

Client Sample ID			V93 Soil M20-Se38641 Sep 22, 2020	V94 Soil M20-Se38642 Sep 22, 2020	V95 Soil M20-Se38643 Sep 22, 2020	V96 Soil M20-Se38644 Sep 22, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	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
<b>% Moisture</b>						
	1	%	13	13	13	14

Client Sample ID			V97 Soil M20-Se38645 Sep 22, 2020	V98 Soil M20-Se38646 Sep 22, 2020	V99 Soil M20-Se38647 Sep 22, 2020	V100 Soil M20-Se38648 Sep 22, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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
<b>BTEX</b>						
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	%	88	86	133	121
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	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
<b>% Moisture</b>						
	1	%	11	19	13	13

Client Sample ID			V101 Soil M20-Se38649 Sep 22, 2020	V102 Soil M20-Se38650 Sep 22, 2020	V103 Soil M20-Se38651 Sep 22, 2020	V104 Soil M20-Se38652 Sep 22, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	140	< 20	89
TRH C15-C28	50	mg/kg	< 50	330	< 50	370
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	470	< 50	459
<b>BTEX</b>						
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	%	64	71	72	129
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	240	< 50	200
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	240	< 50	200
TRH >C16-C34	100	mg/kg	< 100	230	< 100	280
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	470	< 100	480
% Moisture	1	%	12	13	1.5	12

Client Sample ID			V105 Soil M20-Se38653 Sep 22, 2020	V106 Soil M20-Se38654 Sep 22, 2020	V107 Soil M20-Se38655 Sep 22, 2020	V108 Soil M20-Se38656 Sep 22, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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	80	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	80	< 50	< 50
<b>BTEX</b>						
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	%	65	62	122	67

Client Sample ID			V105	V106	V107	V108
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Se38653	M20-Se38654	M20-Se38655	M20-Se38656
Date Sampled			Sep 22, 2020	Sep 22, 2020	Sep 22, 2020	Sep 22, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	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	%	6.5	12	12	14

Client Sample ID			V109	V110	V111	V112
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Se38657	M20-Se38658	M20-Se38659	M20-Se38660
Date Sampled			Sep 22, 2020	Sep 22, 2020	Sep 22, 2020	Sep 22, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	20	mg/kg	< 20	< 20	56	< 20
TRH C10-C14	20	mg/kg	< 20	1100	6700	630
TRH C15-C28	50	mg/kg	87	2500	15000	2200
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	87	3600	21700	2830
<b>BTEX</b>						
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	0.6	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	7.6	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	0.2	5.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	13	< 0.3
4-Bromofluorobenzene (surr.)	1	%	69	91	122	130
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	0.5	mg/kg	< 0.5	< 0.5	2.4	< 0.5
TRH C6-C10	20	mg/kg	< 20	28	280	25
TRH C6-C10 less BTEX (F1) <sup>N04</sup>	20	mg/kg	< 20	28	270	25
TRH >C10-C16	50	mg/kg	< 50	1800	11000	1200
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	1800	10997.6	1200
TRH >C16-C34	100	mg/kg	< 100	1800	11000	1600
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	3600	22000	2800
% Moisture	1	%	13	18	8.4	15

Client Sample ID			V113	V114	V115	QA07
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Se38661	M20-Se38662	M20-Se38663	M20-Se38664
Date Sampled			Sep 22, 2020	Sep 22, 2020	Sep 22, 2020	Sep 22, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	240	390	< 20	40
TRH C15-C28	50	mg/kg	700	8000	< 50	180
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	940	8390	< 50	220
<b>BTEX</b>						
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	%	130	146	137	142
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	440	1800	< 50	87
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	440	1800	< 50	87
TRH >C16-C34	100	mg/kg	500	6900	< 100	130
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	940	8700	< 100	217
% Moisture	1	%	15	17	13	12

Client Sample ID			QA09
Sample Matrix			Soil
Eurofins Sample No.			M20-Se38665
Date Sampled			Sep 22, 2020
Test/Reference	LOR	Unit	
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50
<b>BTEX</b>			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	82

<b>Client Sample ID</b>			<b>QA09</b>
<b>Sample Matrix</b>			<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>M20-Se38665</b>
<b>Date Sampled</b>			<b>Sep 22, 2020</b>
Test/Reference	LOR	Unit	
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>			
Naphthalene <sup>N02</sup>	0.5	mg/kg	< 0.5
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1) <sup>N04</sup>	20	mg/kg	< 20
TRH >C10-C16	50	mg/kg	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100
<b>% Moisture</b>			
	1	%	3.7

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**Sample History**

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

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Sep 24, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Sep 24, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Sep 24, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Sep 24, 2020	
- Method: LTM-ORG-2010 TRH C6-C40			
% Moisture	Melbourne	Sep 23, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

DRAFT

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**Company Name:** Greencap NT P/L  
**Address:** 11/14 Winnellie Road  
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**Project Name:** ONE RAIL - DIESEL SPILL INVESTIGATION  
**Project ID:** J168829

**Order No.:** 278853  
**Report #:** 745838  
**Phone:** 61 8 8984 4244  
**Fax:** 61 8 8984 3105

**Received:** Sep 23, 2020 10:50 AM  
**Due:** Sep 24, 2020  
**Priority:** 1 Day  
**Contact Name:** Stuart Carroll

**Eurofins Analytical Services Manager : Michael Morrison**

Sample Detail						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	V85	Sep 22, 2020		Soil	M20-Se38633	X
2	V86	Sep 22, 2020		Soil	M20-Se38634	X
3	V87	Sep 22, 2020		Soil	M20-Se38635	X
4	V88	Sep 22, 2020		Soil	M20-Se38636	X
5	V89	Sep 22, 2020		Soil	M20-Se38637	X
6	V90	Sep 22, 2020		Soil	M20-Se38638	X
7	V91	Sep 22, 2020		Soil	M20-Se38639	X
8	V92	Sep 22, 2020		Soil	M20-Se38640	X
9	V93	Sep 22, 2020		Soil	M20-Se38641	X
External Laboratory						
Eurofins Suite B1						
Moisture Set						
BTEX						



Environment Testing

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**Contact Name:** Stuart Carroll

**Eurofins Analytical Services Manager : Michael Morrison**

Sample Detail		BTEX	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271		X	X	X
Sydney Laboratory - NATA Site # 18217				
Brisbane Laboratory - NATA Site # 20794				
Perth Laboratory - NATA Site # 23736				
10	V94 Sep 22, 2020	Soil	M20-Se38642	X
11	V95 Sep 22, 2020	Soil	M20-Se38643	X
12	V96 Sep 22, 2020	Soil	M20-Se38644	X
13	V97 Sep 22, 2020	Soil	M20-Se38645	X
14	V98 Sep 22, 2020	Soil	M20-Se38646	X
15	V99 Sep 22, 2020	Soil	M20-Se38647	X
16	V100 Sep 22, 2020	Soil	M20-Se38648	X
17	V101 Sep 22, 2020	Soil	M20-Se38649	X
18	V102 Sep 22, 2020	Soil	M20-Se38650	X
19	V103 Sep 22, 2020	Soil	M20-Se38651	X
20	V104 Sep 22, 2020	Soil	M20-Se38652	X
21	V105 Sep 22, 2020	Soil	M20-Se38653	X
22	V106 Sep 22, 2020	Soil	M20-Se38654	X



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**Project ID:** J168829

**Order No.:** 278853  
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**Phone:** 61 8 8984 4244  
**Fax:** 61 8 8984 3105

**Received:** Sep 23, 2020 10:50 AM  
**Due:** Sep 24, 2020  
**Priority:** 1 Day  
**Contact Name:** Stuart Carroll

**Eurofins Analytical Services Manager : Michael Morrison**

Sample Detail		BTEX	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271		X	X	X
Sydney Laboratory - NATA Site # 18217				
Brisbane Laboratory - NATA Site # 20794				
Perth Laboratory - NATA Site # 23736				
23	V107 Sep 22, 2020	Soil	M20-Se38655	X
24	V108 Sep 22, 2020	Soil	M20-Se38656	X
25	V109 Sep 22, 2020	Soil	M20-Se38657	X
26	V110 Sep 22, 2020	Soil	M20-Se38658	X
27	V111 Sep 22, 2020	Soil	M20-Se38659	X
28	V112 Sep 22, 2020	Soil	M20-Se38660	X
29	V113 Sep 22, 2020	Soil	M20-Se38661	X
30	V114 Sep 22, 2020	Soil	M20-Se38662	X
31	V115 Sep 22, 2020	Soil	M20-Se38663	X
32	QA07 Sep 22, 2020	Soil	M20-Se38664	X
33	QA09 Sep 22, 2020	Soil	M20-Se38665	X
34	TB01 Sep 22, 2020	Water	M20-Se38666	X
35	RB01 Sep 22, 2020	Water	M20-Se38667	X



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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

**Order No.:** 278853  
**Report #:** 745838  
**Phone:** 61 8 8984 4244  
**Fax:** 61 8 8984 3105

**Received:** Sep 23, 2020 10:50 AM  
**Due:** Sep 24, 2020  
**Priority:** 1 Day  
**Contact Name:** Stuart Carroll

**Eurofins Analytical Services Manager : Michael Morrison**

Sample Detail	BTEX	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271	X	X	X
Sydney Laboratory - NATA Site # 18217			
Brisbane Laboratory - NATA Site # 20794			
Perth Laboratory - NATA Site # 23736			
<b>Test Counts</b>	1	33	34

**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**

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	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.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	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.
<b>TEQ</b>	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	
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
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		
<b>Method Blank</b>								
<b>BTEX</b>								
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		
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
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		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	%	76			70-130	Pass		
TRH C10-C14	%	109			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>BTEX</b>								
Benzene	%	75			70-130	Pass		
Toluene	%	117			70-130	Pass		
Ethylbenzene	%	90			70-130	Pass		
m&p-Xylenes	%	89			70-130	Pass		
Xylenes - Total*	%	91			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
Naphthalene	%	91			70-130	Pass		
TRH C6-C10	%	78			70-130	Pass		
TRH >C10-C16	%	112			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	M20-Se38634	CP	%	115		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>BTEX</b>								
Benzene	M20-Se38634	CP	%	104		70-130	Pass	
Toluene	M20-Se38634	CP	%	122		70-130	Pass	
Ethylbenzene	M20-Se38634	CP	%	117		70-130	Pass	
m&p-Xylenes	M20-Se38634	CP	%	119		70-130	Pass	
o-Xylene	M20-Se38634	CP	%	119		70-130	Pass	
Xylenes - Total*	M20-Se38634	CP	%	119		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
				Result 1				

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Naphthalene	M20-Se38634	CP	%	116		70-130	Pass	
TRH C6-C10	M20-Se38634	CP	%	108		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1				
TRH C10-C14	M20-Se38644	CP	%	112		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1				
TRH >C10-C16	M20-Se38644	CP	%	107		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1				
TRH C6-C9	M20-Se38654	CP	%	111		70-130	Pass	
TRH C10-C14	M20-Se38654	CP	%	119		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>BTEX</b>				Result 1				
Benzene	M20-Se38654	CP	%	87		70-130	Pass	
Toluene	M20-Se38654	CP	%	101		70-130	Pass	
Ethylbenzene	M20-Se38654	CP	%	95		70-130	Pass	
m&p-Xylenes	M20-Se38654	CP	%	93		70-130	Pass	
o-Xylene	M20-Se38654	CP	%	94		70-130	Pass	
Xylenes - Total*	M20-Se38654	CP	%	94		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1				
Naphthalene	M20-Se38654	CP	%	110		70-130	Pass	
TRH C6-C10	M20-Se38654	CP	%	109		70-130	Pass	
TRH >C10-C16	M20-Se38654	CP	%	126		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1				
TRH C10-C14	M20-Se38664	CP	%	99		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1				
TRH >C10-C16	M20-Se38664	CP	%	102		70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD		
TRH C6-C9	M20-Se38633	CP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C10-C14	M20-Se38633	CP	mg/kg	130	98	31	30%	Fail Q15
TRH C15-C28	M20-Se38633	CP	mg/kg	580	450	25	30%	Pass
TRH C29-C36	M20-Se38633	CP	mg/kg	< 50	< 50	<1	30%	Pass
<b>Duplicate</b>								
<b>BTEX</b>				Result 1	Result 2	RPD		
Benzene	M20-Se38633	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	M20-Se38633	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	M20-Se38633	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	M20-Se38633	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	M20-Se38633	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total*	M20-Se38633	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
<b>Duplicate</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD		
Naphthalene	M20-Se38633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	M20-Se38633	CP	mg/kg	< 20	< 20	<1	30%	Pass
TRH >C10-C16	M20-Se38633	CP	mg/kg	340	250	29	30%	Pass
TRH >C16-C34	M20-Se38633	CP	mg/kg	420	330	24	30%	Pass
TRH >C34-C40	M20-Se38633	CP	mg/kg	< 100	< 100	<1	30%	Pass

Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M20-Se38643	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M20-Se38643	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M20-Se38643	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M20-Se38643	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M20-Se38643	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M20-Se38643	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M20-Se38643	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M20-Se38643	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M20-Se38643	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	M20-Se38643	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M20-Se38643	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M20-Se38643	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	M20-Se38643	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M20-Se38643	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M20-Se38643	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M20-Se38653	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M20-Se38653	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M20-Se38653	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M20-Se38653	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M20-Se38653	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M20-Se38653	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M20-Se38653	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M20-Se38653	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M20-Se38653	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	M20-Se38653	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M20-Se38653	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M20-Se38653	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	M20-Se38653	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M20-Se38653	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M20-Se38653	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
% Moisture	M20-Se38653	CP	%	6.5	4.1	45	30%	Fail	Q15
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	M20-Se38663	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M20-Se38663	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M20-Se38663	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M20-Se38663	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M20-Se38663	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M20-Se38663	CP	mg/kg	< 100	< 100	<1	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M20-Se38663	CP	%	13	13	1.0	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.
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
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](#).

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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: **Stuart Carroll**

Report **745838-W**  
Project name **ONE RAIL - DIESEL SPILL INVESTIGATION**  
Project ID **J168829**  
Received Date **Sep 23, 2020**

Client Sample ID			TB01	RB01
Sample Matrix			Water	Water
Eurofins Sample No.			M20-Se38666	M20-Se38667
Date Sampled			Sep 22, 2020	Sep 22, 2020
Test/Reference	LOR	Unit		
<b>BTEX</b>				
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	%	96	90
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				
TRH C6-C9	0.02	mg/L	-	< 0.02
TRH C10-C14	0.05	mg/L	-	< 0.05
TRH C15-C28	0.1	mg/L	-	< 0.1
TRH C29-C36	0.1	mg/L	-	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	-	< 0.1
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				
Naphthalene <sup>N02</sup>	0.01	mg/L	-	< 0.01
TRH C6-C10	0.02	mg/L	-	< 0.02
TRH C6-C10 less BTEX (F1) <sup>N04</sup>	0.02	mg/L	-	< 0.02
TRH >C10-C16	0.05	mg/L	-	< 0.05
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	0.05	mg/L	-	< 0.05
TRH >C16-C34	0.1	mg/L	-	< 0.1
TRH >C34-C40	0.1	mg/L	-	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	-	< 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			
BTEX	Melbourne	Sep 24, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Sep 24, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Sep 24, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Sep 24, 2020	
- Method: LTM-ORG-2010 TRH C6-C40			

DRAFT

**Australia**

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NATA # 1261  
Site # 1254 & 14271

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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  
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**Perth**  
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**New Zealand**

**Auckland**  
35 O'Rourke Road  
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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

**Order No.:** 278853  
**Report #:** 745838  
**Phone:** 61 8 8984 4244  
**Fax:** 61 8 8984 3105

**Received:** Sep 23, 2020 10:50 AM  
**Due:** Sep 24, 2020  
**Priority:** 1 Day  
**Contact Name:** Stuart Carroll

**Eurofins Analytical Services Manager : Michael Morrison**

Sample Detail					
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID
1	V85	Sep 22, 2020		Soil	M20-Se38633
2	V86	Sep 22, 2020		Soil	M20-Se38634
3	V87	Sep 22, 2020		Soil	M20-Se38635
4	V88	Sep 22, 2020		Soil	M20-Se38636
5	V89	Sep 22, 2020		Soil	M20-Se38637
6	V90	Sep 22, 2020		Soil	M20-Se38638
7	V91	Sep 22, 2020		Soil	M20-Se38639
8	V92	Sep 22, 2020		Soil	M20-Se38640
9	V93	Sep 22, 2020		Soil	M20-Se38641
External Laboratory					
Eurofins Suite B1					
Moisture Set					
BTEX					



Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Australia

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

Sydney  
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16 Mars Road  
Lane Cove West NSW 2066  
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Sample Detail		BTEX	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271		X	X	X
Sydney Laboratory - NATA Site # 18217				
Brisbane Laboratory - NATA Site # 20794				
Perth Laboratory - NATA Site # 23736				
10	V94 Sep 22, 2020	Soil	M20-Se38642	X
11	V95 Sep 22, 2020	Soil	M20-Se38643	X
12	V96 Sep 22, 2020	Soil	M20-Se38644	X
13	V97 Sep 22, 2020	Soil	M20-Se38645	X
14	V98 Sep 22, 2020	Soil	M20-Se38646	X
15	V99 Sep 22, 2020	Soil	M20-Se38647	X
16	V100 Sep 22, 2020	Soil	M20-Se38648	X
17	V101 Sep 22, 2020	Soil	M20-Se38649	X
18	V102 Sep 22, 2020	Soil	M20-Se38650	X
19	V103 Sep 22, 2020	Soil	M20-Se38651	X
20	V104 Sep 22, 2020	Soil	M20-Se38652	X
21	V105 Sep 22, 2020	Soil	M20-Se38653	X
22	V106 Sep 22, 2020	Soil	M20-Se38654	X

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Sample Detail		BTEX	Moisture Set	Eurofins Suite B1		
<b>Melbourne Laboratory - NATA Site # 1254 &amp; 14271</b>						
<b>Sydney Laboratory - NATA Site # 18217</b>						
<b>Brisbane Laboratory - NATA Site # 20794</b>						
<b>Perth Laboratory - NATA Site # 23736</b>						
23	V107	Sep 22, 2020	Soil	M20-Se38655	X	X
24	V108	Sep 22, 2020	Soil	M20-Se38656	X	X
25	V109	Sep 22, 2020	Soil	M20-Se38657	X	X
26	V110	Sep 22, 2020	Soil	M20-Se38658	X	X
27	V111	Sep 22, 2020	Soil	M20-Se38659	X	X
28	V112	Sep 22, 2020	Soil	M20-Se38660	X	X
29	V113	Sep 22, 2020	Soil	M20-Se38661	X	X
30	V114	Sep 22, 2020	Soil	M20-Se38662	X	X
31	V115	Sep 22, 2020	Soil	M20-Se38663	X	X
32	QA07	Sep 22, 2020	Soil	M20-Se38664	X	X
33	QA09	Sep 22, 2020	Soil	M20-Se38665	X	X
34	TB01	Sep 22, 2020	Water	M20-Se38666	X	
35	RB01	Sep 22, 2020	Water	M20-Se38667		X



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Sample Detail	BTEX	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271	X	X	X
Sydney Laboratory - NATA Site # 18217			
Brisbane Laboratory - NATA Site # 20794			
Perth Laboratory - NATA Site # 23736			
<b>Test Counts</b>	1	33	34

**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**

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	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.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	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.
<b>TEQ</b>	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	
<b>Method Blank</b>									
<b>BTEX</b>									
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		
<b>Method Blank</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>									
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		
<b>Method Blank</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>									
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		
<b>LCS - % Recovery</b>									
<b>BTEX</b>									
Benzene		%	106			70-130	Pass		
Toluene		%	109			70-130	Pass		
Ethylbenzene		%	90			70-130	Pass		
m&p-Xylenes		%	92			70-130	Pass		
Xylenes - Total*		%	92			70-130	Pass		
<b>LCS - % Recovery</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>									
TRH C6-C9		%	106			70-130	Pass		
TRH C10-C14		%	100			70-130	Pass		
<b>LCS - % Recovery</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>									
Naphthalene		%	116			70-130	Pass		
TRH C6-C10		%	112			70-130	Pass		
TRH >C10-C16		%	101			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code	
<b>Spike - % Recovery</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>									
TRH C10-C14		M20-Se39655	NCP	%	84		70-130	Pass	
<b>Spike - % Recovery</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>									
TRH >C10-C16		M20-Se39655	NCP	%	85		70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code	
<b>Duplicate</b>									
<b>BTEX</b>									
Benzene		M20-Se40028	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Toluene		M20-Se40028	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Ethylbenzene		M20-Se40028	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
m&p-Xylenes		M20-Se40028	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>BTEX</b>				Result 1	Result 2	RPD			
o-Xylene	M20-Se40028	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M20-Se40028	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD			
TRH C6-C9	M20-Se40028	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M20-Se30646	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M20-Se30646	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M20-Se30646	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD			
Naphthalene	M20-Se40028	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	M20-Se40028	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M20-Se30646	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M20-Se30646	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M20-Se30646	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](#).

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# CHAIN OF CUSTODY RECORD

Sydney Laboratory

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61 61 93 88 65 EurofinsEnvironmental@sydney.com

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Company: **Greencap NT PIL**  
 Address: **11/14 Winnellie Road, Winnellie, NT, 0800**  
 Contact Name: **Stuart Carroll**  
 Phone No: **0466 776 038**  
 Special Directions:  
 Purchase Order: **279188**  
 Quote ID No:

Project No: **J168829**  
 Project Name: **One Rail - Diesel Spill Investigation**

Project Manager: **EDD Forrest**  
 (Please Print Name)

Handled over by: **Stuart Carroll**  
 Email for Results: **Stuart.Carroll@greencap.com.au**

Nr	Vial ID	Date	Matrix	Substrate	Volume	Containers					Other (Acetone AS/Block, etc. Substrate)	Required Turnaround Time (TAT) <small>(Lead time for 2 days if not stated)</small>	Sample Comments <b>(Dangerous Goods Hazard Warning)</b>
						500mL Plastic - Unpreserved	500mL Plastic - Sodium Thiosulfate	60mL Plastic - Metals	200mL Amber Glass	4mL VOA Glass Vial			
1	V116	1/10/20	Soil		1								
2	V117	1/10/20	Soil		1								
3	V118	1/10/20	Soil		1								
4	V119	1/10/20	Soil		1								
5	V120	1/10/20	Soil		1								
6	V121	1/10/20	Soil		1								
7	V122	1/10/20	Soil		1								
8	V123	1/10/20	Soil		1								
9	V124	1/10/20	Soil		1								
10	V125	1/10/20	Soil		1								
11	V126	1/10/20	Soil		1								
12	V127	1/10/20	Soil		1								
13	V128	1/10/20	Soil		1								
14	V129	1/10/20	Soil		1								
15	V130	1/10/20	Soil		1								
16	V131	1/10/20	Soil		1								
17	V132	1/10/20	Soil		1								
18	V133	1/10/20	Soil		1								
19	V134	1/10/20	Soil		1								
20	V135	1/10/20	Soil		1								
21	V136	1/10/20	Soil		1								
22	V137	1/10/20	Soil		1								
23	V138	1/10/20	Soil		1								
24	V139	1/10/20	Soil		1								
25	V140	1/10/20	Soil		1								
26	V141	1/10/20	Soil		1								
27	V142	1/10/20	Soil		1								
28	V143	1/10/20	Soil		1								
29	V144	1/10/20	Soil		1								
30	V145	1/10/20	Soil		1								
31	V146	1/10/20	Soil		1								
32	V147	1/10/20	Soil		1								
33	V148	1/10/20	Soil		1								
34	V149	1/10/20	Soil		1								
35	V150	1/10/20	Soil		1								
36	V151	1/10/20	Soil		1								
37	V152	1/10/20	Soil		1								
38	V153	1/10/20	Soil		1								
39	V154	1/10/20	Soil		1								
40	V155	1/10/20	Soil		1								
41	V156	1/10/20	Soil		1								
42	V157	1/10/20	Soil		1								
43	V158	1/10/20	Soil		1								
44	V159	1/10/20	Soil		1								
45	V160	1/10/20	Soil		1								
46	V161	1/10/20	Soil		1								
47	V162	1/10/20	Soil		1								
48	V163	1/10/20	Soil		1								
49	V164	1/10/20	Soil		1								
50	V165	1/10/20	Soil		1								
51	V166	1/10/20	Soil		1								
52	V167	1/10/20	Soil		1								
53	V168	1/10/20	Soil		1								
54	V169	1/10/20	Soil		1								
55	V170	1/10/20	Soil		1								
56	V171	1/10/20	Soil		1								
57	V172	1/10/20	Soil		1								
58	V173	1/10/20	Soil		1								
59	V174	1/10/20	Soil		1								
60	QA01	1/10/20	Soil		1								
61	QA03	1/10/20	Soil		1								
62	QA05	1/10/20	Soil		1								
63	QA07	1/10/20	Soil		1								
64	TB	1/10/20	Blank		1								
65	RB	1/10/20	Blank		1								

Add new rows		Total Counts		62	1	1	2	62
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Method of Shipment: **Hand Delivered** Courier Ref: **1** Postal: **1** Name: **ashwin** Date: **02/10/20** Time: **4:10PM** Temperature: **25.6°C**

Eurofins | mg Laboratory Use Only Received By: **Ashwin Desai** Signature: **ashwin** Date: **02/10/20** Time: **4:10PM** Temperature: **25.6°C**

Signature: **ashwin** Date: **02/10/20** Time: **4:10PM** Temperature: **25.6°C**

Report No: **747984**

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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  
**Turnaround time:** 5 Day  
**Date/Time received:** Oct 2, 2020  
**Eurofins reference:** 747984

**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 **747984-S-V2**  
Project name **ONE RAIL - DIESEL SPILL INVESTIGATION**  
Project ID **J168829**  
Received Date **Oct 02, 2020**

Client Sample ID			V116	V117	V118	V119
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04065	M20-Oc04066	M20-Oc04067	M20-Oc04068
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	75	22	< 20	200
TRH C15-C28	50	mg/kg	740	170	220	2300
TRH C29-C36	50	mg/kg	67	69	210	90
TRH C10-C36 (Total)	50	mg/kg	882	261	430	2590
<b>BTEX</b>						
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	94	86	73
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	170	< 50	< 50	590
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	170	< 50	< 50	590
TRH >C16-C34	100	mg/kg	690	200	330	2000
TRH >C34-C40	100	mg/kg	100	110	350	140
TRH >C10-C40 (total)*	100	mg/kg	960	310	680	2730
% Moisture	1	%	14	12	18	13

Client Sample ID			V120 Soil M20-Oc04069 Oct 01, 2020	V121 Soil M20-Oc04070 Oct 01, 2020	V122 Soil M20-Oc04071 Oct 01, 2020	V123 Soil M20-Oc04072 Oct 01, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	1800	< 20
TRH C15-C28	50	mg/kg	< 50	230	8600	79
TRH C29-C36	50	mg/kg	< 50	310	430	230
TRH C10-C36 (Total)	50	mg/kg	< 50	540	10830	309
<b>BTEX</b>						
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	%	84	90	78	74
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	4100	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	4100	< 50
TRH >C16-C34	100	mg/kg	< 100	390	6600	210
TRH >C34-C40	100	mg/kg	< 100	510	1100	440
TRH >C10-C40 (total)*	100	mg/kg	< 100	900	11800	650
% Moisture	1	%	11	6.9	11	7.0

Client Sample ID			V124 Soil M20-Oc04073 Oct 01, 2020	V125 Soil M20-Oc04074 Oct 01, 2020	V126 Soil M20-Oc04075 Oct 01, 2020	V127 Soil M20-Oc04076 Oct 01, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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	79	560	< 50	< 50
TRH C29-C36	50	mg/kg	270	150	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	349	710	< 50	< 50
<b>BTEX</b>						
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	%	89	79	79	80

Client Sample ID			V124	V125	V126	V127
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04073	M20-Oc04074	M20-Oc04075	M20-Oc04076
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	230	630	< 100	< 100
TRH >C34-C40	100	mg/kg	520	270	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	750	900	< 100	< 100
<b>% Moisture</b>						
	1	%	15	15	11	6.8

Client Sample ID			V128	V129	V130	V131
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04077	M20-Oc04078	M20-Oc04079	M20-Oc04080
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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	54	< 50	< 50	52
TRH C29-C36	50	mg/kg	60	72	95	94
TRH C10-C36 (Total)	50	mg/kg	114	72	95	146
<b>BTEX</b>						
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	%	88	88	101	79
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	120	160	170
TRH >C10-C40 (total)*	100	mg/kg	< 100	120	160	170
<b>% Moisture</b>						
	1	%	< 1	< 1	1.3	1.9

