



Appendix C: Report and Information

DRAFT



12 June 2020

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RE: BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL – UPDATED INTERIM REMEDIATION ACTION PLAN

1.0 Introduction

Greencap Pty Ltd (Greencap) was commissioned by One Rail Australia (ORA) to prepare a Remediation Action Plan (RAP) following a diesel spill at the Berrimah Freight Rail Terminal, 75 O’Sullivan Circuit, Berrimah, Northern Territory (NT) (the Site).

It is noted that ORA has implemented an emergency response to the spill and has been undertaking remediation excavation works as advised by Greencap (see Interim Remediation Action Plan letter – 1 June 2020). This subsequent update is intended to enunciate activities required to progress the incident to a close out phase. This includes completion of remediation works, finalisation of the RAP with an outline of any future monitoring required to prevent immediate and observe any long-term pollution and environmental harm resulting from the diesel spill.

2.0 Background

A diesel spill of an estimated volume of 19,934 litres (L) occurred on the Site during automatic refuelling of a diesel locomotive on Saturday 30 May 2020. Upon discovery, temporary controls were immediately installed, including:

- A temporary sump excavated downgradient of the spill to collect surface diesel with the use of a vacuum truck; and
- Placement of absorbent materials between the spill and downstream drain to the south-west of the spill.

ORA notified the Northern Territory Environment Protection Authority (NT EPA) shortly thereafter who attended the Site on Saturday 30 May 2020 to inspect the spill. As a result, the NT EPA issued an Authorised Officer Direction on 1 June 2020, directing ORA to:

“Immediately prevent pollution and environmental harm resulting from the spill. By the method of preventing all spilled liquids (including diesel/hydrocarbons) from contaminating soils, surface waters or ground waters.”

Furthermore, the NT EPA issued a second Authorised Officer Direction on 4 June 2020, directing ORA to:

- 1) To immediately manage waste on or in land by:
 - a. Undertaking sufficient surface water, groundwater and soil analysis to be able to determine the types, amount, distribution and mobility of contaminants in the



environment as a result of the diesel spill that occurred at the premises on 30 May 2020; and

- b. By 1500 on 5 June 2020 determine and implement suitable actions to manage and start to recover waste in the land that have resulted from the diesel spill that occurred at the premises on 30 May 2020; and*
- c. Undertake daily inspections and sufficient monitoring to detect any pollution or impact to the surrounding environment as a result of the diesel spill, including but not limited to the identified Significant Biodiversity Area located adjacent to the spill location.*

GreenCap has undertaken targeted site contamination investigation (SCI) works in conjunction with remediation excavation works to delineate the vertical and lateral extent of the diesel spill. Initial findings of the SCI are discussed in **Section 4.0**.

The objective of this interim RAP is to detail the scope of physical works, planned sampling, clean-up criteria, waste management, ongoing monitoring and reporting to be undertaken in attempt to complete works in response to the spill and NT EPA Authorised Officer Directions. It is noted that the RAP is to be updated and finalized upon completion of the site contamination investigation works.

3.0 Setting

The Site is located to the south of an intertidal mangrove community on East Arm, Darwin Harbour and is used for the loading and transfer of freight to and from heavy rail. The location of the spill was on the 1 Road rail line to the south of the sealed container pad, directly north of the Site office and approximately 45 metres from the edge of the intertidal mangrove community.

Diesel was observed pooling to the south of the Auxillary Road rail line and slowly draining along a swale stormwater drain in a south-westerly direction. A second swale stormwater drain is located approximately 40 metres to the south of the spill site, however, there were no indicators that the spill had reached this drain upon initial inspection on Saturday 30 May 2020 and during daily inspections up until Friday 12 June 2020.

4.0 Site Contamination Investigation

Targeted site contamination investigation (SCI) works have been undertaken to assess the vertical and lateral extent of the diesel spill. The investigation has involved test pitting, the drilling of boreholes and the collection of soil samples to delineate extent of impact within and around the spill site.

Soils encountered and indicators of impacts from the diesel spill (i.e. odorous/stained materials and/or materials emitting volatile organic compounds (VOC) detected by a calibrated photo-ionization detector (PID)) were recorded by an experienced environmental consultant. Soil samples were submitted to a National Association of Testing Authorities (NATA)-accredited laboratory for analysis of diesel/hydrocarbon contaminants of potential concern (COPC) i.e. total recoverable hydrocarbons (TRH) and benzene, toluene, ethylbenzene and xylene (BTEX). Findings of the investigation to date are summarised as follows:

Materials encountered at the spill site are characterised as follows:

- The rail lines have a layer of ballast generally underlain by a thin layer of sand and deeper gravelly, sandy silt (compacted fill) to at least 3.5 metres below ground level (m bgl).
- Materials between the rail lines have/had a layer of coarse gravel underlain by compacted fill to at least 3.5 m bgl.
- The container pad to the north of the spill point contains a surface layer of asphalt underlain by compacted fill to at least 4.0 m bgl.



- Groundwater was encountered at approximately 3.0 m below the level of the container pad.

Materials encountered for which field observations indicated diesel impacts included the following:

- Sub-ballast soils beneath the 1 Road, Auxillary Road and Ramp Road rail lines.
- Compacted fill below surface gravel between the rail lines (the majority of which has been excavated and stockpiled away from the spill site).
- Within surface and subs-surface fill materials south of and adjacent to the Ramp Road rail line.
- Beneath the asphalt between the 1 Road and Ramp Road rail lines to the west of the spill point.
- Within underground service lines at apparent isolated locations near the east and west ends of the swale stormwater drain.

Analytical results received to date have confirmed the following:

- Impacts are shallow and generally decrease with depth.
- Hydrocarbons in soils beneath ballast within the 1 Road rail line in exceedance of the adopted assessment criteria.
- Hydrocarbons in soil beneath the asphalt between the 1 Road and Auxillary rail lines to the west of the spill point (some of which has been excavated and stockpiled away from the spill site) in exceedance of the adopted assessment criteria.
- Residual hydrocarbons in soil directly beneath the asphalt within the container pad, immediately adjacent to the spill point.

Two soil samples collected at the depth of groundwater directly beneath and adjacent to the spill point were analysed for COPC and were reported to contain no COPC at or above the respective limits of reporting.

It should be noted that some laboratory analytical results remain pending, the results of which are required to inform final investigation and/or remediation works required.

The investigation is being undertaken in accordance with:

- National Environment Protection Council (1999). *Assessment of Site Contamination National Environment Protection Measure* (as amended 2013);
- Australian Standard AS 4482.1-2005. Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds; and
- NT EPA (2017). *Northern Territory Contaminated Land Guideline*.

5.0 Interim Remediation Action Plan

5.1 Remediation Activities

This RAP is based on the impacts observed and analytical results received to date and is to be further informed once final laboratory results are received. One Rail has undertaken spill clean-up works including the following:

- Excavation of a temporary, approximately 0.3 m deep sump downgradient of the spill to collect surface diesel to be pumped out and removed;
- Placement of absorbent materials between the spill and downstream drain to the south-west of the spill;
- Removal of soils impacted by diesel from the stormwater swale drain to the south-west of the spill site;
- Removal of soils impacted by diesel as far as is reasonably practicable within and surrounding the vicinity of the rail line infrastructure; and



- Impacted soil that has been and will be excavated is being temporarily stored on and under heavy duty plastic sheeting on an elevated pad.

Based upon the findings outlined in **Section 4.0** the following should be undertaken:

- Remove further accessible diesel impacted soils from the following locations:
 - Between and around the rail lines including from the asphalt covered area between the 1 Road and Auxillary Road rail lines to the west of the spill point and from south of the Ramp Road; and
 - Within underground service lines near the east and west ends of the swale stormwater drain; and.
- Undertake subsequent validation sampling.

The fate of materials beneath the rail line will be considered in the final RAP; however, due to the impacts reported in samples collected beneath the rail line, a long-term impact monitoring program should be implemented, the details of which are outlined in **Section 6.0**.

It should be noted that some analytical results remain pending and would be used to inform further remediation excavation required as well as the long-term impact monitoring program.

Remediation works are to continue to be undertaken in accordance with the NT EPA Authorised Officer Directions.

5.2 Waste Storage and Management

Diesel-impacted soils excavated from the spill site are to be stored appropriately to ensure the material is adequately contained. Stockpile management measures will be detailed in the final RAP, noting interim measures are considered sufficient to mitigate the loss of soil via erosion or sedimentation.

Impacted soil should be disposed of at a waste facility appropriately licensed to receive such impacted materials. Acceptance of excavated materials at the waste facility will be dependent upon analytical testing and results for waste classification parameters outlined in the New South Wales EPA (2014) *Waste Classification Guidelines, Part 1: Classifying waste*, including total petroleum hydrocarbons and BTEX.

Alternatively, a selection of on-site remediation options could be considered to allow potential re-use of impacted materials on-site. This option would be dependent on:

- Confirmation of remediation via analytical testing of these materials; and
- Application to, and approval from, the NT EPA.

The location of any stockpiled impacted materials must also be sampled following the removal of these materials to confirm the ground surface has not been impacted by the stockpiled materials.

Waste management measures are to be informed by the RAP.

5.3 Remediation Criteria

Remediation criteria for the site is based on the current land use, that being Industrial/Commercial (ASC NEPM, 2013).

6.0 Ongoing Monitoring

Impacts remaining from the spill have the potential to migrate to groundwater and/or offsite. Daily inspections of the identified Significant Biodiversity Area located adjacent to the spill location should continue to be undertaken as per the Authorised Officer Direction (4 June 2020).

Furthermore, a groundwater monitoring network should be installed to:



1. Confirm the direction of groundwater flow;
2. Investigate the potential migration of diesel impacts to groundwater within/surrounding the spill site, immediately and in the mid/long-term future;
3. Monitor the groundwater at the down-gradient boundary of the ORA site for potential off-site migration of impacts; and
4. Inform other necessary appropriate remediation measures if required.

The monitoring network would comprise the installation of 7 groundwater monitoring wells, 3 wells surrounding the spill site to delineate on-site impacts and a series of 4 wells along the northern boundary. Routine monitoring would be undertaken at a frequency to be determined in the final RAP for the duration of at least one wet season and comprise the collection and analysis of samples of groundwater for the aforementioned COPC.

Should significant impacts be detected in groundwater, recovery wells may need to be installed within the spill site. Recovery wells would be pumped out on a regular basis to remove impacted groundwater and to create a “cone of depression” to prevent/minimise off-site migration of the diesel.

7.0 Reporting

Following receipt of pending analytical data, Greencap will prepare a SCI report including results of sampling and a conceptual site model (CSM) to update remediation advice. Following conclusion of remediation and long-term monitoring works, Greencap will either prepare a validation report confirming the success of remediation works as evidenced by soil and groundwater sampling/analysis and/or undertake a risk assessment at the completion of all works to further advise.

Yours Sincerely,

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Dylan Burford
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Attachments

- 1 Statement of Limitations**



Remediation Action Plan

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 1: Statement of Limitations

Statements of Limitation

All and any Services proposed by Greencap to the Client were subject to the Terms and Conditions listed on the Greencap website at: <https://www.greencap.com.au/terms-conditions>. Unless otherwise expressly agreed to in writing and signed by Greencap, Greencap does not agree to any alternative terms or variation of these terms if subsequently proposed by the Client. The Services were carried out in accordance with the current and relevant industry standards of testing, interpretation and analysis. The Services were carried out in accordance with Commonwealth, State, Territory or Government legislation, regulations and/or guidelines. The Client was deemed to have accepted these Terms when the Client signed the Proposal (where indicated) or when the Company commenced the Services at the request (written or otherwise) of the Client.

The services were carried out for the Specific Purpose, outlined in the body of the Proposal. To the fullest extent permitted by law, Greencap, its related bodies corporate, its officers, consultants, employees and agents assume no liability, and will not be liable to any person, or in relation to, any losses, damages, costs or expenses, and whether arising in contract, tort including negligence, under statute, in equity or otherwise, arising out of, or in connection with, any matter outside the Specific Purpose.

The Client acknowledged and agreed that proposed investigations were to rely on information provided to Greencap by the Client or other third parties. Greencap made no representation or warranty regarding the completeness or accuracy of any descriptions or conclusions based on information supplied to it by the Client, its employees or other third parties during provision of the Services. Under no circumstances shall Greencap have any liability for, or in relation to, any work, reports, information, plans, designs, or specifications supplied or prepared by any third party, including any third party recommended by Greencap. The Client releases and indemnifies Greencap from and against all Claims arising from errors, omissions or inaccuracies in documents or other information provided to Greencap by the Client, its employees or other third parties.

The Client was to ensure that Greencap had access to all information, sites and buildings as required by or necessary for Greencap to undertake the Services. Notwithstanding any other provision in these Terms, Greencap will have no liability to the Client or any third party to the extent that the performance of the Services was not able to be undertaken (in whole or in part) due to access to any relevant sites or buildings being prevented or delayed due to the Client or their respective employees or contractors expressing safety or health concerns associated with such access.

Unless otherwise expressly agreed to in writing and signed by Greencap, Greencap, its related bodies corporate, its officers, employees and agents assume no liability and will not be liable for lost profit, revenue, production, contract, opportunity, loss arising from business interruption or delay, indirect or consequential loss or loss to the extent caused or contributed to by the Client or third parties, suffered or incurred arising out of or in connection with our Proposals, Reports, the Project or the Agreement. In the event Greencap is found by a Court or Tribunal to be liable to the Client for any loss or damage arising in connection with the Services, the Client's entitlement to recover damages from Greencap shall be reduced by such amount as reflects the extent to which any act, default, omission or negligence of the Client, or any third party, caused or contributed to such loss or damage. Unless otherwise agreed in writing and signed by both parties, Greencap's total aggregate liability will not exceed the total consulting fees paid by the client in relation to this Proposal. For further detail, see Greencap's Terms and Conditions available at <https://www.greencap.com.au/terms-conditions>

The Report is provided for the exclusive use of the Client and for this Project only, in accordance with the Scope and Specific Purpose as outlined in the Agreement, and only those third parties who have been authorized in writing by Greencap. It should not be used for other purposes, other projects or by a third party unless otherwise agreed and authorized in writing by Greencap. Any person relying upon this Report beyond its exclusive use and Specific Purpose, and without the express written consent of Greencap, does so entirely at their own risk and without recourse to Greencap for any loss, liability or damage. To the extent permitted by law, Greencap assumes no responsibility for any loss, liability, damage, costs or expenses arising from interpretations or conclusions made by others, or use of the Report by a third party. Except as specifically agreed by Greencap in writing, it does not authorize the use of this Report by any third party. It is the responsibility of third parties to independently make inquiries or seek advice in relation to their particular requirements and proposed use of the site.

The conclusions, or data referred to in this Report, should not be used as part of a specification for a project without review and written agreement by Greencap. This Report has been written as advice and opinion, rather than with the purpose of specifying instructions for design or redevelopment. Greencap does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise in relation to the site it investigated.

This Report should be read in whole and should not be copied in part or altered. The Report as a whole set outs the findings of the investigations. No responsibility is accepted by Greencap for use of parts of the Report in the absence (or out of context) of the balance of the Report.



21 August 2020

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RE: BERRIMAH FREIGHT TERMINAL DIESEL SPILL – GROUNDWATER MONITORING EVENT, JULY 2020

Introduction

Greencap Pty Ltd (Greencap) was commissioned by One Rail Australia (One Rail) to conduct a groundwater monitoring event in accordance with the Groundwater Monitoring and Management Plan (GMMP) developed for the Berrimah Freight Terminal, 75 O'Sullivan Circuit, Berrimah, Northern Territory (NT) (the Site).

The GMMP was prepared as a response measure to a diesel spill which occurred on the Site on 30 May 2020. The GMMP was developed to accomplish the following objectives:

- To conduct regular monitoring of groundwater beneath diesel impacted soils in order to advise if impacts in soil migrate to groundwater.
- If diesel impacts to groundwater become evident, to confirm whether or not they present a risk to offsite receptors located down groundwater hydraulic gradient of the site (the direction will be established upon completion of installation of the groundwater monitoring well network).
- To establish mechanisms and management measures or remedial actions which should be implemented if a risk to human health and/or the environment is identified.

This letter presents the results of the first round of groundwater monitoring conducted in accordance with the GMMP.

Groundwater Monitoring Event – July 2020

Sampling Methodology

Greencap conducted a groundwater monitoring event (GME) on 30 July 2020 involving the gauging and sampling of the four groundwater monitoring wells (MW01 to MW04, refer to **Attachment 2** for groundwater monitoring well location plan).

Groundwater samples were collected using low-flow sampling techniques in accordance with GMMP requirements. The following methodology was applied:

- Measuring standing water levels (SWL) from the surveyed point at the top of the casings using a water/product interface water level meter prior to sampling.
- Monitoring physico-chemical parameters (pH, temperature, electrical conductivity, oxidation-reduction potential and dissolved oxygen) during purging using a calibrated water quality meter. Sampling occurred when the drawdown and these parameters had stabilised within the ranges presented in NT Department of Mines and Energy *Methodology for the Sampling of Ground Waters (2009)*.



- The sampler wearing a clean pair of disposable nitrile gloves when collecting each sample.
- All groundwater samples collected in appropriate bottles/containers provided by analytical laboratories and placed in a chilled esky for transportation immediately after collection.
- Collection of appropriate QA/QA samples including intra- and inter-laboratory duplicates and rinsate and trip blanks.

Field Observations

The SWL and physico-chemical field parameters measured in/from each monitoring well were recorded and are presented in **Table 1** and **Table 2** respectively below.

Table 1 – July 2020 GME Field Observations

Well ID	Easting	Northing	Well Elevation (mAHD)	Surface Elevation (mAHD)	Standing Water Level (mbtoc)	GW Elevation (mAHD)
MW01	708423.825	8620973.001	5.958	5.227	2.994	2.964
MW02	708491.822	8620929.677	5.026	5.093	1.788	3.238
MW03	708498.128	8621016.708	5.891	5.989	2.910	2.981
MW04	708460.568	8621002.703	5.867	5.990	2.963	2.904

Table 2 – July 2020 GME Field Observations

Well ID	Temperature (°C)	Electrical Conductivity (µS/cm)	pH	ORP (mV)	Dissolved Oxygen (% saturation)
MW01	30.5	11514	4.61	171.6	39.2
MW02	31.5	14341	5.16	198.5	10.0
MW03	30.9	21480	4.91	226.4	57.9
MW04	31.6	17779	6.93	200.9	64.2

As shown in **Table 1** the groundwater beneath the area is saline and slightly acidic. Measured levels of ORP and dissolved oxygen indicate oxidation conditions (refer to **Attachment 3** for field record sheets).

Groundwater level gauging results were used to plot groundwater level contours which are included in **Attachment 4**. The inferred groundwater flow direction was in a north-northwesterly direction, i.e. from the Site towards the intertidal mangrove community. The groundwater level contours also indicate that **MW02** is a background monitoring well.

Analytical Results

As required by the GMMP, groundwater samples were analysed for total recoverable hydrocarbons (TRH) and benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN) at National Association of Testing Authorities (NATA)-accredited laboratory (primary laboratory – Eurofins-MGT; secondary laboratory ALS). The results are included in **Attachment 5** and summarised in **Table 1** below. Laboratory certificates are included in **Appendix A**.



Table 3 – July 2020 GME Analytical Results

Monitoring Well	TRH (µg/L)					Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylene (µg/L)			Naphthalene (mg/L)
	F1	F2	F3	F4	Total				m-	p-	o-	
TV*	6,000	-	-	-	-	500-5000	110	50	50	200	350	50
MW01	<20	140	<100	<100	150	<1	<1	2	<2		3	<10
MW02	<20	<50	<100	<100	<120	<1	<1	<1	<2		<1	<10
MW03	<20	<50	<100	<100	<120	<1	<1	<1	<2		<1	<10
MW04	<20	240	400	<100	650	<1	<1	<1	<2		<1	<10

F1 = C₆-C₁₀ less BTEX; F2 = >C₁₀-C₁₆ less naphthalene; F3 = >C₁₆-C₃₄; F4 = >C₃₄-C₄₀; TV – trigger values

As shown in **Table** no trigger value exceedances were reported during the July 2020 GME. The presence of petroleum hydrocarbons was however reported for two groundwater wells, *MW01* and *MW04*. These wells are installed in the area where hydrocarbons impacts associated with the diesel spill were reported in soil samples (refer GMMP) indicating that these groundwater impacts may be associated with the diesel spill. This will be verified during additional GMEs scheduled in the GMMP.

Although there are no adopted trigger values for TRH (F2, F3 or F4), the reported sum of TRH concentrations at *MW04* (refer **Table**) were within LC₅₀ ranges for diesel toxicity on several taxa as observed by Tsvetnenko (1998) and presented in ANZECC 2018 (see **Table 4** below)

Table 4 – Table 8.3.24 from ANZECC 2018 Toxicity ranges for different oils to marine organisms—from from Tsvetnenko (1998). LC50 figures normalised (Hamoda et al. 1989) (mg/L)

Organism	Crude oil	Gas condensate	Diesel	Bunker fuels
Fish (n=3)	2.3-8.1	NA	1.4-2.2	0.6-1.1
Crustaceans (n=8)	0.07a-7.8	0.5-0.6	0.3-> 4.5	0.6-1.0
Molluscs (n=1)	NA	NA	0.6	NA
Annelids (n=6)	3.5-8.5	NA	0.8-3.2	0.3-1.3
Algae (n=6)	0.5-> 10	10.6-11.5	0.5-> 1.6	NA

Further comparison of the hydrocarbon concentrations will be undertaken using the results of additional GMEs scheduled in the GMMP.

QA/QC Results

Groundwater Duplicate Analysis

Field duplicates (*MWQA01* and *MWQA02*, duplicates of *MW01*) were collected during the sampling event and analysed at the primary (Eurofins) and secondary (ALS) laboratories for TRH and BTEXN). Duplicate analytical results were assessed by calculating relative percent differences between primary sample results and duplicate sample results. The majority of inter and intra laboratory duplicate groundwater analyses had RPD values below the recommended comparison criteria of 50%, with the following exceptions:

Intra-laboratory

- TRH C10-C14 (143 %);



- TRH C6-C10 (67 %);
- TRH >C10-C16 (139 %); and
- TRH >C10-C16 (less naphthalene) (139 %).

Inter-laboratory

- Ethylbenzene (67 %)
- TRH C10-C14 (143 %);
- TRH C6-C10 (67 %);
- TRH >C10-C16 (173 %); and
- TRH >C10-C16 (less naphthalene) (94 %).

These variations may be due to differences in suspended solids in the primary and duplicate containers.

All primary/intra-laboratory results with RPDs outside acceptable limits had the primary sample result reported as the greater concentration. All primary/inter-laboratory results with RPDs outside acceptable limits had the primary sample result reported as the greater concentration. In addition, all reported results were below the adopted water quality criteria therefore these variations are not considered significant in terms of this groundwater monitoring event.

A table summarising the duplicate sample results is presented at the end of this report (refer to **Attachment 6**).

Blank Analyses

A rinsate blank sample (*RB01*) was collected and analysed at the primary laboratory for TRH and BTEXN. The rinsate blank sample was collected from decontaminated sampling equipment to ensure adequate cleaning has occurred.

A trip blank sample (*TB02*) was prepared and kept with the sample esky for the duration of the GME and delivered to the primary laboratory for TRH and BTEXN analysis. The trip blank was prepared using de-ionised water to detect potential cross-contamination throughout the sampling and sample delivery stages of the GME.

A table summarising the rinsate and trip blanks sample results is presented at the end of this report (refer to **Attachment 6**).

Conclusions and Recommendations

All of the reported analytical results for the July 2020 GME were below the respective trigger values indicating that no application of contingency measures is required.

The next quarterly groundwater monitoring round is scheduled to occur in October 2020.



Attachments

- 1 Statement of Limitations
- 2 Groundwater Monitoring Well Location Plan
- 3 Field Record Sheets
- 4 Groundwater Elevation Contours Figure
- 5 Results Summary Table
- 6 QA/QC Summary Tables

Appendices

- A Laboratory Certificates of Analysis

Yours Sincerely,

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Groundwater Monitoring Event – July 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 1: Statement of Limitations

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Statements of Limitation

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Unless otherwise expressly agreed to in writing and signed by Greencap, Greencap, its related bodies corporate, its officers, employees and agents assume no liability and will not be liable for lost profit, revenue, production, contract, opportunity, loss arising from business interruption or delay, indirect or consequential loss or loss to the extent caused or contributed to by the Client or third parties, suffered or incurred arising out of or in connection with our Proposals, Reports, the Project or the Agreement. In the event Greencap is found by a Court or Tribunal to be liable to the Client for any loss or damage arising in connection with the Services, the Client's entitlement to recover damages from Greencap shall be reduced by such amount as reflects the extent to which any act, default, omission or negligence of the Client, or any third party, caused or contributed to such loss or damage. Unless otherwise agreed in writing and signed by both parties, Greencap's total aggregate liability will not exceed the total consulting fees paid by the client in relation to this Proposal. For further detail, see Greencap's Terms and Conditions available at <https://www.greencap.com.au/terms-conditions>

The Report is provided for the exclusive use of the Client and for this Project only, in accordance with the Scope and Specific Purpose as outlined in the Agreement, and only those third parties who have been authorized in writing by Greencap. It should not be used for other purposes, other projects or by a third party unless otherwise agreed and authorized in writing by Greencap. Any person relying upon this Report beyond its exclusive use and Specific Purpose, and without the express written consent of Greencap, does so entirely at their own risk and without recourse to Greencap for any loss, liability or damage. To the extent permitted by law, Greencap assumes no responsibility for any loss, liability, damage, costs or expenses arising from interpretations or conclusions made by others, or use of the Report by a third party. Except as specifically agreed by Greencap in writing, it does not authorize the use of this Report by any third party. It is the responsibility of third parties to independently make inquiries or seek advice in relation to their particular requirements and proposed use of the site.

The conclusions, or data referred to in this Report, should not be used as part of a specification for a project without review and written agreement by Greencap. This Report has been written as advice and opinion, rather than with the purpose of specifying instructions for design or redevelopment. Greencap does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise in relation to the site it investigated.

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Groundwater Monitoring Event – July 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 2: Groundwater Monitoring Well Location Plan



Legend

- Site boundary
- Groundwater Monitoring Well Locations

Date Data Collected: 8 May, 2020
 Source: Background Photomap, courtesy of [nearmap](http://nearmap.com)

Client: One Rail Australia
 Client No: C105292
 Project: Diesel Spill Targeted Site Contamination Investigation
 Job No: J1168829

Title: Groundwater Monitoring Plan 0
 Address: Berimah Freight Terminal - Export Drive, Berimah NT

Drawn: PW: KTK
 Date: 13/07/2020
 File Name: J1168829_GW Plan

Approximate Scale: 20 m
 Figure No: 5
GREENCAP
 Level 1
 477 High Street
 Kew East, VIC 3102
 P: (03) 9896 8600
 www.greencap.com.au



Groundwater Monitoring Event – July 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 3: Field Record Sheets

**One Rail Australia - Berrimah Freight Terminal
GROUNDWATER Field Sheet**

Client:	One Rail Australia	Job No:	J168829-01
Project:	Diesel Spill Groundwater Monitoring	Date:	30/07/2020
Location:	Berrimah Freight Terminal, Export Drive, Berrimah NT		

MW04	WELL DETAILS				SAMPLING EQUIPMENT						
	Well depth:	3.787	(m)		Sampling device:	Peristaltic (low flow)	GEO#	5			
	Well diameter:	50mm	NA		Water meter:	YSI	YSI#	1			
	Casing type:	PVC			Turbidity Meter:		TM#	8			
	Initial water level	2.963	(m)		Interphase probe:	IP Dipper Pro (30m)	IP#	1			

Time	Amount purged (L)	Cumulative purged (L)	Water Level (m)	Temperature °C	DO % sat	Sp. Conductivity μS/cm	Salinity PSU	pH Units	ORP mV	Turbidity NTU
11:05	2.5	2.5	well purged dry due to slow recharge (total purged 2.5 L)							
13:10			3.205	31.6	64.2	17779	10.49	6.93	200.9	93.00
Stabilisation Criteria (3 readings within ranges)		N/A	Drawdown <10cm	± 10%	± 10%	± 5%	± 10%	± 0.1	± 10mv	N/A

Field observations: eg. Nearby activities, weather

Clear skies, light breeze

Logger present: N/A
 Time removed:
 Time replaced:

Has water quality meter and turbidity meter been calibrated in accordance with operating manual and recorded? Yes
 Decontamination procedures followed? Yes

Observations during Sampling:- eg. Odours, sheens, turbidity, water colour	Samples Taken	Number	Duplicate:	Triplicate:
No odour No sheen Low-moderate turbidity Clear to faint brown coloured water	Metals Plastic*			
	Cr (III & VI)*			
	Plastic unpreserved inorganics (1L)			
	Preserved inorganics (60mL)			
	Glass vials (40mL)	2		
	Glass amber unpreserved (200mL)	2		
	Plastic nutrients green/white (60mL)*			
	PFAS-free plastic unpreserved (500mL)			
	Plastic nutrients light green (60mL)			
	Glass amber unpreserved (100mL) (ALS)			
	Plastic unpreserved inorganics (250mL)			
(* DESIGNATES SAMPLES FILTERED IN FIELD)				

MONITORING WELL VOLUMES:-

Diameter of well casing:	50	mm
Diameter of hole drilled:	125	mm
(1) Volume of casing only	0.001964	m3 (kL) 1.96 L per metre
(2) Volume of drill-hole	0.012273	m3 (kL) 12.27 L per metre
(3) Volume of annulus around casing	0.010310	m3 (kL) 10.31 L per metre
(4) Total Bore Volume = 0.3*(3) + (1) (assuming 30% porosity in sand/gravel pack)	0.005057	m3 (kL) 5.1 L/m

Field Technician #1
 Full name: STUART CARROLL

Field Technician #2
 Full name:

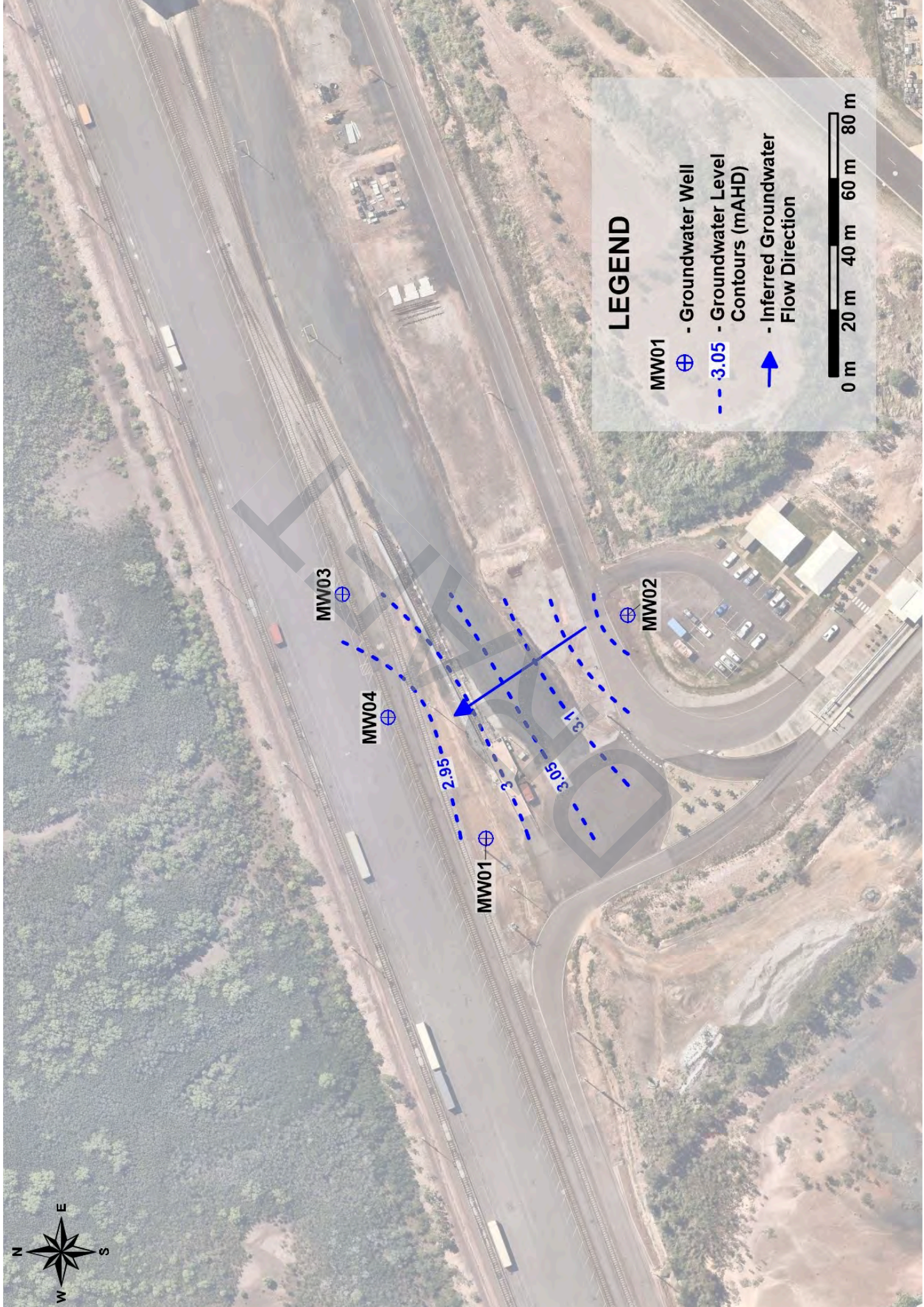


Groundwater Monitoring Event – July 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 4: Groundwater Elevation Contours Figure



LEGEND

- MW01 ⊕ - Groundwater Well
 - - - 3.05 - Groundwater Level Contours (mAH)
 - ➔ - Inferred Groundwater Flow Direction
- 0 m 20 m 40 m 60 m 80 m





Groundwater Monitoring Event – July 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 5: Results Summary Table

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Monitoring Well	TRH - 1999 NEPM Fractions (µg/L)				TRH - 2013 NEPM Fractions (µg/L)				Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylene (µg/L)			Naphthalene (µg/L)	
	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	C ₁₀ -C ₃₆ (Total)	C ₆ -C ₁₀	F1	>C ₁₀ -C ₁₆				F2	F3	F4		>C ₁₀ -C ₄₀ Total
NEPM HSL ¹	-	-	-	-	-	6,000	-	NL	-	-	-	-	NL	NL	NL	NL
ANZECC ²	-	-	-	-	-	-	-	-	-	500	50	-	50	200	350	50
Fish (n=3) ³	-	-	-	-	1400-2200	-	-	-	-	-	-	1400-2200	-	-	-	-
Crustacean (N=8) ³	-	-	-	-	300-4500	-	-	-	-	-	-	300-4500	-	-	-	-
Molluscs (n=1) ³	-	-	-	-	600	-	-	-	-	-	-	600	-	-	-	-
Annelids (n=6) ³	-	-	-	-	800-3200	-	-	-	-	-	-	800-3200	-	-	-	-
Algae (n=6) ³	-	-	-	-	500-1600	-	-	-	-	-	-	500-1600	-	-	-	-
MW01	<20	150	<100	<100	150	20	<20	140	140	<100	<100	150	<1	<2	3	<10
MW02	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100	<120	<1	<2	<1	<10
MW03	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100	<120	<1	<2	<1	<10
MW04	<20	100	600	<100	700	<20	<20	240	240	400	<100	650	<1	<2	<1	<10

F1 = C₆-C₁₀ less BTEX; F2 = >C₁₀-C₁₆ less naphthalene; F3 = >C₁₆-C₃₄; F4 = >C₃₄-C₄₀

1 = Groundwater Health Screening Level for vapour intrusion – Commercial/Industrial land use with sand 2 m to <4 m. Assessment of Site Contamination National Environment Protection Measure (1999). National Environment Protection Council (as amended 2013)

2 = Marine ecosystems (99 % protection) – 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. Available at www.waterquality.gov.au/anz-guidelines

3 = Table 8.3.24 from ANZECC 2018. Toxicity ranges for different oils to marine organisms—from from Tsvetenko (1998). LC50 figures normalised (Hamoda et al. 1989) (mg/L)



Groundwater Monitoring Event – July 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 6: QA/QC Summary Tables

DRAFT

Duplicate/Triplicate Relative Percent Differences						
Analyte	MW01	MWQA01	RPD	MW01	MWQA02	RPD
Benzene	< 0.001	< 0.001	0	< 0.001	< 0.001	0
Ethylbenzene	0.002	0.002	0	0.002	0.001	66.6667
m&p-Xylenes	< 0.002	< 0.002	0	< 0.002	< 0.002	N/A
o-Xylene	0.003	0.003	0	0.003	0.003	0
Toluene	< 0.001	< 0.001	0	< 0.001	< 0.002	N/A
Naphthalene	< 0.01	< 0.01	0	< 0.01	<0.005	N/A
TRH C6-C9	< 0.02	< 0.02	0	< 0.02	< 0.02	0
TRH C10-C14	0.15	0.025	142.8571	0.15	0.025	142.857
TRH C15-C28	< 0.1	< 0.1	0	< 0.1	<0.1	0
TRH C29-C36	< 0.1	< 0.1	0	< 0.1	<0.05	N/A
TRH C6-C10	0.02	0.01	66.66667	0.02	0.01	66.6667
TRH >C10-C16 less Naphthalene (F2)	0.14	0.025	139.3939	0.14	0.01	173.333
TRH >C10-C16	0.14	0.025	139.3939	0.14	0.05	94.7368
TRH C6-C10 less BTEX (F1)	< 0.02	< 0.02	0	< 0.02	<0.1	N/A
TRH >C16-C34	< 0.1	< 0.1	0	< 0.1	<0.1	0
TRH >C34-C40	< 0.1	< 0.1	0	< 0.1	<0.1	0

Rinsate Blank & Trip Blank		
Analyte	RB01	TB01
Benzene	< 0.001	< 0.001
Ethylbenzene	< 0.001	< 0.001
m&p-Xylenes	< 0.002	< 0.002
o-Xylene	< 0.001	< 0.001
Toluene	< 0.001	< 0.001
Xylenes - Total*	< 0.003	< 0.003
Naphthalene	< 0.01	-
TRH C6-C9	< 0.02	-
TRH C10-C14	< 0.05	-
TRH C15-C28	< 0.1	-
TRH C29-C36	< 0.1	-
TRH C10-C36 (Total)	< 0.1	-
TRH C6-C10	< 0.02	-
TRH C6-C10 less BTEX (F1)	< 0.02	-
TRH >C10-C16	< 0.05	-
TRH >C10-C16 less Naphthalene (F2)	< 0.05	-
TRH >C16-C34	< 0.1	-
TRH >C34-C40	< 0.1	-
TRH >C10-C40 (total)*	< 0.1	-



Groundwater Monitoring Event – July 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Appendix A: Laboratory Certificates of Analysis



CHAIN OF CUSTODY RECORD

Sydney Laboratory
 Unit F3 Bld F 16 Mims Road Lanni Cove West NSW 2066
 02 9900 8400 EnviroSampleNSW@eurofins.com

Brisbane Laboratory
 Unit 121 Smallwood Place Muramba QLD 4172
 07 3902 4600 EnviroSampleQLD@eurofins.com

Perth Laboratory
 Unit 2 91 Leach Highway Kowale WA 5105
 08 9251 9600 EnviroSampleWA@eurofins.com

Melbourne Laboratory
 6 Mooney Road Dandenong South VIC 3175
 03 8564 5000 EnviroSampleVic@eurofins.com

Company		Greencap NT P/L		Project No		Project Name		Project Manager		Sample(s)		Email for Results	
11/14 Winnellie Road, Winnellie, NT, 0800		Stuart Carroll		J188829-01		ORA - Diesel Spill Groundwater Monitoring		Stuart Carroll		Stuart Carroll		Stuart Carroll	
Contact Name		Stuart Carroll		Project Name		ORA - Diesel Spill Groundwater Monitoring		Project Manager		Sample(s)		Email for Results	
Phone No		0466 776 038		Where notes to be requested, please specify 'Total' or 'Filtered'		Sulfide B1		EDD Format		Handed over by		Stuart Carroll	
Special Directions		277234		Matrix		Solid (S)		E5&K EOU'S etc		Change container type & size if necessary.		Stuart.Carrroll@greencap.com.au	
Purchase Order		277234		Sampled Date/Time		Solid (S)		E5&K EOU'S etc		500mL Amber Glass		Required Turnaround Time (TAT)	
Quote ID No		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		200mL Plastic		Default will be 5 days if not boxed	
Client Sample ID		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		50mL Plastic		Overnight (reporting by 9am) <input type="checkbox"/>	
Client Sample ID		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		250mL Plastic		Same day <input type="checkbox"/>	
Client Sample ID		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		40mL VOA Vial		2 days <input type="checkbox"/>	
Client Sample ID		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		500mL PFS Bottle		5 days (Standard) <input checked="" type="checkbox"/>	
Client Sample ID		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		Jar (Glass or HDPE)		Other <input type="checkbox"/>	
Client Sample ID		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		Other (Asbestos AS4564, WA Guidelines)		Suchcharge will apply	
Client Sample ID		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		Other (Asbestos AS4564, WA Guidelines)		1 day <input type="checkbox"/>	
Client Sample ID		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		Other (Asbestos AS4564, WA Guidelines)		3 days <input type="checkbox"/>	
Client Sample ID		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		Other (Asbestos AS4564, WA Guidelines)		5 days (Standard) <input checked="" type="checkbox"/>	
Client Sample ID		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		Other (Asbestos AS4564, WA Guidelines)		Other <input type="checkbox"/>	
Client Sample ID		277234		dd/mm/yyyy hh:mm		Water (W)		E5&K EOU'S etc		Other (Asbestos AS4564, WA Guidelines)		Sample Comments / Dangerous Goods Hazard Warning	
1	MW01	30/07/20	W	1									
2	MW02	30/07/20	W	1									
3	MW03	30/07/20	W	1									
4	MW04	30/07/20	W	1									
5	MWQA01	30/07/20	W	1									
6	RB01	30/07/20	W	1									
6	TB01	30/07/20	W	1									
6													
6													
6													
10													
Add new rows				Total Counts		5							
Method of Shipment		Hand Delivered		Courier (#)									
Eurofins mgt Laboratory Use Only		Received By		ASB in Desc		Signature		Signature		Date		Time	
		Received By		ASB in Desc		Signature		Signature		Date		Time	
										30/07/20		1:50 PM	
												23:58	
												23/7/20	

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.

