.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SS09	SS09	Normal	26/05/2020	723875	13	<0.5	5.4	7.2	7.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SS23	SS23	Normal	26/05/2020	723875	5	<0.5	5.3	4.2	6.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SS28	SS28	Normal	27/05/2020	723875	6.5	<0.5	5.2	6.6	21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SS34	SS34	Normal	27/05/2020	723875	2.5	<0.5	4.5	4.2	8.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SS37	SS37	Normal	27/05/2020	723875	2.9	<0.5	4.8	3.3	13	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SS38	SS38	Normal	27/05/2020	723875	4.3	<0.5	4.5	4.1	8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SS40	SS40	Normal	26/05/2020	723875	5	<0.5	4.9	18	19	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SS53	SS53	Normal	26/05/2020	723875	11	<0.5	5.4	3.4	14	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SS56	SS56	Normal	26/05/2020	723875	4.2	<0.5	4.8	5.4	19	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Statistical Summary																												
Number of Results					17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Number of Detects					17	0	17	17	17	1	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1		
Minimum Concentration					2.2	<0.5	4.5	0.9	4.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Minimum Detect					2.2	ND	4.5	0.9	4.9	0.8	ND	ND	ND	0.7	1.1	1.4	0.7	1	0.7	ND	0.8	ND	0.6	ND	0.8	7.2		
Maximum Concentration					13	<0.5	5.7	18	21	0.8	<0.5	<0.5	<0.5	0.7	1.1	1.4	0.7	1	0.7	<0.5	0.8	<0.5	0.6	<0.5	0.8	7.2		
Maximum Detect					13	ND	5.7	18	21	0.8	ND	ND	ND	0.7	1.1	1.4	0.7	1	0.7	ND	0.8	ND	0.6	ND	0.8	7.2		
Average Concentration					5.7	0.25	5.1	4.8	10	0.28	0.25	0.25	0.25	0.28	0.3	0.32	0.28	0.29	0.28	0.25	0.28	0.25	0.27	0.25	0.28	0.66		
Median Concentration					4.6	0.25	5.2	4.1	7.6	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25		
Standard Deviation					3.4	0	0.38	4	5.9	0.13	0	0	0	0.11	0.21	0.28	0.11	0.18	0.11	0	0.13	0	0.085	0	0.13	1.7		
Number of Guideline Exceedances					0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0		
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0		

					Metals
					Lead
					µg/L
EQL					10
Field_ID	**LocCode**	**Sample_Type**	**Sampled_Date-Time**	**Lab_Report_Number**	
SS09_0.2	SS09	Normal	26/05/2020	726119	20
SS10_0.2	SS10	Normal	26/05/2020	726119	80
SS12_0.2	SS12	Normal	26/05/2020	726119	40
SS16_0.2	SS16	Normal	26/05/2020	726119	210
SS21_0.2	SS21	Normal	26/05/2020	726119	10
SS26_0.2	SS26	Normal	26/05/2020	726119	<10
SS29_0.2	SS29	Normal	26/05/2020	726119	20
SS40_0.1	SS40	Normal	26/05/2020	726119	<10
SS41_0.2	SS41	Normal	26/05/2020	726119	30
SS43_0.2	SS43	Normal	26/05/2020	726119	60
SS50_0.1	SS50	Normal	26/05/2020	726119	10
BH01_0.5	BH01	Normal	26/05/2020	726119	20
D01_20200526	SS09	Field_D	26/05/2020	726119	<10
D01_20200527	SS40	Field_D	26/05/2020	726119	<10
D01_20200528	BH01	Field_D	26/05/2020	726119	10

Statistical Summary

Number of Results	15
Number of Detects	11
Minimum Concentration	<10
Minimum Detect	10
Maximum Concentration	210
Maximum Detect	210
Average Concentration	35
Median Concentration	20
Standard Deviation	53
Number of Guideline Exceedances	0
Number of Guideline Exceedances(Detects Only)	0

					Metals		
					Antimony (Filtered)	Arsenic (Filtered)	Lead (Filtered)
					µg/L	µg/L	µg/L
EQL					5	1	1
ANZG 95% Protection freshwater*						**13**	**1**
ANZG 95% Protection Marine Water*							**2.2**
Austrlian Drinking Water Guidelines					**3**	**10**	**10**
Field_ID	**LocCode**	**Sample_Type**	**Sampled_Date-Time**	**Lab_Report_Number**			
SW01	SW01	Normal	26/05/2020	724572	<5	<1	3
SW02	SW02	Normal	26/05/2020	724572	<5	<1	<1
SW02	SW02	Normal	27/05/2020	723875	-	-	-
SW03	SW03	Normal	26/05/2020	724572	<5	<1	1
SW03	SW03	Normal	27/05/2020	723875	-	-	-
SW04	SW04	Normal	26/05/2020	724572	<5	1	2
SW05	SW05	Normal	28/05/2020	723044	<5	1	2
SW06	SW06	Normal	28/05/2020	723044	<5	1	1

Statistical Summary

Number of Results	6	6	6
Number of Detects	0	3	5
Minimum Concentration	<5	<1	<1
Minimum Detect	ND	1	1
Maximum Concentration	<5	1	3
Maximum Detect	ND	1	3
Average Concentration	2.5	0.75	1.6
Median Concentration	2.5	0.75	1.5
Standard Deviation	0	0.27	0.92
Number of Guideline Exceedances	6	0	5
Number of Guideline Exceedances(Detects Only)	0	0	5

					Naphthalene	pH	TOC	PAH	PAH/Phenols													
					Naphthalene	pH (Lab)	Fraction Organic Carbon	Benzo(b&j)fluoranthene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total)
					µg/L	pH units	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL					1	0.1	5	0.001	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ANZECC 2000 95% Protection Freshwater						**7.5-8.5**																
ANZECC 2000 95% Protection Marine Water						**7.5-8.5**																
Austrlian Water Drinkig Guidelines													**0.01**									
Field_ID	**LocCode**	**Sample_Type**	**Sampled_Date-Time**	**Lab_Report_Number**																		
SW02	SW02	Normal	27/05/2020	723875	<1	7	14	<0.001	<1	<1	<1	<1	**<1**	<1	<1	<1	<1	<1	<1	<1	<1	<1
SW03	SW03	Normal	27/05/2020	723875	<1	7	11	<0.001	<1	<1	<1	<1	**<1**	<1	<1	<1	<1	<1	<1	<1	<1	<1
Statistical Summary																						
Number of Results					2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Number of Detects					0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration					<1	7	11	<0.001	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Minimum Detect					ND	7	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration					<1	7	14	<0.001	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Maximum Detect					ND	7	14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration																						
Median Concentration					0.5	7	12.5	0.0005	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Standard Deviation																						
Number of Guideline Exceedances					0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)					0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

					Metals		
					Antimony	Arsenic	Lead
					mg/kg	mg/kg	mg/kg
EQL					10	2	5
CSIRO (2013) Sediment Quality Guidelines					**2**	**20**	**50**
CSIRO (2013) Sediment Quality Guidelines - High					**25**	**70**	**220**
Field_ID	**LocCode**	**Sample_Type**	**Sampled_Date-Time**	**Lab_Report_Number**			
SED01	SED01	Normal	26/05/2020	724572	**<10**	<2	<5
SED02	SED02	Normal	26/05/2020	724572	**<10**	<2	<5
SED02	SED02	Normal	27/05/2020	723875	-	-	-
SED03	SED03	Normal	26/05/2020	724572	**<10**	<2	<5
SED03	SED03	Normal	27/05/2020	723875	-	-	-
SED04	SED04	Normal	26/05/2020	724572	**<10**	2.1	<5
SED05	SED05	Normal	28/05/2020	723044	**<10**	2.9	10
SED06	SED06	Normal	28/05/2020	723044	**<10**	4.7	22

Statistical Summary

Number of Results	6	6	6
Number of Detects	0	3	2
Minimum Concentration	<10	<2	<5
Minimum Detect	ND	2.1	10
Maximum Concentration	<10	4.7	22
Maximum Detect	ND	4.7	22
Average Concentration	5	2.1	7
Median Concentration	5	1.55	2.5
Standard Deviation	0	1.5	7.9
Number of Guideline Exceedances	6	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0

		Naphthalene	pH	TOC	Inorganics	PAH	PAH/Phenols															
	CEC	Naphthalene	pH (aqueous extract)	Fraction Organic Carbon	Moisture Content (dried @ 103°C)	Benzo(b&j)fluoranthene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a)pyrene TEQ (zero)	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total)
	mg/kg	mg/kg	pH Units	%	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.05	0.5	0.1	0.1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
CSIRO (2013) Sediment Quality Guidelines - Low											**430**											
CSIRO (2013) Sediment Quality Guidelines - High											**1600**											

Field_ID	LocCode	Sample_Type	Sampled_Date-Time	Lab_Report_Number																				
SED01	SED01	Normal	26/05/2020	724572	-	-	-	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SED02	SED02	Normal	26/05/2020	724572	-	-	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SED02	SED02	Normal	27/05/2020	723875	0.9	<0.5	6.1	<0.1	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SED03	SED03	Normal	26/05/2020	724572	-	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SED03	SED03	Normal	27/05/2020	723875	0.63	<0.5	6.7	<0.1	19	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SED04	SED04	Normal	26/05/2020	724572	-	-	-	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SED05	SED05	Normal	28/05/2020	723044	-	-	-	-	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SED06	SED06	Normal	28/05/2020	723044	-	-	-	-	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Statistical Summary

Number of Results	2	2	2	2	8	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Number of Detects	2	0	2	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	0.63	<0.5	6.1	<0.1	15	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Minimum Detect	0.63	ND	6.1	ND	15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	0.9	<0.5	6.7	<0.1	66	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Maximum Detect	0.9	ND	6.7	ND	66	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration					30																		
Median Concentration	0.765	0.25	6.4	0.05	18.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Standard Deviation					22																		
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Blanks (SOIL)
Filter: SDG in('29 May 2020','04 Jun 2020','10 Jun 2

SDG	29-May-20	29-May-20
Field ID	TB (1)	TB (2)
Sampled_Date/Time	27/05/2020	27/05/2020
Sample Type	Trip_B	Trip_B

Method_Type	ChemName	Units	EQL		
Heavy Metal	Antimony	mg/kg	10		
	Arsenic	mg/kg	2		
	CEC	mg/kg	0.05		
	Lead	mg/kg	5		
Inorganic	Fraction Organic Carbon	%	0.1		
	Moisture Content (dried @ 103°C)	%	1		
	pH (aqueous extract)	pH units	0.1		
Organic	TRH C6-C10	mg/kg	20	<20	<20
	Naphthalene	mg/kg	0.5	<0.5	<0.5
	TRH C6-C9	mg/kg	20	<20	<20
	TRH C6-C10 less BTEX (F1)	mg/kg	20	<20	<20
PAH	Acenaphthene	mg/kg	0.5		
	Acenaphthylene	mg/kg	0.5		
	Anthracene	mg/kg	0.5		
	Benz(a)anthracene	mg/kg	0.5		
	Benzo(a) pyrene	mg/kg	0.5		
	Benzo(a)pyrene TEQ (zero)	mg/kg	0.5		
	Benzo(b&j)fluoranthene	mg/kg	0.5		
	Benzo(g,h,i)perylene	mg/kg	0.5		
	Benzo(k)fluoranthene	mg/kg	0.5		
	Chrysene	mg/kg	0.5		
	Dibenz(a,h)anthracene	mg/kg	0.5		
	Fluoranthene	mg/kg	0.5		
	Fluorene	mg/kg	0.5		
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5		
	Naphthalene	mg/kg	0.5		
	Phenanthrene	mg/kg	0.5		
	Pyrene	mg/kg	0.5		
	PAHs (Sum of total)	mg/kg	0.5		
Volatile	Benzene	mg/kg	0.1	<0.1	<0.1
	Toluene	mg/kg	0.1	<0.1	<0.1
	Ethylbenzene	mg/kg	0.1	<0.1	<0.1
	Xylene (o)	mg/kg	0.1	<0.1	<0.1
	Xylene (m & p)	mg/kg	0.2	<0.2	<0.2
	Xylene Total	mg/kg	0.3	<0.3	<0.3

Field Duplicates (SOIL)
Filter: SDG in('29 May

SDG			29-May-20	29-May-20		29-May-20	29-May-20		29-May-20	29-May-20		4-Jun-20	4-Jun-20		4-Jun-20	4-Jun-20		4-Jun-20	4-Jun-20	
Field ID			SS09_0.2	DOI_20200526	**RPD**	SS40_0.1	DOI_20200527	**RPD**	BH01_0.5	DOI_20200528	**RPD**	SS09	D01_20200526	**RPD**	SS40	D01_20200527	**RPD**	BH01_0.5	D01_20200528	**RPD**
Sampled Date/Time			26/05/2020	26/05/2020		27/05/2020	27/05/2020		28/05/2020	28/05/2020		26/05/2020	26/05/2020		26/05/2020	26/05/2020		28/05/2020	28/05/2020	
Method_T	**ChemNam**	**Units**	**EQL**																	
ASLP (lead	Final pH	pH_Units	0.1																	
	Initial pH	pH_Units	0.1																	
	Leachate F	mg/l																		
	pH (Leacha	pH units	0.1																	
ched)																				
Heavy Met	CEC	mg/kg	0.05 (Primary): 0.1 (Interlab)									13.0	13.0	0	5.0	4.5	11	3.0	3.7	21
al																				
Inorganic	Fraction O	%	0.1 (Primary): 0.5 (Interlab)									7.2	7.1	1	**18.0**	**6.4**	**95**	**1.4**	**0.9**	**43**
	pH (aqueo	pH units	0.1									5.4	5.5	2	4.9	4.7	4	5.5	5.5	0
PAH	Naphthaler	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Inorganic	Moisture C	%	1	8.2	8.7	6	23.0	19.0	19	4.7	5.2	10	7.5	7.6	1	19.0	20.0	5	5.0	5.0	0
Heavy Met	Antimony	mg/kg	10	<10.0	<10.0	0	<10.0	<10.0	0	<10.0	<10.0	0								
	Arsenic	mg/kg	2	<2.0	<2.0	0	3.6	4.2	15	4.8	5.0	4								
	Lead	mg/kg	5	**19.0**	**38.0**	**67**	23.0	31.0	30	17.0	17.0	0								
al																				
Heavy Met	Lead	µg/l	10																	
al (leached)																				
PAH	Benzo(b&j)	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Acenaphth	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Acenaphth	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Anthracene	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benz(a)ant	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a) p	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a)py	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(g,h,	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(k)flu	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Chrysene	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Dibenz(a,h	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Fluoranthe	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Fluorene	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Indeno(1,2	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Phenanthre	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	Pyrene	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
	PAHs (Sur	mg/kg	0.5									<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 100 (1-5 x EQL); 40 (5-10 x EQL); 40 (> 10 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Field Duplicates (SOIL)
Filter: SDG in('29 May

SDG			17-Jun-20	17-Jun-20		17-Jun-20	17-Jun-20		17-Jun-20	17-Jun-20		4-Jun-20	ALSE-Sydney 04-Jun-20		4-Jun-20	ALSE-Sydney 04-Jun-20	
Field ID			SS09	D01_20200526	**RPD**	SS40	D01_20200527	**RPD**	BH01_0.5	D01_20200528	**RPD**	SS23	T01_20200526	**RPD**	SS53	T01_20200527	**RPD**
Sampled Date/Time			26/05/2020	26/05/2020		26/05/2020	26/05/2020		26/05/2020	26/05/2020		26/05/2020	26/05/2020		26/05/2020	26/05/2020	
Method_T	**ChemNam**	**Units**	**EQL**														
ASLP (lead	Final pH	pH_Units	0.1	5.6	5.7	2	5.4	5.1	6	5.5	5.7	4						
	Initial pH	pH_Units	0.1	5.7	5.6	2	5.6	5.5	2	5.8	5.8	0						
	Leachate F	mg/l		4.0	4.0	0	4.0	4.0	0	4.0	4.0	0						
	pH (Leacha	pH units	0.1	5.9	5.9	0	5.9	5.9	0	5.9	5.9	0						
ched)																		
Heavy Met	CEC	mg/kg	0.05 (Primary): 0.1 (Inter										5.0	5.6	11	11.0	10.2	8
al																		
Inorganic	Fraction O	%	0.1 (Primary): 0.5 (Interla										**4.2**	**2.8**	**40**	3.4	3.3	3
	pH (aqueo	pH units	0.1															
PAH	Naphthaler	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
Inorganic	Moisture C	%	1															
Heavy Met	Antimony	mg/kg	10															
	Arsenic	mg/kg	2															
	Lead	mg/kg	5															
al																		
Heavy Met	Lead	µg/l	10	20.0	<10.0	67	<10.0	<10.0	0	20.0	10.0	67						
al (leached)																		
PAH	Benzo(b&j)	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Acenaphth	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Acenaphth	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Anthracene	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Benz(a)ant	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a) p	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a)py	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(g,h,	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(k)flu	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Chrysene	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Dibenz(a,h	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Fluoranthe	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Fluorene	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Indeno(1,2	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Phenanthre	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	Pyrene	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0
	PAHs (Sur	mg/kg	0.5										<0.5	<0.5	0	<0.5	<0.5	0

*RPDs have only been considered where a concentration
**High RPDs are in bold (Acceptable RPDs for each EQL
***Interlab Duplicates are matched on a per compound ba

APPENDIX C SAQP

ERM

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Mr Andrew Fairfield Smith
President Sporting Clays NSW
via Email
nswscapresident@gmail.com

1 July 2020

Reference: *0555344 Bermagui Sporting Clays Baseline Contamination Study: Sampling Analysis and Quality Plan (SAQP)*

Dear Andrew,

1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by Sporting Clays NSW (SC NSW) to prepare a sampling and analysis quality plan (SAQP) to guide a baseline contamination study of the Bermagui Sporting Clays (BSC) gun club grounds at 3200 Tathra- Bermagui Road, Murrah NSW 2546 (the Site).

2. SITE DESCRIPTION

The Site is located at 3200 Tathra- Bermagui Road, Murrah NSW 2546 and is formally identified as Lot 101 of DP1172182. The Site has been used as a venue for the completion of sporting clays competition shooting and is currently permitted to shoot on 12 days per year under an existing Development Application (DA) from Bega Valley Shire Council (Council).

The Site occupies an area of 24.35 hectares (ha) of mostly heavily vegetated land located in the upper reaches of the Murrah River Catchment and exhibits some steep topography with several gullies and drainage lines crossing the property.

3. OBJECTIVES

The primary objective of the baseline contamination study is to assess the level of contaminants of concern and determine if there are any complete ‘source-pathway-receptor’ scenarios resulting from the shooting activities undertaken on the property. The secondary objective is to identify specific measures that may need to be undertaken to mitigate potential contamination of the Site and adjoining lands and waterways.

4. CONCEPTUAL SITE MODEL

4.1 Overview

The development of a Conceptual Site Model (CSM) is the fundamental step that describes exposure pathways between the source of contamination and the receptor. The linkages between these elements in the CSM examines if a complete, potential or incomplete exposure pathway exists. The status of the exposure pathway determines the presence of risk to environment and/or human health. A preliminary CSM is presented in Table 4.1 based on a review of the available information.

4.2 Potential Sources of Contamination

The potential primary sources of contamination are associated with the operation of a sporting clay club shooting range.

ERM understands that sporting clays is a discipline of competitive shotgun shooting designed primarily to simulate hunting situations by using clay targets thrown in a variety of presentations including (but not limited to) incoming, outgoing, overhead, crossing, chandelle (looping), springing 'teal' and rolling 'rabbit' style targets. These various presentations mean that, upon firing, the shot can be propelled by the shotgun away from the firing position at a variety of trajectories ranging from almost vertically upward (in the case of overhead targets) to angling downward into the ground in front or to the side of the firing position (in the case of rabbit targets for example). As such, the range of dispersion of shot from the firing position varies considerably but is generally limited to a maximum of 300 - 400 m.

Based on the site history and background data reviewed and ERMs professional experience, the Potential Contaminants of Concern (PCOC) associated with current and historical land uses undertaken in the general area are considered to include the following:

Potential Source	PCOC	Comment
Operation of a sporting clay club shooting range	Metals (lead, arsenic, antimony)	Shotgun loads used in sporting clays competition predominantly utilise up to 28 grams of lead (with up to 6% antimony and trace 0.1 -0.2% arsenic) shot with each pellet being 2 to 2.5 mm in diameter. Metals (Pb, Sb, As) are therefore the PCOCs. The potential for lead impacts is likely to be higher in areas where targets are shot on or close to the ground.
	Polycyclic Aromatic Hydrocarbons (PAHs)	Clay targets utilised on site may have historically been treated with products containing concentrations of PAHs. The concentrations of PAHs are likely to have decreased to lower levels over time, and it is understood that these products have not been used in more recent years.

4.3 Potential Pathways

The primary potential exposure pathways of concern at the Site are:

- Inhalation of contaminated dust (from soils);
- Dermal contact and / or incidental ingestion with contaminated surface water and soils / sediments;
- Transport of contamination through surface water flows;
- Transport of contamination to underlying groundwater aquifers; and
- Transport of contaminants through mechanical transport (e.g. overland flow/ erosion and transport of soil/sediments).

4.4 Potential Receptors

The identified potentially sensitive human and ecological receptors have been identified as:

- Current and future visitors and users of the shooting range;
- Off-site groundwater users and potential future users of groundwater;
- Workers carrying out installation or maintenance works within the site; Off-site residents; and
- On-site and off-site freshwater aquatic ecosystems and down gradient estuarine ecosystems.

4.5 Preliminary Conceptual Site Model

Table 4-1 Preliminary Conceptual Site Model

Potential Sources	Potential Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
Operation of a sporting clay club shooting range	Inhalation of contaminated dust	■ Current and future land users; and ■ Workers carrying out installation or maintenance works within the site.	High	■ Potential inhalation of dust and dermal contact/ ingestion with contaminated surface waters/soils is considered moderate – high as the site is unsealed and contamination related to the shooting activities on Site are likely to have resulted in impacts to surface soils. ■ ERM notes that where intrusive works/ redevelopment occurs the potential for dermal contact with soils should be considered.
	Dermal contact and/or incidental ingestion of contaminated soils	■ Current and future land users; and ■ Workers carrying out installation or maintenance works within the site.	Moderate	
	Dermal contact and/or incidental ingestion with contaminated surface waters	■ Current and future land users; and ■ Workers carrying out installation or maintenance works within the site.	Moderate	
	Transport of contaminated sediments by surface water flows	■ Off-site human and ecological sensitive receptors	High	
	Migration of contamination from soil to underlying groundwater aquifers	■ Off-site users of groundwater; ■ Aquatic ecosystems receiving groundwater; and ■ Future potential onsite users of groundwater.	Low-moderate	
	Overland transport of contaminants through mechanical transport	■ Current and future land users; and ■ Workers carrying out installation or maintenance works within the site.	Moderate	

5. DATA QUALITY OBJECTIVES

5.1 Overview

The ASC NEPM (NEPC, 1999) recommends that DQOs be implemented during the assessment of potentially contaminated sites. The DQO process described in the ASC NEPM (NEPC, 1999) outlines seven distinct steps to outline the project goals, decisions, constraints and an assessment of the project uncertainties and how to address these when they arise.

The site will be assessed against criteria suitable for the protection of human health and ecological receptors, as discussed in Section 7.

5.2 Step 1: State the Problem

The objective of the investigation is to assess the presence and extent of contamination associated with the operation of a shooting range. As such, the technical objectives of the investigation will be to:

- Assess the extent of contamination in soil, sediment and surface water above applicable assessment criteria;
- Assess the potentially complete pathways to on-site and off-site receptors;
- Identify potential unacceptable human health and ecological risks and recommended remedial actions.