Client Sample ID			V132	V133	V134	V135
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04081	M20-Oc04082	M20-Oc04083	M20-Oc04084
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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	85	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	110	71	120	110
TRH C10-C36 (Total)	50	mg/kg	195	71	120	110
<b>BTEX</b>						
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	%	80	91	97	85
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	130	< 100	100	< 100
TRH >C34-C40	100	mg/kg	180	100	190	200
TRH >C10-C40 (total)*	100	mg/kg	310	100	290	200
% Moisture	1	%	< 1	6.9	2.7	3.3

Client Sample ID			V136	V137	V138	V139
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04085	M20-Oc04086	M20-Oc04087	M20-Oc04088
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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	54	80	79	84
TRH C10-C36 (Total)	50	mg/kg	54	80	79	84
<b>BTEX</b>						
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	%	98	83	88	93

Client Sample ID			V136	V137	V138	V139
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04085	M20-Oc04086	M20-Oc04087	M20-Oc04088
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	120	160	160	160
TRH >C10-C40 (total)*	100	mg/kg	120	160	160	160
% Moisture	1	%	10	7.2	6.4	6.1

Client Sample ID			V140	V141	V142	V143
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04089	M20-Oc04090	M20-Oc04091	M20-Oc04092
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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	65	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	65	< 50	< 50	< 50
<b>BTEX</b>						
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	%	96	101	94	90
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	130	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	130	< 100	< 100	< 100
% Moisture	1	%	4.8	9.3	8.0	11

Client Sample ID			V144	V145	V146	V147
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04093	M20-Oc04094	M20-Oc04095	M20-Oc04096
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	20	mg/kg	< 20	45	72	< 20
TRH C10-C14	20	mg/kg	< 20	8400	11000	< 20
TRH C15-C28	50	mg/kg	< 50	19000	23000	< 50
TRH C29-C36	50	mg/kg	< 50	480	770	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	27880	34770	< 50
<b>BTEX</b>						
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	0.3	0.2	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	5.5	9.0	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	4.5	7.6	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	10.0	17	< 0.3
4-Bromofluorobenzene (surr.)	1	%	97	90	80	101
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	0.5	mg/kg	< 0.5	0.9	1.0	< 0.5
TRH C6-C10	20	mg/kg	< 20	180	240	< 20
TRH C6-C10 less BTEX (F1) <sup>N04</sup>	20	mg/kg	< 20	170	220	< 20
TRH >C10-C16	50	mg/kg	< 50	16000	17000	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	15999.1	16999	< 50
TRH >C16-C34	100	mg/kg	< 100	13000	17000	< 100
TRH >C34-C40	100	mg/kg	< 100	510	820	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	29510	34820	< 100
% Moisture	1	%	9.4	5.6	6.9	9.2

Client Sample ID			V148	V149	V150	V151
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04097	M20-Oc04098	M20-Oc04099	M20-Oc04100
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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	120	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	120	< 50	< 50	< 50
<b>BTEX</b>						
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	%	74	81	141	68

Client Sample ID			V148	V149	V150	V151
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04097	M20-Oc04098	M20-Oc04099	M20-Oc04100
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	110	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	110	< 100	< 100	< 100
% Moisture	1	%	14	11	8.7	11

Client Sample ID			V152	V153	V154	V155
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04101	M20-Oc04102	M20-Oc04103	M20-Oc04104
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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	150
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	150
<b>BTEX</b>						
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	%	82	82	76	78
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	140
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	140
% Moisture	1	%	11	8.4	9.3	13

Client Sample ID			V156	V157	V158	V159
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04105	M20-Oc04106	M20-Oc04107	M20-Oc04108
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	620	< 20	1500	21
TRH C15-C28	50	mg/kg	5000	< 50	5200	90
TRH C29-C36	50	mg/kg	5100	< 50	900	< 50
TRH C10-C36 (Total)	50	mg/kg	10720	< 50	7600	111
<b>BTEX</b>						
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	%	66	71	86	89
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	1400	< 50	2900	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	1400	< 50	2900	< 50
TRH >C16-C34	100	mg/kg	7600	< 100	4400	< 100
TRH >C34-C40	100	mg/kg	4900	< 100	990	< 100
TRH >C10-C40 (total)*	100	mg/kg	13900	< 100	8290	< 100
% Moisture	1	%	9.7	4.6	11	9.5

Client Sample ID			V160	V161	V162	V163
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04109	M20-Oc04110	M20-Oc04111	M20-Oc04112
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	100	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	770	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	60
TRH C10-C36 (Total)	50	mg/kg	870	< 50	< 50	60
<b>BTEX</b>						
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	%	96	62	55	60

Client Sample ID			V160	V161	V162	V163
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04109	M20-Oc04110	M20-Oc04111	M20-Oc04112
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	240	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	240	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	640	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	100
TRH >C10-C40 (total)*	100	mg/kg	880	< 100	< 100	100
% Moisture	1	%	9.8	6.2	3.5	6.0

Client Sample ID			V164	V165	V166	V167
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04113	M20-Oc04114	M20-Oc04115	M20-Oc04116
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	3200
TRH C15-C28	50	mg/kg	< 50	< 50	81	7600
TRH C29-C36	50	mg/kg	70	< 50	75	3800
TRH C10-C36 (Total)	50	mg/kg	70	< 50	156	14600
<b>BTEX</b>						
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	0.2
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	55	99	92	98
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	5300
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	< 50	5300
TRH >C16-C34	100	mg/kg	< 100	< 100	120	7500
TRH >C34-C40	100	mg/kg	120	< 100	130	4700
TRH >C10-C40 (total)*	100	mg/kg	120	< 100	250	17500
% Moisture	1	%	5.1	5.5	4.5	11

Client Sample ID			V168	V169	V170	V171
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04117	M20-Oc04118	M20-Oc04119	M20-Oc04120
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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	120	93	58	< 50
TRH C10-C36 (Total)	50	mg/kg	120	93	58	< 50
<b>BTEX</b>						
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	%	100	96	95	135
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	220	170	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	220	170	< 100	< 100
% Moisture	1	%	5.0	5.5	5.2	4.9

Client Sample ID			V172	V173	V174	QA01
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04121	M20-Oc04122	M20-Oc04123	M20-Oc04124
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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	81
TRH C29-C36	50	mg/kg	76	< 50	< 50	160
TRH C10-C36 (Total)	50	mg/kg	76	< 50	< 50	241
<b>BTEX</b>						
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	%	136	97	73	139

Client Sample ID			V172	V173	V174	QA01
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04121	M20-Oc04122	M20-Oc04123	M20-Oc04124
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	170
TRH >C34-C40	100	mg/kg	130	< 100	< 100	270
TRH >C10-C40 (total)*	100	mg/kg	130	< 100	< 100	440
<b>% Moisture</b>						
	1	%	6.0	5.8	6.0	16

Client Sample ID			QA03	QA05	QA07
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			M20-Oc04125	M20-Oc04126	M20-Oc04127
Date Sampled			Oct 01, 2020	Oct 01, 2020	Oct 01, 2020
Test/Reference	LOR	Unit			
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>					
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
<b>BTEX</b>					
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	%	92	61	99
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>					
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	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
<b>% Moisture</b>					
	1	%	6.6	11	5.0

**Sample History**

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

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Oct 06, 2020	14 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Oct 06, 2020	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Oct 06, 2020	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Oct 06, 2020	
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Oct 02, 2020	14 Days

DRAFT

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

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

**Order No.:** 279188  
**Report #:** 747984  
**Phone:** 61 8 8984 4244  
**Fax:** 61 8 8984 3105

**Received:** Oct 2, 2020 12:00 AM  
**Due:** Oct 7, 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	V116	Oct 01, 2020		Soil	M20-Oc04065
2	V117	Oct 01, 2020		Soil	M20-Oc04066
3	V118	Oct 01, 2020		Soil	M20-Oc04067
4	V119	Oct 01, 2020		Soil	M20-Oc04068
5	V120	Oct 01, 2020		Soil	M20-Oc04069
6	V121	Oct 01, 2020		Soil	M20-Oc04070
7	V122	Oct 01, 2020		Soil	M20-Oc04071
8	V123	Oct 01, 2020		Soil	M20-Oc04072
9	V124	Oct 01, 2020		Soil	M20-Oc04073

BTEX	X				
Moisture Set	X				
Eurofins Suite B1	X				



# Environment Testing

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Winnellie  
NT 0800

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**Project ID:** J168829

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**Fax:** 61 8 8984 3105

**Received:** Oct 2, 2020 12:00 AM  
**Due:** Oct 7, 2020  
**Priority:** 5 Day  
**Contact Name:** Stuart Carroll

**Eurofins Analytical Services Manager : Michael Morrison**

Sample Detail		BTEX	Moisture Set	Eurofins Suite B1		
		X	X	X		
<b>Melbourne Laboratory - NATA Site # 1254 &amp; 14271</b>						
<b>Sydney Laboratory - NATA Site # 18217</b>						
<b>Brisbane Laboratory - NATA Site # 20794</b>						
<b>Perth Laboratory - NATA Site # 23736</b>						
<b>Mayfield Laboratory</b>						
<b>External Laboratory</b>						
10	V125	Oct 01, 2020	Soil	M20-Oc04074	X	X
11	V126	Oct 01, 2020	Soil	M20-Oc04075	X	X
12	V127	Oct 01, 2020	Soil	M20-Oc04076	X	X
13	V128	Oct 01, 2020	Soil	M20-Oc04077	X	X
14	V129	Oct 01, 2020	Soil	M20-Oc04078	X	X
15	V130	Oct 01, 2020	Soil	M20-Oc04079	X	X
16	V131	Oct 01, 2020	Soil	M20-Oc04080	X	X
17	V132	Oct 01, 2020	Soil	M20-Oc04081	X	X
18	V133	Oct 01, 2020	Soil	M20-Oc04082	X	X
19	V134	Oct 01, 2020	Soil	M20-Oc04083	X	X
20	V135	Oct 01, 2020	Soil	M20-Oc04084	X	X



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Melbourne Laboratory - NATA Site # 1254 & 14271		X	X	X
Sydney Laboratory - NATA Site # 18217				
Brisbane Laboratory - NATA Site # 20794				
Perth Laboratory - NATA Site # 23736				
Mayfield Laboratory				
External Laboratory				
21	V136 Oct 01, 2020 Soil		X	X
22	V137 Oct 01, 2020 Soil		X	X
23	V138 Oct 01, 2020 Soil		X	X
24	V139 Oct 01, 2020 Soil		X	X
25	V140 Oct 01, 2020 Soil		X	X
26	V141 Oct 01, 2020 Soil		X	X
27	V142 Oct 01, 2020 Soil		X	X
28	V143 Oct 01, 2020 Soil		X	X
29	V144 Oct 01, 2020 Soil		X	X
30	V145 Oct 01, 2020 Soil		X	X
31	V146 Oct 01, 2020 Soil		X	X



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<b>Melbourne Laboratory - NATA Site # 1254 &amp; 14271</b>						
<b>Sydney Laboratory - NATA Site # 18217</b>						
<b>Brisbane Laboratory - NATA Site # 20794</b>						
<b>Perth Laboratory - NATA Site # 23736</b>						
<b>Mayfield Laboratory</b>						
<b>External Laboratory</b>						
32	V147	Oct 01, 2020	Soil	M20-Oc04096	X	X
33	V148	Oct 01, 2020	Soil	M20-Oc04097	X	X
34	V149	Oct 01, 2020	Soil	M20-Oc04098	X	X
35	V150	Oct 01, 2020	Soil	M20-Oc04099	X	X
36	V151	Oct 01, 2020	Soil	M20-Oc04100	X	X
37	V152	Oct 01, 2020	Soil	M20-Oc04101	X	X
38	V153	Oct 01, 2020	Soil	M20-Oc04102	X	X
39	V154	Oct 01, 2020	Soil	M20-Oc04103	X	X
40	V155	Oct 01, 2020	Soil	M20-Oc04104	X	X
41	V156	Oct 01, 2020	Soil	M20-Oc04105	X	X
42	V157	Oct 01, 2020	Soil	M20-Oc04106	X	X



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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						
43	V158	Oct 01, 2020	Soil	M20-Oc04107	X	X
44	V159	Oct 01, 2020	Soil	M20-Oc04108	X	X
45	V160	Oct 01, 2020	Soil	M20-Oc04109	X	X
46	V161	Oct 01, 2020	Soil	M20-Oc04110	X	X
47	V162	Oct 01, 2020	Soil	M20-Oc04111	X	X
48	V163	Oct 01, 2020	Soil	M20-Oc04112	X	X
49	V164	Oct 01, 2020	Soil	M20-Oc04113	X	X
50	V165	Oct 01, 2020	Soil	M20-Oc04114	X	X
51	V166	Oct 01, 2020	Soil	M20-Oc04115	X	X
52	V167	Oct 01, 2020	Soil	M20-Oc04116	X	X
53	V168	Oct 01, 2020	Soil	M20-Oc04117	X	X



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Sample Detail		BTEX	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271		X	X	X
Sydney Laboratory - NATA Site # 18217				
Brisbane Laboratory - NATA Site # 20794				
Perth Laboratory - NATA Site # 23736				
Mayfield Laboratory				
External Laboratory				
54	V169 Oct 01, 2020 Soil		X	X
55	V170 Oct 01, 2020 Soil		X	X
56	V171 Oct 01, 2020 Soil		X	X
57	V172 Oct 01, 2020 Soil		X	X
58	V173 Oct 01, 2020 Soil		X	X
59	V174 Oct 01, 2020 Soil		X	X
60	QA01 Oct 01, 2020 Soil		X	X
61	QA03 Oct 01, 2020 Soil		X	X
62	QA05 Oct 01, 2020 Soil		X	X
63	QA07 Oct 01, 2020 Soil		X	X
64	TB Oct 01, 2020 Water	X		



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Sample Detail		
Eurofins Suite B1	X	X
Moisture Set	X	
BTEX	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		
65 RB	Oct 01, 2020	Water
M20-Oc04129		
<b>Test Counts</b>		
	1	63
	X	64

**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**

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	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.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	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.
<b>TEQ</b>	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	
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
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		
<b>Method Blank</b>								
<b>BTEX</b>								
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		
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
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		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	%	105			70-130	Pass		
TRH C10-C14	%	98			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>BTEX</b>								
Benzene	%	94			70-130	Pass		
Toluene	%	111			70-130	Pass		
Ethylbenzene	%	106			70-130	Pass		
m&p-Xylenes	%	105			70-130	Pass		
Xylenes - Total*	%	105			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
Naphthalene	%	103			70-130	Pass		
TRH C6-C10	%	105			70-130	Pass		
TRH >C10-C16	%	98			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	M20-Oc04066	CP	%	94		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>BTEX</b>								
Benzene	M20-Oc04066	CP	%	75		70-130	Pass	
Toluene	M20-Oc04066	CP	%	96		70-130	Pass	
Ethylbenzene	M20-Oc04066	CP	%	87		70-130	Pass	
m&p-Xylenes	M20-Oc04066	CP	%	88		70-130	Pass	
o-Xylene	M20-Oc04066	CP	%	89		70-130	Pass	
Xylenes - Total*	M20-Oc04066	CP	%	88		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
				Result 1				

Test	Lab Sample ID	QA Source	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code
Naphthalene	M20-Oc04066	CP	%	95	70-130	Pass	
TRH C6-C10	M20-Oc04066	CP	%	91	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1			
TRH C10-C14	M20-Oc04067	CP	%	119	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1			
TRH >C10-C16	M20-Oc04067	CP	%	118	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1			
TRH C6-C9	M20-Oc04076	CP	%	101	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>BTEX</b>				Result 1			
Benzene	M20-Oc04076	CP	%	84	70-130	Pass	
Toluene	M20-Oc04076	CP	%	98	70-130	Pass	
Ethylbenzene	M20-Oc04076	CP	%	89	70-130	Pass	
m&p-Xylenes	M20-Oc04076	CP	%	88	70-130	Pass	
o-Xylene	M20-Oc04076	CP	%	88	70-130	Pass	
Xylenes - Total*	M20-Oc04076	CP	%	88	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1			
Naphthalene	M20-Oc04076	CP	%	76	70-130	Pass	
TRH C6-C10	M20-Oc04076	CP	%	103	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1			
TRH C10-C14	M20-Oc04077	CP	%	112	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1			
TRH >C10-C16	M20-Oc04077	CP	%	113	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1			
TRH C6-C9	M20-Oc04086	CP	%	76	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>BTEX</b>				Result 1			
Benzene	M20-Oc04086	CP	%	79	70-130	Pass	
Toluene	M20-Oc04086	CP	%	92	70-130	Pass	
Ethylbenzene	M20-Oc04086	CP	%	85	70-130	Pass	
m&p-Xylenes	M20-Oc04086	CP	%	85	70-130	Pass	
o-Xylene	M20-Oc04086	CP	%	84	70-130	Pass	
Xylenes - Total*	M20-Oc04086	CP	%	84	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1			
Naphthalene	M20-Oc04086	CP	%	126	70-130	Pass	
TRH C6-C10	M20-Oc04086	CP	%	73	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1			
TRH C10-C14	M20-Oc04087	CP	%	130	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1			
TRH >C10-C16	M20-Oc04087	CP	%	115	70-130	Pass	
<b>Spike - % Recovery</b>							
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1			
TRH C6-C9	M20-Oc04096	CP	%	96	70-130	Pass	
<b>Spike - % Recovery</b>							

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>BTEX</b>				Result 1				
Benzene	M20-Oc04096	CP	%	90		70-130	Pass	
Toluene	M20-Oc04096	CP	%	85		70-130	Pass	
Ethylbenzene	M20-Oc04096	CP	%	93		70-130	Pass	
m&p-Xylenes	M20-Oc04096	CP	%	96		70-130	Pass	
o-Xylene	M20-Oc04096	CP	%	79		70-130	Pass	
Xylenes - Total*	M20-Oc04096	CP	%	90		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1				
Naphthalene	M20-Oc04096	CP	%	90		70-130	Pass	
TRH C6-C10	M20-Oc04096	CP	%	96		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1				
TRH C10-C14	M20-Oc04097	CP	%	126		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1				
TRH >C10-C16	M20-Oc04097	CP	%	127		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1				
TRH C6-C9	M20-Oc04106	CP	%	97		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>BTEX</b>				Result 1				
Benzene	M20-Oc04106	CP	%	80		70-130	Pass	
Toluene	M20-Oc04106	CP	%	93		70-130	Pass	
Ethylbenzene	M20-Oc04106	CP	%	79		70-130	Pass	
m&p-Xylenes	M20-Oc04106	CP	%	79		70-130	Pass	
o-Xylene	M20-Oc04106	CP	%	78		70-130	Pass	
Xylenes - Total*	M20-Oc04106	CP	%	78		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1				
Naphthalene	M20-Oc04106	CP	%	75		70-130	Pass	
TRH C6-C10	M20-Oc04106	CP	%	97		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1				
TRH C10-C14	M20-Oc04107	CP	%	Int		70-130	Fail	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1				
TRH >C10-C16	M20-Oc04107	CP	%	Int		70-130	Fail	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1				
TRH C6-C9	M20-Oc04116	CP	%	122		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>BTEX</b>				Result 1				
Benzene	M20-Oc04116	CP	%	100		70-130	Pass	
Toluene	M20-Oc04116	CP	%	110		70-130	Pass	
Ethylbenzene	M20-Oc04116	CP	%	103		70-130	Pass	
m&p-Xylenes	M20-Oc04116	CP	%	106		70-130	Pass	
o-Xylene	M20-Oc04116	CP	%	103		70-130	Pass	
Xylenes - Total*	M20-Oc04116	CP	%	105		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1				
Naphthalene	M20-Oc04116	CP	%	88		70-130	Pass	
TRH C6-C10	M20-Oc04116	CP	%	109		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD			
TRH C6-C9	M20-Oc04065	CP	mg/kg	< 20	< 20	<1	30%	Pass	
<b>Duplicate</b>									
<b>BTEX</b>				Result 1	Result 2	RPD			
Benzene	M20-Oc04065	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M20-Oc04065	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M20-Oc04065	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M20-Oc04065	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M20-Oc04065	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	M20-Oc04065	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD			
Naphthalene	M20-Oc04065	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M20-Oc04065	CP	mg/kg	< 20	< 20	<1	30%	Pass	
<b>Duplicate</b>									
				Result 1	Result 2	RPD			
% Moisture	M20-Oc04072	CP	%	7.0	10.0	35	30%	Fail	Q15
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD			
TRH C6-C9	M20-Oc04075	CP	mg/kg	< 20	< 20	<1	30%	Pass	
<b>Duplicate</b>									
<b>BTEX</b>				Result 1	Result 2	RPD			
Benzene	M20-Oc04075	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M20-Oc04075	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M20-Oc04075	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M20-Oc04075	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M20-Oc04075	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	M20-Oc04075	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD			
Naphthalene	M20-Oc04075	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M20-Oc04075	CP	mg/kg	< 20	< 20	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD			
TRH C10-C14	M20-Oc04076	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M20-Oc04076	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M20-Oc04076	CP	mg/kg	< 50	< 50	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD			
TRH >C10-C16	M20-Oc04076	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M20-Oc04076	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M20-Oc04076	CP	mg/kg	< 100	< 100	<1	30%	Pass	
<b>Duplicate</b>									
				Result 1	Result 2	RPD			
% Moisture	M20-Oc04082	CP	%	6.9	7.0	1.0	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD			
TRH C6-C9	M20-Oc04085	CP	mg/kg	< 20	< 20	<1	30%	Pass	

Duplicate								
<b>BTEX</b>				Result 1	Result 2	RPD		
Benzene	M20-Oc04085	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	M20-Oc04085	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	M20-Oc04085	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	M20-Oc04085	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	M20-Oc04085	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total*	M20-Oc04085	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD		
Naphthalene	M20-Oc04085	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	M20-Oc04085	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD		
TRH C10-C14	M20-Oc04086	CP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C15-C28	M20-Oc04086	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH C29-C36	M20-Oc04086	CP	mg/kg	80	97	19	30%	Pass
Duplicate								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD		
TRH >C10-C16	M20-Oc04086	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH >C16-C34	M20-Oc04086	CP	mg/kg	< 100	< 100	<1	30%	Pass
TRH >C34-C40	M20-Oc04086	CP	mg/kg	160	180	15	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	M20-Oc04092	CP	%	11	11	2.0	30%	Pass
Duplicate								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD		
TRH C6-C9	M20-Oc04095	CP	mg/kg	72	74	2.0	30%	Pass
Duplicate								
<b>BTEX</b>				Result 1	Result 2	RPD		
Benzene	M20-Oc04095	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	M20-Oc04095	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	M20-Oc04095	CP	mg/kg	0.2	0.2	<1	30%	Pass
m&p-Xylenes	M20-Oc04095	CP	mg/kg	9.0	9.0	<1	30%	Pass
o-Xylene	M20-Oc04095	CP	mg/kg	7.6	7.8	2.0	30%	Pass
Xylenes - Total*	M20-Oc04095	CP	mg/kg	17	17	1.0	30%	Pass
Duplicate								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD		
Naphthalene	M20-Oc04095	CP	mg/kg	1.0	1.0	1.0	30%	Pass
TRH C6-C10	M20-Oc04095	CP	mg/kg	240	250	4.0	30%	Pass
Duplicate								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD		
TRH C10-C14	M20-Oc04096	CP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C15-C28	M20-Oc04096	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH C29-C36	M20-Oc04096	CP	mg/kg	< 50	< 50	<1	30%	Pass
Duplicate								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD		
TRH >C10-C16	M20-Oc04096	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH >C16-C34	M20-Oc04096	CP	mg/kg	< 100	< 100	<1	30%	Pass
TRH >C34-C40	M20-Oc04096	CP	mg/kg	< 100	< 100	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	M20-Oc04102	CP	%	8.4	9.2	9.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	M20-Oc04112	CP	%	6.0	5.2	15	30%	Pass

Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C6-C9	M20-Oc04115	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
BTEX				Result 1	Result 2	RPD		
Benzene	M20-Oc04115	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	M20-Oc04115	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	M20-Oc04115	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	M20-Oc04115	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	M20-Oc04115	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total*	M20-Oc04115	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	M20-Oc04115	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	M20-Oc04115	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	M20-Oc04122	CP	%	5.8	6.1	5.0	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.
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
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](#).

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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: **Stuart Carroll**

Report **747984-W-V2**  
Project name **ONE RAIL - DIESEL SPILL INVESTIGATION**  
Project ID **J168829**  
Received Date **Oct 02, 2020**

Client Sample ID			TB Water	RB Water
Sample Matrix			M20-Oc04128	M20-Oc04129
Eurofins Sample No.			Oct 01, 2020	Oct 01, 2020
Date Sampled				
Test/Reference	LOR	Unit		
<b>BTEX</b>				
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	%	91	90
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				
TRH C6-C9	0.02	mg/L	-	< 0.02
TRH C10-C14	0.05	mg/L	-	< 0.05
TRH C15-C28	0.1	mg/L	-	< 0.1
TRH C29-C36	0.1	mg/L	-	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	-	< 0.1
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				
Naphthalene <sup>N02</sup>	0.01	mg/L	-	< 0.01
TRH C6-C10	0.02	mg/L	-	< 0.02
TRH C6-C10 less BTEX (F1) <sup>N04</sup>	0.02	mg/L	-	< 0.02
TRH >C10-C16	0.05	mg/L	-	< 0.05
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	0.05	mg/L	-	< 0.05
TRH >C16-C34	0.1	mg/L	-	< 0.1
TRH >C34-C40	0.1	mg/L	-	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	-	< 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			
BTEX	Melbourne	Oct 06, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Oct 09, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Oct 06, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Oct 10, 2020	
- Method: LTM-ORG-2010 TRH C6-C40			

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# Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

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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

**Order No.:** 279188  
**Report #:** 747984  
**Phone:** 61 8 8984 4244  
**Fax:** 61 8 8984 3105

**Received:** Oct 2, 2020 12:00 AM  
**Due:** Oct 7, 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	V116	Oct 01, 2020		Soil	M20-Oc04065
2	V117	Oct 01, 2020		Soil	M20-Oc04066
3	V118	Oct 01, 2020		Soil	M20-Oc04067
4	V119	Oct 01, 2020		Soil	M20-Oc04068
5	V120	Oct 01, 2020		Soil	M20-Oc04069
6	V121	Oct 01, 2020		Soil	M20-Oc04070
7	V122	Oct 01, 2020		Soil	M20-Oc04071
8	V123	Oct 01, 2020		Soil	M20-Oc04072
9	V124	Oct 01, 2020		Soil	M20-Oc04073
External Laboratory					
Eurofins Suite B1					
Moisture Set					
BTEX					



Environment Testing

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

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

**Order No.:** 279188  
**Report #:** 747984  
**Phone:** 61 8 8984 4244  
**Fax:** 61 8 8984 3105

**Received:** Oct 2, 2020 12:00 AM  
**Due:** Oct 7, 2020  
**Priority:** 5 Day  
**Contact Name:** Stuart Carroll

**Eurofins Analytical Services Manager : Michael Morrison**

Sample Detail		BTEX	Moisture Set	Eurofins Suite B1
		X	X	X
<b>External Laboratory</b>				
10	V125	Oct 01, 2020	Soil	M20-Oc04074
11	V126	Oct 01, 2020	Soil	M20-Oc04075
12	V127	Oct 01, 2020	Soil	M20-Oc04076
13	V128	Oct 01, 2020	Soil	M20-Oc04077
14	V129	Oct 01, 2020	Soil	M20-Oc04078
15	V130	Oct 01, 2020	Soil	M20-Oc04079
16	V131	Oct 01, 2020	Soil	M20-Oc04080
17	V132	Oct 01, 2020	Soil	M20-Oc04081
18	V133	Oct 01, 2020	Soil	M20-Oc04082
19	V134	Oct 01, 2020	Soil	M20-Oc04083
20	V135	Oct 01, 2020	Soil	M20-Oc04084

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Sample Detail			
Sample ID	Sample Description	Sample Date	Sample Matrix
	BTEX		X
	Moisture Set		X
	Eurofins Suite B1		X
<b>External Laboratory</b>			
21	V136	Oct 01, 2020	Soil
			M20-Oc04085
22	V137	Oct 01, 2020	Soil
			M20-Oc04086
23	V138	Oct 01, 2020	Soil
			M20-Oc04087
24	V139	Oct 01, 2020	Soil
			M20-Oc04088
25	V140	Oct 01, 2020	Soil
			M20-Oc04089
26	V141	Oct 01, 2020	Soil
			M20-Oc04090
27	V142	Oct 01, 2020	Soil
			M20-Oc04091
28	V143	Oct 01, 2020	Soil
			M20-Oc04092
29	V144	Oct 01, 2020	Soil
			M20-Oc04093
30	V145	Oct 01, 2020	Soil
			M20-Oc04094
31	V146	Oct 01, 2020	Soil
			M20-Oc04095