Melbourne

6 Monterey Road
Dandenong South Vic 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney

Unit F3, Building F
16 Mars Road
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

Sample Receipt Advice

Company name: **Greencap NT P/L**
Contact name: **Stuart Carroll**
Project name: **ORA-DIESEL SPILL GROUNDWATER MONITORING**
Project ID: **J168829-01**
COC number: **Not provided**
Turn around time: **5 Day**
Date/Time received: **Jul 30, 2020 1:30 PM**
Eurofins reference: **734907**

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:

Michael Morrison on Phone : 03 8564 5933 or by e.mail: MichaelMorrison@eurofins.com

Results will be delivered electronically via e.mail to Stuart Carroll - stuart.carroll@greencap.com.au.

Note: A copy of these results will also be delivered to the general Greencap NT P/L email address.

Greencap NT P/L
11/14 Winnellie Road
Winnellie
NT 0800



NATA Accredited
Accreditation Number 1261
Site Number 1254

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: **Stuart Carroll**

Report **734907-W**
Project name **ORA-DIESEL SPILL GROUNDWATER MONITORING**
Project ID **J168829-01**
Received Date **Jul 30, 2020**

Client Sample ID			MW01 Water	MW02 Water	MW03 Water	MW04 Water
Sample Matrix			M20-JI49593	M20-JI49594	M20-JI49595	M20-JI49596
Eurofins Sample No.			Jul 30, 2020	Jul 30, 2020	Jul 30, 2020	Jul 30, 2020
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	0.15	< 0.05	< 0.05	0.10
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	0.6
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	0.15	< 0.1	< 0.1	0.7
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	0.002	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	0.003	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	95	98	95	93
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	0.14	< 0.05	< 0.05	0.24
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	0.14	< 0.05	< 0.05	0.24
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	0.4
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	0.14	< 0.1	< 0.1	0.64

Client Sample ID			MWQA01 Water	RB01 Water	TB01 Water
Sample Matrix			M20-JI49597	M20-JI49598	M20-JI49599
Eurofins Sample No.			Jul 30, 2020	Jul 30, 2020	Jul 30, 2020
Date Sampled					
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	-
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	-

Client Sample ID			MWQA01	RB01	TB01
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M20-JI49597	M20-JI49598	M20-JI49599
Date Sampled			Jul 30, 2020	Jul 30, 2020	Jul 30, 2020
Test/Reference	LOR	Unit			
BTEX					
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	0.002	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	0.003	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	94	87	93
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	-
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	-
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	-
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	-

DRAFT

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
Eurofins Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Jul 31, 2020	7 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Jul 31, 2020	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Jul 31, 2020	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Jul 31, 2020	

DRAFT



Environment Testing

web : www.eurofins.com.au e.mail : EnviroSales@eurofins.com

ABN - 50 005 085 521

Australia

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Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

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

Brisbane
1/21 Smallwood Place
Murarie 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

New Zealand

Auckland
35 O'Rourke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name: Greencap NT P/L
Address: 11/14 Winnellie Road
Winnellie
NT 0800

Project Name: ORA-DIESEL SPILL GROUNDWATER MONITORING
Project ID: J168829-01

Order No.: 277234
Report #: 734907
Phone: 61 8 8984 4244
Fax: 61 8 8984 3105

Received: Jul 30, 2020 1:30 PM
Due: Aug 6, 2020
Priority: 5 Day
Contact Name: Stuart Carroll

Eurofins Analytical Services Manager : Michael Morrison

Sample Detail				
No	Sample ID	Sample Date	Sampling Time	LAB ID
1	MW01	Jul 30, 2020		M20-JI49593
2	MW02	Jul 30, 2020		M20-JI49594
3	MW03	Jul 30, 2020		M20-JI49595
4	MW04	Jul 30, 2020		M20-JI49596
5	MWQA01	Jul 30, 2020		M20-JI49597
6	RB01	Jul 30, 2020		M20-JI49598
7	TB01	Jul 30, 2020		M20-JI49599
Test Counts				1
External Laboratory				6
Eurofins Suite B1				
BTEX				
Melbourne Laboratory - NATA Site # 1254 & 14271				
Sydney Laboratory - NATA Site # 18217				
Brisbane Laboratory - NATA Site # 20794				
Perth Laboratory - NATA Site # 23736				
Matrix				
Water				
Water				
Water				
Water				
Water				
Water				
Water				
Water				

Internal Quality Control Review and Glossary

General

- 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.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- 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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C6-C9		mg/L	< 0.02			0.02	Pass		
TRH C10-C14		mg/L	< 0.05			0.05	Pass		
TRH C15-C28		mg/L	< 0.1			0.1	Pass		
TRH C29-C36		mg/L	< 0.1			0.1	Pass		
Method Blank									
BTEX									
Benzene		mg/L	< 0.001			0.001	Pass		
Toluene		mg/L	< 0.001			0.001	Pass		
Ethylbenzene		mg/L	< 0.001			0.001	Pass		
m&p-Xylenes		mg/L	< 0.002			0.002	Pass		
o-Xylene		mg/L	< 0.001			0.001	Pass		
Xylenes - Total*		mg/L	< 0.003			0.003	Pass		
Method Blank									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
Naphthalene		mg/L	< 0.01			0.01	Pass		
TRH C6-C10		mg/L	< 0.02			0.02	Pass		
TRH >C10-C16		mg/L	< 0.05			0.05	Pass		
TRH >C16-C34		mg/L	< 0.1			0.1	Pass		
TRH >C34-C40		mg/L	< 0.1			0.1	Pass		
LCS - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C6-C9		%	110			70-130	Pass		
TRH C10-C14		%	108			70-130	Pass		
LCS - % Recovery									
BTEX									
Benzene		%	99			70-130	Pass		
Toluene		%	106			70-130	Pass		
Ethylbenzene		%	106			70-130	Pass		
m&p-Xylenes		%	106			70-130	Pass		
Xylenes - Total*		%	108			70-130	Pass		
LCS - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
Naphthalene		%	80			70-130	Pass		
TRH C6-C10		%	106			70-130	Pass		
TRH >C10-C16		%	102			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C10-C14		B20-JI49614	NCP	%	80		70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
TRH >C10-C16		B20-JI49614	NCP	%	74		70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C10-C14		B20-JI49613	NCP	mg/L	1.6	1.5	7.0	30%	Pass
TRH C15-C28		B20-JI49613	NCP	mg/L	1.2	1.2	2.0	30%	Pass
TRH C29-C36		B20-JI49613	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass

Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
TRH >C10-C16	B20-JI49613	NCP	mg/L	2.1	2.0	5.0	30%	Pass
TRH >C16-C34	B20-JI49613	NCP	mg/L	0.5	0.5	1.0	30%	Pass
TRH >C34-C40	B20-JI49613	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass

DRAFT

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
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
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.

Authorised By

Michael Morrison	Analytical Services Manager
Harry Bacalis	Senior Analyst-Volatile (VIC)
Joseph Edouard	Senior Analyst-Organic (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](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

CHAIN OF CUSTODY

ALS Laboratory, please tick →

ADLAIDE 21 Burns Road Portola SA 5095
Ph: 08 8350 0830 E: adelaide@alsglobal.com

BRISBANE 23 Blyth Street, Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 46 Callomonah Drive Clinton QLD 4680
Ph: 07 7471 9500 E: gladstone@alsglobal.com

DIMACKAY 78 Harbour Road Mackay QLD 4740
Ph: 07 4544 0777 E: mackay@alsglobal.com

DIMELBOURNE 24 Westall Road Springvale VIC 3171
Ph: 03 8549 9500 E: samples.melbourne@alsglobal.com

DIMUDGEE 128 Sydneybase Mudgee NSW 2860
Ph: 02 6372 9355 E: mudgee@alsglobal.com

NEWCASTLE 5955 Mainland Road Mayfield West NSW 2304
Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

LINCOLN 4413 Grassy Place North Nowra NSW 2541
Ph: 02 4423 2063 E: nowra@alsglobal.com

PERTH 10 Beach Way Melaleuca WA 8100
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

DUNEDIN 277-269 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydneyp@alsglobal.com

TOWNSVILLE 14-15 Desma Court Bona QLD 4818
Ph: 07 4786 0600 E: townsville.environmental@alsglobal.com

WOLLONGONG 89 Kenny Street Wollongong NSW 2500
Ph: 02 4225 9355 E: wollongong@alsglobal.com

CLIENT: Greencap
OFFICE: Darwin, NT

PROJECT: ORA -- Diesel Spill Groundwater Monitoring
PURCHASE ORDER NO.: 277235
PROJECT NO.: J168823-01

ORDER NUMBER: [Blank]
PROJECT MANAGER: Stuart Carroll
COC SEQUENCE NUMBER (Circle): 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

SAMPLER: Stuart Carroll
CONTACT PH: 0466 776 038
SAMPLER MOBILE: [Blank]

COC EDD FORMAT (or default): [Blank]
Country of Origin: [Blank]

Turnaround Requirements: Standard TAT (List due date):
 Non Standard or urgent TAT (List due date):

FOR LABORATORY USE ONLY (Circle):
Custody Seal intact? Yes No
Free ice / frozen ice bricks present upon receipt? Yes No
Random Sample Temperature on Receipt: [Blank] °C
Other comment: [Blank]

RECEIVED BY: [Signature]
DATE/TIME: 30/07/20

RELINQUISHED BY: [Signature]
DATE/TIME: 30/07/20


RECEIVED BY: [Signature]
DATE/TIME: 31/7/20

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)	CONTAINER INFORMATION	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) <small>Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required)</small>	Additional Information			
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <small>(refer to codes below)</small>	TOTAL BOTTLES	SUITE WA	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
①	MMQA01	30/07/2020 0:00	W	AG & VOA	3	X	
	rec'd as MWQA02	30/07/2020					
				TOTAL			

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Ca Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; U = Unpreserved Bottle; STI = Sterile Sodium Iodide Preserved Bottles.

LAB OF ORIGIN: DARWIN

Environmental Division
Sydney
Work Order Reference
ES2026250



Telephone: 61-2-8784 8656

Form Page 1 of 1



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2026250

Client : GREENCAP-NAA PTY LTD
Contact : STUART CARROLL
Address : 11/14 Winnellie Road WINNELLIE NT, AUSTRALIA 0820
Laboratory : Environmental Division Sydney
Contact : Peter Ravlic
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail : stuart.carroll@greencap.com.au
Telephone : +61 08 8984 4244
Facsimile : +61 08 8984 3105
Project : J168829-01 ORA - Diesel Spill Groundwater Monitoring
Order number : ---
C-O-C number : ---
Site : ---
Sampler : STUART CARROLL
Laboratory E-mail : peter.ravlic@alsglobal.com
Telephone : +6138549 9645
Facsimile : +61-2-8784 8500
Page : 1 of 2
Quote number : EM2018ADEENV0003 (EN/111/18 Primary Work Only)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 31-Jul-2020 08:30
Client Requested Due Date : 07-Aug-2020
Issue Date : 31-Jul-2020
Scheduled Reporting Date : 07-Aug-2020

Delivery Details

Mode of Delivery : Client Drop Off
No. of coolers/boxes : ---
Receipt Detail :
Security Seal : Not Available
Temperature : 18.0' C
No. of samples received / analysed : 1 / 1

General Comments

- This report contains the following information:
- Sample Container(s)/Preservation Non-Compliances
- Summary of Sample(s) and Requested Analysis
- Proactive Holding Time Report
- Requested Deliverables
Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.
Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).
Please direct any queries you have regarding this work order to the above ALS laboratory contact.
Analytical work for this work order will be conducted at ALS Sydney.
Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **ES2026250**

Client : **GREENCAP-NAA PTY LTD**

Contact : **STUART CARROLL**

Address : **11/14 Winnellie Road**
WINNELLIE NT, AUSTRALIA 0820

Telephone : **+61 08 8984 4244**

Project : **J168829-01 ORA - Diesel Spill Groundwater Monitoring**

Order number : **----**

C-O-C number : **----**

Sampler : **STUART CARROLL**

Site : **----**

Quote number : **EN/11/18 Primary Work Only**

No. of samples received : **1**

No. of samples analysed : **1**

Page : 1 of 4

Laboratory : **Environmental Division Sydney**

Contact : **Peter Ravlic**

Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**

Telephone : **+6138549 9645**

Date Samples Received : **31-Jul-2020 08:30**

Date Analysis Commenced : **04-Aug-2020**

Issue Date : **06-Aug-2020 13:06**



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
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



Page : 2 of 4
Work Order : ES2026250
Client : GREENCAP-NAA PTY LTD
Project : J168829-01 ORA - Diesel Spill Groundwater Monitoring

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID	
Compound	CAS Number	LOR	Unit
			Client sampling date / time
			MWQA01 Received as MWQA02 30-Jul-2020 00:00
			ES2026250-001 Result
EP080/071: Total Petroleum Hydrocarbons			
C6 - C9 Fraction		20	µg/L
C10 - C14 Fraction		50	µg/L
C15 - C28 Fraction		100	µg/L
C29 - C36 Fraction		50	µg/L
^ C10 - C36 Fraction (sum)		50	µg/L
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions			
C6 - C10 Fraction	C6_C10	20	µg/L
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L
>C10 - C16 Fraction		100	µg/L
>C16 - C34 Fraction		100	µg/L
>C34 - C40 Fraction		100	µg/L
^ >C10 - C40 Fraction (sum)		100	µg/L
^ >C10 - C16 Fraction minus Naphthalene (F2)		100	µg/L
EP080: BTEXN			
Benzene	71-43-2	1	µg/L
Toluene	108-88-3	2	µg/L
Ethylbenzene	100-41-4	2	µg/L
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L
ortho-Xylene	95-47-6	2	µg/L
^ Total Xylenes		2	µg/L
^ Sum of BTEX		1	µg/L
Naphthalene	91-20-3	5	µg/L
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	2	%
Toluene-D8	2037-26-5	2	%
4-Bromofluorobenzene	460-00-4	2	%



Page : 4 of 4
Work Order : ES2026250
Client : GREENCAP-NAA PTY LTD
Project : J168829-01 ORA - Diesel Spill Groundwater Monitoring

Surrogate Control Limits

Sub-Matrix: WATER			
Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

DRAFT



Environmental

QUALITY CONTROL REPORT

Work Order : **ES2026250**

Page : 1 of 5

Client : **GREENCAP-NAA PTY LTD**
 Contact : **STUART CARROLL**
 Address : **11/14 Winnellie Road**
WINNELLIE NT, AUSTRALIA 0820
 Telephone : **+61 08 8984 4244**
 Project : **J168829-01 ORA - Diesel Spill Groundwater Monitoring**
 Order number : **----**
 C-O-C number : **----**
 Sampler : **STUART CARROLL**
 Site : **----**
 Quote number : **EN/11/18 Primary Work Only**
 No. of samples received : **1**
 No. of samples analysed : **1**

Laboratory : **Environmental Division Sydney**
 Contact : **Peter Ravlic**
 Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**
 Telephone : **+6138549 9645**
 Date Samples Received : **31-Jul-2020**
 Date Analysis Commenced : **04-Aug-2020**
 Issue Date : **06-Aug-2020**



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 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
 Edwandy Fadjar

Position
 Organic Coordinator

Accreditation Category

Sydney Organics, Smithfield, NSW



Page : 2 of 5
 Work Order : ES2026250
 Client : GREENCAP-NAA PTY LTD
 Project : J168829-01 ORA - Diesel Spill Groundwater Monitoring

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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: **WATER**

Laboratory sample ID	Client sample ID	Method/Compound	Laboratory Duplicate (DUP) Report						
			CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/074: Total Petroleum Hydrocarbons (QC Lot: 3173524)									
ES2026250-001	MWQA01 Received as MWQA02	EP071: C15 - C28 Fraction	---	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	---	50	µg/L	<50	<50	0.00	No Limit
EP080/074: Total Petroleum Hydrocarbons (QC Lot: 3174276)									
ES2026637-001	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
ES2026637-009	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3173524)									
ES2026250-001	MWQA01 Received as MWQA02	EP071: >C10 - C16 Fraction	---	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	---	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	µg/L	<100	<100	0.00	No Limit
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3174276)									
ES2026637-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES2026637-009	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3174276)									
ES2026637-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
		106-42-3	106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES2026637-009	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit



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 Work Order : ES2026250
 Client : GREENCAP-NAA PTY LTD
 Project : J168829-01 ORA - Diesel Spill Groundwater Monitoring

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
EP080: BTEXN (QC Lot: 3174276) - continued							Original Result	Duplicate Result	RPD (%)	
ES2026637-009	Anonymous		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
			EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
			EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
			EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
			EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

DRAFT



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: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3173524)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	74.9	55.8	112	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	84.4	71.6	113	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	91.0	56.0	121	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3174276)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	81.5	75.0	127	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3173524)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	81.2	57.9	119	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	80.9	62.5	110	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	102	61.5	121	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3174276)									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	85.4	75.0	127	
EP080: BTEXN (QCLot: 3174276)									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	104	70.0	122	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	90.6	69.0	123	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	92.5	70.0	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	91.4	69.0	121	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	92.2	72.0	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	87.1	70.0	120	

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 (DOOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	Matrix Spike (MS) Report				
			Spike Concentration	Spike Recovery (%)	MS	Recovery Limits (%)	
			CAS Number	Low	High		
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3173524)							
ES2026250-001	MWQA01 Received as MWQA02		----	200 µg/L	99.4	70.0	130
			----	250 µg/L	130	71.0	130
			----	200 µg/L	109	67.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3174276)							
ES2026637-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	110	70.0	130



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 Work Order : ES2026250
 Client : GREENCAP-NAA PTY LTD
 Project : J168829-01 ORA - Diesel Spill Groundwater Monitoring

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%)	Recovery Limits (%)
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3173524)						
ES2026250-001	MWQA01 Received as MWQA02	EP071: >C10 - C16 Fraction	----	250 µg/L	98.2	70.0
		EP071: >C16 - C34 Fraction	----	350 µg/L	89.6	75.0
		EP071: >C34 - C40 Fraction	----	150 µg/L	97.3	67.0
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3174276)						
ES2026637-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	114	70.0
EP080: BTEXN (QCLot: 3174276)						
ES2026637-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	108	70.0
		EP080: Toluene	108-88-3	25 µg/L	92.8	70.0
		EP080: Ethylbenzene	100-41-4	25 µg/L	92.2	70.0
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	91.1	70.0
			106-42-3			
		EP080: ortho-Xylene	95-47-6	25 µg/L	94.4	70.0
		EP080: Naphthalene	91-20-3	25 µg/L	96.4	70.0



Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2026250	Page	: 1 of 4
Client	: GREENCAP-NAA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: STUART CARROLL	Telephone	: +6138549 9645
Project	: J168829-01 ORA - Diesel Spill Groundwater Monitoring	Date Samples Received	: 31-Jul-2020
Site	: ----	Issue Date	: 06-Aug-2020
Sampler	: STUART CARROLL	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

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

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

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



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: WATER

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Date analysed	Due for analysis
EP080/071: Total Petroleum Hydrocarbons					
Amber Glass Bottle - Unpreserved (EP071)					
MWQA01 - Received as MWQA02	30-Jul-2020	04-Aug-2020	06-Aug-2020	05-Aug-2020	13-Sep-2020
Amber VOC Vial - Sulfuric Acid (EP080)					
MWQA01 - Received as MWQA02	30-Jul-2020	04-Aug-2020	13-Aug-2020	04-Aug-2020	13-Aug-2020
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions					
Amber Glass Bottle - Unpreserved (EP071)					
MWQA01 - Received as MWQA02	30-Jul-2020	04-Aug-2020	06-Aug-2020	05-Aug-2020	13-Sep-2020
Amber VOC Vial - Sulfuric Acid (EP080)					
MWQA01 - Received as MWQA02	30-Jul-2020	04-Aug-2020	13-Aug-2020	04-Aug-2020	13-Aug-2020
EP080: BTEXN					
Amber VOC Vial - Sulfuric Acid (EP080)					
MWQA01 - Received as MWQA02	30-Jul-2020	04-Aug-2020	13-Aug-2020	04-Aug-2020	13-Aug-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: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Analytical Methods	Method	Count		Actual	Rate (%)		Evaluation	Quality Control Specification
			QC	Regular		Expected	Actual		
Laboratory Duplicates (DUP)									
TRH - Semivolatle Fraction	EP071		1	2	50.00	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		2	20	10.00	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)									
TRH - Semivolatle Fraction	EP071		1	2	50.00	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		1	20	5.00	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)									
TRH - Semivolatle Fraction	EP071		1	2	50.00	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		1	20	5.00	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)									
TRH - Semivolatle Fraction	EP071		1	2	50.00	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		1	20	5.00	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



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 Work Order : ES2026250
 Client : GREENCAP-NAA PTY LTD
 Project : J168829-01 ORA - Diesel Spill Groundwater Monitoring

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.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TRH - Semivolatle Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

4 December 2020

11/14 Winnellie Central
Winnellie, NT 0820
P: (08) 7906 1300
www.greencap.com.au

Adam Reed, Environment Manager
One Rail Australia
Level 3, 33 Richmond Road, Keswick
South Australia 5035

RE: BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL – GROUNDWATER MONITORING EVENT

1.0 Introduction

Greencap Pty Ltd (Greencap) was commissioned by One Rail Australia (One Rail) to conduct a groundwater monitoring event (GME) in accordance with the Groundwater Monitoring and Management Plan (GMMP) developed for the Berrimah Freight Terminal, 75 O’Sullivan Circuit, Berrimah, Northern Territory (the Site).

2.0 GMMP

The GMMP was prepared as a response measure to a diesel spill which occurred on the Site on 30 May 2020. The GMMP was developed to accomplish the following primary objectives:

- To conduct regular monitoring of groundwater underlying soils with residual diesel impacts in order to advise if impacts in soil cause groundwater contamination.
- If diesel impacts to groundwater become evident, to confirm whether or not they present a risk to offsite receptors located down groundwater hydraulic gradient of the site (assessed to be to the north-west during the July 2020 monitoring event).
- To establish mechanisms and management measures should unacceptable risk to human health and/or the environment be identified.

The GMMP included a set of trigger levels which were designed to assess a change in risk to on-site and down-gradient receptors. The adopted trigger levels for the groundwater monitoring program are included in Table 1.

Table 1 - Trigger Levels

Analyte	Trigger Level (mg/L)	
	Groundwater HSL for vapour intrusion – Commercial/Industrial (2 m to <4 m)	Groundwater investigation level (GIL) (marine water)
C ₆ -C ₁₀ less BTEX (F1)	NL	-
>C ₁₀ -C ₁₆ less naphthalene (F2)	NL	-
Benzene	30	0.5
Toluene	NL	110*
Ethylbenzene	NL	0.05*
m-xylene	-	0.05*
o-xylene	NL	0.35**
p-xylene	NL	0.20**
Naphthalene	NL	0.05

* (ANZECC 2018)

**GIL for marine water not available, GIL for freshwater adopted alternatively

The protocol for the application of trigger levels included two levels of contingency measures as follows:

Level 1 – Additional Monitoring, Assessment and Review

If the result exceeds an adopted trigger level, then the groundwater well(s) which showed the exceedance should be re-sampled within 2 weeks to verify the result. If the elevated result is confirmed, the following protocol applies:

1. Increase frequency of groundwater monitoring events to monthly for the well(s) in which an exceedance was reported;
2. If results are below trigger levels during two subsequent consecutive monthly rounds, continue with the original scheduled monitoring; and
3. If results exceed trigger levels at least once within two subsequent monthly monitoring events, implement Level 2 actions.

Level 2 – Implement Contingency Measures

1. Review the historical data and any change in the on-site and off-site activities.
2. Consider installation of additional groundwater monitoring wells, subsequent sampling and assessments.
3. Assess risks to human health and the environment based on any additional information available.
4. Consider implementation of groundwater contamination control measures e.g. skimming, pump and treat.

3.0 Previous (July 2020) Monitoring Event

The first round of groundwater monitoring in accordance with the GMMP was conducted in July 2020.

Groundwater monitoring wells MW01 to MW04 were constructed, surveyed, gauged and sampled (refer to **Attachment 2** for the well locations).

Based on the July 2020 GME results the groundwater flow direction was inferred to be to the north west towards mangroves. In regards to the hydrocarbon impacts in groundwater associated with the diesel spill, no trigger value exceedances were reported, however, the presence of petroleum hydrocarbons was reported for two groundwater wells (MW01 and MW04) indicating that groundwater impacts may be associated with the diesel spill.

4.0 Groundwater Monitoring Event – October 2020

This letter presents the results of the second round of groundwater monitoring conducted in accordance with the GMMP in October 2020.

Four additional groundwater monitoring wells MW05 to MW08 (refer **Attachment 2** for their locations) were installed on 13 and 14 October 2020 to further delineate the extent of the diesel spill identified during the July 2020 GME and to determine if there are any groundwater impacts in close proximity to the mangrove fringe.

It should be noted that MW01 was not sampled during the October GME as approximately 0.06m of floating light nonaqueous phase liquid (LNAPL, likely spilled diesel) was present. MW01A, which is in close proximity to MW01 did not have signs of LNAPL was sampled in its place.

4.1 Sampling Methodology

GreenCap conducted a GME on 14 October 2020 involving the gauging and sampling of the four existing groundwater monitoring wells (MW01A, MW02, MW03 and MW04) and on 30 October 2020 involving the gauging and sampling of four newly installed monitoring wells (MW05 to MW08).

Groundwater samples were collected using low-flow sampling techniques in accordance with GMMP requirements. The following methodology was applied:

- Measuring standing water levels (SWL) from the surveyed point at the top of the casings using a water/product interface water level meter prior to sampling.
- Monitoring physio-chemical parameters (pH, temperature, electrical conductivity, oxidation-reduction potential and dissolved oxygen) during purging using a calibrated water quality meter. Sampling occurred when the drawdown and these parameters had stabilised within the ranges presented in NT Department of Mines and Energy *Methodology for the Sampling of Ground Waters (2009)*.
- The sampler wearing a clean pair of disposable nitrile gloves when collecting each sample.
- All groundwater samples collected in appropriate bottles/containers provided by analytical laboratories and placed in a chilled esky for transportation immediately after collection.
- Collection of appropriate QA/QA samples including intra- and inter-laboratory duplicates and rinsate and trip blanks.

Low-flow sampling could not be undertaken in MW01A, MW03 and MW04 as groundwater inflow was not sufficient. These wells were purged dry to remove all stagnant water from the well casing and screens and groundwater samples were collected using dedicated bailers after the volume of recovered groundwater was sufficient to fill sampling containers.

4.2 Field Observations

The SWLs gauged on 30 October 2020 and physio-chemical field parameters measured in/from each monitoring well were recorded and are summarised in Table 2 and Table 3 respectively. The field record sheets are attached in **Attachment 3**.

Table 2 – October 2020 GME Groundwater Levels

Well ID	Easting	Northing	Well Elevation (mAHD)	Depth to LNAPL (mbtoc)	Standing Water Level (mbtoc)	SWL Elevation (mAHD)
MW01	708423.825	8620973.001	5.958	2.740	2.800	N/A
MW01A	708416.945	8620986.556	5.921	-	2.674	3.247
MW02	708491.822	8620929.677	5.026	-	1.807	3.219
MW03	708498.128	8621016.708	5.891	-	2.910	2.981
MW04	708460.568	8621002.703	5.867	-	2.963	2.904
MW05	708374.723	8621004.469	5.249	-	2.003	3.246
MW06	708470.486	8621039.916	5.262	-	2.022	3.240
MW07	708398.119	8620980.232	5.906	-	2.658	3.248
MW08	708521.037	8621025.589	5.970	5.994	2.739	3.231

An attempt was made to construct groundwater level contours using the October gauging results. Groundwater level gauging results are shown on a plan included in **Attachment 4**. Based on the gauging results, it appeared no discernable direction of groundwater flow can be inferred because the water level values differ from each other by only a few millimetres. Such flat groundwater surface may be a typical wet season pattern. This will be further verified during subsequent monitoring events.

Table 3 – October 2020 GME Field Observations

Well ID	Temperature (°C)	Electrical Conductivity (µS/cm)	pH	ORP (mV)	Dissolved Oxygen (% saturation)
MW01A	33.4	97,551	6.31	113.7	40.8
MW02	33.6	16,093	5.1	159.6	30.3
MW03	33.5	26,860	5.16	169.4	44.9
MW04	33.2	13,088	6.15	144.4	71.3
MW05	33.6	36,676	5.55	97.9	2.3
MW06	33.7	23,275	4.77	147.3	3.5
MW07	35.8	14,205	5.25	118.8	27.6
MW08	36.0	18,678	6.23	3.0	17.9

As shown in Error! Reference source not found., the groundwater beneath the area is saline and slightly acidic. Measured levels of ORP and dissolved oxygen generally indicate of oxidation conditions potentially favourable for natural biodegradation of petroleum hydrocarbons (associated with the diesel spill).

4.3 Analytical Results

As required by the GMMP, groundwater samples were analysed for total recoverable hydrocarbons (TRH) and benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN) at National Association of Testing Authorities (NATA)-accredited laboratory (primary laboratory – Eurofins; secondary laboratory – ALS). The results are included in **Attachment 5** and elevated results above laboratory limits of reporting (LORs) including elevated results from the July monitoring event are summarised in Table 4 below. Laboratory certificates are included in **Appendix A**.

Table 4 – July and October 2020 GME Elevated Analytical Results (µg/L)

Monitoring Well	Sample Date	F2: TRH (C ₁₀ -C ₁₆ less naphthalene)	F3: TRH (>C ₁₆ -C ₃₄)	Total TRH (C ₁₀ -C ₄₀)	Ethylbenzene	O-Xylene
Trigger Value	-	-	-	-	50	350
MW01	30-Jul-20	140	<100	150	2	3
MW01	14-Oct-20	Not sampled due to 6cm of LNAPL				
MW01A	14-Oct-20	140	600	600	2	3
MW04	30-Jul-20	240	400	650	<1	1
MW04	31-Oct-20	520	1,300	1,820	<1	1

The presence of petroleum hydrocarbons was reported for two groundwater wells, MW01/MW01A and MW04. Both wells are located down inferred hydraulic gradient (as per July flow direction noting there was no distinct flow direction in October). The heavier hydrocarbon fractions (>C₁₀ to C₃₄) are typical of diesel

fractions and, therefore, their presence in groundwater is likely to be associated with the diesel spill.

Reported results from the other groundwater monitoring wells were all below laboratory reporting levels.

From Table 4, an increase in hydrocarbon concentrations is noted between July and October 2020 monitoring events, including the presence of LNAPL in MW01. This indicates that hydrocarbon contaminated groundwater plume may have been migrating to the north west. However, this will be verified during subsequent monitoring events.

No trigger value exceedances were reported during the October 2020 GME.

4.4 QA/QC Results

Groundwater Duplicate Analysis

Field duplicates (*QA01* and *QA02*, duplicates of *MW02*) were collected during the initial October sampling event on 14 October and analysed at the primary (Eurofins) and secondary (ALS) laboratories for TRH and BTEXN).

Field duplicates (*QC01* and *QC01A*, duplicates of *MW05*) were collected during the second October sampling event on 31 October and analysed at the primary (Eurofins) and secondary (ALS) laboratories for TRH and BTEXN).

Duplicate analytical results were assessed by calculating relative percent differences between primary sample results and duplicate sample results. All of the inter and intra laboratory duplicate groundwater analyses had RPD values below the recommended comparison criteria of 50%.

A table summarising the duplicate sample results is presented at the end of this report (refer to **Attachment 6**).

Blank Analyses

Rinsate blank samples (*RB01x2*) were collected during 14 and 31 October and analysed at the primary laboratory for TRH and BTEXN. The rinsate blank samples were collected from decontaminated sampling equipment to ensure adequate cleaning has occurred.

A trip blank samples (*TB01x2*) were prepared and kept with the sample esky for the duration of the GME (during both 14 and 31 October sampling) and delivered to the primary laboratory for TRH and BTEXN analysis. The trip blanks were prepared using de-ionised water to detect potential cross-contamination throughout the sampling and sample delivery stages of the GME.

A table summarising the rinsate and trip blanks sample results is presented at the end of this report (refer to **Attachment 6**).

5.0 Conclusions and Recommendations

The October 2020 groundwater monitoring event was conducted over two days on 14 and 31 October.

All of the analytical results for the October 2020 GME were reported to be below the GMMP trigger levels indicating that no application of contingency measures is required.

However, the concentrations of TRH were noted to be higher in October compared to July results MW01/MW01A and MW04 and the presence of LNAPL was observed in MW01 in October indicating potential subsurface migration of LNAPL as well as potential migration of the groundwater plume. This will be further assessed during subsequent sampling events.

No discernable direction of groundwater flow could be inferred based on the October 2020 gauging results which was interpreted to be a wet season pattern. The flow direction will be verified during subsequent



monitoring rounds.

The next quarterly groundwater monitoring round is scheduled to occur in January 2021.

Attachments

- 1** Statements of Limitation
- 2** Groundwater Monitoring Well Location Plan
- 3** Field Record Sheets
- 4** Groundwater Level Elevation Figure
- 5** Results Summary Table
- 6** QA/QC Summary Tables

Appendices

- A** Laboratory Certificates of Analysis

Yours Sincerely,

Varun Bhagwat
Environmental Consultant - NT

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DRAFT



Groundwater Monitoring Event – October 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 1: Statements of Limitation

Statements of Limitation

All and any Services proposed by Greencap to the Client were subject to the Terms and Conditions listed on the Greencap website at: <https://www.greencap.com.au/terms-conditions>. Unless otherwise expressly agreed to in writing and signed by Greencap, Greencap does not agree to any alternative terms or variation of these terms if subsequently proposed by the Client. The Services were carried out in accordance with the current and relevant industry standards of testing, interpretation and analysis. The Services were carried out in accordance with Commonwealth, State, Territory or Government legislation, regulations and/or guidelines. The Client was deemed to have accepted these Terms when the Client signed the Proposal (where indicated) or when the Company commenced the Services at the request (written or otherwise) of the Client.

The services were carried out for the Specific Purpose, outlined in the body of the Proposal. To the fullest extent permitted by law, Greencap, its related bodies corporate, its officers, consultants, employees and agents assume no liability, and will not be liable to any person, or in relation to, any losses, damages, costs or expenses, and whether arising in contract, tort including negligence, under statute, in equity or otherwise, arising out of, or in connection with, any matter outside the Specific Purpose.

The Client acknowledged and agreed that proposed investigations were to rely on information provided to Greencap by the Client or other third parties. Greencap made no representation or warranty regarding the completeness or accuracy of any descriptions or conclusions based on information supplied to it by the Client, its employees or other third parties during provision of the Services. Under no circumstances shall Greencap have any liability for, or in relation to, any work, reports, information, plans, designs, or specifications supplied or prepared by any third party, including any third party recommended by Greencap. The Client releases and indemnifies Greencap from and against all Claims arising from errors, omissions or inaccuracies in documents or other information provided to Greencap by the Client, its employees or other third parties.

The Client was to ensure that Greencap had access to all information, sites and buildings as required by or necessary for Greencap to undertake the Services. Notwithstanding any other provision in these Terms, Greencap will have no liability to the Client or any third party to the extent that the performance of the Services was not able to be undertaken (in whole or in part) due to access to any relevant sites or buildings being prevented or delayed due to the Client or their respective employees or contractors expressing safety or health concerns associated with such access.

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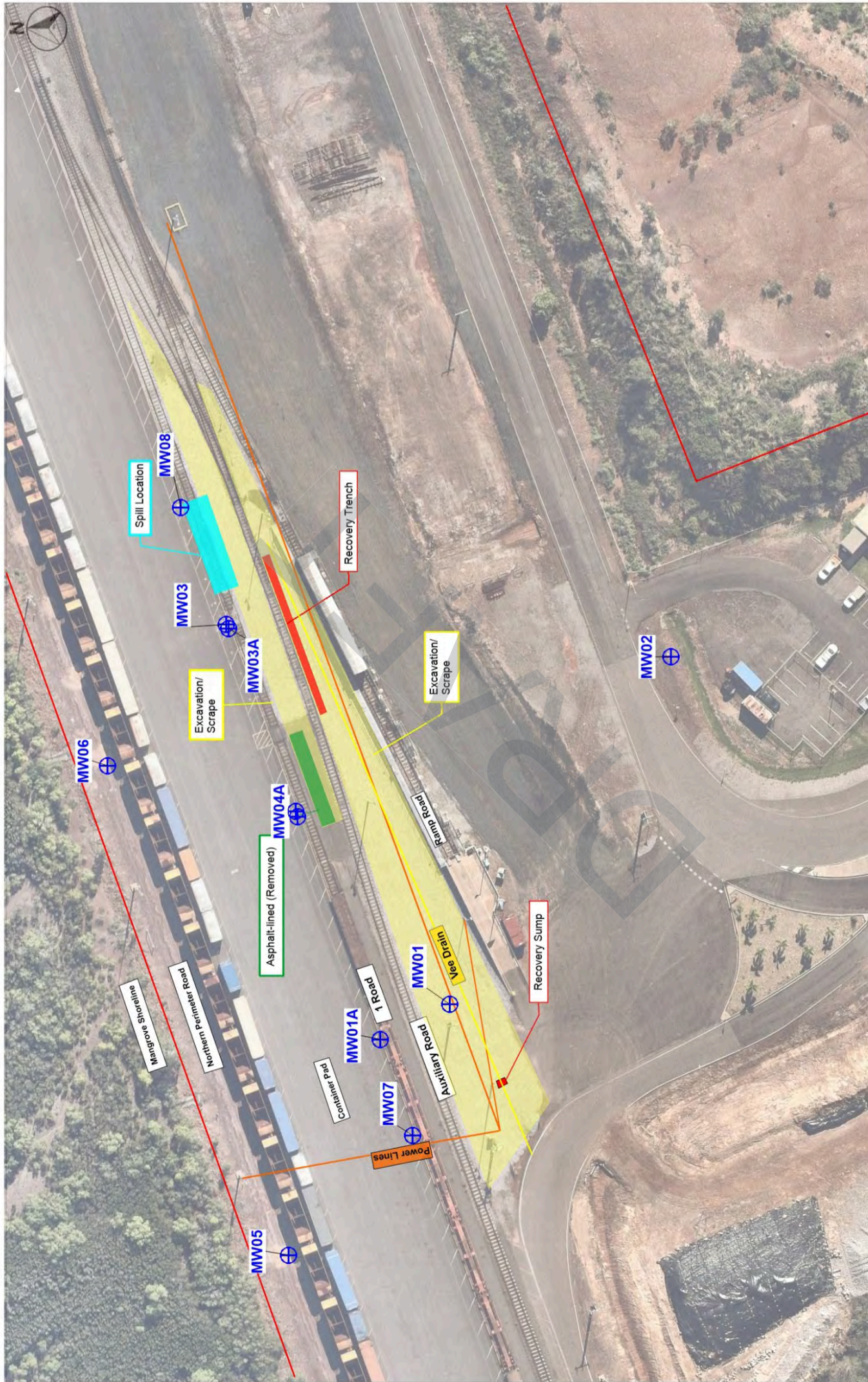


Groundwater Monitoring Event – October 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 2: Groundwater Monitoring Well Location Plan



Legend Site boundary Groundwater Monitoring Well Locations	Client: One Rail Australia Client No: C105292 Project: Diesel Spill Targeted Site Contamination Investigation Job No: J168829	Title: Groundwater Monitoring Plan 0 Address: Berimah Freight Terminal - Export Drive, Berimah NT	Drawn: PM: AS DB Date: 28/11/2020 File Name: J168829 GW Plan	Approximate Scale: 20 m Figure No: 5
	Date Data Collected: 30 Oct 2020 Source: Background Photomap, courtesy of	GREENCAP Level 1 477 High Street Kew East, VIC 3102 P: (03) 9896 8600 F: (03) 9896 8600 www.greencap.com.au		



Groundwater Monitoring Event – October 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 3: Field Record Sheets

Groundwater Monitoring Field Record Sheet

Client: One Rail Australia	Job No: J168829-01
Project: Diesel Spill Groundwater Monitoring	Date: 14/10/2020
Location: Berrimah Freight Terminal, Export Drive, Berrimah NT	

MW 02	WELL DETAILS			SAMPLING EQUIPMENT			
	Well depth: 5.299 (m)	Well diameter: 50mm	Casing type: PVC	Initial water level: 1.873 (m)	Sampling device: Peristaltic (low flow)	Water meter: YSI	Turbidity Meter: Interphase probe: IP Dipper Pro (30m)
					GEO# 5	YSI# 1	TM# 8
					IP# 1		

Time	Amount purged (L)	Cumulative purged (L)	Water Level (m)	Temperature °C	DO % sat	Sp. Conductivity µS/cm	Salinity PSU	pH Units	ORP mV	Turbidity NTU
14:50										
15:01	1.0	1.0	1.873	33.5	4.6	22756	13.57	5.27	169.8	19.7
15:04	1.0	2.0	1.873	33.5	3.5	22669	13.51	5.26	167.9	16.52
15:07	1.0	3.0	1.873	33.5	6.7	21169	12.38	5.26	165.9	13.87
15:10	1.0	4.0	1.873	33.5	23.7	16868	9.78	5.17	161.1	10.71
15:13	1.0	5.0	1.873	33.6	29.8	16352	9.46	5.14	160.1	5.64
15:16	1.0	6.0	1.873	33.5	27.8	16131	9.33	5.12	159.9	3.37
15:19	1.0	7.0	1.873	33.6	30.3	16093	9.30	5.10	159.6	3.30

Stabilisation Criteria (3 readings within ranges)	N/A	Drawdown <10cm	± 10%	± 10%	± 5%	± 10%	± 0.1	± 10mv	N/A
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Field observations: eg. Nearby activities, weather