5.3 Step 2: Identify the Decisions

The decisions to be made based on the proposed scope of work and objectives are:

- Do contaminant concentrations in soil meet the adopted investigation criteria suitable for the protection of human health (recreational land use on-site, public open space and rural / residential land use off-site), and ecological receptors?
- Do contaminant concentrations in sediment and/or surface water indicate potential migration of contamination from soil?
- Is the data collected during this investigation sufficient to provide an assessment of the environmental condition and extent of any existing contamination to environmental media to support risk based decision making?
- Do soil impacts represent a potential risk to identified human health under a recreational land use scenario (on-site, continuation of shooting range use), public open space and rural residential land use (off-site), and ecological receptors?
- What management and/or remedial actions are best suited to mitigate potential risk to human health and the environment?

5.4 Step 3: Identify Inputs to the Decisions

The inputs required to make the above decisions are as follows:

- Identification of representative sampling locations;
- Identification of contaminants of potential concern (COPCs);
- Soil field screening data (soil type and characteristics);

- Direct observation of environmental variables including visual disturbance, odours and staining in soil;
- Laboratory analytical results for the COPCs;
- Field and laboratory quality assurance/quality control data (refer to *Section 6* for further details); and
- Adopted screening levels outlined in *Section 7*.

5.5 Step 4: Define the Study Boundaries

The spatial boundaries are shown on *Figure 1, Appendix A*.

The temporal period of the investigation will be from the date of commencement (May 2020) until the date of completion of the current works which are anticipated to be completed by July 2020.

5.6 Step 5: Develop a Decision Rule

Laboratory analytical data will be assessed against the screening levels identified in *Section 7*.

Table 5.1: Decision Rules

DECISION REQUIRED TO BE MADE	DECISION RULE
1. Is data acquired of acceptable quality for interpretive purposes?	Have appropriate controls and operating procedures been used, specifically: ■ Consistent sampling methods including appropriate decontamination procedures; ■ Analytical techniques, both standardised method and detection limits appropriate to assessment criteria for different laboratories and for the same laboratories over time; and ■ Relevant QA/QC parameters tested. If the criteria stated above are satisfied, the decision is Yes. If the criteria are not satisfied, the decision is No.
2. Has a sufficiently robust CSM been established?	Interpretation of the available field observations has enabled the key source-pathway-receptor (SPR) linkages to be adequately defined in terms of the proposed land use and in accordance with the guidance established per the standards outlined in ASC NEPM (NEPC, 1999). The CSM allows risk driving pathways to be established and appropriate application of selected assessment criteria. If the criteria stated above are satisfied, the decision is Yes. If the criteria are not satisfied, the decision is No.
3. Is the data obtained sufficient to delineate the extent of contamination?	If there are exceedances of the adopted screening levels (for protection of receptors identified in the CSM for the relevant land use), are there sufficient data inputs to the CSM to establish whether SPR linkages are presently complete, or may be complete in the future? Has a significant risk been realised per ASC NEPM (NEPC, 1999)?
4. Is there sufficient data (quantity and distribution) to provide preliminary identification and delineation of source areas?	Does the data set allow statistical and qualitative assessment of identified screening level exceedances to enable a preliminary delineation of associated source areas per the guidance available in ASC NEPM (NEPC, 1999)? If yes, the decision is Yes. Otherwise, the decision is No.

5.7 Step 6: Specify the Performance or Acceptance Criteria

The acceptable limits on decision errors applied during the review of the results will be based on the Data Quality Indicators (DQIs) of precision, accuracy, representativeness, comparability and completeness in accordance with the requirements of the ASC NEPM (NEPC, 1999).

The potential for significant decision errors will be minimised by:

- Completing a robust QA/QC assessment of the validation data and application of the probability that 95% of data will satisfy the DQIs, therefore a limit on the decision error would be 5% that a conclusive statement may be incorrect;
- Assessing whether appropriate sampling and analytical density has been achieved for the purposes of providing an established status of conditions; and
- Selection of appropriate screening levels that reflect the relevant on-site and off-site land uses and environmental values. Refer to Section 7 for adopted screening levels.

5.8 Step 7: Optimise the Design for Obtaining Data

This SAQP has been developed based on a review of existing information and land use (recreational; shooting range). Should field screening data gathered during this assessment indicate that the objectives of this SAQP may not be met, the sampling design (including sampling pattern, type of samples and analytes) may be adjusted accordingly (subject to client approval).

If more significant changes to the SAQP are required, these changes will be documented and discussed with relevant stakeholders.

6. SCOPE OF WORK/METHODOLOGY

6.1 Overview

Preliminary tasks will include:

- Preparation of a Health and Safety Plan (HASP);
- Review of previous investigations relating to the Site and its surroundings;
- An initial Site Inspection;
- Preparation of this Sampling and Analysis Quality Plan (SAQP), which will be provided to SC NSW prior to commencing work. No further works will be undertaken until all relevant stakeholders are satisfied that the proposed scope of works is sufficient to meet the project requirements.

Further detail on the scope of works and methodology is provided in the following sections, in summary, the scope of works for the investigation will include:

- Collection of surface soil samples from 0.1-0.2 m bgl to assess for impacts to surface soils;
- Collection of soil samples using a hand auger to approximately 0.5 m bgl to assess for the potential of deeper impacts at targeted locations; and
- Collection of surface water samples from creeks and dams.
- Collection of sediment samples from creeks and dams.

6.2 Soil Investigation Methodology

Prior to the commencement of intrusive works, plans will be obtained from Dial Before You Dig and subsurface services will be located and marked on the ground by ERM's private utility location subcontractor.

As any contamination related to the shooting activities on the Site are likely to have resulted in impacts to the surface soils (i.e. top 0.1-0.2 m), soil sampling will therefore primarily be undertaken via surface sampling with a smaller proportion (nominally 5%) of locations having samples collected via hand auger down to approximately 0.5 m bgl to assess the potential for deeper impacts.

The breakdown of soil sampling locations per area are summarised in Table 3-1.

Surface soil sampling will be conducted via use of hand tools only. During investigation works, all sampling locations will be logged in accordance with ERM soil logging procedures. For the purposes of this fee proposal ERM has estimated one sample analysed from each surface sampling location. All samples collected samples will be placed within laboratory-supplied containers, stored in a chilled cooler and transported to a NATA accredited laboratory analysis under chain of custody (CoC) conditions for the required analysis.

6.3 Sediment and Surface Water Methodology

Surface water and sediment samples will be collected from onsite and offsite creeks and dams (as noted in Table 3-1 and shown in Figure 2, Appendix A). Samples will be collected either directly into the sampling containers or via a hand-held sampling device (e.g. Swing Sampler) with subsequent decanting into the laboratory sampling containers. Where possible, surface water and sediment samples will be collected from co-located sampling locations and collected in a manner to minimise disturbance to sediment to avoid excess sediment load in the surface water sample, this will include collection of surface water sample at a given location, prior to the sediment sample being collected. Collected samples will be placed within laboratory-supplied containers, stored in a chilled cooler and transported to a NATA accredited laboratory analysis under CoC conditions for the required analysis.

6.4 Laboratory Analysis

The primary analytical laboratory selected for sample analysis is Eurofins|MGT. The secondary analytical laboratory selected is Australian Laboratory Services. Both laboratories are accredited by the National Association of Testing Authorities (NATA) for the analytical suites proposed.
Based on knowledge of the current and past operations, the following COPCs have been identified for the site:

- Metals (lead, arsenic, antimony); and
- PAHs.

The soil, sediment and surface water samples will be analysed for the COPCs as well as soil parameters (%clay, Cation Exchange Capacity, Total Organic Carbon and pH) to understand contaminant mobility potential, and leachability using the Australian Standard Leaching Procedure (ASLP). A summary of the proposed analytical suite is presented in *Table 6-1,* noting that this may be subject to further refinement and review following completion of the works.

6.5 Summary of Proposed Scope

A summary of the number of sampling locations per area, and the analytical suite for soil, sediment and surface water is presented in Table 6-1 below. The proposed sample locations are illustrated in Figure 2 of Appendix A. It is noted that there may be a need to relocate certain sampling locations due to access constraints etc. However where this occurs, this will be justified in the DSI report.

Table 6-1 Nominal Field Investigation Scope

Potential for impact	Area	% Property	Area (m2)	Primary Samples	Metals	PAH	Soil* Parameters	ASLP Lead
Low	Outside fall zones / buffer	40%	97400	5	5	1	1	1
Moderate	Indirect / incidental impact areas	40%	97400	10	10	3	3	2
High	Impact zones / fall areas	15%	36525	20	20	5	5	5
TBC	Offsite	N/A	N/A	5	5	2	2	2
Moderate	Drainage Lines and perimeter	5%	12175	20 (surface water/ sediment)	20	2	20	0
	Whole Site	**100%**	243500	40 surface soil 20 surface water/sediment	40 20	10 2	10 2	10 0

*Soil parameters will include %clay, Cation Exchange Capacity, Total Organic Carbon and pH

ASLP – Australian Standard Leaching Procedure

7. ASSESSMENT CRITERIA

Investigation data will be assessed against investigation criteria published in the ASC *NEPM (2013) Schedule B1 Guideline on the Investigation Levels for Soil and Groundwater*.

- Soil data will be assessed against the *ASC NEPM (2013) Health Investigation Levels (HILs) for Recreational land-use (HIL-C)*; and
- Sediment and surface water data will be assessed against the *ASC NEPM (2013) Ecological Investigation Levels (EILs).*

Where no relevant Australian endorsed assessment criteria is available, reference to relevant international guidance documents will be sought. It is noted that these guideline values have no regulatory standing in NSW and hence further assessment of any exceedances of these criteria may be required.

8. QUALITY ASSURANCE QUALITY CONTROL

A number of actions, procedures, checks and decisions will be undertaken by ERM to obtain accurate and reliable analytical results and document the representativeness and integrity of samples collected in accordance with actions reference methods described in Schedules B(2) and B(3) of the ASC NEPM. *Table 2* below provides a summary of the QA/QC procedures to be followed during the baseline contamination study.

Table 2 QA/QC Procedures

QA/QC Procedure	Description
Record Keeping	Detailed records of relevant field activities will be maintained on ERMs standard field logging templates.
Sample Labelling	Unique sample numbers will be used for each sample to clearly specify the sample origin (source, date and sample type code), preservation techniques used and accepting custody of samples.
Chain of Custody	Chain of custody (COC) documentation will be used for sample transfers. COC forms will include sample numbers, description and sample date, and will be signed by the persons transferring and accepting custody of the samples.
Sample Storage	Samples will be transferred in approved sampling containers with appropriate preservation and will be placed in cool storage (target temperature at or below 6ºC) prior to and during transfer to the laboratory. Samples will be shipped to the laboratory immediately after completion of the sampling program and within prescribed holding times.
Decontamination	Field equipment will be decontaminated between sampling locations (as required) using a phosphate free detergent followed by rinsing twice with potable water. Field rinsate samples will be collected from reusable sampling equipment on a daily basis to confirm the effectiveness of decontamination procedures. Rinsate samples will be analysed for COPCs representative of impacts at the site.

QA/QC Procedure	Description
QC Samples (intra-laboratory duplicates, inter-laboratory duplicate and trip blanks)	In addition to the analysis of primary samples, field duplicate samples will be analysed at a total frequency of 1:10 primary samples. Duplicate samples will be analysed for the same COPCs as the primary samples. Trip blank and spikes will be prepared by the laboratory and sampled at a rate of 1 laboratory batch per day.
Laboratory Internal QA/QC	Primary samples will be analysed by Eurofins and triplicate samples by ALS. Laboratory analytical methods to be used during the investigation are identified in the laboratory certificates of analysis. Each of these laboratories is National Association of Testing Authorities (NATA)-accredited for the analysis performed. Where appropriate, the laboratories will use internal standards to check the consistency of the analytical processes (e.g. injection volumes, instrument sensitivity and retention times for chromatographic systems). Sample splits and method validation processes will also be used as part of their internal QA/QC procedures

9. REPORTING

On completion of the field investigation, ERM will summarise the findings of the investigation within a detailed report. Each report will be written in accordance with the ASC NEPM and relevant NSW EPA reporting guidelines. The following will be included:

- Introduction, scope of works, methodology and sampling procedures.
- A summary of previous investigations and identified data gaps (where present) including the aforementioned assessment of data quality and validity.
- A summary of field observations, including a table summarising well conditions.
- Comparison of the laboratory test data against relevant NSW EPA made or approved assessment criteria, including the provision of summary tables.
- Revision and refinement of the CSM.
- Conclusions and recommendations (if any) including, where necessary, measures that could be undertaken to reduce the potential for further contamination of the land and adjoining lands and waterways.
- Figures showing site location and sampling locations.

Yours sincerely,

Environmental Resources Management Australia Pty Ltd

DRAFT

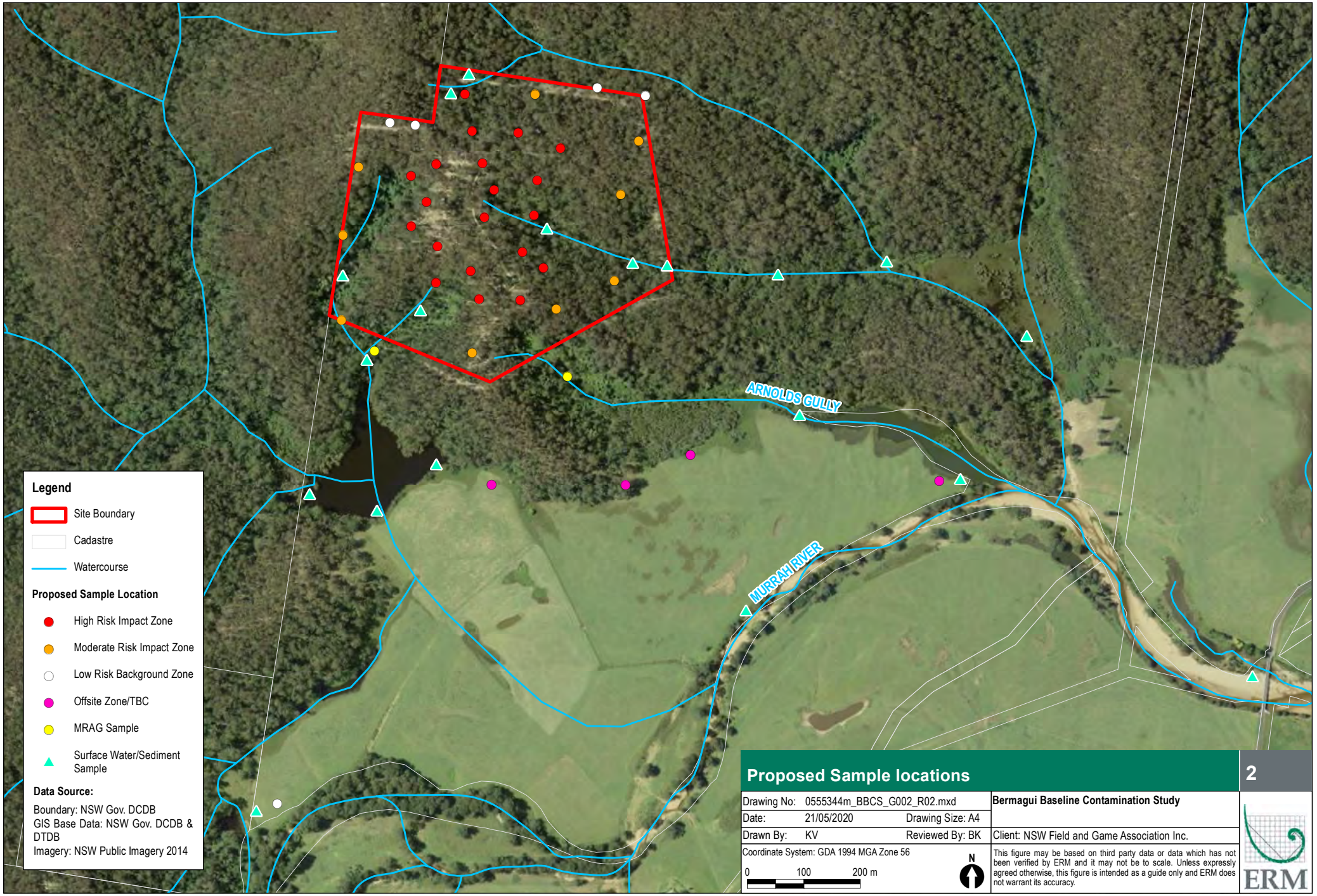
Ian Batterley
Project Manager

DRAFT

Peter Lavelle
Partner

APPENDIX A - FIGURE 1 SITE LOCATION

Source: NSW Six Maps: https://maps.six.nsw.gov.au/, accessed 13/05/2020


ARNOLDS GULLY
MURRAH RIVER
Legend
Site Boundary
Cadastre
Watercourse
Proposed Sample Location
High Risk Impact Zone
Moderate Risk Impact Zone
Low Risk Background Zone
Offsite Zone/TBC
MRAG Sample
Surface Water/Sediment Sample
Data Source:
Boundary: NSW Gov. DCDB
GIS Base Data: NSW Gov. DCDB & DTDB
Imagery: NSW Public Imagery 2014
Proposed Sample locations
2
Drawing No: 0555344m_BBCS_G002_R02.mxd
Date: 21/05/2020
Drawing Size: A4
Drawn By: KV
Reviewed By: BK
Coordinate System: GDA 1994 MGA Zone 56
0 100 200 m
N
Bermagui Baseline Contamination Study
Client: NSW Field and Game Association Inc.
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
ERM

APPENDIX D FIELD NOTES

Location	Sample Depth	Description	PID Measurement (ppm)
SS01	0.1-0.2	Leafy organic matter over weathered sandstone, medium to coarse grained, poorly sorted, loose, dry, grey brown, sandsone fragments, roots and organic matter throughout.	1.3
SS02	0.1-0.2	Leafy organic matter over weathered sandstone, light brown/orange, medium to coarse grained, poorly sorted, loose, dry, sandstone fragments and roots throughout.	0.9
SS03	0.1-0.2	Leafy organic matter over weathered/ crushed sandstone, light brown, dry, loose, medium to coarse grained, poorly sorted, loose, dry, sandstone fragments and roots throughout.	1.0
SS04	0.1-0.2	Leafy organic matter over weathered/ crushed sandstone, light brown, loose, dry, medium coarse grained, poorly sorted, sandstone fragments and roots throughout.	1.8
SS05	0.1-0.2	Leafy organic matter over crushed/ weathered sandstone, grey/ light brown, dry, loose, medium to coarse grained, moderately well sorted, sandstone, fragments throughout, roots throughout.	1.4
SS06	0.1-0.2	Leafy organic matter over clay targets, crushed/ weathered sandstone, light brown, orange, dry, loose, coarse grained, poorly sorted, sandstone fragments throughout, roots througout.	0.5
SS07	0.1-0.2	Leafy organic matter over crushed/ weathered sandstone, dry, fine to medium grained, poorly sorted, grey/ brown, sandstone fragments throughout, roots throughout	2.0
SS08	0.1-0.2	Leafy organic matter/ vegetation over weathered/ crushed sandstone, medium to coarse grained, poorly sorted, dry, loose, sandstone, fragment througout, roots throughout, orange.	2.9
SS09	0.1-0.2	Leafy organic matter over loam, dark brown, loose, fine grained, moist, moderately sorted, roots thorughout, sandstone fragments throughout.	2.0
SS10	0.1-0.2	Leafy organic matter over crushed/ weathered sandstone, medium brown, medium-coarse grained, poorly sorted, loose, dry, sandstone fragments throughout, roots and organic matter throughout.	1.9
SS11	0.1-0.2	Leafy organic matter over crushed/ weathered sandstone, light brown/ orange, medium to coarse grained, poorly sorted, loose, dry, moderately sorted, sandstone fragments throughout, roots througout.	2.9
SS12	0.1-0.2	Leafy organic matter, orange/ light brown, loose, dry, medium grained, poorly sorted, weathered/ crushed sandstone, sandstone fragments throughout.	3.7
SS13	0.1-0.2	Leafy oraganic matter over brown, dry, loose, fine to medium grained, organic matter and roots throughout, weathered/ crushed sandstone, poorly sorted	3.7
SS14	0.1-0.2	Leafy organic matter over weathered/ crushed sandstone, dry, loose, coarse grained, poorly sorted, sandstone fragments throughout, roots throughout.	3.4
SS15	0.1-0.2	Weathered/ crushed sandstone, orange/ brown, coarse grained, poorly sorted, dry, loose, sandstone fragments throughout, roots throughout.	2.6
SS16	0.1-0.2	Medium brown, poorly sorted, medium to coarse grained, dry, loose, weathered sandstone, fragments throughout, roots throughout.	2.3
SS17	0.1-0.2	Leafy organic matter over weathered/ crushed sandstone, light brown, medium to coarse grained, poorly sorted, loose, dry, sandstone fragments throughout, roots throughout.	3.6
SS18	0.1-0.2	Leafy organic matter over crushed/ weathered sandstone, medium brown, fine to medium grained, dry, loose, poorly sorted, sandstone fragments throughout, roots throughout	2.3
SS19	0.1-0.2	Leafy oragnic matter, vegetation over crushed/ weathered sandstone, light-medium brown, dry, loose, medium grained, poorly sorted, sandstone fragments throughout, roots and organic matter throughout	1.7

Location	Sample Depth	Description	PID Measurement (ppm)
SS20	0.1-0.2	Leafy organic matter weathered/ crushed sandstone, medium to coarse grained, dry, loose, poorly sorted, light brown, sandstone fragments througout, roots and organic matter throughout.	3.0
SS21	0.1-0.2	Leafy organic matter over light brown, loose, dry, medium to coarse grained, poorly sorted, weathered/ crushed sandstone, fragments throughout, roots throughout	2.6
SS22	0.1-0.2	Leafy organic matter over light brown, dry, loose, fine to coarse grained, poorly sorted, weathered/ crushed sandstone, fragments throughout, roots throughout	2.4
SS23	0.1-0.2	Leafy organic matter over medium brown, dry, loose, medium to coarse grained, poorly sorted, crushed/ weathered sandstone, fragments throughout, roots throughout	1.9
SS24	0.1-0.2	Leafy organic matter over broken clay targets, crushed/ weathered sandstone, fine to medium grained, light brown, poorly sorted, loose, dry, sandstone fragments throughout, roots throughout.	3.0
SS25	0.1-0.2	Leafy organic matter over crushed/ weathered sandstone, light brown, loose, dry, poorly sorted, medium grained, sandstone fragments throughout, roots throughout.	2.2
SS26	0.1-0.2	Grass / vegetation over top soil, moist, loose, coarse grained, medium brown, moderately sorted, roots throughout	0.4
SS27	0.1-0.2	Grass/ bamboo, water vegetation over top soil, moist, slightly plastic, medium to coarse grained, poorly sorted, medium brown, roots and organic matter throughout.	0.2
SS28	0.1-0.2	Leafy organic matter/ grass/ vegetation over loam, coarse grained, moist, poorly sorted, loose, sandstone fragments throughout, roots and organic matter throughout.	1.0
SS29	0.1-0.2	Leafy organic matter, vegetation and river rocks (cobbles) over gravelly silty clay, slightly plastic, moist, coarse grained, moderately sorted, roots and organic matter throughout.	0.4
SS30	0.1-0.2	Leaves and organic matter over light yellow brown, dry, gravelly, slightly sandy, clayey silt, gravel is subangular to subrounded.	0.3
SS31	0.1-0.2	Leaves and organic matter over light yellow brown, dry, gravelly, slightly sandy, clayey silt, gravel is subangular to subrounded.	0.2
SS32	0.1-0.2	Dry leaves and organic matter over light brown grey, dry silty sand with some gravel, sand is medium grained.	0.3
SS33	0.1-0.2	Dry leaves and organic matter over yellow brown, dry silty sand with some gravel, sand is medium grained.	0.5
SS34	0.1-0.2	Dry leaves and organic matter over brown grey, dry sandy silt with some gravel, sand is medium grained.	0.1
SS35	0.1-0.2	Leaves and organic matter over reddish brown, dry to moist silty gravel.	0.8
SS36	0.1-0.2	Dry leaves and organic matter over light brown grey, dry silty sand with some gravel, sand is medium to fine grained.	0.7
SS37	0.1-0.2	Dry leaves and organic matter over yellow brown, dry silty sand with some gravel, sand is medium grained.	0.2
SS38	0.1-0.2	Dry leaves and organic matter over grey brown, dry, slightly gravelly clayey silt with some rootlets and organic inclusions.	0.4
SS39	0.1-0.2	Wet leaves and organic matter over slightly moisr grey brown dlayey silt with trace fine gravels and sand.	0.5
SS40	0.1-0.2	Leafy organic matter, vegetation over loamy soil, fine to medium grained, moist, loose, moderately sorted, medium brown, roots and organic matter throughout.	0.9
SS41	0.1-0.2	Leafy organic matter over loam, moist, medium brown, loose, coarse grained, poorly sorted, roots and organic matter throughout, sandstone fragments throughout.	0.9
SS42	0.1-0.2	Leafy organic matter, vegetation over soil, moist, coarse grained, loose, medium brown, moderately sorted, roots and organic matter throughout, sandstone fragments throughout.	0.8
SS43	0.1-0.2	Leafy organic matter over loam, moist, coarse grained, poorly sorted, medium brown, loose, roots and organic matter throughout.	1.8