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Sample Detail		BTEX	Moisture Set	Eurofins Suite B1
		X	X	X
<b>Melbourne Laboratory - NATA Site # 1254 &amp; 14271</b>				
<b>Sydney Laboratory - NATA Site # 18217</b>				
<b>Brisbane Laboratory - NATA Site # 20794</b>				
<b>Perth Laboratory - NATA Site # 23736</b>				
<b>Mayfield Laboratory</b>				
<b>External Laboratory</b>				
32	V147	Oct 01, 2020	Soil	M20-Oc04096
33	V148	Oct 01, 2020	Soil	M20-Oc04097
34	V149	Oct 01, 2020	Soil	M20-Oc04098
35	V150	Oct 01, 2020	Soil	M20-Oc04099
36	V151	Oct 01, 2020	Soil	M20-Oc04100
37	V152	Oct 01, 2020	Soil	M20-Oc04101
38	V153	Oct 01, 2020	Soil	M20-Oc04102
39	V154	Oct 01, 2020	Soil	M20-Oc04103
40	V155	Oct 01, 2020	Soil	M20-Oc04104
41	V156	Oct 01, 2020	Soil	M20-Oc04105
42	V157	Oct 01, 2020	Soil	M20-Oc04106



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Sample Detail		BTEX	Moisture Set	Eurofins Suite B1
		X	X	X
<b>External Laboratory</b>				
43	V158	Oct 01, 2020	Soil	M20-Oc04107
44	V159	Oct 01, 2020	Soil	M20-Oc04108
45	V160	Oct 01, 2020	Soil	M20-Oc04109
46	V161	Oct 01, 2020	Soil	M20-Oc04110
47	V162	Oct 01, 2020	Soil	M20-Oc04111
48	V163	Oct 01, 2020	Soil	M20-Oc04112
49	V164	Oct 01, 2020	Soil	M20-Oc04113
50	V165	Oct 01, 2020	Soil	M20-Oc04114
51	V166	Oct 01, 2020	Soil	M20-Oc04115
52	V167	Oct 01, 2020	Soil	M20-Oc04116
53	V168	Oct 01, 2020	Soil	M20-Oc04117



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Sample Detail		BTEX	Moisture Set	Eurofins Suite B1
Meibourne Laboratory - NATA Site # 1254 & 14271		X	X	X
Sydney Laboratory - NATA Site # 18217				
Brisbane Laboratory - NATA Site # 20794				
Perth Laboratory - NATA Site # 23736				
Mayfield Laboratory				
External Laboratory				
54 V169	Oct 01, 2020	Soil	M20-Oc04118	X
55 V170	Oct 01, 2020	Soil	M20-Oc04119	X
56 V171	Oct 01, 2020	Soil	M20-Oc04120	X
57 V172	Oct 01, 2020	Soil	M20-Oc04121	X
58 V173	Oct 01, 2020	Soil	M20-Oc04122	X
59 V174	Oct 01, 2020	Soil	M20-Oc04123	X
60 QA01	Oct 01, 2020	Soil	M20-Oc04124	X
61 QA03	Oct 01, 2020	Soil	M20-Oc04125	X
62 QA05	Oct 01, 2020	Soil	M20-Oc04126	X
63 QA07	Oct 01, 2020	Soil	M20-Oc04127	X
64 TB	Oct 01, 2020	Water	M20-Oc04128	X

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Sample Detail			Eurofins Suite B1		Moisture Set		BTEX	
Melbourne Laboratory - NATA Site # 1254 & 14271			X	X				
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory								
External Laboratory								
65	RB	Oct 01, 2020		Water	M20-Oc04129		X	64
<b>Test Counts</b>								
			1	63				

## 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

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	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.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	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.
<b>TEQ</b>	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	
<b>Method Blank</b>								
<b>BTEX</b>								
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		
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	mg/L	< 0.02			0.02	Pass		
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
Naphthalene	mg/L	< 0.01			0.01	Pass		
TRH C6-C10	mg/L	< 0.02			0.02	Pass		
<b>LCS - % Recovery</b>								
<b>BTEX</b>								
Benzene	%	88			70-130	Pass		
Toluene	%	104			70-130	Pass		
Ethylbenzene	%	91			70-130	Pass		
m&p-Xylenes	%	94			70-130	Pass		
Xylenes - Total*	%	93			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	%	91			70-130	Pass		
TRH C10-C14	%	124			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
Naphthalene	%	114			70-130	Pass		
TRH C6-C10	%	91			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
<b>Spike - % Recovery</b>								
<b>BTEX</b>								
Benzene	M20-Oc05385	NCP	%	97		70-130	Pass	
Toluene	M20-Oc05385	NCP	%	105		70-130	Pass	
Ethylbenzene	M20-Oc05385	NCP	%	91		70-130	Pass	
m&p-Xylenes	M20-Oc05385	NCP	%	91		70-130	Pass	
o-Xylene	M20-Oc05385	NCP	%	89		70-130	Pass	
Xylenes - Total*	M20-Oc05385	NCP	%	90		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	M20-Oc05385	NCP	%	97		70-130	Pass	
TRH C10-C14	M20-Oc06704	NCP	%	76		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
Naphthalene	M20-Oc05385	NCP	%	96		70-130	Pass	
TRH C6-C10	M20-Oc05385	NCP	%	90		70-130	Pass	
TRH >C10-C16	M20-Oc06704	NCP	%	80		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>BTEX</b>				Result 1	Result 2	RPD			
Benzene	M20-Oc05369	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M20-Oc05369	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M20-Oc05369	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M20-Oc05369	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M20-Oc05369	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M20-Oc05369	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD			
TRH C6-C9	M20-Oc05369	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M20-Oc06698	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M20-Oc06698	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M20-Oc06698	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD			
Naphthalene	M20-Oc05369	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	M20-Oc05369	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M20-Oc06698	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M20-Oc06698	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M20-Oc06698	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	

DRAFT

**Comments**

V2: This report has been revised (V2) following repeat analysis. TRH results for sample Oc04129 have now been replaced by the repeat results.

**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](#).

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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: **Stuart Carroll**

Report **749730-S**  
Project name **ONE RAIL AUSTRALIA - DIESEL SPILL**  
Project ID **J168829**  
Received Date **Oct 12, 2020**

Client Sample ID			V175	V176	V177	V178
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Oc18029	M20-Oc18030	M20-Oc18031	M20-Oc18032
Date Sampled			Oct 12, 2020	Oct 12, 2020	Oct 12, 2020	Oct 12, 2020
Test/Reference	LOR	Unit				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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	80	60	67
TRH C29-C36	50	mg/kg	180	210	120	190
TRH C10-C36 (Total)	50	mg/kg	180	290	180	257
<b>BTEX</b>						
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	%	61	76	77	74
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	150	190	120	170
TRH >C34-C40	100	mg/kg	310	350	230	320
TRH >C10-C40 (total)*	100	mg/kg	460	540	350	490
% Moisture	1	%	6.8	4.3	7.9	6.2

**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 13, 2020	14 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Oct 13, 2020	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Oct 13, 2020	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Oct 13, 2020	
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Oct 12, 2020	14 Days

DRAFT



# Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

## 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:** ONE RAIL AUSTRALIA - DIESEL SPILL  
**Project ID:** J168829

**Order No.:** 279449  
**Report #:** 749730  
**Phone:** 61 8 8984 4244  
**Fax:** 61 8 8984 3105

**Received:** Oct 12, 2020 1:55 PM  
**Due:** Oct 19, 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	V175	Oct 12, 2020		Soil	M20-Oct18029	X X
2	V176	Oct 12, 2020		Soil	M20-Oct18030	X X
3	V177	Oct 12, 2020		Soil	M20-Oct18031	X X
4	V178	Oct 12, 2020		Soil	M20-Oct18032	X X
5	RB	Oct 12, 2020		Water	M20-Oct18033	X
6	TB	Oct 12, 2020		Water	M20-Oct18034	X
<b>Test Counts</b>						1 4 5
Eurofins Suite B1						
Moisture Set						
BTEX						
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

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	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.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	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.
<b>TEQ</b>	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	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD			
TRH C6-C9	M20-Oc21154	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M20-Oc20181	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M20-Oc20181	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M20-Oc20181	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
<b>Duplicate</b>									
<b>BTEX</b>				Result 1	Result 2	RPD			
Benzene	M20-Oc21154	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M20-Oc21154	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M20-Oc21154	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M20-Oc21154	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M20-Oc21154	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	M20-Oc21154	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD			
Naphthalene	M20-Oc22187	NCP	mg/kg	**	**	<1	30%	Pass	
TRH C6-C10	M20-Oc22187	NCP	mg/kg	**	**	<1	30%	Pass	
TRH >C10-C16	M20-Oc20181	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M20-Oc20181	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
<b>Duplicate</b>									
				Result 1	Result 2	RPD			
% Moisture	M20-Oc18031	CP	%	7.9	8.9	12	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](#).

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SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2019730

Client	: GRENCAP-NAA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: ROBIN BIRUA	Contact	: Peter Ravlic
Address	: 11/14 Winnellie Road WINNELLIE NT, AUSTRALIA 0820	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: robin.birua@greencap.com.au	E-mail	: peter.ravlic@alsglobal.com
Telephone	: +61 08 8984 4244	Telephone	: +6138549 9645
Facsimile	: +61 08 8984 3105	Facsimile	: +61-2-8784 8500
Project	: J168829 Diesel Spill Investigation - Berrimah Freight Terminal, East Arm, NT	Page	: 1 of 2
Order number	: 275590	Quote number	: EM2018ADEENV0003 (EN/111/18 Primary Work Only)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: STUART CARROLL		

Dates

Date Samples Received	: 12-Jun-2020 09:30	Issue Date	: 12-Jun-2020
Client Requested Due Date	: 15-Jun-2020	Scheduled Reporting Date	: <b>15-Jun-2020</b>

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 22.1' C
Receipt Detail	:	No. of samples received / analysed	: 5 / 3

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** : **ES2019730**  
**Client** : **GREENCAP-NAA PTY LTD**  
**Contact** : **ROBIN BIRUA**  
**Address** : **11/14 Winnellie Road**  
**WINNELLIE NT, AUSTRALIA 0820**  
**Telephone** : **+61 08 8984 4244**  
**Project** : **J168829 Diesel Spill Investigation - Berrimah Freight Terminal, East Arm, NT**  
**Order number** : **275590**  
**C-O-C number** : **----**  
**Sampler** : **STUART CARROLL**  
**Site** : **----**  
**Quote number** : **EN/11/18 Primary Work Only**  
**No. of samples received** : **5**  
**No. of samples analysed** : **3**

**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** : **12-Jun-2020 09:30**  
**Date Analysis Commenced** : **12-Jun-2020**  
**Issue Date** : **15-Jun-2020 13:34**



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.

Signatories	Position	Accreditation Category
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



Page : 2 of 4  
Work Order : ES2019730  
Client : GREENCAP-NAA PTY LTD  
Project : J168829 Diesel Spill Investigation - Berrimah Freight Terminal, East Arm, NT

### 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.



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)	Compound	CAS Number	LOR	Unit	Client sample ID				
					Client sampling date / time	QA14	QA16	QA20	
	EA055: Moisture Content (Dried @ 105-110°C)		0.1	%	10-Jun-2020 00:00	ES2019730-002	11-Jun-2020 00:00	ES2019730-005	
	Moisture Content				9.6	9.6	9.6	8.2	
	<b>EP080/071: Total Petroleum Hydrocarbons</b>								
	C6 - C9 Fraction		10	mg/kg	<10	<10	<10	66	
	C10 - C14 Fraction		50	mg/kg	210	210	<50	18400	
	C15 - C28 Fraction		100	mg/kg	1740	1740	<100	41600	
	C29 - C36 Fraction		100	mg/kg	360	360	<100	110	
	^ C10 - C36 Fraction (sum)		50	mg/kg	2310	2310	<50	60100	
	<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
	C6 - C10 Fraction		10	mg/kg	<10	<10	<10	198	
	^ C6 - C10 Fraction minus BTEX (F1)		10	mg/kg	<10	<10	<10	186	
	>C10 - C16 Fraction		50	mg/kg	620	620	<50	31800	
	>C16 - C34 Fraction		100	mg/kg	1620	1620	<100	26900	
	>C34 - C40 Fraction		100	mg/kg	230	230	<100	<100	
	^ >C10 - C40 Fraction (sum)		50	mg/kg	2470	2470	<50	58700	
	^ >C10 - C16 Fraction minus Naphthalene (F2)		50	mg/kg	620	620	<50	31800	
	<b>EP080: BTEXN</b>								
	Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	
	Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
	Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	1.6	
	meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	<0.5	6.0	
	ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	4.0	
	^ Sum of BTEX		0.2	mg/kg	<0.2	<0.2	<0.2	11.6	
	^ Total Xylenes		0.5	mg/kg	<0.5	<0.5	<0.5	10.0	
	Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	1	
	<b>EP080S: TPH(V)/BTEX Surrogates</b>								
	1,2-Dichloroethane-D4	17060-07-0	0.2	%	90.9	90.9	96.3	86.9	
	Toluene-D8	2037-26-5	0.2	%	113	113	115	108	
	4-Bromofluorobenzene	460-00-4	0.2	%	115	115	117	102	



Page : 4 of 4  
Work Order : ES2019730  
Client : GREENCAP-NAA PTY LTD  
Project : J168829 Diesel Spill Investigation - Berrimah Freight Terminal, East Arm, NT

### Surrogate Control Limits

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

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**Environmental**

## QUALITY CONTROL REPORT

Work Order : **ES2019730**

Page : 1 of 4

Client : **GREENCAP-NAA PTY LTD**  
Contact : **ROBIN BIRUA**  
Address : **11/14 Winnellie Road  
WINNELLIE NT, AUSTRALIA 0820**  
Telephone : **+61 08 8984 4244**  
Project : **J168829 Diesel Spill Investigation - Berrimah Freight Terminal,  
East Arm, NT**  
Order number : **275590**  
C-O-C number : **----**  
Sampler : **STUART CARROLL**  
Site : **----**  
Quote number : **EN/11/18 Primary Work Only**  
No. of samples received : **5**  
No. of samples analysed : **3**

Laboratory : **Environmental Division Sydney**  
Contact : **Peter Ravlic**  
Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**  
Telephone : **+6138549 9645**  
Date Samples Received : **12-Jun-2020**  
Date Analysis Commenced : **12-Jun-2020**  
Issue Date : **15-Jun-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 Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



Page : 2 of 4  
 Work Order : ES2019730  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 Diesel Spill Investigation - Berrimah Freight Terminal, East Arm, NT

### 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	Client sample ID	Method/Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
<b>EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3076587)</b>									
ES2019730-001	QA12	EA055: Moisture Content	---	0.1	%	7.8	7.0	10.2	0% - 20%
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3075269)</b>									
ES2019730-001	QA12	EP071: C15 - C28 Fraction	---	100	mg/kg	34000	34600	1.67	0% - 20%
		EP071: C29 - C36 Fraction	---	100	mg/kg	320	320	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	14800	15000	1.66	0% - 20%
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3075301)</b>									
ES2019730-002	QA14	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3075269)</b>									
ES2019730-001	QA12	EP071: >C16 - C34 Fraction	---	100	mg/kg	22100	22500	2.11	0% - 20%
		EP071: >C34 - C40 Fraction	---	100	mg/kg	320	340	7.05	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	25800	26200	1.43	0% - 20%
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3075301)</b>									
ES2019730-002	QA14	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080: BTEXN (QC Lot: 3075301)</b>									
ES2019730-002	QA14	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



### 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	High
<b>EP080/071: Total Petroleum Hydrocarbons (QC.Lot: 3075269)</b>									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	99.6	75.0	129	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	98.7	77.0	131	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	94.7	71.0	129	
<b>EP080/071: Total Petroleum Hydrocarbons (QC.Lot: 3075301)</b>									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	77.3	68.4	128	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC.Lot: 3075269)</b>									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	101	77.0	125	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	96.7	74.0	138	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	87.8	63.0	131	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC.Lot: 3075301)</b>									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	78.4	68.4	128	
<b>EP080: BTEXN (QC.Lot: 3075301)</b>									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	77.5	62.0	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	81.1	67.0	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	78.6	65.0	117	
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	81.4	66.0	118	
	106-42-3								
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	83.7	68.0	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	85.6	63.0	119	

### 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: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	MS	Recovery Limits (%)
				Low	High		
<b>EP080/071: Total Petroleum Hydrocarbons (QC.Lot: 3075269)</b>							
ES2019730-001	QA12	EP071: C10 - C14 Fraction	----	523 mg/kg	# Not Determined	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	# Not Determined	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	68.3	52.0	132



Page : 4 of 4  
 Work Order : ES2019730  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 Diesel Spill Investigation - Berrimah Freight Terminal, East Arm, NT

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	MS	Recovery Limits (%)
EP080/074: Total Petroleum Hydrocarbons (QCLot: 3075301)				Low	High		
ES2019730-002	QA14	EP080: C6 - C9 Fraction	----	32.5 mg/kg	98.9	70.0	130
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3075269)							
ES2019730-001	QA12	EP071: >C10 - C16 Fraction	----	860 mg/kg	# Not Determined	73.0	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	# Not Determined	53.0	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	53.3	52.0	132
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3075301)							
ES2019730-002	QA14	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	88.8	70.0	130
EP080: BTEXN (QCLot: 3075301)							
ES2019730-002	QA14	EP080: Benzene	71-43-2	2.5 mg/kg	88.4	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	104	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	99.1	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	95.9	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	97.5	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	95.9	70.0	130



**ALS** Environmental

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2019730	Page	: 1 of 5
Client	: GREENCAP-NAA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: ROBIN BIRUA	Telephone	: +6138549 9645
Project	: J168829 Diesel Spill Investigation - Berrimah Freight Terminal, East Arm, NT	Date Samples Received	: 12-Jun-2020
Site	: ----	Issue Date	: 15-Jun-2020
Sampler	: STUART CARROLL	No. of samples received	: 5
Order number	: 275590	No. of samples analysed	: 3

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

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

#### Outliers : Frequency of Quality Control Samples

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



**Outliers : Quality Control Samples**  
 Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: SOIL

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Matrix Spike (MS) Recoveries</b>							
EP080/071: Total Petroleum Hydrocarbons	ES2019730--001	QA12	C10 - C14 Fraction	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP080/071: Total Petroleum Hydrocarbons	ES2019730--001	QA12	C15 - C28 Fraction	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	ES2019730--001	QA12	>C10 - C16 Fraction	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	ES2019730--001	QA12	>C16 - C34 Fraction	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

**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
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>						
Soil Glass Jar - Unpreserved (EA055) QA14	----	----	12-Jun-2020	24-Jun-2020	✓	✓
Soil Glass Jar - Unpreserved (EA055) QA16, QA20	----	----	12-Jun-2020	25-Jun-2020	✓	✓
<b>EP080/071: Total Petroleum Hydrocarbons</b>						
Soil Glass Jar - Unpreserved (EP080) QA14	12-Jun-2020	24-Jun-2020	12-Jun-2020	24-Jun-2020	✓	✓
Soil Glass Jar - Unpreserved (EP080) QA16, QA20	12-Jun-2020	25-Jun-2020	12-Jun-2020	25-Jun-2020	✓	✓
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>						
Soil Glass Jar - Unpreserved (EP080) QA14	12-Jun-2020	24-Jun-2020	12-Jun-2020	24-Jun-2020	✓	✓
Soil Glass Jar - Unpreserved (EP080) QA16, QA20	12-Jun-2020	25-Jun-2020	12-Jun-2020	25-Jun-2020	✓	✓



Page : 3 of 5  
 Work Order : ES2019730  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 Diesel Spill Investigation - Berrimah Freight Terminal, East Arm, NT

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

Method	Sample Date	Extraction / Preparation		Analysis					
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
<b>EP080: BTEXN</b>									
Soil Glass Jar - Unpreserved (EP080) QA14	10-Jun-2020	12-Jun-2020	24-Jun-2020	✓	12-Jun-2020	24-Jun-2020	✓		
Soil Glass Jar - Unpreserved (EP080) QA16, QA20	11-Jun-2020	12-Jun-2020	25-Jun-2020	✓	12-Jun-2020	25-Jun-2020	✓		

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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	Method	Count			Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected			
<b>Laboratory Duplicates (DUP)</b>								
Moisture Content	EA055	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH - Semivolatile Fraction	EP071	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH Volatiles/BTEX	EP080	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
<b>Laboratory Control Samples (LCS)</b>								
TRH - Semivolatile Fraction	EP071	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH Volatiles/BTEX	EP080	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
<b>Method Blanks (MB)</b>								
TRH - Semivolatile Fraction	EP071	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH Volatiles/BTEX	EP080	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
<b>Matrix Spikes (MS)</b>								
TRH - Semivolatile Fraction	EP071	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH Volatiles/BTEX	EP080	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard	



Page : 5 of 5  
 Work Order : ES2019730  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 Diesel Spill Investigation - Berrimah Freight Terminal, East Arm, NT

## 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>
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260D. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.





SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2020384

Client	: GREENCAP-NAA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: ROBIN BIRUA	Contact	: Peter Ravlic
Address	: LEVEL 2, 11 KHARTOUM ROAD NORTH RYDE NSW 2190	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: robin.birua@greencap.com.au	E-mail	: peter.ravlic@alsglobal.com
Telephone	: +61 08 7906 1300	Telephone	: +6138549 9645
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: J168829 DIESEL SPILL INVESTIGATION - BERRIMAH FREIGHT TERMINAL, EAST ARM, NT	Page	: 1 of 2
Order number	: 275524	Quote number	: EP2018GRECAP0006 (EN/111/18 - Primary Work Only)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: EAST ARM, DARWIN, NT		
Sampler	:		

Dates

Date Samples Received	: 12-Jun-2020 12:50	Issue Date	: 12-Jun-2020
Client Requested Due Date	: 15-Jun-2020	Scheduled Reporting Date	: <b>15-Jun-2020</b>

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 17.3°C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 5 / 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
- **TAT to be confirmed.**
- **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.





**ALS** Environmental

## CERTIFICATE OF ANALYSIS

**Work Order** : **ES2020384** Page : 1 of 4  
**Client** : **GREENCAP-NAA PTY LTD** Laboratory : Environmental Division Sydney  
**Contact** : **ROBIN BIRUA** Contact : Peter Ravlic  
**Address** : **LEVEL 2, 11 KHARTOUM ROAD**  
**NORTH RYDE NSW 2190** Address : 277-289 Woodpark Road Smithfield NSW Australia 2164  
**Telephone** : **+61 08 7906 1300** Telephone : +6138549 9645  
**Project** : **J168829 DIESEL SPILL INVESTIGATION - BERRIMAH** Date Samples Received : 12-Jun-2020 12:50  
**Order number** : **FREIGHT TERMINAL, EAST ARM, NT** Date Analysis Commenced : 15-Jun-2020  
**C-O-C number** : **275524** Issue Date : 15-Jun-2020 15:39  
**Sampler** : **\*\*\*\*\***  
**Site** : **EAST ARM, DARWIN, NT**  
**Quote number** : **EN/11/18 - Primary Work Only**  
**No. of samples received** : **5**  
**No. of samples analysed** : **2**



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

### Signatories

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

Signatories	Position	Accreditation Category
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW



Page : 2 of 4  
Work Order : ES2020384  
Client : GREENCAP-NAA PTY LTD  
Project : J168829 DIESEL SPILL INVESTIGATION - BERRIMAH FREIGHT TERMINAL, EAST ARM, NT

### 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.



### Analytical Results

Compound	CAS Number	Client sample ID		Unit	Result	QA06	QA08	Result
		LOR	Client sampling date / time					
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>								
Moisture Content	----	0.1	%		6.3	19.2		
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	10	mg/kg		<10	<10		
C10 - C14 Fraction	----	50	mg/kg		<50	<50		
C15 - C28 Fraction	----	100	mg/kg		<100	<100		
C29 - C36 Fraction	----	100	mg/kg		<100	<100		
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50		
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10		
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10		
>C10 - C16 Fraction	----	50	mg/kg		<50	<50		
>C16 - C34 Fraction	----	100	mg/kg		<100	<100		
>C34 - C40 Fraction	----	100	mg/kg		<100	<100		
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50		
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50		
<b>EP080: BTEXN</b>								
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2		
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5		
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5		
meta- & para-Xylene	108-38-3	0.5	mg/kg		<0.5	<0.5		
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5		
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2		
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5		
Naphthalene	91-20-3	1	mg/kg		<1	<1		
<b>EP080S: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	0.2	%		103	99.9		
Toluene-D8	2037-26-5	0.2	%		108	108		
4-Bromofluorobenzene	460-00-4	0.2	%		114	109		



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Work Order : ES2020384  
Client : GREENCAP-NAA PTY LTD  
Project : J168829 DIESEL SPILL INVESTIGATION - BERRIMAH FREIGHT TERMINAL, EAST ARM, NT

### Surrogate Control Limits

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

DRAFT



QUALITY CONTROL REPORT

Work Order : ES2020384

Page : 1 of 4

Client : GREENCAP-NAA PTY LTD  
 Contact : ROBIN BIRUA  
 Address : LEVEL 2, 11 KHARTOUM ROAD  
 NORTH RYDE NSW 2190  
 Telephone : +61 08 7906 1300  
 Project : J168829 DIESEL SPILL INVESTIGATION - BERRIMAH  
 FREIGHT TERMINAL, EAST ARM, NT  
 Order number : 275524  
 C-O-C number : ----  
 Sampler : ----  
 Site : EAST ARM, DARWIN, NT  
 Quote number : EN/11/18 - Primary Work Only  
 No. of samples received : 5  
 No. of samples analysed : 2

Laboratory : Environmental Division Sydney  
 Contact : Peter Ravlic  
 Address : 277-289 Woodpark Road Smithfield NSW Australia 2164  
 Telephone : +6138549 9645  
 Date Samples Received : 12-Jun-2020  
 Date Analysis Commenced : 15-Jun-2020  
 Issue Date : 15-Jun-2020



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 Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW



Page : 2 of 4  
 Work Order : ES2020384  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 DIESEL SPILL INVESTIGATION - BERRIMAH FREIGHT TERMINAL, EAST ARM, NT

### 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

LOR = Limit of reporting

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

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	Client sample ID	Method/Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
<b>EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3077835)</b>									
ES2020384-003	QA06	EA055: Moisture Content	----	0.1	%	6.3	6.4	0.00	0% - 20%
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3077651)</b>									
ES2020384-003	QA06	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3077777)</b>									
ES2020384-003	QA06	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
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3077651)</b>									
ES2020384-003	QA06	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3077777)</b>									
ES2020384-003	QA06	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
<b>EP080: BTEXN (QC Lot: 3077651)</b>									
ES2020384-003	QA06	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



### 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 Concentration	Spike Recovery (%)	LCS	Low
<b>EP080/074: Total Petroleum Hydrocarbons (QCLot: 3077651)</b>									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	85.6	68.4	128	
<b>EP080/074: Total Petroleum Hydrocarbons (QCLot: 3077777)</b>									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	90.9	75.0	129	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	99.9	77.0	131	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	97.4	71.0	129	
<b>EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3077651)</b>									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	85.8	68.4	128	
<b>EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3077777)</b>									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	95.7	77.0	125	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	104	74.0	138	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	75.1	63.0	131	
<b>EP080: BTEXN (QCLot: 3077651)</b>									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	86.1	62.0	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	88.6	67.0	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	85.9	65.0	117	
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	87.6	66.0	118	
	106-42-3								
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	91.0	68.0	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	87.0	63.0	119	

### 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: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%)	MS	Recovery Limits (%)
				Low	High		
<b>EP080/074: Total Petroleum Hydrocarbons (QCLot: 3077651)</b>							
ES2020384-003	QA06	EP080: C6 - C9 Fraction	----	32.5 mg/kg	99.3	70.0	130
<b>EP080/074: Total Petroleum Hydrocarbons (QCLot: 3077777)</b>							
ES2020384-003	QA06	EP071: C10 - C14 Fraction	----	523 mg/kg	108	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	119	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	119	52.0	132



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 Work Order : ES2020384  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 DIESEL SPILL INVESTIGATION - BERRIMAH FREIGHT TERMINAL, EAST ARM, NT

Sub-Matrix: SOIL		Matrix Spike (MS) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3077651)						
ES2020384-003	QA06	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	99.8	70.0 - 130
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3077777)						
ES2020384-003	QA06	EP071: >C10 - C16 Fraction	----	860 mg/kg	112	73.0 - 137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	118	53.0 - 131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	111	52.0 - 132
EP080: BTEXN (QCLot: 3077651)						
ES2020384-003	QA06	EP080: Benzene	71-43-2	2.5 mg/kg	77.8	70.0 - 130
		EP080: Toluene	108-88-3	2.5 mg/kg	84.9	70.0 - 130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	83.9	70.0 - 130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	85.9	70.0 - 130
			106-42-3			
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	90.3	70.0 - 130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	82.0	70.0 - 130

Work Order : **ES2020384** Page : 1 of 4

Client : **GREENCAP-NAA PTY LTD** Laboratory : Environmental Division Sydney  
Contact : **ROBIN BIRUA** Telephone : **+6138549 9645**  
Project : **J168829 DIESEL SPILL INVESTIGATION - BERRIMAH FREIGHT** Date Samples Received : **12-Jun-2020**  
Site : **TERMINAL, EAST ARM, NT** Issue Date : **15-Jun-2020**  
Sampler : **----** No. of samples received : **5**  
Order number : **275524** No. of samples analysed : **2**

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

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

## Summary of Outliers

### Outliers : Quality Control Samples

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

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

### Outliers : Analysis Holding Time Compliance

- **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: **SOIL**

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

Method	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Date analysed	Due for analysis
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>					
Soil Glass Jar - Unpreserved (EA055) QA06	04-Jun-2020	----	----	15-Jun-2020	19-Jun-2020
Soil Glass Jar - Unpreserved (EA055) QA08	05-Jun-2020	----	----	15-Jun-2020	19-Jun-2020
<b>EP080/071: Total Petroleum Hydrocarbons</b>					
Soil Glass Jar - Unpreserved (EP080) QA06	04-Jun-2020	15-Jun-2020	19-Jun-2020	15-Jun-2020	19-Jun-2020
Soil Glass Jar - Unpreserved (EP080) QA08	05-Jun-2020	15-Jun-2020	19-Jun-2020	15-Jun-2020	19-Jun-2020
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>					
Soil Glass Jar - Unpreserved (EP080) QA06	04-Jun-2020	15-Jun-2020	19-Jun-2020	15-Jun-2020	19-Jun-2020
Soil Glass Jar - Unpreserved (EP080) QA08	05-Jun-2020	15-Jun-2020	19-Jun-2020	15-Jun-2020	19-Jun-2020
<b>EP080: BTEXN</b>					
Soil Glass Jar - Unpreserved (EP080) QA06	04-Jun-2020	15-Jun-2020	19-Jun-2020	15-Jun-2020	19-Jun-2020
Soil Glass Jar - Unpreserved (EP080) QA08	05-Jun-2020	15-Jun-2020	19-Jun-2020	15-Jun-2020	19-Jun-2020



## Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type	Method	Count			Rate (%)		Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<b>Laboratory Duplicates (DUP)</b>							
Moisture Content	EA055	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
TRH - Semivolatile Fraction	EP071	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
TRH - Semivolatile Fraction	EP071	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
TRH - Semivolatile Fraction	EP071	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Page : 4 of 4  
 Work Order : ES2020384  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 DIESEL SPILL INVESTIGATION - BERRIMAH FREIGHT TERMINAL, EAST ARM, NT

## 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 (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).	
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.	
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260D. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.	
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.	





SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2024223

Client	: GREENCAP-NAA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: STUART CARROLL	Contact	: Peter Ravlic
Address	: 11/14 Winnellie Road WINNELLIE NT, AUSTRALIA 0820	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: stuart.carroll@greencap.com.au	E-mail	: peter.ravlic@alsglobal.com
Telephone	: +61 08 8984 4244	Telephone	: +6138549 9645
Facsimile	: +61 08 8984 3105	Facsimile	: +61-2-8784 8500
Project	: J168829 One Rail Australia - Diesel Spill DSI	Page	: 1 of 2
Order number	: 276923	Quote number	: EM2018ADEENV0003 (EN/111/18 Primary Work Only)
C-O-C number	: 1	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Berrimah Freight Terminal. Export Dr. Berrimah NT		
Sampler	: STUART CARROLL		

Dates

Date Samples Received	: 21-Jul-2020 08:30	Issue Date	: 21-Jul-2020
Client Requested Due Date	: 28-Jul-2020	Scheduled Reporting Date	: <b>28-Jul-2020</b>

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 22.9
Receipt Detail	:	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** : **ES2024223** Page : 1 of 4  
**Client** : **GREENCAP-NAA PTY LTD** Laboratory : Environmental Division Sydney  
**Contact** : **STUART CARROLL** Contact : Peter Ravlic  
**Address** : **11/14 Winnellie Road** Address : 277-289 Woodpark Road Smithfield NSW Australia 2164  
**Telephone** : **WINNELLIE NT, AUSTRALIA 0820** Telephone : +6138549 9645  
**Project** : **+61 08 8984 4244** Date Samples Received : 21-Jul-2020 08:30  
**Order number** : **J168829 One Rail Australia - Diesel Spill DSI** Date Analysis Commenced : 22-Jul-2020  
**C-O-C number** : **276923** Issue Date : 28-Jul-2020 13:43  
**Sampler** : **1**  
**Site** : **STUART CARROLL**  
**Quote number** : **Berrimah Freight Terminal, Export Dr. Berrimah NT**  
**No. of samples received** : **1** Accreditation No. 825  
**No. of samples analysed** : **1** 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.

Signature	Position	Accreditation Category
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



Page : 2 of 4  
Work Order : ES2024223  
Client : GREENCAP-NAA PTY LTD  
Project : J168829 One Rail Australia - Diesel Spill DSI

### 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: 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		QA08
		LOR	Unit	
Sub-Matrix: SOIL (Matrix: SOIL)		Client sampling date / time		15-Jul-2020 00:00
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>		0.1	%	12.3
<b>EP080/071: Total Petroleum Hydrocarbons</b>				
C6 - C9 Fraction		10	mg/kg	<10
C10 - C14 Fraction		50	mg/kg	<50
C15 - C28 Fraction		100	mg/kg	<100
C29 - C36 Fraction		100	mg/kg	<100
^ C10 - C36 Fraction (sum)		50	mg/kg	<50
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>				
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	<100
>C34 - C40 Fraction		100	mg/kg	<100
^ >C10 - C40 Fraction (sum)		50	mg/kg	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)		50	mg/kg	<50
<b>EP080: BTEXN</b>				
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
<b>EP080S: TPH(V)/BTEX Surrogates</b>				
1,2-Dichloroethane-D4	17060-07-0	0.2	%	94.8
Toluene-D8	2037-26-5	0.2	%	106
4-Bromofluorobenzene	460-00-4	0.2	%	110



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Work Order : ES2024223  
Client : GREENCAP-NAA PTY LTD  
Project : J168829 One Rail Australia - Diesel Spill DSI

### Surrogate Control Limits

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

DRAFT



**Environmental**

## QUALITY CONTROL REPORT

Work Order : **ES2024223**

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 One Rail Australia – Diesel Spill DSI**  
 Order number : **276923**  
 C-O-C number : **1**  
 Sampler : **STUART CARROLL**  
 Site : **Berrimah Freight Terminal, Export Dr. Berrimah NT**  
 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 : **21-Jul-2020**  
 Date Analysis Commenced : **22-Jul-2020**  
 Issue Date : **28-Jul-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 Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



Page : 2 of 5  
 Work Order : ES2024223  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 One Rail Australia - Diesel Spill DSI

### 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	Client sample ID	Method/Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
<b>EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3162513)</b>									
EP2007478-038	Anonymous	EA055: Moisture Content	---	0.1	%	0.8	0.7	0.00	No Limit
ES2024831-001	Anonymous	EA055: Moisture Content	---	0.1	%	53.3	50.9	4.54	0% - 20%
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3152137)</b>									
ES2024970-001	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	170	210	19.8	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	210	200	5.40	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3154380)</b>									
ES2024037-001	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
ES2024978-001	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3152137)</b>									
ES2024970-001	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	330	340	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	170	150	13.2	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3154380)</b>									
ES2024037-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES2024978-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080: BTEXN (QC Lot: 3154380)</b>									
ES2024037-001	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



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 Work Order : ES2024223  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 One Rail Australia - Diesel Spill DSI

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
<b>EP080: BTEXN (QC Lot: 3154380) - continued</b>									
ES2024978-001	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	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit



Page : 4 of 5  
 Work Order : ES2024223  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 One Rail Australia - Diesel Spill DSI

### 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 Concentration	Spike Recovery (%)	LCS	Low
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3152137)</b>									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	96.1	75.0	129	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	99.3	77.0	131	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	92.2	71.0	129	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3154380)</b>									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	109	68.4	128	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3152137)</b>									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	98.1	77.0	125	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	99.3	74.0	138	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	83.2	63.0	131	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3154380)</b>									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	107	68.4	128	
<b>EP080: BTEXN (QCLot: 3154380)</b>									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	103	62.0	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	105	67.0	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	105	65.0	117	
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	104	66.0	118	
	106-42-3								
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	107	68.0	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	106	63.0	119	

### 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: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	Matrix Spike (MS) Report			
			Spike Concentration	Spike Recovery (%)	MS	Recovery Limits (%)
		CAS Number	Concentration	MS	Low	High
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3152137)</b>						
ES2024970-001	Anonymous	----	523 mg/kg	104	73.0	137
		----	2319 mg/kg	105	53.0	131
		----	1714 mg/kg	99.8	52.0	132
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3154380)</b>						
ES2024037-001	Anonymous	----	32.5 mg/kg	112	70.0	130



Page : 5 of 5  
 Work Order : ES2024223  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 One Rail Australia - Diesel Spill DSI

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%)	Recovery Limits (%)
<b>EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3152137)</b>						
ES2024970-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	103	73.0
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	103	53.0
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	92.1	52.0
<b>EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3154380)</b>						
ES2024037-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	110	70.0
<b>EP080: BTEXN (QCLot: 3154380)</b>						
ES2024037-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	101	70.0
		EP080: Toluene	108-88-3	2.5 mg/kg	103	70.0
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	104	70.0
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	101	70.0
			106-42-3			
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	102	70.0
		EP080: Naphthalene	91-20-3	2.5 mg/kg	97.3	70.0



**Environmental**

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2024223	Page	: 1 of 4
Client	: GRENCAP-NAA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: STUART CARROLL	Telephone	: +6138549 9645
Project	: J168829 One Rail Australia - Diesel Spill DSI	Date Samples Received	: 21-Jul-2020
Site	: Berrimah Freight Terminal. Export Dr. Berrimah NT	Issue Date	: 28-Jul-2020
Sampler	: STUART CARROLL	No. of samples received	: 1
Order number	: 276923	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: **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
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>					
Soil Glass Jar - Unpreserved (EA055) QA08	15-Jul-2020	----	----	27-Jul-2020	29-Jul-2020
<b>EP080/071: Total Petroleum Hydrocarbons</b>					
<b>Soil Glass Jar - Unpreserved (EP071)</b>					
QA08	15-Jul-2020	22-Jul-2020	29-Jul-2020	22-Jul-2020	31-Aug-2020
Soil Glass Jar - Unpreserved (EP080) QA08	15-Jul-2020	22-Jul-2020	29-Jul-2020	23-Jul-2020	29-Jul-2020
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>					
<b>Soil Glass Jar - Unpreserved (EP071)</b>					
QA08	15-Jul-2020	22-Jul-2020	29-Jul-2020	22-Jul-2020	31-Aug-2020
Soil Glass Jar - Unpreserved (EP080) QA08	15-Jul-2020	22-Jul-2020	29-Jul-2020	23-Jul-2020	29-Jul-2020
<b>EP080: BTEXN</b>					
<b>Soil Glass Jar - Unpreserved (EP080)</b>					
QA08	15-Jul-2020	22-Jul-2020	29-Jul-2020	23-Jul-2020	29-Jul-2020



## Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type Analytical Methods	Method	Count			Rate (%)		Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<b>Laboratory Duplicates (DUP)</b>							
Moisture Content	EA055	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	EP071	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
TRH - Semivolatle Fraction	EP071	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
TRH - Semivolatle Fraction	EP071	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
TRH - Semivolatle Fraction	EP071	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Page : 4 of 4  
Work Order : ES2024223  
Client : GREENCAP-NAA PTY LTD  
Project : J168829 One Rail Australia - Diesel Spill DSI

## 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>
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).	
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.	
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260D. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.	
<i>Preparation Methods</i>		<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.	

J.J.L.

# CHAIN OF CUSTODY



**CLIENT:** Greencap  
**OFFICE:** Darwin  
**PROJECT:** ORA Diesel Spill  
**ORDER NUMBER:** PROJECT NO J168829 ALS QUOTE NO:  
**PROJECT MANAGER:** Stuart Carroll  
**SAMPLER:** Stuart Carroll  
**COC Emailed to ALS?** ( YES / NO )  
**RELINQUISHED BY:** Stuart Carroll  
**DATE/TIME:** 31/8/20  
**RECEIVED BY:** [Signature]  
**DATE/TIME:** 31/08/20

**TURNAROUND REQUIREMENTS:**  
 Standard TAT (List due date):  
 Non Standard or urgent TAT (List due date):  
**CONTACT PH:** 0466 776 038  
**SAMPLER MOBILE:**  
**EDD FORMAT (or default):** stuart.carroll@greencap.com.au  
**Email Reports to (will default to PM if no other addresses are listed):** stuart.carroll@greencap.com.au  
**Email Invoice to (will default to PM if no other addresses are listed):** ap@greencap.com.au

**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:** °C  
**Other comment:** 0/25 17/4  
**RECEIVED BY:** [Signature]  
**DATE/TIME:** 2/9/20 8:30am

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 Verbs are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).	Additional Information
1	QA02	24/08/2020	Soil	Glass Jar	1	Suite 2 X	
2	QA04	25/08/2020	Soil	Glass Jar	1	X	
3	QA06	26/08/2020	Soil	Glass Jar	1	X	
					<b>TOTAL</b>		

**COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:**

**LAB OF ORIGIN:** DARWIN

**Environmental Division**  
**Sydney**  
**Work Order Reference**  
**ES2030455**

LABORATORY: 61-2-8794 8654

**Water Container Codes:** P = Unpreserved Plastic; N = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd 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 Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solids; B = Unpreserved Bag; L = Lugol's Iodine Preserved Bottle; STT = Sterile Sodium Thiosulfate Preserved Bottle.

Form Page 1 of 1  
 Approved Date: 06/02/14



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2030455

Client : GREENCAP-NAA PTY LTD
Contact : STUART CARROLL
Address : 11/14 Winnellie Road WINNELLIE NT, AUSTRALIA 0820
Laboratory : Environmental Division Sydney
Contact : Shane Ellis
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail : stuart.carroll@greencap.com.au
E-mail : Shane.Ellis@ALSGlobal.com
Telephone : +61 08 8984 4244
Telephone : +61 2 8784 8555
Facsimile : +61 08 8984 3105
Facsimile : +61-2-8784 8500
Project : J168829 ORA Diesel Spill
Page : 1 of 2
Order number : 278158
Quote number : ES2020ADEENV0001 (EN/222)
C-O-C number : 1
QC Level : NEPM 2013 B3 & ALS QC Standard
Site : ----
Sampler : STUART CARROLL

Dates

Date Samples Received : 02-Sep-2020 08:30
Issue Date : 02-Sep-2020
Client Requested Due Date : 09-Sep-2020
Scheduled Reporting Date : 09-Sep-2020

Delivery Details

Mode of Delivery : Client Drop Off
Security Seal : Not Available
No. of coolers/boxes : ----
Temperature : 17.4
Receipt Detail :
No. of samples received / analysed : 3 / 3

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**

## QUALITY CONTROL REPORT

Work Order : **ES2030455**

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 ORA Diesel Spill**  
Order number : **278158**  
C-O-C number : **1**  
Sampler : **STUART CARROLL**  
Site : **----**  
Quote number : **EN/222**  
No. of samples received : **3**  
No. of samples analysed : **3**

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

Telephone : **+61 2 8784 8555**  
Date Samples Received : **02-Sep-2020**  
Date Analysis Commenced : **03-Sep-2020**  
Issue Date : **08-Sep-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
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



Page : 2 of 5  
 Work Order : ES2030455  
 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 : Anonymus = 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	Client sample ID	Method/Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
<b>EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3243068)</b>									
ES2030455-001	QA02	EA055: Moisture Content	----	0.1	%	5.4	5.6	3.37	0% - 20%
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3234926)</b>									
ES2030654-001	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
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3235820)</b>									
ES2030093-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES2030654-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3234926)</b>									
ES2030654-001	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
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3235820)</b>									
ES2030093-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES2030654-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080: BTEXN (QC Lot: 3235820)</b>									
ES2030093-001	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
ES2030654-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit



Page : 3 of 5  
 Work Order : ES2030455  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 ORA Diesel Spill

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
EP080: BTEXN (QC Lot: 3235820) - continued							Original Result	Duplicate Result	RPD (%)	
ES2030654-001	Anonymous		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	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	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: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Concentration	Spike Concentration	Spike Recovery (%)	LCS	Low
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3234926)</b>									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	100	75.0	129	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	104	77.0	131	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	100	71.0	129	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3235820)</b>									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	92.9	68.4	128	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3234926)</b>									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	98.7	77.0	125	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	106	74.0	138	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	81.6	63.0	131	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3235820)</b>									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	91.5	68.4	128	
<b>EP080: BTEXN (QCLot: 3235820)</b>									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	98.6	62.0	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	95.6	67.0	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	95.4	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	98.9	68.0	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	91.1	63.0	119	

### 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: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)	
			Low	High			
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3234926)</b>							
ES2030654-001	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	93.1	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	93.4	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	121	52.0	132
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3235820)</b>							
ES2030093-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	106	70.0	130



Page : 5 of 5  
 Work Order : ES2030455  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 ORA Diesel Spill

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%)	Recovery Limits (%)
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3234926)</b>						
ES2030654-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	103	73.0
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	104	53.0
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	105	52.0
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3235820)</b>						
ES2030093-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	104	70.0
<b>EP080: BTEXN (QCLot: 3235820)</b>						
ES2030093-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	98.3	70.0
		EP080: Toluene	108-88-3	2.5 mg/kg	97.9	70.0
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	99.4	70.0
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	97.8	70.0
			106-42-3			
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	100	70.0
		EP080: Naphthalene	91-20-3	2.5 mg/kg	90.3	70.0



Work Order	: ES2030455	Page	: 1 of 5
Client	: GRENCAP-NAA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: STUART CARROLL	Telephone	: +61 2 8784 8555
Project	: J168829 ORA Diesel Spill	Date Samples Received	: 02-Sep-2020
Site	: ----	Issue Date	: 08-Sep-2020
Sampler	: STUART CARROLL	No. of samples received	: 3
Order number	: 278158	No. of samples analysed	: 3

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: 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
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>					
Soil Glass Jar - Unpreserved (EA055) QA02	24-Aug-2020	----	----	07-Sep-2020	07-Sep-2020
Soil Glass Jar - Unpreserved (EA055) QA04	25-Aug-2020	----	----	07-Sep-2020	08-Sep-2020
Soil Glass Jar - Unpreserved (EA055) QA06	26-Aug-2020	----	----	07-Sep-2020	09-Sep-2020
<b>EP080/071: Total Petroleum Hydrocarbons</b>					
Soil Glass Jar - Unpreserved (EP080) QA02	24-Aug-2020	03-Sep-2020	07-Sep-2020	03-Sep-2020	07-Sep-2020
Soil Glass Jar - Unpreserved (EP071) QA02	24-Aug-2020	03-Sep-2020	07-Sep-2020	04-Sep-2020	13-Oct-2020
Soil Glass Jar - Unpreserved (EP080) QA04	25-Aug-2020	03-Sep-2020	08-Sep-2020	03-Sep-2020	08-Sep-2020
Soil Glass Jar - Unpreserved (EP071) QA04	25-Aug-2020	03-Sep-2020	08-Sep-2020	04-Sep-2020	13-Oct-2020
Soil Glass Jar - Unpreserved (EP080) QA06	26-Aug-2020	03-Sep-2020	09-Sep-2020	03-Sep-2020	09-Sep-2020
Soil Glass Jar - Unpreserved (EP071) QA06	26-Aug-2020	03-Sep-2020	09-Sep-2020	04-Sep-2020	13-Oct-2020
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>					
Soil Glass Jar - Unpreserved (EP080) QA02	24-Aug-2020	03-Sep-2020	07-Sep-2020	03-Sep-2020	07-Sep-2020
Soil Glass Jar - Unpreserved (EP071) QA02	24-Aug-2020	03-Sep-2020	07-Sep-2020	04-Sep-2020	13-Oct-2020
Soil Glass Jar - Unpreserved (EP080) QA04	25-Aug-2020	03-Sep-2020	08-Sep-2020	03-Sep-2020	08-Sep-2020
Soil Glass Jar - Unpreserved (EP071) QA04	25-Aug-2020	03-Sep-2020	08-Sep-2020	04-Sep-2020	13-Oct-2020
Soil Glass Jar - Unpreserved (EP080) QA06	26-Aug-2020	03-Sep-2020	09-Sep-2020	03-Sep-2020	09-Sep-2020
Soil Glass Jar - Unpreserved (EP071) QA06	26-Aug-2020	03-Sep-2020	09-Sep-2020	04-Sep-2020	13-Oct-2020



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

Method	Sample Date	Extraction / Preparation		Analysis					
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
<b>EP080: BTEXN</b>									
Soil Glass Jar - Unpreserved (EP080) QA02	24-Aug-2020	03-Sep-2020	07-Sep-2020	✓	03-Sep-2020	07-Sep-2020	✓		
Soil Glass Jar - Unpreserved (EP080) QA04	25-Aug-2020	03-Sep-2020	08-Sep-2020	✓	03-Sep-2020	08-Sep-2020	✓		
Soil Glass Jar - Unpreserved (EP080) QA06	26-Aug-2020	03-Sep-2020	09-Sep-2020	✓	03-Sep-2020	09-Sep-2020	✓		

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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	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
<b>Laboratory Duplicates (DUP)</b>							
Moisture Content	EA055	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
TRH - Semivolatile Fraction	EP071	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
TRH - Semivolatile Fraction	EP071	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
TRH - Semivolatile Fraction	EP071	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Page : 5 of 5  
Work Order : ES2030455  
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>
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 - Semivolatile 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.	
<i>Preparation Methods</i>		<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.	



**Environmental**

## CERTIFICATE OF ANALYSIS

**Work Order** : **ES2030455** **Page** : 1 of 4  
**Client** : **GREENCAP-NAA PTY LTD** **Laboratory** : Environmental Division Sydney  
**Contact** : **STUART CARROLL** **Contact** : **Shane Ellis**  
**Address** : **11/14 Winnellie Road** **Address** : **277-289 Woodpark Road Smithfield NSW Australia 2164**  
**Telephone** : **WINNELLIE NT, AUSTRALIA 0820** **Telephone** : **+61 2 8784 8555**  
**Project** : **J168829 ORA Diesel Spill** **Date Samples Received** : **02-Sep-2020 08:30**  
**Order number** : **278158** **Date Analysis Commenced** : **03-Sep-2020**  
**C-O-C number** : **1** **Issue Date** : **08-Sep-2020 14:22**  
**Sampler** : **STUART CARROLL**  
**Site** : **----**  
**Quote number** : **EN/222**  
**No. of samples received** : **3**  
**No. of samples analysed** : **3**



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
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



Page : 2 of 4  
Work Order : ES2030455  
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.

● EP071: Results of sample QA02 have been confirmed by re-extraction and re-analysis.



### Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			
	CAS Number	LOR	Unit	Client sampling date / time
Compound				
EA055: Moisture Content (Dried @ 105-110°C)		0.1	%	24-Aug-2020 00:00 ES2030455-001 Result 5.4
Moisture Content				25-Aug-2020 00:00 ES2030455-002 Result 7.4
EA055: Moisture Content (Dried @ 105-110°C)				26-Aug-2020 00:00 ES2030455-003 Result 10.6
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	120
C29 - C36 Fraction		100	mg/kg	<100
^ C10 - C36 Fraction (sum)		50	mg/kg	120
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	<100
>C34 - C40 Fraction		100	mg/kg	<100
^ >C10 - C40 Fraction (sum)		50	mg/kg	<50
^ >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	%	100
Toluene-D8	2037-26-5	0.2	%	100.0
4-Bromofluorobenzene	460-00-4	0.2	%	100
				107
				93.9
				100.0
				98.6
				96.0
				99.8



Page : 4 of 4  
Work Order : ES2030455  
Client : GREENCAP-NAA PTY LTD  
Project : J168829 ORA Diesel Spill

### Surrogate Control Limits

Sub-Matrix: SOIL	
Compound	CAS Number
<b>EP080S: TPH(V)/BTEX Surrogates</b>	
1,2-Dichloroethane-D4	17060-07-0
Toluene-D8	2037-26-5
4-Bromofluorobenzene	460-00-4

Recovery Limits (%)	
Low	High
73	133
74	132
72	130

FOR REVIEW

Oil 10.20



**CHAIN OF CUSTODY**  
ALS Laboratory, please tick →

**CLIENT: Greencap**  
**OFFICE: Darwin**  
**PROJECT: ORA Diesel Spill**  
**ORDER NUMBER:**  
**PROJECT MANAGER: Stuart Carroll**  
**SAMPLER: Stuart Carroll**  
**COC Emailled to ALS? ( YES / NO )**  
**Email Reports to (will default to PM if no other addresses are listed): stuart.carroll@greencap.com.au**  
**Email Invoice to (will default to PM if no other addresses are listed): ap@greencap.com.au**

**TURNAROUND REQUIREMENTS:**  Standard TAT (List due date):  Non Standard or urgent TAT (List due date):  
 (Standard TAT may be longer for some tests e.g. Ultra Traces Organics)  
**PROJECT NO** J168829 **ALS QUOTE NO.:**  
**PURCHASE ORDER NO.:** 278865 **COUNTRY OF ORIGIN:**  
**CONTACT PH:** 0466 776 038  
**SAMPLER MOBILE:**  
**EDD FORMAT (or default):**  
**RECEIVED BY:** Stuart Carroll **DATE/TIME:** 23/09/20  
**RELINQUISHED BY:** Kim **DATE/TIME:** 24.09.20 8:00am

**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: 18.2 °C  
 Other comment: 0.25 18.2

**COG SEQUENCE NUMBER (Circle)**  
 coc: 1 2 3 4 5 6 7  
 OF: 1 2 3 4 5 6 7

**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 (filtered bottle required).

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)	CONTAINER INFORMATION	Additional Information
1	QA08	23/09/2020	Soil	Glass Jar	1	X Suite S4		
2	QA10	23/09/2020	Soil	Glass Jar	1	X		
					<b>TOTAL</b>			

**COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:**

**LAB OF ORIGIN:** DARWIN

**Environmental Division**  
 Sydney  
 Work Order Reference  
**ES2033271**

Telephone: 01-2-8784 8657

**Water Container Codes:** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = 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 Amber Glass; H = HCl preserved Amber Glass; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; U = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY



PROJECT NO.: A1R305D  
 PROJECT NAME: BP SORRENTO  
 DATE NEEDED BY:  
 PHONE: Sydney: 02 8245 0300 | Melbourne: 03 9372 6600 | Adelaide: 08 8431 7113 | Perth: 08 9488 0100 | Brisbane: 07 3181 5738  
 SEND REPORT & INVOICE TO: (1) admin@jbsg.com.au; (2) ~~admin@jbsg.com.au~~; (3) ~~admin@jbsg.com.au~~  
 COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	TRH/BTEXN	PAHS	VOCs/SVOC	MTBE	Metals	NOTES
01 0C07	S	21/9/20		1 jar		X	X	X	X	X	ATS Sydney
02 0C08	S	21/9/20				X	X	X	X	X	ATS Sydney
03 0C09	S	21/9/20				X	X	X	X	X	ATS Sydney
04 TBS 214	↑	10/9/20				X	X	X	X	X	
05 TBS 215	↑	10/9/20				X	X	X	X	X	
06 0C10	W	21/9/20		3 bottles		X	X	X	X	X	

RELINQUISHED BY: NAME: Brian Hoque DATE: 21/9/20  
 METHOD OF SHIPMENT: TRANSPORT CO: JBS&G  
 CONSIGNMENT NOTE NO.:  
 RECEIVED BY: NAME: [Signature] DATE: 21/9/20  
 METHOD OF SHIPMENT: TRANSPORT CO: JBS&G  
 CONSIGNMENT NOTE NO.:  
 COOLER SEAL - Yes/No: [ ] Intact/ [ ] Broken  
 COOLER TEMP: [ ] deg C  
 COOLER SEAL - Yes/No: [ ] Intact/ [ ] Broken  
 COOLER TEMP: [ ] deg C

Environmental Division  
 Sydney  
 Work Order Reference  
**ES2033271**  
 Telephone : + 61 2-8794 8656

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Presv; C = Sodium Hydroxide Presv; VC = Hydrochloric Acid Presv; VMS = Sulfuric Acid Presv; VMS = Sulfuric Acid Presv; VMS = Sulfuric Acid Presv; Z = Zinc Presv; E = EDTA Presv; ST = Sterile Bottle; O = Other  
 JMSO Form 013 - Chain of Custody - Generic

## Matthew Westwell

---

**From:** Matthew Westwell on behalf of Samples Perth  
**Sent:** Tuesday, 22 September 2020 8:58 AM  
**To:** Mia Burkett; Samples Perth  
**Subject:** RE: [EXTERNAL] - COC for BP Sorrento

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Mia,


I'm logging this project in now and we've gone ahead with our standard 8 metals(As, Cd, Cr, Cu, Pb, Ni, Zn, Hg) for all samples with 'metals' requested.