Weather: Hot, humid, light breeze, scattered cloud

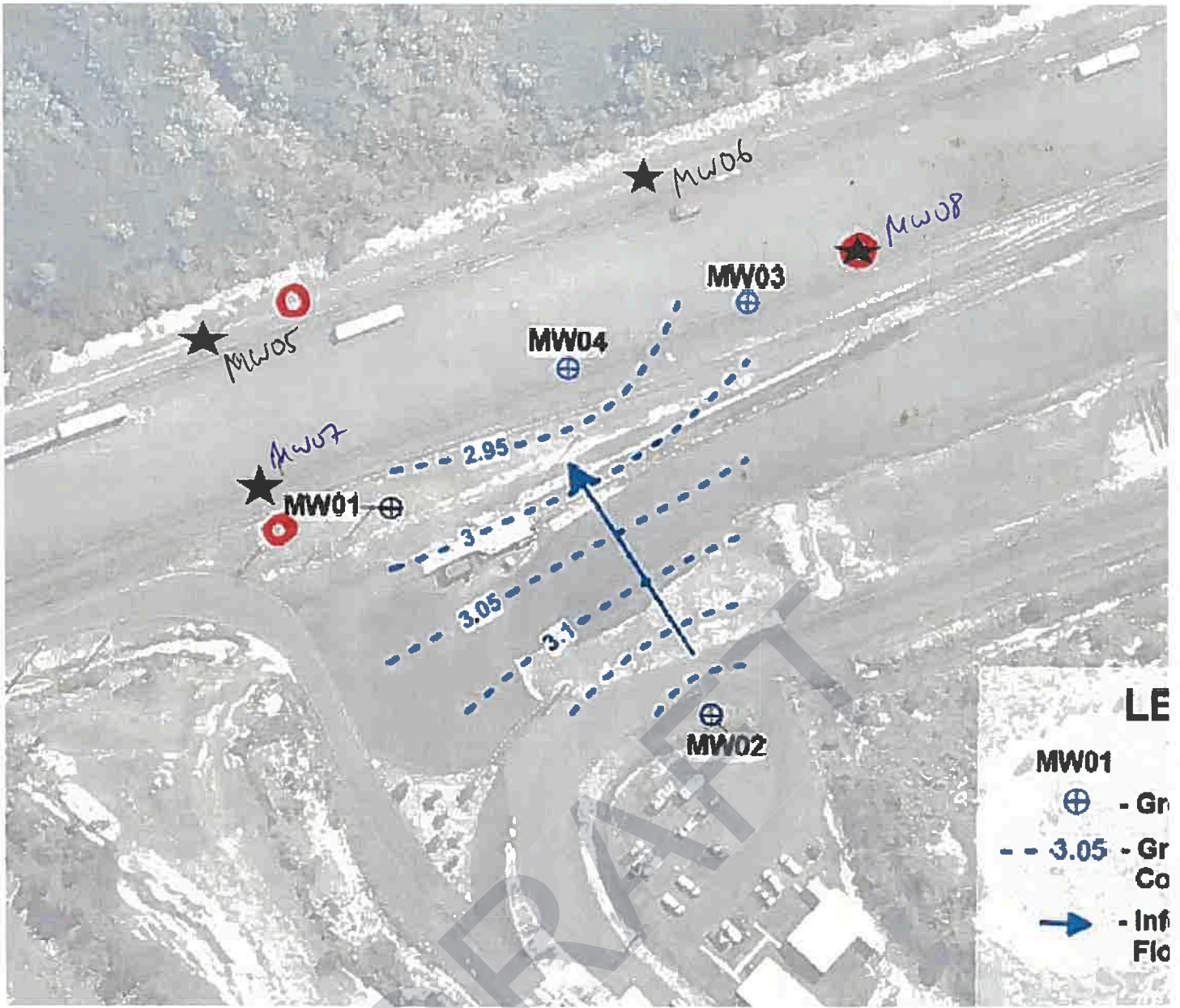
Logger present: N/A	Has water quality meter and turbidity meter been calibrated in accordance with operating manual and recorded? Yes Decontamination procedures followed? Yes
Time removed:	
Time replaced:	

Observations during Sampling:- eg. Odours, sheens, turbidity, water colour <i>Clear water</i> <i>Low turbidity</i> <i>No odour</i> <i>No sheen</i>	Samples Taken	Number	Duplicate: QA	Triplicate: QA
	Metals Plastic*			
	Cr (III & VI)*			
	Plastic unpreserved inorganics (1L)			
	Preserved inorganics (60mL)			
	Glass vials (40mL)	2		
	Glass amber unpreserved (200mL)	2		
	Plastic nutrients green/white (60mL)*			
	PFAS-free plastic unpreserved (500mL)			
	Plastic nutrients light green (60mL)			
Glass amber unpreserved (100mL) (ALS)				
Plastic unpreserved inorganics (250mL)				

MONITORING WELL VOLUMES:-			
Diameter of well casing:	50 mm		
Diameter of hole drilled:	150 mm		
(1) Volume of casing only	0.001964 m3 (kL)	1.96 L per metre	
(2) Volume of drill-hole	0.017674 m3 (kL)	17.67 L per metre	
(3) Volume of annulus around casing	0.015710 m3 (kL)	15.71 L per metre	
(4) Total Bore Volume = 0.3*(3) + (1)	0.006677 m3 (kL)	6.7 L /m	
(assuming 30% porosity in sand/gravel pack)			

Field Technician #1 Full name: STUART CARROLL

Field Technician #2 Full name:



J168829 - ADDITIONAL WELL SAMPLING

30/10/2020

Client: ORA		Job No: J168829
Project: Diesel		Gauged by: VB
Location: Berrimah Freight Terminal		Date: 30/10/2020

Water Level Dipper Type (interphase, length etc): **IP**

Time	Well Name	Depth to Product (m)	Depth to water (m)	Product Thickness (mm)	Depth of Well (m)	Comments
0940	MW05	-	2.003	-	3.306	
1050	MW06	-	2.022	-	3.999	
1320	MW07	-	2.658	-	4.659	
1140	MW08	-	2.739	-	5.007	
1252	MW03	-	2.651	-	-	
1400	MW04	-	2.686	-	-	
1355	MW01A	-	2.674	-	-	
1435	MW01	-	2.699	-	-	SLIGHT HL ABOVE ON PROBE
1438	MW02	-	1.807	-	-	

Observations / Comments:
Weather Conditions (e.g. cloudy, sunny, windy etc), Pumping, etc
SUNNY, LIGHT BREEZE

Groundwater Sampling Record

Client: ORA Job No: J168829 Well ID: MW05
 Project: Diesel Spill Sampled by: VB
 Location: Berrimah Freight Terminal Date: 30-Oct-20

WELL DETAILS		SAMPLING EQUIPMENT			*Other Sampling Equipment / Method
Well depth: <u>3.306</u> (m)	Device: <u>micropurge</u> <u>peristaltic</u> footvalve bailer	Method: <u>low-flow</u> 4-well-volume purged dry			
Casing diameter: <u>50</u> (mm)	WQM Make: <u>YSI</u>				
Casing type: <u>PVC</u> / steel / other	WL Meter: <u>interface</u> non-interface				
Depth to product: <u>—</u> (m bTOC)	Screen (from - to), m: <u>0.306 - 3.306</u>				
Depth to water: <u>2.003</u> (m bTOC)	Pump Depth (m bTOC): <u>2.007</u>				
Product thickness: <u>—</u> (m)					

Field observations: eg well condition, nearby activities, weather, vegetation, etc
SUNNY LIGHT BREEZE

Purging instructions:
 Start purging and stabilise the water level at ~ 0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater). Purging finishes when the three consecutive readings are within the ranges below.

Low Flow: The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.

4-well volume: Well volume: 50mm (2") diameter - 2 L/metre, 100mm (4") diameter - 8 L/metre, 150mm (6") diameter - 18 L/metre

Time	Cumulative Volume purged (L)	Water Level (m bTOC)	Temp (°C)	pH Units	Sp. Cond (µS/cm / mS/cm)	ORP (mV)	DO (mg/L / ppm / %)	Comment <i>Turbidity, Colour, Odour, Sheen, etc</i>
0948	INT	2.003	33.6	5.84	35506	137.5	3.8	Low turbidity, clear, no sheen/odour
0951	2	2.003	33.6	5.54	36055	127.4	1.9	
0954	4	2.003	33.5	5.53	36118	122.3	1.9	
0957	6	2.003	33.5	5.53	36154	116.6	1.6	
1001	8	2.003	33.6	5.53	36279	110.7	1.6	
1005	10	2.003	33.6	5.55	36692	104.5	2.0	
1009	12	2.003	33.6	5.54	36588	100.3	2.1	
1011	14	2.003	33.6	5.55	36676	97.9	2.3	

Observations during Sampling: eg odours, sheens, turbidity, water colour, etc
QUICK RECHARGE, sampled after 14L purged

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments
Glass amber (100-250ml)	6	none	Duplicate ID <u>Q201</u>	
Glass vial (40ml)	6	HCl	Triplicate ID <u>Q201A</u>	
Plastic (60mL) - metals*		HNO3		
Plastic (60mL) - cyanide, CrVI*		NaOH		
Plastic (60mL) - nutrients		H2SO4		
Plastic (500mL) - inorganics		none		
Plastic ()			Blanks	
Plastic ()			Rinsate ID <u>R201</u>	
			<u>T201</u>	

*samples for dissolved metals to be filtered in the field prior to filling sampling container

Groundwater Sampling Record

Client: <u>ORA</u>	Job No: <u>J168829</u>	Well ID <u>MW 06</u>
Project: <u>Diesel Spill</u>	Sampled by: <u>VB</u>	
Location: <u>Berrimah Freight Terminal</u>	Date: <u>30-Oct-20</u>	

WELL DETAILS	SAMPLING EQUIPMENT
Well depth: <u>3.999</u> (m)	Device: <u>micropurge</u> <u>peristaltic</u> footvalve bailer
Casing diameter: <u>50</u> (mm)	Method: <u>low-flow</u> 4-well-volume purged dry
Casing type: <u>PVC</u> / steel / other	WQM Make: <u>YSI</u>
Depth to product: <u>—</u> (m bTOC)	WL Meter: <u>interface</u> non-interface
Depth to water: <u>2.022</u> (m bTOC)	Screen (from - to), m <u>0.999 - 3.999</u>
Product thickness: <u>—</u> (m)	Pump Depth (m bTOC) <u>3.5</u>

Field observations: eg well condition, nearby activities, weather, vegetation, etc
SUNNY, LIGHT BREEZE

Purging instructions:

Low Flow: Start purging and stabilise the water level at ~ 0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater). Purging finishes when the three consecutive readings are within the ranges below.

4-well volume: The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.
Well volume: 50mm (2" diameter) - 2 L/metre, 100mm (4" diameter) - 8 L/metre, 150mm (6" diameter) - 18 L/metre

Stabilisation Criteria (3 readings within ranges)		Drawdown stable <0.1m	± 0.2 °C	± 0.1 pH unit	± 5%	± 10mv	± 10%	Comment <i>Turbidity, Colour, Odour, Sheen, etc</i>
Time	Cumulative Volume purged (L)	Water Level (m bTOC)	Temp °C	pH Units	Sp. Cond <u>µS/cm / mS/cm</u>	ORP mV	DO mg/L / ppm / <u>µ</u>	
1101	1WT	2.022	33.9	5.17	19241	139.5	3.7	↓
1104	2	2.022	33.8	5.08	19652	148.1	2.7	
1107	3	2.022	33.8	4.94	19987	152.4	2.3	
1110	4	2.022	33.8	4.81	20519	157.8	2.7	
1113	5	2.022	33.8	4.79	21323	157.4	2.9	
1116	6	2.022	33.7	4.77	22344	154.6	3.1	
1119	7	2.022	33.8	4.76	22794	157.5	3.4	
1122	8	2.022	33.7	4.77	23275	147.3	3.5	
<u>SAMPLED</u>								

Observations during Sampling:- eg odours, sheens, turbidity, water colour, etc
QUICK RECHARGE, SAMPLED AFTER 8L PURGED

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments
Glass amber (100-250ml)	<u>2</u>	none	Duplicate ID	
Glass vial (40ml)	<u>2</u>	HCl		
Plastic (60mL) - metals*		HNO3	Triplicate ID	
Plastic (60mL) - cyanide, CrVI*		NaOH		
Plastic (60mL) - nutrients		H2SO4	Blanks	
Plastic (500mL) - inorganics		none		
Plastic ()			Rinsate ID	
Plastic ()	<u>(2)</u>			

*samples for dissolved metals to be filtered in the field prior to filling sampling container

Groundwater Sampling Record

Client: <u>ORA</u>		Job No: <u>J168829</u>		Well ID <u>MW07</u>				
Project: <u>Diesel Spill</u>		Sampled by: <u>VB</u>						
Location: <u>Berrimah Freight Terminal</u>		Date: <u>30-Oct-20</u>						
WELL DETAILS			SAMPLING EQUIPMENT					
Well depth:	<u>4.659</u> (m)	Device:	<u>micropurge</u> <u>peristaltic</u> footvalve bailer	*Other Sampling Equipment / Method				
Casing diameter:	<u>50</u> (mm)	Method:	<u>low-flow</u> 4-well-volume purged dry					
Casing type:	<u>PVC</u> / steel / other	WQM Make:	<u>YSI</u>					
Depth to product	— (m bTOC)	WL Meter:	<u>interface</u> non-interface					
Depth to water:	<u>2.658</u> (m bTOC)	Screen (from - to), m	<u>4.459 - 1.659-4.659</u>					
Product thickness	— (m)	Pump Depth (m bTOC)	<u>4.1</u>					
Field observations: eg well condition, nearby activities, weather, vegetation, etc <u>SUNNY, LIGHT BREEZE</u>								
Purging instructions:								
Start purging and stabilise the water level at ~ 0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater). Purging finishes when the three consecutive readings are within the ranges below.								
Low Flow:								
The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.								
4-well volume								
Well volume 50mm (2") diameter - 2 L/metre, 100mm (4") diameter - 8 L/metre, 150mm (6") diameter - 18 L/metre								
Stabilisation Criteria (3 readings within ranges)		Drawdown stable <0.1m	± 0.2 °C	± 0.1 pH unit	± 5%	± 10mv	± 10%	Comment <i>Turbidity, Colour, Odour, Sheen, etc</i>
Time	Cumulative Volume purged (L)	Water Level (m bTOC)	Temp °C	pH Units	Sp. Cond <u>µS/cm / mS/cm</u>	ORP mV	DO mg/L / ppm (%)	
1332	INT	2.658	35.8	6.08	31376	13.4	3.9	↓ <i>L-m turbidity, pale brown slight HCl odour/no sheen</i>
1335	1	2.658	35.7	6.13	29342	2.9	2.6	
1338	2	2.658	35.9	5.99	17136	40.9	10.3	
1342	4	2.658	35.8	5.70	14534	71.6	18.7	
1346	5	2.658	35.8	5.58	14849	84.8	21.3	
1349	6	2.658	35.8	5.48	14321	94.9	24.8	
1352	7	2.658	35.8	5.40	14306	103.0	25.4	
1356	8	2.658	35.8	5.26	14237	115.8	27.7	
1400	9	2.658	35.8	5.25	14231	117.6	27.7	
Observations during Sampling: eg odours, sheens, turbidity, water colour, etc <u>51404 10 2.658 35.8 5.24 14205 118.8 27.6</u> <u>QUICK RECHARGE, SAMPLED AFTER 10L PURGED</u>								
Container Volume (L)	No of containers	Preservative	Duplicates				Other Comments	
Glass amber (100-250ml)	<u>2</u>	none	Duplicate ID					
Glass vial (40mL)	<u>2</u>	HCl	Triplicate ID					
Plastic (60mL) - metals*		HNO3	Blanks					
Plastic (60mL) - cyanide, CrVI*		NaOH	Rinsate ID					
Plastic (60mL) - nutrients		H2SO4						
Plastic (500mL) - inorganics		none						
Plastic ()								
Plastic ()								
Plastic ()								

Groundwater Sampling Record

Client: <u>ORA</u>	Job No: <u>J168829</u>	Well ID <u>MW08</u>
Project: <u>Diesel Spill</u>	Sampled by: <u>VB</u>	
Location: <u>Berrimah Freight Terminal</u>	Date: <u>30-Oct-20</u>	

WELL DETAILS	SAMPLING EQUIPMENT	*Other Sampling Equipment / Method
Well depth: <u>5.007</u> (m)	Device: <u>micropurge</u> <u>peristaltic</u> footvalve bailer	
Casing diameter: <u>50</u> (mm)	Method: <u>low-flow</u> 4-well-volume purged dry	
Casing type: <u>PVC</u> / steel / other	WQM Make: <u>YSI</u>	
Depth to product: <u>-</u> (m bTOC)	WL Meter: <u>interface</u> non-interface	
Depth to water: <u>2.739</u> (m bTOC)	Screen (from - to), m: <u>2.007 - 5.007</u>	
Product thickness: <u>-</u> (m)	Pump Depth (m bTOC): <u>4.5</u>	

Field observations: eg well condition, nearby activities, weather, vegetation etc

SUNNY, LIGHT BREEZE

Purging instructions:

Start purging and stabilise the water level at ~ 0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater) Purging finishes when the three consecutive readings are within the ranges below

Low Flow:

4-well volume

The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.
Well volume: 50mm (2" diameter) - 2 L/metre, 100mm (4" diameter) - 8 L/metre, 150mm (6" diameter) - 18 L/metre

Stabilisation Criteria (3 readings within ranges)		Drawdown stable <0.1m	± 0.2 °C	± 0.1 pH unit	± 5%	± 10mv	± 10%	Comment <i>Turbidity, Colour Odour Sheen, etc</i>
Time	Cumulative Volume purged (L)	Water Level (m bTOC)	Temp °C	pH Units	Sp. Cond (µS/cm / mS/cm)	ORP mV	DO mg/L / ppm / %	
1152	1NT	2.931	35.8	6.42	9214	-14.3	2.1	Low turbidity, pale brown, no sheen, very slight hc odour
1156	2	2.798	36.2	6.34	9456	-5.8	1.6	↓
1200	3	4.142	36.1	6.30	9786	-8.7	5.8	
1205	4	4.324	36.0	6.32	11879	-25.3	12.5	Low turbidity, pale brown slight sheen & hc odour
1210	5	4.319	37.1	6.23	12657	-10.3	34.8	↓
1214	6	4.406	36.3	6.30	13954	-19.1	18.1 36.2	
1218	7	4.443	37.2	6.21	12710	-8.9	38.8 38.8	med turbidity, light brown hc odour, sheen
1222	8	4.746	35.5	6.54	14492	-39.4	4.9	↓
1414	9	2.929	36.0	6.23	18678	3.0	17.9	

Observations during Sampling: eg odours, sheens, turbidity, water colour, etc

sheen

hc odour

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments WEL PURGED ONLY AFTER 10L PURGED, VERY SLOW RECHARGE + sampled after 9L purged
Glass amber (100-250ml)	2	none	Duplicate ID	
Glass vial (40mL)	2	HCl		
Plastic (60mL) - metals*		HNO3	TriPLICATE ID	
Plastic (60mL) - cyanide, CrVI*		NaOH		
Plastic (60mL) - nutrients		H2SO4	Blanks	
Plastic (500mL) - inorganics		none		
Plastic ()				
Plastic ()	(4)		Rinsate ID	
Plastic ()				
Plastic ()				

*samples for dissolved metals to be filtered in the field prior to filling sampling container

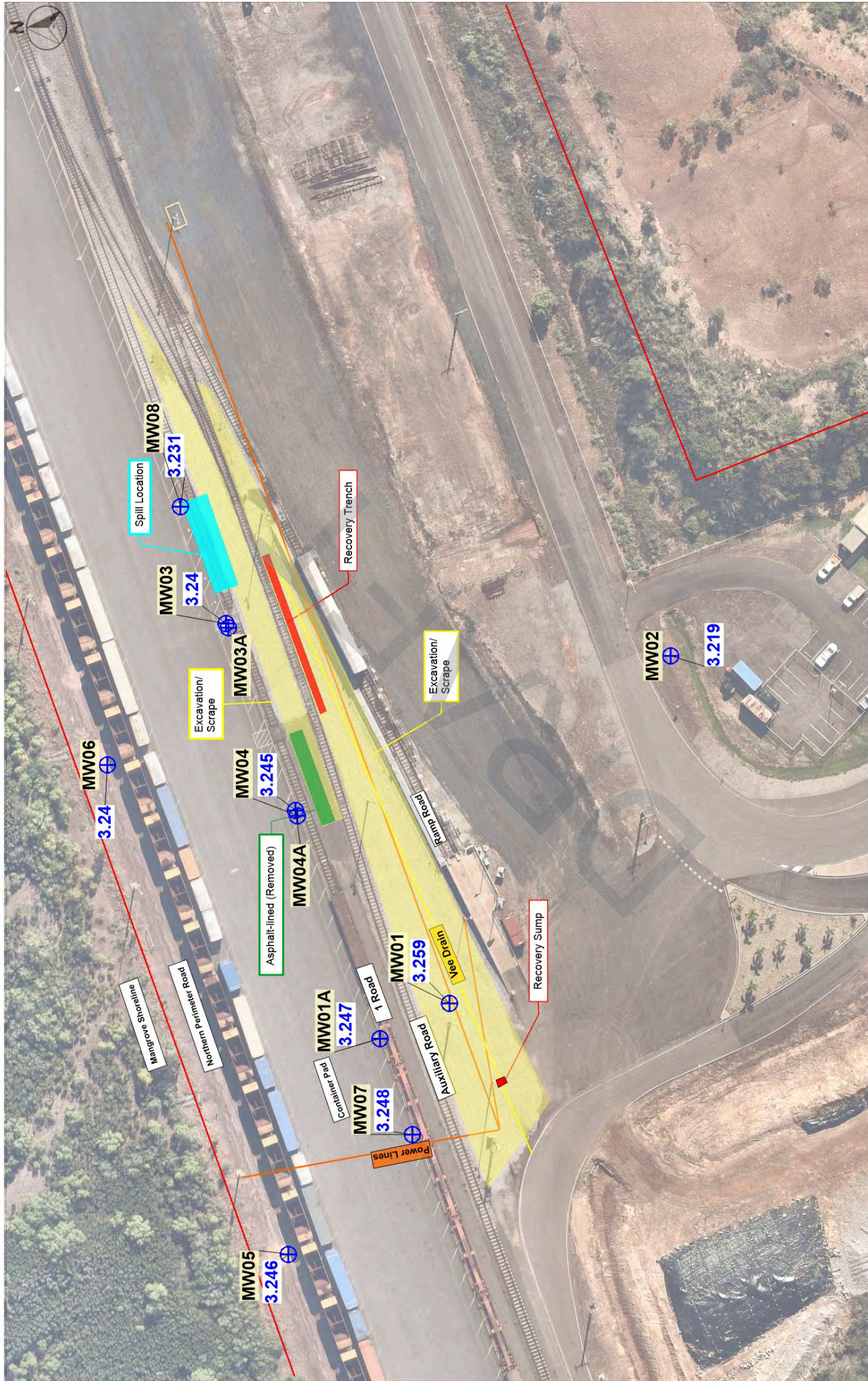


Groundwater Monitoring Event – October 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 4: Groundwater Level Elevation Figure



Legend

- Site boundary
- Groundwater Monitoring Well Locations
- 3.25 Groundwater Level Elevation (mAHD)

Date Data Collected: 30 Oct 2020
Source: Background Photomap, courtesy of nearmap.com

Client: One Rail Australia
Client No.: C105292
Project: Diesel Spill Targeted Site Contamination Investigation
Job No.: J168829

Title: Groundwater Monitoring Plan 0
Address: Berrimah Freight Terminal - Export Drive, Berrimah NT
Groundwater Level Elevations (mAHD)

Drawn: AS **DB** **Date:** 28/11/2020 **File Name:** J168829 GW Plan **Figure No.:** 6

Approximate Scale: 20 m

GREENCAP
Level 1
477 High Street
Kew East, VIC 3102
P: (03) 9896 8600
F: (03) 9896 8600
www.greencap.com.au



Groundwater Monitoring Event – October 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 5: Results Summary Table

Monitoring Well	Date	TRH - 1999 NEPM Fractions (µg/L)				TRH - 2013 NEPM Fractions (µg/L)				Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylene (µg/L)			Naphthalene (µg/L)		
		C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	C ₁₀ -C ₃₆ (Total)	C ₆ -C ₁₀	F1	>C ₁₀ -C ₁₆				F2	F3	F4		>C ₁₀ -C ₄₀ Total	m-
NEPM HSL ¹		-	-	-	-	-	6,000	-	NL	-	-	-	5,000	NL	NL	NL	NL	NL
ANZECC ²		-	-	-	-	-	-	-	-	-	-	-	500	50	200	350	50	-
Fish (n=3) ³		-	-	-	1400-2200	-	-	-	-	-	-	-	-	-	-	-	-	-
Crustacean (N=8) ³		-	-	-	300-4500	-	-	-	-	-	-	-	-	-	-	-	-	-
Molluscs (n=1) ³		-	-	-	600	-	-	-	-	-	-	-	-	-	-	-	-	-
Annelids (n=6) ³		-	-	-	800-3200	-	-	-	-	-	-	-	-	-	-	-	-	-
Algae (n=6) ³		-	-	-	500-1600	-	-	-	-	-	-	-	-	-	-	-	-	-
MW01	30/07/2020	<20	150	<100	<100	150	20	<20	140	140	<100	<100	<1	2	<2	3	<10	<10
MW02	30/07/2020	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<100	<1	<1	<2	<1	<10	<10
MW03	30/07/2020	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<120	<1	<1	<2	<1	<10	<10
MW04	30/07/2020	<20	100	600	<100	700	<20	<20	240	240	400	<100	<1	<1	<2	<1	<10	<10
MW01A	14/10/2020	<20	<50	500	200	700	20	<20	140	140	600	<100	<1	2	<2	3	<10	<10
MW02	14/10/2020	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<120	<1	<1	<2	<1	<10	<10
MW03	14/10/2020	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<120	<1	<1	<2	<1	<10	<10
MW04	14/10/2020	<20	210	1600	<100	1810	<20	<20	520	520	1300	<100	<1	<1	<2	1	<10	<10
MW05	31/10/2020	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<120	<1	<1	<2	<1	<10	<10
MW06	31/10/2020	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<120	<1	<1	<2	<1	<10	<10
MW07	31/10/2020	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<120	<1	<1	<2	<1	<10	<10
MW08	31/10/2020	<20	<50	<100	<100	<100	<20	<20	<50	<50	<100	<120	<1	<1	<2	<1	<10	<10

F1 = C₆-C₁₀ less BTEX; F2 = >C₁₀-C₁₆ less naphthalene; F3 = >C₁₆-C₃₄; F4 = >C₃₄-C₄₀

1 = Groundwater Health Screening Level for vapour intrusion – Commercial/Industrial land use with sand 2 m to <4 m. Assessment of Site Contamination National Environment Protection Measure (1999). National Environment Protection Council (as amended 2013)

2 = Marine ecosystems (99 % protection) – 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. Available at www.waterquality.gov.au/anz-guidelines

3 = Table 8.3.24 from ANZECC 2018 Toxicity ranges for different oils to marine organisms – from Tsvetnenko (1998). LC50 figures normalised (Hamoda et al. 1989) (mg/L)



Groundwater Monitoring Event – October 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 6: QA/QC Summary Tables

DRAFT

Date	Duplicate/Triplicate Relative Percent Differences											
	14/10/2020	14/10/2020	14/10/2020	14/10/2020	14/10/2020	14/10/2020	14/10/2020	14/10/2020	14/10/2020	14/10/2020	14/10/2020	14/10/2020
Analyte	MW02	QA01	RPD	MW02	QA02	RPD	MW05	QC01	RPD	MW05	QC01A	RPD
Benzene	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.001	< 0.001	0
Ethylbenzene	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.001	< 0.001	0
m&p-Xylenes	< 0.002	< 0.002	0	< 0.002	< 0.002	0	< 0.002	< 0.002	0	< 0.002	< 0.002	0
o-Xylene	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.001	< 0.001	0
Toluene	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.001	< 0.001	0
Naphthalene	< 0.01	< 0.01	0	< 0.01	< 0.01	0	< 0.01	< 0.01	0	< 0.01	< 0.01	0
TRH C6-C9	< 0.02	< 0.02	0	< 0.02	< 0.02	0	< 0.02	< 0.02	0	< 0.02	< 0.02	0
TRH C10-C14	< 0.05	< 0.05	0	< 0.05	< 0.05	0	< 0.05	< 0.05	0	< 0.05	< 0.05	0
TRH C15-C28	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 0.1	< 0.1	0
TRH C29-C36	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 0.1	< 0.1	0
TRH C6-C10	< 0.02	< 0.02	0	< 0.02	< 0.02	0	< 0.02	< 0.02	0	< 0.02	< 0.02	0
TRH >C10-C16 less Naphthalene (F2)	< 0.05	< 0.05	0	< 0.05	< 0.05	0	< 0.05	< 0.05	0	< 0.05	< 0.05	0
TRH >C10-C16	< 0.05	< 0.05	0	< 0.05	< 0.05	0	< 0.05	< 0.05	0	< 0.05	< 0.05	0
TRH C6-C10 less BTEX (F1)	< 0.02	< 0.02	0	< 0.02	< 0.02	0	< 0.02	< 0.02	0	< 0.02	< 0.02	0
TRH >C16-C34	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 0.1	< 0.1	0
TRH >C34-C40	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 0.1	< 0.1	0

Rinsate Blank & Trip Blank		
Date	14/10/2020	14/10/2020
Analyte	RB01	TB01
Benzene	< 0.001	< 0.001
Ethylbenzene	< 0.001	< 0.001
m&p-Xylenes	< 0.002	< 0.002
o-Xylene	< 0.001	< 0.001
Toluene	< 0.001	< 0.001
Xylenes - Total*	< 0.003	< 0.003
Naphthalene	< 0.01	-
TRH C6-C9	< 0.02	-
TRH C10-C14	< 0.05	-
TRH C15-C28	< 0.1	-
TRH C29-C36	< 0.1	-
TRH C10-C36 (Total)	< 0.1	-
TRH C6-C10	< 0.02	-
TRH C6-C10 less BTEX (F1)	< 0.02	-
TRH >C10-C16	< 0.05	-
TRH >C10-C16 less Naphthalene (F2)	< 0.05	-
TRH >C16-C34	< 0.1	-
TRH >C34-C40	< 0.1	-
TRH >C10-C40 (total)*	< 0.1	-

DRAFT

Rinsate Blank & Trip Blank			
Date	31/10/2020	31/10/2020	31/10/2020
Analyte	RB01	TB01	
Benzene	< 0.001	< 0.001	
Ethylbenzene	< 0.001	< 0.001	
m&p-Xylenes	< 0.002	< 0.002	
o-Xylene	< 0.001	< 0.001	
Toluene	< 0.001	< 0.001	
Xylenes - Total*	< 0.003	< 0.003	
Naphthalene	< 0.01	-	
TRH C6-C9	< 0.02	-	
TRH C10-C14	< 0.05	-	
TRH C15-C28	< 0.1	-	
TRH C29-C36	< 0.1	-	
TRH C10-C36 (Total)	< 0.1	-	
TRH C6-C10	< 0.02	-	
TRH C6-C10 less BTEX (F1)	< 0.02	-	
TRH >C10-C16	< 0.05	-	
TRH >C10-C16 less Naphthalene (F2)	< 0.05	-	
TRH >C16-C34	< 0.1	-	
TRH >C34-C40	< 0.1	-	
TRH >C10-C40 (total)*	< 0.1	-	



Groundwater Monitoring Event – October 2020

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Appendix A: Laboratory Certificates of Analysis



RECORD

Eurofins (Int) ABN 50 005 086 521

Sydney Laboratory
Unit F3, Bld F, 19 Murrumbidgee Lane, Zone West NSW 2066
02 9900 8400 - Emergencerequests@eurofins.com

Brisbane Laboratory
Unit 1, 21 Smallwood Place, Brisbane QLD 4172
07 5302 4620 - Emergencerequests@eurofins.com

Perth Laboratory
Unit 2/1 Leahy Highway, Kewdale WA 6105
08 9231 9600 - Emergencerequests@eurofins.com

Melbourne Laboratory
8 Monivue Road, Dandenong South VIC 3175
03 9544 0000 - Emergencerequests@eurofins.com

Company	Greencap NT PIL	Project No	J168829-04	Project Manager	Dylan Burford	Project Name	One Rail - Diesel Spill Investigation	Method of Shipment	Courier (#)	Hand Delivered	Total Counts
Address	11/14 Winnellie Road, Winnellie, NT, 0800	Project Name	One Rail - Diesel Spill Investigation	EDD Format	ESDall Equipment	Matrix		Sample Date		Sampling Date	
Contact Name	Stuart Carroll/Varun Bhagwat	Matrix		Matrix		Matrix		Matrix		Matrix	
Phone No	0465 776 038/ 0428 829 444	Matrix		Matrix		Matrix		Matrix		Matrix	
Special Directions		Matrix		Matrix		Matrix		Matrix		Matrix	
Purchase Order	279597	Matrix		Matrix		Matrix		Matrix		Matrix	
Quote ID No		Matrix		Matrix		Matrix		Matrix		Matrix	
No	Client Sample ID	Matrix	Sample Date	Matrix	Matrix	Matrix	Matrix	Matrix	Matrix	Matrix	Matrix
1	MW01A	W	14/10/20	W	1	1	1	1	1	1	1
2	MW02	W	14/10/20	W	1	1	1	1	1	1	1
3	MW03	W	14/10/20	W	1	1	1	1	1	1	1
4	MW04	W	14/10/20	W	1	1	1	1	1	1	1
5	QA01	W	14/10/20	W	1	1	1	1	1	1	1
6											
7	RB01	W	14/10/20	W	1	1	1	1	1	1	1
8	TB01	W	14/10/20	W	1	1	1	1	1	1	1
9											
Add new rows											

Company	Greencap NT PIL	Project No	J168829-04	Project Manager	Dylan Burford	Project Name	One Rail - Diesel Spill Investigation	Method of Shipment		Courier (#)		Hand Delivered		Total Counts	6
Address	11/14 Winnellie Road, Winnellie, NT, 0800	EDD Format	ESDall Equipment	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Contact Name	Stuart Carroll/Varun Bhagwat	Matrix		Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Phone No	0465 776 038/ 0428 829 444	Matrix		Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Special Directions		Matrix		Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Purchase Order	279597	Matrix		Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Quote ID No		Matrix		Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
No	Client Sample ID	Matrix	Sample Date	Matrix	Matrix	Matrix	Matrix	Matrix	Matrix	Matrix	Matrix	Matrix	Matrix	Matrix	Matrix

Submission of samples to the laboratory will be deemed as acceptance of Eurofins' (Int) Standard Terms and Conditions as available on request.

Perth Laboratory
Unit 2/1 Leahy Highway, Kewdale WA 6105
08 9231 9600 - Emergencerequests@eurofins.com

Brisbane Laboratory
Unit 1, 21 Smallwood Place, Brisbane QLD 4172
07 5302 4620 - Emergencerequests@eurofins.com

Sydney Laboratory
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02 9900 8400 - Emergencerequests@eurofins.com

Melbourne Laboratory
8 Monivue Road, Dandenong South VIC 3175
03 9544 0000 - Emergencerequests@eurofins.com

Australia

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Phone : +61 3 8564 5000
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

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Sample Receipt Advice

Company name: Greencap NT P/L
Contact name: Stuart Carroll
Project name: ONE RAIL- DIESEL SPILL INVESTIGATION
Project ID: J168829-04
Turnaround time: 5 Day
Date/Time received: Oct 15, 2020
Eurofins reference: 750628

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

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Michael Morrison on phone : 03 8564 5933 or by email: MichaelMorrison@eurofins.com

Results will be delivered electronically via email to Stuart Carroll - stuart.carroll@greencap.com.au.

Note: A copy of these results will also be delivered to the general Greencap NT P/L email address.

Greencap NT P/L
11/14 Winnellie Road
Winnellie
NT 0800



NATA Accredited
Accreditation Number 1261
Site Number 1254

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: **Stuart Carroll**

Report **750628-W**
Project name **ONE RAIL- DIESEL SPILL INVESTIGATION**
Project ID **J168829-04**
Received Date **Oct 15, 2020**

Client Sample ID			MW01A	MW02	MW03	MW04
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M20-Oc25812	M20-Oc25813	M20-Oc25814	M20-Oc25815
Date Sampled			Oct 14, 2020	Oct 14, 2020	Oct 14, 2020	Oct 14, 2020
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	0.21
TRH C15-C28	0.1	mg/L	0.5	< 0.1	< 0.1	1.6
TRH C29-C36	0.1	mg/L	0.2	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	0.7	< 0.1	< 0.1	1.81
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	78	79	87	88
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	0.52
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	< 0.05	0.52
TRH >C16-C34	0.1	mg/L	0.6	< 0.1	< 0.1	1.3
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	0.6	< 0.1	< 0.1	1.82
Conductivity (at 25°C)	10	uS/cm	50000	8800	14000	7200

Client Sample ID			QA01	RB01	TB01
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M20-Oc25816	M20-Oc25817	M20-Oc25818
Date Sampled			Oct 14, 2020	Oct 14, 2020	Oct 14, 2020
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	-
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-
TRH C15-C28	0.1	mg/L	< 0.1	0.2	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	0.2	-
BTEX					
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	85	80	82
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	-
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	-
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	-
TRH >C10-C16	0.05	mg/L	< 0.05	0.10	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	0.1	-
TRH >C16-C34	0.1	mg/L	< 0.1	0.2	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	0.3	-

DRAFT

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
Eurofins Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Oct 16, 2020	7 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Oct 16, 2020	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Oct 16, 2020	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Oct 16, 2020	
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Oct 16, 2020	28 Days

DRAFT

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
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
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Murarie QLD 4172
Phone : +61 7 3802 4600
NATA # 1261 Site # 20794

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Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

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

Company Name: Greencap NT P/L
Address: 11/14 Winnellie Road
Winnellie
NT 0800

Project Name: ONE RAIL- DIESEL SPILL INVESTIGATION
Project ID: J168829-04

Order No.: 279597
Report #: 750628
Phone: 61 8 8984 4244
Fax: 61 8 8984 3105

Received: Oct 15, 2020 12:00 AM
Due: Oct 22, 2020
Priority: 5 Day
Contact Name: Stuart Carroll

Eurofins Analytical Services Manager : Michael Morrison

Sample Detail						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	MW01A	Oct 14, 2020		Water	M20-Oc25812	X
2	MW02	Oct 14, 2020		Water	M20-Oc25813	X
3	MW03	Oct 14, 2020		Water	M20-Oc25814	X
4	MW04	Oct 14, 2020		Water	M20-Oc25815	X
5	QA01	Oct 14, 2020		Water	M20-Oc25816	X
6	RB01	Oct 14, 2020		Water	M20-Oc25817	X
7	TB01	Oct 14, 2020		Water	M20-Oc25818	X
Test Counts						
						4
						1
						6
Eurofins Suite B1						
BTEX						
Conductivity (at 25°C)						

Meibourne Laboratory - NATA Site # 1254 & 14271

Sydney Laboratory - NATA Site # 18217

Brisbane Laboratory - NATA Site # 20794

Perth Laboratory - NATA Site # 23736

Mayfield Laboratory

External Laboratory

Internal Quality Control Review and Glossary
General

- 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.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- 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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	mg/L	< 0.02			0.02	Pass		
TRH C10-C14	mg/L	< 0.05			0.05	Pass		
TRH C15-C28	mg/L	< 0.1			0.1	Pass		
TRH C29-C36	mg/L	< 0.1			0.1	Pass		
Method Blank								
BTEX								
Benzene	mg/L	< 0.001			0.001	Pass		
Toluene	mg/L	< 0.001			0.001	Pass		
Ethylbenzene	mg/L	< 0.001			0.001	Pass		
m&p-Xylenes	mg/L	< 0.002			0.002	Pass		
o-Xylene	mg/L	< 0.001			0.001	Pass		
Xylenes - Total*	mg/L	< 0.003			0.003	Pass		
Method Blank								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	mg/L	< 0.01			0.01	Pass		
TRH C6-C10	mg/L	< 0.02			0.02	Pass		
TRH >C10-C16	mg/L	< 0.05			0.05	Pass		
TRH >C16-C34	mg/L	< 0.1			0.1	Pass		
TRH >C34-C40	mg/L	< 0.1			0.1	Pass		
Method Blank								
Conductivity (at 25°C)	uS/cm	< 10			10	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	%	96			70-130	Pass		
TRH C10-C14	%	95			70-130	Pass		
LCS - % Recovery								
BTEX								
Benzene	%	105			70-130	Pass		
Toluene	%	103			70-130	Pass		
Ethylbenzene	%	87			70-130	Pass		
m&p-Xylenes	%	90			70-130	Pass		
Xylenes - Total*	%	90			70-130	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	%	84			70-130	Pass		
TRH C6-C10	%	93			70-130	Pass		
TRH >C10-C16	%	97			70-130	Pass		
LCS - % Recovery								
Conductivity (at 25°C)	%	90			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	M20-Oc29366	NCP	%	110		70-130	Pass	
TRH C10-C14	M20-Oc28919	NCP	%	101		70-130	Pass	
Spike - % Recovery								
BTEX								
Benzene	M20-Oc29366	NCP	%	106		70-130	Pass	
Toluene	M20-Oc29366	NCP	%	108		70-130	Pass	
Ethylbenzene	M20-Oc29366	NCP	%	97		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
m&p-Xylenes	M20-Oc29366	NCP	%	100			70-130	Pass	
o-Xylene	M20-Oc29366	NCP	%	96			70-130	Pass	
Xylenes - Total*	M20-Oc29366	NCP	%	99			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M20-Oc29366	NCP	%	87			70-130	Pass	
TRH C6-C10	M20-Oc29366	NCP	%	103			70-130	Pass	
TRH >C10-C16	M20-Oc28919	NCP	%	102			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M20-Oc29365	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M20-Oc27200	NCP	mg/L	0.30	0.44	38	30%	Fail	Q15
TRH C15-C28	M20-Oc27200	NCP	mg/L	0.2	0.3	51	30%	Fail	Q15
TRH C29-C36	M20-Oc27200	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M20-Oc29365	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M20-Oc29365	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M20-Oc29365	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M20-Oc29365	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M20-Oc29365	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M20-Oc29365	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M20-Oc29365	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	M20-Oc29365	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M20-Oc27200	NCP	mg/L	0.40	0.57	34	30%	Fail	Q15
TRH >C16-C34	M20-Oc27200	NCP	mg/L	< 0.1	0.2	91	30%	Fail	Q15
TRH >C34-C40	M20-Oc27200	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (at 25°C)	S20-Oc26481	NCP	uS/cm	890	740	18	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
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
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

Michael Morrison	Analytical Services Manager
Joseph Edouard	Senior Analyst-Organic (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)
Vivian Wang	Senior Analyst-Volatile (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](#).