Location	Sample Depth	Description	PID Measurement (ppm)
SS44	0.1-0.2	Vegetation/ water reeds over soil, fine to medium grained, clay-like, moist, slightly plastic, medium brown, roots and organic matter throughout.	1.1
SS45	0.1-0.2	Vegetation over soil, fine to medium grained, clay-like, moist, slightly plastic, medium brown, roots and organic matter throughout.	0.5
SS46	0.1-0.2	Thick grass over brown, slightly moist loam, some rootlets throughout.	
SS47	0.1-0.2	Thick grass over greyish brown, slightly moist loam with trace gravel, some rootlets throughout.	
SS48	0.1-0.2	Grass/ vegetation over loamy soil, moist, coarse grained, poorly sorted, loose, medium brown, roots and organic matter throughout.	0.5
SS49	0.1-0.2	Grass over soil, coarse grained, poorly sorted, loose, moist, medium brown, roots and organic matter throughout.	0.3
SS50	0.1-0.2	Grass and organic matter over grey to light brown, dry to moist, slightly clayey, sandy silt with some rootlets.	0.1
SS51	0.1-0.2	Grass and organic matter over grey to light brown, dry to moist, slightly clayey, sandy silt with some rootlets.	0.3
SS52	0.1-0.2	Vegetation/ water reeds over soil, fine to medium grained, silty sandy clay, moist, slightly plastic, roots and organic matter throughout.	1.1
SS53	0.1-0.2	Thick grass over brown to dark brown, slightly moist loam, some rootlets throughout.	0.2
SS54	0.1-0.2	Leafy organic matter over loam, wet, sand is coarse grained, moderately sorted, dark brown, roots throughout.	0.2
SS55	0.1-0.2	Leafy organic matter over loam, medium brown, dry, coarse grained, poorly sorted, roots and organic matter throughout.	1.1
SS56	0.1-0.2	Leafy organic matter over soil, moist. Loose, coarse grained, medium brown, roots and organic matter throughout	1.1

BORE LOG ID BH01

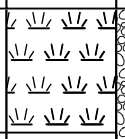
Client: SC NSW
Project No: 0555344
Project Name: Bermagui Baseline Investigation
Site Address: Murrah River Road
Drilling Date: 28/02/2020 - 28/02/2020

Drilling Method: Hand Augering:
Hole Diam./Width (mm): 100
Surface Completion: Backfill
Final Water Level (m bgl): -

Elevation (Ground):
Elevation (Case):
Easting (MGA): 233193.32056
Northing (MGA): 5955355.03692

Comments:

Log By: BK
Checked By: MM

Material Description	Symbol	Well Diagram	Depth (m)	Sample Type	Analysed	PID	Samples	Additional Observations
ORGANIC MATERIAL: Leafy organic matter and fragments of clay targets			0.05					
GRAVELLY SAND: Crushed Sandstone: Medium brown, damp, poorly sorted, medium-coarse grained, sandstone fragments throughout			0.1	DS	YES		BH01_0.2	Duplicate Sample Taken
			0.15			0.3		
			0.2					
			0.25					
			0.3					
			0.35					
			0.4	DS	YES		BH01_0.5	
			0.45			2.6		
Termination Depth at:0.5 m			0.5					
			0.55					

BORE LOG ID BH02

Client: SC NSW
Project No: 0555344
Project Name: Bermagui Baseline Investigation
Site Address: Murrah River Road
Drilling Date: 28/02/2020 - 28/02/2020

Drilling Method: Hand Augering:
Hole Diam./Width (mm): 100
Surface Completion: Backfill
Final Water Level (m bgl): -

Elevation (Ground):
Elevation (Case):
Easting (MGA): 233241.943846
Northing (MGA): 5955200.42081

Comments:

Log By: BK
Checked By: MM

Material Description	Symbol	Well Diagram	Depth (m)	Sample Type	Analysed	PID	Samples	Additional Observations
ORGANIC MATERIAL: Leafy organic matter and fragments of clay targets			0.02 0.04					
GRAVELLY SAND: Crushed Sandstone: Medium brown, damp, poorly sorted, medium-coarse grained, sandstone fragments throughout			0.06 0.08 0.1 0.12 0.14 0.16 0.18 0.2 0.22 0.24 0.26 0.28 0.3	DS DS	YES YES	1.2 1.3	BH02_0.2 BH02_0.3	Becoming lighter with depth V
Termination Depth at:0.3 m			0.32 0.34 0.36 0.38 0.4 0.42 0.44 0.46 0.48					

BORE LOG ID BH03

Client: SC NSW
Project No: 0555344
Project Name: Bermagui Baseline Investigation
Site Address: Murrah River Road
Drilling Date: 28/02/2020 - 28/02/2020

Drilling Method: Hand Augering:
Hole Diam./Width (mm): 100
Surface Completion: Backfill
Final Water Level (m bgl): -

Elevation (Ground):
Elevation (Case):
Easting (MGA): 233249.225948
Northing (MGA): 5955190.4645

Comments:

Log By: BK
Checked By: MM

Material Description	Symbol	Well Diagram	Depth (m)	Sample Type	Analysed	PID	Samples	Additional Observations
ORGANIC MATERIAL: Leafy organic matter and fragments of clay targets			0.05					
GRAVELLY SAND: Crushed Sandstone: Medium brown, damp, poorly sorted, find - medium grained, sandstone fragments throughout			0.1	DS	YES		BH03_0.2	
			0.15			1.3		
			0.2					
			0.25					
			0.3					
			0.35					
			0.4	DS	YES		BH03_0.5	
			0.45			1.6		
			0.5					
Termination Depth at:0.5 m			0.55					

produced by ESlog.ESdat.net on 10 Jul 2020

Daily Environmental Report Sheet

Job Information	
Project Number: 0555344	Project Name: Bermagui Baseline
Date: 26/5/20	Client: Sporting Clays NSW
Sampler: BK	Location: Bermagui Sporting Clays
Project Manager: IB	Weather: Rainy
Site Manager (GESS):	

Persons On Site			PM Notified/De-brief:	
Name	Arrived on Site	Departed Site	ERM/Client/Contractor	
Brittany Knight	08:00	16:30	ERM	✓
New Brady	08:00	16:30	Client	✓

Contractors Activities On-site

NA

ERM's Activities On-site

Baseline investigation: surface soil samples

Occupational Health & Safety/ Environmental Issues/Controls (dust, noise, odour, sediment, traffic)

Slips, trips & falls - avoid steep areas, keep work areas tidy.

Bites/stings - look for snakes & spiders, wear correct PPE.

Details of Records Taken: (e.g. photos, gw field sheet, borelogs)

Soil bore logs, photos, GPS coordinates.

ERM

Daily Environmental Report Sheet

Daily Log/ Discussions
08:00 Arrived on-site. Safety briefing.
08:30 Began sampling on-site
12:30 Lunch break
13:30 Continued sampling on-site
16:30 Departed site

Sampling and Dispatch Details (list all primary, duplicate, TS/TB, rinsates)

Matrix	Sample Type	Sample ID	Parent Sample	Time
e.g. Soil	e.g. Primary/Duplicate			
Soil	Primary	SS01 - SS25		
	Dup	D01 - 20200526	SS09	
	Dup	T01 - 20200526	~~SS23~~ SS23	
	Rinsate	R01 - 20200526		
	TB			
	TS			

Daily Environmental Report Sheet

Job Information	
Project Number: 0555344	Project Name: Bermagui Baseline
Date: 27/5/20	Client: SC NSW
Sampler: BK / PL	Location: Bermagui SC
Project Manager: IB	Weather: Sunny
Site Manager (GESS):	

Persons On Site			PM Notified/De-brief:	
Name	Arrived on Site	Departed Site	ERM/Client/Contractor	
Brittany Knight	08:30	18:00	ERM	✓
Pete Lovelle	08:30	18:00	ERM	✓
Nev Brady	08:30	18:00	Client	✓
Barry	08:30	18:00	Client	✓

Contractors Activities On-site

NA

ERM's Activities On-site

Baseline investigation: surface soil samples
sediment samples
surface water samples

Occupational Health & Safety/ Environmental Issues/Controls (dust, noise, odour, sediment, traffic)

Slips, trips & falls - avoid steep areas, avoid deep water, keep work area clean.

Bites/ stings - keep an eye out for snakes & spiders; correct PPE.

Details of Records Taken: (e.g. photos, gw field sheet, borelogs)

Soil bore logs, photos, GPS coordinates.

ERM

Daily Environmental Report Sheet

Daily Log/ Discussions	
08:30	Arrived on site
08:45	Began sampling on-site
12:00	Lunch break
13:00	Continued sampling off-site
16:00	Departed site

Sampling and Dispatch Details (list all primary, duplicate, TS/TB, rinsates)

Matrix	Sample Type	Sample ID	Parent Sample	Time
e.g. Soil	e.g. Primary/Duplicate			
Soil	~~Primary~~	~~SS26 – SS29~~		
	Dup	D01-20200527	SS40	
	Dup	T01-20200527	SS53	
	Rinsate	R01-20200527		
	TB			
	TS			
	~~Primary~~	~~SED01~~		
	~~Primary~~	~~SS55, SS56~~		
	~~Primary~~	~~SS41/45~~		
		~~SS48, SS49~~		
	Primary	SS26 - SS53		
	Primary	SS55, SS56		

Daily Environmental Report Sheet

Job Information	
Project Number: 0555344	Project Name: Bermagui Baseline
Date: 28/5/20	Client: SC NSW
Sampler: BK	Location: Bermagui SC
Project Manager: IB	Weather: Sunny
Site Manager (GESS):	

Persons On Site			PM Notified/De-brief:	
Name	Arrived on Site	Departed Site	ERM/Client/Contractor	
Brittany Knight	07:30	16:00	ERM	✓
Nev Brady	07:30	16:00	Client	✓

Contractors Activities On-site

NA

ERM's Activities On-site

Baseline investigation: surface water samples
sediment samples
bore hole / hand augers
surface soil saple

Occupational Health & Safety/ Environmental Issues/Controls (dust, noise, odour, sediment, traffic)

Slips, trips & falls: avoid steep areas, keep work area tidy, avoid deep water.

Bites/stings: Wear correct PPE, look for snakes & spiders.

Details of Records Taken: (e.g. photos, gw field sheet, borelogs)

Photos, soil bore logs, water parameters, GPS locations

Daily Environmental Report Sheet

Daily Log/ Discussions	
07:30	Arrived on-site
07:40	Began sampling off-site
11:30	Lunch break
12:00	Continued sampling on-site (including 2 x HA)
16:00	Departed site

Sampling and Dispatch Details (list all primary, duplicate, TS/TB, rinsates)				
Matrix	Sample Type	Sample ID	Parent Sample	Time
e.g. Soil	e.g. Primary/Duplicate			
Soil	Primary	SS54		
	Primary	BH01 - BH03		
	Primary	SED02 - SED06		
Water	Primary	SW01 - SW06		
	Dup	D01-20200528	BH01-0.5	
	Rinsate	R01-20200528		

Project Name Bermagui Baseline	Job Number 05553444

Date 26/5/20 ☐ Meeting ☐ Telephone ☐ Calculation ☑ Other Page 1 of

ERM

Between of ERM

and of Telephone

Other attendees at meeting Surface water and sediment samples.

Sample ID	Temp (°c)	DO (ppm)	SPC (µs/cm)	pH	Redox (mV)
SW01	12.4	0.78	421.6	8.15	-163.9
SW02	11.2	5.65	554.3	7.88	-40.0
SW03	10.6	6.16	9,864	7.16	-42.7
SW04	12.1	5.52	40062	8.03	1.5
SW05	12.2	5.19	32,881	7.66	-34.9
SW06	11.3	6.83	37,558	7.58	-5.9

Sample ID	Description
SED01	Coarse grained sand, moderately sorted, angular, saturated, loose, orange/white.
SED02	Coarse grained sand, moderately sorted, angular, saturated, loose, orange/white.
SED03	Coarse grained sand, moderately sorted, angular, saturated, loose, orange/white.
SED04	Coarse grained sand, moderately sorted, angular, saturated, loose, orage/white.
SED05	Fine grained silt, well sorted, saturated, medium brown, loose, nestled in reeds.
SED06	Fine grained silt, well sorted, saturated, medium brown, loose, nestled in reeds.

PM/PD

APPENDIX E PHOTOLOG

Photograph 1

Surface soil sampling equipment.

Photograph 2

SS09 and D01_20200526 – primary and duplicate sample.

Photograph 3

SS10

Photograph 4

SS12

Photograph 5

SS16

Photograph 6

SS19

Photograph 7

SS21

Photograph 8

SS26

Photograph 9

SS29

Photograph 10

Photograph 11

SS41

Photograph 12

SS43

Photograph 13

SS50

Photograph 14

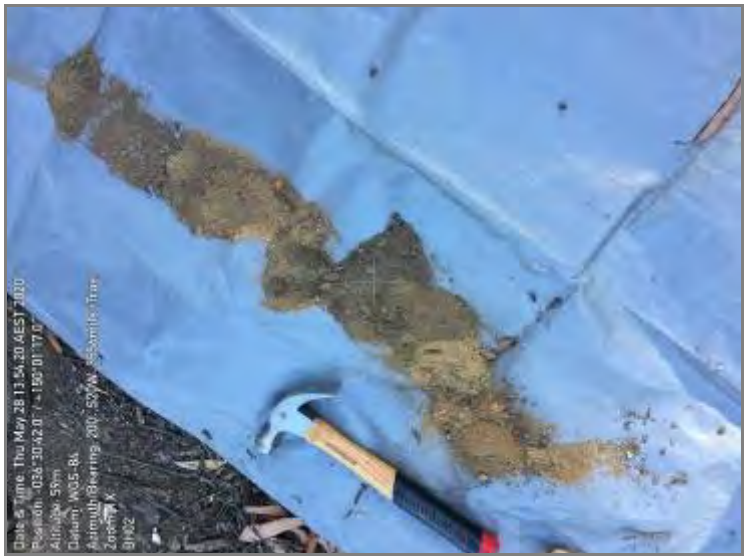
SS53 and T01_20200527 – primary and triplicate sample.

Photograph 15

SS38

Photograph 16

BH01 sample location.



Photograph 17

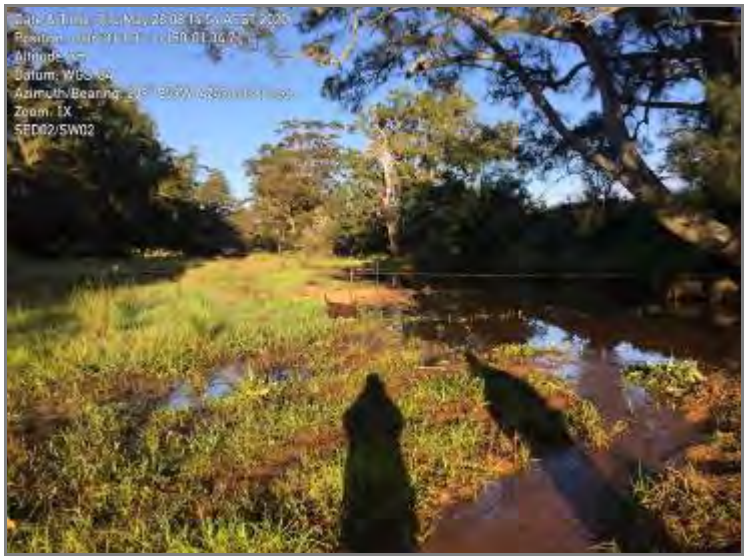
BH02 sample location.

Photograph 18

BH03 sample location.

Photograph 19

South western dam void of water and overgrown with vegetation.



Photograph 20

Murrah River facing west – SW02 location.

Photograph 21

Murrah River facing north, south of convergence point with Arnolds Gully – SW04 location.

APPENDIX F LABORATORY REPORTS

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

☑ Eurofins | mgt Sydney Lab — Unit F3 Building F, 16 Mars Road, Lane Cove West, NSW 2066 P +61 2 9900 8400 E EnviroSampleNSW@eurofins.com.au

☐ Eurofins | mgt Brisbane Lab — Unit 1 21 Smallwood Place, Murarrie, QLD 4172 P +61 7 3902 4600 E EnviroSampleQLD@eurofins.com.au

☐ Eurofins | mgt Melbourne Lab — 2 Kingston Town Close, Oakleigh, VIC 3166 P +61 3 8564 5000 F +61 3 8564 5090 E EnviroSampleVic@eurofins.com.au

1/6

Company	ERM	Purchase Order		Project Manager	Ian Batterley
Address	309 Kent St, Sydney 2000	Eurofins | mgt Quote №		Project №	555344
Contact Name	Brittany Knight				
Contact Phone №	433788322				
Special Direction					
Relinquished by (Signature) (Time / Date)	Brittany Knight				

Project Name	Bermagui Baseline Contamination
Electronic Results Format	ESDAT
Email for Results	brittany.knight@erm.com, peter.lavelle@erm.com
Turn Around Requirements	☐ 1 DAY* ☐ 2 DAY* ☐ 3 DAY* * Surcharges apply ☑ 5 DAY (Std.) ☐ Other ( )

Containers: 1L Plastic | 250mL Plastic | 125mL Plastic | 200mL Amber Glass | 40mL Vial | 125mL Amber Glass | Jar | 1 container

Method of Shipment: ☑ Courier (#) ☑ Hand Delivered ☐ Postal

Analysis (Note Where metals are requested, please specify "Total" or "Filtered") — Metals (lead, arsenic, antimony) | PAH, phenols | Soil Parameters | ASLP Lead | HOLD

№	Client Sample ID	Date	Matrix	Sample Comments / DG Hazard Warning
1	SS01_0.2	26/5	Soil	
2	SS02_0.2			
3	SS03_0.2			
4	SS04_0.2			
5	SS05_0.2			
6	SS06_0.2			
7	SS07_0.2			
8	SS08_0.2			
9	SS09_0.2			
10	SS10_0.2			
11	SS11_0.2			
12	SS12_0.2			

Note: All samples to be analysed for metals but please HOLD remainder of sample for further analysis. We will be in touch with further instructions.

Laboratory Use Only

Received By	Suzanne Ford	SYD | BNE | MEL | PER | ADL | NEW | DAR	Date	1/6/2020	Time	4:10pm	Signature	Temperature 3.8°C
Received By		SYD | BNE | MEL | PER | ADL | NEW | DAR	Date	__/__/__	Time	__:__	Signature	Report № TR3044

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

☑ Eurofins | mgt Sydney Lab

☐ Eurofins | mgt Brisbane Lab

☐ Eurofins | mgt Melbourne Lab
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E EnviroSampleVic@eurofins.com.au

2/6

Company	ERM	Purchase Order		Project Manager	Ian Batterley
Address	309 Kent St, Sydney 2000	Eurofins | mgt Quote №		Project №	555344
Contact Name	Brittany Knight				
Contact Phone №	433788322				
Special Direction					
Relinquished by (Signature)	Brittany Knight				
(Time / Date)					

Project Name	Bermagui Baseline Contamination
Electronic Results Format	ESDAT
Email for Results	brittany.knight@erm.com, peter.lavelle@erm.com
Turn Around Requirements	☐ 1 DAY* ☐ 2 DAY* ☐ 3 DAY* * Surcharges apply ☑ 5 DAY (Std.) ☐ Other ( )

Analysis (Note: Where metals are requested, please specify "Total" or "Filtered")

№	Client Sample ID	Date	Matrix	Metals (lead, arsenic, antimony)	PAH, phenols	Soil Parameters	ASLP Lead	HOLD	Containers: 1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL Vial	125mL Amber Glass	Jar	1 container	Sample Comments / DG Hazard Warning
1	SS13_0.2	26/5	Soil	✓													
2	SS14_0.2			✓													
3	SS15_0.2			✓													
4	SS16_0.2			✓													
5	SS17_0.2			✓													
6	SS18_0.2			✓													
7	SS19_0.2			✓													
8	SS20_0.2			✓													
9	SS21_0.2			✓													
10	SS22_0.2			✓													
11	SS23_0.2			✓													
12	SS24_0.2			✓													

Method of Shipment: ☑ Courier (#) ☑ Hand Delivered ☐ Postal

Laboratory Use Only

Received By	[signature]	SYD | BNE | MEL | PER | ADL | NEW | DAR	Date	1/6/2020	Time	11:00AM	Signature	[signature]
Received By		SYD | BNE | MEL | PER | ADL | NEW | DAR	Date	__/__/__	Time	__:__	Signature	

Temperature: 13.86°C

Report №: 723044

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

☑ Eurofins | mgt Sydney Lab

☐ Eurofins | mgt Brisbane Lab

☐ Eurofins | mgt Melbourne Lab
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316

Company	ERM	Purchase Order	
Address	309 Kent St, Sydney 2000	Eurofins | mgt Quote №	
Contact Name	Brittany Knight	Project Manager	Ian Batterley
Contact Phone №	433788322	Project №	555344
Special Direction		Project Name	Bermagui Baseline Contamination
Relinquished by (Signature) (Time / Date)	Brittany Knight	Electronic Results Format	ESDAT
		Email for Results	brittany.knight@erm.com, peter.lavelle@erm.com
		Turn Around Requirements	☐ 1 DAY* ☐ 2 DAY* ☐ 3 DAY* * Surcharges apply ☑ 5 DAY (Std.) ☐ Other ( )

Analysis (Note: Where metals are requested, please specify "Total" or "Filtered")

№	Client Sample ID	Date	Matrix	Metals (lead, arsenic, antimony)	PAH, phenols	Soil Parameters	ASLP Lead	HOLD	Containers: 1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL Vial	125mL Amber Glass	Jar	1 container	Sample Comments / DG Hazard Warning
1	SS25-0.2	26/5	Soil	✓													
2	DO1_20200526	↓	↓	✓													
3	TO1-20200526			✓													
4	RO1-20R00526		Water	✓													
5	TB	28/5	↓	✓													
6	TS	28/5		✓													
7	DO1-20200527	27/5	Soil	✓													
8	RO1-20200527	↓	Water	✓													
9	TO1-20200527	↓	Soil	✓													
10	DO1_20200528	28/5	Soil	✓													
11	RO1_20200528	28/5	Wate	✓													
12																	

Method of Shipment: ☑ Courier (#) ☑ Hand Delivered ☐ Postal

Laboratory Use Only

Received By	Suzanne Ford	SYD | BNE | MEL | PER | ADL | NEW | DAR	Date 4/6/2020	Time 4:10PM	Signature	Temperature 13.8°C
Received By		SYD | BNE | MEL | PER | ADL | NEW | DAR	Date __/__/__	Time __:__	Signature	Report № 723044