Please contact us if you have any queries. Your ALS work order number is EP2010103.

Kind Regards,

**Matthew Westwell**  
Creation/Commitals Officer  
Environmental

[EnviroMail™ 123 Re-Release – Leaching Environmental Assessment Framework](#)

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Right Solutions - Right Partner  
[www.alsglobal.com](http://www.alsglobal.com)

**From:** Mia Burkett [mailto:MBurkett@jbsg.com.au]  
**Sent:** Monday, 21 September 2020 4:33 PM  
**To:** Samples Perth <Samples.Perth@ALSGlobal.com>  
**Subject:** [EXTERNAL] - COC for BP Sorrento

**CAUTION:** This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi,

Brian Hague delivered an esky this afternoon – please see attached COC for the samples.

Thanks  
Mia

JBS&G



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2033271

Client	: GREENCAP-NAA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: STUART CARROLL	Contact	: Shane Ellis
Address	: 11/14 Winnellie Road WINNELLIE NT, AUSTRALIA 0820	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: stuart.carroll@greencap.com.au	E-mail	: Shane.Ellis@ALSGlobal.com
Telephone	: +61 08 8984 4244	Telephone	: +61 2 8784 8555
Facsimile	: +61 08 8984 3105	Facsimile	: +61-2-8784 8500
Project	: J168829 ORA Diesel Spill	Page	: 1 of 2
Order number	: 278865	Quote number	: ES2020ADEENV0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: STUART CARROLL		

Dates

Date Samples Received	: 24-Sep-2020 08:00	Issue Date	: 24-Sep-2020
Client Requested Due Date	: 01-Oct-2020	Scheduled Reporting Date	: <b>01-Oct-2020</b>

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 18.2
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.





**Environmental**

## QUALITY CONTROL REPORT

Work Order : **ES2033271**

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 ORA Diesel Spill**  
Order number : **278865**  
C-O-C number : **----**  
Sampler : **STUART CARROLL**  
Site : **----**  
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 : **24-Sep-2020**  
Date Analysis Commenced : **28-Sep-2020**  
Issue Date : **01-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 Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



Page : 2 of 5  
 Work Order : ES2033271  
 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	Client sample ID	Method/Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
<b>EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3283444)</b>									
ES2032549-008	Anonymous	EA055: Moisture Content	---	0.1	%	3.6	4.0	10.8	No Limit
ES2033315-016	Anonymous	EA055: Moisture Content	---	0.1	%	3.8	4.2	8.45	0% - 20%
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3275499)</b>									
ES2033643-012	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
		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
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3279192)</b>									
ES2033271-001	QA08	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
ES2033678-009	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3275499)</b>									
ES2033643-012	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
		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
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3279192)</b>									
ES2033271-001	QA08	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES2033678-009	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080: BTEXN (QC Lot: 3279192)</b>									
ES2033271-001	QA08	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	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 Concentration	Spike Recovery (%)	LCS	Low
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3275499)</b>									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	97.5	75.0	129	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	96.4	77.0	131	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	94.0	71.0	129	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3279192)</b>									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	111	68.4	128	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3275499)</b>									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	95.5	77.0	125	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	95.3	74.0	138	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	84.2	63.0	131	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3279192)</b>									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	114	68.4	128	
<b>EP080: BTEXN (QCLot: 3279192)</b>									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	101	62.0	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	96.1	67.0	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	100	65.0	117	
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	100	66.0	118	
	106-42-3								
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	98.7	68.0	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	89.8	63.0	119	

### 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: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%)	MS	Recovery Limits (%)
				Low	High		
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3275499)</b>							
ES2033599-007	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	94.6	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	73.9	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	60.7	52.0	132
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3279192)</b>							
ES2033271-001	QA08	EP080: C6 - C9 Fraction	----	32.5 mg/kg	115	70.0	130



Page : 5 of 5  
 Work Order : ES2033271  
 Client : GREENCAP-NAA PTY LTD  
 Project : J168829 ORA Diesel Spill

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%)	Recovery Limits (%)
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3275499)</b>						
ES2033599-007	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	99.1	73.0
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	65.9	53.0
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	54.2	52.0
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3279192)</b>						
ES2033271-001	QA08	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	114	70.0
<b>EP080: BTEXN (QCLot: 3279192)</b>						
ES2033271-001	QA08	EP080: Benzene	71-43-2	2.5 mg/kg	95.2	70.0
		EP080: Toluene	108-88-3	2.5 mg/kg	91.4	70.0
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	97.2	70.0
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	93.5	70.0
		EP080: ortho-Xylene	106-42-3	2.5 mg/kg	96.1	70.0
		EP080: Naphthalene	95-47-6	2.5 mg/kg	80.1	70.0
			91-20-3	2.5 mg/kg		130



**ALS** Environmental

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2033271	Page	: 1 of 4
Client	: GREENCAP-NAA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: STUART CARROLL	Telephone	: +61 2 8784 8555
Project	: J168829 ORA Diesel Spill	Date Samples Received	: 24-Sep-2020
Site	: ----	Issue Date	: 01-Oct-2020
Sampler	: STUART CARROLL	No. of samples received	: 2
Order number	: 278865	No. of samples analysed	: 2

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

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

### Summary of Outliers

#### Outliers : Quality Control Samples

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

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

#### Outliers : Analysis Holding Time Compliance

- **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: **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
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>						
Soil Glass Jar - Unpreserved (EA055) QA08,	23-Sep-2020	----	29-Sep-2020	07-Oct-2020	---	✓
<b>EP080/071: Total Petroleum Hydrocarbons</b>						
Soil Glass Jar - Unpreserved (EP071) QA08,	23-Sep-2020	07-Oct-2020	28-Sep-2020	07-Nov-2020	✓	✓
Soil Glass Jar - Unpreserved (EP080) QA08,	23-Sep-2020	07-Oct-2020	30-Sep-2020	07-Oct-2020	✓	✓
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>						
Soil Glass Jar - Unpreserved (EP071) QA08,	23-Sep-2020	07-Oct-2020	28-Sep-2020	07-Nov-2020	✓	✓
Soil Glass Jar - Unpreserved (EP080) QA08,	23-Sep-2020	07-Oct-2020	30-Sep-2020	07-Oct-2020	✓	✓
<b>EP080: BTEXN</b>						
Soil Glass Jar - Unpreserved (EP080) QA08,	23-Sep-2020	07-Oct-2020	30-Sep-2020	07-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: **SOIL**

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

Quality Control Sample Type	Method	Count			Rate (%)		Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<b>Laboratory Duplicates (DUP)</b>							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Page : 4 of 4  
 Work Order : ES2033271  
 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>
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 - Semivolatile 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.
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.



**Environmental**

## CERTIFICATE OF ANALYSIS

**Work Order** : **ES2033271**  
**Client** : **GREENCAP-NAA PTY LTD**  
**Contact** : **STUART CARROLL**  
**Address** : **11/14 Winnellie Road**  
**WINNELLIE NT, AUSTRALIA 0820**  
**Telephone** : **+61 08 8984 4244**  
**Project** : **J168829 ORA Diesel Spill**  
**Order number** : **278865**  
**C-O-C number** : **----**  
**Sampler** : **STUART CARROLL**  
**Site** : **----**  
**Quote number** : **EN/222**  
**No. of samples received** : **2**  
**No. of samples analysed** : **2**

**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** : **24-Sep-2020 08:00**  
**Date Analysis Commenced** : **28-Sep-2020**  
**Issue Date** : **01-Oct-2020 12:31**



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 Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



Page : 2 of 4  
Work Order : ES2033271  
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.
- EP071: Results of sample QA08 have been confirmed by re-extraction and re-analysis.



### Analytical Results

Compound	CAS Number	Client sample ID		Unit	Result	QA08	QA10	Result
		LOR	Client sampling date / time					
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>								
Moisture Content	----	0.1	%		10.9	2.4		
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	10	mg/kg		<10	<10		
C10 - C14 Fraction	----	50	mg/kg		250	<50		
C15 - C28 Fraction	----	100	mg/kg		780	<100		
C29 - C36 Fraction	----	100	mg/kg		<100	<100		
^ C10 - C36 Fraction (sum)	----	50	mg/kg		1030	<50		
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10		
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10		
>C10 - C16 Fraction	----	50	mg/kg		510	<50		
>C16 - C34 Fraction	----	100	mg/kg		520	<100		
>C34 - C40 Fraction	----	100	mg/kg		<100	<100		
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		1030	<50		
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		510	<50		
<b>EP080: BTEXN</b>								
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2		
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5		
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5		
meta- & para-Xylene	108-38-3	0.5	mg/kg		<0.5	<0.5		
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5		
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2		
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5		
Naphthalene	91-20-3	1	mg/kg		<1	<1		
<b>EP080S: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	0.2	%		102	99.5		
Toluene-D8	2037-26-5	0.2	%		107	106		
4-Bromofluorobenzene	460-00-4	0.2	%		108	109		



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Work Order : ES2033271  
Client : GREENCAP-NAA PTY LTD  
Project : J168829 ORA Diesel Spill

### Surrogate Control Limits

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

DRAFT

Chartered Chemists

19-Oct-2020

Greencap

11/14 Winnellie Rd  
Winnellie

NT 0820

Attention: Stuart Carroll

**REPORT NUMBER: M202325**

Site/Client Ref: J168829

Order No: 278094

## CERTIFICATE OF ANALYSIS

**SAMPLES:**

Three samples were received for analysis

**DATE RECEIVED:**

28-Aug-2020

**DATE COMMENCED:**

28-Aug-2020

**METHODS:**

See Attached Results

**RESULTS:**

Please refer to attached pages for results.

Note: Results are based on samples as received at SGS laboratories

**REPORTED BY:**



**Adam Atkinson**

Australian Chemistry Manager

# ANALYTICAL RESULTS

**Matrix: Soil**

**Method: MA-30.SL.05 TPH (C6-C36) / TRH (NEPM C6-C40)**

Sample units are expressed in mg/kg on a dry weight basis unless otherwise stated

Test Started: 15/09/2020

Analyte Name	Sampled Date	PQL	Leeder ID	2020034268	2020034269	2020034270
			Client ID	1 RD	AUX RD	RAMP RD
>C10-C40	27/08/2020	20		5900	4700	5000
			TPH>C10-C40			

**Matrix: Soil**

**Method: Leaching Report Information**

Units as Listed

Test Started: 15/09/2020

Analyte Name	Sampled Date	PQL	Leeder ID	2020035266
			Client ID	1 RD T01
Mass of Column Packing	N/A			200
Volume of Fluid Collected	N/A			40
Leaching Start Date	N/A			15/09/2020
Collection Date	N/A			15/09/2020

**Matrix: Soil**

**Method: Leaching Report Information**

Units as Listed

Test Started: 15/09/2020

Analyte Name	Sampled Date	PQL	Leeder ID	2020035267	2020035268	2020035269	2020035270	2020035271
			Client ID	1 RD T02-T05	1 RD T06-T09	AUX RD T01	AUX RD T02-T05	AUX RD T06-T09
Mass of Column Packing	N/A			200	200	200	200	200
Volume of Fluid Collected	N/A			360	1600	40	360	1600
Leaching Start Date	N/A			15/09/2020	17/09/2020	30/09/2020	30/09/2020	02/10/2020
Collection Date	N/A			17/09/2020	26/09/2020	30/09/2020	02/10/2020	11/10/2020

## ANALYTICAL RESULTS

**Matrix: Soil**  
**Method: Leaching Report Information**  
 Units as Listed

Test Started: 15/09/2020

Analyte Name	Sampled Date	Leader ID	2020035272	2020035273	2020035274
		Client ID	RAMP RD T01	RAMP RD T02-T05	RAMP RD T06-T09
Mass of Column Packing	N/A		200	200	200
Volume of Fluid Collected	N/A		40	360	1600
Leaching Start Date	N/A		02/10/2020	02/10/2020	04/10/2020
Collection Date	N/A		02/10/2020	04/10/2020	13/10/2020

**Matrix: Soil**  
**Method: USEPA 1314 TCLP / MA-30 Total Petroleum Hydrocarbons**  
 Sample units are expressed in mg/L

Test Started: 15/09/2020

Analyte Name	Sampled Date	Leader ID	2020035266
		Client ID	1 RD T01
>C10-C40	TPH>C10_C40	0.01	3.8

**Matrix: Soil**  
**Method: USEPA 1314 TCLP / MA-30 Total Petroleum Hydrocarbons**  
 Sample units are expressed in mg/L

Test Started: 15/09/2020

Analyte Name	Sampled Date	Leader ID	2020035267	2020035268	2020035269	2020035270	2020035271
		Client ID	1 RD T02-T05	1 RD T06-T09	AUX RD T01	AUX RD T02-T05	AUX RD T06-T09
>C10-C40	TPH>C10_C40	0.01	3.9	0.77	72	24	4.6

**Matrix: Soil**  
**Method: USEPA 1314 TCLP / MA-30 Total Petroleum Hydrocarbons**  
 Sample units are expressed in mg/L

Test Started: 15/09/2020

Analyte Name	Sampled Date	Leader ID	2020035272	2020035273	2020035274	2020035275
		Client ID	RAMP RD T01	RAMP RD T02-T05	RAMP RD T06-T09	Method TCLP TPH
>C10-C40	TPH>C10_C40	0.01	0.48	0.30	0.30	nd

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## QUALIFIERS / NOTES FOR REPORTED RESULTS

PQL	Practical Quantitation Limit
nd	Not Detected – The analyte was not detected above the reported PQL.
is	Insufficient Sample to perform this analysis.
T	Tentative identification based on computer library search of mass spectra.
NC	Not calculated and/or Results below PQL
NV	No Vacuum, Canister received above standard atmospheric pressure
nr	Not Requested for analysis.
R	Rejected Result – results for this analysis failed QC checks.
SQ	Semi-Quantitative result – quantitation based on a generic response factor for this class of analyte.
IM	Inappropriate method of analysis for this compound
U	Unable to provide Quality Control data – high levels of compounds in sample interfered with analysis of QC results.
UF	Unable to provide Quality Control data- Surrogates failed QC checks due to sample matrix effects
L	Analyte detected at a level above the linear response of calibration curve.
E	Estimated result. NATA accreditation does not cover estimated results.
C1	These compounds co-elute.
--	Parameter Not Determined
CT	Elevated concentration. Results reported from carbon tube analysis
**	Sample shows non-petroleum hydrocarbon profile

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**APPENDIX ONE.**

CHAIN OF CUSTODY DOCUMENT

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SGS Notting Hill Bottle Map

Job Number:	Eskies/boxes:	Ice /icebricks:	Temperature:	15°C	
Sample ID FURD FOX RD RAMP RD	Tray No.	5113			
	Matrix	soil			
		water			
		oil			
		filter			
		impinger			
		other			
	BOTTLE TYPE	250 mL Jar glass + teflon lid	none		
		125 mL Jar glass + teflon lid	none		
		40 mL Glass VOA vial + teflon lid	none (NO HEADSPACE)		
		40 mL Glass VOA vial + teflon lid	none (HALF FILLED)		
		1 Litre Plastic (opaque)	none		
		500 mL Plastic (opaque)	none		
		250 mL Plastic (opaque)	none		
		125 mL Plastic (opaque)	none		
		1 Litre Amber glass + teflon lid	none		
		500mL Amber glass + teflon lid	none		
		200mL Amber glass + teflon lid	none		
		100mL Amber glass + teflon lid	none		
		HNO <sub>3</sub> (field filter)	HNO <sub>3</sub> (field filter)		
	HNO <sub>3</sub> (no filtering)	HNO <sub>3</sub> (no filtering)			
	HCl (no filtering)	HCl (no filtering)			
	HCl (field filter)	HCl (field filter)			
	0.125M EDTA (field filter)	0.125M EDTA (field filter)			
	5M H <sub>2</sub> SO <sub>4</sub>	5M H <sub>2</sub> SO <sub>4</sub>			
	CuSO <sub>4</sub>	CuSO <sub>4</sub>			
	none (foil covered)	none (foil covered)			
	500 mL Amber glass + teflon lid	500 mL Amber glass + teflon lid			
	100 mL Amber glass + teflon lid	100 mL Amber glass + teflon lid			
	500 mL Amber glass + teflon lid	500 mL Amber glass + teflon lid			
	100 mL Amber glass + teflon lid	100 mL Amber glass + teflon lid			
	Lugol	Lugol			
	sterilised -thiosulphate (24hr holding time)	sterilised -thiosulphate (24hr holding time)			
	40 mL Glass VOA vial + teflon lid	40 mL Glass VOA vial + teflon lid			
	40 mL Glass VOA vial + teflon lid	40 mL Glass VOA vial + teflon lid			
	Dechlorinating agent (NH <sub>4</sub> Cl)	Dechlorinating agent (NH <sub>4</sub> Cl)			
Totals				9	

Comments: client supplied the new jars

Shirley Shen 25/8/10 9:16AM



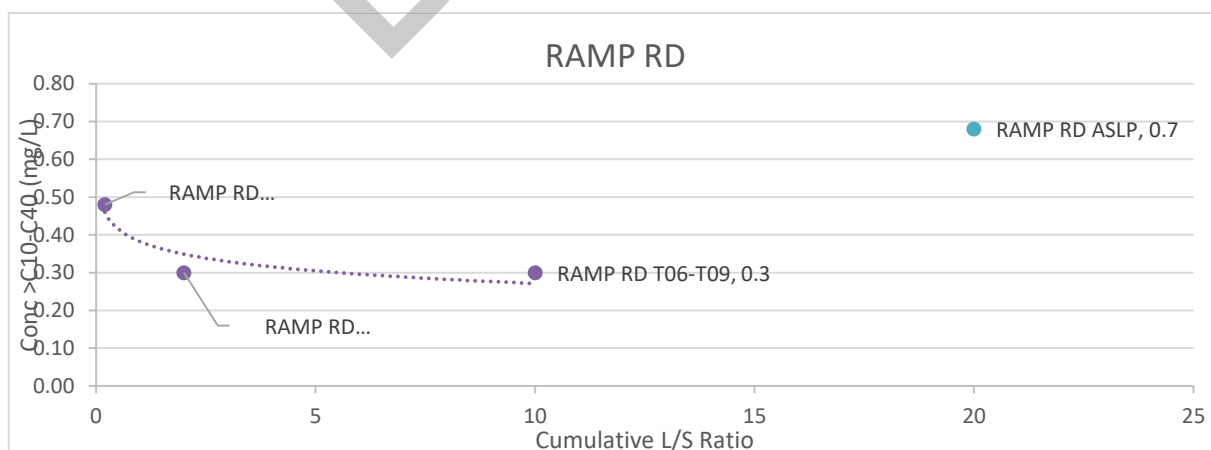
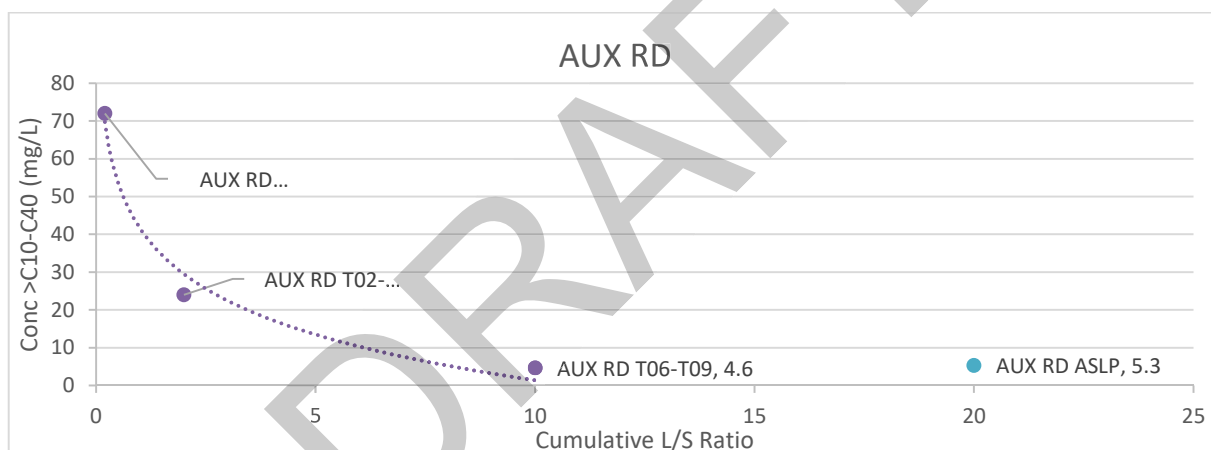
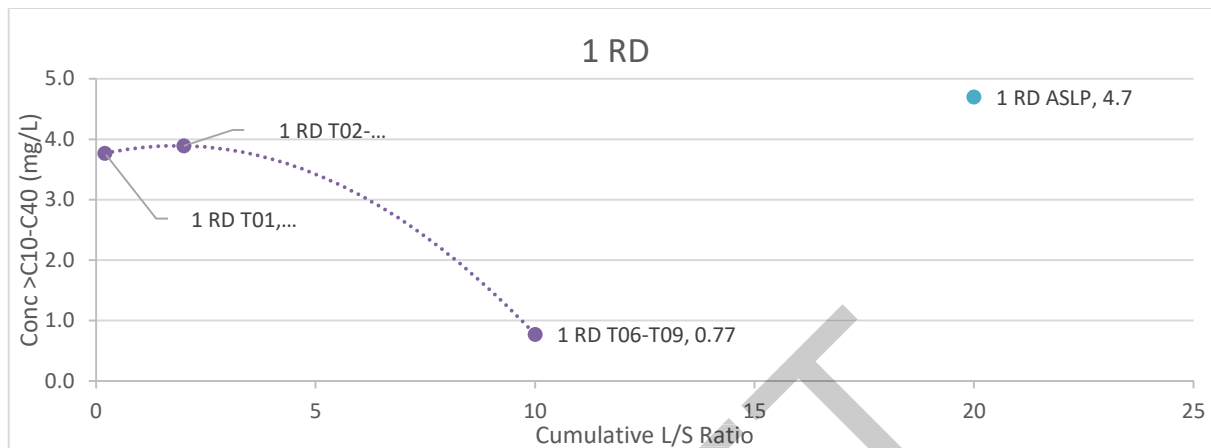
**APPENDIX One**

**Summary of Results**

Sample ID	Volume (mL)	Soil (g)	L/S	TRH C10-C40
1 RD T01	40	200	0.2	3.8
1 RD T02-T05	360	200	2	3.9
1 RD T06-T09	1600	200	10	0.77
1 RD T01-T09	2000	200	10	1.4
1 RD ASLP	500	25	20	4.7
1 RD Total	-	-	-	5900
AUX RD T01	40	200	0.2	72
AUX RD T02-T05	360	200	2	24
AUX RD T06-T09	1600	200	10	4.6
AUX RD T01-T09	2000	200	10	9.5
AUX RD ASLP	500	25	20	5.3
AUX RD Total				4700
RAMP RD T01	40	200	0.2	0.48
RAMP RD T02-T05	360	200	2	0.3
RAMP RD T06-T09	1600	200	10	0.3
RAMP RD T01-T09	2000	200	10	0.3
RAMP RD ASLP	500	25	20	0.7
RAMP RD Total	-	-	-	5000

## APPENDIX Two

### Plot of Concentration vs Cumulative L/S



**Diesel Spill – Detailed Site Investigation**

**One Rail Australia**

**Berrimah Freight Terminal, Export Drive, Berrimah NT**

## **Appendix E GROUNDWATER WELL CONSTRUCTION LOGS**

<b>Client:</b> One Rail Australia <b>Project:</b> Diesel Spill <b>Project No:</b> J168829 <b>Location:</b> Berrimah, NT	<b>Date Drilled:</b> 16/07/2020 <b>Drilling Co:</b> Proactive Drilling Services <b>Total Depth (m):</b> 4.90 <b>Diameter (mm):</b> 50	<b>Bore No.:</b> MW01 <b>Easting:</b> 708423.825 <b>Northing:</b> 8620973.001 <b>Logged by:</b> VB <b>Checked by:</b> 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		MW01_0.0-0.1	0.0	Faint hydrocarbon odour.	1
0.45			FILL: Silty Sandy GRAVEL, fine to medium gravel, medium dense, fine to medium grained sand, light greyish brown.	M		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				M		MW01_1.0-1.1	0.0		
2.0			NATURAL: Gravelly Sandy SILT, medium dense, fine to coarse gravel, fine to medium grained sand, light greyish purple.	M					2
3.15				W		MW01_3.0-3.1	0.0	QA07/QA08	
				W		MW01_3.1-3.2	0.0		
3.85			NATURAL: Gravelly Sandy Clayey SILT, firm, fine to medium gravel, fine to medium grained sand, yellowish brown to light grey.	M					3
4.4				S/M					
4.9			MW01 Terminated at 4.90m bgl.						4
								Push Tube refusal.	5

<b>Client:</b> One Rail Australia	<b>Date Drilled:</b> 16/07/2020	<b>Bore No.:</b> MW01A
<b>Project:</b> Diesel Spill	<b>Drilling Co:</b> Proactive Drilling Services	<b>Easting:</b> 708423.825
<b>Project No:</b> J168829	<b>Total Depth (m):</b> 4.92	<b>Northing:</b> 8620973.001
<b>Location:</b> Berrimah, NT	<b>Diameter (mm):</b> 50	<b>Logged by:</b> VB
		<b>Checked by:</b> AS

**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	MW01A_0.0-0.1	0.0		
					Bentonite	MW01A_0.5-0.6	0.0		
						MW01A_1.0-1.1	0.0		1
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
2.9	▽		NATURAL: Sandy Gravelly SILT, hard, fine to medium sand, fine to coarse gravel, yellowish brown.		Sand	MW01A_3.0-3.1	0.0		3
4.92			MW01A Terminated at 4.92m bgl.						5

<b>Client:</b> One Rail Australia <b>Project:</b> Diesel Spill <b>Project No:</b> J168829 <b>Location:</b> Berrimah, NT	<b>Date Drilled:</b> 3/07/2020 <b>Drilling Contractor:</b> Drilling Services <b>Total Depth (m):</b> 5.21 <b>Diameter (mm):</b> 50	<b>Bore No.:</b> MW02 <b>Easting:</b> 708491.822 <b>Northing:</b> 8620929.677 <b>Logged by:</b> VB <b>Checked by:</b> 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		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		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		
1.7			NATURAL: SILT - firm, minor inclusions of sedimentary stone, brownish red.	S/M		MW02_1.5-1.6	0.0		
2.0			NATURAL: Clayey SILT - firm, light grey.	M		MW02_2-2.1	0.0		
2.45	1		NATURAL: Silty Sedimentary STONE - highly weathered, dark brownish red.	W		MW02_2.45-2.55	0.0		
2.6	2		NATURAL: Clayey SILT - firm, light grey.			MW02_2.6-2.7	0.0		
3.0			NATURAL: Clayey SILT - firm, light grey.			MW02_2.7-2.8	0.0		
3.25			NATURAL - Clayey SILT - soft, light bluish grey.			MW02_3.0-3.1	0.0		
						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.	
						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		

<b>Client:</b> One Rail Australia <b>Project:</b> Diesel Spill <b>Project No:</b> J168829 <b>Location:</b> Berrimah, NT	<b>Date Drilled:</b> 15/07/2020 <b>Drilling Co:</b> Proactive Drilling Services <b>Total Depth (m):</b> 5.0 <b>Diameter (mm):</b> 50	<b>Bore No.:</b> MW03 <b>Easting:</b> 708498.128 <b>Northing:</b> 8621016.708 <b>Logged by:</b> VB <b>Checked by:</b> 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

<b>Client:</b> One Rail Australia	<b>Date Drilled:</b> 15/07/2020	<b>Bore No.:</b> MW03A
<b>Project:</b> Diesel Spill	<b>Drilling Co:</b> Proactive Drilling Services	<b>Easting:</b> 708497.314
<b>Project No:</b> J168829	<b>Total Depth (m):</b> 8.41	<b>Northing:</b> 8621016.232
<b>Location:</b> Berrimah, NT	<b>Diameter (mm):</b> 50	<b>Logged by:</b> VB
		<b>Checked by:</b> AS

**COMMENTS**

Depth/Elevation	WATER STRIKE	Graphic Log	SOIL DESCRIPTION	Moisture	Well Diagram	Field ID	PID (ppm)	Comment	Depth (m)
0.58			FILL: Gravelly Silty SAND, fine to medium grained sand, fine to medium gravel, medium dense, light brownish grey.	M	Concrete				0.58
0.71			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					
1.6			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	Bentonite	MW03A_3.0-3.1	2.0		3.0
				W		MW03A_3.5-3.6	1.8		3.5
				M					
3.95			NATURAL: Sandy Silty CLAY, soft, fine to medium grained sand, trace fine gravel, dark greenish grey.			MW03A_4.0-4.1	4.0		4.0
						MW03A_4.5-4.6	3.9		4.5
									5.0
									6.0
									7.0
					Sand				8.0
8.41			MW03A Terminated @ 8.41m bgl.						8.41

<b>Client:</b> One Rail Australia <b>Project:</b> Diesel Spill <b>Project No:</b> J168829 <b>Location:</b> Berrimah, NT	<b>Date Drilled:</b> 16/07/2020 <b>Drilling Co:</b> Proactive Drilling Services <b>Total Depth (m):</b> 3.80 <b>Diameter (mm):</b> 50	<b>Bore No.:</b> MW04 <b>Easting:</b> 708460.568 <b>Northing:</b> 8621002.703 <b>Logged by:</b> VB <b>Checked by:</b> 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		
					Sand	MW04_2.0-2.1	0.0		2
2.8			NATURAL: Gravelly Sandy SILT, firm, fine to medium gravel, fine to medium grained sand, light brown.	S/M		MW04_2.8-2.9	0.0		3
3.4			NATURAL: Gravelly Sandy SILT, soft, fine to medium gravel, fine to medium grained sand, light brown.	W		MW04_3.4-3.5	0.0		
3.8						MW04_3.5-3.6	0.0		
			MW04 Terminated at 3.8m bgl.						4

<b>Client:</b> One Rail Australia <b>Project:</b> Diesel Spill <b>Project No:</b> J168829 <b>Location:</b> Berrimah, NT	<b>Date Drilled:</b> 16/07/2020 <b>Drilling Co:</b> Proactive Drilling Services <b>Total Depth (m):</b> 3.80 <b>Diameter (mm):</b> 50	<b>Bore No.:</b> MW04A <b>Easting:</b> 708461.577 <b>Northing:</b> 8621003.05 <b>Logged by:</b> VB <b>Checked by:</b> 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
1.1			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.						2
				S/M					3
				W					
				M					
3.8			MW04A Terminated @ 3.80m bgl.						4



# ENVIRONMENTAL LOGGING SHEET

Bore / Well ID	MW06
Page	
Total Depth	4m
Drilling Contractor	Proactive
Drill Method	Auger
Drill Rig Model	
Drilling Fluid	
Logged by	AR
Checked by	

Date Started	13/10/2020
Date Finished	13/10/2020
Elevation	
Northing	
Easting	
Borehole Dia. (mm)	120
Permit No	
Water Depth Cut (m)	2.5
Water Depth Standing (m)	2

Project Name	Berrimah Terminal
Client	
Project No.	
Location	
Datum	

Depth Scale	Method	Penetration - 1=S, 2=M, 3=H, 4=R	Lithology											Additional Comments  (secondary lithology description / structure / minor components / mottling / general observations)	Odour	Staining	Sample		Well Constr.									
			Depth From / To	Classification	Primary Lithology	Secondary Lithology	Primary Colour	Secondary Colour	Grain Size	Shape	Plasticity	Moisture	Consistency - cohesive soils only				Sample / Duplicate ID	PID	Depth	Anulus	Casing	Anulus						
0	A	M	0	1	N	SI	SA	Br	-	F/C	-	-	D		Silty Sand, gravels to 25mm.	N	N			0								
1		M	1	1	N	SI	SA	Br	-	F/C	-	-	D		Silty Sand, gravels to 25mm.													
2		M	2	3	N	CL	SA	Br	-	F/C	-	-	D/M		Light brown, slight moisture	N	N			0								
3		M	3	4	N	CL	SA	Br	-	F/C	-	-	W		Becoming wet at 3m, drilled to 4m, collapse back to 3.2m.	N	N			0								
4																												
			50mm PVC 3 metre screen 0.2m casing with gatic.																									