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#AU_CAU001_EnviroSampleVic

From: Varun Bhagwat <Varun.Bhagwat@greencap.com.au>
Sent: Friday, 30 October 2020 6:20 PM
To: Michael Morrison
Cc: #AU_CAU001_EnviroSampleVic; #AU09_EnviroSampleDRW; Dylan Burford
Subject: J168829 - COC with Testing
Attachments: J168829 - EFCOC.pdf

Hi Michael,

Attached is the COC with testing for groundwater samples collected on 30/10/2020 for the project: **J168829**.

The samples were delivered to the Darwin Eurofins drop off point on 30/10/2020.

Thank you.

Kind Regards

Varun Bhagwat

Environmental Consultant | Greencap

Unit 11 / 14 Winnellie Road Winnellie, NT 0820
M: 0428 829 444 | E: Varun.Bhagwat@greencap.com.au | in: [LinkedIn](#)

754483

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IANZ # 1327

Christchurch

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

Sample Receipt Advice

Company name: Greencap NT P/L
Contact name: Varun
Project name: ORA DIESEL SPILL
Project ID: J168829
Turnaround time: 3 Day
Date/Time received: Oct 30, 2020 6:20 PM
Eurofins reference: 754483

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

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Michael Morrison on phone : 03 8564 5933 or by email: MichaelMorrison@eurofins.com

Results will be delivered electronically via email to Varun - varun.bhagwat@greencap.com.au.

Note: A copy of these results will also be delivered to the general Greencap NT P/L email address.

Greencap NT P/L
11/14 Winnellie Road
Winnellie
NT 0800



NATA Accredited
Accreditation Number 1261
Site Number 1254

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: Varun

Report: 754483-W
Project name: ORA DIESEL SPILL
Project ID: J168829
Received Date: Oct 30, 2020

Client Sample ID			MW05 Water	MW06 Water	MW07 Water	MW08 Water
Sample Matrix			M20-No04480	M20-No04481	M20-No04482	M20-No04483
Eurofins Sample No.			Oct 30, 2020	Oct 30, 2020	Oct 30, 2020	Oct 30, 2020
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	65	78	83	80
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			QC01 Water	RB01 Water	TB01 Water
Sample Matrix			M20-No04484	M20-No04485	M20-No04486
Eurofins Sample No.			Oct 30, 2020	Oct 30, 2020	Oct 30, 2020
Date Sampled					
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	-
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	-

Client Sample ID			QC01	RB01	TB01
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M20-No04484	M20-No04485	M20-No04486
Date Sampled			Oct 30, 2020	Oct 30, 2020	Oct 30, 2020
Test/Reference	LOR	Unit			
BTEX					
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	114	79	112
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	-
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	-
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	-

DRAFT

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
Eurofins Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Nov 04, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Nov 04, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 04, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 04, 2020	
- Method: LTM-ORG-2010 TRH C6-C40			

DRAFT

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarie QLD 4172
Phone : +61 7 3802 4600
NATA # 1261 Site # 20794

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

New Zealand

Auckland
35 O'Rourke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name: Greencap NT P/L
Address: 11/14 Winnellie Road
Winnellie
NT 0800
Project Name: ORA DIESEL SPILL
Project ID: J168829

Order No.: PO280106
Report #: 754483
Phone: 61 8 8984 4244
Fax: 61 8 8984 3105

Received: Oct 30, 2020 6:20 PM
Due: Nov 6, 2020
Priority: 3 Day
Contact Name: Varun

Eurofins Analytical Services Manager : Michael Morrison

Sample Detail						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	MW05	Oct 30, 2020		Water	M20-No04480	X
2	MW06	Oct 30, 2020		Water	M20-No04481	X
3	MW07	Oct 30, 2020		Water	M20-No04482	X
4	MW08	Oct 30, 2020		Water	M20-No04483	X
5	QC01	Oct 30, 2020		Water	M20-No04484	X
6	RB01	Oct 30, 2020		Water	M20-No04485	X
7	TB01	Oct 30, 2020		Water	M20-No04486	X
Test Counts						1
Eurofins Suite B1						X
BTEX and Naphthalene						X
Melbourne Laboratory - NATA Site # 1254 & 14271 Sydney Laboratory - NATA Site # 18217 Brisbane Laboratory - NATA Site # 20794 Perth Laboratory - NATA Site # 23736 Mayfield Laboratory External Laboratory						

Internal Quality Control Review and Glossary
General

- 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.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- 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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	mg/L	< 0.02			0.02	Pass		
TRH C10-C14	mg/L	< 0.05			0.05	Pass		
TRH C15-C28	mg/L	< 0.1			0.1	Pass		
TRH C29-C36	mg/L	< 0.1			0.1	Pass		
Method Blank								
BTEX								
Benzene	mg/L	< 0.001			0.001	Pass		
Toluene	mg/L	< 0.001			0.001	Pass		
Ethylbenzene	mg/L	< 0.001			0.001	Pass		
m&p-Xylenes	mg/L	< 0.002			0.002	Pass		
o-Xylene	mg/L	< 0.001			0.001	Pass		
Xylenes - Total*	mg/L	< 0.003			0.003	Pass		
Method Blank								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	mg/L	< 0.01			0.01	Pass		
TRH C6-C10	mg/L	< 0.02			0.02	Pass		
TRH >C10-C16	mg/L	< 0.05			0.05	Pass		
TRH >C16-C34	mg/L	< 0.1			0.1	Pass		
TRH >C34-C40	mg/L	< 0.1			0.1	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	%	116			70-130	Pass		
TRH C10-C14	%	113			70-130	Pass		
LCS - % Recovery								
BTEX								
Benzene	%	109			70-130	Pass		
Toluene	%	108			70-130	Pass		
Ethylbenzene	%	106			70-130	Pass		
m&p-Xylenes	%	112			70-130	Pass		
Xylenes - Total*	%	109			70-130	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	%	83			70-130	Pass		
TRH C6-C10	%	113			70-130	Pass		
TRH >C10-C16	%	118			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	M20-Oc52391	NCP	%	128		70-130	Pass	
TRH C10-C14	B20-No02737	NCP	%	76		70-130	Pass	
Spike - % Recovery								
BTEX								
Benzene	M20-Oc52391	NCP	%	103		70-130	Pass	
Toluene	M20-Oc52391	NCP	%	98		70-130	Pass	
Ethylbenzene	M20-Oc52391	NCP	%	100		70-130	Pass	
m&p-Xylenes	M20-Oc52391	NCP	%	104		70-130	Pass	
o-Xylene	M20-Oc52391	NCP	%	102		70-130	Pass	
Xylenes - Total*	M20-Oc52391	NCP	%	103		70-130	Pass	
Spike - % Recovery								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M20-Oc52391	NCP	%	93			70-130	Pass	
TRH C6-C10	M20-Oc52391	NCP	%	123			70-130	Pass	
TRH >C10-C16	B20-No02737	NCP	%	81			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M20-No02242	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	S20-Oc48266	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	S20-Oc48266	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	S20-Oc48266	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M20-No02242	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M20-No02242	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M20-No02242	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M20-No02242	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M20-No02242	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M20-No02242	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M20-No02242	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	M20-No02242	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	S20-Oc48266	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	S20-Oc48266	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	S20-Oc48266	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	

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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
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
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.

Authorised By

Michael Morrison	Analytical Services Manager
Joseph Edouard	Senior Analyst-Organic (VIC)
Vivian Wang	Senior Analyst-Volatile (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](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

2310.20

CHAIN OF CUSTODY

ALS Laboratory; please tick →
 CAPELLADE 21 Burns Road, Poroska SA 5096
 Ph: 08 8359 0800 E: adlab@alsglobal.com
 DORRISANE 2, 8th Street, Sturtford QLD 4053
 Ph: 07 324 7222 E: samplesbrisbane@alsglobal.com
 DARLINGTON 48 Callenderden Drive, Clinton, QLD 4680
 Ph: 07 7471 5600 E: gstanston@alsglobal.com

JIMCARTY 78 Thebar Road Mackay QLD 4740
 Ph: 07 4944 0177 E: mackay@alsglobal.com
DMELBOURNE 2, 4 Westall Road, Springvale VIC 3171
 Ph: 03 8549 8600 E: samples.melbourne@alsglobal.com
CHMUDGE 1233 Sweeney Road, Mulgump NSW 2850
 Ph: 02 6372 8755 E: mudgee@mail@alsglobal.com

LINEYCASTLE 5685 Maitland Road, Mayfield West NSW 2304
 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
CHNOWRA 4/13 Geary Place, North Nowra NSW 2541
 Ph: 02 4423 2833 E: nowra@alsglobal.com
CHPERTH 101 Red Way, Malaga WA 6090
 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

US'DNEY 277-289 Woodpark Road, Smithfield NSW 2164
 Ph: 02 8781 8555 E: samples.sydney@alsglobal.com
DTOWNSVILLE 14-15 Desma Court, Bohle QLD 4618
 Ph: 07 4736 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street, Wollongong NSW 2500
 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: Greencap
OFFICE: Darwin
PROJECT: ORA Diesel Spill GME
ORDER NUMBER: PURCHASE ORDER NO.: 279589
PROJECT NO.: J168823-01
ALS QUOTE NO.:
COUNTRY OF ORIGIN:
CONTACT PH:
SAMPLER MOBILE: 0466776038
EDD FORMAT (or default):
 stuart.carroll@greencap.com.au
 varun.bhagwat@greencap.com.au
 alex.sereda@greencap.com.au

TURNAROUND REQUIREMENTS:
 Standard TAT (List due date):
 Non Standard or urgent TAT (List due date):

FOR LABORATORY USE ONLY (Circle)
 Custody Seal Intact? Yes No
 Free ice / frozen ice bricks present upon receipt? Yes No
 Random Sample Temperature on Receipt: 92.5 °C
 Other comment:

RECEIVED BY: Kim
 DATE/TIME: 16/10/20

RECEIVED BY: [Signature]
 DATE/TIME: 15/10/20 11:20am

RELINQUISHED BY: [Signature]
 DATE/TIME: 15/10/20 11:20am

RELINQUISHED BY: [Signature]
 DATE/TIME: 16/10/20 8:00am

COOLING CURVES (COC):
 COC: 1 2 3 4 5 6 7
 OF: 1 2 3 4 5 6 7

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	ANALYSIS REQUIRED including SUITES (NB: Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).	Additional Information
1	QA02	14/10/2020 0:00	Water	AG & V	3	Suite W-4 1	
					TOTAL	3	

Environmental Division
 Sydney
 Work Order Reference
ES2035966



Telephone : 61-2-8784 8544

LAB OF ORIGIN:
DARWIN

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Citric Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = VOA Vial Sulfuric Preserved; Vial SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solids; B = Unpreserved Bag; LI = Luggs Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.



Environmental

QUALITY CONTROL REPORT

Work Order : **ES2035966**

Page : 1 of 4

Client : **GREENCAP-NAA PTY LTD**
Contact : **MR DYLAN BURFORD**
Address : **11/14 Winnellie Road
WINNELLIE NT, AUSTRALIA 0820**
Telephone : **+61 08 8299 9955**
Project : **J168829-01 ORA - Diesel Spill GME**
Order number : **279599**
C-O-C number : **1**
Sampler : **STUART CARROLL**
Site : **----**
Quote number : **EN/222**
No. of samples received : **1**
No. of samples analysed : **1**

Laboratory : **Environmental Division Sydney**
Contact : **Shane Ellis**
Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**
Telephone : **+61 2 8784 8555**
Date Samples Received : **16-Oct-2020**
Date Analysis Commenced : **19-Oct-2020**
Issue Date : **22-Oct-2020**



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 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
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



Page : 2 of 4
 Work Order : ES2035966
 Client : GREENCAP-NAA PTY LTD
 Project : J168829-01 ORA - Diesel Spill GME

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: **WATER**

Laboratory sample ID	Client sample ID	Method/Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3313489)									
ES2035949-001	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
ES2036321-001	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3313489)									
ES2035949-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES2036321-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3313489)									
ES2035949-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
ES2036321-001	Anonymous	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit



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

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control 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: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
EP080/074: Total Petroleum Hydrocarbons (QCLot: 3312614)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	83.3	55.8	112	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	77.7	71.6	113	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	81.9	56.0	121	
EP080/074: Total Petroleum Hydrocarbons (QCLot: 3313489)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	84.9	75.0	127	
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3312614)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	68.7	57.9	119	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	78.5	62.5	110	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	71.8	61.5	121	
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3313489)									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	86.3	75.0	127	
EP080: BTEXN (QCLot: 3313489)									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.2	70.0	122	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	93.7	69.0	123	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	93.8	70.0	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	92.7	69.0	121	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	97.6	72.0	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	96.7	70.0	120	

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 (DOOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Matrix Spike (MS) Report		
					Spike Recovery(%)	MS	Recovery Limits (%)
				Low	High		
EP080/074: Total Petroleum Hydrocarbons (QCLot: 3313489)							
ES2035949-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	78.2	70.0	130
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3313489)							
ES2035949-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	76.7	70.0	130
EP080: BTEXN (QCLot: 3313489)							
ES2035949-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	84.0	70.0	130



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 Work Order : ES2035966
 Client : GREENCAP-NAA PTY LTD
 Project : J168829-01 ORA - Diesel Spill GME

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%)	Recovery Limits (%)
EP080: BTEXN (QCLot: 3313489) - continued						
ES2035949-001	Anonymous	EP080: Toluene	108-88-3	25 µg/L	86.4	70.0 - 130
		EP080: Ethylbenzene	100-41-4	25 µg/L	88.0	70.0 - 130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	85.6	70.0 - 130
		EP080: ortho-Xylene	106-42-3	25 µg/L	90.9	70.0 - 130
		EP080: Naphthalene	91-20-3	25 µg/L	78.8	70.0 - 130

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Work Order : **ES2035966** Page : 1 of 4
Client : **GRENCAP-NAA PTY LTD** Laboratory : **Environmental Division Sydney**
Contact : **MR DYLAN BURFORD** Telephone : **+61 2 8784 8555**
Project : **J168829-01 ORA - Diesel Spill GME** Date Samples Received : **16-Oct-2020**
Site : **----** Issue Date : **22-Oct-2020**
Sampler : **STUART CARROLL** No. of samples received : **1**
Order number : **279599** No. of samples analysed : **1**

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

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

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



Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP) TRH - Semivolatle Fraction	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS) TRH - Semivolatle Fraction	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

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: **WATER**

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Date analysed	Due for analysis
EP080/071: Total Petroleum Hydrocarbons Amber Glass Bottle - Unpreserved (EP071) QA02	14-Oct-2020	19-Oct-2020	21-Oct-2020	20-Oct-2020	28-Nov-2020
Amber VOC Vial - Sulfuric Acid (EP080) QA02	14-Oct-2020	21-Oct-2020	28-Oct-2020	21-Oct-2020	28-Oct-2020
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions Amber Glass Bottle - Unpreserved (EP071) QA02	14-Oct-2020	19-Oct-2020	21-Oct-2020	20-Oct-2020	28-Nov-2020
Amber VOC Vial - Sulfuric Acid (EP080) QA02	14-Oct-2020	21-Oct-2020	28-Oct-2020	21-Oct-2020	28-Oct-2020
EP080: BTEXN Amber VOC Vial - Sulfuric Acid (EP080) QA02	14-Oct-2020	21-Oct-2020	28-Oct-2020	21-Oct-2020	28-Oct-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: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Analytical Methods	Method	Count		Actual	Rate (%)		Evaluation	Quality Control Specification
			QC	Regular		Expected	Actual		
Laboratory Duplicates (DUP)									
TRH - Semivolatle Fraction	EP071		0	13	0.00	10.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		2	20	10.00	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)									
TRH - Semivolatle Fraction	EP071		1	13	7.69	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		1	20	5.00	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)									
TRH - Semivolatle Fraction	EP071		1	13	7.69	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		1	20	5.00	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)									
TRH - Semivolatle Fraction	EP071		0	13	0.00	5.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		1	20	5.00	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Page : 4 of 4
 Work Order : ES2035966
 Client : GREENCAP-NAA PTY LTD
 Project : J168829-01 ORA - Diesel Spill GME

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.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TRH - Semivolatle Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **ES2035966**
Client : **GREENCAP-NAA PTY LTD**
Contact : **MR DYLAN BURFORD**
Address : **11/14 Winnellie Road**
WINNELLIE NT, AUSTRALIA 0820
Telephone : **+61 08 8299 9955**
Project : **J168829-01 ORA - Diesel Spill GME**
Order number : **279599**
C-O-C number : **1**
Sampler : **STUART CARROLL**
Site : **----**
Quote number : **EN/222**
No. of samples received : **1**
No. of samples analysed : **1**

Page : **1 of 4**
Laboratory : **Environmental Division Sydney**
Contact : **Shane Ellis**
Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**
Telephone : **+61 2 8784 8555**
Date Samples Received : **16-Oct-2020 08:00**
Date Analysis Commenced : **19-Oct-2020**
Issue Date : **22-Oct-2020 12:01**



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

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.

Edwandy Fadjar *Position*

Organic Coordinator

Accreditation Category

Sydney Organics, Smithfield, NSW



Page : 2 of 4
Work Order : ES2035966
Client : GREENCAP-NAA PTY LTD
Project : J168829-01 ORA - Diesel Spill GME

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		QA02
Compound	CAS Number	LOR	Client sampling date / time	ES2035966-001 Result
EP080/071: Total Petroleum Hydrocarbons				
C6 - C9 Fraction		20		<20
C10 - C14 Fraction		50		<50
C15 - C28 Fraction		100		<100
C29 - C36 Fraction		50		<50
^ C10 - C36 Fraction (sum)		50		<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions				
C6 - C10 Fraction	C6_C10	20		<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20		<20
>C10 - C16 Fraction		100		<100
>C16 - C34 Fraction		100		<100
>C34 - C40 Fraction		100		<100
^ >C10 - C40 Fraction (sum)		100		<100
^ >C10 - C16 Fraction minus Naphthalene (F2)		100		<100
EP080: BTEXN				
Benzene	71-43-2	1		<1
Toluene	108-88-3	2		<2
Ethylbenzene	100-41-4	2		<2
meta- & para-Xylene	108-38-3 106-42-3	2		<2
ortho-Xylene	95-47-6	2		<2
^ Total Xylenes		2		<2
^ Sum of BTEX		1		<1
Naphthalene	91-20-3	5		<5
EP080S: TPH(V)/BTEX Surrogates				
1,2-Dichloroethane-D4	17060-07-0	2	%	110
Toluene-D8	2037-26-5	2	%	96.1
4-Bromofluorobenzene	460-00-4	2	%	93.5



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Work Order : ES2035966
Client : GREENCAP-NAA PTY LTD
Project : J168829-01 ORA - Diesel Spill GME

Surrogate Control Limits

Sub-Matrix: WATER		
Compound	CAS Number	
Recovery Limits (%)		
	Low	High
EP080S: TPH(V)/BTEX Surrogates		
1,2-Dichloroethane-D4	17060-07-0	71 137
Toluene-D8	2037-26-5	79 131
4-Bromofluorobenzene	460-00-4	70 128

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Environmental

QUALITY CONTROL REPORT

Work Order : **ES2038032**

Page : 1 of 5

Client : **GREENCAP-NAA PTY LTD**
 Contact : **MR DYLAN BURFORD**
 Address : **11/14 Winnellie Road**
WINNELLIE NT, AUSTRALIA 0820
 Telephone : **+61 08 8299 9955**
 Project : **J168829 ORA Diesel Spill**
 Order number : **PO280108**
 C-O-C number : **----**
 Sampler : **VARUN BHAGWAT**
 Site : **Berrimah Freight Terminal**
 Quote number : **EN/222**
 No. of samples received : **1**
 No. of samples analysed : **1**

Laboratory : **Environmental Division Sydney**
 Contact : **Shane Ellis**
 Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**

Telephone : **+61 2 8784 8555**
 Date Samples Received : **03-Nov-2020**
 Date Analysis Commenced : **04-Nov-2020**
 Issue Date : **10-Nov-2020**



Accreditation No. 825
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 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 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

Accreditation Category

Edwandy Fadjar

Organic Coordinator

Sydney Organics, Smithfield, NSW



Page : 2 of 5
 Work Order : ES2038032
 Client : GREENCAP-NAA PTY LTD
 Project : J168829 ORA Diesel Spill

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: WATER

Laboratory sample ID	Client sample ID	Method/Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3343231)									
ES2038032-001	QC01A	EP071: C15 - C28 Fraction	---	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	---	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3345606)									
ES2038032-001	QC01A	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
ES2038687-004	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3343231)									
ES2038032-001	QC01A	EP071: >C10 - C16 Fraction	---	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	---	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3345606)									
ES2038032-001	QC01A	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES2038687-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3345606)									
ES2038032-001	QC01A	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
ES2038687-004	Anonymous	EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit



Page : 3 of 5
 Work Order : ES2038032
 Client : GREENCAP-NAA PTY LTD
 Project : J168829 ORA Diesel Spill

Sub-Matrix: **WATER**

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
EP080: BTEXN (QC Lot: 3345606) - continued							Original Result	Duplicate Result	RPD (%)	
ES2038687-004	Anonymous		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
			EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
			EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

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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: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3343231)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	79.6	55.8	112	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	76.3	71.6	113	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	82.7	56.0	121	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3345606)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	86.3	75.0	127	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3343231)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	74.8	57.9	119	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	75.6	62.5	110	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	86.9	61.5	121	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3345606)									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	85.9	75.0	127	
EP080: BTEXN (QCLot: 3345606)									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	87.5	70.0	122	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	95.8	69.0	123	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	87.1	70.0	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	84.4	69.0	121	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	88.1	72.0	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	102	70.0	120	

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 (DOOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)
			Low	High		
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3343231)						
ES2038032-001	QC01A	EP071: C10 - C14 Fraction	200 µg/L	93.0	70.0	130
		EP071: C15 - C28 Fraction	250 µg/L	107	71.0	130
		EP071: C29 - C36 Fraction	200 µg/L	81.4	67.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3345606)						
ES2038032-001	QC01A	EP080: C6 - C9 Fraction	325 µg/L	117	70.0	130



Page : 5 of 5
 Work Order : ES2038032
 Client : GREENCAP-NAA PTY LTD
 Project : J168829 ORA Diesel Spill

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3343231)						
ES2038032-001	QC01A	EP071: >C10 - C16 Fraction	----	250 µg/L	96.0	70.0
		EP071: >C16 - C34 Fraction	----	350 µg/L	79.0	75.0
		EP071: >C34 - C40 Fraction	----	150 µg/L	102	67.0
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3345606)						
ES2038032-001	QC01A	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	114	70.0
EP080: BTEXN (QCLot: 3345606)						
ES2038032-001	QC01A	EP080: Benzene	71-43-2	25 µg/L	98.6	70.0
		EP080: Toluene	108-88-3	25 µg/L	102	70.0
		EP080: Ethylbenzene	100-41-4	25 µg/L	105	70.0
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	109	70.0
			106-42-3			
		EP080: ortho-Xylene	95-47-6	25 µg/L	108	70.0
		EP080: Naphthalene	91-20-3	25 µg/L	105	70.0



Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order : **ES2038032** Page : 1 of 4

Client : **GREENCAP-NAA PTY LTD** Laboratory : Environmental Division Sydney
Contact : **MR DYLAN BURFORD** Telephone : **+61 2 8784 8555**
Project : **J168829 ORA Diesel Spill** Date Samples Received : **03-Nov-2020**
Site : **Berrimah Freight Terminal** Issue Date : **10-Nov-2020**
Sampler : **VARUN BHAGWAT** No. of samples received : **1**
Order number : **PO280108** No. of samples analysed : **1**

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

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

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



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: **WATER**

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis		
		Date extracted	Due for extraction	Date analysed	Due for analysis	
EP080/071: Total Petroleum Hydrocarbons						
Amber Glass Bottle - Unpreserved (EP071) QC01A	30-Oct-2020	04-Nov-2020	06-Nov-2020	10-Nov-2020	14-Dec-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC01A	30-Oct-2020	06-Nov-2020	13-Nov-2020	06-Nov-2020	13-Nov-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions						
Amber Glass Bottle - Unpreserved (EP071) QC01A	30-Oct-2020	04-Nov-2020	06-Nov-2020	10-Nov-2020	14-Dec-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC01A	30-Oct-2020	06-Nov-2020	13-Nov-2020	06-Nov-2020	13-Nov-2020	✓
EP080: BTEXN						
Amber VOC Vial - Sulfuric Acid (EP080) QC01A	30-Oct-2020	06-Nov-2020	13-Nov-2020	06-Nov-2020	13-Nov-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: **WATER**

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

Quality Control Sample Type	Analytical Methods	Method	Count		Actual	Rate (%)		Evaluation	Quality Control Specification
			QC	Regular		Expected	Actual		
Laboratory Duplicates (DUP)									
TRH - Semivolatlie Fraction	EP071		1	2	50.00	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatlies/BTEX	EP080		2	20	10.00	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)									
TRH - Semivolatlie Fraction	EP071		1	2	50.00	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatlies/BTEX	EP080		1	20	5.00	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)									
TRH - Semivolatlie Fraction	EP071		1	2	50.00	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatlies/BTEX	EP080		1	20	5.00	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)									
TRH - Semivolatlie Fraction	EP071		1	2	50.00	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatlies/BTEX	EP080		1	20	5.00	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



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 Work Order : ES2038032
 Client : GREENCAP-NAA PTY LTD
 Project : J168829 ORA Diesel Spill

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.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TRH - Semivolatle Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

CERTIFICATE OF ANALYSIS

Work Order : **ES2038032**
Client : **GREENCAP-NAA PTY LTD**
Contact : **MR DYLAN BURFORD**
Address : **11/14 Winnellie Road**
WINNELLIE NT, AUSTRALIA 0820
Telephone : **+61 08 8299 9955**
Project : **J168829 ORA Diesel Spill**
Order number : **PO280108**
C-O-C number : **----**
Sampler : **VARUN BHAGWAT**
Site : **Berrimah Freight Terminal**
Quote number : **EN/222**
No. of samples received : **1**
No. of samples analysed : **1**

Page : **1 of 4**
Laboratory : **Environmental Division Sydney**
Contact : **Shane Ellis**
Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**

Telephone : **+61 2 8784 8555**
Date Samples Received : **03-Nov-2020 07:30**
Date Analysis Commenced : **04-Nov-2020**
Issue Date : **10-Nov-2020 10:47**



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.

Edwandy Fadjar

Organic Coordinator

Sydney Organics, Smithfield, NSW



Page : 2 of 4
Work Order : ES2038032
Client : GREENCAP-NAA PTY LTD
Project : J168829 ORA Diesel Spill

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.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.



Analytical Results

Compound	CAS Number	Client sample ID		QC01A	Result
		LOR	Unit		
Sub-Matrix: WATER					
(Matrix: WATER)					
Client sampling date / time					
30-Oct-2020 00:00					
ES2038032-001					
Result					
EP080/071: Total Petroleum Hydrocarbons					
C6 - C9 Fraction		20	µg/L	<20	*****
C10 - C14 Fraction		50	µg/L	<50	*****
C15 - C28 Fraction		100	µg/L	<100	*****
C29 - C36 Fraction		50	µg/L	<50	*****
^ C10 - C36 Fraction (sum)		50	µg/L	<50	*****
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions					
C6 - C10 Fraction	C6_C10	20	µg/L	<20	*****
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	*****
>C10 - C16 Fraction		100	µg/L	<100	*****
>C16 - C34 Fraction		100	µg/L	<100	*****
>C34 - C40 Fraction		100	µg/L	<100	*****
^ >C10 - C40 Fraction (sum)		100	µg/L	<100	*****
^ >C10 - C16 Fraction minus Naphthalene (F2)		100	µg/L	<100	*****
EP080: BTEXN					
Benzene	71-43-2	1	µg/L	<1	*****
Toluene	108-88-3	2	µg/L	<2	*****
Ethylbenzene	100-41-4	2	µg/L	<2	*****
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	*****
ortho-Xylene	95-47-6	2	µg/L	<2	*****
^ Total Xylenes		2	µg/L	<2	*****
^ Sum of BTEX		1	µg/L	<1	*****
Naphthalene	91-20-3	5	µg/L	<5	*****
EP080S: TPH(V)/BTEX Surrogates					
1,2-Dichloroethane-D4	17060-07-0	2	%	85.8	*****
Toluene-D8	2037-26-5	2	%	109	*****
4-Bromofluorobenzene	460-00-4	2	%	104	*****



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Work Order : ES2038032
Client : GREENCAP-NAA PTY LTD
Project : J168829 ORA Diesel Spill

Surrogate Control Limits

Sub-Matrix: WATER			
Compound	CAS Number		
Recovery Limits (%)			
	Low	High	
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

DRAFT

12 March 2021

11/14 Winnellie Central
Winnellie, NT 0820
P: (08) 7906 1300
www.greencap.com.au

Adam Reed, Environment Manager
One Rail Australia
Level 3, 33 Richmond Road, Keswick
South Australia 5035

**RE: BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL – GROUNDWATER MONITORING EVENT
(JANUARY 2021)**

1.0 Introduction

Greencap Pty Ltd (Greencap) was commissioned by One Rail Australia (One Rail) to conduct a groundwater monitoring event (GME) in accordance with the Groundwater Monitoring and Management Plan (GMMP) developed for the Berrimah Freight Terminal, 75 O'Sullivan Circuit, Berrimah, Northern Territory (the Site).

2.0 GMMP

The GMMP was prepared as a response measure to a diesel spill which occurred on the Site on 30 May 2020. The GMMP was developed to accomplish the following primary objectives:

- To conduct regular monitoring of groundwater underlying soils with residual diesel impacts in order to advise if impacts in soil cause groundwater contamination.
- If diesel impacts to groundwater become evident, to confirm whether or not they present a risk to offsite receptors located down groundwater hydraulic gradient of the site (assessed to be to the north-west during the July 2020 monitoring event).
- To establish mechanisms and management measures should unacceptable risk to human health and/or the environment be identified.

The GMMP included a set of trigger levels designed to assess a change in risk to on-site and down-gradient receptors. The adopted trigger levels for the groundwater monitoring program are included in Table 1.

Table 1 – Adopted Trigger Levels

Analyte	Trigger Level (mg/L)	
	Groundwater HSL for vapour intrusion – Commercial/Industrial (2 m to <4 m)	Groundwater investigation level (GIL) (marine water)
C ₆ -C ₁₀ less BTEX (F1)	NL	-
>C ₁₀ -C ₁₆ less naphthalene (F2)	NL	-
Sum of >C ₁₀ – C ₃₄	-	0.3 [^]
Benzene	30	0.5
Toluene	NL	0.11*
Ethylbenzene	NL	0.05*
m-xylene	-	0.05*
o-xylene	NL	0.35**
p-xylene	NL	0.20**
Naphthalene	NL	0.05

* ANZECC 2018 **GIL for marine water not available, GIL for freshwater adopted as alternative [^] See GMMP Table 6-1

A protocol for the application of trigger levels included two levels of contingency measures as follows:

Level 1 – Additional Monitoring, Assessment and Review

If the result exceeds an adopted trigger level, then the groundwater well(s) which showed the exceedance should be re-sampled within 2 weeks to verify the result. If the elevated result is confirmed, the following protocol applies:

1. Increase frequency of groundwater monitoring events to monthly for the well(s) in which an exceedance was reported;
2. If results are below trigger levels during two subsequent consecutive monthly rounds, continue with the original scheduled monitoring; and
3. If results exceed trigger levels in two subsequent monthly monitoring events, implement Level 2 actions.

Level 2 – Implement Contingency Measures

1. Review the historical data and any change in the on-site and off-site activities.
2. Consider installation of additional groundwater monitoring wells, subsequent sampling and assessments.
3. Assess risks to human health and the environment based on any additional information available.
4. Consider implementation of groundwater contamination control measures e.g. skimming, pump and treat.

3.0 Previous (July & October 2020) Monitoring Events

Groundwater monitoring wells MW01 to MW04 and MW01A, MW03A and MW04A were constructed, surveyed, gauged and sampled prior to the undertaking of the first GME in July 2020 (refer to **Attachment 2** for the well locations).

The groundwater flow direction was inferred to be to the north west towards mangroves. Hydrocarbons likely associated with diesel were reported for two groundwater wells (MW01 and MW04) with results below trigger values.

Four additional groundwater monitoring wells MW05 to MW08 (refer **Attachment 2** for their locations) were installed in October 2020 to further delineate the extent of the hydrocarbon impacts reported during the July 2020 GME and to monitor for potential groundwater impacts adjacent the nearest sensitive receptor being the mangrove fringe.

No discernable direction of groundwater flow could be inferred based on the gauging results of the October 2020 GME. This has been attributed to be wet season influence on the water table. Approximately 0.06m of floating light nonaqueous phase liquid (LNAPL) was measured in MW01 located in the near vicinity of the temporary sump excavated during spill recovery activities. MW01A located in near proximity to MW01 was sampled during this GME.

No trigger value exceedances were reported in October 2020 for the four wells sampled. The concentrations of hydrocarbons in MW04 were noted to be higher in October compared to July results. The October results generally indicated potential subsurface migration of LNAPL as well as potential migration of the groundwater plume.

4.0 Groundwater Monitoring Event – January 2021

The results of the third GME conducted in January 2021 are presented in sections blow.

It is noted that MW01 was not sampled during the January GME as approximately 0.02m of LNAPL was present. MW01A was sampled in place of MW01 as per the October 2020 GME.

4.1 Sampling Methodology

Greencap conducted a GME on 21 January 2021 involving the gauging and sampling of the 10 existing groundwater monitoring wells (MW01 to MW08, inclusive of MW01A and MW04A).

Groundwater samples were collected using low-flow sampling techniques in accordance with GMMP requirements. The following methodology was applied:

- Measuring standing water levels (SWL) from the surveyed point at the top of the casings using water/product interface water level meter prior to sampling.
- Monitoring physio-chemical parameters (pH, temperature, electrical conductivity, oxidation-reduction potential and dissolved oxygen) during purging using a calibrated water quality meter. Sampling occurred when the drawdown and these parameters had stabilised within the ranges presented in NT Department of Mines and Energy Methodology for the Sampling of Ground Waters (2009).
- The sampler wearing a clean pair of disposable nitrile gloves when collecting each sample.
- All groundwater samples collected in appropriate bottles/containers provided by analytical laboratories and placed in a chilled esky for transportation immediately after collection.
- Collection of appropriate QA/QA samples including intra- and inter-laboratory duplicates and rinsate and trip blanks.

Low-flow sampling was attempted but could not be undertaken for MW01A as groundwater inflow was not sufficient. This well was purged dry to remove all stagnant water from the well casing and screens and groundwater samples were collected using a dedicated bailer after the volume of recovered groundwater was sufficient to fill sampling containers.

4.2 Field Observations

The SWLs gauged on 21 January 2021 and physio-chemical field parameters measured in/from each monitoring well were recorded and are summarised in Table 2 and Table 3 – January 2021 GME Groundwater Levels

Well ID	Easting	Northing	Well Elevation (mAHD)	Standing Water Level (mbtoc)	SWL Elevation (mAHD)	Calculated Water Density* (kg/m ³)	Density corrected levels (mAHD)
MW01	708423.825	8620973.001	5.958	2.483	3.475	998.38	3.482
MW01A	708416.945	8620986.556	5.921	2.444	3.477	1,000.05	3.489
MW02	708491.822	8620929.677	5.026	1.174	3.852	999.99	3.869
MW03	708498.128	8621016.708	5.891	2.428	3.463	995.30	3.464
MW04	708460.568	8621002.703	5.931	2.459	3.472	996.89	3.474
MW05	708374.723	8621004.469	5.249	1.776	3.473	1,012.35	3.500
MW06	708470.486	8621039.916	5.262	1.798	3.464	997.43	3.469
MW07	708398.119	8620980.232	5.906	2.43	3.476	1,001.58	3.491

Well ID	Easting	Northing	Well Elevation (mAHD)	Standing Water Level (mbtoc)	SWL Elevation (mAHD)	Calculated Water Density* (kg/m ³)	Density corrected levels (mAHD)
MW08	708521.037	8621025.589	5.970	2.514	3.456	996.05	3.459

*Calculated based on field measured salinity and temperature

respectively. The field record sheets are attached in **Attachment 3**.

Table 2 – January 2020 GME Field Observations

Well ID	Temperature (°C)	Electrical Conductivity (µS/cm)	pH	ORP (mV)	Dissolved Oxygen (% saturation)
MW01A	34.4	12,801	7.02	36.3	47.4
MW02	33.4	11,915	5.12	151.9	12.5
MW03	36.3	3,573	5.03	133.3	8.4
MW04	34.6	5,935	5.26	136.4	9.2
MW05	33.1	39,063	5.49	91.5	1.2
MW06	33.6	6,384	4.98	162.1	3.5
MW07	35.4	16,722	5.71	33.6	11.3
MW08	36.7	5,627	5.15	63.3	7.2

As shown in Table 2, the groundwater beneath the area is saline (with salinity range between 3,573 and 39,063 µS/cm) and slightly acidic. Measured levels of ORP and dissolved oxygen are generally indicative of oxidation conditions, potentially favourable for natural biodegradation of petroleum hydrocarbons.

The gauged groundwater levels are shown in Table 3 – January 2021 GME Groundwater Levels

Well ID	Easting	Northing	Well Elevation (mAHD)	Standing Water Level (mbtoc)	SWL Elevation (mAHD)	Calculated Water Density* (kg/m ³)	Density corrected levels (mAHD)
MW01	708423.825	8620973.001	5.958	2.483	3.475	998.38	3.482
MW01A	708416.945	8620986.556	5.921	2.444	3.477	1,000.05	3.489
MW02	708491.822	8620929.677	5.026	1.174	3.852	999.99	3.869
MW03	708498.128	8621016.708	5.891	2.428	3.463	995.30	3.464
MW04	708460.568	8621002.703	5.931	2.459	3.472	996.89	3.474
MW05	708374.723	8621004.469	5.249	1.776	3.473	1,012.35	3.500
MW06	708470.486	8621039.916	5.262	1.798	3.464	997.43	3.469
MW07	708398.119	8620980.232	5.906	2.43	3.476	1,001.58	3.491
MW08	708521.037	8621025.589	5.970	2.514	3.456	996.05	3.459

*Calculated based on field measured salinity and temperature

Table 3 – January 2021 GME Groundwater Levels

Well ID	Easting	Northing	Well Elevation (mAHD)	Standing Water Level (mbtoc)	SWL Elevation (mAHD)	Calculated Water Density* (kg/m ³)	Density corrected levels (mAHD)
MW01	708423.825	8620973.001	5.958	2.483	3.475	998.38	3.482
MW01A	708416.945	8620986.556	5.921	2.444	3.477	1,000.05	3.489
MW02	708491.822	8620929.677	5.026	1.174	3.852	999.99	3.869
MW03	708498.128	8621016.708	5.891	2.428	3.463	995.30	3.464
MW04	708460.568	8621002.703	5.931	2.459	3.472	996.89	3.474
MW05	708374.723	8621004.469	5.249	1.776	3.473	1,012.35	3.500
MW06	708470.486	8621039.916	5.262	1.798	3.464	997.43	3.469
MW07	708398.119	8620980.232	5.906	2.43	3.476	1,001.58	3.491
MW08	708521.037	8621025.589	5.970	2.514	3.456	996.05	3.459

*Calculated based on field measured salinity and temperature

Groundwater level contours were constructed using the density corrected January 2021 gauging results. Groundwater level gauging results are shown on a plan included in **Attachment 4**. Based on the gauging results the direction of groundwater flow is to the north towards mangroves which is consistent with the July 2020 results.

4.3 Analytical Results

Groundwater samples were analysed for total recoverable hydrocarbons (TRH) and benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN) at National Association of Testing Authorities (NATA)-accredited laboratories. The results are included in **Attachment 5** and results from the three monitoring events to date are summarised in Table 4. Laboratory certificates are included in **Appendix A**.

Table 4 – July/October 2020 and January 2021 GME Analytical Results (µg/L)

Monitoring Well	Sample Date	F2: TRH (C ₁₀ -C ₁₆ less naphthalene)	F3: TRH (>C ₁₆ -C ₃₄)	TRH (C _{>10} -C ₃₄)	Ethylbenzene	O-Xylene
Trigger Value	-	-	-	300	50	350
MW01	30-Jul-20	140	<100	140	2	3
	14-Oct-20	Not sampled due to 6cm of LNAPL				
	21-Jan-21	Not sampled due to 2cm of LNAPL				
MW01A	14-Oct-20	<50	600	640	2	3
	21-Jan-21	<50	<100	<100	<1	<1
MW02	All GMEs	<50	<100	<100	<1	<1
MW03	30-Jul-20 / 14-Oct 20	<50	<100	<100	<1	<1
	21-Jan-21	<50	300	300	<1	1
MW04	30-Jul-20	240	400	650	<1	1
	31-Oct-20	520	1,300	1,820	<1	1
	21-Jan-21	<50	<100	<100	<1	<1
MW05	14-Oct 20 / 21-Jan-21	<50	<100	<100	<1	<1
MW06	14-Oct 20 / 21-Jan-21	<50	<100	<100	<1	<1
MW07	14-Oct 20 / 21-Jan-21	<50	<100	<100	<1	<1
MW08	14-Oct 20	<50	<100	<100	<1	<1
	21-Jan-21	<50	100	100	<1	<1

The reported elevated hydrocarbon impacts at MW01A and MW04 in October 2020 were not repeated during the January 2021 GME. LNAPL remained present in MW01 albeit marginally less than previous. The presence of petroleum hydrocarbons was reported in MW03 and MW08 having not been reported in the previous monitoring event. These wells are located in the vicinity of the original spill area.