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

4/6

☑ Eurofins | mgt Sydney Lab

☐ Eurofins | mgt Brisbane Lab — Unit 1, 21 Smallwood Place, Murarrie QLD 4172, P +61 7 3902 4600, E EnviroSampleQLD@eurofins.com.au

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Company	ERM	Purchase Order		Project Manager	Ian Batterley
Address	309 Kent St, Sydney 2000	Eurofins | mgt Quote №		Project №	555344
Contact Name	Brittany Knight				
Contact Phone №	433788322				
Special Direction					
Relinquished by (Signature)	Brittany Knight				
(Time / Date)					

Project Name	Bermagui Baseline Contamination
Electronic Results Format	ESDAT
Email for Results	brittany.knight@erm.com, peter.lavelle@erm.com
Turn Around Requirements	☐ 1 DAY* ☐ 2 DAY* ☐ 3 DAY* * Surcharges apply ☑ 5 DAY (Std.) ☐ Other ( )

Analysis (Note: Where metals are requested, please specify "Total" or "Filtered")

№	Client Sample ID	Date	Matrix	Metals (lead, arsenic, antimony)	PAH, phenols	Soil Parameters	ASLP Lead	HOLD	Containers: 1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL Vial	125mL Amber Glass	Jar	1 container	Sample Comments / DG Hazard Warning
1	SS26_0.2	27/5	Soil	✓													
2	SS27_0.2			✓													
3	SS28_0.2			✓													
4	SS29_0.2			✓													
5	SS30_0.1			✓													
6	SS31_0.1			✓													
7	SS32_0.1			✓													
8	SS33_0.1			✓													
9	SS34_0.1			✓													
10	SS35_0.1			✓													
11	SS36_0.1			✓													
12	SS37_0.1			✓													

Method of Shipment: ☑ Courier (#) ☑ Hand Delivered ☐ Postal

Laboratory Use Only								
Received By	Suzanne Lord	SYD / BNE / MEL / PER / ADL / NEW / DAR	Date	1/6/2020	Time	4:10PM	Signature	Temperature 15.8°C
Received By		SYD / BNE / MEL / PER / ADL / NEW / DAR	Date	__/__/__	Time	__:__	Signature	Report № 623044

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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☐ Eurofins | mgt Melbourne Lab — 2 Kingston Town Close, Oakleigh, VIC 3166 P +61 3 8564 5000 F +61 3 8564 5090 E EnviroSampleVic@eurofins.com.au

5/6

Company	ERM	Purchase Order		Project Manager	Ian Batterley
Address	309 Kent St, Sydney 2000	Eurofins | mgt Quote №		Project №	555344
Contact Name	Brittany Knight				
Contact Phone №	433788322				
Special Direction					
Relinquished by (Signature) (Time / Date)	Brittany Knight				

Project Name	Bermagui Baseline Contamination
Electronic Results Format	ESDAT
Email for Results	brittany.knight@erm.com, peter.lavelle@erm.com
Turn Around Requirements	☐ 1 DAY* ☐ 2 DAY* ☐ 3 DAY* * Surcharges apply ☑ 5 DAY (Std.) ☐ Other ( )

Analysis (Note: Where metals are requested, please specify "Total" or "Filtered")

№	Client Sample ID	Date	Matrix	Metals (lead, arsenic, antimony)	PAH, phenols	Soil Parameters	ASLP Lead	HOLD	Containers: 1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL Vial	125mL Amber Glass	Jar	1 container	Sample Comments / DG Hazard Warning
1	SS38_0.1	27/5	Soil	✓													
2	SS39_0.1			✓													
3	SS40_0.1			✓													
4	SS41_0.2			✓													
5	SS42_0.2			✓													
6	SS43_0.2			✓													
7	SS44_0.2			✓													
8	SS45_0.2			✓													
9	SS46_0.1			✓													
10	SS47_0.1			✓													
11	SS48_0.2			✓													
12	SS49_0.2			✓													

Method of Shipment: ☑ Courier (#) ☑ Hand Delivered ☐ Postal

Laboratory Use Only								
Received By	Alyssa Kerod	SYD | BNE | MEL | PER | ADL | NEW | DAR	Date	1/6/2020	Time	9:10AM	Signature	
Received By		SYD | BNE | MEL | PER | ADL | NEW | DAR	Date	__/__/__	Time	__:__	Signature	

Temperature 13.86°C

Report № 723044

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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☐ Eurofins | mgt Brisbane Lab

☐ Eurofins | mgt Melbourne Lab

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E EnviroSampleVic@eurofins.com.au

6/6

Company	ERM	Purchase Order		Project Manager	Ian Batterley
Address	309 Kent St, Sydney 2000	Eurofins | mgt Quote №		Project №	555344
Contact Name	Brittany Knight				
Contact Phone №	433788322				
Special Direction					
Relinquished by (Signature)	Brittany Knight				
(Time / Date)					

Project Name	Bermagui Baseline Contamination
Electronic Results Format	ESDAT
Email for Results	brittany.knight@erm.com, peter.lavelle@erm.com
Turn Around Requirements	☐ 1 DAY* ☐ 2 DAY* ☐ 3 DAY* * Surcharges apply ☑ 5 DAY (Std.) ☐ Other ( )

Containers

Method of Shipment: ☑ Courier (#) ☐ Hand Delivered ☐ Postal

Analysis (Note: Where metals are requested, please specify "Total" or "Filtered")

№	Client Sample ID	Date	Matrix	Metals (lead, arsenic, antimony)	PAH, phenols	Soil Parameters	ASLP Lead	HOLD	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mLvial	125mL Amber Glass	Jar	1 container	Sample Comments / DG Hazard Warning
1	SS50_0.1	27/5	Soil														
2	SS51_0.2	↓	↓														
3	SS52_0.2	↓	↓														
4	SED01	27/5	Sed.														
5	SW01	26/5	Water														
6	SED02	↓	Soil														
7	SW02	↓	Water														
8	SED03	↓	Soil														
9	SW03	↓	Water														
10	SED04	↓	Soil														
11	SW04	↓	Water														
12	P.T.O																

Laboratory Use Only

Received By	Suzanne Reid	SYD | BNE | MEL | PER | ADL | NEW | DAR	Date	1/6/2020	Time	4:40PM	Signature	Temperature 13.86°C
Received By		SYD | BNE | MEL | PER | ADL | NEW | DAR	Date	__/__/__	Time	__:__	Signature	Report № 723044

Metals

SED05 — 29/5 — Soil
SW05 — Water
SED06 — Soil
~~SED~~
SW06 — Water
BH01_0.2 — Soil
BH01_0.5
BH02_0.2
BH02_0.3
BH03_0.2
BH03_0.5
SS54_0.2

29/5 4:20PM
drop
dull
12.5
14.5
14
+0.2

Suzanne [signature] 1/6/2020 4:10PM [signature] 13.86°C

#AU04_Enviro_Sample_NSW

From: Brittany Knight <Brittany.Knight@erm.com>
Sent: Tuesday, 2 June 2020 4:02 PM
To: #AU04_Enviro_Sample_NSW
Cc: Peter Lavelle; Ian Batterley
Subject: RE: Eurofins Sample Receipt Advice - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Suzanne,

Sorry for the confusion – we had a couple of mix-ups in the field.

Can you please alter the sample names as follows:

- SS53_0.1 to remain as is
- SS53_0.2 change to SS55_0.2
- SS54_0.1 to remain as is
- SS54_0.2 change to SS56_0.2

Please analyse these for metals and hold the remainder of the sample as we will be in touch with further analysis.

Kind regards

Brittany Knight
Environmental Scientist

From: EnviroSampleNSW@eurofins.com <EnviroSampleNSW@eurofins.com>
Sent: Tuesday, June 2, 2020 3:19 PM
To: Ian Batterley <Ian.Batterley@erm.com>
Cc: Brittany Knight <Brittany.Knight@erm.com>; Peter Lavelle <Peter.Lavelle@erm.com>
Subject: Eurofins Sample Receipt Advice - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

Dear Valued Client,

Samples; SS53_0.1 and SS53_0.2 received extra - analysis on hold.

Please find attached an amended Sample Receipt Advice (SRA), an amended Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section and sample numbers as well as the requested analysis. If there are any irregularities then please contact your Eurofins | mgt Analytical Services Manager as soon as possible to make certain that they get changed.

Regards

Suzanne Ford
Sample Receipt

Eurofins | Environment Testing

Unit F3, Parkview Building
16 Mars Road
LANE COVE WEST NSW 2066
AUSTRALIA
Phone: +61 02 9900 8421
Email: EnviroSampleNSW@eurofins.com
Website:environment.eurofins.com.au

EnviroNote 1079 - PFAS Fingerprinting
EnviroNote 1080 - Total Organofluorine Analysis & PFAS Investigations
EnviroNote 1098 - Melbourne PFAS Accreditation
EnviroNote 1103 - NATA Accreditation for Dioxins

#AU04_Enviro_Sample_NSW

To: Brittany Knight
Subject: RE: Eurofins Sample Receipt Advice - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

From: Brittany Knight [mailto:Brittany.Knight@erm.com]
Sent: Wednesday, 3 June 2020 10:55 AM
To: #AU04_Enviro_Sample_NSW
Cc: Peter Lavelle; Ian Batterley; Anne Ashworth
Subject: RE: Eurofins Sample Receipt Advice - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

Hello,

As discussed, can you please hold the analysis on the following triplicate samples and send them on to ALS:

- T01_20200526
- TO1_20200527

Please contact me if you have any questions.

Kind regards

Brittany Knight
Environmental Scientist

ERM
Level 15 | 309 Kent St | Sydney NSW 2000
T +61 (0)2 8586 8744 | **M** +61 (0) 433 788 322
E brittany.knight@erm.com | **W** www.erm.com

From: EnviroSampleNSW@eurofins.com <EnviroSampleNSW@eurofins.com>
Sent: Tuesday, June 2, 2020 9:54 PM
To: Ian Batterley <Ian.Batterley@erm.com>
Cc: Brittany Knight <Brittany.Knight@erm.com>; Peter Lavelle <Peter.Lavelle@erm.com>
Subject: Eurofins Sample Receipt Advice - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

Dear Valued Client,

Please find attached an amended Sample Receipt Advice (SRA), an amended Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section

and sample numbers as well as the requested analysis. If there are any irregularities then please contact your Eurofins | mgt Analytical Services Manager as soon as possible to make certain that they get changed.

Regards

Suzanne Ford
Sample Receipt

Eurofins | Environment Testing
Unit F3, Parkview Building
16 Mars Road
LANE COVE WEST NSW 2066
AUSTRALIA
Phone: +61 02 9900 8421
Email: EnviroSampleNSW@eurofins.com
Website:environment.eurofins.com.au

EnviroNote 1079 - PFAS Fingerprinting
EnviroNote 1080 - Total Organofluorine Analysis & PFAS Investigations
EnviroNote 1098 - Melbourne PFAS Accreditation
EnviroNote 1103 - NATA Accreditation for Dioxins

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eurofins | Environment Testing

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Dandenong South Vic 3175
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NATA # 1261
Site # 1254 & 14271

Sydney
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Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**ERM Sydney**
Contact name:	Ian Batterley
Project name:	BERMAGUI BASELINE CONTAMINATION
Project ID:	555344
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	May 29, 2020 4:20 PM
Eurofins reference:	**723044**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☑ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Notes

Samples TO1_20200526 and TO1_20200527 sent to ALS

Contact notes

If you have any questions with respect to these samples please contact:

Alena Bounkeua on Phone : or by e.mail: AlenaBounkeua@eurofins.com

Results will be delivered electronically via e.mail to Ian Batterley - ian.batterley@erm.com.

Note: A copy of these results will also be delivered to the general ERM Sydney email address.

ERM Sydney
Level 15, 309 Kent St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ian Batterley**

Report **723044-S-V2**
Project name BERMAGUI BASELINE CONTAMINATION
Project ID 555344
Received Date May 29, 2020

Client Sample ID			**SS01_0.2**	**SS02_0.2**	**SS03_0.2**	**SS04_0.2**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Jn02104**	**S20-Jn02105**	**S20-Jn02106**	**S20-Jn02107**
Date Sampled			**May 26, 2020**	**May 26, 2020**	**May 26, 2020**	**May 26, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	3.2	5.6	< 2	9.3
Lead	5	mg/kg	14	26	< 5	14
% Moisture	1	%	7.0	8.4	5.1	6.2

Client Sample ID			**SS05_0.2**	**SS06_0.2**	**SS07_0.2**	**SS08_0.2**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Jn02108**	**S20-Jn02109**	**S20-Jn02110**	**S20-Jn02111**
Date Sampled			**May 26, 2020**	**May 26, 2020**	**May 26, 2020**	**May 26, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	7.0	4.5	4.0	4.0
Lead	5	mg/kg	15	25	24	17
% Moisture	1	%	8.1	7.2	6.7	8.6

Client Sample ID			**SS09_0.2**	**SS10_0.2**	**SS11_0.2**	**SS12_0.2**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Jn02112**	**S20-Jn02113**	**S20-Jn02114**	**S20-Jn02115**
Date Sampled			**May 26, 2020**	**May 26, 2020**	**May 26, 2020**	**May 26, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	< 2	< 2	4.9	16
Lead	5	mg/kg	19	60	14	70
% Moisture	1	%	8.2	9.1	7.5	11

Client Sample ID			SS13_0.2	SS14_0.2	SS15_0.2	SS16_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02116	S20-Jn02117	S20-Jn02118	S20-Jn02119
Date Sampled			May 26, 2020	May 26, 2020	May 26, 2020	May 26, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	5.5	5.2	3.5	8.8
Lead	5	mg/kg	20	13	12	260
% Moisture	1	%	8.9	7.5	7.5	9.6

Client Sample ID			SS17_0.2	SS18_0.2	SS19_0.2	SS20_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02120	S20-Jn02121	S20-Jn02122	S20-Jn02123
Date Sampled			May 26, 2020	May 26, 2020	May 26, 2020	May 26, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	3.9	3.7	< 2	10
Lead	5	mg/kg	41	26	65	20
% Moisture	1	%	7.6	6.7	4.8	5.3

Client Sample ID			SS21_0.2	SS22_0.2	SS23_0.2	SS24_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02124	S20-Jn02125	S20-Jn02126	S20-Jn02127
Date Sampled			May 26, 2020	May 26, 2020	May 26, 2020	May 26, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	2.9	7.4	6.0	4.1
Lead	5	mg/kg	83	21	23	20
% Moisture	1	%	5.9	4.6	7.2	6.8

Client Sample ID			SS25_0.2	DOI_20200526	DOI_20200527	DOI_20200528
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02128	S20-Jn02129	S20-Jn02132	S20-Jn02135
Date Sampled			May 26, 2020	May 26, 2020	May 27, 2020	May 27, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	4.7	< 2	4.2	5.0
Lead	5	mg/kg	20	38	31	17
% Moisture	1	%	8.3	8.7	19	5.2

Client Sample ID			SS26_0.2	SS27_0.2	SS28_0.2	SS29_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02137	S20-Jn02138	S20-Jn02139	S20-Jn02140
Date Sampled			May 27, 2020	May 27, 2020	May 27, 2020	May 27, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	5.1	6.5	4.7	4.9
Lead	5	mg/kg	42	37	41	75
% Moisture	1	%	47	45	22	22

Client Sample ID			SS30_0.1	SS31_0.1	SS32_0.1	SS33_0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02141	S20-Jn02142	S20-Jn02143	S20-Jn02144
Date Sampled			May 27, 2020	May 27, 2020	May 27, 2020	May 27, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	8.9	7.4	2.7	5.7
Lead	5	mg/kg	32	26	18	20
% Moisture	1	%	8.9	11	11	16

Client Sample ID			SS34_0.1	SS35_0.1	SS36_0.1	SS37_0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02145	S20-Jn02146	S20-Jn02147	S20-Jn02148
Date Sampled			May 27, 2020	May 27, 2020	May 27, 2020	May 27, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	2.1	11	3.9	11
Lead	5	mg/kg	9.8	20	10.0	19
% Moisture	1	%	8.8	9.3	7.5	13

Client Sample ID			SS38_0.1	SS39_0.1	SS40_0.1	SS41_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02149	S20-Jn02150	S20-Jn02151	S20-Jn02152
Date Sampled			May 27, 2020	May 27, 2020	May 27, 2020	May 27, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	3.3	2.9	3.6	3.4
Lead	5	mg/kg	16	38	23	200
% Moisture	1	%	8.4	20	23	21

Client Sample ID			SS42_0.2	SS43_0.2	SS44_0.2	SS45_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02153	S20-Jn02154	S20-Jn02155	S20-Jn02156
Date Sampled			May 27, 2020	May 27, 2020	May 27, 2020	May 27, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	2.8	5.4	3.9	5.3
Lead	5	mg/kg	24	1000	25	35
% Moisture	1	%	16	27	36	37

Client Sample ID			SS46_0.1	SS47_0.1	SS48_0.2	SS49_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02157	S20-Jn02158	S20-Jn02159	S20-Jn02160
Date Sampled			May 27, 2020	May 27, 2020	May 27, 2020	May 27, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	2.9	5.2	7.5	3.8
Lead	5	mg/kg	14	26	28	21
% Moisture	1	%	28	24	23	22

Client Sample ID			SED05	SED06	BH01_0.2	BH01_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02161	S20-Jn02163	S20-Jn02165	S20-Jn02166
Date Sampled			May 28, 2020	May 28, 2020	May 28, 2020	May 28, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	2.9	4.7	4.8	4.8
Lead	5	mg/kg	10	22	32	17
% Moisture	1	%	66	63	5.2	4.7

Client Sample ID			BH02_0.2	BH02_0.3	BH03_0.2	BH03_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02167	S20-Jn02168	S20-Jn02169	S20-Jn02170
Date Sampled			May 28, 2020	May 28, 2020	May 28, 2020	May 28, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	6.8	6.6	8.6	9.5
Lead	5	mg/kg	130	150	59	32
% Moisture	1	%	4.6	4.6	6.8	6.7

Client Sample ID			SS54_0.2	TB (1)	TB (2)	TS (1)
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn02171	S20-Jn02183	S20-Jn02184	S20-Jn02185
Date Sampled			May 28, 2020	May 27, 2020	May 27, 2020	May 27, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	-	-	-
Arsenic	2	mg/kg	6.6	-	-	-
Lead	5	mg/kg	32	-	-	-
% Moisture	1	%	39	-	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	< 0.5	< 0.5	93
TRH C6-C10	20	mg/kg	-	< 20	< 20	82
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	< 20	< 20	-
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	< 20	< 20	82
BTEX						
Benzene	0.1	mg/kg	-	< 0.1	< 0.1	110
Toluene	0.1	mg/kg	-	< 0.1	< 0.1	85
Ethylbenzene	0.1	mg/kg	-	< 0.1	< 0.1	83
m&p-Xylenes	0.2	mg/kg	-	< 0.2	< 0.2	86
o-Xylene	0.1	mg/kg	-	< 0.1	< 0.1	85
Xylenes - Total*	0.3	mg/kg	-	< 0.3	< 0.3	85
4-Bromofluorobenzene (surr.)	1	%	-	64	86	76

Client Sample ID			TS (2)
Sample Matrix			Soil
Eurofins Sample No.			S20-Jn02186
Date Sampled			May 27, 2020
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	96
TRH C6-C10	20	mg/kg	100
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	20	mg/kg	100
BTEX			
Benzene	0.1	mg/kg	100
Toluene	0.1	mg/kg	100
Ethylbenzene	0.1	mg/kg	100
m&p-Xylenes	0.2	mg/kg	100
o-Xylene	0.1	mg/kg	99
Xylenes - Total*	0.3	mg/kg	100
4-Bromofluorobenzene (surr.)	1	%	125

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Sydney	Jun 03, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Jun 01, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			
Total Recoverable Hydrocarbons	Sydney	Jun 03, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jun 03, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Jun 03, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			

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Project Name: BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Order No.:
Report #: 723044
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: May 29, 2020 4:20 PM
Due: Jun 5, 2020
Priority: 5 Day
Contact Name: Ian Batterley

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	CANCELLED	HOLD	Lead	Lead (filtered)	Moisture Set	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
External Laboratory															
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**										
1	SS01_0.2	May 26, 2020		Soil	S20-Jn02104	X		X				X		X	
2	SS02_0.2	May 26, 2020		Soil	S20-Jn02105	X		X				X		X	
3	SS03_0.2	May 26, 2020		Soil	S20-Jn02106	X		X				X		X	
4	SS04_0.2	May 26, 2020		Soil	S20-Jn02107	X		X				X		X	
5	SS05_0.2	May 26, 2020		Soil	S20-Jn02108	X		X				X		X	
6	SS06_0.2	May 26, 2020		Soil	S20-Jn02109	X		X				X		X	
7	SS07_0.2	May 26, 2020		Soil	S20-Jn02110	X		X				X		X	
8	SS08_0.2	May 26, 2020		Soil	S20-Jn02111	X		X				X		X	
9	SS09_0.2	May 26, 2020		Soil	S20-Jn02112	X		X				X		X	
10	SS10_0.2	May 26, 2020		Soil	S20-Jn02113	X		X				X		X	

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Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	CANCELLED	HOLD	Lead	Lead (filtered)	Moisture Set	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
11	SS11_0.2	May 26, 2020		Soil	S20-Jn02114	X		X				X		X	
12	SS12_0.2	May 26, 2020		Soil	S20-Jn02115	X		X				X		X	
13	SS13_0.2	May 26, 2020		Soil	S20-Jn02116	X		X				X		X	
14	SS14_0.2	May 26, 2020		Soil	S20-Jn02117	X		X				X		X	
15	SS15_0.2	May 26, 2020		Soil	S20-Jn02118	X		X				X		X	
16	SS16_0.2	May 26, 2020		Soil	S20-Jn02119	X		X				X		X	
17	SS17_0.2	May 26, 2020		Soil	S20-Jn02120	X		X				X		X	
18	SS18_0.2	May 26, 2020		Soil	S20-Jn02121	X		X				X		X	
19	SS19_0.2	May 26, 2020		Soil	S20-Jn02122	X		X				X		X	
20	SS20_0.2	May 26, 2020		Soil	S20-Jn02123	X		X				X		X	
21	SS21_0.2	May 26, 2020		Soil	S20-Jn02124	X		X				X		X	
22	SS22_0.2	May 26, 2020		Soil	S20-Jn02125	X		X				X		X	
23	SS23_0.2	May 26, 2020		Soil	S20-Jn02126	X		X				X		X	

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Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	CANCELLED	HOLD	Lead	Lead (filtered)	Moisture Set	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
24	SS24_0.2	May 26, 2020		Soil	S20-Jn02127	X		X				X		X	
25	SS25_0.2	May 26, 2020		Soil	S20-Jn02128	X		X				X		X	
26	DOI_20200526	May 26, 2020		Soil	S20-Jn02129	X		X				X		X	
27	TOI_20200526	May 26, 2020		Soil	S20-Jn02130					X					
28	ROI_20200526	May 26, 2020		Water	S20-Jn02131		X		X				X		
29	DOI_20200527	May 27, 2020		Soil	S20-Jn02132	X		X				X		X	
30	ROI_20200527	May 27, 2020		Water	S20-Jn02133		X		X				X		
31	TOI_20200527	May 27, 2020		Soil	S20-Jn02134					X					
32	DOI_20200528	May 27, 2020		Soil	S20-Jn02135	X		X				X		X	