# ENVIRONMENTAL LOGGING SHEET

Bore / Well ID	MW07
Page	
Total Depth	5
Drilling Contractor	Proactive
Drill Method	Auger
Drill Rig Model	
Drilling Fluid	
Logged by	AR
Checked by	

Date Started	14/10/2020
Date Finished	14/10/2020
Elevation	
Northing	
Easting	
Borehole Dia. (mm)	120
Permit No	
Water Depth Cut (m)	4
Water Depth Standing (m)	3

Project Name	Berrimah Terminal
Client	
Project No.	
Location	
Datum	

Depth Scale	Method	Penetration - 1=S, 2=M, 3=H, 4=R	Lithology										Additional Comments  (secondary lithology description / structure / minor components / mottling / general observations)	Odour	Staining	Sample / Duplicate ID	PID	Well Constr.							
			Depth From / To	Classification	Primary Lithology	Secondary Lithology	Primary Colour	Secondary Colour	Grain Size	Shape	Plasticity	Moisture						Consistency - cohesive soils only	Depth	Anulus	Casing	Anulus			
0	A	M	0	0	F	SA	Gr	Br	-		C-30mm			D	Bitumen at surface 200mm Road base to 400mm	N	N			0					
1	A	M	1	2	N	SI	SA	Br	-	F/C	-	-	D	Silty Sand, gravels to 25mm.	N	N			0						
2		M	2	3	N	SI	SA	Br	-	F/C	-	-	D	Silt											
3		M	3	4	N	CL	SA	Br	-	F/C	-	-	D/M	Light brown, slight moisture	N	N			0						
4		M	4	5	N	CL	SA	Br	-	F/C	-	-	W	Becoming wet at 4m	N	N			0						
5																									
			50mm PVC																						
			4 metre screen																						
			1m casing with gatic.																						



**Diesel Spill – Detailed Site Investigation**

**One Rail Australia**

**Berrimah Freight Terminal, Export Drive, Berrimah NT**

**Appendix F GROUNDWATER SAMPLING RECORDS AND  
CALIBRATION CERTIFICATES**

Groundwater Monitoring Field Record Sheet

Client: One Rail Australia	Job No: J168829-01	
Project: Diesel Spill Groundwater Monitoring	Date: 30/7/20	
Location: Berrimah Freight Terminal, Export Drive, Berrimah NT		

Time	Amount purged (L)	Cumulative purged (L)	WELL DETAILS		SAMPLING EQUIPMENT										
			Water Level (m)	Temperature °C	Well depth: (m)	Well diameter: (mm)	Casing type:	Initial water level: (m)	Interphase probe:	DO % sat	Sp. Conductivity μS/cm	Salinity PSU	pH Units	ORP mV	Turbidity NTU
09:16	1.0	1.0	2.996	30.6	4.465	50mm	PVC	2.994	IP Dipper Pro (30m)	8.2	14210	8.12	4.93	156.3	35.0
09:19	2.0		2.999	30.5		NA				17.8	1318.5	7.53	5.10	156.7	19.0
09:22	3.0		2.996	30.6						23.2	12802	7.29	5.09	157.4	22.4
09:25	4.0		2.996	30.5						29.2	12456	7.09	5.02	158.3	10.29
09:28	5.0		2.996	30.5						33.2	12160	6.90	4.87	160.5	6.83
09:31	6.0		2.996	30.5						35.7	11946	6.77	4.77	162.9	5.76
09:34	7.0		2.996	30.6						38.9	11795	6.67	4.70	165.6	5.02
09:37	8.0		2.996	30.6						39.1	11646	6.58	4.65	168.6	3.23
09:40	9.0		2.996	30.5						39.2	11574	6.51	4.61	171.6	3.26
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
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Observations during Sampling:- eg. Odours, sheens, turbidity, water colour  <i>No odour</i> <i>No sheen</i> <i>clear water</i> <i>Low turbidity</i>	<b>Samples Taken</b>	<b>Number</b>	<b>Duplicate: QA</b>	<b>Triplicate: QA</b>
	Metals Plastic*			
	Cr (III & VI)*			
	Plastic unpreserved inorganics (1L)			
	Preserved inorganics (60mL)			
	Glass vials (40mL)			
	Glass amber unpreserved (200mL)	2	2	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)

<b>MONITORING WELL VOLUMES:-</b>			
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	Field Technician #2
Full name: STUART CARROLL	Full name:



Client: One Rail Australia  
 Project: Diesel Spill Groundwater Monitoring  
 Location: Berrimah Freight Terminal, Export Drive, Berrimah NT

Job No: J168829-01  
 Date: 30/7/20

MW 02	WELL DETAILS			SAMPLING EQUIPMENT		
	Well depth:	5.300	(m)	Sampling device:	Peristaltic (low flow)	GEO#
	Well diameter:	50mm	NA	Water meter:	YSI	YSI#
	Casing type:	PVC		Turbidity Meter:		TM#
	Initial water level:	1.788	(m)	Interphase probe:	IP Dipper Pro (30m)	IP#

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
11:40	1.0	1.0	1.788	35.2	10.0	13859	7.96	5.48	167.6	111
11:43		2.0	1.788	33.4	11.5	13862	7.89	5.43	176.6	95.3
11:46		3.0	1.788	31.5	7.0	14633	8.37	5.28	183.2	58.9
11:49		4.0	1.788	31.5	6.1	14153	8.11	5.28	186.8	28.4
11:52		5.0	1.788	31.5	10.8	14625	8.40	5.23	192.2	13.7
11:55		6.0	1.788	31.5	9.5	14373	8.25	5.19	195.0	99.4
11:58		7.0	1.788	31.5	9.2	14359	8.25	5.19	196.5	54.0
12:01	↓	8.0	1.788	31.5	10.8	14341	8.25	5.16	198.5	21.0

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

Clear skies, light breeze, mild

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: 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)						

(\* DESIGNATES SAMPLES FILTERED IN FIELD)

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) (assuming 30% porosity in sand/gravel pack)	0.006677 m3 (kL)	6.7 L /m

Field Technician #1  
 Full name: STUART CARROLL

Field Technician #2  
 Full name:

Greencap  
Groundwater Monitoring Well Development Field Record Sheet

Client: One Road Australia Job No: J168829  
 Project: Diesel Spill Gauged by: Stuart Carroll  
 Location: Export Drive, Berrimah NT Date: 23/7/20

Method of development: *Good recharge*

Time	Well ID	SWL before development (m btoe)	Depth of Well (m btoe)	Volume purged (L)	SWL after development (m btoe)	pH	Temp.	Conduct. $\mu S/cm$	ORP	DO	Turbidity	Observations
09:53	MW02	1.750	4.525	90	1.755							↓ clear brown water w. with seal
10:51	MW01	3.005	4.441	35	3.020							light brown w. seal
11:36	MW04	2.971	4.845	25	2.655							clear recharge
11:58	MW04	2.970	3.773	20	2.644	7.16	32.9	150.2	211.0	17.1	458	clear recharge
	MW04	2.915	3.345									
	MW02	3.189	4.375	40	2.830	5.38	31.1	226.4	43.5	55.9	123.8	clear recharge
	MW03	3.169	8.147	35	1.689							brackish still present

Depth of well Post-Dev  
 5.300 m btoe  
 4.469  
 4.880  
 poor recharge  
 3.78  
 " " " " " "  
 4.350  
 8.225 320

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



Client: One Rail Australia	Job No: J168829-01	
Project: Diesel Spill Groundwater Monitoring	Date: 30/7/20	
Location: Berrimah Freight Terminal, Export Drive, Berrimah NT		

Time	Amount purged (L)	WELL DETAILS			SAMPLING EQUIPMENT										
		Cumulative purged (L)	Water Level (m)	Temperature °C	Well depth: (m)	Well diameter: NA	Casing type: PVC	Initial water level: (m)	Sampling device: Peristaltic (low flow)	Water meter: YSI	Turbidity Meter:	Interphase probe: IP Dipper Pro (30m)	GEO#	YSI#	TM#
10:20			3.065	33.3	42.5	11745	6.61	6.03	181.6	63.9					
10:23			3.155	33.6	37.5	12050	6.81	5.95	178.6	85.3					
10:26			(4.5L) Purged dry due to slow recharge												
10:29															
10:32															
12:45			3.543	30.9	57.9	21480	12.89	4.91	226.4	170					

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

DRAFT

Clear skies, light breeze, mild

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
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Observations during Sampling:- eg. Odours, sheens, turbidity, water colour	Samples Taken	Number	Duplicate: QA	Triplicate: QA
No odour No sheen High turbidity Light 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:	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: _____ 
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## WELL PURGE CALCULATION

Diameter of well casing:	50 mm
Diameter of hole drilled:	150 mm
<b>casing</b> $V_c =$	0.001964 m <sup>3</sup> (kL) 1.96375 L per metre of water column
<b>hole</b> $V_h =$	0.017674 m <sup>3</sup> (kL) 17.67375 L per metre in the hole 15.71 L per metre in the hole (minus amount in casing) 4.713 L per metre in the hole (minus casing with 30% porosity)
$V_{total} = V_c + V_h$	6.68 L per metre in the total well

**Total amount to be purged** = 3 x water in well per metre of water column x height of water column.

**20.0 litres per metre of water column**

$$= \frac{.15}{2} \times \frac{.15}{2}$$

$$= 0.0725 \times 0.0725$$

$$= 11.67 \text{ L/m}$$

$$= 15$$

Greencap  
Groundwater Monitoring Well Development Field Record Sheet

Client: One Road Australia  
 Project: Diesel Spill  
 Location: Export Drive, Berrimah NT

Job No: J168829  
 Gauged by: Stuart Carroll  
 Date: 23/7/20

Depth of well  
Post of Per  
5.300 m btoe  
4.469  
4.880  
Poor recharge  
3.78  
4.350  
8.25 320

Good recharge

Time	Well ID	SWL before development (m btoe)	Depth of Well (m btoe)	Volume purged (L)	SWL after development (m btoe)	pH	Temp.	Conduct	ORP	DO	Turbidity	Observations
09:53	MW02	1.750	4.525	90	1.755							clear brown water with seed
10:51	MW01	3.005	4.441	35	3.020							light brown w. S.O.P
11:36	MW04	2.971	4.845	25	2.655							clear recharge
11:58	MW04	2.970	3.773	20	3.64							clear recharge
	MW04	2.915	3.345		3.850							brackish still present
	MW03	3.169	4.375	40	4.580							
	MW03A	3.169	8.447	35	7.689							

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





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)	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: 1.873 (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
<del>14:50</del>										
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>	<b>Samples Taken</b>	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)				

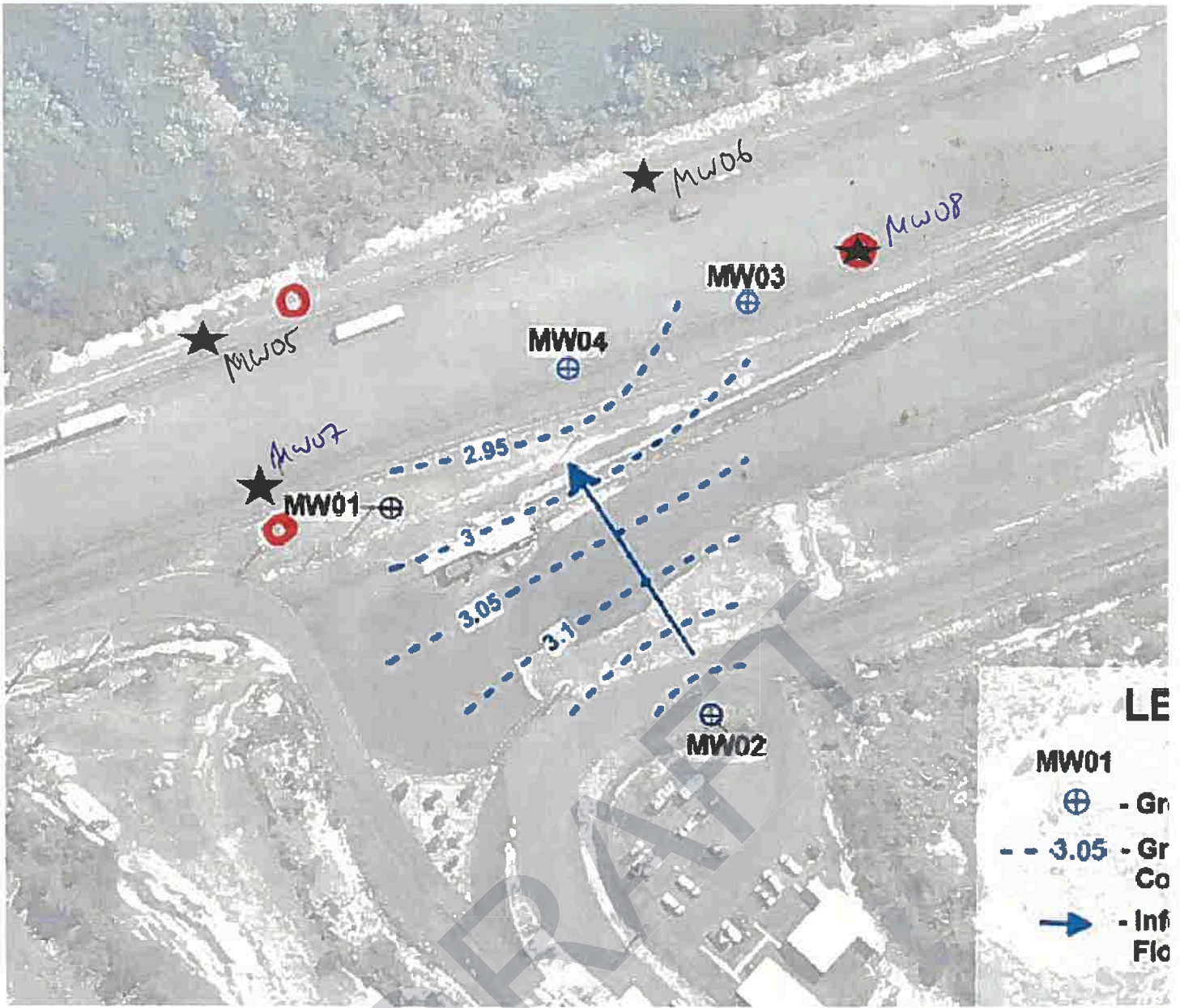
<b>MONITORING WELL VOLUMES:-</b>			
Diameter of well casing:	50 mm		
Diameter of hole drilled:	150 mm		
(1) Volume of casing only	0.001964 m3 (kL)	1.96 L per metre	
(2) Volume of drill-hole	0.017674 m3 (kL)	17.67 L per metre	
(3) Volume of annulus around casing	0.015710 m3 (kL)	15.71 L per metre	
(4) 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 Q201	
Glass vial (40ml)	6	HCl	Triplicate ID Q201A	
Plastic (60mL) - metals*		HNO3		
Plastic (60mL) - cyanide, CrVI*		NaOH		
Plastic (60mL) - nutrients		H2SO4		
Plastic (500mL) - inorganics		none		
Plastic ( )			Blanks	
Plastic ( )			Rinsate ID R201	
			T201	

\*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>	<b>Well ID</b>  <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:**  
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 / <u>µ</u>	
1101	1WT	2.022	33.9	5.17	19241	139.5	3.7	↓ L-m turbidity, clear, no sheen/odour
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>		<b>Well ID</b> <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	<b>*Other Sampling Equipment / Method</b>				
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>					
<b>Field observations:</b> eg well condition, nearby activities, weather, vegetation, etc <u>SUNNY, LIGHT BREEZE</u>								
<b>Purging instructions:</b> 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. <b>Low Flow:</b> 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. <b>4-well volume</b> <i>Well volume 50mm (2" diameter) - 2 L/metre, 100mm (4" diameter) - 8 L/metre, 150mm (6" diameter) - 18 L/metre</i>								
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 HC 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	
1404	10	2.658	35.8	5.24	14205	118.8	27.6	
<b>Observations during Sampling:</b> eg odours, sheens, turbidity, water colour, etc <u>QUICK RECHARGE, SAMPLED AFTER 10L PURGED</u>								
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*		HNO3	Blanks					
Plastic (60mL) - cyanide, CrVI*		NaOH	Rinsate ID					
Plastic (60mL) - nutrients		H2SO4						
Plastic (500mL) - inorganics		none						
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>	<b>Well ID</b>  <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	<del>18.1</del> 36.2	
1218	7	4.413	37.2	6.21	12710	-8.9	<del>38.8</del> 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  <u>WELL PURGED ONLY AFTER 100L PURGED, VERY SLOW RECHARGE</u>  <u>sampled after 9L purged</u>
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 Rinsate ID	
Plastic (500mL) - inorganics		none		
Plastic ( )				
Plastic ( )	(4)			

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

YSI Calibration Register - Environmental Impact Monitoring Program



Going Further in Managing Risk

Please record Initial value (indicates YSI reading when placed in buffer solution prior to calibrating) and final value (indicates any variation post-calibration).

Date	ID	Temp	EC		pH 4		pH 7		ORP		DO 100% Sat		Solution replaced? Y/N	Initials
			Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final		
16-12-20	YS1-4	22.4	12640	12884	4.01	4.01	7.00	7.00	231.0	229.1	100.1	99.4	N	RB
Comments:														
28-01	YS1-2	24.2	12840	12881	3.96	3.96	7.02	7.02	230.0	229.0	102.4	98.4	N	RB
Comments:														
18-02	YS1-2	25.1	12490	12882	3.99	3.99	7.01	7.01	229.4	229.1	95.5	98.4	N	RB
Comments:														
18-03	YS1-2	24.80	1418	1416	4.06	4.06	7.50	7.50	226.4	229.0	96.6	99.4	N	RB
Comments:														
21-04	YS1-2	23.5	58.1	58.6	4.07	4.07	7.03	7.03	242.1	228.1	96.8	100.1	N	RB
Comments:														
20-5	YS1-2	24.6	61.2	58.2	4.02	4.02	7.00	7.00	230.0	229.0	91.2	98.4	N	RB
Comments:														
22-6	YS1-2	23.6	12794	12887	4.05	4.05	7.10	7.10	232.4	218.4	110.4	98.9	Y	RB
Comments: pH, EC, orp Replaced.														
21/7	YS1-2	23.9	12980	12884	4.08	4.08	7.01	7.01	237.1	228.9	108.5	100.4	Y	SC
Comments: YSI-1														
29/7	YS1-2	23.1	13003	12882	4.11	4.11	7.04	7.04	235.4	227.9	106.6	101.0	Y	SC
Comments: YSI-1														





**Diesel Spill – Detailed Site Investigation**

**One Rail Australia**

**Berrimah Freight Terminal, Export Drive, Berrimah NT**

**Appendix G    LABORATORY CERTIFICATES – GROUNDWATER**



**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

ABN – 50 005 085 521

e.mail : EnviroSales@eurofins.com

web : www.eurofins.com.au

## 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				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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
<b>BTEX</b>						
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
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	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) <sup>N01</sup>	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			
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>					
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			
<b>BTEX</b>					
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
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>					
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	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) <sup>N01</sup>	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

**Melbourne**  
6 Monterey Road  
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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 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	Matrix	LAB ID	
1	MW01	Jul 30, 2020		Water	M20-JI49593	X
2	MW02	Jul 30, 2020		Water	M20-JI49594	X
3	MW03	Jul 30, 2020		Water	M20-JI49595	X
4	MW04	Jul 30, 2020		Water	M20-JI49596	X
5	MWQA01	Jul 30, 2020		Water	M20-JI49597	X
6	RB01	Jul 30, 2020		Water	M20-JI49598	X
7	TB01	Jul 30, 2020		Water	M20-JI49599	X
<b>Test Counts</b>						1
Eurofins Suite B1						X
BTEX						X
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
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**

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	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.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	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.
<b>TEQ</b>	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	
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
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		
<b>Method Blank</b>								
<b>BTEX</b>								
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		
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
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		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	%	110			70-130	Pass		
TRH C10-C14	%	108			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>BTEX</b>								
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		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
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
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C10-C14	B20-JI49614	NCP	%	80		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
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
<b>Duplicate</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
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 →

**DADELAIDE 21** Burns Road, Porters SA 5095  
Ph: 08 8358 0830 E: adelaide@alsglobal.com

**DEP BRISBANE 2** Buln Street, Stafford QLD 4053  
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

**GLADSTONE 46** Callomon Rd, Clinton QLD 4680  
Ph: 07 7471 9600 E: gladstone@alsglobal.com

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

**DIMELBOURNE 2-4** Westall Road Springvale VIC 3171  
Ph: 03 8549 9500 E: samples.melbourne@alsglobal.com

**DIMUDGEE 128** Sydneybase Mudgee NSW 2860  
Ph: 02 6372 9735 E: mudgee@alsglobal.com

**DNEWCASTLE 5955** Main Rd West NSW 2304  
Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

**DNEWCASTLE 4413** Gary Place North Nowra NSW 2541  
Ph: 02 4423 2063 E: nowra@alsglobal.com

**DPERTH 10** Hca Way Melba WA 8100  
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

**DSYDNEY 277-269** Woodpark Road Smithfield NSW 2154  
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

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

**DWOLLONGONG 89** Kenny Street Wollongong NSW 2500  
Ph: 02 4225 9325 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  
**COUNTRY OF ORIGIN:** [Blank]  
**ALS QUOTE NO.:** [Blank]

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

**COC Emailled to ALS?** ( YES / NO )  
**EDD FORMAT (or default):** [Blank]  
**Email Reports to (will default to PM if no other addresses are listed):** stuart.carroll@greencap.com.au  
**Email Invoice to (will default to PM if no other addresses are listed):** ap@greencap.com.au, stuart.carroll@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: 18.0 °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					
<b>TOTAL</b>							

**LAB OF ORIGIN:** DARWIN

**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 Bag; LI = Lugol's Iodine Preserved Bottles; STI = Sterile Sodium Iodide Preserved Bottles.

Environmental Division  
Sydney  
Work Order Reference  
**ES2026250**

Telephone: 61-2-8781 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**

**Page** : 1 of 4

**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 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.

Edwandy Fadjar *Position*

*Accreditation Category*

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			
<b>EP080/071: Total Petroleum Hydrocarbons</b>			
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
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>			
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
<b>EP080: BTEXN</b>			
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
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
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		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
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

### 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	Laboratory Duplicate (DUP) Report						
			CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP080/074: Total Petroleum Hydrocarbons (QC Lot: 3173524)</b>									
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
<b>EP080/074: Total Petroleum Hydrocarbons (QC Lot: 3174276)</b>									
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
<b>EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3173524)</b>									
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
<b>EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3174276)</b>									
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
<b>EP080: BTEXN (QC Lot: 3174276)</b>									
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							
		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



Page : 3 of 5  
 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	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



### 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
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3173524)</b>									
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	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3174276)</b>									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	81.5	75.0	127	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3173524)</b>									
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	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3174276)</b>									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	85.4	75.0	127	
<b>EP080: BTEXN (QCLot: 3174276)</b>									
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	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)
			Low	High		
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3173524)</b>						
ES2026250-001	MWQA01 Received as MWQA02	EP071: C10 - C14 Fraction	200 µg/L	99.4	70.0	130
		EP071: C15 - C28 Fraction	250 µg/L	130	71.0	130
		EP071: C29 - C36 Fraction	200 µg/L	109	67.0	130
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3174276)</b>						
ES2026637-001	Anonymous	EP080: C6 - C9 Fraction	325 µg/L	110	70.0	130



Page : 5 of 5  
 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



**ALS** 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
<b>EP080/071: Total Petroleum Hydrocarbons</b>					
<b>Amber Glass Bottle - Unpreserved (EP071)</b>					
MWQA01 - Received as MWQA02	30-Jul-2020	04-Aug-2020	06-Aug-2020	05-Aug-2020	13-Sep-2020
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>					
MWQA01 - Received as MWQA02	30-Jul-2020	04-Aug-2020	13-Aug-2020	04-Aug-2020	13-Aug-2020
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>					
<b>Amber Glass Bottle - Unpreserved (EP071)</b>					
MWQA01 - Received as MWQA02	30-Jul-2020	04-Aug-2020	06-Aug-2020	05-Aug-2020	13-Sep-2020
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>					
MWQA01 - Received as MWQA02	30-Jul-2020	04-Aug-2020	13-Aug-2020	04-Aug-2020	13-Aug-2020
<b>EP080: BTEXN</b>					
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>					
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		
<b>Laboratory Duplicates (DUP)</b>									
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
<b>Laboratory Control Samples (LCS)</b>									
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
<b>Method Blanks (MB)</b>									
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
<b>Matrix Spikes (MS)</b>									
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



Page : 4 of 4  
 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.

Analytical Methods	Method	Matrix	Method Descriptions
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)
Preparation Methods	Method	Matrix	Method Descriptions
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.