No trigger value exceedances were reported during the January 2021 GME.

During January 2021 groundwater samples were also tested for a suite of analytes to assess natural attenuation of petroleum hydrocarbons in groundwater. This includes methane, ferrous iron, manganese, nitrate, sulphate and alkalinity.

Generally, during the biodegradation of hydrocarbons in groundwater bacterial activity consumes oxygen, creating a reducing environment which may be characterized by a reduction in nitrate and sulphate and an increase in iron, manganese and methane concentrations. Change in concentrations of these chemicals will be reviewed and biodegradation potential will be assessed during subsequent monitoring rounds.

4.4 QA/QC Results

Groundwater Duplicate Analysis

Field duplicates (QC01 and QC01A, duplicates of MW02) were collected during the January sampling event and analysed at the primary (Eurofins) and secondary (ALS) laboratories for TRH and BTEXN.

Duplicate analytical results were assessed by calculating relative percent differences between primary sample results and duplicate sample results. All of the inter and intra laboratory duplicate groundwater analyses had RPD values below the recommended comparison criteria of 50%.

A table summarising the duplicate sample results is presented at the end of this report (refer to **Attachment 6**).

Blank Analyses

Rinsate blank samples (RB01) was collected on 21 January and analysed at the primary laboratory for TRH and BTEXN. The rinsate blank samples were collected from decontaminated sampling equipment to ensure adequate cleaning has occurred.

A trip blank sample (TB01) was prepared and kept with the portable sample cooler for the duration of the and delivered to the primary laboratory for TRH and BTEXN analysis. The trip blanks were prepared using de-ionised water to detect potential cross-contamination throughout the sampling and sample delivery stages of the GME.

A table summarising the rinsate and trip blanks sample results is presented at the end of this report (refer to **Attachment 6**).

5.0 Surface Water and Sediment Sampling

Surface water and/or sediment samples are to be collected during each scheduled GME to assess for potential migration of hydrocarbon impacts.

Sampling locations are associated with drains downgradient of the spill site and are presented in **Attachment 7**. Justification for the locations are outlines below in Table 5.

Table 5 – Surface Water and Sediment Monitoring Details

Location ID	Target
1	Culvert under 1 road – monitor for evidence of migration of diesel from existing impacts underlying rail lines
2	Stormwater drain directing water offsite – delineation sampling point if impacts are identified at sample location 1 and/or impact associated from potential soil loss from the hydrocarbon-impact material storage area
3	Stormwater discharge point – contingency stormwater sampling point if impacts are identified at sample locations 1 and/or 2
4	Receiving environment – contingency stormwater/sediment sampling point if impacts are identified at sample locations 1 and/or 2

Surface water (stormwater) samples are collected as appropriate when stormwater is present in the drains. Sediment samples are collected during all scheduled GMMP sampling events. In the event that no water is present at the sample locations, only sediment samples are collected.

Surface water and sediment samples are analysed for diesel fuel-related contamination, i.e. TRH and BTEX. The adopted trigger levels for the surface water and sediment monitoring program are included in Table 6.

Table 6 – Surface Water and Sediment Trigger Levels

Analyte	Trigger Level (mg/L)	
	Surface water (mg/L)	Sediment (mg/kg)
C ₆ -C ₁₀ less BTEX (F1)	< Limit of Reporting	< Limit of Reporting
>C ₁₀ -C ₁₆ less naphthalene (F2)	< Limit of Reporting	-
Sum of >C ₁₀ – C ₃₄	0.3	280 [#]
Benzene	< 5 (99% protection level) *	< Limit of Reporting
Toluene	<0.11 (99% protection level) **	< Limit of Reporting
Ethylbenzene	< 0.005 (99% protection level) (ANZECC 2000b) **	< Limit of Reporting
m-xylene	< 0.075 **	< Limit of Reporting
o-xylene		< Limit of Reporting
p-xylene		< Limit of Reporting
Naphthalene	< 0.050 99% protection level) *	< Limit of Reporting

* Australian and New Zealand guidelines for fresh and marine water quality – Volume 1 (ANZECC 2000a) – Section 3 Aquatic ecosystems

** Australian and New Zealand guidelines for fresh and marine water quality – Volume 2 Aquatic Ecosystems – Rationale and Background Information (ANZECC 2000b) – Section 8.3.7 Detailed descriptions of chemicals

[#] <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants>

5.1 Sampling Methodology

Surface water and sediment samples were collected using techniques in accordance with GMMP requirements. The following methodology was applied:

- Surface water samples were collected the stormwater drains directly into the appropriate sampling containers with the aid of an extension pole.
- All surface water samples were collected in appropriate, decontaminated bottles/vials provided by an analytical laboratory and immediately placed in a chilled esky for transportation to a laboratory.
- Sediment samples were collected using decontaminated stainless steel hand trowels from the base of the drains. Collected samples were placed in containers provided by an analytical laboratory (typically used for soil samples).
- All sediment samples were immediately placed in a chilled esky for transportation to a laboratory.

5.2 Field Observations

Surface water and sediment samples were collected in conjunction with the GME on 21 January 2021. No water was present at the sample locations 1 and 2, surface water samples were collected from sample locations 3 (SW03) and 4 (SW04).

Sediment samples (SS01 and SS02) were collected from locations 1 and 2. The sediment samples comprised brown silty clayey sands with gravel inclusions.

5.3 Analytical Results

Surface water and sediment samples were analysed for total recoverable hydrocarbons (TRH) and benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN) at National Association of Testing Authorities (NATA)-accredited laboratories.

No results were reported above the LORs for surface water samples. A result above LORs were reported for one sediment sample (SS01). The results are included in **Attachment 5** and elevated results above LORs are summarised in Table 7. Laboratory certificates are included in **Appendix A**.

Table 7 – Elevated Analytical Results (mg/kg)

Location	Sample Date	C ₆ -C ₁₀ less BTEX (F1)	F2: TRH (C ₁₀ -C ₁₆ less naphthalene)	Sum of >C ₁₀ – C ₃₄
Trigger Value		Above LOR	Above LOR	280
SS01	21-Jan-21	<20	<50	350
	05-Feb-21	<20	<50	<50

The concentration of >C₁₀-C₃₄ hydrocarbon fractions in SS01 was reported to exceed the adopted trigger value. As a result of this exceedance, approximately one ton of potentially impacted ballast and sediment material were excavated from this location which is adjacent the culvert near the former temporary sump. This location was resampled¹ on 5 February 2021 with results reported below LORs.

5.4 QA/QC Results

Field duplicates (QC01 and QC01A, duplicates of SS01) were collected during the January sampling event and analysed at the primary (Eurofins) and secondary (ALS) laboratories for TRH and BTEXN.

Duplicate analytical results were assessed by calculating relative percent differences (RPDs) between primary sample results and duplicate sample results.

RPDs for hydrocarbon fractions C₁₅ to C₄₀ were calculated to range between 57 and 67%, i.e., above the recommended comparison criteria of 50%. The slightly elevated RPDs were potentially due to the heterogenous nature of the sediment material. It is also noted that the concentrations for the duplicate sample were lower than for the primary sample. This exceedance of RPDs is therefore not considered to affect the outcome of this report.

A table summarising the duplicate sample results is presented at the end of this report (refer to Attachment 6).

¹ note that the original sample ID is SS01. The additional sample was labelled SED 1, however, both samples were collected from the same location.

6.0 Conclusions and Recommendations

6.1 Conclusions

Apart from the LNAPL present in MW01, all groundwater results were reported to be below the GMMP trigger levels.

Previously reported hydrocarbon impacts at MW01A and MW04 were not repeated during the January 2021 GME. The thickness of the LNAPL present in MW01 was slightly less than that measured previously. The presence of petroleum hydrocarbons was reported for two groundwater wells (MW03 and MW08) located along the spill-impact area.

Groundwater flow was inferred to be to the north, similar to July 2020 results.

Surface water and sediment samples were collected in conjunction with the GME on 21 January 2021. No water was present at the sample locations 1 and 2 (nearest to spill location). Surface water samples were collected from sample locations 3 and 4 located along the drain discharging to the mangrove environment. Surface water samples reported no presence of hydrocarbons above laboratory detection limits.

Sediment samples were collected from locations 1 and 2. The presence of petroleum hydrocarbons was reported for the sediment sample collected at sample location 1, adjacent the culvert immediately downgradient from the spill remediation area. The reported concentration exceeded the adopted trigger value and as a result, remedial works were undertaken involving the removal of potentially impacted ballast and sediments from the drain. This area was resampled on 5 February 2021 with results reported below detection limits.

6.2 Recommendations

It is recommended that the trigger levels and their application is reviewed as part of the annual GMMP review due after the April GME. The trigger levels are to be addressed as follows:

- Include trigger level relating to monitored changes in thickness of LNAPL and/or occurrence in other monitoring wells.
- Differentiate groupings of wells as follows:
 - Impacted area = MW01, MW03, MW03A, MW04, MW08 – trigger responses to take into account trigger levels and trend data (i.e. increasing trend in consecutive events).
 - Impacted area delineation = MW01A MW07 – trigger responses to take into account presence of hydrocarbon (i.e. impact migration) trigger levels and trend data (i.e. increasing trend in consecutive events).
 - Sensitive receptor area = MW05, MW06 – trigger responses to take into account presence of hydrocarbon (i.e. impact migration) and trigger levels.
 - The application of Level 1, Level 2 and any other measures will vary based on the grouping of wells as above.

The next quarterly groundwater, surface water and sediment monitoring round is scheduled to occur in April 2021.



Attachments

- 1 Statements of Limitation
- 2 Groundwater Monitoring Well Location Plan
- 3 Field Record Sheets
- 4 Groundwater Level Elevation Figure
- 5 Results Summary Tables
- 6 QA/QC Summary Tables
- 7 Surface Water and Sediment Location Plan

Appendices

- A Laboratory Certificates of Analysis

Yours Sincerely,

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DRAFT



Groundwater Monitoring Event – January 2021

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 1: Statements of Limitation

Statements of Limitation

All and any Services proposed by Greencap to the Client were subject to the Terms and Conditions listed on the Greencap website at: <https://www.greencap.com.au/terms-conditions> Unless otherwise expressly agreed to in writing and signed by Greencap, Greencap does not agree to any alternative terms or variation of these terms if subsequently proposed by the Client. The Services were carried out in accordance with the current and relevant industry standards of testing, interpretation and analysis. The Services were carried out in accordance with Commonwealth, State, Territory or Government legislation, regulations and/or guidelines. The Client was deemed to have accepted these Terms when the Client signed the Proposal (where indicated) or when the Company commenced the Services at the request (written or otherwise) of the Client.

The services were carried out for the Specific Purpose, outlined in the body of the Proposal. To the fullest extent permitted by law, Greencap, its related bodies corporate, its officers, consultants, employees and agents assume no liability, and will not be liable to any person, or in relation to, any losses, damages, costs or expenses, and whether arising in contract, tort including negligence, under statute, in equity or otherwise, arising out of, or in connection with, any matter outside the Specific Purpose.

The Client acknowledged and agreed that proposed investigations were to rely on information provided to Greencap by the Client or other third parties. Greencap made no representation or warranty regarding the completeness or accuracy of any descriptions or conclusions based on information supplied to it by the Client, its employees or other third parties during provision of the Services. Under no circumstances shall Greencap have any liability for, or in relation to, any work, reports, information, plans, designs, or specifications supplied or prepared by any third party, including any third party recommended by Greencap. The Client releases and indemnifies Greencap from and against all Claims arising from errors, omissions or inaccuracies in documents or other information provided to Greencap by the Client, its employees or other third parties.

The Client was to ensure that Greencap had access to all information, sites and buildings as required by or necessary for Greencap to undertake the Services. Notwithstanding any other provision in these Terms, Greencap will have no liability to the Client or any third party to the extent that the performance of the Services was not able to be undertaken (in whole or in part) due to access to any relevant sites or buildings being prevented or delayed due to the Client or their respective employees or contractors expressing safety or health concerns associated with such access.

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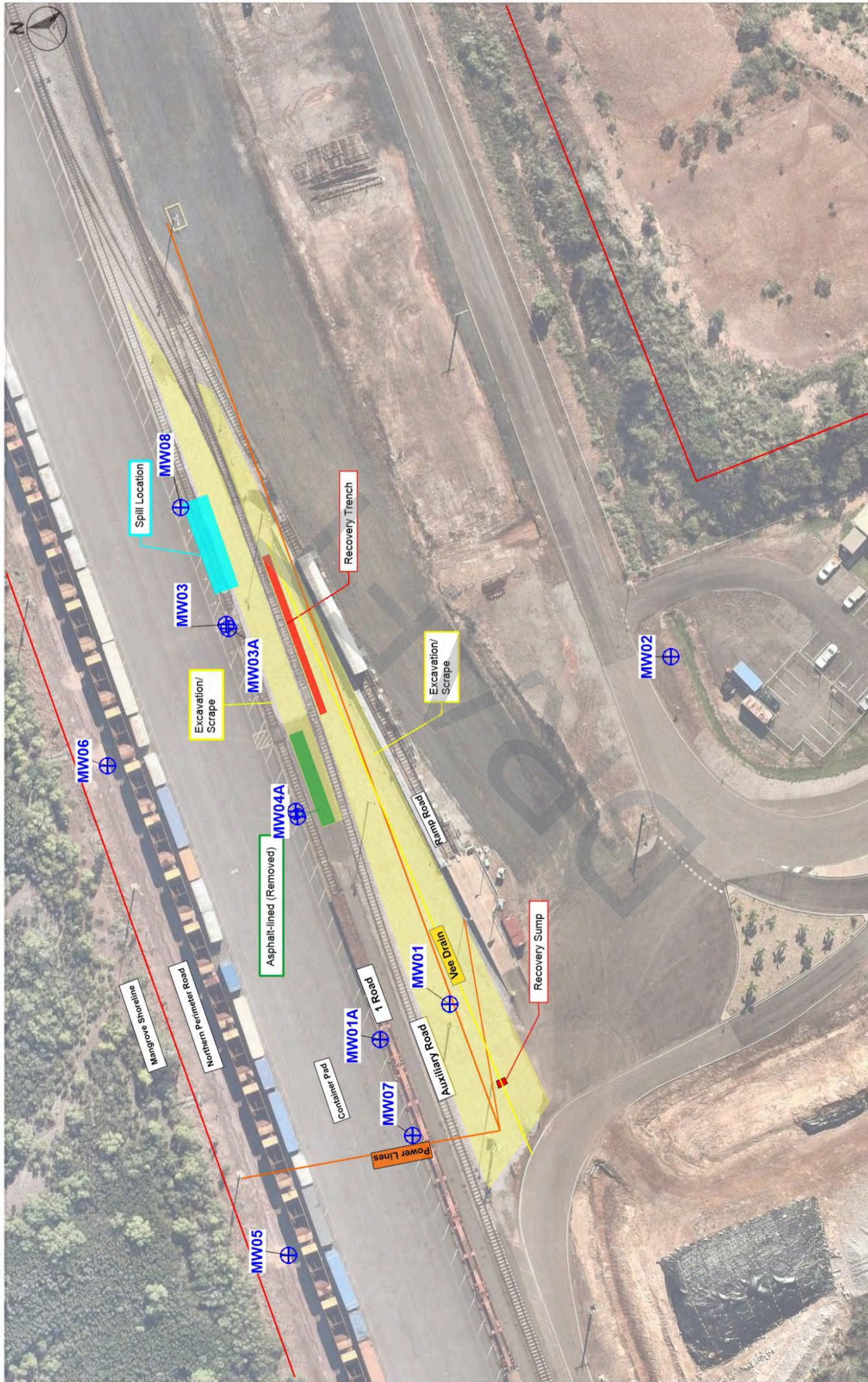


Groundwater Monitoring Event – January 2021

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 2: Groundwater Monitoring Well Location Plan



Legend Site boundary Groundwater Monitoring Well Locations	Client: One Rail Australia Client No: C105292 Project: Diesel Spill Targeted Site Contamination Investigation Job No: J168829	Title: Groundwater Monitoring Plan 0 Address: Berimah Freight Terminal - Export Drive, Berimah NT	Drawn: PM: AS DB Date: 28/11/2020 File Name: J168829 GW Plan	Approximate Scale: 20 m Figure No: 5
	Date Data Collected: 30 Oct 2020 Source: Background Photomap, courtesy of	GREENCAP Level 1 477 High Street Kew East, VIC 3102 P: (03) 9896 8600 F: (03) 9896 8600 www.greencap.com.au		



Groundwater Monitoring Event – January 2021

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 3: Field Record Sheets

DRAFT

Client: ORA		Job No: J168829
Project: Diesel Spill		Gauged by: VB
Location: Export Drive, Berrimah NT		Date: 21/01/2021

Water Level Dipper Type (interphase, length etc): IP

Time	Well Name	Depth to Product (m)	Depth to water (m)	Product Thickness (mm)	Depth of Well (m)	Comments
0910	MW07	-	2.430	-	4.688	SILT ON PROBE
1100	MW01A	-	2.444	-	4.904	
1150	MW04	-	2.459	-	3.806	
1232	MW04A	-	2.391	-	3.089	SILT ON PROBE
1305	MW03	-	2.428	-	4.370	
1400	MW08	-	2.514	-	5.019	
1530	MW06	-	1.798	-	4.005	
	MW05		3.306		3.306	
1615	MW05	-	1.776	-	3.297	
1735	MW01	-	2.483	-	4.465	STRONG HC odour ON PROBE
1845	MW02	-	1.174	-	5.311	SILT ON PROBE

Observations / Comments:
 Weather Conditions (e.g. cloudy, sunny, windy etc), Pumping, etc
 # 0.023m OF PRODUCT IN BAIKLETT BUT NOT PICKED UP ON IP
 MW01 NOT SAMPLED

Groundwater Sampling Record

Client: <u>ORA</u>	Job No: <u>J168829</u>	Well ID <u>MW01A</u>
Project: <u>Diesel Spill</u>	Sampled by: <u>VB</u>	
Location: <u>Export Drive, Berrimah NT</u>	Date: <u>21/1/21</u>	

WELL DETAILS	SAMPLING EQUIPMENT	
Well depth: <u>4.904</u> (m)	Device: <u>micropurge</u> <u>peristaltic</u> footvalve bailer	*Other Sampling Equipment / Method
Casing diameter: <u>50</u> (mm)	Method: <u>low-flow</u> 4-well-volume purged dry	
Casing type: <u>EVO</u> / steel / other	WQM Make: <u>YSI</u>	
Depth to product: <u>—</u> (m bTOC)	WL Meter: <u>interface</u> non-interface	
Depth to water: <u>2.444</u> (m bTOC)	Screen (from - to), m: <u>1.904 - 4.904</u>	
Product thickness: <u>—</u> (m)	Pump Depth (m bTOC): <u>—</u>	

Field observations: eg. well condition, nearby activities, weather, vegetation, etc
SUNNY, LIGHT BREEZE

Purging instructions:
Start purging and stabilise the water level at ~ 0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater) Purging finishes when the three consecutive readings are within the ranges below

4-well volume The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.
Well volume: 50mm (2") diameter - 2 L/metre, 100mm (4") diameter - 8 L/metre, 150mm (6") diameter - 18 L/metre

Stabilisation Criteria (3 readings within ranges)		Drawdown stable <0.1m	± 0.2 °C	± 0.1 pH unit	± 5%	± 10mv	± 10%	Comment <i>Turbidity, Colour, Odour, Sheen, etc</i>
Time	Cumulative Volume purged (L)	Water Level (m bTOC)	Temp °C	pH Units	Sp. Cond (µS/cm / mS/cm)	ORP mV	DO mg/L / ppm / %	
<u>1103</u>	<u>NT</u>	<u>2.317</u>	<u>35.0</u>	<u>5.47</u>	<u>68931</u>	<u>79.4</u>	<u>54.3</u>	↓
<u>1106</u>	<u>1</u>	<u>2.861</u>	<u>34.9</u>	<u>5.24</u>	<u>65419</u>	<u>88.8</u>	<u>3.6</u>	
<u>1109</u>	<u>2</u>	<u>3.109</u>	<u>34.9</u>	<u>5.25</u>	<u>57890</u>	<u>83.2</u>	<u>2.5</u>	
<u>1112</u>	<u>3</u>	<u>3.439</u>	<u>34.9</u>	<u>5.18</u>	<u>51094</u>	<u>79.5</u>	<u>3.4</u>	
<u>1118</u>	<u>4</u>	<u>3.528</u>	<u>34.8</u>	<u>4.92</u>	<u>56909</u>	<u>88.3</u>	<u>2.8</u>	
<u>1135</u>	<u>12</u>	<u>PURGED DRY</u>				<u>36.3</u>	<u>47.4</u>	
<u>1450</u>	<u>2</u>	<u>3.009</u>	<u>34.4</u>	<u>7.02</u>	<u>12801</u>	<u>36.3</u>	<u>47.4</u>	

Observations during Sampling:- eg. odours, sheens, turbidity, water colour, etc

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments <u>* VERY SLOW RECHARGE, PURGED 12L TO DRY, RSE SAMPLED w/ BAILER</u>
Glass amber (100-250ml)	<u>1</u>	none	Duplicate ID	
Glass vial (40mL)	<u>2</u>	HCl		
Plastic (60mL) - metals*	<u>1</u>	HNO3	Triplicate ID	
Plastic (60mL) - cyanide, CrVI*		NaOH		
Plastic (60mL) - nutrients	<u>1</u>	H2SO4	Blanks	
Plastic (500mL) - inorganics	<u>1</u>	none		
Plastic () <u>FE</u>	<u>1</u>		Rinsate ID	
Plastic ()	<u>1</u>			
	<u>1</u>			
	<u>1</u>			

*samples for dissolved metals to be filtered in the field prior to filling sampling container

Groundwater Sampling Record

Client: ORA Job No: J168829 Well ID: MW02
 Project: Diesel Spill Sampled by: VB
 Location: Export Drive, Berrimah NT Date: 28/1/21

WELL DETAILS		SAMPLING EQUIPMENT			*Other Sampling Equipment / Method
Well depth:	<u>5.311</u> (m)	Device:	<u>micropurge</u> <u>peristaltic</u> footvalve bailer		
Casing diameter:	<u>50</u> (mm)	Method:	<u>low-flow</u> 4-well-volume purged dry		
Casing type:	PVC / steel / other	WQM Make:	<u>YSI</u>		
Depth to product	(m bTOC)	WL Meter:	interface non-interface		
Depth to water:	<u>1.174</u> (m bTOC)	Screen (from - to), m	<u>2.311 - 5.311</u>		
Product thickness	(m)	Pump Depth (m bTOC)			

Field observations: eg. well condition, nearby activities, weather, vegetation, etc
PARTLY SUNNY / CLOUDY, SLIGHT BREEZE

Purging instructions:
 Start purging and stabilise the water level at ~0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater). Purging finishes when the three consecutive readings are within the

Low Flow: The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.

4-well volume: The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.
 Well volume 50mm (2") diameter - 2 L/metre; 100mm (4") diameter - 8 L/metre; 150mm (6") diameter - 18 L/metre

Time	Cumulative Volume purged (L)	Drawdown stable <0.1m Water Level (m bTOC)	± 0.2 °C	± 0.1 pH unit	± 5%	± 10mv	± 10%	Comment <i>Turbidity, Colour, Odour, Sheen, etc</i>
			Temp °C	pH Units	Sp. Cond <u>(µS/cm)</u> mS/cm	ORP mV	DO mg/L / ppm / %	
1755	1NT	1.176	33.5	5.01	25182	161.7	20.2	↓ <u>Low turbidity, clear no sheen/odour</u>
1758	1.5	1.174	33.5	4.92	24980	166.8	3.5	
1801	3.0	1.174	33.5	4.96	22323	164.5	5.4	
1804	4.5	1.174	33.5	5.04	17364	159.8	9.4	
1807	6.0	1.174	33.5	5.10	14188	155.3	12.4	
1810	7.5	1.174	33.4	5.11	12944	153.4	12.6	
1813	9.0	1.174	33.4	5.12	11915	151.9	12.5	
				<u>SAMPLED</u>				

Observations during Sampling:- eg. odours, sheens, turbidity, water colour, etc
SAMPLED AFTER 9L PURGED
QUICK RECHARGE

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments
Glass amber (100-250ml)	<u>6</u>	none	Duplicate ID <u>QCO1</u>	
Glass vial (40mL)	<u>6</u>	HCl	Triplicate ID <u>QCO1A</u>	
Plastic (60mL) - metals*	<u>3</u>	HNO3	Blanks	
Plastic (60mL) - cyanide, CrVI*		NaOH	Rinsate ID	
Plastic (60mL) - nutrients	<u>3</u>	H2SO4		
Plastic (500mL) - inorganics	<u>3</u>	none		
Plastic () <u>FE</u>	<u>3</u>			
Plastic ()	<u>(2)</u>			

*samples for dissolved metals to be filtered in the field prior to filling sampling container

Groundwater Sampling Record

Client: <u>ORA</u>	Job No: <u>J168829</u>	Well ID <u>MW03</u>
Project: <u>Diesel Spill</u>	Sampled by: <u>VB</u>	
Location: <u>Export Drive, Berrimah NT</u>	Date: <u>21/1/21</u>	

WELL DETAILS	SAMPLING EQUIPMENT	*Other Sampling Equipment / Method
Well depth: <u>4.370</u> (m)	Device: <u>micropurge</u> <u>peristaltic</u> footvalve bailer	
Casing diameter: <u>50</u> (mm)	Method: <u>low-flow</u> 4-well-volume purged dry	
Casing type: <u>PVC</u> steel / other	WQM Make: <u>YSI</u>	
Depth to product _____ (m bTOC)	WL Meter: <u>interface</u> non-interface	
Depth to water: <u>2.428</u> (m bTOC)	Screen (from - to), m <u>1.370 - 4.370</u>	
Product thickness _____ (m)	Pump Depth (m bTOC)	

Field observations: eg. well condition, nearby activities, weather, vegetation, etc
SUNNY LIGHT BREEZE

Purging instructions:
Start purging and stabilise the water level at ~ 0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater). Purging finishes when the three consecutive readings are within the ranges below.

Low Flow: The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.
Well volume: 50mm (2") diameter - 2 L/metre, 100mm (4") diameter - 8 L/metre, 150mm (6") diameter - 18 L/metre

Stabilisation Criteria (3 readings within ranges)		Drawdown stable <0.1m	± 0.2 °C	± 0.1 pH unit	± 5%	± 10mv	± 10%	Comment <i>Turbidity, Colour, Odour, Sheen, etc</i>
Time	Cumulative Volume purged (L)	Water Level (m bTOC)	Temp °C	pH Units	Sp. Cond <u>µS/cm / mS/cm</u>	ORP mV	DO <u>mg/L / ppm / %</u>	
1310	1NT	2.524	35.9	5.49	3955	118.1	7.3	<i>6-m turbidity pale brown no sheen / odour</i>
1314	2	2.931	36.0	5.29	3396	129.8	3.7	
1317	4	3.131	35.9	5.04	5592	128.2	1.4	
1321	6	3.129	36.7	4.82	5653	152.3	20.7	
1324	7	3.136	36.3	4.77	5561	153.4	5.2	
1327	8	3.124	36.6	4.80	5145	150.5	5.2	
1330	9	3.131	36.5	4.93	4223	141.6	6.6	
1333	10	3.131	36.3	4.99	3610	135.6	8.6	
1336	11	3.131	36.3	5.03	2573	133.3	8.4	

Observations during Sampling: eg. odours, sheens, turbidity, water colour, etc
slow RECOVERY, SAMPLED AFTER 10L PURGED

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments
Glass amber (100-250ml)	1	none	Duplicate ID	
Glass vial (40mL)	2	HCl		
Plastic (60mL) - metals*	1	HNO3	Triplicate ID	
Plastic (60mL) - cyanide, CrVI*		NaOH		
Plastic (60mL) - nutrients	1	H2SO4	Blanks	
Plastic (500mL) - inorganics	1	none		
Plastic () <u>FE</u>	1			
Plastic ()	1		Rinsate ID	
Plastic ()	1			
Plastic ()	1			

*samples for dissolved metals to be filtered in the field prior to filling sampling container

Groundwater Sampling Record

Client: <u>ORA</u>	Job No: <u>J168829</u>	Well ID <u>Mw04</u>
Project: <u>Diesel Spill</u>	Sampled by: <u>VB</u>	
Location: <u>Export Drive, Berrimah NT</u>	Date: <u>21/1/21</u>	

WELL DETAILS	SAMPLING EQUIPMENT
Well depth: <u>3.806</u> (m)	Device: <u>micropurge</u> <u>peristaltic</u> footvalve bailer
Casing diameter: (mm)	Method: <u>low-flow</u> 4-well-volume purged dry
Casing type: <u>PVC / steel / other</u>	WQM Make: <u>YSI</u>
Depth to product (m bTOC)	WL Meter: <u>interface</u> non-interface
Depth to water: <u>2.459</u> (m bTOC)	Screen (from - to), m <u>0.806 - 3.806</u>
Product thickness (m)	Pump Depth (m bTOC)

Field observations: eg. well condition, nearby activities, weather, vegetation, etc
SUNNY, LIGHT BREEZE

Purging instructions:
Start purging and stabilise the water level at ~ 0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater). Purging finishes when the three consecutive readings are within the ranges below.

Low Flow: The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.

4-well volume: Well volume: 50mm (2") diameter - 2 L/metre, 100mm (4") diameter - 8 L/metre, 150mm (6") diameter - 18 L/metre

Stabilisation Criteria (3 readings within ranges)		Drawdown stable <0.1m	± 0.2 °C	± 0.1 pH unit	± 5%	± 10mv	± 10%	Comment <i>Turbidity, Colour, Odour, Sheen, etc</i>
Time	Cumulative Volume purged (L)	Water Level (m bTOC)	Temp °C	pH Units	Sp. Cond <u>µS/cm / mS/cm</u>	ORP mV	DO <u>mg/L / ppm / %</u>	
1157	1NT	2.529	34.7	6.86	3195	29.6	11.0	Low turbidity, pale brown, no sheen/odour
1200	2	2.812	34.7	6.57	4427	25.3	2.5	↓
1204	4	2.809	34.7	6.01	6087	73.1	6.6	med turbidity, brown, no sheen/odour
1208	6	2.646	34.6	5.45	5883	125.7	8.4	↓
1212	8	2.639	34.5	5.31	5907	134.5	8.5	↓
1215	10	2.619	34.5	5.27	5921	137.4	9.0	↓
1218	12	2.619	34.5	5.26	5933	136.9	9.4	↓
1221	14	2.619	34.6	5.26	5935	136.4	9.2	↓
SAMPLED								

Observations during Sampling: - eg. odours, sheens, turbidity, water colour, etc
SAMPLED AFTER 14L PURGED
DROPPED HEAD BY ~ 0.4M & THEN STABILISED

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments
Glass amber (100-250ml)	1	none		
Glass vial (40mL)	2	HCl	Duplicate ID	
Plastic (60mL) - metals*	1	HNO3		
Plastic (60mL) - cyanide CrVI*		NaOH	Triplicate ID	
Plastic (60mL) - nutrients	1	H2SO4		
Plastic (500mL) - inorganics	1	none	Blanks	
Plastic () <u>pe</u>	1		Rinsate ID	
Plastic ()				

*samples for dissolved metals to be filtered in the field prior to filling sampling container

Groundwater Sampling Record

Client: <u>ORA</u>	Job No: <u>J168829</u>	Well ID <u>MLW05</u>
Project: <u>Diesel Spill</u>	Sampled by: <u>VB</u>	
Location: <u>Export Drive, Berrimah NT</u>	Date: <u>21/1/21</u>	
WELL DETAILS		SAMPLING EQUIPMENT
Well depth: <u>3.297</u> (m)	Device: <u>micropurge</u> <u>peristaltic</u> footvalve bailer	*Other Sampling Equipment / Method
Casing diameter: <u>50</u> (mm)	Method: <u>low-flow</u> 4-well-volume purged dry	
Casing type: <u>(EVC)</u> steel / other	WQM Make: <u>YSI</u>	
Depth to product (m bTOC)	WL Meter: <u>interface</u> non-interface	
Depth to water: <u>1.776</u> (m bTOC)	Screen (from - to), m <u>0.297 - 3.297</u>	
Product thickness (m)	Pump Depth (m bTOC)	
Field observations: eg. well condition, nearby activities, weather, vegetation, etc <u>CLOUDY</u>		

Purging instructions:

Low Flow: Start purging and stabilise the water level at ~ 0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater). Purging finishes when the three consecutive readings are within the ranges below.

4-well volume: The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.
Well volume 50mm (2") diameter - 2 L/metre, 100mm (4") diameter - 8 L/metre, 150mm (6") diameter - 18 L/metre

Time	Cumulative Volume purged (L)	Water Level (m bTOC)	Temp (°C)	± 0.2 °C	± 0.1 pH unit	± 5%	± 10mv	± 10%	Comment <i>Turbidity, Colour, Odour, Sheen, etc</i>
				Sp. Cond	ORP	DO			
				Units	<u>µS/cm</u> / mS/cm	mV	mg/L / ppm / %		
1620	1NT	1.775	33.1	5.39	37849	111.1	3.1	L-m turbidity, pale brown, no sheen follow	
1623	1.5	1.775	33.1	5.45	38224	99.0	1.5		
1626	3.0	1.775	33.1	5.47	38508	95.3	1.4		
1629	4.5	1.775	33.1	5.48	38758	93.8	1.3		
1632	6.0	1.775	33.1	5.49	38925	92.6	1.1		
1635	7.5	1.775	33.1	5.49	39063	91.5	1.2		
				SAMPLED					

Observations during Sampling:- eg. odours, sheens, turbidity, water colour, etc

SAMPLED AFTER 7.5 L PURGED
QUICK RECHARGE

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments
Glass amber (100-250ml)	1	none	Duplicate ID	
Glass vial (40mL)	2	HCl		
Plastic (60mL) - metals*	1	HNO3	Triplicate ID	
Plastic (60mL) - cyanide, CrVI*		NaOH		
Plastic (60mL) - nutrients	1	H2SO4	Blanks	
Plastic (500mL) - inorganics	1	none		
Plastic () <u>FR</u>	1			
Plastic ()			Rinsate ID	
Plastic ()				

*samples for dissolved metals to be filtered in the field prior to filling sampling container

Groundwater Sampling Record

Client: ORA Job No: J168829 Well ID: MCS06
 Project: Diesel Spill Sampled by: VB
 Location: Export Drive, Berrimah NT Date: 25/1/21

WELL DETAILS		SAMPLING EQUIPMENT		
Well depth: <u>4.005</u> (m)	Device: <u>micropurge</u> <u>peristaltic</u> footvalve bailer	*Other Sampling Equipment / Method		
Casing diameter: <u>50</u> (mm)	Method: <u>low-flow</u> 4-well-volume purged dry			
Casing type: <u>PVE</u> / steel / other	WQM Make: <u>YSI</u>			
Depth to product: <u>—</u> (m bTOC)	WL Meter: <u>interface</u> non-interface			
Depth to water: <u>1.799</u> (m bTOC)	Screen (from - to), m: <u>1.005 - 4.005</u>			
Product thickness: <u>—</u> (m)	Pump Depth (m bTOC)			

Field observations: eg. well condition, nearby activities, weather, vegetation, etc
CLOUDY, LIGHT BREEZE

Purging instructions:
 Start purging and stabilise the water level at ~ 0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater). Purging finishes when the three consecutive readings are within the ranges below.

Low Flow: The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.
 Well volume, 50mm (2") diameter - 2 L/metre; 100mm (4") diameter - 8 L/metre, 150mm (6") diameter - 18 L/metre

Time	Cumulative Volume purged (L)	Drawdown stable <0.1m (m bTOC)	± 0.2 °C	± 0.1 pH unit	± 5%	± 10mv	± 10%	Comment <i>Turbidity, Colour, Odour, Sheen, etc</i>
			Temp °C	pH Units	Sp. Cond µS/cm / mS/cm	ORP mV	DO mg/L / ppm / %	
1541	1NT	1.799	33.6	5.83	5999	153.1	7.9	2-m turbidity, pale brown, no sheen/odour
1544	2	1.799	33.6	5.31	5995	162.0	5.1	
1547	3.5	1.799	33.6	5.12	6133	162.3	4.8	
1550	5.0	1.799	33.6	5.05	6205	161.2	4.1	
1553	6.5	1.799	33.6	5.00	6302	161.3	3.7	
1556	8	1.799	33.6	4.98	6384	162.1	3.5	
			SAMPLED					

Observations during Sampling:- eg. odours, sheens, turbidity, water colour, etc
SAMPLED AFTER 8L PURGED
QUICK RECHARGE

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments
Glass amber (100-250ml)	1	none	Duplicate ID	
Glass vial (40mL)	2	HCl	Triplicate ID	
Plastic (60mL) - metals*	1	HNO3	Blanks	
Plastic (60mL) - cyanide, CrVI*		NaOH	Rinsate ID	
Plastic (60mL) - nutrients	1	H2SO4		
Plastic (500mL) - inorganics	1	none		
Plastic () <u>Fe</u>	1			
Plastic ()	1			

*samples for dissolved metals to be filtered in the field prior to filling sampling container

Groundwater Sampling Record



Client: ORA Job No: J168829 Well ID: MW07
 Project: Diesel Spill Sampled by: VB
 Location: Export Drive, Berrimah NT Date: 21/1/21

WELL DETAILS		SAMPLING EQUIPMENT			*Other Sampling Equipment / Method
Well depth: <u>4.688</u> (m)	Device: <u>micropurge</u> <u>peristaltic</u> <u>footvalve</u> <u>bailer</u>				
Casing diameter: <u>50</u> (mm)	Method: <u>low-flow</u> <u>4-well-volume</u> <u>purged dry</u>				
Casing type: <u>PVC</u> / steel / other	WQM Make: <u>YSI</u>				
Depth to product: <u>-</u> (m bTOC)	WL Meter: <u>interface</u> <u>non-interface</u>				
Depth to water: <u>2.430</u> (m bTOC)	Screen (from - to), m: <u>1.488 - 4.688</u>				
Product thickness: <u>-</u> (m)	Pump Depth (m bTOC): <u>-</u>				

Field observations: eg. well condition, nearby activities, weather, vegetation, etc
SUNNY LIGHT BREEZE

Purging instructions:

Low Flow: Start purging and stabilise the water level at ~0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater). Purging finishes when the three consecutive readings are within the ranges below.

4-well volume: The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.
 Well volume: 50mm (2") diameter - 2 L/metre, 100mm (4") diameter - 8 L/metre, 150mm (6") diameter - 18 L/metre

Time	Cumulative Volume purged (L)	Drawdown stable <0.1m (m bTOC)	± 0.2 °C Temp °C	± 0.1 pH unit pH Units	± 5% Sp. Cond µS/cm mS/cm	± 10mv ORP mV	± 10% DO mg/L / ppm / %	Comment Turbidity, Colour, Odour, Sheen, etc
0955	1NT	2.431	35.3	7.03	35681	-95.1	80.5	M-H turbidity, L brown, slight HC odour, no sheen
0959	1	2.431	35.3	6.42	28624	-56.6	48.3	
1003	2	2.431	35.2	6.32	25232	-37.8	17.7	
1007	3	2.431	35.3	6.17	21447	-17.5	14.0	
1011	4	2.431	35.3	6.03	16714	-2.7	11.7	
1014	5	2.431	35.2	5.91	16797	10.0	10.3	
1018	6	2.431	35.3	5.81	16706	21.7	10.1	
1021	7	2.431	35.4	5.74	16759	28.8	9.9	
1024	8	2.431	35.4	5.71	16782	33.6	10.3	

Observations during Sampling: eg. odours, sheens, turbidity, water colour, etc
M-H TURBIDITY, L BROWN, SLIGHT HC ODOR, NO SHEEN

SAMPLED AFTER 8 L PURGED
QUICK RECHARGE

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments
Glass amber (100-250ml)	2	none	Duplicate ID	
Glass vial (40mL)	2	HCl	Triplicate ID	
Plastic (60mL) - metals*	1	HNO3	Blanks	
Plastic (60mL) - cyanide CrVI*		NaOH	Rinsate ID	
Plastic (60mL) - nutrients	1	H2SO4		
Plastic (500mL) - inorganics	1	none		
Plastic () - Fe	1			
Plastic ()	1			
	1			

*samples for dissolved metals to be filtered in the field prior to filling sampling container

Groundwater Sampling Record

Client: ORA Job No: J168829 Well ID: MCS08
 Project: Diesel Spill Sampled by: VB
 Location: Export Drive, Berrimah NT Date: 21/1/21

WELL DETAILS		SAMPLING EQUIPMENT		
Well depth: <u>5.019</u> (m)	Device: <u>micropurge</u> <u>peristaltic</u> footvalve bailer	*Other Sampling Equipment / Method		
Casing diameter: <u>50</u> (mm)	Method: <u>low-flow</u> 4-well-volume purged dry			
Casing type: <u>PVC</u> / steel / other	WQM Make: <u>YSI</u>			
Depth to product: <u>-</u> (m bTOC)	WL Meter: <u>interface</u> non-interface			
Depth to water: <u>2.514</u> (m bTOC)	Screen (from - to), m: <u>2.019 - 5.019</u>			
Product thickness: <u>-</u> (m)	Pump Depth (m bTOC): <u>-</u>			

Field observations: eg. well condition, nearby activities, weather, vegetation, etc
SUNNY, LIGHT BREEZE

Purging instructions:

Low Flow: Start purging and stabilise the water level at ~ 0.1m drawdown. Once water level stabilises start taking water quality readings. Readings are to be taken every 3 minutes or every flow-through-cell volume (whichever is greater) Purging finishes when the three consecutive readings are within the ranges below.