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Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	CANCELLED	HOLD	Lead	Lead (filtered)	Moisture Set	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
33	ROI_20200528	May 28, 2020		Water	S20-Jn02136		X		X				X		
34	SS26_0.2	May 27, 2020		Soil	S20-Jn02137	X		X				X		X	
35	SS27_0.2	May 27, 2020		Soil	S20-Jn02138	X		X				X		X	
36	SS28_0.2	May 27, 2020		Soil	S20-Jn02139	X		X				X		X	
37	SS29_0.2	May 27, 2020		Soil	S20-Jn02140	X		X				X		X	
38	SS30_0.1	May 27, 2020		Soil	S20-Jn02141	X		X				X		X	
39	SS31_0.1	May 27, 2020		Soil	S20-Jn02142	X		X				X		X	
40	SS32_0.1	May 27, 2020		Soil	S20-Jn02143	X		X				X		X	
41	SS33_0.1	May 27, 2020		Soil	S20-Jn02144	X		X				X		X	
42	SS34_0.1	May 27, 2020		Soil	S20-Jn02145	X		X				X		X	
43	SS35_0.1	May 27, 2020		Soil	S20-Jn02146	X		X				X		X	
44	SS36_0.1	May 27, 2020		Soil	S20-Jn02147	X		X				X		X	

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Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	CANCELLED	HOLD	Lead	Lead (filtered)	Moisture Set	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
45	SS37_0.1	May 27, 2020		Soil	S20-Jn02148	X		X				X		X	
46	SS38_0.1	May 27, 2020		Soil	S20-Jn02149	X		X				X		X	
47	SS39_0.1	May 27, 2020		Soil	S20-Jn02150	X		X				X		X	
48	SS40_0.1	May 27, 2020		Soil	S20-Jn02151	X		X				X		X	
49	SS41_0.2	May 27, 2020		Soil	S20-Jn02152	X		X				X		X	
50	SS42_0.2	May 27, 2020		Soil	S20-Jn02153	X		X				X		X	
51	SS43_0.2	May 27, 2020		Soil	S20-Jn02154	X		X				X		X	
52	SS44_0.2	May 27, 2020		Soil	S20-Jn02155	X		X				X		X	
53	SS45_0.2	May 27, 2020		Soil	S20-Jn02156	X		X				X		X	
54	SS46_0.1	May 27, 2020		Soil	S20-Jn02157	X		X				X		X	
55	SS47_0.1	May 27, 2020		Soil	S20-Jn02158	X		X				X		X	
56	SS48_0.2	May 27, 2020		Soil	S20-Jn02159	X		X				X		X	
57	SS49_0.2	May 27, 2020		Soil	S20-Jn02160	X		X				X		X	

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Company Name: ERM Sydney
Address: Level 15, 309 Kent St
Sydney
NSW 2000

Project Name: BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Order No.:
Report #: 723044
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: May 29, 2020 4:20 PM
Due: Jun 5, 2020
Priority: 5 Day
Contact Name: Ian Batterley

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	CANCELLED	HOLD	Lead	Lead (filtered)	Moisture Set	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
58	SED05	May 28, 2020		Soil	S20-Jn02161	X		X				X		X	
59	SW05	May 28, 2020		Water	S20-Jn02162		X		X				X		
60	SED06	May 28, 2020		Soil	S20-Jn02163	X		X				X		X	
61	SW06	May 28, 2020		Water	S20-Jn02164		X		X				X		
62	BH01_0.2	May 28, 2020		Soil	S20-Jn02165	X		X				X		X	
63	BH01_0.5	May 28, 2020		Soil	S20-Jn02166	X		X				X		X	
64	BH02_0.2	May 28, 2020		Soil	S20-Jn02167	X		X				X		X	
65	BH02_0.3	May 28, 2020		Soil	S20-Jn02168	X		X				X		X	
66	BH03_0.2	May 28, 2020		Soil	S20-Jn02169	X		X				X		X	
67	BH03_0.5	May 28, 2020		Soil	S20-Jn02170	X		X				X		X	
68	SS54_0.2	May 28, 2020		Soil	S20-Jn02171	X		X				X		X	
69	SS50_0.1	May 27, 2020		Soil	S20-Jn02172						X				
70	SS51_0.2	May 27, 2020		Soil	S20-Jn02173						X				

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Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
71	SS52_0.2	May 27, 2020		Soil	S20-Jn02174						X				
72	SED01	May 27, 2020		Soil	S20-Jn02175						X				
73	SW01	May 27, 2020		Water	S20-Jn02176						X				
74	SED02	May 27, 2020		Soil	S20-Jn02177						X				
75	SW02	May 27, 2020		Water	S20-Jn02178						X				
76	SED03	May 27, 2020		Soil	S20-Jn02179						X				
77	SW03	May 27, 2020		Water	S20-Jn02180						X				
78	SED04	May 27, 2020		Soil	S20-Jn02181						X				
79	SW04	May 27, 2020		Water	S20-Jn02182						X				
80	TB (1)	May 27, 2020		Soil	S20-Jn02183										X
81	TB (2)	May 27, 2020		Soil	S20-Jn02184										X
82	TS (1)	May 27, 2020		Soil	S20-Jn02185										X
83	TS (2)	May 27, 2020		Soil	S20-Jn02186										X

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Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	CANCELLED	HOLD	Lead	Lead (filtered)	Moisture Set	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
84	SS53_0.1	May 26, 2020		Soil	S20-Jn02208						X				
85	SS55_0.2	May 26, 2020		Soil	S20-Jn02209						X				
Test Counts						61	5	61	5	2	13	61	5	61	4

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Antimony	mg/kg	< 10			10	Pass	
Arsenic	mg/kg	< 2			2	Pass	
Lead	mg/kg	< 5			5	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
LCS - % Recovery							
Heavy Metals							
Antimony	%	100			70-130	Pass	
Arsenic	%	102			70-130	Pass	
Lead	%	107			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	86			70-130	Pass	
TRH C6-C10	%	71			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	74			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	84			70-130	Pass	
Toluene	%	85			70-130	Pass	
Ethylbenzene	%	84			70-130	Pass	
m&p-Xylenes	%	88			70-130	Pass	
o-Xylene	%	85			70-130	Pass	
Xylenes - Total*	%	87			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	S20-Jn02109	CP	%	116			70-130	Pass	
Arsenic	S20-Jn02109	CP	%	117			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	S20-Jn02129	CP	%	118			70-130	Pass	
Arsenic	S20-Jn02129	CP	%	120			70-130	Pass	
Lead	S20-Jn02129	CP	%	104			70-130	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heavy Metals				Result 1					
Antimony	S20-Jn02152	CP	%	120			70-130	Pass	
Arsenic	S20-Jn02152	CP	%	120			70-130	Pass	
Lead	S20-Jn02152	CP	%	117			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S20-My44898	NCP	%	80			70-130	Pass	
TRH C6-C10	S20-Jn04810	NCP	%	70			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S20-Jn04810	NCP	%	70			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S20-My44898	NCP	%	71			70-130	Pass	
Toluene	S20-My44898	NCP	%	72			70-130	Pass	
Ethylbenzene	S20-My44898	NCP	%	73			70-130	Pass	
m&p-Xylenes	S20-My44898	NCP	%	77			70-130	Pass	
o-Xylene	S20-My44898	NCP	%	73			70-130	Pass	
Xylenes - Total*	S20-My44898	NCP	%	76			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	S20-Jn02108	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	S20-Jn02108	CP	mg/kg	7.0	7.2	3.0	30%	Pass	
Lead	S20-Jn02108	CP	mg/kg	15	19	21	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Jn02108	CP	%	8.1	7.6	6.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	S20-Jn02118	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	S20-Jn02118	CP	mg/kg	3.5	3.1	11	30%	Pass	
Lead	S20-Jn02118	CP	mg/kg	12	10	15	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Jn02118	CP	%	7.5	7.6	2.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Jn02128	CP	%	8.3	9.5	13	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	S20-Jn02141	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	S20-Jn02141	CP	mg/kg	8.9	6.0	38	30%	Fail	Q15
Lead	S20-Jn02141	CP	mg/kg	32	35	9.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Jn02141	CP	%	8.9	8.2	8.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	S20-Jn02151	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	S20-Jn02151	CP	mg/kg	3.6	4.2	18	30%	Pass	
Lead	S20-Jn02151	CP	mg/kg	23	28	21	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Jn02151	CP	%	23	21	8.0	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	S20-Jn02161	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	S20-Jn02161	CP	mg/kg	2.9	3.4	15	30%	Pass	
Lead	S20-Jn02161	CP	mg/kg	10	14	30	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Jn02161	CP	%	66	67	1.0	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S20-Jn00534	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S20-Jn00534	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S20-Jn00534	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S20-Jn00534	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S20-Jn00534	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S20-Jn00534	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S20-Jn00534	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S20-Jn00534	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	S20-Jn00534	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	

Comments

This report has been revised (V2) to amend sample name for S20-Jn02171.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Alena Bounkeua	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

ERM Sydney
Level 15, 309 Kent St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ian Batterley**

Report **723044-W-V2**
Project name BERMAGUI BASELINE CONTAMINATION
Project ID 555344
Received Date May 29, 2020

Client Sample ID			**ROI_20200526**	**ROI_20200527**	**ROI_20200528**	**SW05**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**S20-Jn02131**	**S20-Jn02133**	**S20-Jn02136**	**S20-Jn02162**
Date Sampled			**May 26, 2020**	**May 27, 2020**	**May 28, 2020**	**May 28, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	0.002

Client Sample ID			**SW06**
Sample Matrix			**Water**
Eurofins Sample No.			**S20-Jn02164**
Date Sampled			**May 28, 2020**
Test/Reference	LOR	Unit	
Heavy Metals			
Antimony (filtered)	0.005	mg/L	< 0.005
Arsenic (filtered)	0.001	mg/L	0.001
Lead (filtered)	0.001	mg/L	0.001

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals (filtered)	Sydney	Jun 02, 2020	180 Days

- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS

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Project Name: BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Order No.:
Report #: 723044
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: May 29, 2020 4:20 PM
Due: Jun 5, 2020
Priority: 5 Day
Contact Name: Ian Batterley

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	CANCELLED	HOLD	Lead	Lead (filtered)	Moisture Set	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
External Laboratory															
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**										
1	SS01_0.2	May 26, 2020		Soil	S20-Jn02104	X		X				X		X	
2	SS02_0.2	May 26, 2020		Soil	S20-Jn02105	X		X				X		X	
3	SS03_0.2	May 26, 2020		Soil	S20-Jn02106	X		X				X		X	
4	SS04_0.2	May 26, 2020		Soil	S20-Jn02107	X		X				X		X	
5	SS05_0.2	May 26, 2020		Soil	S20-Jn02108	X		X				X		X	
6	SS06_0.2	May 26, 2020		Soil	S20-Jn02109	X		X				X		X	
7	SS07_0.2	May 26, 2020		Soil	S20-Jn02110	X		X				X		X	
8	SS08_0.2	May 26, 2020		Soil	S20-Jn02111	X		X				X		X	
9	SS09_0.2	May 26, 2020		Soil	S20-Jn02112	X		X				X		X	
10	SS10_0.2	May 26, 2020		Soil	S20-Jn02113	X		X				X		X	

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Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
11	SS11_0.2	May 26, 2020		Soil	S20-Jn02114	X		X				X		X	
12	SS12_0.2	May 26, 2020		Soil	S20-Jn02115	X		X				X		X	
13	SS13_0.2	May 26, 2020		Soil	S20-Jn02116	X		X				X		X	
14	SS14_0.2	May 26, 2020		Soil	S20-Jn02117	X		X				X		X	
15	SS15_0.2	May 26, 2020		Soil	S20-Jn02118	X		X				X		X	
16	SS16_0.2	May 26, 2020		Soil	S20-Jn02119	X		X				X		X	
17	SS17_0.2	May 26, 2020		Soil	S20-Jn02120	X		X				X		X	
18	SS18_0.2	May 26, 2020		Soil	S20-Jn02121	X		X				X		X	
19	SS19_0.2	May 26, 2020		Soil	S20-Jn02122	X		X				X		X	
20	SS20_0.2	May 26, 2020		Soil	S20-Jn02123	X		X				X		X	
21	SS21_0.2	May 26, 2020		Soil	S20-Jn02124	X		X				X		X	
22	SS22_0.2	May 26, 2020		Soil	S20-Jn02125	X		X				X		X	
23	SS23_0.2	May 26, 2020		Soil	S20-Jn02126	X		X				X		X	

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Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
24	SS24_0.2	May 26, 2020		Soil	S20-Jn02127	X		X				X		X	
25	SS25_0.2	May 26, 2020		Soil	S20-Jn02128	X		X				X		X	
26	DOI_20200526	May 26, 2020		Soil	S20-Jn02129	X		X				X		X	
27	TOI_20200526	May 26, 2020		Soil	S20-Jn02130					X					
28	ROI_20200526	May 26, 2020		Water	S20-Jn02131		X		X				X		
29	DOI_20200527	May 27, 2020		Soil	S20-Jn02132	X		X				X		X	
30	ROI_20200527	May 27, 2020		Water	S20-Jn02133		X		X				X		
31	TOI_20200527	May 27, 2020		Soil	S20-Jn02134					X					
32	DOI_20200528	May 27, 2020		Soil	S20-Jn02135	X		X				X		X	

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Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
33	ROI_20200528	May 28, 2020		Water	S20-Jn02136		X		X				X		
34	SS26_0.2	May 27, 2020		Soil	S20-Jn02137	X		X				X		X	
35	SS27_0.2	May 27, 2020		Soil	S20-Jn02138	X		X				X		X	
36	SS28_0.2	May 27, 2020		Soil	S20-Jn02139	X		X				X		X	
37	SS29_0.2	May 27, 2020		Soil	S20-Jn02140	X		X				X		X	
38	SS30_0.1	May 27, 2020		Soil	S20-Jn02141	X		X				X		X	
39	SS31_0.1	May 27, 2020		Soil	S20-Jn02142	X		X				X		X	
40	SS32_0.1	May 27, 2020		Soil	S20-Jn02143	X		X				X		X	
41	SS33_0.1	May 27, 2020		Soil	S20-Jn02144	X		X				X		X	
42	SS34_0.1	May 27, 2020		Soil	S20-Jn02145	X		X				X		X	
43	SS35_0.1	May 27, 2020		Soil	S20-Jn02146	X		X				X		X	
44	SS36_0.1	May 27, 2020		Soil	S20-Jn02147	X		X				X		X	

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Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
45	SS37_0.1	May 27, 2020		Soil	S20-Jn02148	X		X				X		X	
46	SS38_0.1	May 27, 2020		Soil	S20-Jn02149	X		X				X		X	
47	SS39_0.1	May 27, 2020		Soil	S20-Jn02150	X		X				X		X	
48	SS40_0.1	May 27, 2020		Soil	S20-Jn02151	X		X				X		X	
49	SS41_0.2	May 27, 2020		Soil	S20-Jn02152	X		X				X		X	
50	SS42_0.2	May 27, 2020		Soil	S20-Jn02153	X		X				X		X	
51	SS43_0.2	May 27, 2020		Soil	S20-Jn02154	X		X				X		X	
52	SS44_0.2	May 27, 2020		Soil	S20-Jn02155	X		X				X		X	
53	SS45_0.2	May 27, 2020		Soil	S20-Jn02156	X		X				X		X	
54	SS46_0.1	May 27, 2020		Soil	S20-Jn02157	X		X				X		X	
55	SS47_0.1	May 27, 2020		Soil	S20-Jn02158	X		X				X		X	
56	SS48_0.2	May 27, 2020		Soil	S20-Jn02159	X		X				X		X	
57	SS49_0.2	May 27, 2020		Soil	S20-Jn02160	X		X				X		X	

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Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
58	SED05	May 28, 2020		Soil	S20-Jn02161	X		X				X		X	
59	SW05	May 28, 2020		Water	S20-Jn02162		X		X				X		
60	SED06	May 28, 2020		Soil	S20-Jn02163	X		X				X		X	
61	SW06	May 28, 2020		Water	S20-Jn02164		X		X				X		
62	BH01_0.2	May 28, 2020		Soil	S20-Jn02165	X		X				X		X	
63	BH01_0.5	May 28, 2020		Soil	S20-Jn02166	X		X				X		X	
64	BH02_0.2	May 28, 2020		Soil	S20-Jn02167	X		X				X		X	
65	BH02_0.3	May 28, 2020		Soil	S20-Jn02168	X		X				X		X	
66	BH03_0.2	May 28, 2020		Soil	S20-Jn02169	X		X				X		X	
67	BH03_0.5	May 28, 2020		Soil	S20-Jn02170	X		X				X		X	
68	SS54_0.2	May 28, 2020		Soil	S20-Jn02171	X		X				X		X	
69	SS50_0.1	May 27, 2020		Soil	S20-Jn02172						X				
70	SS51_0.2	May 27, 2020		Soil	S20-Jn02173						X				

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Melbourne Laboratory - NATA Site # 1254 & 14271															
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
71	SS52_0.2	May 27, 2020		Soil	S20-Jn02174						X				
72	SED01	May 27, 2020		Soil	S20-Jn02175						X				
73	SW01	May 27, 2020		Water	S20-Jn02176						X				
74	SED02	May 27, 2020		Soil	S20-Jn02177						X				
75	SW02	May 27, 2020		Water	S20-Jn02178						X				
76	SED03	May 27, 2020		Soil	S20-Jn02179						X				
77	SW03	May 27, 2020		Water	S20-Jn02180						X				
78	SED04	May 27, 2020		Soil	S20-Jn02181						X				
79	SW04	May 27, 2020		Water	S20-Jn02182						X				
80	TB (1)	May 27, 2020		Soil	S20-Jn02183										X
81	TB (2)	May 27, 2020		Soil	S20-Jn02184										X
82	TS (1)	May 27, 2020		Soil	S20-Jn02185										X
83	TS (2)	May 27, 2020		Soil	S20-Jn02186										X

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Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
84	SS53_0.1	May 26, 2020		Soil	S20-Jn02208						X				
85	SS55_0.2	May 26, 2020		Soil	S20-Jn02209						X				
Test Counts						61	5	61	5	2	13	61	5	61	4

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Antimony (filtered)	mg/L	< 0.005			0.005	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Heavy Metals							
Antimony (filtered)	%	114			70-130	Pass	
Arsenic (filtered)	%	116			70-130	Pass	
Lead (filtered)	%	114			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony (filtered)	S20-Jn02164	CP	%	104			70-130	Pass	
Arsenic (filtered)	S20-Jn02164	CP	%	114			70-130	Pass	
Lead (filtered)	S20-Jn02164	CP	%	80			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony (filtered)	S20-Jn02131	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Arsenic (filtered)	S20-Jn02131	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead (filtered)	S20-Jn02131	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Comments

This report has been revised (V2) to amend sample name for S20-Jn02171.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Alena Bounkeua	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

#AU04_Enviro_Sample_NSW

From: Brittany Knight <Brittany.Knight@erm.com>
Sent: Thursday, 4 June 2020 10:07 AM
To: #AU04_Enviro_Sample_NSW
Cc: Peter Lavelle; Ian Batterley; Anne Ashworth
Subject: RE: Eurofins Sample Receipt Advice - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

Follow Up Flag: Follow up
Flag Status: Completed

Thanks for that Luca,

Can you please analyse the following for PAH and Soil Parameters, and hold the remainder of **all** samples for ASLP Lead instructions to follow.

		Metals	PAH	Soil Parameters	ASLP Lead
1	SS01	1			
2	SS02	HOLD			
3	SS03	1			
4	SS04	HOLD			
5	SS05	1			
6	SS06	1	1	1	
7	SS07	1			
8	SS08	1			
9	SS09	1	1	1	
10	D01_20200526	1	1	1	
11	SS10	1			
12	SS11	1			
13	SS12	1			
14	SS13	1			
15	SS14	1			
16	SS15	HOLD			
17	SS16	1			
18	SS17	HOLD			
19	SS18	1			
20	SS19	1			
21	SS20	1			
22	SS21	1			
23	SS22	1			
24	SS23	1	1	1	
25	T01_20200526	1	1	1	
26	SS24	1			
27	SS25	1			
28	SS26*	1			
29	SS27	1			
30	SS28	1	1	1	

31	SS29	1			
32	SS30	1			
33	SS31	1			
34	SS32	1			
35	SS33	1			
36	SS34	1	1	1	
37	SS35	1			
38	SS36	1			
39	SS37	1	1	1	
40	SS38	1	1	1	
41	SS39	1			
42	SS40	1	1	1	
43	D01_20200527	1	1	1	
44	SS41	1			
45	SS42	1			
46	SS43	1			
47	SS44	1			
48	SS45	1			
49	SS46	1			
50	SS47	1			
51	SS48	1			
52	SS49	1			
53	SS50*	1			
54	SS51	1			
55	SS52	1			
56	SS53	1	1	1	
57	T01_20200527	1	1	1	
58	SS54	1	1	1	
59	SS55	1			
60	SS56	1	1	1	
61	BH01_0.2	1	1	1	
62	BH01_0.5	1	1	1	
63	D01_20200528	1	1	1	
64	BH02_0.2	HOLD			
65	BH02_0.3	HOLD			
66	BH03_0.2	1	1	1	
67	BH03_0.5	1	1	1	
		61	20	20	0

		Metals	PAH	Soil Parameters	ASLP Lead
1	SW01	1			
2	SW02	1	1	1 (TOC/pH)	
3	SW03	1	1	1 (TOC/pH)	
4	SW04	1			
5	SW05	1			
6	SW06	1			
7	SED01	1			

8	SED02	1	1	1	
9	SED03	1	1	1	
10	SED04	1			
11	SED05	1			
12	SED06	1			
13	R01_20200526	1	1		
14	R01_20200527	1	1		
15	R01_20200528	1	1		
		15	7	4	0

Kind regards

Brittany Knight
Environmental Scientist

From: EnviroSampleNSW@eurofins.com <EnviroSampleNSW@eurofins.com>
Sent: Wednesday, June 3, 2020 12:38 PM
To: Ian Batterley <Ian.Batterley@erm.com>
Cc: Brittany Knight <Brittany.Knight@erm.com>; Peter Lavelle <Peter.Lavelle@erm.com>
Subject: Eurofins Sample Receipt Advice - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

Dear Valued Client,

Samples TO1_20200526 and TO1_20200527 sent to ALS

Please find attached a Sample Receipt Advice (SRA), a Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section and sample numbers as well as the requested analysis. If there are any irregularities then please contact your Eurofins | mgt Analytical Services Manager as soon as possible to make certain that they get changed.

Regards

Luca Dominici
Sample Receipt

Eurofins | Environmental Testing
Unit F3, Parkview Building
16 Mars Road
LANE COVE WEST NSW 2066
AUSTRALIA
Phone: +61 02 9900 8421
Email: EnviroSampleNSW@eurofins.com
Website:environment.eurofins.com.au

EnviroNote 1098 - Melbourne PFAS Accreditation
EnviroNote 1103 - NATA Accreditation for Dioxins

eurofins | Environment Testing

Melbourne
6 Monterey Road
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Phone : +61 3 8564 5000
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NATA # 1261 Site # 18217

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Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**ERM Sydney**
Contact name:	Brittany Knight
Project name:	ADDITIONAL: BERMAGUI BASELINE CONTAMINATION
Project ID:	555344
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Jun 4, 2020 10:07 AM
Eurofins reference:	**723875**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Alena Bounkeua on Phone : or by e.mail: AlenaBounkeua@eurofins.com

Results will be delivered electronically via e.mail to Brittany Knight - brittany.knight@erm.com.

Note: A copy of these results will also be delivered to the general ERM Sydney email address.