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**Christchurch**  
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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				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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
<b>BTEX</b>						
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
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	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) <sup>N01</sup>	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			
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>					
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	-
<b>BTEX</b>					
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
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>					
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	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) <sup>N01</sup>	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	-

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**Sample History**

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

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

Description	Testing Site	Extracted	Holding Time
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)	Melbourne	Oct 16, 2020	28 Days
- Method: LTM-INO-4030 Conductivity			

DRAFT

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**Company Name:** Grencap 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
<b>Test Counts</b>						4
Conductivity (at 25°C)						X
BTEX						X
Eurofins Suite B1						X

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**

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	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.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	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.
<b>TEQ</b>	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	
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
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		
<b>Method Blank</b>								
<b>BTEX</b>								
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		
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
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		
<b>Method Blank</b>								
Conductivity (at 25°C)	uS/cm	< 10			10	Pass		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	%	96			70-130	Pass		
TRH C10-C14	%	95			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>BTEX</b>								
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		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
Naphthalene	%	84			70-130	Pass		
TRH C6-C10	%	93			70-130	Pass		
TRH >C10-C16	%	97			70-130	Pass		
<b>LCS - % Recovery</b>								
Conductivity (at 25°C)	%	90			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	M20-Oc29366	NCP	%	110		70-130	Pass	
TRH C10-C14	M20-Oc28919	NCP	%	101		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>BTEX</b>								
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	
<b>Spike - % Recovery</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				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
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				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	
<b>Duplicate</b>									
<b>BTEX</b>				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	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				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	
<b>Duplicate</b>									
				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: [Linkedln](#)

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				
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
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
<b>BTEX</b>						
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
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	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) <sup>N01</sup>	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			
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>					
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			
<b>BTEX</b>					
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
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>					
Naphthalene <sup>N02</sup>	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) <sup>N04</sup>	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) <sup>N01</sup>	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	-

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**Sample History**

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

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

Description	Testing Site	Extracted	Holding Time
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

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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
<b>Test Counts</b>						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**

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	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.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	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.
<b>TEQ</b>	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	
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
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		
<b>Method Blank</b>								
<b>BTEX</b>								
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		
<b>Method Blank</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
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		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	%	116			70-130	Pass		
TRH C10-C14	%	113			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>BTEX</b>								
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		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
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
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	M20-Oc52391	NCP	%	128		70-130	Pass	
TRH C10-C14	B20-No02737	NCP	%	76		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>BTEX</b>								
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	
<b>Spike - % Recovery</b>								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				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
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				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	
<b>Duplicate</b>									
<b>BTEX</b>				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	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				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	

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](#).

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**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 (%)	
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3313489)</b>									
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
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3313489)</b>									
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
<b>EP080: BTEXN (QC Lot: 3313489)</b>									
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
<b>EP080/074: Total Petroleum Hydrocarbons (QCLot: 3312614)</b>									
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	
<b>EP080/074: Total Petroleum Hydrocarbons (QCLot: 3313489)</b>									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	84.9	75.0	127	
<b>EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3312614)</b>									
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	
<b>EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3313489)</b>									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	86.3	75.0	127	
<b>EP080: BTEXN (QCLot: 3313489)</b>									
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		
<b>EP080/074: Total Petroleum Hydrocarbons (QCLot: 3313489)</b>							
ES2035949-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	78.2	70.0	130
<b>EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3313489)</b>							
ES2035949-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	76.7	70.0	130
<b>EP080: BTEXN (QCLot: 3313489)</b>							
ES2035949-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	84.0	70.0	130



Page : 4 of 4  
 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 (%)	
				MS	Low	High	
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	95-47-6	25 µg/L	78.8	70.0	130
			EP080: Naphthalene	91-20-3	25 µg/L	78.8	70.0



**ALS** Environmental

## QA/QC Compliance Assessment to assist with Quality Review

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	
<b>EP080/071: Total Petroleum Hydrocarbons</b>						
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	✓
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>						
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	✓
<b>EP080: BTEXN</b>						
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		
<b>Laboratory Duplicates (DUP)</b>									
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
<b>Laboratory Control Samples (LCS)</b>									
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
<b>Method Blanks (MB)</b>									
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
<b>Matrix Spikes (MS)</b>									
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.

## 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**



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

*Position*  
*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
<b>EP080/071: Total Petroleum Hydrocarbons</b>				
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
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>				
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
<b>EP080: BTEXN</b>				
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
<b>EP080S: TPH(V)/BTEX Surrogates</b>				
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



Page : 4 of 4  
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  
 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  
 Organic Coordinator

Accreditation Category  
 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	Laboratory Duplicate (DUP) Report						
			CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3343231)</b>									
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
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3345606)</b>									
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
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3343231)</b>									
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
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3345606)</b>									
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
<b>EP080: BTEXN (QC Lot: 3345606)</b>									
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
		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
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3343231)</b>									
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	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3345606)</b>									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	86.3	75.0	127	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3343231)</b>									
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	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3345606)</b>									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	85.9	75.0	127	
<b>EP080: BTEXN (QCLot: 3345606)</b>									
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		
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3343231)</b>						
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
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 3345606)</b>						
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 (%)
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3343231)						
ES2038032-001	QC01A	EP071: >C10 - C16 Fraction	----	250 µg/L	96.0	70.0 - 130
		EP071: >C16 - C34 Fraction	----	350 µg/L	79.0	75.0 - 130
		EP071: >C34 - C40 Fraction	----	150 µg/L	102	67.0 - 130
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3345606)						
ES2038032-001	QC01A	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	114	70.0 - 130
EP080: BTEXN (QCLot: 3345606)						
ES2038032-001	QC01A	EP080: Benzene	71-43-2	25 µg/L	98.6	70.0 - 130
		EP080: Toluene	108-88-3	25 µg/L	102	70.0 - 130
		EP080: Ethylbenzene	100-41-4	25 µg/L	105	70.0 - 130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	109	70.0 - 130
			106-42-3			
		EP080: ortho-Xylene	95-47-6	25 µg/L	108	70.0 - 130
		EP080: Naphthalene	91-20-3	25 µg/L	105	70.0 - 130



**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	
<b>EP080/071: Total Petroleum Hydrocarbons</b>						
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	✓
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>						
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	✓
<b>EP080: BTEXN</b>						
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				
<b>Laboratory Duplicates (DUP)</b>								
TRH - Semivolatle Fraction	EP071		1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>								
TRH - Semivolatle Fraction	EP071		1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>								
TRH - Semivolatle Fraction	EP071		1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>								
TRH - Semivolatle Fraction	EP071		1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080		1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Page : 4 of 4  
 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  
Position

Accreditation Category

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

∅ = 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		
<b>EP080/071: Total Petroleum Hydrocarbons</b>					
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	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>					
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	
<b>EP080: BTEXN</b>					
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-Xylenes	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	
<b>EP080S: TPH(V)/BTEX Surrogates</b>					
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  
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Project : J168829 ORA Diesel Spill

### Surrogate Control Limits

Sub-Matrix: WATER		
Compound	CAS Number	
Recovery Limits (%)		
	Low	High
<b>EP080S: TPH(V)/BTEX Surrogates</b>		
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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# REMEDICATION MANAGEMENT PLAN

June 2021  
J168829

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## One Rail Australia

## Berrimah Freight Terminal

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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.

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## Document Control

Document Quality Management Details	
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<b>Site Details:</b>	Berrimah Freight Terminal
<b>Project Number:</b>	J168829-05-01
<b>Client Name:</b>	One Rail Australia
<b>Signatures:</b>	Prepared By:  <b>Peter Spiers</b> Senior Environmental Consultant
	Authorised By:  <b>Dylan Burford</b> Practice Manager – Environmental & Contaminated Land Management

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**Remediation Management Plan**  
**One Rail Australia**  
**Berrimah Freight Terminal**

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## 1 INTRODUCTION

Grencap Pty Ltd (Grencap) was commissioned by One Rail Australia (the client) to prepare this Remediation Management Plan (RMP) specific to the management of approximately 800m<sup>3</sup> of diesel impacted soil on the site located at the Berrimah Freight Terminal, Export Drive, Berrimah Northern Territory (the Site).

A stockpile of diesel contaminated soil was generated during remedial works following an onsite diesel spill. Findings from a Detailed Site Investigation (Grencap, April 2021) and a Remediation Action Plan (RAP) (Grencap, June 2021) identified that the heavily impacted soil was not suitable for re-use at the time and that bio-remediation measures (or alternative remediation) were required prior to re-using the soil or disposing of it to landfill.

This report details the objectives of the remediation, outlines the site setting, identifies hazards and considers remediation options. This report is an interim document and is to be updated once the final remediation methodology is proven and selected.

The location of the approximate site boundary and surrounding area is shown in Figure 1.



**Figure 1: Site Location Plan**

The remediation management plan has been based on industry standards and guidelines including, but not limited to:

- National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)
- Australian Standard AS4482.1 – 2005 (Guide to the investigation and sampling of potentially contaminated soil)
- Northern Territory Contaminated Land Guideline (NT EPA 2017)
- Guideline for the assessment and remediation of site contamination (SA EPA 2018, as updated November 2019)

- National Remediation Framework Technical Guide: Bioremediation (CRC CARE, August 2018)

Additional resources include but are not limited to:

- Best Practice Note: Landfarming (2014, NSW EPA).
- How To Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites – A Guide for Corrective Action Plan Reviewers (US EPA, 2017) *Biopiling information*.
- Soil bioremediation (SA EPA, 2005).

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## 2 SITE INFORMATION

### 2.1 Site Details

A summary of site detail is provided in Table 1.

**Table 1: Site Details Summary**

Details	Description
Street Address	Export Drive, Berrimah NT
Certificate of Title	Volume 757 Folio 262; and Volume 754 Folio 416
Parcel Reference	NT Portions 5411; and 5641, Hundred of Bagot
Plan	S2000/1912B; and S2003/163
Zoning	Zoned as Railway under the NT Planning Scheme
Local Government Authority	Darwin City

### 2.2 Site Description and Current Land Use

The site operates as a freight rail terminal and consists of four railway lines (Main Line, 1 Road, Auxiliary Road and Ramp Road lines) 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. An aerial photograph showing the current site layout and features of interest is presented in Figure 2.



**Figure 2: Current Site Layout and Spill Location**

During remedial works immediately following the spill event, excavated diesel impacted soils were placed and stored to the south of the railway as shown on .

Site features along with a location for potential onsite remediation of the stockpile are also identified. The potential remediation site has been cleared of weeds and graded since this aerial photograph. Fill is present across the site consisting brown gravelly silty sand with traces of crushed rock, red brick and bitumen.

The site is relatively level with a slight fall towards the east. Excess rainfall from this area drains towards the north east, connecting with the common drain that runs adjacent to the site. The drain continues in a north-western direction where it diverts towards the west, running along the northern boundary of the initial stockpile location. The drainage line continues to a stormwater pit and then diverts north via a box culvert under the rail line where it discharges to the intertidal mangrove habitat.



**Figure 3: Stockpile Location and Site identified for pilot trial / bioremediation**

## 2.3 General Climatology

The site is located 6km southeast of the Darwin airport and the Darwin airport weather station. The site is part of greater Darwin and has a similar climate with distinct wet and dry seasons with the average maximum temperature of approximately 32 degrees similar all year round. The dry season typically runs from about May to September with little rainfall and minimum temperatures dropping to an average 20 degrees from the 25 degrees they are the rest of the year. The prevailing wind direction for the site based on the Darwin airport weather station is to the southeast.

## 2.4 Regional and Physical Setting

The site is located in the upper reaches of East Arm in Darwin Harbour, approximately seven kilometres (km) east of the City of Darwin, NT and occupies an area of approximately 19 hectares (ha) (refer to Figure 1).

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.

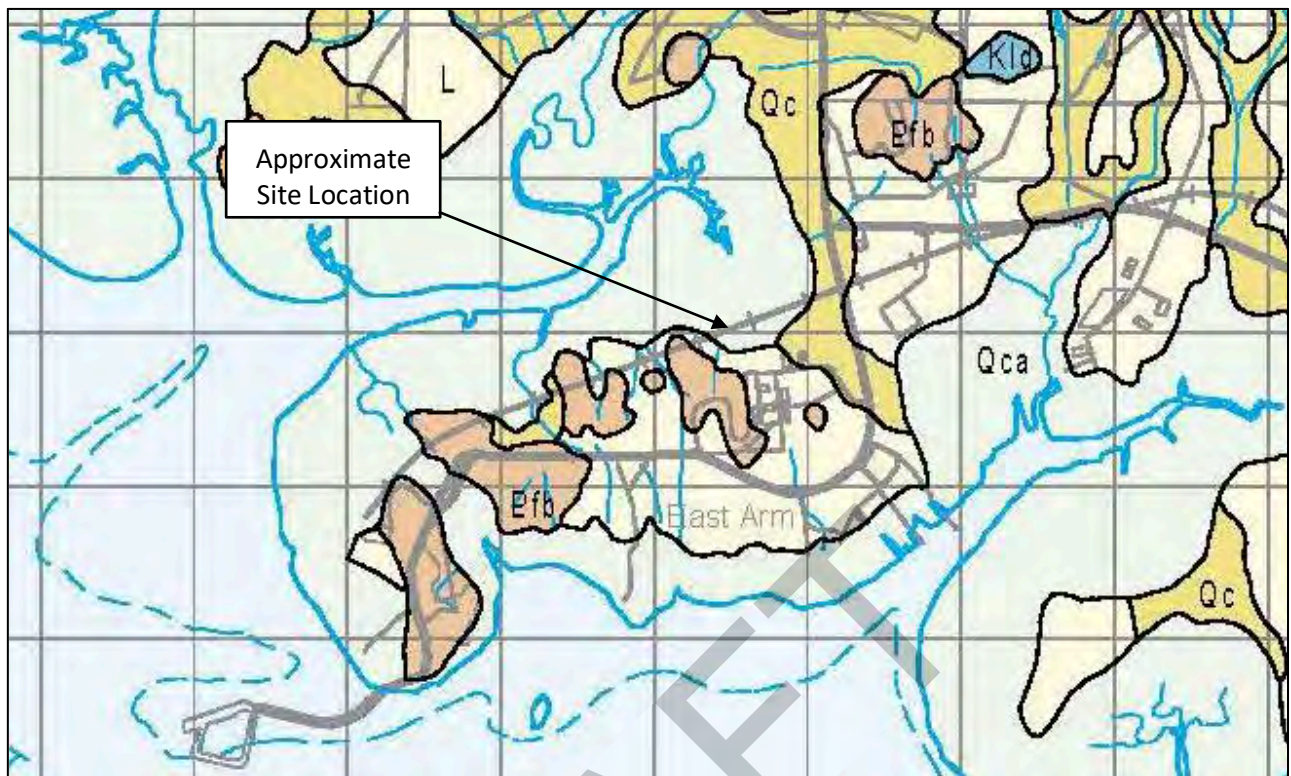
The nearest surface water body is the intertidal mangrove assemblage zone of Darwin Harbour's East Arm and Blesser's Creek, located directly adjacent to the northern boundary of the site.

## 2.5 Site Geology And Hydrogeology

### 2.5.1 Geology

The 1:100,000 Geology (NT Gov. Department of Business, Industry and Resource Development, 2001) identifies four geological forms for the site (see Figure 4) 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 4: 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.

### **2.5.2 Fill/Reclaimed Material**

Fill/reclaimed material was encountered across the diesel spill investigation area consisting of rail ballast/gravel and surface asphalt. Underlying material encountered comprised of trench backfill and compacted fill described as sandy gravelly silt. The stockpiled of diesel impacted soils is made up of these materials.

### **2.5.3 Acid Sulfate Soils**

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.

### **2.5.4 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.

A number of wells were installed on the site as part of a groundwater monitoring plan with groundwater at a depth of approximately 3.5m bgl in silty gravels.

The dry season groundwater flow direction reported in the DSI (Grencap 2021) was inferred to be in a north westerly direction towards the intertidal mangrove community. No discernible direction of groundwater flow could be determined based on the data from the October and January GMEs after which time wet season rainfall was likely to be influencing flow direction (or lack thereof).

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### 3 HAZARD IDENTIFICATION

#### 3.1 Chemicals of Concern

The chemicals of concern specific to the stockpiled material exceeding one or more of the adopted assessment criteria are petroleum hydrocarbons, specifically diesel fuel-related fractions C<sub>10</sub> to C<sub>28</sub>. Initial testing of the stockpiled impacted material for benzene, toluene, ethylbenzene, xylene and naphthalene were below the adopted criteria and generally below detection limits. The trace detections are not considered chemicals of concern in the context of this remediation management plan.

#### 3.2 Persistence and Mobility of Chemicals of Concern

The mobility of total petroleum hydrocarbons ranges from low to high depending on the hydrocarbon molecular structure and weight. The persistence of petroleum hydrocarbons also ranges from low to high, also dependent on hydrocarbon molecular structure and weight.

Heavier hydrocarbon fractions (C<sub>10+</sub>) are less mobile compared to lighter fractions but more persistent in the environment.

Petroleum hydrocarbons may dissipate over time via volatilisation and natural biodegradation processes under aerobic conditions.

#### 3.3 Nature and Extents of Identified Impacts

The nature and extent of impacts resulting from the diesel spill are presented in the DSI (Greencap, 2021). The material relevant to this remediation management plan is limited to the soil excavated from the spill site and stockpiled in the location shown in Figure 2. The approximate volume of this soil was estimated at 800m<sup>3</sup>.

The stockpile consists of two distinct horizontal layers separated by a plastic membrane. During the initial excavation works in the area of the spill attempts were made to segregate highly impacted material and lesser impacted material. Results from testing the two layers indicates the upper layer is less contaminated with total recoverable hydrocarbon concentrations ranging from 363mg/kg to 28,100 mg/kg in comparison to the lower layer with concentrations ranging from 8,900mg/kg to 54,000 mg/kg. Volume estimations for the two layers are to be confirmed during the relocation of the material.

#### 3.4 Potential Receptors

##### Potential Receptors

The DSI (Greencap, April 2021) identified potential human ecological receptors at the spill site. The potential receptors relevant to the current stockpile and future remedial works are as follows: -

Onsite:

- Onsite workers.
- Site visitors who may be spending some amount of time onsite.
- Future construction workers involved in any potential site development/repair work.
- Future maintenance workers, who may be required to maintain or repair various areas, including underground infrastructure at the site.

Offsite:

- Potential environmental receptor of the intertidal mangrove community.
- Users of the various commercial industrial properties near the site.
- Offsite users of extracted groundwater.

### 3.5 Potential Exposure Pathways

Exposure in relation to site contamination means an exposure pathway that a chemical substance takes from its source to reach a population, such as incidental ingestion of surface soil or indoor dust, indoor and outdoor inhalation of dust, or consumption of home grown produce. Potential exposure pathways considered relevant for the diesel impacted soils currently stockpiled are:

#### Human

- Outdoor inhalation of dust;
- Dermal contact with shallow soil and dust;
- Incidental ingestion of shallow soil and dust;
- Outdoor inhalation of vapour from soil; and
- Contact or ingestion of impacted surface water, leachate or groundwater.

#### Ecological

- Direct contact/uptake of contaminated airborne particles, soil, sediment, surface water, surface water runoff or groundwater.
- Ingestion of or contact with contaminated sediment/water by flora or fauna.

### 3.6 Source Pathway-Receptor Linkages

There are several potential transport mechanisms which could create pathway receptor linkage such as wind erosion and atmospheric dispersion, stormwater/surface water transport and leaching to groundwater as well as the potential for direct contact. The remediation of the impacted soils aims to remove the potential for long-term pathway receptor linkages. To address the potential for pathway-receptor linkages until the soil is deemed suitable for onsite retention or disposed of offsite, management measures are required. The measures are detailed in Section 6.

## 4 REMEDIATION OPTIONS AND ISSUES

### 4.1 Remediation Goals and Objectives

The Remediation Action Plan (RAP) (Greencap, June 2021) identified that the heavily impacted soil was not suitable for re-use at the time and that bio-remediation measures (or alternative remediation) were required prior to re-using the soil or disposing of it to landfill. The goal of the remediation is therefore to treat the soil to a level at which it can be safely reused/stored onsite or disposed of offsite.

The hierarchy of actions for bioremediation in the Northern Territory as listed in the Northern Territory Contaminated Land Guideline (NT EPA, 2017) is as follows:

1. On-site treatment of the chemical substances to reduce risk to an acceptable level.
2. Off-site treatment of excavated soil to reduce risk to an acceptable level, after which the treated soil is returned to the site.
3. Containment of soil on site with a properly designed barrier for disposal of affected soil to an approved landfill.

A remediation options assessment presented in the DSI (Greencap, 2021) considered the nature of the material (heavy fraction hydrocarbon) and location of the site (adjacent sensitive receptors). The options assessment identified:

1. On-site treatment in its current location presents an elevated risk due to the location of the soil in proximity to a sensitive receptor. Rigorous additional control measures will be needed to be maintained to ensure appropriate retention of material given the contaminant is diesel.
2. Off-site treatment offers a means to remove the existing source-receptor (mangroves) pathway however this would require a suitable treatment facility and would incur additional transport and management costs.
3. On-site containment is not appropriate until treatment has been conducted; and is complicated by the proximity to sensitive receptors and shallow groundwater. Disposal to landfill is not yet feasible.

An onsite location which reduces the risk to the nearby sensitive receptors was identified for potential longer term onsite storage and treatment allowing for onsite treatment to be pursued. This was selected as the preferred remediation option, aligning with NT EPA bioremediation preferences. Information on the locations' suitability is discussed in Section 5.1.

With regards to onsite treatment being a long term and cost-effective solution, further scrutiny is proposed to validate or otherwise its selection whilst optimising the design to ensure it will best meet project and stakeholder objectives. A pilot trial including a detailed assessment of the soil condition is planned.

Dependant on the level of success of the remediation and if onsite retention is chosen ongoing management may be required to ensure risks are managed into the future. Ongoing site management is outside the scope of this RMP and if required will be included in a Site Management Plan (SMP) under a separate cover.

## 5 REMEDIATION - SCOPE OF WORK

In general terms, the scope of the remediation will comprise:

- Assessment of the impacted material.
- Assessment and preparation of the receiving site.
- Relocation of the existing stockpile and construction of biopiles.
- Construction of pilot test stockpiles.
- Development of detailed remediation methodology (informed by the results of the pilot trials).
- Remediation and validation.
- Offsite disposal, reuse or onsite containment and related reporting.

### Required Hold Points

Discussions held at key points during the remediation / validation works are as follows:

- Start-up meeting with all relevant parties: One Rail, Greencap, Civil Contractor.
- Visual inspection of the liner prior to placing soil.
- Visual inspection of the completed stockpiles / biopiles and associated environmental protections prior to civil contractor demobilisation.
- Review of results of pilot trial before commencing further works.
- Review of classification documents prior to offsite disposal or reuse plan if soils are to be reused on site.
- Review of surface validation sample results prior to reporting.

Additional hold points will be detailed as required following the completion of the pilot trial and development of the detailed remediation methodology.

### 5.1 Assessment of impacted material

*TBC – Updated data will be collected of the stockpiled material to form a baseline for the remediation trials. Samples are to be collected from the biopiles as formed, marked on a plan, and compared to historical data.*

### 5.2 Assessment and preparation of the receiving site

The site shown on Figure 3 was identified as a potential location for the pilot trial and future remediation of the impacted soils based on the following:

- The site is in an unused area of the site located the greatest distance from the sensitive receptor of the Darwin Harbour's East Arm and Blesser's Creek waters. The adjacent land uses immediately surrounding the potential site not considered sensitive and are:
- Southwest – site boundary and historical industrial area – currently occupied by temporary contractors but no permanent structure is present.
- Southeast – site boundary and O'Sullivan Circuit. Beyond this is an industrial area occupied by various commercial entities.
- Northeast – road/site entrance and continuation of site. Beyond the site boundary is the intertidal mangrove habitat zone.
- Northwest – a crushed bitumen pile, vacant land/temporary storage area. A stormwater drain is present further north and beyond the site boundary is the intertidal mangrove habitat zone.
- The location is easily accessible and is out of the way of site operations.
- The size of the site is more than adequate to accommodate the volume of contaminated soil presently stockpiled into biopiles along with room for any associated infrastructure and access ways.

- The topography is suitable with the site being approximately level with a slight fall to the east.
- There is no sensitive or protected flora at the location, the site had previously been cleared and weeds had grown back across the site. Fill is present across the site consisting brown gravelly silty sand with traces of crushed rock, red brick and bitumen. Details on local geology, hydrogeology and meteorology are included in Section 2.

The site was assessed to be suitable and as a lesser risk to potential sensitive receptors. To prepare the site for receiving the impacted soils the following works are to be undertaken (in progress at the time of writing):

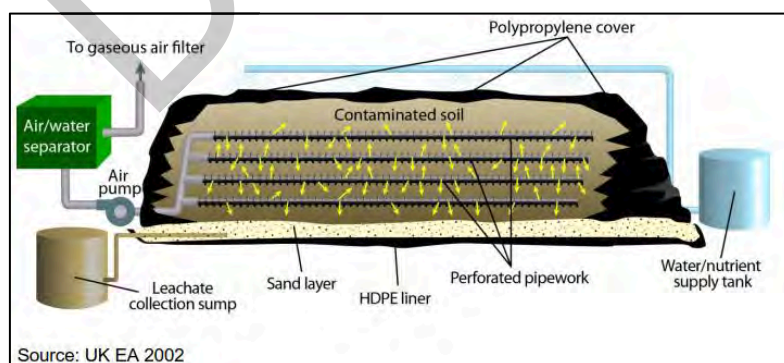
- Inform site personnel and stakeholders.
- Clear site of any existing (weed) vegetation and relocate pre-existing stockpiles to allow for adequate access and space for biopile construction.
- Inspect site post-clearing of vegetation to ensure the area and surface is suitable for biopile construction.
- Prior to the commencement of the biopile construction phase, collect and analyse several pre-placement surface samples to gather baseline soil data. Further information in Section 5.8.

### 5.3 Stockpile Relocation Pilot Trial and Biopile Construction

The design of the biopiles will be finalised following the outcomes of the pilot trial. As the proposed biopile location was considered less of a risk to the identified sensitive potential receptor and based on an expectation to proceed with biopiling the existing stockpile is to be relocated.

Movement of the stockpile will take into consideration the different levels of impacts in upper and lower layers of the existing stockpile. These will be placed into separate stockpiles so they can be treated independently as required.

While relocating some elements typically included in a biopile are to be included in the design of the stockpile awaiting the outcomes of the pilot trial. An indicative drawing showing some of the elements that can be included in a biopile is provided in Figure 5. The elements selected for the initial biopile design are the HDPE liner and leachate collection sump, a sand layer (in the form of lesser impacted sandy soils which are currently the top layer of the existing stockpile), perforated pipework for aeration, irrigation pipework and a polypropylene cover.



**Figure 5: Generic biopile design (image sourced from CRC Care, August 2018)**

The methodology for the construction of the biopiles is as follows:

- Place 40m x 5.2m wide x 0.5mm thick plastic HDPE liner as a base to withstand wet-season conditions. Liners are continuous in construction and allow a greater level of reinforcement to be used to prevent tearing in high winds.
- Following inspection and approval of the site preparation and liner placement begin relocation of less impacted soils from the temporary stockpile and place an approximate 100mm layer of less contaminated sandy soil. The sandy base material is intended to enable any leachate or run off to drain towards a leachate collection sump. The layout and design are to be determined post-completion of the biopile construction and installation is required prior to the application of water to the biopile (if opted).
- Add approximately 600mm of soil from the main contaminated stockpile and lay out three rows of drainage pipe running along the length of biopile with a metre of pipe protruding from each end.
- Adding another 600mm layer of soil from the main contaminated stockpile.
- Lay out three rows of irrigation pipe on top of the pile with a metre protruding from each end.
- Covering the biopile with plastic.
- Repeat for subsequent rows of biopiles as required and for 3x pilot trial stockpiles.

#### 5.4 Pilot Trials

A pilot bioremediation treatability study is planned to include initial laboratory analysis to assess physical properties of the soil including soil type and heterogeneity, organic content, permeability and plasticity followed by a planned 6-8 week remediation trial to determine:

1. if biodegradation is occurring, and that reductions in contaminant concentrations are not due solely to volatilization, adsorption, photodegradation and/or leaching of contaminants from the soil;
2. the effectiveness of the bioremediation design to significantly reduce contaminant concentrations during a 6-8 week study, as compared to a control;
3. design information required for the next level of remedy screening should the treatability study be deemed successful; and
4. if the bioremediation design will meet end-use clean-up goals in a timely and cost-effective manner when compared to other options.

The exact scope and requirements of the trial will be determined as part of preliminary works however it will likely include GreenCap personnel collecting a large representative sample of the contaminated soil which will be homogenised through sieving and split into a number of subsamples. Trials will include control samples as well the addition of nutrients, air and water to the pilot biopiles. The soils will be retained onsite, treated and resampled on a weekly basis over a planned 6-week period to monitor TRH concentrations and other parameters. Initial sample analysis will provide data on the soil properties such as pH, cation exchange capacity, clay content, hydrocarbon utilising bacteria, total plate count and contaminant information.