4-well volume: The purging will continue until at least 4 well volumes and three consecutive readings are within the ranges below. Water quality readings are to be taken at half-well-volume apart.
 Well volume: 50mm (2") diameter - 2 L/metre, 100mm (4") diameter - 8 L/metre, 150mm (6") diameter - 18 L/metre

Time	Cumulative Volume purged (L)	Water Level (m bTOC)	Temp (°C)	pH Units	Sp. Cond (µS/cm / mS/cm)	ORP (mV)	DO (mg/L / ppm / %)	Comment <i>Turbidity, Colour, Odour, Sheen, etc</i>
1408	1NT	2.619	36.3	6.09	40954	-66.5	2.0	2-m turbidity, pale brown slight hc odour, no sheen ↓ 4-m turbidity, bright brown slight hc odour, no sheen ↓ ↓ ↓
1412	2	2.774	36.5	6.67	11534	-86.3	1.2	
1416	4	3.072	36.6	6.19	10561	-244.6	8.1	
1419	6	2.652	36.6	6.44	7463	-14.4	4.3	
1422	8	2.575	36.6	6.00	6409	1.9	5.4	
1425	9	2.561	36.6	5.37	5716	49.2	5.5	
1428	10	2.561	36.7	5.25	5640	55.3	6.2	
1431	11	2.561	36.7	5.16	5640	60.0	6.6	
1434	12	2.561	36.7	5.15	5627	63.3	7.2	

Observations during Sampling: eg. odours, sheens, turbidity, water colour, etc
SAMPLED AFTER 12L PURGED
DROPPED HEAD BY ~ 0.5m & STABILISED

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments
Glass amber (100-250ml)	1	none		
Glass vial (40mL)	2	HCl	Duplicate ID	
Plastic (60mL) - metals*	1	HNO3		
Plastic (60mL) - cyanide, CrVI*		NaOH	Triplicate ID	
Plastic (60mL) - nutrients	1	H2SO4		
Plastic (500mL) - inorganics	1	none	Blanks	
Plastic () <u>FR</u>	1		Rinsate ID	
Plastic ()				
Plastic ()	<u>7</u>			

*samples for dissolved metals to be filtered in the field prior to filling sampling container

ORA

DTW

MW01 - 2.483

0.023 product thickness
not picked up on IP

SS01 (QCO1/QCO1A) - ~~as before~~ Silty Clayey SAND (f-m), L-mp,
CULVERT w/ f-m gravels, brown, M, no odour

SS02 - ~~as before~~ - As Above

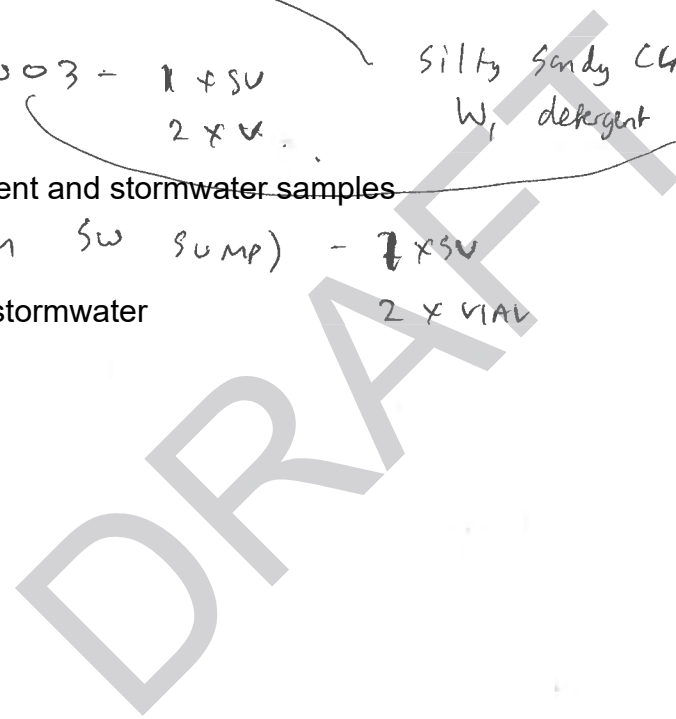
North end of
Culvert

SS03 & SW03 - 1 x SV
~~as before~~ 2 x V. Silty Sandy CLAY, L-mp, f-m, orange brown,
W, detergent smell

NW Drain (Sediment and stormwater samples)

SW04 (From SW sump) - 1 x SV

Sampled from NW stormwater
sump 2 x VIAL



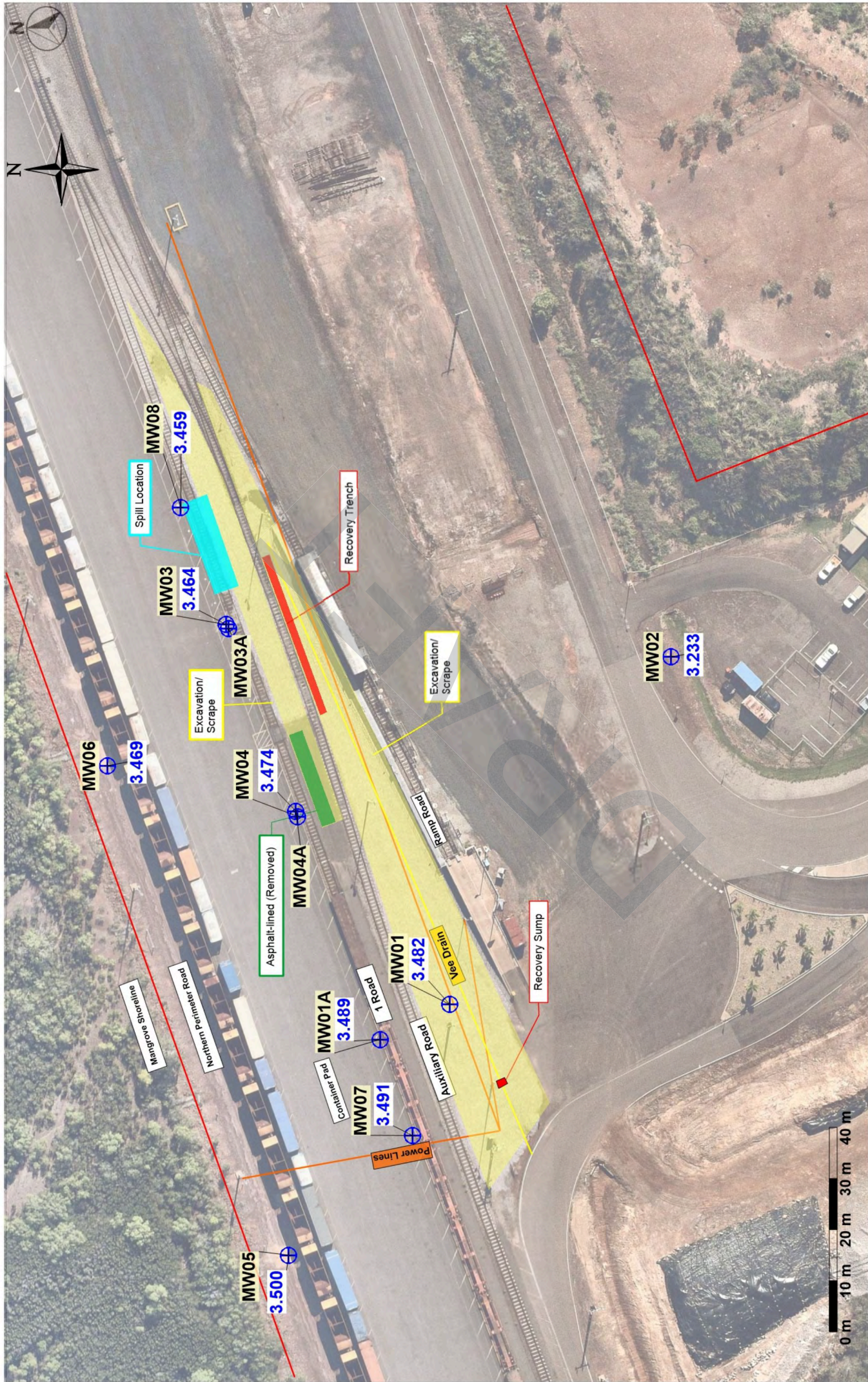


Groundwater Monitoring Event – January 2021

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 4: Groundwater Level Elevation Figure



Legend Site boundary Groundwater Monitoring Well Locations Groundwater Level Elevation (mAHD) 3.25 Groundwater Level Elevation (mAHD) <small>Date Data Collected: 30 Oct 2020 Source: Background Photomap, courtesy of nearmap</small>	Client: One Rail Australia Client No: C105292 Project: Diesel Spill Targeted Site Contamination Investigation Job No: J168829	Drawn: AS DB Date: 10/02/2021 File Name: J168829 GW Plan	Figure No: 6
	Title: Groundwater Monitoring Plan 0 Address: Berrimah Freight Terminal - Export Drive, Berrimah NT Groundwater Level Elevations (mAHD)	Approximate Scale: 20 m	



Groundwater Monitoring Event – January 2021

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 5: Results Summary Table

DRAFT

			TRH		BTEXN				
			C6-C10 - BTEX (F1)	TRH >C16-C34	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Naphthalene
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR			20	100	0.1	0.1	0.1	0.2	0.5
ANZ Guidelines Trigger Value			>LOR	280	>LOR	>LOR	>LOR	>LOR	>LOR
Location	Field ID	Sample Date							
1	SS01	21/01/2021	<20	350	<0.1	<0.1	<0.1	<0.2	<0.5
2	SS02	21/02/2021	<20	<100	<0.1	<0.1	<0.1	<0.2	<0.5



Groundwater Monitoring Event – January 2021

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 6: QA/QC Summary Tables

Date	21/01/2021		21/01/2021		21/01/2021		21/01/2021		21/01/2021		21/01/2021		21/01/2021		
	MW02	QC01 (W)	RPD	MW02	QC01A (W)	RPD	SS01	QC01 (\$)	RPD	SS01	QC01A (\$)	RPD	SS01	QC01A (\$)	RPD
Analyte															
Benzene	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.1	< 0.1	0	< 0.1	< 0.2	0	< 0.1	< 0.2	0
Ethylbenzene	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.1	< 0.1	0	< 0.1	< 0.5	0	< 0.1	< 0.5	0
m&p-Xylenes	< 0.002	< 0.002	0	< 0.002	< 0.002	0	< 0.1	< 0.1	0	< 0.1	< 0.5	0	< 0.1	< 0.5	0
o-Xylene	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.1	< 0.1	0	< 0.1	< 0.5	0	< 0.1	< 0.5	0
Toluene	< 0.001	< 0.001	0	< 0.001	< 0.001	0	< 0.1	< 0.1	0	< 0.1	< 0.5	0	< 0.1	< 0.5	0
Naphthalene	< 0.01	< 0.01	0	< 0.01	< 0.01	0	< 0.5	< 0.5	0	< 0.5	< 1	0	< 0.5	< 1	0
TRH C6-C9	< 0.02	< 0.02	0	< 0.02	< 0.02	0	< 20	< 20	0	< 20	< 10	0	< 20	< 10	0
TRH C10-C14	< 0.05	< 0.05	0	< 0.05	< 0.05	0	< 20	< 20	0	< 20	< 50	0	< 20	< 50	0
TRH C15-C28	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 20	110	67	220	190	14	220	190	14
TRH C29-C36	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 20	150	60	280	230	19	280	230	19
TRH C6-C10	< 0.02	< 0.02	0	< 0.02	< 0.02	0	< 20	< 20	0	< 20	< 10	0	< 20	< 10	0
TRH >C10-C16	< 0.05	< 0.05	0	< 0.05	< 0.05	0	< 50	< 50	0	< 50	< 50	0	< 50	< 50	0
TRH >C10-C16 (F2)	< 0.05	< 0.05	0	< 0.05	< 0.05	0	< 50	< 50	0	< 50	< 50	0	< 50	< 50	0
TRH >C10-C16 (F1)	< 0.02	< 0.02	0	< 0.02	< 0.02	0	< 0.02	< 0.02	0	< 0.02	< 10	0	< 0.02	< 10	0
TRH >C16-C34	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 350	180	64	350	310	12	350	310	12
TRH >C34-C40	< 0.1	< 0.1	0	< 0.1	< 0.1	0	< 470	260	57	470	300	44	470	300	44

Rinsate Blank & Trip Blank		
Date	21/01/2021	21/01/2021
Analyte	RB01	TB01
Benzene	< 0.001	< 0.001
Ethylbenzene	< 0.001	< 0.001
m&p-Xylenes	< 0.002	< 0.002
o-Xylene	< 0.001	< 0.001
Toluene	< 0.001	< 0.001
Xylenes - Total*	< 0.003	< 0.003
Naphthalene	< 0.01	-
TRH C6-C9	< 0.02	-
TRH C10-C14	< 0.05	-
TRH C15-C28	< 0.1	-
TRH C29-C36	< 0.1	-
TRH C10-C36 (Total)	< 0.1	-
TRH C6-C10	< 0.02	-
TRH C6-C10 less BTEX (F1)	< 0.02	-
TRH >C10-C16	< 0.05	-
TRH >C10-C16 less Naphthalene (F2)	< 0.05	-
TRH >C16-C34	< 0.1	-
TRH >C34-C40	< 0.1	-
TRH >C10-C40 (total)*	< 0.1	-

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Rinsate Blank & Trip Blank			
Date	31/10/2020	31/10/2020	31/10/2020
Analyte	RB01	TB01	TB01
Benzene	< 0.001	< 0.001	< 0.001
Ethylbenzene	< 0.001	< 0.001	< 0.001
m&p-Xylenes	< 0.002	< 0.002	< 0.002
o-Xylene	< 0.001	< 0.001	< 0.001
Toluene	< 0.001	< 0.001	< 0.001
Xylenes - Total*	< 0.003	< 0.003	< 0.003
Naphthalene	< 0.01	-	-
TRH C6-C9	< 0.02	-	-
TRH C10-C14	< 0.05	-	-
TRH C15-C28	< 0.1	-	-
TRH C29-C36	< 0.1	-	-
TRH C10-C36 (Total)	< 0.1	-	-
TRH C6-C10	< 0.02	-	-
TRH C6-C10 less BTEX (F1)	< 0.02	-	-
TRH >C10-C16	< 0.05	-	-
TRH >C10-C16 less Naphthalene (F2)	< 0.05	-	-
TRH >C16-C34	< 0.1	-	-
TRH >C34-C40	< 0.1	-	-
TRH >C10-C40 (total)*	< 0.1	-	-



Groundwater Monitoring Event – January 2021

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Attachment 7: Surface Water and Sediment Location Plan



Location ID	Description
1	Spill side of culvert. Immediately downgradient from spill
2	Further downgradient from spill and adjacent stockpile of impacted material
3	Stormwater sampling contingency point – this is a drain that goes under the rail line into the mangroves
4	Sediment sampling contingency point – discharge point



Groundwater Monitoring Event – January 2021

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Appendix A: Laboratory Certificates of Analysis

#AU_CAU001_EnviroSampleVic

From: Varun Bhagwat <Varun.Bhagwat@greencap.com.au>
Sent: Monday, 25 January 2021 11:21 AM
To: Michael Morrison
Cc: #AU_CAU001_EnviroSampleVic; #AU09_EnviroSampleDRW; Dylan Burford
Subject: J168829 - COC with Testing
Attachments: J168829 - EFCOC -22.01.2021.pdf

Hi Michael,

Attached is the COC with testing for groundwater, stormwater and sediment samples collected on 21/1/2021 for the project: **J168829**

The samples were delivered to the Darwin Eurofins drop off point on 22/1/2021.

Please contact me if you have any questions/queries.

Thank you.

Cheers,

Varun Bhagwat

Environmental Consultant | Greencap

Unit 11 / 14 Winnellie Road Winnellie, NT 0820
M: 0428 829 444 | E: Varun.Bhagwat@greencap.com.au | In: [LinkedIn](#)

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Greencap NT P/L
11/14 Winnellie Road
Winnellie
NT 0800



NATA Accredited
Accreditation Number 1261
Site Number 1254

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: **Dylan Burford**

Report **769561-S-V2**
Project name **ORA DIESEL SPILL**
Project ID **J168829**
Received Date **Jan 25, 2021**

Client Sample ID			SS01	SS02	QC01 (S)
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			M21-Ja29391	M21-Ja29392	M21-Ja29394
Date Sampled			Jan 21, 2021	Jan 21, 2021	Jan 21, 2021
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	20	mg/kg	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	220	< 50	110
TRH C29-C36	50	mg/kg	280	< 50	150
TRH C10-C36 (Total)	50	mg/kg	980	< 50	520
BTEX					
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	97	113	100
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	350	< 100	180
TRH >C34-C40	100	mg/kg	470	< 100	260
TRH >C10-C40 (total)*	100	mg/kg	760	< 100	390
% Moisture	1	%	11	13	14

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
Eurofins Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Jan 28, 2021	14 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Jan 28, 2021	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Jan 28, 2021	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Jan 28, 2021	14 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Jan 25, 2021	14 Days

DRAFT

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Site # 1254 & 14271

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NATA # 1261 Site # 20794

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NATA # 1261 Site # 20794

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NATA # 1261
Site # 23736

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Company Name: Greencap NT P/L
Address: 11/14 Winnellie Road
Winnellie
NT 0800
Project Name: ORA DIESEL SPILL
Project ID: J168829

Order No.: PO282724
Report #: 769561
Phone: 61 8 8984 4244
Fax: 61 8 8984 3105

Received: Jan 25, 2021 11:21 AM
Due: Feb 2, 2021
Priority: 5 Day
Contact Name: Dylan Burford

Eurofins Analytical Services Manager : Michael Morrison

Sample Detail

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	Hold	Manganese (filtered)	Total Alkalinity (as CaCO3)	BTEX	Moisture Set	Eurofins Suite B1	Eurofins Suite B16A: SO4, CH4, NO3, Fe2+
1	MW01A	Jan 21, 2021		Water	M21-Ja29383	X	X	X		X	X	X
2	MW02	Jan 21, 2021		Water	M21-Ja29384		X	X			X	X
3	MW03	Jan 21, 2021		Water	M21-Ja29385		X	X			X	X
4	MW04	Jan 21, 2021		Water	M21-Ja29386		X	X			X	X
5	MW05	Jan 21, 2021		Water	M21-Ja29387		X	X			X	X
6	MW06	Jan 21, 2021		Water	M21-Ja29388		X	X			X	X
7	MW07	Jan 21, 2021		Water	M21-Ja29389		X	X			X	X
8	MW08	Jan 21, 2021		Water	M21-Ja29390		X	X			X	X
9	SS01	Jan 21, 2021		Soil	M21-Ja29391					X	X	



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Company Name: Greencap NT P/L
Address: 11/14 Winnellie Road
Winnellie
NT 0800
Project Name: ORA DIESEL SPILL
Project ID: J168829

Order No.: PO282724
Report #: 769561
Phone: 61 8 8984 4244
Fax: 61 8 8984 3105

Received: Jan 25, 2021 11:21 AM
Due: Feb 2, 2021
Priority: 5 Day
Contact Name: Dylan Burford

Eurofins Analytical Services Manager : Michael Morrison

Sample Detail									
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
10	SS02	Jan 21, 2021	Soil	M21-Ja29392					
11	QC01 (W)	Jan 21, 2021	Water	M21-Ja29393	X	X	X	X	
12	QC01 (S)	Jan 21, 2021	Soil	M21-Ja29394			X	X	
13	RB01	Jan 21, 2021	Water	M21-Ja29395	X			X	
14	TB01	Jan 21, 2021	Water	M21-Ja29396			X		
15	SW03	Jan 21, 2021	Water	M21-Ja29397	X				
16	SW04	Jan 21, 2021	Water	M21-Ja29398	X				
17	SS03	Jan 21, 2021	Soil	M21-Ja29399	X				
Test Counts									
					3	10	9	1	3
									13
									9

Internal Quality Control Review and Glossary

General

- 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.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- 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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	mg/kg	< 20			20	Pass		
TRH C10-C14	mg/kg	< 20			20	Pass		
TRH C15-C28	mg/kg	< 50			50	Pass		
TRH C29-C36	mg/kg	< 50			50	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		
Method Blank								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	mg/kg	< 0.5			0.5	Pass		
TRH C6-C10	mg/kg	< 20			20	Pass		
TRH >C10-C16	mg/kg	< 50			50	Pass		
TRH >C16-C34	mg/kg	< 100			100	Pass		
TRH >C34-C40	mg/kg	< 100			100	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	%	108			70-130	Pass		
TRH C10-C14	%	112			70-130	Pass		
LCS - % Recovery								
BTEX								
Benzene	%	96			70-130	Pass		
Toluene	%	94			70-130	Pass		
Ethylbenzene	%	87			70-130	Pass		
m&p-Xylenes	%	98			70-130	Pass		
Xylenes - Total*	%	94			70-130	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	%	125			70-130	Pass		
TRH C6-C10	%	101			70-130	Pass		
TRH >C10-C16	%	110			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	M21-Ja29538	NCP	%	78		70-130	Pass	
TRH C10-C14	M21-Ja35180	NCP	%	101		70-130	Pass	
Spike - % Recovery								
BTEX								
Benzene	M21-Ja29538	NCP	%	78		70-130	Pass	
Toluene	M21-Ja29538	NCP	%	82		70-130	Pass	
Ethylbenzene	M21-Ja29538	NCP	%	72		70-130	Pass	
m&p-Xylenes	M21-Ja29538	NCP	%	81		70-130	Pass	
o-Xylene	M21-Ja29538	NCP	%	77		70-130	Pass	
Xylenes - Total*	M21-Ja29538	NCP	%	80		70-130	Pass	
Spike - % Recovery								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M21-Ja29538	NCP	%	110			70-130	Pass	
TRH C6-C10	M21-Ja29538	NCP	%	72			70-130	Pass	
TRH >C10-C16	M21-Ja35180	NCP	%	99			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M21-Ja32338	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M21-Ja32949	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M21-Ja32949	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M21-Ja32949	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M21-Ja32338	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M21-Ja32338	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M21-Ja32338	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M21-Ja32338	NCP	mg/kg	0.2	< 0.2	11	30%	Pass	
o-Xylene	M21-Ja32338	NCP	mg/kg	0.1	0.1	8.0	30%	Pass	
Xylenes - Total*	M21-Ja32338	NCP	mg/kg	0.4	0.3	10	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M21-Ja32338	NCP	mg/kg	1.3	0.9	41	30%	Fail	Q15
TRH C6-C10	M21-Ja32338	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	M21-Ja32949	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M21-Ja32949	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M21-Ja32949	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M21-Ja28064	NCP	%	7.1	7.2	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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
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

Michael Morrison	Analytical Services Manager
Joseph Edouard	Senior Analyst-Organic (VIC)
Vivian Wang	Senior Analyst-Volatile (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](#).

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Greencap NT P/L
11/14 Winnellie Road
Winnellie
NT 0800



NATA Accredited
Accreditation Number 1261
Site Number 1254

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: **Dylan Burford**

Report **769561-W-V2**
Project name **ORA DIESEL SPILL**
Project ID **J168829**
Received Date **Jan 25, 2021**

Client Sample ID			MW01A Water	MW02 Water	MW03 Water	MW04 Water
Sample Matrix			M21-Ja29383	M21-Ja29384	M21-Ja29385	M21-Ja29386
Eurofins Sample No.			Jan 21, 2021	Jan 21, 2021	Jan 21, 2021	Jan 21, 2021
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	0.3	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	0.3	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	88	90	88	89
Dissolved Gases						
Methane	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	0.3	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	0.3	< 0.1
Inorganic						
Ferrous Iron - Fe ²⁺	0.05	mg/L	20	< 0.05	< 0.05	0.18
Nitrate (as N)	0.02	mg/L	0.63	0.46	1.0	1.2
Sulphate (as SO ₄)	5	mg/L	2900	480	180	290
Alkalinity (speciated)						
Total Alkalinity (as CaCO ₃)	20	mg/L	90	< 20	< 20	21
Heavy Metals						
Manganese (filtered)	0.005	mg/L	1.2	3.8	1.1	1.2

Client Sample ID			MW05 Water	MW06 Water	MW07 Water	MW08 Water
Sample Matrix			M21-Ja29387	M21-Ja29388	M21-Ja29389	M21-Ja29390
Eurofins Sample No.			Jan 21, 2021	Jan 21, 2021	Jan 21, 2021	Jan 21, 2021
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	91	85	91	89
Dissolved Gases						
Methane	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	0.1
Inorganic						
Ferrous Iron - Fe2+	0.05	mg/L	5.8	< 0.05	3.8	1.0
Nitrate (as N)	0.02	mg/L	< 0.02	1.1	0.69	1.2
Sulphate (as SO4)	5	mg/L	2100	320	850	290
Alkalinity (speciated)						
Total Alkalinity (as CaCO3)	20	mg/L	35	< 20	37	< 20
Heavy Metals						
Manganese (filtered)	0.005	mg/L	0.88	1.0	1.0	1.3

Client Sample ID			QC01 (W) Water	RB01 Water	TB01 Water
Sample Matrix			M21-Ja29393	M21-Ja29395	M21-Ja29396
Eurofins Sample No.			Jan 21, 2021	Jan 21, 2021	Jan 21, 2021
Date Sampled					
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	-
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-
TRH C15-C28	0.1	mg/L	0.1	< 0.1	-
TRH C29-C36	0.1	mg/L	0.1	< 0.1	-
TRH C10-C36 (Total)	0.1	mg/L	0.3	< 0.1	-

Client Sample ID			QC01 (W)	RB01	TB01
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M21-Ja29393	M21-Ja29395	M21-Ja29396
Date Sampled			Jan 21, 2021	Jan 21, 2021	Jan 21, 2021
Test/Reference	LOR	Unit			
BTEX					
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	88	59	77
Dissolved Gases					
Methane	0.05	mg/L	< 0.05	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	-
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	-
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	-
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	-
TRH >C16-C34	0.1	mg/L	0.2	< 0.1	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-
TRH >C10-C40 (total)*	0.1	mg/L	0.3	< 0.1	-
Inorganic					
Ferrous Iron - Fe2+	0.05	mg/L	< 0.05	-	-
Nitrate (as N)	0.02	mg/L	0.46	-	-
Sulphate (as SO4)	5	mg/L	500	-	-
Alkalinity (speciated)					
Total Alkalinity (as CaCO3)	20	mg/L	< 20	-	-
Heavy Metals					
Manganese (filtered)	0.005	mg/L	3.9	< 0.005	-

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
Eurofins Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Feb 04, 2021	7 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Jan 27, 2021	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Jan 27, 2021	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Feb 04, 2021	7 Days
Eurofins Suite B16A: SO₄, CH₄, NO₃, Fe₂₊			
Dissolved Gases - Method: LTM-ORG-2070 by Headspace GC-FID	Melbourne	Jan 27, 2021	14 Days
Ferrous Iron - Fe ₂₊ - Method: LTM-INO-4190 Ferrous Iron in Water by Discrete Analyser	Melbourne	Jan 27, 2021	7 Days
Nitrate (as N) - Method: LTM-INO-4120 Analysis of NO _x NO ₂ NH ₃ by FIA	Melbourne	Jan 27, 2021	28 Days
Sulphate (as SO ₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Jan 27, 2021	28 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Jan 27, 2021	14 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Jan 27, 2021	180 Days

DRAFT

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Company Name: Greencap NT P/L
Address: 11/14 Winnellie Road
Winnellie
NT 0800
Project Name: ORA DIESEL SPILL
Project ID: J168829

Order No.: PO282724
Report #: 769561
Phone: 61 8 8984 4244
Fax: 61 8 8984 3105

Received: Jan 25, 2021 11:21 AM
Due: Feb 2, 2021
Priority: 5 Day
Contact Name: Dylan Burford

Eurofins Analytical Services Manager : Michael Morrison

Sample Detail

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																																										
1	MW01A	Jan 21, 2021		Water	M21-Ja29383																																										
2	MW02	Jan 21, 2021		Water	M21-Ja29384																																										
3	MW03	Jan 21, 2021		Water	M21-Ja29385																																										
4	MW04	Jan 21, 2021		Water	M21-Ja29386																																										
5	MW05	Jan 21, 2021		Water	M21-Ja29387																																										
6	MW06	Jan 21, 2021		Water	M21-Ja29388																																										
7	MW07	Jan 21, 2021		Water	M21-Ja29389																																										
8	MW08	Jan 21, 2021		Water	M21-Ja29390																																										
9	SS01	Jan 21, 2021		Soil	M21-Ja29391																																										
<table border="1"> <tr> <td>Euofins Suite B16A: SO4, CH4, NO3, Fe2+</td> <td>X</td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td>Euofins Suite B1</td> <td></td> <td>X</td> <td></td> <td></td> <td>X</td> </tr> <tr> <td>Moisture Set</td> <td></td> <td>X</td> <td></td> <td></td> <td>X</td> </tr> <tr> <td>BTEX</td> <td></td> <td>X</td> <td></td> <td></td> <td>X</td> </tr> <tr> <td>Total Alkalinity (as CaCO3)</td> <td></td> <td>X</td> <td></td> <td>X</td> <td>X</td> </tr> <tr> <td>Manganese (filtered)</td> <td></td> <td>X</td> <td></td> <td>X</td> <td>X</td> </tr> <tr> <td>HOLD</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>						Euofins Suite B16A: SO4, CH4, NO3, Fe2+	X				X	Euofins Suite B1		X			X	Moisture Set		X			X	BTEX		X			X	Total Alkalinity (as CaCO3)		X		X	X	Manganese (filtered)		X		X	X	HOLD	X				
Euofins Suite B16A: SO4, CH4, NO3, Fe2+	X				X																																										
Euofins Suite B1		X			X																																										
Moisture Set		X			X																																										
BTEX		X			X																																										
Total Alkalinity (as CaCO3)		X		X	X																																										
Manganese (filtered)		X		X	X																																										
HOLD	X																																														
<p>Melbourne Laboratory - NATA Site # 1254 & 14271</p> <p>Sydney Laboratory - NATA Site # 18217</p> <p>Brisbane Laboratory - NATA Site # 20794</p> <p>Perth Laboratory - NATA Site # 23736</p> <p>Mayfield Laboratory</p> <p>External Laboratory</p>																																															



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IANZ # 1290

Company Name: Greencap NT P/L
Address: 11/14 Winnellie Road
Winnellie
NT 0800
Project Name: ORA DIESEL SPILL
Project ID: J168829

Order No.: PO282724
Report #: 769561
Phone: 61 8 8984 4244
Fax: 61 8 8984 3105

Received: Jan 25, 2021 11:21 AM
Due: Feb 2, 2021
Priority: 5 Day
Contact Name: Dylan Burford

Eurofins Analytical Services Manager : Michael Morrison

Sample Detail									
	Hold	Manganese (filtered)	Total Alkalinity (as CaCO3)	BTEX	Moisture Set	Eurofins Suite B1	Eurofins Suite B16A: SO4, CH4, NO3, Fe2+		
	X	X	X	X	X	X	X		
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
10	SS02	Jan 21, 2021	Soil			X			
11	QC01 (W)	Jan 21, 2021	Water			X	X		
12	QC01 (S)	Jan 21, 2021	Soil			X	X		
13	RB01	Jan 21, 2021	Water			X			
14	TB01	Jan 21, 2021	Water		X				
15	SW03	Jan 21, 2021	Water						
16	SW04	Jan 21, 2021	Water						
17	SS03	Jan 21, 2021	Soil						
Test Counts									
								3	10
								1	3
								9	9
								13	13
								3	9

Internal Quality Control Review and Glossary
General

- 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.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- 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
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SRA	Sample Receipt Advice
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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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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						
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	mg/L	< 0.02		0.02	Pass	
TRH C10-C14	mg/L	< 0.05		0.05	Pass	
TRH C15-C28	mg/L	< 0.1		0.1	Pass	
TRH C29-C36	mg/L	< 0.1		0.1	Pass	
Method Blank						
BTEX						
Benzene	mg/L	< 0.001		0.001	Pass	
Toluene	mg/L	< 0.001		0.001	Pass	
Ethylbenzene	mg/L	< 0.001		0.001	Pass	
m&p-Xylenes	mg/L	< 0.002		0.002	Pass	
o-Xylene	mg/L	< 0.001		0.001	Pass	
Xylenes - Total*	mg/L	< 0.003		0.003	Pass	
Method Blank						
Dissolved Gases						
Methane	mg/L	< 0.05		0.05	Pass	
Method Blank						
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene	mg/L	< 0.01		0.01	Pass	
TRH C6-C10	mg/L	< 0.02		0.02	Pass	
TRH >C10-C16	mg/L	< 0.05		0.05	Pass	
TRH >C16-C34	mg/L	< 0.1		0.1	Pass	
TRH >C34-C40	mg/L	< 0.1		0.1	Pass	
Method Blank						
Ferrous Iron - Fe2+	mg/L	< 0.05		0.05	Pass	
Nitrate (as N)	mg/L	< 0.02		0.02	Pass	
Sulphate (as SO4)	mg/L	< 5		5	Pass	
Method Blank						
Alkalinity (speciated)						
Total Alkalinity (as CaCO3)	mg/L	< 20		20	Pass	
LCS - % Recovery						
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	%	115		70-130	Pass	
TRH C10-C14	%	94		70-130	Pass	
LCS - % Recovery						
BTEX						
Benzene	%	106		70-130	Pass	
Toluene	%	109		70-130	Pass	
Ethylbenzene	%	100		70-130	Pass	
m&p-Xylenes	%	112		70-130	Pass	
Xylenes - Total*	%	110		70-130	Pass	
LCS - % Recovery						
Dissolved Gases						
Methane	%	129		70-130	Pass	
LCS - % Recovery						
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene	%	75		70-130	Pass	
TRH C6-C10	%	114		70-130	Pass	
TRH >C10-C16	%	95		70-130	Pass	
LCS - % Recovery						
Ferrous Iron - Fe2+	%	111		70-130	Pass	

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nitrate (as N)				%	98			70-130	Pass	
Sulphate (as SO4)				%	112			70-130	Pass	
LCS - % Recovery										
Alkalinity (speciated)										
Total Alkalinity (as CaCO3)				%	87			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					Result 1					
TRH C10-C14	B21-Ja25641	NCP	%	101				70-130	Pass	
Spike - % Recovery										
Dissolved Gases					Result 1					
Methane	M21-Ja29835	NCP	%	90				70-130	Pass	
Spike - % Recovery										
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					Result 1					
TRH >C10-C16	B21-Ja25641	NCP	%	100				70-130	Pass	
Spike - % Recovery										
					Result 1					
Nitrate (as N)	B21-Ja27718	NCP	%	101				70-130	Pass	
Spike - % Recovery										
Alkalinity (speciated)					Result 1					
Total Alkalinity (as CaCO3)	B21-Ja25693	NCP	%	136				70-130	Fail	Q08
Spike - % Recovery										
Heavy Metals					Result 1					
Manganese (filtered)	M21-Ja29383	CP	%	166				75-125	Fail	Q08
Spike - % Recovery										
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					Result 1					
TRH C6-C9	M21-Ja32445	NCP	%	128				70-130	Pass	
Spike - % Recovery										
BTEX					Result 1					
Benzene	M21-Ja32445	NCP	%	92				70-130	Pass	
Toluene	M21-Ja32445	NCP	%	103				70-130	Pass	
Ethylbenzene	M21-Ja32445	NCP	%	101				70-130	Pass	
m&p-Xylenes	M21-Ja32445	NCP	%	107				70-130	Pass	
o-Xylene	M21-Ja32445	NCP	%	98				70-130	Pass	
Xylenes - Total*	M21-Ja32445	NCP	%	104				70-130	Pass	
Spike - % Recovery										
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					Result 1					
Naphthalene	M21-Ja32445	NCP	%	103				70-130	Pass	
TRH C6-C10	M21-Ja32445	NCP	%	122				70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Duplicate										
Dissolved Gases					Result 1	Result 2	RPD			
Methane	M21-Ja29383	CP	mg/L	< 0.05	< 0.05	<1		30%	Pass	
Duplicate										
					Result 1	Result 2	RPD			
Sulphate (as SO4)	M21-Ja27662	NCP	mg/L	< 5	< 5	<1		30%	Pass	
Duplicate										
Alkalinity (speciated)					Result 1	Result 2	RPD			
Total Alkalinity (as CaCO3)	B21-Ja25518	NCP	mg/L	120	110	14		30%	Pass	
Duplicate										
Heavy Metals					Result 1	Result 2	RPD			
Manganese (filtered)	M21-Ja29383	CP	mg/L	1.2	1.3	3.0		30%	Pass	

Duplicate								
				Result 1	Result 2	RPD		
Nitrate (as N)	M21-Ja29388	CP	mg/L	1.1	1.1	1.0	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C10-C14	M21-Ja29389	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
TRH C15-C28	M21-Ja29389	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
TRH C29-C36	M21-Ja29389	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
TRH >C10-C16	M21-Ja29389	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
TRH >C16-C34	M21-Ja29389	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
TRH >C34-C40	M21-Ja29389	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C10-C14	M21-Ja29390	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
TRH C15-C28	M21-Ja29390	CP	mg/L	0.1	0.1	6.0	30%	Pass
TRH C29-C36	M21-Ja29390	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
TRH >C10-C16	M21-Ja29390	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
TRH >C16-C34	M21-Ja29390	CP	mg/L	0.1	0.1	3.0	30%	Pass
TRH >C34-C40	M21-Ja29390	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C6-C9	M21-Ja32444	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass
Duplicate								
BTEX				Result 1	Result 2	RPD		
Benzene	M21-Ja32444	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Toluene	M21-Ja32444	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Ethylbenzene	M21-Ja32444	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
m&p-Xylenes	M21-Ja32444	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass
o-Xylene	M21-Ja32444	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Xylenes - Total*	M21-Ja32444	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	M21-Ja32444	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass
TRH C6-C10	M21-Ja32444	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass

Comments

V2: This report has been amended with repeated TRH results for client sample MW06

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
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
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.
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

Authorised By

Michael Morrison	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)
Vivian Wang	Senior Analyst-Volatile (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](#).

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Greencap NT P/L
11/14 Winnellie Road
Winnellie
NT 0800



NATA Accredited
Accreditation Number 1261
Site Number 1254

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: **Dylan Burford**

Report **771358-W**
Project name **ORA DIESEL SPILL**
Project ID **J168829**
Received Date **Feb 03, 2021**

Client Sample ID			SW03	SW04
Sample Matrix			Water	Water
Eurofins Sample No.			M21-Fe05813	M21-Fe05814
Date Sampled			Jan 21, 2021	Jan 21, 2021
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1
BTEX				
Benzene	0.001	mg/L	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	71	72
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1

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
Eurofins Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Feb 03, 2021	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Feb 03, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Feb 03, 2021	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Feb 03, 2021	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			

DRAFT

Internal Quality Control Review and Glossary
General

- 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.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- 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

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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

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- 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.
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- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	mg/L	< 0.02			0.02	Pass		
TRH C10-C14	mg/L	< 0.05			0.05	Pass		
TRH C15-C28	mg/L	< 0.1			0.1	Pass		
TRH C29-C36	mg/L	< 0.1			0.1	Pass		
Method Blank								
BTEX								
Benzene	mg/L	< 0.001			0.001	Pass		
Toluene	mg/L	< 0.001			0.001	Pass		
Ethylbenzene	mg/L	< 0.001			0.001	Pass		
m&p-Xylenes	mg/L	< 0.002			0.002	Pass		
o-Xylene	mg/L	< 0.001			0.001	Pass		
Xylenes - Total*	mg/L	< 0.003			0.003	Pass		
Method Blank								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	mg/L	< 0.01			0.01	Pass		
TRH C6-C10	mg/L	< 0.02			0.02	Pass		
TRH >C10-C16	mg/L	< 0.05			0.05	Pass		
TRH >C16-C34	mg/L	< 0.1			0.1	Pass		
TRH >C34-C40	mg/L	< 0.1			0.1	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	%	116			70-130	Pass		
TRH C10-C14	%	74			70-130	Pass		
LCS - % Recovery								
BTEX								
Benzene	%	108			70-130	Pass		
Toluene	%	110			70-130	Pass		
Ethylbenzene	%	108			70-130	Pass		
m&p-Xylenes	%	113			70-130	Pass		
Xylenes - Total*	%	110			70-130	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	%	112			70-130	Pass		
TRH C6-C10	%	111			70-130	Pass		
TRH >C10-C16	%	75			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C10-C14	S21-Fe02032	NCP	%	79		70-130	Pass	
Spike - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
TRH >C10-C16	S21-Fe02032	NCP	%	80		70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C10-C14	S21-Fe02046	NCP	mg/L	0.32	0.31	5.0	30%	Pass
TRH C15-C28	S21-Fe02046	NCP	mg/L	0.7	0.8	11	30%	Pass
TRH C29-C36	S21-Fe02046	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass

Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
TRH >C10-C16	S21-Fe02046	NCP	mg/L	0.44	0.44	<1	30%	Pass
TRH >C16-C34	S21-Fe02046	NCP	mg/L	0.6	0.7	13	30%	Pass
TRH >C34-C40	S21-Fe02046	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass

DRAFT

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
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
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.

Authorised By

Michael Morrison	Analytical Services Manager
Joseph Edouard	Senior Analyst-Organic (VIC)
Vivian Wang	Senior Analyst-Volatile (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](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

#AU_CAU001_EnviroSampleVic

From: Varun Bhagwat <Varun.Bhagwat@greencap.com.au>
Sent: Monday, 8 February 2021 5:21 PM
To: Michael Morrison
Cc: #AU_CAU001_EnviroSampleVic; #AU09_EnviroSampleDRW; Dylan Burford
Subject: J168829 - COC with Testing
Attachments: J168829 - EFCOC 08.02.2021.pdf

Hi Michael,

Attached is the COC with testing for soil and water samples collected on 5/2/2021 and 8/2/2021 for the project: **J168829**.

The samples were delivered to the Darwin Eurofins drop off point on 5/2/2021 and 8/2/2021.

Unfortunately there is a bit of confusion with the sample names and they therefore have to be relabelled.

If possible, please can you relabel the samples:

- SP01 - SP06 relabel to SPR1 - SPR6 respectively.
- SED 1, SED 2 and SED 3 sampled on 8/2/21 to SED 6, SED 7 and SED 8 respectively.
- SW01 and SW02 sampled on 8/2/21 to SW06 and SW07 respectively.
- SW03 sampled on 8/2/21 to NW MANGROVE DRAIN 2.
- SW04 and SW05 sampled on 8/2/21 to SW08 and SW09 respectively

I hope that makes sense.