ERM Sydney
Level 15, 309 Kent St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Brittany Knight**

Report **723875-S**
Project name ADDITIONAL: BERMAGUI BASELINE CONTAMINATION
Project ID 555344
Received Date Jun 04, 2020

Client Sample ID			**SS06**	**SS09**	**D01_20200526**	**SS23**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Jn08620**	**S20-Jn08621**	**S20-Jn08622**	**S20-Jn08623**
Date Sampled			**May 26, 2020**	**May 26, 2020**	**May 26, 2020**	**May 26, 2020**
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	81	80	93	96
p-Terphenyl-d14 (surr.)	1	%	95	100	103	106
% Clay	1	%	10	7.0	8.0	11
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	36	29	43	18
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.5	5.4	5.5	5.3
Total Organic Carbon	0.1	%	1.2	7.2	7.1	4.2
% Moisture	1	%	5.8	7.5	7.6	6.9
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	2.2	13	13	5.0

Client Sample ID			SS28	SS34	SS37	SS38
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn08625	S20-Jn08626	S20-Jn08627	S20-Jn08628
Date Sampled			May 27, 2020	May 27, 2020	May 27, 2020	May 27, 2020
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	85	103	89	93
p-Terphenyl-d14 (surr.)	1	%	101	113	102	112
% Clay	1	%	14	11	16	14
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	110	18	25	210
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.2	4.5	4.8	4.5
Total Organic Carbon	0.1	%	6.6	4.2	3.3	4.1
% Moisture	1	%	21	8.3	13	8.0
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	6.5	2.5	2.9	4.3

Client Sample ID			D01_20200527	SS53	SS56	BH01_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn08629	S20-Jn08630	S20-Jn08632	S20-Jn08633
Date Sampled			May 27, 2020	May 26, 2020	May 26, 2020	May 28, 2020
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID			D01_20200527	SS53	SS56	BH01_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn08629	S20-Jn08630	S20-Jn08632	S20-Jn08633
Date Sampled			May 27, 2020	May 26, 2020	May 26, 2020	May 28, 2020
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	89	102	105	91
p-Terphenyl-d14 (surr.)	1	%	100	120	128	97
% Clay	1	%	19	10	14	8.0
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	37	41	36	610
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	4.7	5.4	4.8	5.7
Total Organic Carbon	0.1	%	6.4	3.4	5.4	2.2
% Moisture	1	%	20	14	19	4.9
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	4.5	11	4.2	4.6

Client Sample ID			BH01_0.5	D01_20200528	BH03_0.2	BH03_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn08634	S20-Jn08635	S20-Jn08636	S20-Jn08637
Date Sampled			May 28, 2020	May 28, 2020	May 28, 2020	May 28, 2020
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	1.4	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	1.7	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.9	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	0.7	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	1.1	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	0.8	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	0.7	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	1.0	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	0.7	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	0.8	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	0.6	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	0.8	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	7.2	< 0.5
2-Fluorobiphenyl (surr.)	1	%	81	108	106	91
p-Terphenyl-d14 (surr.)	1	%	108	117	118	126

Client Sample ID			BH01_0.5	D01_20200528	BH03_0.2	BH03_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn08634	S20-Jn08635	S20-Jn08636	S20-Jn08637
Date Sampled			May 28, 2020	May 28, 2020	May 28, 2020	May 28, 2020
Test/Reference	LOR	Unit				
% Clay	1	%	9.0	11	14	10
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	23	17	80	57
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.5	5.5	4.9	5.1
Total Organic Carbon	0.1	%	1.4	0.9	3.2	2.1
% Moisture	1	%	5.0	5.0	6.1	6.7
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	3.0	3.7	7.0	5.0

Client Sample ID			SED02	SED03	SS40
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			S20-Jn08640	S20-Jn08641	S20-Jn17620
Date Sampled			May 27, 2020	May 27, 2020	May 26, 2020
Test/Reference	LOR	Unit			
Polycyclic Aromatic Hydrocarbons					
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	71	68	113
p-Terphenyl-d14 (surr.)	1	%	121	112	125
% Clay	1	%	4.0	4.0	14
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	47	1400	27
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	6.1	6.7	4.9
Total Organic Carbon	0.1	%	< 0.1	< 0.1	18
% Moisture	1	%	18	19	19
Cation Exchange Capacity					
Cation Exchange Capacity	0.05	meq/100g	0.90	0.63	5.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Polycyclic Aromatic Hydrocarbons	Sydney	Jun 15, 2020	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
% Clay	Brisbane	Jun 16, 2020	0 Days
- Method: LTM-GEN-7040			
pH (1:5 Aqueous extract at 25°C as rec.)	Sydney	Jun 11, 2020	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Total Organic Carbon	Melbourne	Jun 12, 2020	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Melbourne	Jun 12, 2020	7 Days
- Method: LTM-INO-4030 Conductivity			
Cation Exchange Capacity	Melbourne	Jun 15, 2020	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage			
% Moisture	Sydney	Jun 11, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name: ERM Sydney
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Project Name: ADDITIONAL: BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Order No.:
Report #: 723875
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: Jun 4, 2020 10:07 AM
Due: Jun 12, 2020
Priority: 5 Day
Contact Name: Brittany Knight

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						% Clay	pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25°C)	Total Organic Carbon	Polycyclic Aromatic Hydrocarbons	Moisture Set	Cation Exchange Capacity
Melbourne Laboratory - NATA Site # 1254 & 14271									X		X	X
Sydney Laboratory - NATA Site # 18217							X	X		X	X	
Brisbane Laboratory - NATA Site # 20794						X						
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	SS06	May 26, 2020		Soil	S20-Jn08620	X	X		X	X	X	X
2	SS09	May 26, 2020		Soil	S20-Jn08621	X	X		X	X	X	X
3	D01_20200526	May 26, 2020		Soil	S20-Jn08622	X	X		X	X	X	X
4	SS23	May 26, 2020		Soil	S20-Jn08623	X	X		X	X	X	X
5	SS28	May 27, 2020		Soil	S20-Jn08625	X	X		X	X	X	X
6	SS34	May 27, 2020		Soil	S20-Jn08626	X	X		X	X	X	X
7	SS37	May 27, 2020		Soil	S20-Jn08627	X	X		X	X	X	X
8	SS38	May 27, 2020		Soil	S20-Jn08628	X	X		X	X	X	X
9	D01_20200527	May 27, 2020		Soil	S20-Jn08629	X	X		X	X	X	X

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Order No.:
Report #: 723875
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: Jun 4, 2020 10:07 AM
Due: Jun 12, 2020
Priority: 5 Day
Contact Name: Brittany Knight

Project Name: ADDITIONAL: BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						% Clay	pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25°C)	Total Organic Carbon	Polycyclic Aromatic Hydrocarbons	Moisture Set	Cation Exchange Capacity
Melbourne Laboratory - NATA Site # 1254 & 14271									X		X	X
Sydney Laboratory - NATA Site # 18217							X	X		X	X	
Brisbane Laboratory - NATA Site # 20794						X						
Perth Laboratory - NATA Site # 23736												
10	SS53	May 26, 2020		Soil	S20-Jn08630	X	X		X	X	X	X
11	SS56	May 26, 2020		Soil	S20-Jn08632	X	X		X	X	X	X
12	BH01_0.2	May 28, 2020		Soil	S20-Jn08633	X	X		X	X	X	X
13	BH01_0.5	May 28, 2020		Soil	S20-Jn08634	X	X		X	X	X	X
14	D01_20200528	May 28, 2020		Soil	S20-Jn08635	X	X		X	X	X	X
15	BH03_0.2	May 28, 2020		Soil	S20-Jn08636	X	X		X	X	X	X
16	BH03_0.5	May 28, 2020		Soil	S20-Jn08637	X	X		X	X	X	X
17	SW02	May 27, 2020		Water	S20-Jn08638			X	X	X		
18	SW03	May 27, 2020		Water	S20-Jn08639			X	X	X		
19	SED02	May 27, 2020		Soil	S20-Jn08640	X	X		X	X	X	X
20	SED03	May 27, 2020		Soil	S20-Jn08641	X	X		X	X	X	X
21	R01_2020052	May 26, 2020		Water	S20-Jn08642					X		

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Company Name: ERM Sydney
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Order No.:
Report #: 723875
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: Jun 4, 2020 10:07 AM
Due: Jun 12, 2020
Priority: 5 Day
Contact Name: Brittany Knight

Project Name: ADDITIONAL: BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						% Clay	pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25°C)	Total Organic Carbon	Polycyclic Aromatic Hydrocarbons	Moisture Set	Cation Exchange Capacity
Melbourne Laboratory - NATA Site # 1254 & 14271									X		X	X
Sydney Laboratory - NATA Site # 18217							X	X		X	X	
Brisbane Laboratory - NATA Site # 20794						X						
Perth Laboratory - NATA Site # 23736												
	6											
22	R01_20200527	May 27, 2020		Water	S20-Jn08643					X		
23	R01_20200528	May 28, 2020		Water	S20-Jn08644					X		
24	SS40	May 26, 2020		Soil	S20-Jn17620	X	X		X	X	X	X
Test Counts						19	19	2	21	24	19	19

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 10			10	Pass	
Method Blank							
Cation Exchange Capacity							
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	85			70-130	Pass	
Acenaphthylene	%	91			70-130	Pass	
Anthracene	%	93			70-130	Pass	
Benz(a)anthracene	%	83			70-130	Pass	
Benzo(a)pyrene	%	92			70-130	Pass	
Benzo(b&j)fluoranthene	%	89			70-130	Pass	
Benzo(g.h.i)perylene	%	101			70-130	Pass	
Benzo(k)fluoranthene	%	107			70-130	Pass	
Chrysene	%	94			70-130	Pass	
Dibenz(a.h)anthracene	%	90			70-130	Pass	
Fluoranthene	%	95			70-130	Pass	
Fluorene	%	93			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	85			70-130	Pass	
Naphthalene	%	94			70-130	Pass	
Phenanthrene	%	94			70-130	Pass	
Pyrene	%	92			70-130	Pass	
LCS - % Recovery							
Total Organic Carbon	%	102			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S20-Jn08637	CP	%	89			70-130	Pass	
Acenaphthylene	S20-Jn08637	CP	%	97			70-130	Pass	
Anthracene	S20-Jn08637	CP	%	97			70-130	Pass	
Benz(a)anthracene	S20-Jn08637	CP	%	99			70-130	Pass	
Benzo(a)pyrene	S20-Jn08637	CP	%	96			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Benzo(b&j)fluoranthene	S20-Jn08637	CP	%	99			70-130	Pass	
Benzo(g.h.i)perylene	S20-Jn08637	CP	%	103			70-130	Pass	
Benzo(k)fluoranthene	S20-Jn08637	CP	%	100			70-130	Pass	
Chrysene	S20-Jn08637	CP	%	92			70-130	Pass	
Dibenz(a.h)anthracene	S20-Jn08637	CP	%	105			70-130	Pass	
Fluoranthene	S20-Jn08637	CP	%	96			70-130	Pass	
Fluorene	S20-Jn08637	CP	%	104			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S20-Jn08637	CP	%	104			70-130	Pass	
Naphthalene	S20-Jn08637	CP	%	90			70-130	Pass	
Phenanthrene	S20-Jn08637	CP	%	101			70-130	Pass	
Pyrene	S20-Jn08637	CP	%	96			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S20-Jn17558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C as rec.)	M20-Jn15197	NCP	uS/cm	140	110	23	30%	Pass	
Duplicate									
Cation Exchange Capacity				Result 1	Result 2	RPD			
Cation Exchange Capacity	S20-Jn08620	CP	meq/100g	2.2	2.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
pH (1:5 Aqueous extract at 25°C as rec.)	S20-Jn08628	CP	pH Units	4.5	4.5	Pass	30%	Pass	
Total Organic Carbon	S20-Jn08628	CP	%	4.1	4.6	12	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Jn08630	CP	%	14	15	7.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
pH (1:5 Aqueous extract at 25°C as rec.)	S20-Jn08641	CP	pH Units	6.7	6.7	Pass	30%	Pass	
Total Organic Carbon	S20-Jn08641	CP	%	< 0.1	< 0.1	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised By

Alena Bounkeua	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Jonathon Angell	Senior Analyst-Inorganic (QLD)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

ERM Sydney
Level 15, 309 Kent St
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NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Brittany Knight**

Report **723875-W**
Project name ADDITIONAL: BERMAGUI BASELINE CONTAMINATION
Project ID 555344
Received Date Jun 04, 2020

Client Sample ID			**SW02**	**SW03**	**R01_20200526**	**R01_20200527**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**S20-Jn08638**	**S20-Jn08639**	**S20-Jn08642**	**S20-Jn08643**
Date Sampled			**May 27, 2020**	**May 27, 2020**	**May 26, 2020**	**May 27, 2020**
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	111	124	113	113
p-Terphenyl-d14 (surr.)	1	%	79	78	93	93
pH (at 25°C)	0.1	pH Units	7.0	7.0	-	-
Total Organic Carbon	5	mg/L	14	11	-	-

Client Sample ID			**R01_20200528**
Sample Matrix			**Water**
Eurofins Sample No.			**S20-Jn08644**
Date Sampled			**May 28, 2020**
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	0.001	mg/L	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001
Anthracene	0.001	mg/L	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001

Client Sample ID			R01_20200528
Sample Matrix			**Water**
Eurofins Sample No.			**S20-Jn08644**
Date Sampled			**May 28, 2020**
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001
Chrysene	0.001	mg/L	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001
Fluoranthene	0.001	mg/L	< 0.001
Fluorene	0.001	mg/L	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001
Naphthalene	0.001	mg/L	< 0.001
Phenanthrene	0.001	mg/L	< 0.001
Pyrene	0.001	mg/L	< 0.001
Total PAH*	0.001	mg/L	< 0.001
2-Fluorobiphenyl (surr.)	1	%	127
p-Terphenyl-d14 (surr.)	1	%	99

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Polycyclic Aromatic Hydrocarbons	Sydney	Jun 04, 2020	7 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
pH (at 25°C)	Sydney	Jun 05, 2020	1 Days
- Method: LTM-GEN-7090 pH in water by ISE			
Total Organic Carbon	Melbourne	Jun 09, 2020	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			

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NATA # 1261 Site # 20794

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Company Name: ERM Sydney
Address: Level 15, 309 Kent St
Sydney
NSW 2000

Project Name: ADDITIONAL: BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Order No.:
Report #: 723875
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: Jun 4, 2020 10:07 AM
Due: Jun 12, 2020
Priority: 5 Day
Contact Name: Brittany Knight

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						% Clay	pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25°C)	Total Organic Carbon	Polycyclic Aromatic Hydrocarbons	Moisture Set	Cation Exchange Capacity
Melbourne Laboratory - NATA Site # 1254 & 14271									X		X	X
Sydney Laboratory - NATA Site # 18217							X	X		X	X	
Brisbane Laboratory - NATA Site # 20794						X						
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	SS06	May 26, 2020		Soil	S20-Jn08620	X	X		X	X	X	X
2	SS09	May 26, 2020		Soil	S20-Jn08621	X	X		X	X	X	X
3	D01_20200526	May 26, 2020		Soil	S20-Jn08622	X	X		X	X	X	X
4	SS23	May 26, 2020		Soil	S20-Jn08623	X	X		X	X	X	X
5	SS28	May 27, 2020		Soil	S20-Jn08625	X	X		X	X	X	X
6	SS34	May 27, 2020		Soil	S20-Jn08626	X	X		X	X	X	X
7	SS37	May 27, 2020		Soil	S20-Jn08627	X	X		X	X	X	X
8	SS38	May 27, 2020		Soil	S20-Jn08628	X	X		X	X	X	X
9	D01_20200527	May 27, 2020		Soil	S20-Jn08629	X	X		X	X	X	X

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Order No.:
Report #: 723875
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: Jun 4, 2020 10:07 AM
Due: Jun 12, 2020
Priority: 5 Day
Contact Name: Brittany Knight

Project Name: ADDITIONAL: BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						% Clay	pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25°C)	Total Organic Carbon	Polycyclic Aromatic Hydrocarbons	Moisture Set	Cation Exchange Capacity
Melbourne Laboratory - NATA Site # 1254 & 14271									X		X	X
Sydney Laboratory - NATA Site # 18217							X	X		X	X	
Brisbane Laboratory - NATA Site # 20794						X						
Perth Laboratory - NATA Site # 23736												
10	SS53	May 26, 2020		Soil	S20-Jn08630	X	X		X	X	X	X
11	SS56	May 26, 2020		Soil	S20-Jn08632	X	X		X	X	X	X
12	BH01_0.2	May 28, 2020		Soil	S20-Jn08633	X	X		X	X	X	X
13	BH01_0.5	May 28, 2020		Soil	S20-Jn08634	X	X		X	X	X	X
14	D01_20200528	May 28, 2020		Soil	S20-Jn08635	X	X		X	X	X	X
15	BH03_0.2	May 28, 2020		Soil	S20-Jn08636	X	X		X	X	X	X
16	BH03_0.5	May 28, 2020		Soil	S20-Jn08637	X	X		X	X	X	X
17	SW02	May 27, 2020		Water	S20-Jn08638			X	X	X		
18	SW03	May 27, 2020		Water	S20-Jn08639			X	X	X		
19	SED02	May 27, 2020		Soil	S20-Jn08640	X	X		X	X	X	X
20	SED03	May 27, 2020		Soil	S20-Jn08641	X	X		X	X	X	X
21	R01_2020052	May 26, 2020		Water	S20-Jn08642					X		

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NSW 2000

Order No.:
Report #: 723875
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: Jun 4, 2020 10:07 AM
Due: Jun 12, 2020
Priority: 5 Day
Contact Name: Brittany Knight

Project Name: ADDITIONAL: BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						% Clay	pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25°C)	Total Organic Carbon	Polycyclic Aromatic Hydrocarbons	Moisture Set	Cation Exchange Capacity
Melbourne Laboratory - NATA Site # 1254 & 14271									X		X	X
Sydney Laboratory - NATA Site # 18217							X	X		X	X	
Brisbane Laboratory - NATA Site # 20794						X						
Perth Laboratory - NATA Site # 23736												
	6											
22	R01_20200527	May 27, 2020		Water	S20-Jn08643					X		
23	R01_20200528	May 28, 2020		Water	S20-Jn08644					X		
24	SS40	May 26, 2020		Soil	S20-Jn17620	X	X		X	X	X	X
Test Counts						19	19	2	21	24	19	19

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/L	< 0.001			0.001	Pass	
Acenaphthylene	mg/L	< 0.001			0.001	Pass	
Anthracene	mg/L	< 0.001			0.001	Pass	
Benz(a)anthracene	mg/L	< 0.001			0.001	Pass	
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Benzo(b&j)fluoranthene	mg/L	< 0.001			0.001	Pass	
Benzo(g.h.i)perylene	mg/L	< 0.001			0.001	Pass	
Benzo(k)fluoranthene	mg/L	< 0.001			0.001	Pass	
Chrysene	mg/L	< 0.001			0.001	Pass	
Dibenz(a.h)anthracene	mg/L	< 0.001			0.001	Pass	
Fluoranthene	mg/L	< 0.001			0.001	Pass	
Fluorene	mg/L	< 0.001			0.001	Pass	
Indeno(1.2.3-cd)pyrene	mg/L	< 0.001			0.001	Pass	
Naphthalene	mg/L	< 0.001			0.001	Pass	
Phenanthrene	mg/L	< 0.001			0.001	Pass	
Pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Total Organic Carbon	mg/L	< 5			5	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	128			70-130	Pass	
Acenaphthylene	%	124			70-130	Pass	
Anthracene	%	119			70-130	Pass	
Benz(a)anthracene	%	112			70-130	Pass	
Benzo(g.h.i)perylene	%	113			70-130	Pass	
Benzo(k)fluoranthene	%	122			70-130	Pass	
Chrysene	%	109			70-130	Pass	
Dibenz(a.h)anthracene	%	113			70-130	Pass	
Fluoranthene	%	126			70-130	Pass	
Fluorene	%	124			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	96			70-130	Pass	
Naphthalene	%	98			70-130	Pass	
Phenanthrene	%	130			70-130	Pass	
Pyrene	%	127			70-130	Pass	
LCS - % Recovery							
Total Organic Carbon	%	71			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Total Organic Carbon	S20-Jn11310	NCP	%	79			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Acenaphthylene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Anthracene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benz(a)anthracene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(a)pyrene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(b&j)fluoranthene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Benzo(g.h.i)perylene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(k)fluoranthene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chrysene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibenz(a.h)anthracene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluoranthene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluorene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Naphthalene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Phenanthrene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Pyrene	S20-Jn13284	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Organic Carbon	S20-Jn08638	CP	mg/L	14	9.9	33	30%	Fail	Q15

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Alena Bounkeua	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

#AU04_Enviro_Sample_NSW

To: Alena Bounkeua
Subject: RE: *additional analysis* Eurofins Test Results - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

From: Alena Bounkeua
Sent: Wednesday, 10 June 2020 11:22 AM
To: #AU04_Enviro_Sample_NSW
Subject: *additional analysis* Eurofins Test Results - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

Additional analysis please – standard TAT (for now)

Metals – Antimony, Arsenic and Lead

Thanks

Kind Regards,

Alena Bounkeua
Eurofins|Environment Testing
Phone: +61 2 9900 8414
Mobile: +61 429 365 410
Email: AlenaBounkeua@eurofins.com

From: Brittany Knight
Sent: Wednesday, June 10, 2020 9:55 AM
To: AlenaBounkeua@eurofins.com
Cc: Peter Lavelle <Peter.Lavelle@erm.com>; Ian Batterley <Ian.Batterley@erm.com>
Subject: RE: Eurofins Test Results - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

Thanks Alena,

The following samples are missing from the report, can you please analyse them for metals:

- SS50
- SS51
- SS52
- SS53
- SS54
- SS55
- SED01
- SED02
- SED03
- SED04
- SW01
- SW02

- SW03
- SW04

Kind regards

Brittany Knight
Environmental Scientist

eurofins | Environment Testing

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NATA # 1261 Site # 18217

Brisbane
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NATA # 1261 Site # 20794

Perth
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NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**ERM Sydney**
Contact name:	Ian Batterley
Project name:	ADDITIONAL - BERMAGUI BASELINE CONTAMINATION
Project ID:	555344
COC number:	Not provided
Turn around time:	2 Day
Date/Time received:	Jun 10, 2020 11:27 AM
Eurofins reference:	**724572**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Alena Bounkeua on Phone : or by e.mail: AlenaBounkeua@eurofins.com

Results will be delivered electronically via e.mail to Ian Batterley - ian.batterley@erm.com.

Note: A copy of these results will also be delivered to the general ERM Sydney email address.