Please contact me if you have any questions/queries.

Thank you!

Cheers,

Varun Bhagwat

Environmental Consultant | Greencap

Unit 11 / 14 Winnellie Road Winnellie, NT 0820
M: 0428 829 444 | E: Varun.Bhagwat@greencap.com.au | in: [LinkedIn](#)

772780
Nik M.

GREENCAP
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IANZ # 1327

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

Sample Receipt Advice

Company name: Greencap SA P/L
Contact name: Dylan Burford
Project name: SP MANAGEMNT
Project ID: J168829
Turnaround time: 2 Day
Date/Time received: Feb 8, 2021 5:21 PM
Eurofins reference: 772780

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

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Michael Cassidy on phone : +61 3 8564 5000 or by email: MichaelCassidy@eurofins.com

Results will be delivered electronically via email to Dylan Burford - dylan.burford@greencap.com.au.

Note: A copy of these results will also be delivered to the general Greencap SA P/L email address.

Greencap NT P/L
11/14 Winnellie Road
Winnellie
NT 0800



NATA Accredited
Accreditation Number 1261
Site Number 1254

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: **Dylan Burford**

Report **772780-S**
Project name **SP MANAGEMNT**
Project ID **J168829**
Received Date **Feb 08, 2021**

Client Sample ID			SPR1	SPR2	SPR3	SPR4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-Fe17393	M21-Fe17394	M21-Fe17395	M21-Fe17396
Date Sampled			Feb 05, 2021	Feb 05, 2021	Feb 05, 2021	Feb 05, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	86	100	83	67
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
% Moisture	1	%	14	10	17	11

Client Sample ID			SPR5 Soil	SPR6 Soil	SED1 Soil	SED2 Soil
Sample Matrix			M21-Fe17397	M21-Fe17398	M21-Fe17399	M21-Fe17400
Eurofins Sample No.			Feb 05, 2021	Feb 05, 2021	Feb 05, 2021	Feb 05, 2021
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	55	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	710	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	765	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	105	81	88	79
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	180	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	180	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	580	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	760	< 100	< 100	< 100
% Moisture	1	%	17	22	18	17

Client Sample ID			SED3 Soil	SED4 Soil	SED5 Soil	MANGROVE Soil
Sample Matrix			M21-Fe17401	M21-Fe17402	M21-Fe17403	M21-Fe17404
Eurofins Sample No.			Feb 05, 2021	Feb 05, 2021	Feb 05, 2021	Feb 05, 2021
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	83	91	148	82

Client Sample ID			SED3 Soil	SED4 Soil	SED5 Soil	MANGROVE Soil
Sample Matrix			M21-Fe17401	M21-Fe17402	M21-Fe17403	M21-Fe17404
Eurofins Sample No.			Feb 05, 2021	Feb 05, 2021	Feb 05, 2021	Feb 05, 2021
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
% Moisture						
	1	%	29	19	17	16

Client Sample ID			SED6 Soil	SED7 Soil	SED8 Soil
Sample Matrix			M21-Fe17405	M21-Fe17406	M21-Fe17407
Eurofins Sample No.			Feb 08, 2021	Feb 08, 2021	Feb 08, 2021
Date Sampled					
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	20	mg/kg	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50
BTEX					
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	71	64	79
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100
% Moisture					
	1	%	46	32	24

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
Eurofins Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Feb 09, 2021	14 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Feb 09, 2021	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Feb 09, 2021	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Feb 09, 2021	14 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Feb 09, 2021	14 Days

DRAFT

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Company Name: Greencap SA P/L
Address: 12 Greenhill Road
Wayville
SA 5034

Project Name: SP MANAGEMENT
Project ID: J168829

Order No.: PO283189*
Report #: 772780
Phone: 08 8299 9955
Fax: 08 8299 9954

Received: Feb 8, 2021 5:21 PM
Due: Feb 10, 2021
Priority: 2 Day
Contact Name: Dylan Burford

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail					
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID
1	SPR1	Feb 05, 2021		Soil	M21-Fe17393
2	SPR2	Feb 05, 2021		Soil	M21-Fe17394
3	SPR3	Feb 05, 2021		Soil	M21-Fe17395
4	SPR4	Feb 05, 2021		Soil	M21-Fe17396
5	SPR5	Feb 05, 2021		Soil	M21-Fe17397
6	SPR6	Feb 05, 2021		Soil	M21-Fe17398
7	SED1	Feb 05, 2021		Soil	M21-Fe17399
8	SED2	Feb 05, 2021		Soil	M21-Fe17400
9	SED3	Feb 05, 2021		Soil	M21-Fe17401
Eurofins Suite B1					
Moisture Set					
BTEX and Naphthalene					
Melbourne Laboratory - NATA Site # 1254 & 14271					
Sydney Laboratory - NATA Site # 18217					
Brisbane Laboratory - NATA Site # 20794					
Perth Laboratory - NATA Site # 23736					
Mayfield Laboratory					
External Laboratory					

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Project ID: J168829

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Received: Feb 8, 2021 5:21 PM
Due: Feb 10, 2021
Priority: 2 Day
Contact Name: Dylan Burford

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail		Eurofins Suite B1	
BTEX and Naphthalene		Moisture Set	
		X	X
External Laboratory			
10	SED4	Feb 05, 2021	Soil
11	SED5	Feb 05, 2021	Soil
12	MANGROVE	Feb 05, 2021	Soil
13	SED6	Feb 08, 2021	Soil
14	SED7	Feb 08, 2021	Soil
15	SED8	Feb 08, 2021	Soil
16	SW01	Feb 05, 2021	Water
17	SW02	Feb 05, 2021	Water
18	SW03	Feb 05, 2021	Water
19	SW04	Feb 05, 2021	Water
20	SW05	Feb 05, 2021	Water

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Project Name: SP MANAGEMENT
Project ID: J168829

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Received: Feb 8, 2021 5:21 PM
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Priority: 2 Day
Contact Name: Dylan Burford

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail		BTEX and Naphthalene	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271				
Sydney Laboratory - NATA Site # 18217				
Brisbane Laboratory - NATA Site # 20794				
Perth Laboratory - NATA Site # 23736				
Mayfield Laboratory				
External Laboratory				
21	NW MANGROVE DRAIN	Water	M21-Fe17413	X
22	SW06	Water	M21-Fe17414	X
23	SW07	Water	M21-Fe17415	X
24	NW MANGROVE DRAIN 2	Water	M21-Fe17416	X
25	SW08	Water	M21-Fe17417	X
26	SW09	Water	M21-Fe17418	X
27	RB01	Water	M21-Fe17419	X
28	TB01	Water	M21-Fe17420	X



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Wayville
SA 5034
Project Name: SP MANAGEMENT
Project ID: J168829

Order No.: PO283189*
Report #: 772780
Phone: 08 8299 9955
Fax: 08 8299 9954

Received: Feb 8, 2021 5:21 PM
Due: Feb 10, 2021
Priority: 2 Day
Contact Name: Dylan Burford

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail			
Eurofins Suite B1	X	X	28
Moisture Set	X		15
BTEX and Naphthalene	X		2
Melbourne Laboratory - NATA Site # 1254 & 14271			
Sydney Laboratory - NATA Site # 18217			
Brisbane Laboratory - NATA Site # 20794			
Perth Laboratory - NATA Site # 23736			
Mayfield Laboratory			
External Laboratory			
29 RB01	Feb 08, 2021	Water	
30 TB01	Feb 08, 2021	Water	
		M21-Fe17421	
		M21-Fe17422	
Test Counts			

Internal Quality Control Review and Glossary
General

- 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.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- 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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	mg/kg	< 20			20	Pass		
TRH C10-C14	mg/kg	< 20			20	Pass		
TRH C15-C28	mg/kg	< 50			50	Pass		
TRH C29-C36	mg/kg	< 50			50	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		
Method Blank								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	mg/kg	< 0.5			0.5	Pass		
TRH C6-C10	mg/kg	< 20			20	Pass		
TRH >C10-C16	mg/kg	< 50			50	Pass		
TRH >C16-C34	mg/kg	< 100			100	Pass		
TRH >C34-C40	mg/kg	< 100			100	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	%	106			70-130	Pass		
TRH C10-C14	%	103			70-130	Pass		
LCS - % Recovery								
BTEX								
Benzene	%	102			70-130	Pass		
Toluene	%	110			70-130	Pass		
Ethylbenzene	%	98			70-130	Pass		
m&p-Xylenes	%	119			70-130	Pass		
Xylenes - Total*	%	118			70-130	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	%	103			70-130	Pass		
TRH C6-C10	%	106			70-130	Pass		
TRH >C10-C16	%	103			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	M21-Fe17395	CP	%	80		70-130	Pass	
TRH C10-C14	M21-Fe17395	CP	%	96		70-130	Pass	
Spike - % Recovery								
BTEX								
Benzene	M21-Fe17395	CP	%	77		70-130	Pass	
Toluene	M21-Fe17395	CP	%	80		70-130	Pass	
Ethylbenzene	M21-Fe17395	CP	%	78		70-130	Pass	
m&p-Xylenes	M21-Fe17395	CP	%	95		70-130	Pass	
o-Xylene	M21-Fe17395	CP	%	93		70-130	Pass	
Xylenes - Total*	M21-Fe17395	CP	%	94		70-130	Pass	
Spike - % Recovery								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M21-Fe17395	CP	%	88			70-130	Pass	
TRH C6-C10	M21-Fe17395	CP	%	82			70-130	Pass	
TRH >C10-C16	M21-Fe17395	CP	%	94			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M21-Fe15118	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M21-Fe15118	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M21-Fe15118	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M21-Fe15118	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M21-Fe15118	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M21-Fe15118	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	M21-Fe15118	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M21-Fe15118	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M21-Fe15118	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	M21-Fe17394	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M21-Fe17394	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M21-Fe17394	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M21-Fe17394	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M21-Fe17394	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M21-Fe17394	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M21-Fe17398	CP	%	22	23	6.0	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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
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.

Authorised by:

Harry Bacalis	Analytical Services Manager
Joseph Edouard	Senior Analyst-Organic (VIC)
Vivian Wang	Senior Analyst-Volatile (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](#).

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SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2102426

Client	: GREENCAP-NAA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR DYLAN BURFORD	Contact	: Shane Ellis
Address	: 11/14 Winnellie Road WINNELLIE NT, AUSTRALIA 0820	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dylan.burford@greencap.com.au	E-mail	: Shane.Ellis@ALSGlobal.com
Telephone	: +61 08 8299 9955	Telephone	: +61 2 8784 8555
Facsimile	: +61 08 8362 9776	Facsimile	: +61-2-8784 8500
Project	: J168829 ORA Diesel Spill	Page	: 1 of 3
Order number	: PO282725	Quote number	: ES2020ADEENV0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Berrimah Freight Terminal		
Sampler	: VARUN BHAGWAT		

Dates

Date Samples Received	: 28-Jan-2021 09:00	Issue Date	: 28-Jan-2021
Client Requested Due Date	: 04-Feb-2021	Scheduled Reporting Date	: 04-Feb-2021

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 17.9' C
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-04 TRH/BTEXN
ES2102426-002	22-Jan-2021 00:00	QC01A	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - ED037-P Alkalinity as CaCO3 (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - W-04 TRH/BTEXN	WATER - W-28 Natural Attenuation Indicators
ES2102426-001	22-Jan-2021 00:00	QC01A	✓	✓	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

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

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EG051G: Ferrous Iron by Discrete Analyser								
	QC01A	Clear Plastic Bottle - HCl	----	23-Jan-2021	28-Jan-2021	✘	----	----
EK057G: Nitrite as N by Discrete Analyser								
	QC01A	Clear Plastic Bottle - Natural	----	24-Jan-2021	28-Jan-2021	✘	----	----



Requested Deliverables

ALL ACCOUNTS

- A4 - AU Tax Invoice (INV)

Email ap@greencap.com.au

DYLAN BURFORD

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)

Email dylan.burford@greencap.com.au
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Email dylan.burford@greencap.com.au
Email dylan.burford@greencap.com.au
Email dylan.burford@greencap.com.au

VARUN BHAGWAT

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)

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DRAFT



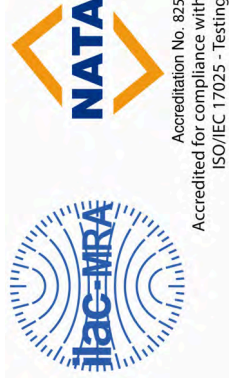
QUALITY CONTROL REPORT

Work Order : ES2102426

Page : 1 of 8

Client : GREENCAP-NAA PTY LTD
 Contact : MR DYLAN BURFORD
 Address : 11/14 Winnellie Road
 WINNELLIE NT, AUSTRALIA 0820
 Telephone : +61 08 8299 9955
 Project : J168829 ORA Diesel Spill
 Order number : PO282725
 C-O-C number : ----
 Sampler : VARUN BHAGWAT
 Site : Berrimah Freight Terminal
 Quote number : EN/222
 No. of samples received : 2
 No. of samples analysed : 2

Laboratory : Environmental Division Sydney
 Contact : Shane Ellis
 Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
 Telephone : +61 2 8784 8555
 Date Samples Received : 28-Jan-2021
 Date Analysis Commenced : 29-Jan-2021
 Issue Date : 03-Feb-2021



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



Page : 2 of 8
 Work Order : ES2102426
 Client : GREENCAP-NAA PTY LTD
 Project : J168829 ORA Diesel Spill

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 sample ID	Sample ID	Method/Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3488692)									
ES2103015-007	Anonymous	EA055: Moisture Content	---	0.1	%	9.8	9.7	1.12	No Limit
ES2103015-008	Anonymous	EA055: Moisture Content	---	0.1	%	8.8	8.8	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3484972)									
ME2100146-001	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3486922)									
ES2102721-005	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
ES2102834-027	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3484972)									
ME2100146-001	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3486922)									
ES2102721-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES2102834-027	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 3486922)									
ES2102721-005	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit



Laboratory sample ID		Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
Sub-Matrix: SOIL										
EP080: BTEXN (QC Lot: 3486922) - continued										
ES2102834-027	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit	
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit	
Sub-Matrix: WATER										
EP037P: Alkalinity by PC Titrator (QC Lot: 3485210)										
ES2102677-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit	
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit	
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	28	28	0.00	0% - 20%	
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	28	28	0.00	0% - 20%	
ES2102658-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit	
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit	
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	115	115	0.00	0% - 20%	
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	115	115	0.00	0% - 20%	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3484204)										
ES2102426-001	QC01A	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	459	462	0.639	0% - 20%	
ES2102537-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	16	16	0.00	0% - 50%	
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3488623)										
ES2103145-005	Anonymous	EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit	
ES2103133-001	Anonymous	EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.009	0.008	0.00	No Limit	
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 3487096)										
ES2102426-001	QC01A	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit	
EW2100428-002	Anonymous	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit	
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 3484924)										
EM2101119-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	10600	10400	2.09	0% - 20%	
EW2100421-002	Anonymous	EP033: Methane	74-82-8	10	µg/L	12	12	0.00	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3485609)										
ES2102429-001	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit	
ES2102770-001	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3485609)										
ES2102429-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
ES2102770-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
EP080: BTEXN (QC Lot: 3485609)										
ES2102429-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit	
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit	



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 Work Order : ES2102426
 Client : GREENCAP-NAA PTY LTD
 Project : J168829 ORA Diesel Spill

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EP080: BTEXN (QC Lot: 3485609) - continued									
ES2102429-001	Anonymous	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES2102770-001	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit



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

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control 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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report		
				Result	Concentration	Spike Recovery (%)	LCS	Low
EP080/074: Total Petroleum Hydrocarbons (QCLot: 3484972)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	109	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	100	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	95.3	71.0	129
EP080/074: Total Petroleum Hydrocarbons (QCLot: 3486922)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	91.2	68.4	128
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3484972)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	106	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	97.8	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	80.6	63.0	131
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3486922)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	92.8	68.4	128
EP080: BTEXN (QCLot: 3486922)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	93.8	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	93.5	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	93.9	65.0	117
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	94.5	66.0	118
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	93.4	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	90.7	63.0	119

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report		
				Result	Concentration	Spike Recovery (%)	LCS	Low
ED037P: Alkalinity by PC Titrator (QCLot: 3485210)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	109	81.0	111
					50 mg/L	118	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3484204)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.6	82.0	122
					500 mg/L	93.7	82.0	122
EG020F: Dissolved Metals by ICP-MS (QCLot: 3488623)								
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	91.5	82.0	110
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3487096)								
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	99.4	89.0	117
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 3484924)								



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 Work Order : ES2102426
 Client : GREENCAP-NAA PTY LTD
 Project : J168829 ORA Diesel Spill

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Concentration	Spike Recovery (%)	Concentration	Low	High
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 3484924) - continued									
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	99.4	86.0	114	
EP080/074: Total Petroleum Hydrocarbons (QCLot: 3484309)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	90.6	55.8	112	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	87.9	71.6	113	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	93.9	56.0	121	
EP080/074: Total Petroleum Hydrocarbons (QCLot: 3485609)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	89.0	75.0	127	
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3484309)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	97.8	57.9	119	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	99.1	62.5	110	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	96.8	61.5	121	
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3485609)									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	89.8	75.0	127	
EP080: BTEXN (QCLot: 3485609)									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	92.2	70.0	122	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	95.2	69.0	123	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	86.4	70.0	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	84.9	69.0	121	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	87.0	72.0	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	95.0	70.0	120	

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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)
			MS	Low	High	
EP080/074: Total Petroleum Hydrocarbons (QCLot: 3484972)						
ME2100146-001	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	94.9	73.0
		EP071: C15 - C28 Fraction	----	2319 mg/kg	111	53.0
		EP071: C29 - C36 Fraction	----	1714 mg/kg	118	52.0
EP080/074: Total Petroleum Hydrocarbons (QCLot: 3486922)						
ES2102721-005	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	94.9	70.0
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3484972)						
ME2100146-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	102	73.0



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 Work Order : ES2102426
 Client : GREENCAP-NAA PTY LTD
 Project : J168829 ORA Diesel Spill

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low High
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3484972) - continued						
ME2100146-001	Anonymous	EP071: >C16 - C34 Fraction	----	3223 mg/kg	118	53.0 131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	115	52.0 132
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3486922)						
ES2102721-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	93.7	70.0 130
EP080: BTEXN (QCLot: 3486922)						
ES2102721-005	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	89.5	70.0 130
		EP080: Toluene	108-88-3	2.5 mg/kg	90.7	70.0 130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	91.3	70.0 130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	91.1	70.0 130
		EP080: ortho-Xylene	106-42-3	2.5 mg/kg	90.7	70.0 130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	87.2	70.0 130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3484204)						
ES2102426-001	QC01A	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70.0 130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3488623)						
ES2102714-006	Anonymous	EG020A-F: Manganese	7439-96-5	1 mg/L	125	70.0 130
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3487096)						
ES2102426-001	QC01A	EG051G: Ferrous Iron	----	1 mg/L	86.3	70.0 130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 3484924)						
EW2100421-001	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	95.0	70.0 130
EP080/074: Total Petroleum Hydrocarbons (QCLot: 3485609)						
ES2102429-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	104	70.0 130
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3485609)						
ES2102429-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	104	70.0 130
EP080: BTEXN (QCLot: 3485609)						
ES2102429-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	97.3	70.0 130
		EP080: Toluene	108-88-3	25 µg/L	102	70.0 130
		EP080: Ethylbenzene	100-41-4	25 µg/L	96.4	70.0 130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	92.1	70.0 130
		EP080: ortho-Xylene	106-42-3	25 µg/L	98.3	70.0 130
		EP080: Naphthalene	91-20-3	25 µg/L	95.1	70.0 130



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Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2102426	Page	: 1 of 8
Client	: GREENCAP-NAA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR DYLAN BURFORD	Telephone	: +61 2 8784 8555
Project	: J168829 ORA Diesel Spill	Date Samples Received	: 28-Jan-2021
Site	: Berrimah Freight Terminal	Issue Date	: 03-Feb-2021
Sampler	: VARUN BHAGWAT	No. of samples received	: 2
Order number	: PO282725	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.
- **Matrix Spike** outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES2102426--001	QC01A	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EG051G: Ferrous Iron by Discrete Analyser							
Clear Plastic Bottle - HCl							
QC01A		----	----	----	01-Feb-2021	23-Jan-2021	9

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Method	Count		Rate (%)		Quality Control Specification
		QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)						
TRH - Semivolatile Fraction		0	17	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)						
TRH - Semivolatile Fraction		0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

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	Date analysed	Due for analysis	Evaluation	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
QC01A		22-Jan-2021	----	01-Feb-2021	05-Feb-2021	----	✓



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 Work Order : ES2102426
 Client : GREENCAP-NAA PTY LTD
 Project : J168829 ORA Diesel Spill

Matrix: **SOIL** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Evaluation	Due for analysis
EP080/071: Total Petroleum Hydrocarbons					
Soil Glass Jar - Unpreserved (EP080)					
QC01A	22-Jan-2021	01-Feb-2021	05-Feb-2021	✓	05-Feb-2021
Soil Glass Jar - Unpreserved (EP071)					
QC01A	22-Jan-2021	29-Jan-2021	05-Feb-2021	✓	10-Mar-2021
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions					
Soil Glass Jar - Unpreserved (EP080)					
QC01A	22-Jan-2021	01-Feb-2021	05-Feb-2021	✓	05-Feb-2021
Soil Glass Jar - Unpreserved (EP071)					
QC01A	22-Jan-2021	29-Jan-2021	05-Feb-2021	✓	10-Mar-2021
EP080: BTEXN					
Soil Glass Jar - Unpreserved (EP080)					
QC01A	22-Jan-2021	01-Feb-2021	05-Feb-2021	✓	05-Feb-2021

Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Evaluation	Due for analysis
ED037P: Alkalinity by PC Titrator					
Clear Plastic Bottle - Natural (ED037-P)					
QC01A	22-Jan-2021	----	----	----	05-Feb-2021
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA					
Clear Plastic Bottle - Natural (ED041G)					
QC01A	22-Jan-2021	----	----	----	19-Feb-2021
EG020F: Dissolved Metals by ICP-MS					
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)					
QC01A	22-Jan-2021	----	----	----	21-Jul-2021
EG051G: Ferrous Iron by Discrete Analyser					
Clear Plastic Bottle - HCl (EG051G)					
QC01A	22-Jan-2021	----	----	----	23-Jan-2021
EP033: C1 - C4 Hydrocarbon Gases					
Amber VOC Vial - Sulfuric Acid (EP033)					
QC01A	22-Jan-2021	----	----	----	05-Feb-2021
EP080/071: Total Petroleum Hydrocarbons					
Amber Glass Bottle - Unpreserved (EP071)					
QC01A	22-Jan-2021	29-Jan-2021	29-Jan-2021	✓	10-Mar-2021
Amber VOC Vial - Sulfuric Acid (EP080)					
QC01A	22-Jan-2021	01-Feb-2021	05-Feb-2021	✓	05-Feb-2021
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions					
Amber Glass Bottle - Unpreserved (EP071)					
QC01A	22-Jan-2021	29-Jan-2021	29-Jan-2021	✓	10-Mar-2021
Amber VOC Vial - Sulfuric Acid (EP080)					
QC01A	22-Jan-2021	01-Feb-2021	05-Feb-2021	✓	05-Feb-2021



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Work Order : ES2102426
Client : GREENCAP-NAA PTY LTD
Project : J168829 ORA Diesel Spill

Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Date analysed	Due for analysis
EP080: BTEXN	22-Jan-2021	01-Feb-2021	05-Feb-2021	01-Feb-2021	05-Feb-2021
Amber VOC Vial - Sulfuric Acid (EP080) QC01A				✓	✓

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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	Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
			QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)							
Moisture Content	EA055		2	10	20.00	10.00	NEPM 2013 B3 & ALS QC Standard ✓
TRH - Semivolatle Fraction	EP071		1	8	12.50	10.00	NEPM 2013 B3 & ALS QC Standard ✓
TRH Volatiles/BTEX	EP080		2	19	10.53	10.00	NEPM 2013 B3 & ALS QC Standard ✓
Laboratory Control Samples (LCS)							
TRH - Semivolatle Fraction	EP071		1	8	12.50	5.00	NEPM 2013 B3 & ALS QC Standard ✓
TRH Volatiles/BTEX	EP080		1	19	5.26	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Method Blanks (MB)							
TRH - Semivolatle Fraction	EP071		1	8	12.50	5.00	NEPM 2013 B3 & ALS QC Standard ✓
TRH Volatiles/BTEX	EP080		1	19	5.26	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Matrix Spikes (MS)							
TRH - Semivolatle Fraction	EP071		1	8	12.50	5.00	NEPM 2013 B3 & ALS QC Standard ✓
TRH Volatiles/BTEX	EP080		1	19	5.26	5.00	NEPM 2013 B3 & ALS QC Standard ✓

Matrix: **WATER**

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

Quality Control Sample Type	Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
			QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P		2	20	10.00	10.00	NEPM 2013 B3 & ALS QC Standard ✓
C1 - C4 Gases	EP033		2	18	11.11	10.00	NEPM 2013 B3 & ALS QC Standard ✓
Dissolved Metals by ICP-MS - Suite A	EG020A-F		2	10	20.00	10.00	NEPM 2013 B3 & ALS QC Standard ✓
Ferrous Iron by Discrete Analyser	EG051G		2	13	15.38	10.00	NEPM 2013 B3 & ALS QC Standard ✓
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G		2	20	10.00	10.00	NEPM 2013 B3 & ALS QC Standard ✓
TRH - Semivolatle Fraction	EP071		0	17	0.00	10.00	NEPM 2013 B3 & ALS QC Standard ✗
TRH Volatiles/BTEX	EP080		2	20	10.00	10.00	NEPM 2013 B3 & ALS QC Standard ✓
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P		2	20	10.00	10.00	NEPM 2013 B3 & ALS QC Standard ✓
C1 - C4 Gases	EP033		1	18	5.56	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Dissolved Metals by ICP-MS - Suite A	EG020A-F		1	10	10.00	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Ferrous Iron by Discrete Analyser	EG051G		1	13	7.69	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G		2	20	10.00	10.00	NEPM 2013 B3 & ALS QC Standard ✓
TRH - Semivolatle Fraction	EP071		1	17	5.88	5.00	NEPM 2013 B3 & ALS QC Standard ✓
TRH Volatiles/BTEX	EP080		1	20	5.00	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Method Blanks (MB)							
C1 - C4 Gases	EP033		1	18	5.56	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Dissolved Metals by ICP-MS - Suite A	EG020A-F		1	10	10.00	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Ferrous Iron by Discrete Analyser	EG051G		1	13	7.69	5.00	NEPM 2013 B3 & ALS QC Standard ✓



Page : 6 of 8
 Work Order : ES2102426
 Client : GREENCAP-NAA PTY LTD
 Project : J168829 ORA Diesel Spill

Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Method	Count		Actual	Rate (%)		Evaluation	Quality Control Specification
Analytical Methods	QC		Regular	QC		Expected	Actual		
Method Blanks (MB) - Continued									
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser		ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH - Semivolatle Fraction		EP071	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH Volatiles/BTEX		EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Matrix Spikes (MS)									
C1 - C4 Gases		EP033	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite A		EG020A-F	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Ferrous Iron by Discrete Analyser		EG051G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser		ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH - Semivolatle Fraction		EP071	0	17	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard	
TRH Volatiles/BTEX		EP080	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
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 Schedule B(3).
TRH - Semivolatle Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrator) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-ENE020. Samples are 0.45um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ferrous Iron by Discrete Analyser	EG051G	WATER	In house: Referenced to APHA 3500 Fe-B. A colorimetric determination based on the reaction between phenanthroline and ferrous iron at pH 3.2-3.3 to form an orange-red complex that is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3).
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TRH - Semivolatle Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)



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Work Order : ES2102426
Client : GREENCAP-NAA PTY LTD
Project : J168829 ORA Diesel Spill

Preparation Methods	Method	Matrix	Method Descriptions
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510. 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **ES2102426**
Client : **GREENCAP-NAA PTY LTD**
Contact : **MR DYLAN BURFORD**
Address : **11/14 Winnellie Road**
WINNELLIE NT, AUSTRALIA 0820
Telephone : **+61 08 8299 9955**
Project : **J168829 ORA Diesel Spill**
Order number : **PO282725**
C-O-C number : **----**
Sampler : **VARUN BHAGWAT**
Site : **Berrimah Freight Terminal**
Quote number : **EN/222**
No. of samples received : **2**
No. of samples analysed : **2**

Page : **1 of 6**
Laboratory : **Environmental Division Sydney**
Contact : **Shane Ellis**
Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**
Telephone : **+61 2 8784 8555**
Date Samples Received : **28-Jan-2021 09:00**
Date Analysis Commenced : **29-Jan-2021**
Issue Date : **03-Feb-2021 14:06**



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, unless the sampling was conducted by ALS. 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
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



Page : 2 of 6
Work Order : ES2102426
Client : GREENCAP-NAA PTY LTD
Project : J168829 ORA Diesel Spill

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.



Analytical Results

Compound	CAS Number	Sample ID		QC01A
		LOR	Unit	
Sub-Matrix: SOIL (Matrix: SOIL)		Sampling date / time		
EA055: Moisture Content (Dried @ 105-110°C)				
Moisture Content		0.1	%	14.8
EP080/071: Total Petroleum Hydrocarbons				
C6 - C9 Fraction		10	mg/kg	<10
C10 - C14 Fraction		50	mg/kg	<50
C15 - C28 Fraction		100	mg/kg	190
C29 - C36 Fraction		100	mg/kg	230
^ C10 - C36 Fraction (sum)		50	mg/kg	420
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions				
C6 - C10 Fraction	C6_C10	10	mg/kg	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10
>C10 - C16 Fraction		50	mg/kg	<50
>C16 - C34 Fraction		100	mg/kg	310
>C34 - C40 Fraction		100	mg/kg	300
^ >C10 - C40 Fraction (sum)		50	mg/kg	610
^ >C10 - C16 Fraction minus Naphthalene (F2)		50	mg/kg	<50
EP080: BTEXN				
Benzene	71-43-2	0.2	mg/kg	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5
meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5
^ Sum of BTEX		0.2	mg/kg	<0.2
^ Total Xylenes		0.5	mg/kg	<0.5
Naphthalene	91-20-3	1	mg/kg	<1
EP080S: TPH(V)/BTEX Surrogates				
1,2-Dichloroethane-D4	17060-07-0	0.2	%	99.4
Toluene-D8	2037-26-5	0.2	%	110
4-Bromofluorobenzene	460-00-4	0.2	%	113



Analytical Results

Compound	CAS Number	Sample ID		QC01A
		LOR	Unit	
ED037P: Alkalinity by PC Titrator				
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	13
Total Alkalinity as CaCO3		1	mg/L	13
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA				
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	459
EG020F: Dissolved Metals by ICP-MS				
Manganese	7439-96-5	0.001	mg/L	3.46
EG051G: Ferrous Iron by Discrete Analyser				
Ferrous Iron		0.05	mg/L	<0.05
EK058G: Nitrate as N by Discrete Analyser				
Nitrate as N	14797-55-8	0.01	mg/L	0.38
EP033: C1 - C4 Hydrocarbon Gases				
Methane	74-82-8	10	µg/L	<10
EP080/071: Total Petroleum Hydrocarbons				
C6 - C9 Fraction		20	µg/L	<20
C10 - C14 Fraction		50	µg/L	<50
C15 - C28 Fraction		100	µg/L	<100
C29 - C36 Fraction		50	µg/L	<50
^ C10 - C36 Fraction (sum)		50	µg/L	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions				
C6 - C10 Fraction	C6_C10	20	µg/L	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20
>C10 - C16 Fraction		100	µg/L	<100
>C16 - C34 Fraction		100	µg/L	<100
>C34 - C40 Fraction		100	µg/L	<100
^ >C10 - C40 Fraction (sum)		100	µg/L	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)		100	µg/L	<100
EP080: BTEXN				
Benzene	71-43-2	1	µg/L	<1
Toluene	108-88-3	2	µg/L	<2
Ethylbenzene	100-41-4	2	µg/L	<2



Analytical Results

Compound	CAS Number	LOR	Sample ID		QC01A	Result
			Sampling date / time	Unit		
EP080: BTEXN - Continued						
meta- & para-Xylene	108-38-3	2	106-42-3	µg/L	<2	
ortho-Xylene	95-47-6	2		µg/L	<2	
^ Total Xylenes		2		µg/L	<2	
^ Sum of BTEX		1		µg/L	<1	
Naphthalene	91-20-3	5		µg/L	<5	
EP080S: TPH(V)/BTEX Surrogates						
1,2-Dichloroethane-D4	17060-07-0	2		%	134	
Toluene-D8	2037-26-5	2		%	99.9	
4-Bromofluorobenzene	460-00-4	2		%	86.5	



Surrogate Control Limits

Sub-Matrix: SOIL			
Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130
Sub-Matrix: WATER			
Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

FINAL REPORT

GROUNDWATER MONITORING AND MANAGEMENT PLAN

March 2021
J168829-01

ONE RAIL AUSTRALIA Berrimah Freight Terminal

Statements of Limitation

All and any Services proposed by Greencap to the Client were subject to the Terms and Conditions listed on the Greencap website at: <https://www.greencap.com.au/terms-conditions>. Unless otherwise expressly agreed to in writing and signed by Greencap, Greencap does not agree to any alternative terms or variation of these terms if subsequently proposed by the Client. The Services were carried out in accordance with the current and relevant industry standards of testing, interpretation and analysis. The Services were carried out in accordance with Commonwealth, State, Territory or Government legislation, regulations and/or guidelines. The Client was deemed to have accepted these Terms when the Client signed the Proposal (where indicated) or when the Company commenced the Services at the request (written or otherwise) of the Client.

The services were carried out for the Specific Purpose, outlined in the body of the Proposal. To the fullest extent permitted by law, Greencap, its related bodies corporate, its officers, consultants, employees and agents assume no liability, and will not be liable to any person, or in relation to, any losses, damages, costs or expenses, and whether arising in contract, tort including negligence, under statute, in equity or otherwise, arising out of, or in connection with, any matter outside the Specific Purpose.

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This Report should be read in whole and should not be copied in part or altered. The Report as a whole set outs the findings of the investigations. No responsibility is accepted by Greencap for use of parts of the Report in the absence (or out of context) of the balance of the Report.

Document Control

Document Quality Management Details		
Report Name:	Groundwater Monitoring and Management Plan	
Site Details:	Berrimah Freight Terminal	
Project Number:	J168829-01	
Client Name:	One Rail Australia	
Signatures:	Prepared By:  Stuart Carroll Environmental Consultant	Reviewed By:  Alex Sereda Principal Hydrogeologist
	Reviewed By: David Ross Principal Environmental	Approved By:  Dylan Burford Practice Manager - Environmental & Contaminated Land

Issue Status

Version No.	Status	Date	Creator	Reviewer
1	Draft	July 2020	SC	DR/AS
2	Draft	December 2020	SC/DB	AS
3	Final	March 2021	SC/DB	AS

Document Circulation

Version	Company
3	One Rail Australia

Groundwater Monitoring and Management Plan

One Rail Australia

Berrimah Freight Terminal

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1 INTRODUCTION

Grencap Pty Ltd (Grencap) was commissioned by One Rail Australia (ORA) to prepare a Groundwater Management and Monitoring Plan (GMMP) in response to a diesel spill which occurred at the Berrimah Freight Rail Terminal, Export Drive, Berrimah, Northern Territory (the Site) (see **Figure 1-1**).

The purpose of this document is to outline planned groundwater monitoring and reactive management measures following the identification of significant residual diesel impacts in soils at the site.

1.1 Background

A diesel spill estimated at ~20,000 litres (L) occurred on the Site during automatic refuelling of a diesel locomotive on Saturday 30 May 2020. ORA notified the Northern Territory Environment Protection Authority (NT EPA) shortly thereafter who attended the Site on Saturday 30 May 2020 to inspect the spill.

The NT EPA issued an Authorised Officer Direction (AOD) on 4 June 2020, directing ORA:

- 1) *To immediately manage waste on or in land by:*
 - a. *Undertaking sufficient surface water, groundwater and soil analysis to be able to determine the types, amount, distribution and mobility of contaminants in the environment as a result of the diesel spill that occurred at the premises on 30 May 2020; and*
 - b. *By 1500 on 5 June 2020 determine and implement suitable actions to manage and start to recover waste in the land that have resulted from the diesel spill that occurred at the premises on 30 May 2020; and*
 - c. *Undertake daily inspections and sufficient monitoring to detect any pollution or impact to the surrounding environment as a result of the diesel spill, including but not limited to the identified Significant Biodiversity Area located adjacent to the spill location.*

In order to comply with item 1) a. of the AOD issued 4 June 2020, Grencap has undertaken a detailed site investigation (DSI).

ORA undertook remedial excavation works concurrently with the DSI, however, based on the findings of the DSI, it was determined that a significant amount of residual soil had not been recovered from beneath the rail lines and underground services backfill in the vicinity of the spill the site, therefore it was considered necessary to develop and implement this GMMP. This action was also considered necessary to comply with item 1) a. of the AOD issued 4 June 2020.



Figure 1-1 – Site Location (source: Nearmap)

2 SITE DETAILS

2.1 Regional and Physical Setting

The Site is located in the upper reaches of East Arm in Darwin Harbour, approximately 7 kilometres (km) east of the City of Darwin, NT and occupies an area of approximately 19 hectares (ha) (refer to **Figure 1-1**). The Site is located at NT Portions 5411 and 5461, Export Drive, Berrimah NT 0828.

Land uses surrounding the site include:

- Directly to the north, intertidal mangrove habitat zoned Development, further north of which is Blesser's creek (Darwin Harbour) and intertidal mangrove habitat zoned Conservation.
- Directly to the east, unoccupied, cleared land zoned Development, further east of which is Berrimah Road and a small amount of uncleared forest.
- Directly to the west, the Darwin passenger rail terminal; and
- Directly to the south are numerous industrial/commercial premises.

The nearest surface water body is the intertidal mangrove assemblage zone of Darwin Harbour's East Arm and Blesser's Creek, located directly adjacent to the northern boundary of the site and typical of the majority of the shoreline of Darwin Harbour.

2.2 Current Site Condition and Land Use

The site is used as a freight rail terminal and consists of four railway lines (Main Line, 1 Road, Auxiliary Road and Ramp Road) all generally running east-west, an asphalt sealed container pad used for the loading and transfer of freight to and from heavy rail, locomotive/car maintenance sheds at the east end of the Site and an office building and gatehouse to the south on Export Drive.

2.3 Spill Site Description

The spill occurred on the 1 Road rail line, to the north of the office building and spread under the Auxiliary Road and Ramp Road rail lines to the south, and along an unlined Vee-drain to the west where a temporary interception sump was excavated and used to recover some of the diesel. The Vee-drain continues west past the recovery/interception sump and a second vee drain exists to the south of the spill site, approximately 20 m to the south of the Ramp Road at its closest point. Directly to the north of the spill site is the asphalt lined container pad, further afield is the edge of the intertidal mangrove community located downgradient of the spill site, approximately 40 metres away. The rail lines are covered by ballast material which is also present on the surface between the rail lines. South of the Ramp road is a cover of unsealed fine crushed rock/gravel material. A spill site plan is presented in **Figure 2-1**.



Legend	Client: Ora Rail Australia	Title: Site Location Plan	Approximate Scale 0 50 100 150m	GREENCAP Level 1
 Site boundary	Client No: C105292	Address: Benimach Freight Terminal - Export Drive, Benimach NT		

Figure 2-1 – Site Plan (source: Nearmap)

3 GEOLOGY AND HYDROGEOLOGY

3.1 Hydrology

It is anticipated that stormwater runoff and overland flow at the Site would drain following local topography and/or into existing drainage channels; all ultimately northwards towards the intertidal mangrove community and Blesser's Creek. Flows are expected to be at a maximum during the wet season.

The spill site drains immediately to the west south-west and south via unlined Vee-drains which travel west-south west and south respectively, ultimately redirecting runoff under and around the Site to the intertidal mangrove community and Blesser's Creek to the north (see **Figure 2-1**).

3.2 Geology

3.2.1 Geology & Soils

The 1:100,000 Geology (NT Gov. Department of Business, Industry and Resource Development, 2001) identifies four geological forms for the site (see **Figure 3-1**) including:

- The eastern end of the site listed as Qc (Quaternary: slope wash, sandy flood plains, gravel, sand, silt, colluvium)
- The central part of the site listed as Qca (Quaternary coastal alluvium: mud, silts and clays)
- Small parts of the western end of the site listed as Efb (Burrell Creek formation: Siltstone, shale and phyllite, quartz veins, coarse quartz sandstone, quartz arenite, arkose, quartz pebble conglomerate) and L (Tertiary laterite gravel (pisolitic and nodular); duricrust/ferricrete)

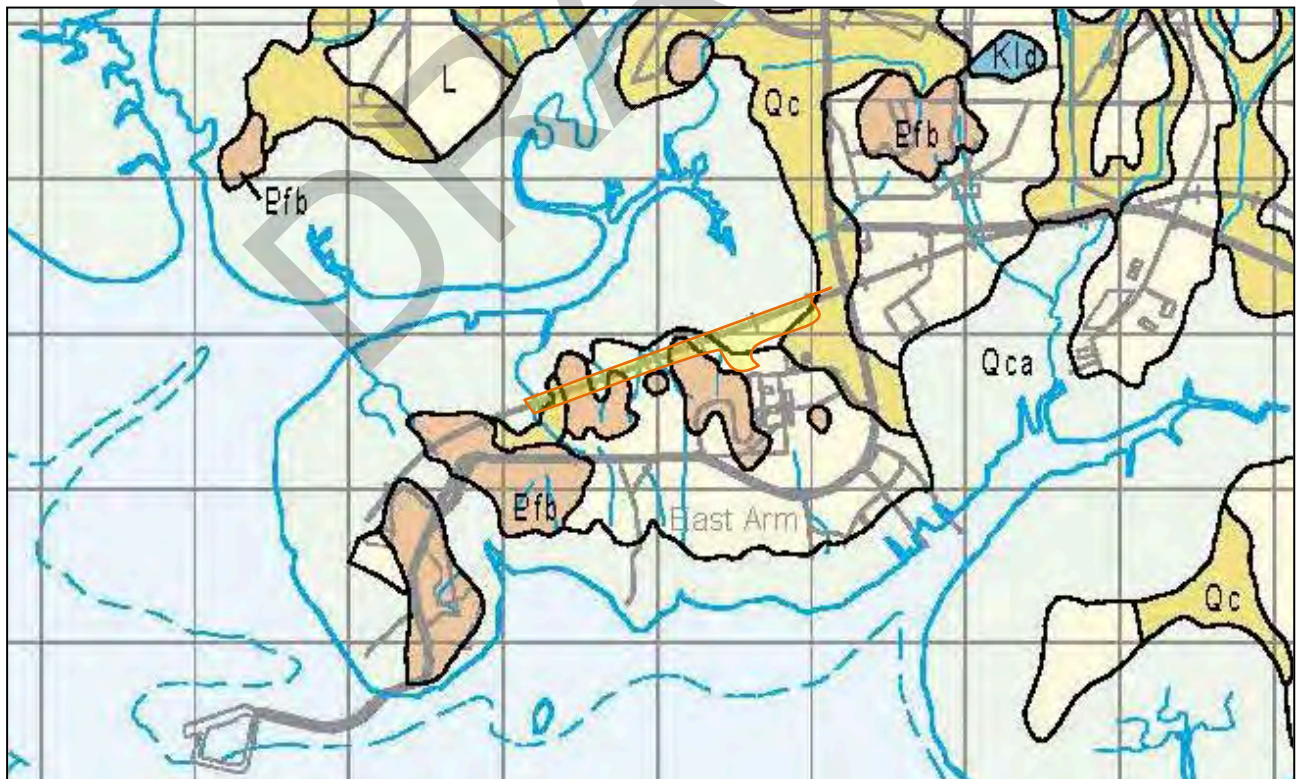


Figure 3-1 – Site Geology (source: 1:100 000 Geological Series Sheet 5073)

Natural soils encountered during this DSI were limited to the northern edge of the Site, i.e. the edge or interface with the intertidal mangrove forest.

The Site is in an area identified as having a high probability of occurrence (with very low confidence) of acid sulphate soils (ASRIS online database, 2020) and natural materials encountered on the edge of the mangroves were noted as containing sulfurous odours.

3.3 Hydrogeology

A general review of regional hydrogeological settings, groundwater occurrence and groundwater quality for the Darwin region is presented in Verma (2002). Regional aquifers generally occur within the Cretaceous and Proterozoic sediments and rocks. Verma (2002) notes that the Burrell Creek Formation typically contains minor aquifers and the Cretaceous Bathurst Island Formation is not classified as an aquifer because bores in this area often become dry during the Dry season due to water level fluctuations. As indicated in Haig and Townsend (2003), aquifer recharge in the Darwin Harbour catchment occurs during wet seasons arising from the direct infiltration of water into the regional aquifer(s) during December through to May. Although in some years, recharge can begin as early as October and end as late as June.

Reference to published groundwater and hydrogeological maps (Northern Territory Government, Department of Planning and Infrastructure, 2004) indicates that Burrell Creek formation underlying the site is a fractured weathered rock with minor groundwater resources. It is classified as a Local Scale Aquifer.

Groundwater information obtained from the NRETAS bore records indicates that the closest current bore is installed approximately 1.8 km to the South of the site (<https://nrmaps.nt.gov.au/nrmaps.html> accessed 17/6/20).

No groundwater quality data is available for the site, however it is expected to be saline due to the proximity of the intertidal zone.

4 DETAILED SITE INVESTIGATION

In order to assist with responding to the NT EPA AOD, Grencap undertook a DSI to:

- Characterise the type of contamination sustained as a result of the spill.
- Estimate the quantities of diesel spilled and recovered.
- Delineate the vertical and lateral extent of the diesel spill.
- Assess the mobility of contaminants still present in the spill site.

The draft DSI confirmed diesel impacts were present at concentrations:

- Within the 1 Road rail line (total recoverable hydrocarbons (TRH) C₆-C₁₀ minus Benzene, toluene, ethylbenzene and xylene (BTEX) as high as 440 mg/kg) that present a soil vapour risk to human health.
- Within and between the 1 Road, Auxiliary Road and Ramp road rail lines (TRH >C₁₀-C₄₀ as high as 63,170 mg/kg) that present a risk to down-gradient ecological receptors and that present a potential light non-aqueous phase liquid (LNAPL)-related hazard.
- In underground services backfill between the Auxiliary Road and Ramp Road, directly south of the spill point lines (TRH >C₁₀-C₄₀ at 32,000 mg/kg) that present a risk to down-gradient ecological receptors and that present a potential LNAPL-related hazard.
- Within the western end of the Vee-drain, between/around the underground services crossover and the road underpass drain (TRH >C₁₀-C₄₀ as high as 39,000 mg/kg) that present a risk to down-gradient ecological receptors.

The draft DSI also confirmed diesel impacts were present at the depth of groundwater at one location beneath the asphalt (since removed) between the 1 Road and Auxiliary Road rail lines, though not currently at a significant soil concentration.

A mass balance calculation estimated approximately 12,600 L of diesel had been recovered and that approximately 7,400 L of diesel remained in situ at the spill site.

Leachate analytical results indicated TRH was not relatively mobile and that toluene and o-xylene were more mobile, although toluene was not necessarily at a concentration likely to impact marine water ecological receptors; however, the reliability of this data was of concern and it should be noted that diesel impacts were detected at the depth of groundwater at one location.

The draft DSI concluded:

1. A risk of soil hydrocarbon vapour exposure to rail workers working in the vicinity of the 1 Road rail line existed (refer **Figure 5-1** for locations) and that the risk to off-site human/ecological receptors via stormwater runoff and/or groundwater migration should be further investigated.
2. In order to prevent worker exposure to soil hydrocarbon vapours or diesel-related impacts reaching down-gradient receptors, sources of contamination or contaminant pathways should be removed and/or contained, the details of which are to be developed in the final RAP.
3. The option to remove the source of contamination may require either the excavation of impacted soils from the site for off-site disposal or appropriate treatment prior to reinstatement, or the removal of diesel contaminants from the ground in-situ e.g. via rinsing (desorption) and the collection of resultant hydrocarbon/rinse solution. The preferred approach should be appropriately validated as detailed in the final RAP and include development and implementation of a GMMP.

4. Should significant impacts remain due to either the selection of such a management approach or removal approaches not being demonstrated to be effective, the following should be undertaken:
 - A human health/ecological risk assessment.
 - A detailed leachate assessment.
 - Development and implementation of a site management plan (SMP).
 - Development and implementation of a GMMP.

DRAFT

5 GROUNDWATER MANAGEMENT AND MONITORING PLAN

5.1 Objectives and Structure

This GMMP aims to accomplish the following objectives:

- To conduct regular monitoring of groundwater beneath diesel impacted soils in order to advise if impacts in soil migrate to groundwater.
- To conduct surface water and sediment monitoring to support the groundwater monitoring program and further assess any potential mobilisation of diesel impacts from impacted materials remaining in situ where removal is not feasible (i.e. directly under rail lines).
- If diesel impacts to groundwater become evident, to confirm whether or not they present a risk to down-gradient receptors via comparison of data to established trigger values.
- To establish mechanisms and management measures or remedial actions which should be implemented if level of risk shows an increasing trend.

The NT EPA guidance documents used for the development of this monitoring plan include:

- Northern Territory Contaminated Land Guideline (June 2017); and
- Guideline for Reporting on Environmental Monitoring (May 2016).

This GMMP comprises the following components:

- The groundwater monitoring schedule and analytical program;
- Definition of adopted trigger levels;
- contingency measures established for the situations if the trigger levels are exceeded; and
- periodic review of the practicability of GWMP to address the required objectives.

5.2 Responsible Parties

The party responsible for the implementation of this GMMP is ORA. ORA should ensure that:

- All other relevant parties are made aware of their responsibilities, such as maintenance workers and other persons conducting excavations in the vicinity of the on-site and off-site groundwater wells.
- Work procedures are developed to address site specific management issues and OH&S requirements relating to this GMMP, which may include the engagement of suitably qualified Environmental Consultants; and
- Groundwater monitoring and reporting activities are conducted by suitably trained, experienced and qualified Environmental Consultants on behalf of the responsible party.

5.3 Monitoring Network

5.3.1 Groundwater Monitoring Wells

The groundwater monitoring wells that form part of this GMMP were positioned to target groundwater at the spill area, down inferred gradient from the spill area, as well as upgradient of the spill site to assess the quality of incoming groundwater (to distinguish between the spill related and non-spill-related impacts). As a result of the complex drilling conditions (presence of cobbles at groundwater interface) two monitoring wells were duplicated as a result of redrilling to enable the appropriate installation of a monitoring well screen. MW03A was installed into deeper part of the uppermost aquifer or possibly in the second shallow aquifer.

Justification for locating each is outlined in **Table 5-1**. Groundwater monitoring wells were constructed in accordance with “*Minimum Construction Requirements for Water Bores in Australia (2003)*” and surveyed by a qualified surveyor; logs and construction details are attached in Appendix A.

Table 5-1 – Groundwater Monitoring Well Network Details

Location ID	Easting	Northing	Elevation – TOC* (mAHD**)	Screen Interval (from-to mbgl)	Target
MW01	708423.8	8620973	5.958	1.9 - 4.9	Impacts directly beneath spill point
MW01A	708416.9	8620987	5.921	1.8 - 4.8	Impacts immediately down inferred gradient (to be used if LNAPL ¹ is observed at MW01)
MW02	708491.8	8620930	5.026	1.2 - 5.2	Background well, up-gradient of spill site
MW03	708498.1	8621017	5.891	6 - 8.4	Impacts down gradient from the spill
MW03A	708497.3	8621016	5.869	1.3 - 4.3	Impacts in deeper aquifer
MW04	708461.6	8621003	5.931	0.85 - 3.85	Impacts down gradient from the spill
MW04A	708460.6	8621003	5.867	0.4 - 3.4	Impacts down gradient from the spill
MW05	708374.7	8621004	5.249	1 - 4	Impacts at mangrove fringe
MW06	708470.5	8621040	5.262	1 - 4	Impacts at mangrove fringe
MW07	708398.1	8620980	5.906	1 - 5	Impacts down gradient from the spill
MW08	708521	8621026	5.970	1 - 5	Impacts down gradient from the spill

Notes:

¹LNAPL – light non-aqueous phase liquid (floating diesel fuel from the spill)

*TOC – top of casing for groundwater wells; GL – ground level for vapour points

**AHD = Australian Height Datum

mbgl – metres below ground level

5.3.2 Maintenance of Monitoring Points

The integrity of all monitoring wells must be maintained. If during any monitoring event, monitoring wells are found to be damaged, the following protocol should be followed:

- Any damaged well(s) should be repaired prior to the next scheduled monitoring event.
- If any of the wells are damaged beyond repair, the damaged wells should be decommissioned as per requirements outlined in the “*Minimum Construction Requirements for Water Bores in Australia (2003)*” and replacement wells installed as soon as practicable.
- The replacement wells should be installed as close as practicable to the decommissioned well.
- The replacement wells should be developed and allowed to stabilise for a period of 7 days prior to sampling being conducted (as per the sampling methodology described in **Table 5-2**).
- All replacement wells should be clearly marked and professionally surveyed.

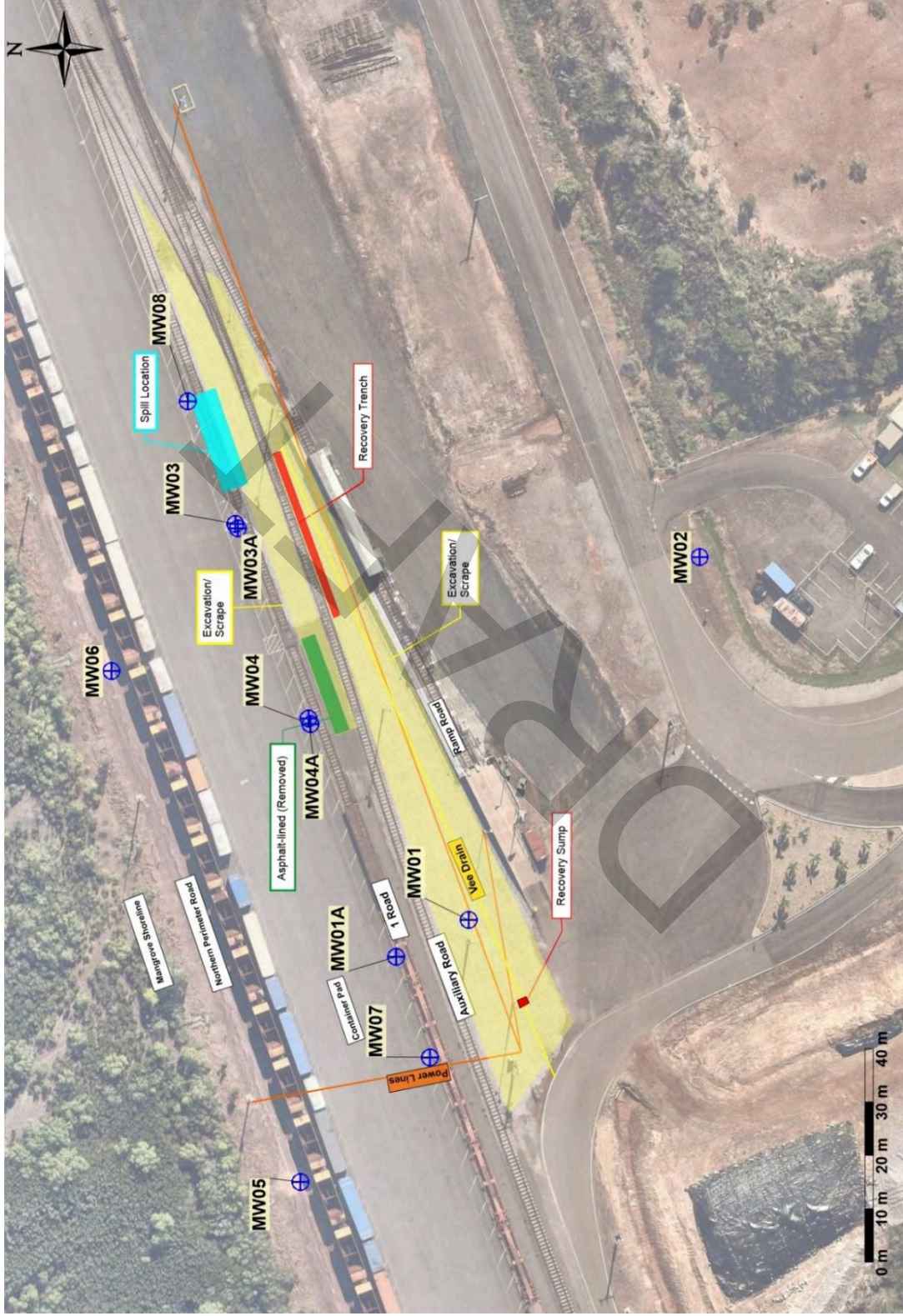


Figure 5-1 – Groundwater monitoring well locations

5.3.3 Surface Water and Sediment Monitoring Points

Surface water and/or sediment samples are to be collected during each scheduled GME (refer Section 5.4). Opportunistic samples are to be collected at the onset of the wet season following a rainfall event.

Sampling locations are associated with drains downgradient of the spill site and are illustrated in **Figure 5-2**. Justification for the locations is outlined below in **Table 5-2**.

Surface water (stormwater) samples are to be collected as appropriate when stormwater is present in the drains. Sediment samples are to be collected during all sampling events.

Table 5-2 – Surface water and sediment monitoring details

Location ID	Target
1	Culvert under 1 road - evidence of migration of diesel from existing impacts underlying rail lines
2	Stormwater drain directing water offsite - delineation sampling point if impacts are identified at sample location 1 and/or impact associated from potential soil loss from the hydrocarbon-impact material storage area
3	Stormwater discharge point – contingency stormwater sampling point if impacts are identified at sample locations 1 and/or 2
4	Receiving environment - contingency stormwater/sediment sampling point if impacts are identified at sample locations 1 and/or 2

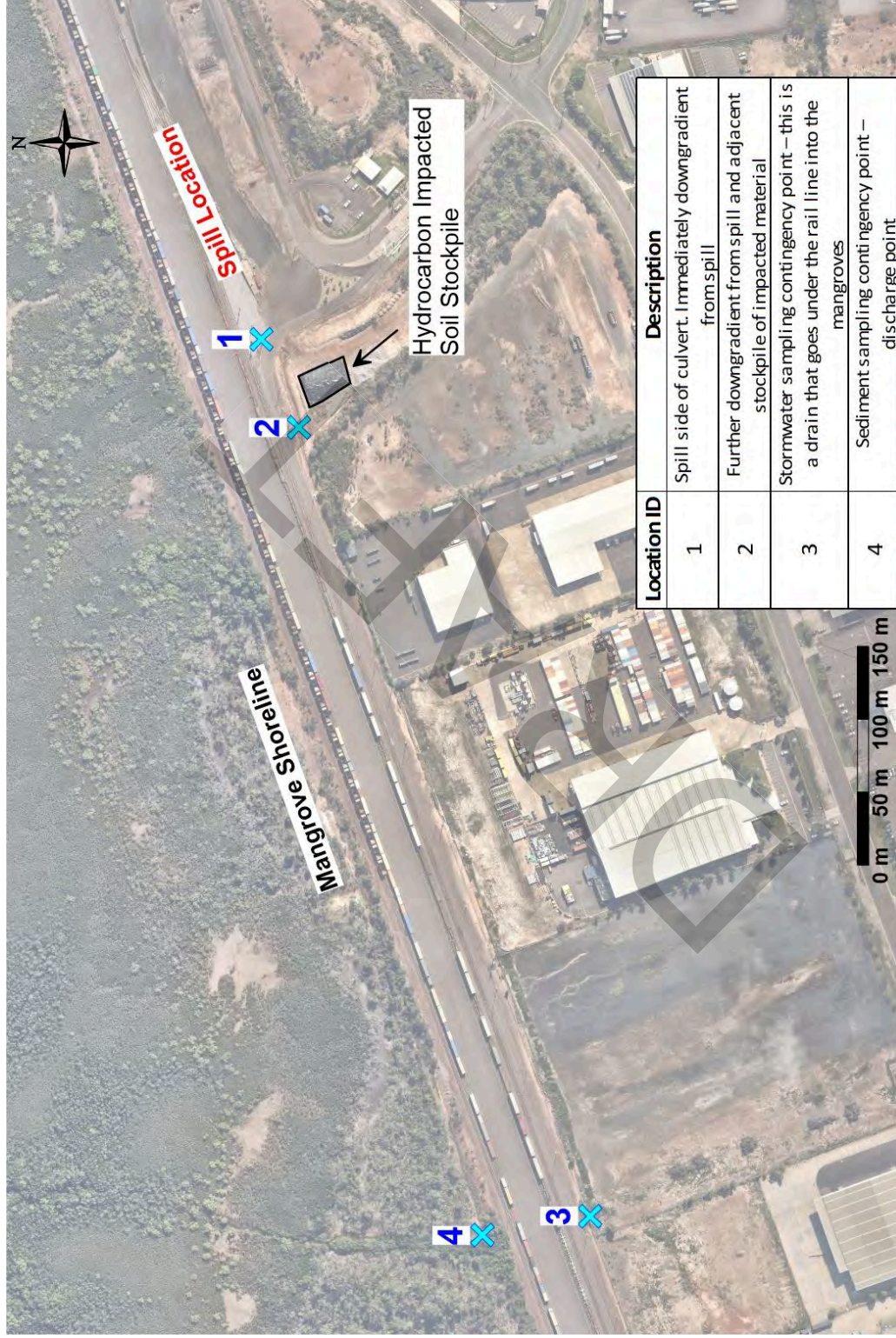


Figure 5-2 – Surface water and sediment monitoring locations

5.4 Monitoring Program

The groundwater, surface water (stormwater) and sediment monitoring program is outlined in **Table 5-3**.

Table 5-3 – Groundwater Monitoring Program

Activity / Item	Details
Monitoring Requirements	Monitoring events are to be conducted by an experienced environmental consultant.
Monitoring Frequency and Duration	The frequency of monitoring is quarterly, commencing in July 2020. The duration of the program is to continue until at least one tropical wet season has passed, at which time all monitoring results and the need to continue monitoring will be considered – If no impacts are confirmed, it is assumed monitoring will no longer be required (detailed in Section 7).
Groundwater sampling methodology	<ul style="list-style-type: none"> • Prior to collecting groundwater samples, standing water levels are to be measured from the top of the casing and recorded. LNAPL product detected will also be measured and recorded. • Groundwater sampling is to be conducted using low-flow sampling techniques with dedicated tubing. The flow rate must be monitored and regulated using an interface probe to maintain a stable water level during purging and sampling of the groundwater. If the water level is observed to draw down excessively, an alternative sampling method should be adopted (i.e. purging well dry and collecting samples once water levels recover). • Water quality parameters (pH, temperature, electrical conductivity, oxidation-reduction potential and dissolved oxygen) are to be monitored during purging using a calibrated water quality meter. Sampling can occur when the drawdown and the water quality parameters have shown to stabilise. • The sampler is to wear a clean pair of disposable nitrile gloves when collecting each sample. • All groundwater samples are to be collected in appropriate, decontaminated bottles/vials provided by an analytical laboratory and immediately placed in a chilled esky for transportation to a laboratory.
Surface water sampling methodology	<p>Surface water samples are to be collected with the aid of an extension pole directly into the appropriate sampling containers. Where volatile analyses are to be undertaken the sample containers are to be filled by decanting directly into the appropriate sample container provided by an analytical laboratory.</p> <p>All surface water samples are to be collected in appropriate, decontaminated bottles/vials provided by an analytical laboratory and immediately placed in a chilled esky for transportation to a laboratory.</p> <p>Surface water sample locations are presented in Figure 5-2. In the event that no water is present at the sample locations only sediment samples are to be collected as detailed below.</p>
Sediment sampling methodology	Sediment samples are to be collected every scheduled quarterly event using decontaminated stainless steel hand trowels from the base of the drain. Collected samples are to be placed in containers provided by an analytical laboratory (typically used for soil samples). All sediment samples are to be immediately placed

Activity / Item	Details
	<p>in a chilled esky for transportation to a laboratory. Sediment sample locations are presented in Figure 5.2.</p>
<p>Quality Assurance / Quality Control</p>	<p>Intra- and inter-laboratory duplicate groundwater, surface water and sediment samples are to be collected at a frequency of 1 sample per 20 primary samples. Duplicate samples will be tested for the same parameters as the primary samples (detailed below).</p> <p>Monitoring equipment is to be decontaminated between the sampling of each monitoring point. Rinsate blank samples are to be collected at a rate of one per day from non-dedicated sampling/monitoring equipment (e.g. water quality meter, hand trowels, non-dedicated surface water sampling container, etc) and analysed for TRH.</p> <p>Trip blanks are to be collected at a rate of one per sampling day and will be analysed for BTEX.</p> <p>Samples are to be collected and analysed in accordance with the National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM) (as updated 2013).</p>
<p>Analytical Program</p>	<p>Groundwater, surface water and sediment samples are to be analysed for diesel fuel-related contaminants of potential concern (COPC) i.e. TRH and BTEX.</p> <p>Groundwater samples will also be analysed for a suite of parameters to allow for the assessment of natural attenuation (natural biodegradation of petroleum hydrocarbons in groundwater), this includes:</p> <ul style="list-style-type: none"> • Alkalinity • Ferrous Iron (Fe²⁺) • Manganese • Methane (CH₄) • Nitrate (NO₃) • Sulphate (SO₄) <p>All sample analyses are to be undertaken at National Association of Testing Authorities (NATA)- accredited analytical laboratories.</p>
<p>Reporting Frequency and Requirements</p>	<p>A brief letter report is to be issued to ORA following each of the first three monitoring events and include tabulated field data and analytical results compared with adopted trigger values. A detailed annual monitoring report is to be issued to ORA following the fourth monitoring event and include a trend analysis of the monitoring data collected throughout the year and a recommendation regarding the continuation of the monitoring program and/or expansion/reduction of the monitoring network.</p> <p>Reports are to be prepared in accordance with the NT EPA:</p> <ul style="list-style-type: none"> • <i>Guideline for Reporting on Environmental Monitoring</i> (2016); and • <i>Northern Territory Contaminated Land Guideline</i> (2017).

6 TRIGGER VALUES

Groundwater, surface water and sediment trigger levels have been designed to assess a change in risk to on-site and down-gradient receptors. On-site receptors include workers/site visitors, therefore commercial/industrial setting health screening levels (HSL) prescribed by the ASC NEPM are adopted as trigger levels for review/further action. Down-gradient receptors include the users, and the ecosystem of Darwin Harbor, therefore 99% species protection for marine waters groundwater investigation levels prescribed by the ASC NEPM/ANZECC are also adopted as trigger values for review/further action. ANZECC also includes low reliability criteria for a toxicity of diesel related hydrocarbons in surface water as shown below in **Table 6-1**.

Table 6-1 – Table 8.3.24 from ANZECC 2018 Toxicity ranges for different oils to marine organisms—from Tsvetnenko (1998). LC50 figures normalised (Hamoda et al. 1989) (mg/L)

Organism	Crude oil	Gas condensate	Diesel	Bunker fuels
Fish (n=3)	2.3-8.1	NA	1.4–2.2	0.6-1.1
Crustaceans (n=8)	0.07a-7.8	0.5-0.6	0.3-> 4.5	0.6-1.0
Molluscs (n=1)	NA	NA	0.6	NA
Annelids (n=6)	3.5-8.5	NA	0.8-3.2	0.3-1.3
Algae (n=6)	0.5-> 10	10.6-11.5	0.5-> 1.6	NA

6.1 Groundwater

The adopted trigger levels for the groundwater monitoring program are included in **Table 6-2**.

Table 6-2– Groundwater & Soil Vapour Trigger Levels

Analyte	Trigger Level (mg/L)	
	Groundwater HSL for vapour intrusion – Commercial/Industrial (2 m to <4 m)	Groundwater investigation level (GIL) (marine water)
C ₆ -C ₁₀ less BTEX (F1)	NL	-
>C ₁₀ -C ₁₆ less naphthalene (F2)	NL	-
Sum of >C ₁₀ – C ₃₄	-	0.3 ^
Benzene	30	0.5
Toluene	NL	110*
Ethylbenzene	NL	0.05*
m-xylene	-	0.05*
o-xylene	NL	0.35**
p-xylene	NL	0.20**
Naphthalene	NL	0.05

* (ANZECC 2018)

**GIL for marine water not available, GIL for freshwater adopted as alternative

^ ANZECC 2018 (diesel fraction applied, refer Table 6-1)

It is noted that no trigger levels have been set for the physico-chemical parameters measured during groundwater sampling and natural attenuation parameters as these are only considered indicators to assess whether groundwater conditions generally support natural biodegradation of petroleum hydrocarbons.

6.2 Surface Water & Sediments

The adopted trigger levels for the surface water and sediment monitoring program are included in **Table 6-3**.

Table 6-3 – Surface water & Sediment Trigger Levels

Analyte	Trigger Level (mg/L)	
	Surface water (mg/L)	Sediment (mg/kg)
C ₆ -C ₁₀ less BTEX (F1)	< Limit of Reporting	< Limit of Reporting
>C ₁₀ -C ₁₆ less naphthalene (F2)	< Limit of Reporting	-
Sum of >C ₁₀ – C ₃₄	0.3	280 [#]
Benzene	< 5 (99% protection level) *	< Limit of Reporting
Toluene	<0.11 (99% protection level) **	< Limit of Reporting
Ethylbenzene	< 0.005 (99% protection level) (ANZECC 2000b) **	< Limit of Reporting
m-xylene	< 0.075 µg/L **	< Limit of Reporting
o-xylene		< Limit of Reporting
p-xylene		< Limit of Reporting
Naphthalene	< 0.050 99% protection level) *	< Limit of Reporting

* Australian and New Zealand guidelines for fresh and marine water quality – Volume 1 (ANZECC 2000a) – Section 3 Aquatic ecosystems

** Australian and New Zealand guidelines for fresh and marine water quality – Volume 2 Aquatic Ecosystems – Rationale and Background Information (ANZECC 2000b) – Section 8.3.7 Detailed descriptions of chemicals

[#] <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants>

6.3 Application of Trigger Levels

In the event that a reported concentration of an analyte exceeds a trigger level presented in Table 6-2 or Table 6-3, then response measures outlined below shall be applied.

6.1.1 Groundwater

Level 1 – Additional Monitoring, Assessment and Review

If the result does not exceed the adopted trigger value (listed in **Table 6-2**) then no further action is necessary.

If the result exceeds an adopted trigger level, then the groundwater well(s) which showed the exceedance should be re-sampled within 2 weeks to verify the result. If the elevated result is confirmed, adopt the following protocol:

1. Increase frequency of groundwater monitoring events to monthly for the well(s) in which an exceedance was reported;
2. If results are below trigger levels during two subsequent consecutive monthly rounds, continue with the original scheduled monitoring; and

3. If results exceed trigger levels in two subsequent monthly monitoring events, implement Level 2 actions.

Level 2 – Implement Contingency Measures

1. Review the historical data and any change in the on-site and off-site activities.
2. Consider installation of additional groundwater monitoring wells, subsequent sampling and assessments.
3. Assess risks to human health and the environment based on any additional information available.
4. Consider implementation of groundwater contamination control measures e.g. skimming, pump and treat.

6.1.2 Surface water and Sediment

Level 1 – Additional Monitoring, Assessment and Review

If the result does not exceed the adopted trigger value (listed in **Table 6-3**) then no further action is necessary.

If the result exceeds an adopted trigger level, then surface water (stormwater) and/or sediment should be re-sampled to confirm the result. If the elevated result is confirmed, adopt the following protocol:

1. Increase frequency of surface water (stormwater) and sediment monitoring events to monthly and/or after significant rainfall events;
2. Include the collection of a sample at the discharge point to the mangroves (see **Figure 5-2**).
3. If results are below trigger levels during two subsequent sampling rounds, continue with the original scheduled monitoring; and
4. If results exceed trigger levels at least once within two subsequent sampling rounds, implement Level 2 actions.

Level 2 – Implement Contingency Measures

1. Review the historical data and any change in the on-site and off-site activities.
2. Assess risks to the environment based on any additional information available.
3. Review Remediation Action Plan and consider implementation of stormwater treatment measures e.g. skimming, pump and treat through hydrocarbon separation devices.

7 REVIEW AND CESSATION OF MONITORING

The GMMP is to be reviewed by a suitably qualified environmental consultant at the end of the wet season, i.e. following 4 monitoring events in April 2021. The review will include a recommendation regarding the continuation, expansion/reduction or cessation of the program consistent with environmental and legal requirements.

Triggers for continuation or expansion of monitoring (i.e. installation and monitoring of additional groundwater monitoring wells, increased frequency of monitoring or requirement for additional remedial measures) beyond the wet season might include:

- Observation of COPC in groundwater in exceedance of GSLs/GILs
- Observation of COPC in surface water in exceedance of TBC
- Observation of COPC in sediment in exceedance of TBC
- Observation of increasing COPC trends in groundwater, surface water or sediment
- A change in land use or pathway
- Presence of a new at-risk receptor

Should COPC not be detected in any locations the monitoring program may be reduced in frequency or cease altogether. A decision to cease or reduce monitoring may be subject to review/approval by the NT EPA.

DRAFT

Groundwater Monitoring and Management Plan
One Rail Australia

Appendix A: Groundwater Well Logs and Survey Results

Client: One Rail Australia Project: Diesel Spill Project No: J168829 Location: Berrimah, NT	Date Drilled: 16/07/2020 Drilling Co: Proactive Drilling Services Total Depth (m): 4.90 Diameter (mm): 50	Bore No.: MW01 Easting: 708423.825 Northing: 8620973.001 Logged by: VB Checked by: AS
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COMMENTS

Depth/Elevation	WATER STRIKE	Graphic Log	SOIL DESCRIPTION	Moisture	Well Diagram	Field ID	PID (ppm)	Comment	Depth (m)
0.2			FILL: Silty Gravelly SAND, fine to medium grained sand, medium dense, fine to medium gravel, brownish grey.	M	Concrete	MW01_0.0-0.1	0.0	Faint hydrocarbon odour.	
0.45			FILL: Silty Sandy GRAVEL, fine to medium gravel, medium dense, fine to medium grained sand, light greyish brown.	M	Bentonite	MW01_0.2-0.3	0.0		
			FILL: Sandy Gravelly SILT, firm, fine to medium grained sand, fine to medium gravel, reddish brown.	S/M		MW01_0.45-0.55	0.0		
1.0						MW01_1.0-1.1	0.0		1
2.0			NATURAL: Gravelly Sandy SILT, medium dense, fine to coarse gravel, fine to medium grained sand, light greyish purple.	M					2
3.15	▽	▽			Sand				
				W		MW01_3.0-3.1	0.0	QA07/QA08	3
				W		MW01_3.1-3.2	0.0		
				S/M					
3.85			NATURAL: Gravelly Sandy Clayey SILT, firm, fine to medium gravel, fine to medium grained sand, yellowish brown to light grey.	M					4
4.4						MW01_4.35-4.45	0.0	Push Tube refusal.	
4.9			MW01 Terminated at 4.90m bgl.						5

Client: One Rail Australia Project: Diesel Spill Project No: J168829 Location: Berrimah, NT	Date Drilled: 16/07/2020 Drilling Co: Proactive Drilling Services Total Depth (m): 4.92 Diameter (mm): 50	Bore No.: MW01A Easting: 708423.825 Northing: 8620973.001 Logged by: VB Checked by: AS
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COMMENTS

Depth/Elevation	WATER STRIKE	Graphic Log	SOIL DESCRIPTION	Moisture	Well Diagram	Field ID	PID (ppm)	Comment	Depth (m)
			FILL: Sandy Gravelly SILT, firm, fine to medium sand, fine to coarse gravel, light brown.	S/M	 Concrete Bentonite Sand	MW01A_0.0-0.1	0.0		0
						MW01A_0.5-0.6	0.0		0.5
						MW01A_1.0-1.1	0.0		1.0
1.9			NATURAL: Sandy Gravelly SILT, soft, fine to medium sand, fine to coarse gravel, yellowish brown.			MW01A_2.0-2.1	0.0		2.0
2.9	▽		NATURAL: Sandy Gravelly SILT, hard, fine to medium sand, fine to coarse gravel, yellowish brown.			MW01A_3.0-3.1	0.0		3.0
4.92			MW01A Terminated at 4.92m bgl.						5

Client: One Rail Australia Project: Diesel Spill Project No: J168829 Location: Berrimah, NT	Date Drilled: 3/07/2020 Drilling Contractor: Drilling Services Total Depth (m): 5.21 Diameter (mm): 50	Bore No.: MW02 Easting: 708491.822 Northing: 8620929.677 Logged by: VB Checked by: AS
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COMMENTS

Depth/Elevation	WATER STRIKE	Graphic Log	SOIL DESCRIPTION	Moisture	Well Diagram	Field ID	PID (ppm)	Comment	Depth (m)
0.2			FILL: Gravelly Sandy SILT, fine to coarse gravels, fine to medium grained sand, dark yellowish brown.	S/M	Concrete	MW02_0.0-0.1	0.0		
			FILL: Gravelly Silty SAND, fine to medium grained sand, fine to coarse gravel, light brown.			MW02_0.2-0.3	0.0	QA01/QA02	
0.6			FILL: Sandy GRAVEL, fine to medium gravel, fine to medium grained sand, light brownish grey.	D	Bentonite	MW02_0.6-0.7	0.0		
0.75			FILL: Gravelly SILT - firm, yellowish brown, grey to red/brown purple sedimentary stone.	M		MW02_0.75-0.85	0.0		1
1.7			NATURAL: SILT - firm, minor inclusions of sedimentary stone, brownish red.	S/M		MW02_1.5-1.6	0.0		
2.0						MW02_2-2.1	0.0		2
2.45	1		NATURAL: Clayey SILT - firm, light grey.	M		MW02_2.45-2.55	0.0		
2.6	2		NATURAL: Silty Sedimentary STONE - highly weathered, dark brownish red.	W		MW02_2.6-2.7	0.0		
3.0			NATURAL: Clayey SILT - firm, light grey.		Sand	MW02_3.0-3.1	0.0		3
3.25			NATURAL - Clayey SILT - soft, light bluish grey.			MW02_3.1-3.2	2.2		
						MW02_3.25-3.35	0.0		
3.9						MW02_3.9-4.0	0.0	Push Tube refusal.	4
						MW02_4.0-4.1	0.0	QA03/QA04	
5.21			MW02 Terminated at 5.21 m bgl.			MW02_5.1-5.2	0.0		5

Client: One Rail Australia Project: Diesel Spill Project No: J168829 Location: Berrimah, NT	Date Drilled: 15/07/2020 Drilling Co: Proactive Drilling Services Total Depth (m): 5.0 Diameter (mm): 50	Bore No.: MW03 Easting: 708498.128 Northing: 8621016.708 Logged by: VB Checked by: AS
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COMMENTS

Depth/Elevation	WATER STRIKE	Graphic Log	SOIL DESCRIPTION	Moisture	Well Diagram	Field ID	PID (ppm)	Comment	Depth (m)
			FILL: Gravelly Silty SAND, fine to medium grained sand, fine to medium gravel, medium dense, light brownish grey.	M	Concrete	MW03_0.0-0.1	5.6		
0.58			FILL: Gravelly Sandy SILT, stiff, fine to medium gravel, fine to medium grained sand, yellowish brown to reddish brown.	M		MW03_0.6-0.7	5.1		
0.71			FILL: Gravelly Sandy SILT, firm, fine to medium gravel, fine to medium grained sand, brownish red.	S/M	Bentonite	MW03_0.75-0.85	7.3		
1.1			FILL: Gravelly Sandy SILT, firm, fine to coarse gravel, yellowish brown to light greyish purple.			MW03_1.1-1.2	4.9		1
1.6			NATURAL - Gravelly Sandy SILT, firm, medium dense, fine to coarse gravel, fine to medium grained sand, yellowish brown.			MW03_1.6-1.7	8.1		
						MW03_1.8-1.9	6.0		2
						MW03_2.2-2.3	4.1		
						MW03_2.4-2.5	7.7		
				S/M					3
					Sand				
				W		MW03_3.4-3.5	4.4		
				M				Push Tube refusal.	
3.9			NATURAL: Sandy Silty CLAY, soft, fine to medium grained sand, trace fine gravel, dark greenish grey.			MW03_4.0-4.5	7.6		4
						MW03_4.5-4.6	6.0		
5.0			MW03 Terminated @ 5.0m bgl.						5

Client: One Rail Australia Project: Diesel Spill Project No: J168829 Location: Berrimah, NT	Date Drilled: 16/07/2020 Drilling Co: Proactive Drilling Services Total Depth (m): 3.80 Diameter (mm): 50	Bore No.: MW04 Easting: 708460.568 Northing: 8621002.703 Logged by: VB Checked by: AS
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COMMENTS

Depth/Elevation	WATER STRIKE	Graphic Log	SOIL DESCRIPTION	Moisture	Well Diagram	Field ID	PID (ppm)	Comment	Depth (m)
0.25			FILL: Gravelly Sandy SILT, medium dense, fine to medium gravel, fine to medium grained sand, brownish grey.	M	Concrete	MW04_0.0-0.1	0.0	Hydrocarbon odour.	
0.4			FILL: Sandy Silty GRAVEL, fine to medium gravel, fine to medium grained sand, firm, reddish brown and grey.			MW04_0.25-0.35	0.0		
0.8			FILL: Gravelly Sandy SILT, firm, fine to medium grained sand, fine to coarse gravel, brownish red to yellowish brown with depth.		Bentonite	MW04_0.4-0.5	0.0		
1.3			FILL: Sandy Silty GRAVEL, coarse gravel, fine to medium grained sand, loose, brownish yellow.	S/M		MW04_0.8-0.9	7.3		1
1.4			NATURAL: Sandy Gravelly SILT, firm, fine to medium grained sand, fine to coarse gravel, reddish to yellowish brown.	D		MW04_1.3-1.4	0.0		
				M		MW04_1.4-1.5	0.4		
2.8			NATURAL: Gravelly Sandy SILT, firm, fine to medium gravel, fine to medium grained sand, light brown.		Sand	MW04_2.0-2.1	0.0		2
3.4				S/M		MW04_2.8-2.9	0.0		
3.4	▼		NATURAL: Gravelly Sandy SILT, soft, fine to medium gravel, fine to medium grained sand, light brown.			MW04_3.4-3.5	0.0		
3.8				W		MW04_3.5-3.6	0.0		
3.8			MW04 Terminated at 3.8m bgl.						4

Client: One Rail Australia Project: Diesel Spill Project No: J168829 Location: Berrimah, NT	Date Drilled: 16/07/2020 Drilling Co: Proactive Drilling Services Total Depth (m): 3.80 Diameter (mm): 50	Bore No.: MW04A Easting: 708461.577 Northing: 8621003.05 Logged by: VB Checked by: AS
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COMMENTS

Depth/Elevation	WATER STRIKE	Graphic Log	SOIL DESCRIPTION	Moisture	Well Diagram	Field ID	PID (ppm)	Comment	Depth (m)
			FILL: Gravelly Silty SAND, fine to medium grained sand, fine to medium gravel, medium dense, light brownish grey.	M					
0.58			FILL: Gravelly Sandy SILT, stiff, fine to medium gravel, fine to medium grained sand, yellowish brown to reddish brown.	M					
0.71			FILL: Gravelly Sandy SILT, firm, fine to medium gravel, fine to medium grained sand, brownish red.	S/M					
1.1			FILL: Gravelly Sandy SILT, firm, fine to coarse gravel, yellowish brown to light greyish purple.						
1.6			NATURAL - Gravelly Sandy SILT, firm, medium dense, fine to coarse gravel, fine to medium grained sand, yellowish brown.						
				S/M					
				W					
				M					
3.8			MW04A Terminated @ 3.80m bgl.						
									4