ERM Sydney
Level 15, 309 Kent St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ian Batterley**

Report **724572-S**
Project name ADDITIONAL - BERMAGUI BASELINE CONTAMINATION
Project ID 555344
Received Date Jun 10, 2020

Client Sample ID			**SS50_0.1**	**SS51_0.2**	**SS52_0.2**	**SS53_0.1**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Jn14690**	**S20-Jn14691**	**S20-Jn14692**	**S20-Jn14693**
Date Sampled			**May 27, 2020**	**May 27, 2020**	**May 27, 2020**	**May 26, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	7.2	< 2	2.8	< 2
Lead	5	mg/kg	22	9.1	22	10
% Moisture	1	%	6.4	14	36	15

Client Sample ID			**SS55_0.2**	**SED01**	**SED02**	**SED03**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Jn14694**	**S20-Jn14695**	**S20-Jn14696**	**S20-Jn14697**
Date Sampled			**May 26, 2020**	**May 26, 2020**	**May 26, 2020**	**May 26, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	4.2	< 2	< 2	< 2
Lead	5	mg/kg	39	< 5	< 5	< 5
% Moisture	1	%	22	21	15	16

Client Sample ID			**SED04**	**SS54_0.2**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S20-Jn14698**	**S20-Jn17122**
Date Sampled			**May 26, 2020**	**May 26, 2020**
Test/Reference	LOR	Unit		
Heavy Metals				
Antimony	10	mg/kg	< 10	< 10
Arsenic	2	mg/kg	2.1	< 2
Lead	5	mg/kg	< 5	18
% Moisture	1	%	18	16

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Sydney	Jun 11, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Jun 11, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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IANZ # 1290

Company Name: ERM Sydney
Address: Level 15, 309 Kent St
Sydney
NSW 2000

Order No.:
Report #: 724572
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: Jun 10, 2020 11:27 AM
Due: Jun 12, 2020
Priority: 2 Day
Contact Name: Ian Batterley

Project Name: ADDITIONAL - BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	Lead	Lead (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	SS50_0.1	May 27, 2020		Soil	S20-Jn14690	X		X		X		X
2	SS51_0.2	May 27, 2020		Soil	S20-Jn14691	X		X		X		X
3	SS52_0.2	May 27, 2020		Soil	S20-Jn14692	X		X		X		X
4	SS53_0.1	May 26, 2020		Soil	S20-Jn14693	X		X		X		X
5	SS55_0.2	May 26, 2020		Soil	S20-Jn14694	X		X		X		X
6	SED01	May 26, 2020		Soil	S20-Jn14695	X		X		X		X
7	SED02	May 26, 2020		Soil	S20-Jn14696	X		X		X		X
8	SED03	May 26, 2020		Soil	S20-Jn14697	X		X		X		X
9	SED04	May 26, 2020		Soil	S20-Jn14698	X		X		X		X
10	SW01	May 26, 2020		Water	S20-Jn14699		X		X		X	

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ABN – 50 005 085 521 web : www.eurofins.com.au e.mail : EnviroSales@eurofins.com

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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: ERM Sydney
Address: Level 15, 309 Kent St
Sydney
NSW 2000

Order No.:
Report #: 724572
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: Jun 10, 2020 11:27 AM
Due: Jun 12, 2020
Priority: 2 Day
Contact Name: Ian Batterley

Project Name: ADDITIONAL - BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	Lead	Lead (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
11	SW02	May 26, 2020		Water	S20-Jn14700		X		X		X	
12	SW03	May 26, 2020		Water	S20-Jn14701		X		X		X	
13	SW04	May 26, 2020		Water	S20-Jn14702		X		X		X	
14	SS54_0.2	May 26, 2020		Soil	S20-Jn17122	X		X		X		X
Test Counts						10	4	10	4	10	4	10

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Antimony	mg/kg	< 10			10	Pass	
Arsenic	mg/kg	< 2			2	Pass	
Lead	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Heavy Metals							
Antimony	%	103			70-130	Pass	
Arsenic	%	110			70-130	Pass	
Lead	%	110			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	S20-Jn14690	CP	%	116			70-130	Pass	
Arsenic	S20-Jn14690	CP	%	124			70-130	Pass	
Lead	S20-Jn17811	NCP	%	110			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Jn14693	CP	%	15	14	4.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	S20-Jn17122	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	S20-Jn17122	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Lead	S20-Jn17122	CP	mg/kg	18	18	1.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Alena Bounkeua	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Certificate of Analysis

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NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ian Batterley**

Report **724572-W**
Project name ADDITIONAL - BERMAGUI BASELINE CONTAMINATION
Project ID 555344
Received Date Jun 10, 2020

Client Sample ID			**SW01**	**SW02**	**SW03**	**SW04**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**S20-Jn14699**	**S20-Jn14700**	**S20-Jn14701**	**S20-Jn14702**
Date Sampled			**May 26, 2020**	**May 26, 2020**	**May 26, 2020**	**May 26, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	0.001
Lead (filtered)	0.001	mg/L	0.003	< 0.001	0.001	0.002

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals (filtered)	Sydney	Jun 10, 2020	180 Days

- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS

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Phone : 0800 856 450
IANZ # 1290

Company Name: ERM Sydney
Address: Level 15, 309 Kent St
Sydney
NSW 2000

Order No.:
Report #: 724572
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: Jun 10, 2020 11:27 AM
Due: Jun 12, 2020
Priority: 2 Day
Contact Name: Ian Batterley

Project Name: ADDITIONAL - BERMAGUI BASELINE CONTAMINATION
Project ID: 555344

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	Lead	Lead (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	SS50_0.1	May 27, 2020		Soil	S20-Jn14690	X		X		X		X
2	SS51_0.2	May 27, 2020		Soil	S20-Jn14691	X		X		X		X
3	SS52_0.2	May 27, 2020		Soil	S20-Jn14692	X		X		X		X
4	SS53_0.1	May 26, 2020		Soil	S20-Jn14693	X		X		X		X
5	SS55_0.2	May 26, 2020		Soil	S20-Jn14694	X		X		X		X
6	SED01	May 26, 2020		Soil	S20-Jn14695	X		X		X		X
7	SED02	May 26, 2020		Soil	S20-Jn14696	X		X		X		X
8	SED03	May 26, 2020		Soil	S20-Jn14697	X		X		X		X
9	SED04	May 26, 2020		Soil	S20-Jn14698	X		X		X		X
10	SW01	May 26, 2020		Water	S20-Jn14699		X		X		X	

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Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Antimony	Antimony (filtered)	Arsenic	Arsenic (filtered)	Lead	Lead (filtered)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
11	SW02	May 26, 2020		Water	S20-Jn14700		X		X		X	
12	SW03	May 26, 2020		Water	S20-Jn14701		X		X		X	
13	SW04	May 26, 2020		Water	S20-Jn14702		X		X		X	
14	SS54_0.2	May 26, 2020		Soil	S20-Jn17122	X		X		X		X
Test Counts						10	4	10	4	10	4	10

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Antimony (filtered)	mg/L	< 0.005			0.005	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Heavy Metals							
Antimony (filtered)	%	100			70-130	Pass	
Arsenic (filtered)	%	103			70-130	Pass	
Lead (filtered)	%	100			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony (filtered)	S20-Jn14702	CP	%	102			70-130	Pass	
Arsenic (filtered)	S20-Jn14702	CP	%	104			70-130	Pass	
Lead (filtered)	S20-Jn14702	CP	%	80			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony (filtered)	S20-Jn14699	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Arsenic (filtered)	S20-Jn14699	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead (filtered)	S20-Jn14699	CP	mg/L	0.003	0.003	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Alena Bounkeua	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

#AU04_Enviro_Sample_NSW

To: Brittany Knight
Subject: RE: Bermagui 0555344 final analysis

From: Brittany Knight [mailto:Brittany.Knight@erm.com]
Sent: Wednesday, 17 June 2020 3:22 PM
To: #AU04_Enviro_Sample_NSW; Alena Bounkeua
Cc: Peter Lavelle; Ian Batterley
Subject: Bermagui 0555344 final analysis

Hello,

Final request for analysis!
Can the following 15 samples please be analysed for ASLP lead with 48 hr turnaround:

- SS09
- SS10
- SS12
- SS16
- SS21
- SS26
- SS29
- SS40
- SS41
- SS43
- SS50
- BH01_0.5
- D01_20200526
- D01_20200527
- D01_20200528

Kind regards

Brittany Knight
Environmental Scientist

ERM
Level 15 | 309 Kent St | Sydney NSW 2000
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E brittany.knight@erm.com | **W** www.erm.com

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Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**ERM Sydney**
Contact name:	Ian Batterley
Project name:	ADDITIONAL - BERMAGUI BASELINE CONTAMINATION
Project ID:	555344
COC number:	Not provided
Turn around time:	2 Day
Date/Time received:	Jun 17, 2020 3:22 PM
Eurofins reference:	**726119**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Alena Bounkeua on Phone : or by e.mail: AlenaBounkeua@eurofins.com

Results will be delivered electronically via e.mail to Ian Batterley - ian.batterley@erm.com.

Note: A copy of these results will also be delivered to the general ERM Sydney email address.

ERM Sydney
Level 15, 309 Kent St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ian Batterley**

Report **726119-L**
Project name ADDITIONAL - BERMAGUI BASELINE CONTAMINATION
Project ID 555344
Received Date Jun 17, 2020

Client Sample ID			**SS09**	**SS10**	**SS12**	**SS16**
Sample Matrix			**AUS Leachate - Reagent Water**	**AUS Leachate - Reagent Water**	**AUS Leachate - Reagent Water**	**AUS Leachate - Reagent Water**
Eurofins Sample No.			**S20-Jn27535**	**S20-Jn27536**	**S20-Jn27537**	**S20-Jn27538**
Date Sampled			**May 26, 2020**	**May 26, 2020**	**May 26, 2020**	**May 26, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	0.02	0.08	0.04	0.21
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	5.7	5.7	5.7	5.6
pH (Leachate fluid)	0.1	pH Units	5.9	5.9	5.9	5.9
pH (off)	0.1	pH Units	5.6	5.7	5.6	5.2

Client Sample ID			**SS21**	**SS26**	**SS29**	**SS40**
Sample Matrix			**AUS Leachate - Reagent Water**	**AUS Leachate - Reagent Water**	**AUS Leachate - Reagent Water**	**AUS Leachate - Reagent Water**
Eurofins Sample No.			**S20-Jn27539**	**S20-Jn27540**	**S20-Jn27541**	**S20-Jn27542**
Date Sampled			**May 26, 2020**	**May 26, 2020**	**May 26, 2020**	**May 26, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	0.01	< 0.01	0.02	< 0.01
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	6.0	4.9	5.1	5.6
pH (Leachate fluid)	0.1	pH Units	5.9	5.9	5.9	5.9
pH (off)	0.1	pH Units	6.1	4.2	6.0	5.4

Client Sample ID			SS41	SS43	SS50	BH01_0.5
Sample Matrix			AUS Leachate - Reagent Water	AUS Leachate - Reagent Water	AUS Leachate - Reagent Water	AUS Leachate - Reagent Water
Eurofins Sample No.			S20-Jn27543	S20-Jn27544	S20-Jn27545	S20-Jn27546
Date Sampled			May 26, 2020	May 26, 2020	May 26, 2020	May 26, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	0.03	0.06	0.01	0.02
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	5.5	5.8	5.6	5.8
pH (Leachate fluid)	0.1	pH Units	5.9	5.9	5.9	5.9
pH (off)	0.1	pH Units	5.1	5.5	5.6	5.5

Client Sample ID			D01_20200526	D01_20200527	D01_20200528
Sample Matrix			AUS Leachate - Reagent Water	AUS Leachate - Reagent Water	AUS Leachate - Reagent Water
Eurofins Sample No.			S20-Jn27547	S20-Jn27548	S20-Jn27549
Date Sampled			May 26, 2020	May 26, 2020	May 26, 2020
Test/Reference	LOR	Unit			
Heavy Metals					
Lead	0.01	mg/L	< 0.01	< 0.01	0.01
AUS Leaching Procedure					
Leachate Fluid[C01]		comment	4.0	4.0	4.0
pH (initial)	0.1	pH Units	5.6	5.5	5.8
pH (Leachate fluid)	0.1	pH Units	5.9	5.9	5.9
pH (off)	0.1	pH Units	5.7	5.1	5.7

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Sydney	Jun 19, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
AUS Leaching Procedure	Sydney	Jun 18, 2020	7 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			

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Contact Name: Ian Batterley

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Project ID: 555344

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Lead	AUS Leaching Procedure
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	SS09	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27535	X	X
2	SS10	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27536	X	X
3	SS12	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27537	X	X
4	SS16	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27538	X	X
5	SS21	May 26, 2020		AUS Leachate	S20-Jn27539	X	X

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Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
				- Reagent Water			
6	SS26	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27540	X	X
7	SS29	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27541	X	X
8	SS40	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27542	X	X
9	SS41	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27543	X	X
10	SS43	May 26, 2020		AUS Leachate - Reagent	S20-Jn27544	X	X

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Sample Detail						Lead	AUS Leaching Procedure
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Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
				Water			
11	SS50	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27545	X	X
12	BH01_0.5	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27546	X	X
13	D01_20200526	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27547	X	X
14	D01_20200527	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27548	X	X
15	D01_20200528	May 26, 2020		AUS Leachate - Reagent Water	S20-Jn27549	X	X

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Rolleston, Christchurch 7675
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IANZ # 1290

Company Name:	ERM Sydney	**Order No.:**		**Received:**	Jun 17, 2020 3:22 PM
Address:	Level 15, 309 Kent St Sydney NSW 2000	**Report #:**	726119	**Due:**	Jun 19, 2020
		Phone:	02 8584 8888	**Priority:**	2 Day
		Fax:	02 8584 8800	**Contact Name:**	Ian Batterley
Project Name:	ADDITIONAL - BERMAGUI BASELINE CONTAMINATION				
Project ID:	555344				

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail	Lead	AUS Leaching Procedure
Melbourne Laboratory - NATA Site # 1254 & 14271		
Sydney Laboratory - NATA Site # 18217	X	X
Brisbane Laboratory - NATA Site # 20794		
Perth Laboratory - NATA Site # 23736		
Test Counts	15	15

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/L	< 0.01			0.01	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	88			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S20-Jn27547	CP	%	113			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S20-Jn27535	CP	mg/L	0.02	< 0.01	82	30%	Fail	Q15
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S20-Jn27543	CP	mg/L	0.03	0.02	30	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Alena Bounkeua	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2019415**	Page	: 1 of 5
Client	: **ENVIRONMENTAL RESOURCES MANAGEMENT (ERM)**	Laboratory	: Environmental Division Sydney
Contact	: Brittany Knight	Contact	: Shane Ellis
Address	: Level 15, 309 Kent Street SYDNEY NSW AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 555344 BERMAGUI BASELINE CONTAMINATION	Date Samples Received	: 04-Jun-2020 13:28
Order number	: ----	Date Analysis Commenced	: 09-Jun-2020
C-O-C number	: ----	Issue Date	: 16-Jun-2020 13:34
Sampler	: ----		
Site	: ----		
Quote number	: EN/114/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

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

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	T01_20200526	T01_20200527	----	----	----
			Client sampling date / time	26-May-2020 00:00	27-May-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES2019415-001	ES2019415-002	--------	--------	--------
				Result	Result	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**5.8**	**6.0**	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**6.7**	**14.5**	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**3.0**	**6.2**	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**2.1**	**3.7**	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	**0.3**	**0.2**	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.3**	**0.1**	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**5.6**	**10.2**	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**4.9**	**1.4**	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Antimony	7440-36-0	5	mg/kg	<5	<5	----	----	----
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Lead	7439-92-1	5	mg/kg	**17**	**9**	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	**4.9**	**5.7**	----	----	----
Total Organic Carbon	----	0.5	%	**2.8**	**3.3**	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	T01_20200526	T01_20200527	----	----	----
				Client sampling date / time	26-May-2020 00:00	27-May-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2019415-001	ES2019415-002	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**85.9**	**88.9**	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**91.0**	**95.4**	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**94.7**	**84.3**	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**99.5**	**103**	----	----	----
Anthracene-d10	1719-06-8	0.5	%		**93.4**	**97.7**	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**96.8**	**99.2**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2019415**	Page	: 1 of 5
Client	: **ENVIRONMENTAL RESOURCES MANAGEMENT (ERM)**	Laboratory	: Environmental Division Sydney
Contact	: Brittany Knight	Contact	: Shane Ellis
Address	: Level 15, 309 Kent Street SYDNEY NSW AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 555344 BERMAGUI BASELINE CONTAMINATION	Date Samples Received	: 04-Jun-2020
Order number	: ----	Date Analysis Commenced	: 09-Jun-2020
C-O-C number	: ----	Issue Date	: 16-Jun-2020
Sampler	: ----		
Site	: ----		
Quote number	: EN/114/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3068382)									
ES2019356-011	Anonymous	EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	13	10	32.5	No Limit
ES2019356-011	Anonymous	EG005T: Antimony	7440-36-0	5	mg/kg	<5	<5	0.00	No Limit
ES2019452-001	Anonymous	EG005T: Antimony	7440-36-0	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	28	30	6.80	No Limit
EA002: pH 1:5 (Soils) (QC Lot: 3073480)									
ES2020008-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	4.2	4.2	0.00	0% - 20%
ES2019961-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	6.3	6.3	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3068385)									
ES2019408-011	Anonymous	EA055: Moisture Content	----	0.1	%	11.9	11.7	2.04	0% - 50%
ED007: Exchangeable Cations (QC Lot: 3078296)									
ES2019415-001	T01_20200526	ED007: Exchangeable Sodium Percent	----	0.1	%	4.9	4.8	0.00	0% - 20%
		ED007: Exchangeable Calcium	----	0.1	meq/100g	3.0	3.1	0.00	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	2.1	2.1	0.00	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	0.3	0.3	0.00	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.3	0.3	0.00	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	5.6	5.8	2.24	0% - 20%
EP004: Organic Matter (QC Lot: 3080308)									
ES2019116-002	Anonymous	EP004: Organic Matter	----	0.5	%	0.6	0.6	0.00	No Limit
		EP004: Total Organic Carbon	----	0.5	%	<0.5	<0.5	0.00	No Limit
ES2019415-002	T01_20200527	EP004: Organic Matter	----	0.5	%	5.7	5.8	1.90	0% - 50%
		EP004: Total Organic Carbon	----	0.5	%	3.3	3.4	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3073127)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3073127) - continued									
ES2019940-059	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3068382)								
EG005T: Antimony	7440-36-0	5	mg/kg	<5	----	----	----	----
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	98 mg/kg	124	86.0	126
EG005T: Lead	7439-92-1	5	mg/kg	<5	50 mg/kg	106	80.0	114
ED007: Exchangeable Cations (QCLot: 3078296)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	107	75.8	120
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.67 meq/100g	101	74.9	115
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.51 meq/100g	106	80.0	120
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.87 meq/100g	102	80.0	120
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----
ED007: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
EP004: Organic Matter (QCLot: 3080308)								
EP004: Organic Matter	----	0.5	%	<0.5	2.53 %	87.4	82.0	98.0
EP004: Total Organic Carbon	----	0.5	%	<0.5	1.46 %	87.7	81.0	99.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3073127)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	94.4	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	96.9	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	92.4	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	96.7	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	95.4	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	94.7	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	99.3	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	97.3	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	90.8	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	89.8	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	88.4	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	88.6	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	91.4	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	88.3	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	86.0	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	88.9	63.0	121

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3068382)							
ES2019356-011	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	70.2	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	88.2	70.0	130
EP004: Organic Matter (QCLot: 3080308)							
ES2019116-002	Anonymous	EP004: Organic Matter	----	0.99 %	77.3	70.0	130
		EP004: Total Organic Carbon	----	0.57 %	78.5	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3073127)							
ES2019940-059	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	86.5	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	82.4	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2019415**	Page	: 1 of 5
Client	: **ENVIRONMENTAL RESOURCES MANAGEMENT (ERM)**	Laboratory	: Environmental Division Sydney
Contact	: Brittany Knight	Telephone	: +61 2 8784 8555
Project	: 555344 BERMAGUI BASELINE CONTAMINATION	Date Samples Received	: 04-Jun-2020
Site	: ----	Issue Date	: 16-Jun-2020
Sampler	: ----	No. of samples received	: 2
Order number	: ----	No. of samples analysed	: 2

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002: pH 1:5 (Soils)						
HDPE Soil Jar T01_20200526	11-Jun-2020	02-Jun-2020	**9**	----	----	----
HDPE Soil Jar T01_20200527	11-Jun-2020	03-Jun-2020	**8**	----	----	----
EP004: Organic Matter						
HDPE Soil Jar T01_20200526	16-Jun-2020	02-Jun-2020	**14**	----	----	----
HDPE Soil Jar T01_20200527	16-Jun-2020	03-Jun-2020	**13**	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons						
HDPE Soil Jar T01_20200526	12-Jun-2020	09-Jun-2020	**3**	----	----	----
HDPE Soil Jar T01_20200527	12-Jun-2020	10-Jun-2020	**2**	----	----	----

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
HDPE Soil Jar (EA002) T01_20200526	**26-May-2020**	**11-Jun-2020**	02-Jun-2020	×	**12-Jun-2020**	12-Jun-2020	✓
HDPE Soil Jar (EA002) T01_20200527	**27-May-2020**	**11-Jun-2020**	03-Jun-2020	×	**12-Jun-2020**	12-Jun-2020	✓
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055) T01_20200526	**26-May-2020**	**----**	----	----	**09-Jun-2020**	09-Jun-2020	✓
HDPE Soil Jar (EA055) T01_20200527	**27-May-2020**	**----**	----	----	**09-Jun-2020**	10-Jun-2020	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED007: Exchangeable Cations							
HDPE Soil Jar (ED007) T01_20200526	**26-May-2020**	**15-Jun-2020**	23-Jun-2020	✓	**15-Jun-2020**	23-Jun-2020	✓
HDPE Soil Jar (ED007) T01_20200527	**27-May-2020**	**15-Jun-2020**	24-Jun-2020	✓	**15-Jun-2020**	24-Jun-2020	✓
EG005(ED093)T: Total Metals by ICP-AES							
HDPE Soil Jar (EG005T) T01_20200526	**26-May-2020**	**09-Jun-2020**	22-Nov-2020	✓	**10-Jun-2020**	22-Nov-2020	✓
HDPE Soil Jar (EG005T) T01_20200527	**27-May-2020**	**09-Jun-2020**	23-Nov-2020	✓	**10-Jun-2020**	23-Nov-2020	✓
EP004: Organic Matter							
HDPE Soil Jar (EP004) T01_20200526	**26-May-2020**	**16-Jun-2020**	02-Jun-2020	×	**16-Jun-2020**	14-Jul-2020	✓
HDPE Soil Jar (EP004) T01_20200527	**27-May-2020**	**16-Jun-2020**	03-Jun-2020	×	**16-Jun-2020**	14-Jul-2020	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
HDPE Soil Jar (EP075(SIM)) T01_20200526	**26-May-2020**	**12-Jun-2020**	09-Jun-2020	×	**15-Jun-2020**	22-Jul-2020	✓
HDPE Soil Jar (EP075(SIM)) T01_20200527	**27-May-2020**	**12-Jun-2020**	10-Jun-2020	×	**15-Jun-2020**	22-Jul-2020	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Exchangeable Cations	ED007	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	20	**15.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Exchangeable Cations	ED007	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Exchangeable Cations	ED007	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Organic Matter	EP004	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1 - 1997. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (2013) Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270E. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Higginson (1992) method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1 - 1997. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (2013) Schedule B(3) (Method 105)
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

Shane Ellis

From: Brittany Knight <Brittany.Knight@erm.com>
Sent: Thursday, 11 June 2020 8:43 AM
To: ALSEnviro Sydney
Subject: [EXTERNAL] - FW: CoC for ALS Workorder : ES2019415 | Your Reference: 555344 BERMAGUI BASELINE CONTAMINATION
Attachments: ES2019415_COC.pdf

Categories: Shane

Morning,

Can someone please confirm that the following two samples were received:

- T01_20200526
- T01_20200527

Can you please analyse these for

- metals (lead, antimony and arsenic);
- soil parameters (%clay, cation exchange capacity, total organic carbon and pH); and
- PAH.

Please hold the remainder of the sample as we may have extra analysis.

Kind regards

Brittany Knight
Environmental Scientist

From: angel-no-reply@alsglobal.com <angel-no-reply@alsglobal.com>
Sent: Thursday, June 4, 2020 10:17 PM
To: Brittany Knight <Brittany.Knight@erm.com>
Subject: CoC for ALS Workorder : ES2019415 | Your Reference: 555344 BERMAGUI BASELINE CONTAMINATION

Deliverables for ALS Workorder ES2019415

Project: 555344 BERMAGUI BASELINE CONTAMINATION

Dear Brittany Knight,

Please find enclosed the following deliverables for **ES2019415**:

- ES2019415_COC.pdf

Report Recipients

- Brittany Knight
  - ES2019415_COC.pdf (Email)
- PETER LAVELLE
  - ES2019415_COC.pdf (Email)
- Ian Batterley
  - ES2019415_COC.pdf (Email)

www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

3/6

☑ Eurofins | mgt Sydney Lab ☐ Eurofins | mgt Brisbane Lab ☐ Eurofins | mgt Melbourne Lab

2 Kingston Town Close Oakleigh, VIC 3166 P +61 3 8564 5000 F +61 3 8564 5090 E EnviroSampleVic@eurofins.com.au

Company	ERM	Purchase Order		Project Manager	Ian Batterley
Address	309 Kent St, Sydney 2000	Eurofins | mgt Quote №		Project №	555344
Contact Name	Brittany Knight			Project Name	Bermagui Baseline Contamination
Contact Phone №	433788322			Electronic Results Format	ESDAT
Special Direction				Email for Results	brittany.knight@erm.com, peter.lavelle@erm.com
Relinquished by	Brittany Knight				
(Signature)					
(Time / Date)					

Turn Around Requirements: ☐ 1 DAY* ☐ 2 DAY* ☐ 3 DAY* ☑ 5 DAY (Std.) ☐ Other ( ) * Surcharges apply

Containers: 1L Plastic, 250mL Plastic, 125mL Plastic, 200mL Amber Glass, 40mL vial, 125mL Amber Glass, Jar, 1 container

Method of Shipment: ☑ Courier (#) ☑ Hand Delivered ☐ Postal

Analysis (Note: Where metals are requested, please specify "Total" or "Filtered")

№	Client Sample ID	Date	Matrix	Metals (lead, arsenic, antimony)	PAH, phenols	Soil Parameters	ASLP Lead	HOLD	Sample Comments / DG Hazard Warning
1	SS25-0.2	26/5	Soil	✓					
2	D01_20200526	↓	↓	✓					
3	T01-20200526	↓	↓	✓					
4	R01-20200526	↓	Water	✓					
5	TB	28/5	↓	✓					
6	TS	28/5	↓	✓					
7	D01-20200527	27/5	Soil	✓					
8	R01-20200527	↓	Water	✓					
9	T01_20200527	↓	Soil	✓					
10	D01_20200528	28/5	Soil	✓					
11	R01_20200528	28/5	Water	✓					
12									

Environmental Division
Sydney
Work Order Reference
ES2019415

Telephone : - 61-2-8784 8555

rec: TMD, 4/6/20 3:3[illegible]

Laboratory Use Only					
Received By	[signature] SYD | BNE | MEL | PER | ADL | NEW | DAR	Date 1/6/2020	Time 4:10PM	Signature [signature]	Temperature 13.56°C
Received By	SYD | BNE | MEL | PER | ADL | NEW | DAR	Date _/_/_	Time	Signature	Report № 723044

QS3009_R4 Modified by S. Kouros Approved by: T. Lekeline Approved on: 11 August 2015

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

ChrisR ALS CN. 4/6/20 Ch T: 13°C

#AU04_Enviro_Sample_NSW

To: Brittany Knight
Subject: RE: Eurofins Sample Receipt Advice - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

From: Brittany Knight [mailto:Brittany.Knight@erm.com]
Sent: Wednesday, 3 June 2020 10:55 AM
To: #AU04_Enviro_Sample_NSW
Cc: Peter Lavelle; Ian Batterley; Anne Ashworth
Subject: RE: Eurofins Sample Receipt Advice - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

Hello,

As discussed, can you please hold the analysis on the following triplicate samples and send them on to ALS:

- T01_20200526
- TO1_20200527

Please contact me if you have any questions.

Kind regards

Brittany Knight
Environmental Scientist

ERM
Level 15 | 309 Kent St | Sydney NSW 2000
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[illegible]
ALS
4/6/20

From: EnviroSampleNSW@eurofins.com <EnviroSampleNSW@eurofins.com>
Sent: Tuesday, June 2, 2020 9:54 PM
To: Ian Batterley <Ian.Batterley@erm.com>
Cc: Brittany Knight <Brittany.Knight@erm.com>; Peter Lavelle <Peter.Lavelle@erm.com>
Subject: Eurofins Sample Receipt Advice - Report 723044 : Site BERMAGUI BASELINE CONTAMINATION (555344)

Dear Valued Client,

Please find attached an amended Sample Receipt Advice (SRA), an amended Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section

APPENDIX G PROUCL CALCULATIONS

1	UCL Statistics for Uncensored Full Data Sets										
2											
3	User Selected Options										
4	Date/Time of Computation	ProUCL 5.130/06/2020 1:51:32 PM									
5	From File	WorkSheet.xls									
6	Full Precision	OFF									
7	Confidence Coefficient	95%									
8	Number of Bootstrap Operations	2000									
9											
10											
11	Benzo[a]pyrene										
12											
13	General Statistics										
14	Total Number of Observations	11			Number of Distinct Observations	2					
15					Number of Missing Observations	0					
16	Minimum	0.5			Mean	0.555					
17	Maximum	1.1			Median	0.5					
18	SD	0.181			Std. Error of Mean	0.0545					
19	Coefficient of Variation	0.326			Skewness	3.317					
20											
21	Normal GOF Test										
22	Shapiro Wilk Test Statistic	0.345			Shapiro Wilk GOF Test						
23	5% Shapiro Wilk Critical Value	0.85			Data Not Normal at 5% Significance Level						
24	Lilliefors Test Statistic	0.528			Lilliefors GOF Test						
25	5% Lilliefors Critical Value	0.251			Data Not Normal at 5% Significance Level						
26	Data Not Normal at 5% Significance Level										
27											
28	Assuming Normal Distribution										
29	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
30	95% Student's-t UCL	0.653			95% Adjusted-CLT UCL (Chen-1995)	0.703					
31					95% Modified-t UCL (Johnson-1978)	0.662					
32											
33	Gamma GOF Test										
34	A-D Test Statistic	3.699			Anderson-Darling Gamma GOF Test						
35	5% A-D Critical Value	0.729			Data Not Gamma Distributed at 5% Significance Level						
36	K-S Test Statistic	0.535			Kolmogorov-Smirnov Gamma GOF Test						
37	5% K-S Critical Value	0.255			Data Not Gamma Distributed at 5% Significance Level						
38	Data Not Gamma Distributed at 5% Significance Level										
39											
40	Gamma Statistics										
41	k hat (MLE)	15.86			k star (bias corrected MLE)	11.59					
42	Theta hat (MLE)	0.035			Theta star (bias corrected MLE)	0.0478					
43	nu hat (MLE)	348.9			nu star (bias corrected)	255					
44	MLE Mean (bias corrected)	0.555			MLE Sd (bias corrected)	0.163					
45					Approximate Chi Square Value (0.05)	219.1					
46	Adjusted Level of Significance	0.0278			Adjusted Chi Square Value	213.6					
47											
48	Assuming Gamma Distribution										
49	95% Approximate Gamma UCL (use when n>=50))	0.646			95% Adjusted Gamma UCL (use when n<50)	0.662					
50											
51	Lognormal GOF Test										
52	Shapiro Wilk Test Statistic	0.345			Shapiro Wilk Lognormal GOF Test						
53	5% Shapiro Wilk Critical Value	0.85			Data Not Lognormal at 5% Significance Level						
54	Lilliefors Test Statistic	0.528			Lilliefors Lognormal GOF Test						
55	5% Lilliefors Critical Value	0.251			Data Not Lognormal at 5% Significance Level						
56	Data Not Lognormal at 5% Significance Level										
57											

58	Lognormal Statistics										
59				Minimum of Logged Data	-0.693			Mean of logged Data	-0.621		
60				Maximum of Logged Data	0.0953			SD of logged Data	0.238		
61											
62	Assuming Lognormal Distribution										
63				95% H-UCL	0.637			90% Chebyshev (MVUE) UCL	0.67		
64				95% Chebyshev (MVUE) UCL	0.724			97.5% Chebyshev (MVUE) UCL	0.799		
65				99% Chebyshev (MVUE) UCL	0.946						
66											
67	Nonparametric Distribution Free UCL Statistics										
68	Data do not follow a Discernible Distribution (0.05)										
69											
70	Nonparametric Distribution Free UCLs										
71				95% CLT UCL	0.644			95% Jackknife UCL	N/A		
72				95% Standard Bootstrap UCL	N/A			95% Bootstrap-t UCL	N/A		
73				95% Hall's Bootstrap UCL	N/A			95% Percentile Bootstrap UCL	N/A		
74				95% BCA Bootstrap UCL	N/A						
75				90% Chebyshev(Mean, Sd) UCL	0.718			95% Chebyshev(Mean, Sd) UCL	0.792		
76				97.5% Chebyshev(Mean, Sd) UCL	0.895			99% Chebyshev(Mean, Sd) UCL	1.097		
77											
78	Suggested UCL to Use										
79				95% Student's-t UCL	0.653			or 95% Modified-t UCL	0.662		
80											
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
82	Recommendations are based upon data size, data distribution, and skewness.										
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
85											

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation	ProUCL 5.130/06/2020 12:15:15 PM										
5	From File	WorkSheet.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10	Lead											
11												
12	General Statistics											
13	Total Number of Observations	43					Number of Distinct Observations	30				
14	Number of Detects	42					Number of Non-Detects	1				
15	Number of Distinct Detects	29					Number of Distinct Non-Detects	1				
16	Minimum Detect	9.8					Minimum Non-Detect	5				
17	Maximum Detect	1000					Maximum Non-Detect	5				
18	Variance Detects	24404					Percent Non-Detects	2.326%				
19	Mean Detects	67.71					SD Detects	156.2				
20	Median Detects	24.5					CV Detects	2.307				
21	Skewness Detects	5.491					Kurtosis Detects	32.68				
22	Mean of Logged Detects	3.508					SD of Logged Detects	0.947				
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic	0.354					Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value	0.942					Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic	0.355					Lilliefors GOF Test					
28	5% Lilliefors Critical Value	0.135					Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean	66.25					KM Standard Error of Mean	23.59				
33	KM SD	152.8					95% KM (BCA) UCL	109.2				
34	95% KM (t) UCL	105.9					95% KM (Percentile Bootstrap) UCL	108.8				
35	95% KM (z) UCL	105.1					95% KM Bootstrap t UCL	199.2				
36	90% KM Chebyshev UCL	137					95% KM Chebyshev UCL	169.1				
37	97.5% KM Chebyshev UCL	213.6					99% KM Chebyshev UCL	301				
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic	4.389					Anderson-Darling GOF Test					
41	5% A-D Critical Value	0.786					Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic	0.255					Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value	0.141					Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected Data Not Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)	0.834					k star (bias corrected MLE)	0.791				
48	Theta hat (MLE)	81.16					Theta star (bias corrected MLE)	85.65				
49	nu hat (MLE)	70.08					nu star (bias corrected)	66.41				
50	Mean (detects)	67.71										
51												
52	Gamma ROS Statistics using Imputed Non-Detects											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											

58					Minimum	0.01				Mean	66.14
59					Maximum	1000				Median	24
60					SD	154.7				CV	2.339
61					k hat (MLE)	0.693				k star (bias corrected MLE)	0.661
62					Theta hat (MLE)	95.37				Theta star (bias corrected MLE)	100.1
63					nu hat (MLE)	59.64				nu star (bias corrected)	56.81
64					Adjusted Level of Significance (β)	0.0444					
65					Approximate Chi Square Value (56.81, α)	40.48				Adjusted Chi Square Value (56.81, β)	40.01
66					95% Gamma Approximate UCL (use when n>=50)	92.8				95% Gamma Adjusted UCL (use when n<50)	93.91
67											
68					Estimates of Gamma Parameters using KM Estimates						
69					Mean (KM)	66.25				SD (KM)	152.8
70					Variance (KM)	23358				SE of Mean (KM)	23.59
71					k hat (KM)	0.188				k star (KM)	0.19
72					nu hat (KM)	16.16				nu star (KM)	16.37
73					theta hat (KM)	352.6				theta star (KM)	348.1
74					80% gamma percentile (KM)	84.96				90% gamma percentile (KM)	200.2
75					95% gamma percentile (KM)	345.7				99% gamma percentile (KM)	749.7
76											
77					Gamma Kaplan-Meier (KM) Statistics						
78					Approximate Chi Square Value (16.37, α)	8.221				Adjusted Chi Square Value (16.37, β)	8.02
79					95% Gamma Approximate KM-UCL (use when n>=50)	131.9				95% Gamma Adjusted KM-UCL (use when n<50)	135.2
80											
81					Lognormal GOF Test on Detected Observations Only						
82					Shapiro Wilk Test Statistic	0.829				Shapiro Wilk GOF Test	
83					5% Shapiro Wilk Critical Value	0.942				Detected Data Not Lognormal at 5% Significance Level	
84					Lilliefors Test Statistic	0.199				Lilliefors GOF Test	
85					5% Lilliefors Critical Value	0.135				Detected Data Not Lognormal at 5% Significance Level	
86					Detected Data Not Lognormal at 5% Significance Level						
87											
88					Lognormal ROS Statistics Using Imputed Non-Detects						
89					Mean in Original Scale	66.21				Mean in Log Scale	3.455
90					SD in Original Scale	154.7				SD in Log Scale	0.999
91					95% t UCL (assumes normality of ROS data)	105.9				95% Percentile Bootstrap UCL	109
92					95% BCA Bootstrap UCL	136.6				95% Bootstrap t UCL	201.6
93					95% H-UCL (Log ROS)	74.98					
94											
95					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution						
96					KM Mean (logged)	3.464				KM Geo Mean	31.93
97					KM SD (logged)	0.968				95% Critical H Value (KM-Log)	2.327
98					KM Standard Error of Mean (logged)	0.149				95% H-UCL (KM -Log)	72.25
99					KM SD (logged)	0.968				95% Critical H Value (KM-Log)	2.327
100					KM Standard Error of Mean (logged)	0.149					
101											
102					DL/2 Statistics						
103					DL/2 Normal					DL/2 Log-Transformed	
104					Mean in Original Scale	66.19				Mean in Log Scale	3.447
105					SD in Original Scale	154.7				SD in Log Scale	1.016
106					95% t UCL (Assumes normality)	105.9				95% H-Stat UCL	76.46
107					DL/2 is not a recommended method, provided for comparisons and historical reasons						
108											
109					Nonparametric Distribution Free UCL Statistics						
110					Data do not follow a Discernible Distribution at 5% Significance Level						
111											
112					Suggested UCL to Use						
113					95% KM (Chebyshev) UCL	169.1					
114											

	A	B	C	D	E	F	G	H	I	J	K	L
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

APPENDIX H QAQC ASSESSMENT

H1. QUALITY ASSURANCE AND QUALITY CONTROL

The objective of this data assessment is to evaluate the quality of data gathered during the project. This process has been undertaken to assess whether the sample data is of a suitable standard to be utilised in this report. The data assessment consists of comparing field and laboratory QA/QC results to documented NEPM, ANZECC, USEPA SW-846 guidelines, USEPA CLP National Functional Guidelines for Inorganic and Organic Data Review, and other internationally recognised publications. The data assessment has been prepared in accordance with the NEPC (2013) *National Environmental Protection (Assessment of Site Contamination) Measure 1999* and NSW EPA (2020) *Consultants reporting on contaminated land* and NSW DEC (2017) *Guidelines for the NSW Site Auditor Scheme (3rd Edition)*. Particular reference is made to the PARCC parameters (precision, accuracy, representativeness, completeness and comparability) in evaluating the data quality.

Table H.1 presents the degree of QA/QC pertinent to the field investigations.

Table H.2 summarises the field QA/QC exceedences.

Table H.3 presents the degree of QA/QC pertinent to the laboratory program.

Table H.4 summarises the laboratory QA/QC exceedences.

The data quality indicators of precision, accuracy, representativeness, comparability and completeness have been assessed as shown in *Table H.5*.

Table H.1 Field QA/QC Assessment

QA/QC Criterion	Comments
QA/QC program includes replicate samples	Field quality control samples including 10 intra-laboratory duplicates were analysed to demonstrate the suitability of the investigation works. 2 inter-laboratory duplicate samples were sent to a second laboratory. An evaluation of the laboratory QA/QC reports indicated that the laboratory was able to generate data of acceptable precision and accuracy.
All relevant media assessed	Soil, surface water and sediment samples were collected as part of the investigation works. ERM notes that intra and inter-laboratory duplicates were only collected from soil samples however as laboratory analysis of CoPCs for surface water and sediment samples returned concentrations generally less than LOR and / or the adopted assessment criteria, ERM does not consider this minor non-conformance to have affected the reliability of the overall collected data set.
Appropriateness of sampling strategy	The sampling strategy (including depths and locations) was considered appropriate for the purpose of the investigation. Sample locations are presented on Figure 2 and were selected to assess areas of environmental concern identified during the desktop review and background concentrations within representative on and offsite areas.
Sample collection, handling and transportation procedures.	Samples were collected, handled and transported following ERM standard operating procedures.
Sampling is representative of site conditions	The number and type of samples collected as part of the characterisation works was considered to be representative of the area of concern. A total of 58 soil investigation locations were completed an area of 24 ha. A total of 6 surface water and 6 sediment samples were collected from representative areas within the Site to assess the onsite catchment and potential offsite migration pathways.
Field QA/QC plan	The sampling team was noted in the report. Samples were collected using a range of hand tools included trowels, hand augers and push tubes (for sediment). Collected samples were placed in laboratory supplied sample jars, stored in a cool box, and forwarded to the NATA accredited laboratory under COC conditions. The methods used to collect the samples, the types of sample containers, preservation techniques and custody protocols outlined within the EM (2020) SAQP were followed and documented appropriately. . Decontamination procedures were implemented between the collection of samples. The processes followed were considered suitable for minimising cross-

QA/QC Criterion	Comments
	contamination during sampling. 3 rinsate blanks (R01_20200526, R01_20200527 and R01_20200528) were collected to demonstrate the efficacy of the decontamination procedures. ■ Laboratory analysis of all CoPCs within collected rinsate samples returned concentrations less than LOR. Borehole logs and/or other sampling records were completed, describing the media sampled, the duplicate types and sampling locations. Duplicate samples were collected following ERM standard operating procedures at a ratio of one intra-laboratory duplicate per 6.2 primary samples. Samples were not homogenised prior to splitting to minimise potential loss of volatile analytes. The RPDs of the duplicate sample pairs were generally below the acceptance limits (30% RPD where one or both values were greater than 10 x LOR or 50% RPD where both values less than 10 x LOR). Minor exceedences are presented in *Table A.2*. Trip blank and rinsate blank samples were collected as part of this investigation. All COPCs were reported below the laboratory LOR, indicating low likelihood of cross-contamination. Background samples were not collected as part of this investigation as a review of geological information and site land use history did not indicate the likely presence of elevated background concentrations of the COPCs in soil on the Site. Trip spikes were collected as part of this investigation. Comparison with a trip spike control sample retained by the laboratory did not indicate unacceptable loss of volatile analytes during sample transport. Field instruments used as part of this investigation were appropriately calibrated and used according to the manufacturer's instructions.

Field QA/QC Exceedences

The following minor exceedances of field duplicate RPD acceptable limits were noted:

Table H.2 Field QA/QC Exceedences

Analyte	LOR	Primary Result	Duplicate Result	RPD	Comment
Lead	5	SS09 19 mg/kg	D01_20200526 38 mg/kg	67%	ERM notes that as the concentrations of both samples were significantly less than the adopted screening criteria, this minor non-conformance is considered unlikely to have affected the suitability of the overall data set.

ERM notes that samples SS40 / D01_20200527, BH101_0.5 / D01_2000528 and SS23 / T01_20200526 also exceeded the adopted RPD acceptance criteria for total organic carbon. As samples were collected from heterogeneous topsoil materials containing residual organic matter (leaves etc.) it is the opinion of ERM that this minor non-conformance is unlikely to have affected the overall quality of the collected data set.

Table H.3 Laboratory QA/QC Assessment

QA/QC Criterion	Comments
Appropriate methodologies used for sample analyses	The laboratory used for the investigation was NATA accredited Eurofins located in Lane Cove NSW, NATA Registration No. 1261. All laboratory reports were NATA stamped and signed by a NATA signatory. All methodologies were considered appropriate for the identified contaminants of concern in the matrix. Statistical data presented in the laboratory QA/QC report was considered adequate in demonstrating the precision and accuracy of the methods used to analyse field samples.

QA/QC Criterion	Comments
Appropriate practical quantitation limits (LORs)	LORS for each analyte are presented in the laboratory reports. All sample results were reported with LORs below the site assessment criteria with the exception of B[a]P in surface water were the LOR was higher than the adopted drinking water criteria. ERM notes that as all PAHs in collected water samples were less than LOR, this is not considered to affect the overall reliability of the collected data set.
Laboratory QA/QC plan	Copies of signed chain of custody forms were returned by the laboratory. All samples were received and analysed within specified laboratory holding times. This information was documented on the laboratory reports. The analytical methods used were NATA approved as documented on the laboratory reports. Laboratory quality control samples included laboratory control samples, internal duplicates, matrix spikes and method blanks. The types of QA/QC samples analysed by the laboratory for the documented samples were considered sufficient to assess the precision and accuracy of the laboratory methods used. The statistical data presented in the laboratory QA/QC report was considered adequate in demonstrating the precision and accuracy of the methods used to analyse field samples. ERM notes that arsenic analysis of laboratory duplicate S20 within batch 723044-S-V02 returned a RPD of 38% exceeding the adopted RPD criteria. ERM notes that this is an isolated exceedance and as all results were less than the adopted assessment criteria, this minor exceedance is unlikely to affect the overall quality of the collected data set.

Table H.4 Laboratory QA/QC Exceedences

QA/QC Sample Type	Analyte	Sample ID	Recovery	Limit	Comments
Laboratory Control Spike	Not applicable – all within acceptable limits				
Matrix Spike	Not applicable – all within acceptable limits				
Surrogate	Not applicable – all within acceptable limits				

Table H.5 Overall Sampling and Analysis Methodology Assessment

Field Considerations	Laboratory Considerations
Precision Requirements	
The investigation was conducted following ERM SOPs and any variations from these procedures were documented.	Analysis of the following were reported: ■ Laboratory and inter-laboratory duplicates; ■ Field duplicates; ■ Field prepared trip blank samples.
Precision Comments	
No significant variations from ERM SOPs were noted. Field split duplicates were generally reported within the acceptance limits of 30% RPD. Minor exceedences were noted, as presented in Table H2.	

Field Considerations	Laboratory Considerations
Accuracy Requirements	
The investigation was conducted following ERM SOPs and any variations from these procedures were documented.	Analysis of the following were reported: ■ Field blanks; ■ Rinsate blanks; ■ Method blanks; ■ Matrix spikes; ■ Matrix spike duplicates; ■ Surrogate spikes; ■ Laboratory control samples; and ■ Laboratory prepared spikes
Accuracy Comments	
No significant variations from ERM SOPs were noted. Laboratory QA/QC samples were reported within the acceptance limits specified in the laboratory reports.	
Representativeness Requirements	
Appropriate media were identified and sampled according to the SAQP (noting that some surface water / sediment locations were replaced with soil samples due to the dry conditions and lack of water in creeks / dams).	All samples were analysed according to the SAQP.
Representativeness Comments	
No exceedences of the requirements were noted.	
Comparability Requirements	
The same SOPs were used during each sampling event. All sampling was conducted by an appropriately qualified and experienced sampler. Impacts of climatic conditions on sample integrity were minimised by placing samples in a chilled cooler on ice immediately after sampling. The types of samples collected were consistent. Results of Field Screening were comparable with Lab analysis.	Analytical methods suitable for the target media were used. The LORs used to report analyte concentrations were less than the adopted investigation levels with the exception of B(a)P within surface waters as detailed above within table H3 The same laboratory was used to analyse all primary samples. The same units were used to report analyte concentrations where appropriate. Results of Lab analysis comparable with field screening results.
Comparability Comments	
No exceedences of the requirements were noted.	
Completeness Requirements	
All critical locations identified within the ERM (2020) SAQP were sampled The investigation was conducted following ERM SOPs and any variations from these procedures were documented. All sampling was conducted by an appropriately qualified and experienced sampler. Documentation of field works was provided.	All critical samples were analysed according to the SAQP. All analytes were analysed according to the SAQP with minor exception of the omission of duplicates for surface water and sediment. Appropriate analysis methods and LORs were used. Sample documentation was provided. Sample holding times were complied with.
Completeness Comments	
No exceedences of the requirements were noted.	

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