Following the conclusion of the field trials data interpretation would involve the comparison of the controls and treated values to determine if there is a statistical difference between the treated and untreated soil concentrations and assess the success of the study. If successful, the design will be evaluated and any necessary alterations made with the final design documented in the remediation plan.

The information collected as part of the bioremediation treatability study will aim to confirm the feasibility of bioremediating the impacts to acceptable levels as well as optimising the design to produce the most effective remediation method.

## 5.5 Development of Detailed Remediation Methodology

*TBA – to be informed by the results of the pilot trials this may involve the addition of nutrients, air and water to the biopiles. It will include further information on any additional environmental protection measures required as well as longer term inspection and sampling regimes.*

*In the interim daily inspections of the cover, liner, and surrounding soils by site personnel are required as detailed in Section 6. A checklist is to be provided to One Rail by Greencap to assist in completion of this task.*

## 5.6 Remediation and Validation

*TBA – based on the above.*

## 5.7 Offsite Disposal, Reuse or Onsite Containment & Reporting

*TBA – based on the results of Section 5.6.*

At the completion of the remediation a post-remediation validation report will be prepared along with a determination on the reuse of the soil onsite. If not, suitable appropriate off-site re-use options will be identified ensuring that expectations of any receiving site are met.

## 5.8 General Sampling Rationale & Methodology

The proposed sampling rationale and methodologies for stockpile, baseline and validation sampling are as follows:

- Baseline and validation samples will be collected from across the base of the excavation in a general grid pattern at a rate based on the density recommended in AS 4482.1. A minimum of five samples will be collected across the base of the site.
- Stockpile samples will be collected from at least 300mm below the surface of stockpiles. The number of samples collected will vary overtime according to project needs however prior to classification for offsite disposal or reuse on site sufficient samples will be required to characterise the soil and this will be based either of AS4482.1 or disposal criteria as relevant.
- A fresh pair of disposable gloves will be worn by the sampler when collecting each individual sample and soil samples will be placed into Teflon sealed glass jars supplied by the laboratory.
- Soil samples will be stored in an ice filled portable esky and transported to the analytical laboratory with chain of custody documentation. All laboratories used will be accredited by the National Association of Testing Authorities (NATA).

Analytical Testing will comprise:

- Soil baseline and validation samples will be analysed for TRH.
- Quality Assurance / Quality Control (QA / QC) sampling and analysis will comprise intra and inter-laboratory duplicates at a rate of 1:20, one rinsate blank per day of baseline or validation sampling) and one trip blank per portable cooler (light fraction TRH).

### 5.8.1 Soil Assessment Criteria

*TBC – NEPM and CRC Care guidelines will be used for initial onsite reuse assessment criteria however site-specific clean-up/remediation values will be determined as part of the detailed remediation scope definition as required. NT waste disposal criteria will be used as default for offsite disposal options.*

## 5.9 Quality Assurance / Quality Control (QA/QC)

QA / QC measures for all investigation work includes:

- Appropriate sample labelling, storage and transport under chain of custody procedures.
- Collection and analysis of field QA / QC samples (duplicates and blanks) (as detailed above).
- Conducting all laboratory analyses within appropriate holding times.
- Use of laboratories that hold NATA accreditation for the analyses undertaken.
- Analysis of laboratory QA / QC samples including duplicate and blanks.

Internal measures of laboratory quality assurance quality control are:

- Accuracy (measured by laboratory spike and surrogate recovery samples) within 70% - 130% recovery;
- Precision (measured by duplicate sample analysis) within 30% relative percentage difference (RPD); and
- Minimum 95% completeness (measured by total number of analyses within acceptable limits).

## 5.10 Contingency Measures

Numerous management measures are put in place to safeguard human and environmental receptors as detailed in Section 6. Detailed remediation contingencies will be documented upon completion of the pilot trial as required.

## 5.11 Materials Tracking

*TBC – However as a minimum the civil contractor shall be responsible for:*

- *Retaining all material tracking certificates (if offsite disposal is undertaken).*
- *Collating each record of material movement with all other records of material movement within 24 hours of completion of the material movement.*
- *Conducting post-relocation surveys of the stockpiles.*
- *Recording non-conformance, notify the Environmental Consultant immediately and implement corrective action procedures.*

Works must be planned and conducted to minimise the tracking of soil from one area to another within the site. Erosion and dust must also be controlled to prevent cross-contamination, further guidance is provided in Section 6.

## 5.12 Reporting

### Interim Reporting

During the remediation works the client will be provided with regular updates on the progress of the remediation work including validation results as soon as they are available, to gain agreement on the satisfactory completion of the remedial works. A hold point is the conclusion of the pilot trial and associated documentation (an updated RMP and associated documentation as required).

### Final Reporting

On completion of all remediation / validation works, a Remediation and Validation (RVR) report will be prepared detailing the works. A site management plan will need to be completed if the soil is to be contained in a dedicated cell onsite.

### 5.13 Timeframe

Stockpile Relocation – May/June

Pilot Trial – July / August (~6 weeks)

Ongoing remediation – TBC

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## 6 REMEDIATION MANAGEMENT

The Waste Management and Pollution Control Act 1998 (NT) sets out a general environmental duty under section 12 which states that:

*a person who:*

*(a) conducts an activity that causes or is likely to cause pollution resulting in environmental harm or that generates or is likely to generate waste; or*

*(b) performs an action that causes or is likely to cause pollution resulting in environmental harm or that generates or is likely to generate waste,*

*must take all measures that are reasonable and practicable to:*

*(c) prevent or minimise the pollution or environmental harm; and*

*(d) reduce the amount of the waste*

Remediation projects require many management measures similar to those recommended for civil and construction projects in a similar setting to protect the environment and comply with local, state and national guidelines and regulations. Due to the nature of remediation work additional consideration and management measures may be required for various health, safety and environmental aspects including, air quality, odours, gases, dust, noise; surface water, soil quality, groundwater, flora and fauna, heritage; and community consultation.

Site management measures and strategies focused on the remediation are proposed in Table 2. Additional general management measures typical of construction or civil projects in a similar setting that are not documented here may also be applicable.

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**Table 2: Remediation Consideration and Management Measures**

Environmental Aspect		Significance and Potential Issues	Additional Management Measures	Responsible party/parties
Public and Occupational Health and Safety	<p>Considering the known concentrations and types of soil contaminants present, normal personal protective equipment and personal hygiene provisions will be adequate to control potential health risks to workers on the site and those involved in the earthworks.</p> <p>Additional PPE will be required for sampling as guided by a SWMS.</p>	<ul style="list-style-type: none"> <li>During earthworks the contractor will ensure all personnel allowed access to the site are given a site induction, which will include the standard safety aspects of the works being conducted (including the contamination issues and associated risks).</li> <li>Dust, noise, surface water protection and soil management controls are presented below and will be adopted to minimise potential hazards to site workers and to the public associated with the earthworks.</li> <li>Normal personal hygiene will be observed, with a focus on frequent washing of hands and other exposed skin areas to prevent inadvertent dermal contact or ingestion of soils. Workers will not be permitted to smoke or handle food in the work areas.</li> </ul> <p><i>The importance of prohibiting public access to impacted soils through various site security measures such as appropriate fencing and locking of gates is not an additional management measure but is noted.</i></p>	<ul style="list-style-type: none"> <li>Greencap will be onsite during the initial relocation of the stockpile to observe works and effectiveness of dust control measures. A PID will be used to monitor ambient conditions, if elevated PIDs are recorded near the site boundary additional management measures may be recommended.</li> <li>A register of complaints in relation to various issues (including air quality) will be established. The contractor is to communicate any complaints to responsible parties immediately with the environmental consultant responsible for providing the Principal and contractor with advice.</li> </ul>	<p>Civil Contractor</p> <p>Civil Contractor</p> <p>Civil Contractor</p>
Air Quality	<p>Chemical substances when released into the air can affect air quality causing varying types and degrees of impact such as explosive conditions, toxic environments, unacceptable health risks etc.</p> <p>Based on the known soil conditions air quality is not expected to be significantly affected by the remediation works provided adequate dust control measures are implemented.</p>	<ul style="list-style-type: none"> <li>Unless advised otherwise, no specific odour control measures will be required by the Contractor at this stage. If strong odours or complaints are received the contractor will cease work and review controls with the environmental consultant. The environmental consultant will be responsible for providing the Principal and contractor with advice.</li> </ul>	<p>Civil Contractor, Greencap</p> <p>Civil Contractor, Greencap</p>	
Odours and gases (volatile emissions)	<p>Odours may cause a nuisance and community concerns because the public is likely to perceive odours as posing a health risk to the potentially affected community.</p> <p>No significantly odorous materials have been encountered during the previous site works. If odorous soils are uncovered management measures may be required.</p>	<ul style="list-style-type: none"> <li>Processes to reduce the generation of dust are considered preferential to those that manage the dust. Where practical water must be applied prior to soil excavation or handling activities with sufficient time allowed for water to infiltrate the soil so that it is at optimum moisture content before being handled.</li> <li>When applying water to manage and reduce dust emissions from stockpiles, all reasonable and practicable measures must be undertaken to prevent runoff or leaching of potentially impacted water at the site.</li> <li>A register of complaints in relation to various issues (including air quality) will be established. The contractor is to communicate any complaints to responsible parties immediately with the environmental consultant responsible for providing the Principal and contractor with advice.</li> <li>For additional guidance refer to the WA DEC publication 'A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities'.</li> </ul>	<p>Civil Contractor</p> <p>Civil Contractor</p> <p>ORA, Civil Contractor, Greencap</p>	
Dust (particulate emissions)	<p>Dust may cause concerns about potential health and environmental impacts if generated at unacceptable levels near sensitive receptors (e.g. remediation workers, neighbouring properties, mangrove environment). Meteorological conditions (e.g. wind currents) or human activities (e.g. traffic, earth moving during site clearing or remediation) may generate dust and result in dust emissions travelling off site. Dust can also be a cause for community concern due to impacts on lifestyle and amenity of the area, and potential health risks posed by chemicals within the dust.</p> <p>Dust may be generated on this project during:</p> <ul style="list-style-type: none"> <li>- Relocation of the stockpile</li> <li>- Reworking of the material into biopiles</li> <li>- Storage of the material in biopiles</li> </ul> <p>Refer to 'Dust (stockpile management) in the follow row for further information.</p>			

Environmental Aspect	Significance and Potential Issues	Additional Management Measures	Responsible party/parties
Dust (stockpile management)	Stockpiles, if not correctly managed, can represent a considerable source of dust due to their height, uncompacted nature and (frequently) close proximity to sensitive receptors.	<ul style="list-style-type: none"> <li>Stockpiles should have a maximum height of 3m, or equal to or lower than the average height of surrounding structures. Stockpile height must reduce as it approaches the site boundary.</li> <li>Stockpiles will be covered with an effective covering. At this stage, a plastic liner is recommended to be constructed as per the initial stockpile and secured against strong winds. Stockpiles should be at optimum moisture content before being handled. Water can be applied the night before and allowed to infiltrate the stockpile. Applying water to a stockpile during handling has little effect on reducing dust emissions. Using water jets or sprays has minimal effect in capturing airborne dust, especially when out in the open.</li> <li>Stockpiles will be established on plastic liners to prevent direct contact with underlying soils.</li> <li>For additional guidance refer to the WA DEC publication 'A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities'.</li> </ul>	Civil Contractor  Civil Contractor  Civil Contractor
Noise	<p>Noise from earthmoving, compaction activities, machinery, sirens and vehicles can be a health risk to workers and a nuisance for neighbouring properties.</p> <p>Failure to adequately address noise issues associated with remediation activities may also have legislative implications under specific legislation and policies.</p> <p>Noise may be generated on this project during:</p> <ul style="list-style-type: none"> <li>Relocation of the stockpile</li> <li>Reworking of the material into biopiles</li> </ul>	<ul style="list-style-type: none"> <li>The site is located in a built up commercial industrial area and no excess project noise is expected. No noise management measures additional to standard industry practices are expected to be required. The contractor should be familiar with and follow the following guidance and references: <ul style="list-style-type: none"> <li>ASC NEPM B2, section 15.2.7</li> <li>NT EPA Northern Territory Noise Management Framework Guide, 2018</li> </ul> </li> <li>A register of complaints in relation to various issues (including noise) will be established. If complaints are received management measures will be reviewed following review of complaints registered in relation to noise, additional measures such as amending working hours and certain on-site operations may be considered.</li> </ul>	Civil Contractor  ORA, Contractor Civil Contractor
Surface Water	<p>Surface waterbodies receive stormwater, which runs directly into waterways, lakes and, ultimately oceans. Runoff from rainfall and natural site drainage may carry with it leachate or suspended solids containing chemical substances.</p> <p>Management of surface waters during remediation activities is an important part of protecting the health of our waterways and preventing the spread of pollution.</p> <p>Containing surface water runoff to prevent silt and contaminants from entering the stormwater system is the main potential issue in terms of surface water protection.</p> <p>Surface water impacts may be generated on this project during:</p> <ul style="list-style-type: none"> <li>Mobilisation/loss of impacted soil to the adjacent open unlined drain during stockpile relocation works</li> <li>Mobilisation/loss of impacted soil to the adjacent open unlined drain during the reworking of the material into biopiles</li> <li>Mobilisation/loss of impacted soil to the adjacent open unlined drain during the storage of biopiles</li> </ul> <p>The nearest sensitive receptor is the Mangrove community to the north of the site. A stormwater drainage system is a potential conduit for contaminated run-off.</p>	<ul style="list-style-type: none"> <li>Movement of stockpiles should be planned to avoid the wet season where possible.</li> <li>Water runoff from any potentially contaminated soil stockpiles will be restricted by covering the stockpiles and placing sediment fencing/bunting around the stockpiles.</li> <li>The contractor will be familiar with and adhere to the following guidance and references: <ul style="list-style-type: none"> <li>ASC NEPM B2, section 15.2.3</li> <li>Keeping Our Stormwater Clean – A Builder's Guide</li> <li>NT EPA Guidelines to Prevent Pollution from Building Sites, 2015</li> </ul> </li> <li>An Erosion and Sediment Control Plan will be developed and implemented prior to the onset of the wet season.</li> <li>Any temporary water storages (e.g. leachate generated from biopiles) are to be located and designed to ensure there is no potential adverse impact on surface water. They will not be located near existing surface drainage paths or drain inlets.</li> </ul>	Civil Contractor  ORA, Civil Contractor  ORA, Greencap  ORA, Civil Contractor

Environmental Aspect	Significance and Potential Issues	Additional Management Measures	Responsible party/parties
Soil Quality	<p>Taking care to prevent cross contamination of nearby clean soils is important to avoid the spread of chemical substances, and to minimise the amount of soil needing to be treated or disposed of and the resources required to undertake the project. Similarly, care must be exercised so that polluted surface water does not affect clean soils.</p> <p>If offsite disposal of soil is to be undertaken it must be to an appropriate receiving site using appropriate documentation and contractors.</p> <p>Soil quality impacts may be generated on this project during:</p> <ul style="list-style-type: none"> <li>- Residual impacts following relocation of impacted soil to the proposed storage area.</li> <li>- Impacts to the footprints of the proposed biopile locations.</li> </ul>	<p>The contractor will undertake the following minimum management measures: -</p> <ul style="list-style-type: none"> <li>• Direct contact between impacted and unimpacted soils is to be prevented through use of liners on the base of stockpiles/biopiles.</li> <li>• Ensure contractors or subcontractors hold appropriate licensing and comply with licensing and documentation requirements for the transportation of soil.</li> <li>• Immediately load excavated material into trucks for transportation or stockpile in accordance with this RMP.</li> <li>• Immediately notify the environment consultant of unexpected finds or conditions.</li> <li>• Track materials in accordance with Section 5.11.</li> <li>• Manage stockpiles in accordance with the dust (stockpile management) section.</li> </ul> <p>The ultimate fate of any soils handled/relocated during remediation and / or validation works will need to be tracked and recorded appropriately.</p>	Civil Contractor
Groundwater	<p>Whilst the civil works are not likely to directly result in adverse impacts on groundwater, there is a groundwater monitoring well network on the site.</p> <p>Groundwater impacts may be generated on this project during:</p> <ul style="list-style-type: none"> <li>- Leaching of impacts from stockpiled material.</li> <li>- Leaching of impacts from biopiles.</li> </ul>	<ul style="list-style-type: none"> <li>• Refer to Dust (stockpile management) and Soil Quality.</li> </ul>	All
Flora and Fauna	<p>Areas of sensitive vegetation and significant trees have substantial environmental value and must be protected, even where site contamination may exist.</p> <p>Potential impacts to flora and fauna on this project relate to:</p> <ul style="list-style-type: none"> <li>- Discharge of impacted soil/water to the receiving mangrove environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Refer to Dust (stockpile management), Soil Quality and Surface Water.</li> </ul>	All
Heritage	<p>No known structures, landscape elements, archaeological deposits or vegetation of heritage significance are known to exist at the site.</p>	<ul style="list-style-type: none"> <li>• If any of the elements listed are identified during the works the contractor shall cease work in that area, inform the Principal and contact the environmental consultant for further advice.</li> <li>• Note: Guidance and references to be referred to in such an occurrence are listed in the Guidelines for the assessment and remediation of site contamination – Appendix 6.</li> </ul>	Civil Contractor, Greencap
Contingency	<p>Unexpected environmental or occupational health and safety issues may arise during the remediation works.</p>	<ul style="list-style-type: none"> <li>• Any additional environmental or health and safety issues that arise will be reported immediately so that specific management measures can be implemented.</li> </ul>	All

## 7 ROLES & RESPONSIBILITIES

The following roles have been established for the Remediation works:

Title	Name	Phone	Email
<b>One Rail Australia Representative</b>			
Environmental Manager	Adam Reed	0458 628 406	adam.reed@1rail.com.au
Site Manager	Brendon Louez	0404 048 546	brendon.louez@1rail.com.au
<b>Greencap (Environmental Consultant)</b>			
Project Manager	Dylan Burford	0436 471 235	Dylan.Burford@greencap.com.au
Field Supervisor	Varun Bhagwat	0428 829 444	Varun.Bhagwat@greencap.com.au
Technical / report writing support	Peter Spiers	0437 500 734	Peter.Spiers@greencap.com.au
<b>Darwin River Diggers (Civil Contractor)</b>			
Project / Site Manager	Kohan Fox	0418 835 547	darwinriverdiggers@bigpond.com
<b>NT EPA (Regulator)</b>			

The remediation works are to be overseen and validated by Greencap (Environmental Consultant) with a civil contractor directly engaged for portions of the work (soil movement). For the purposes of this document the following roles and responsibilities are proposed:

- One Rail Australia – Responsible for overall direction. Daily site inspections when Greencap and civil contractor are not onsite.
- Greencap – Environmental Consultant responsible for project management, overseeing earthworks conducted by the civil contractor, technical guidance and instruction on biopiles, soil sampling and reporting. Greencap is also responsible for conducting validation works and documenting that the remediation works have been completed satisfactorily and in accordance with this RMP.
- Darwin River Diggers – Civil Contractor – Responsible for soil movements and construction of biopiles and associated infrastructure. This may also include waste tracking and transportation for off-site disposal depending on final soil results.
- NT EPA – Regulator.

Notwithstanding any other part of this work plan, the civil contractor is to use their best endeavours to:

- Cooperate with the other parties;
- Manage the site in accordance with supplied documentation and this RMP; and
- Handle excavated soil in the manner described in this RMP.

# GROUNDWATER MONITORING EVENT - ANNUAL REPORT

July 2021  
J168829-01

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## 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.

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.

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# Groundwater Monitoring Event - Annual Report

## One Rail Australia

### Berrimah Freight Terminal

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## 1 INTRODUCTION AND BACKGROUND

Grencap Pty Ltd (Grencap) was commissioned by One Rail Australia (ORA) to undertake a quarterly monitoring event and to prepare an Annual Groundwater Monitoring report 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, **Figure 1** and **Figure 2**) following a diesel spill event that occurred in May 2020.

A diesel spill estimated at approximately 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, 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 residual impacted soil could not be feasibly recovered from beneath the rail lines and underground services backfill in the vicinity of the spill site. The presence of residual diesel contamination in soil may potentially cause impacts on the quality of groundwater beneath the site and as such it was considered necessary to develop and implement this groundwater monitoring and management (GMMP) to monitor groundwater quality and enable the development of mitigation measures in the situation groundwater impacts beneath the site are deemed to present an unacceptable risk to human health or the environment. This activity also complies with item 1)a. of the AOD issued 4 June 2020. Furthermore, the monitoring plan also includes the collection of stormwater and sediment samples to assess potential migration of hydrocarbons impacts from the in situ impacted material.

Four quarterly monitoring events have been conducted since the diesel spill occurred, in July 2020, October 2020, January 2021 and April 2021. As per the GMMP requirements, an annual monitoring report is to be prepared upon the completion of four quarterly GMEs.

The objective of the report is to provide an overall comparison of all monitoring events and to assess trends in groundwater impacts (if any) over a one year of monitoring since the spill.

## 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 2**). 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, transfer of freight to and from heavy rail, locomotive/car maintenance sheds at the east end of the Site, 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 3**.

### 3 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 DSI confirmed diesel impacts were present as follows:

- Within the 1 Road rail line (total recoverable hydrocarbons (TRH) C<sub>6</sub>-C<sub>10</sub> 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 >C<sub>10</sub>-C<sub>40</sub> 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 >C<sub>10</sub>-C<sub>40</sub> 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 >C<sub>10</sub>-C<sub>40</sub> as high as 39,000 mg/kg) that present a risk to down-gradient ecological receptors.

The 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.

A mass balance calculation estimated approximately 18,600 L of diesel had been recovered and that approximately 2,000 L of diesel may still remain subsurface at the spill site.

The DSI concluded that the site in its current condition does not pose an unacceptable risk to the identified human health and environmental receptors (i.e., onsite workers, site visitors and contractors, potential groundwater users, the intertidal mangrove community and the Darwin Harbour). However, the risk to the receptors may change if:

- Site development occurs involving excavation of contaminated soils; or
- Groundwater is extracted for any human consumption; or
- Contaminated groundwater reaches the intertidal area.

One of the works recommended from the DSI is to develop and implement a Groundwater Monitoring and Management Plan (GMMP) to include monitoring of groundwater, surface water and sediment. The GMMP is detailed in Section 4 below.

## 4 GROUNDWATER MANAGEMENT AND MONITORING PLAN

### 4.1 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.

### 4.2 Monitoring Network

#### 4.2.1 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 1. Groundwater monitoring wells were constructed in accordance with “*Minimum Construction Requirements for Water Bores in Australia (2003)*” and surveyed by a qualified surveyor.

Well locations are presented in **Figure 4**.

Table 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 <sup>1</sup> 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

<sup>1</sup>LNAPL – 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

#### 4.2.2 Other Monitoring Points

The monitoring of surface water and sediments was also included in the GMMP. Surface water and/or sediment samples were to be collected during each scheduled GME. Opportunistic samples were 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**. Justification for the locations is outlined below in Table 2.

Surface water (stormwater) samples were collected as appropriate when stormwater is present in the drains. Sediment samples were to be collected during all sampling events.

Table 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

### 4.3 Trigger Values

Groundwater, surface water and sediment trigger levels were designed to assess any 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 have been adopted as trigger levels for review/further action. Down-gradient receptors include the marine ecosystem of Darwin Harbor, therefore 99% species protection prescribed by the ASC NEPM/ANZECC has been 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 3 which were also included as trigger levels for groundwater and surface water monitoring.

**Table 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)**

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

#### 4.3.1 Groundwater

The adopted trigger levels for the groundwater monitoring program are included in Table 4.

**Table 4 - 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 <sub>6</sub> -C <sub>10</sub> less BTEX (F1)	NL	-
>C <sub>10</sub> -C <sub>16</sub> less naphthalene (F2)	NL	-
Sum of >C <sub>10</sub> – C <sub>34</sub>	-	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

^ ANZECC 2018 (diesel fraction applied, refer Table 3)

It is noted that no trigger levels have been set for the physio-chemical parameters measured during groundwater sampling and natural attenuation parameters as these are considered to be indicators to assess whether groundwater conditions generally support natural biodegradation of petroleum hydrocarbons.

#### 4.3.2 Surface Water & Sediments

Adopted trigger levels for the surface water and sediment monitoring program are presented in Table 5.

**Table 5 – Surface water & Sediment Trigger Levels**

Analyte	Trigger Level (mg/L)	
	Surface water (mg/L)	Sediment (mg/kg)
C <sub>6</sub> -C <sub>10</sub> less BTEX (F1)	< Limit of Reporting	< Limit of Reporting
>C <sub>10</sub> -C <sub>16</sub> less naphthalene (F2)	< Limit of Reporting	-
Sum of >C <sub>10</sub> – C <sub>34</sub>	0.3	280 <sup>#</sup>
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 - Vol 1 (ANZECC 2000a) - Section 3 Aquatic ecosystems

\*\* Australian and New Zealand guidelines for fresh and marine water quality – Vol 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>

#### 4.3.3 Application of Trigger Levels

In the event that a reported concentration of an analyte exceeded a trigger level presented in Table 4 or Table 5, then response measures outlined below apply.

##### Groundwater

##### Level 1 – Additional Monitoring, Assessment and Review

If the result does not exceed the adopted trigger value (listed in Table 3) 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.

## Surface water and Sediment

### Level 1 – Additional Monitoring, Assessment and Review

If the result does not exceed the adopted trigger value (listed in Table 5) 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**).
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.

## 4.4 GMMP Review

The GMMP is to be reviewed by a suitably qualified environmental consultant at the end of the wet season, i.e., following four monitoring events. 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 diesel fuel related contaminants of potential concern (COPC) in groundwater in exceedance of GSLs/GILs.
- Observation of COPC in surface water in exceedance of adopted trigger levels.
- Observation of COPC in sediment in exceedance of adopted trigger levels.
- 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.

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## 5 GROUNDWATER MONITORING EVENTS

This section provides a summary of all GMEs conducted to date. The results of GMEs conducted in July 2020, October 2020 and January 2021 are included in the monitoring letter reports submitted under separate covers. The results of the April 2021 GME are reported in this report.

### 5.1 Sampling Methodology

Groundwater samples were collected during each GME 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.

### 5.2 Previous Sampling Results

#### 5.2.1 July 2020

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.

The groundwater flow direction was inferred to be to the northwest towards mangrove intertidal zone. Hydrocarbons likely associated with diesel impacts were reported for two groundwater wells (MW01 and MW04) with results below trigger values.

#### 5.2.2 October 2020

Four additional groundwater monitoring wells MW05 to MW08 were installed in October 2020 to further delineate the extent of the hydrocarbon impacts as part of the DSI and to monitor for potential groundwater impacts adjacent the nearest sensitive receptor being the tidal mangrove zone.

No discernible 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 6cm 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 nine 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.

### 5.2.3 January 2021

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

Previously reported hydrocarbon impacts in 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 in October 2020. The presence of petroleum hydrocarbons was reported for two groundwater monitoring wells (MW03 and MW08) located along the spill-impact area.

Groundwater flow was inferred to be to the north.

### 5.3 April 2021

The April GME was conducted between 30 April 2021 and 5 May 2021, with the slight delay being attributable to some wells being inaccessible on 30 April.

MW02 was initially sampled on April 30 with reported concentrations of several hydrocarbon fractions above detection levels. As no detections were reported in MW02 in previous GMEs, MW02 was resampled on 20 May 2021 and reported concentrations were below laboratory limits of reporting (LORs).

The data from MW02 sampled on 20 May is presented in the following field observations and analytical results.

#### 5.3.1 Field Results

The physio-chemical field parameters measured in/from each monitoring well were recorded and summarised in Table 6 and Table 7. Field records are included in **Appendix A**.

**Table 6 – April 2021 GME Field Observations**

Well ID	Temperature (°C)	Electrical Conductivity (µS/cm)	pH	ORP (mV)	Dissolved Oxygen (% saturation)
MW01A	33.6	54,305	6.48	38.1	56.1
MW02	33.0	19,978	5.02	99.7	4.0
MW03	34.3	3,065	6.66	113.6	57.6
MW04	34.4	8,350	5.44	127	3.1
MW05	33.3	31,793	5.42	56.6	4.5
MW06	33.4	10,792	5.25	94.2	2.3
MW07	34.6	12,638	5.40	54.2	11.3
MW08	36.4	9,214	5.34	36.2	1.0

As shown in Table 6, the groundwater beneath the area is saline (with significant salinity range between 3,065 and 54,305 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 (associated with the diesel spill).

The gauging round was conducted on 5 May 2021. Density adjustments have been made to the measured groundwater levels as a result of the large range in salinity. As the groundwater salinity varies across the aquifer, the measured groundwater heads have been adjusted using the following commonly applied formula presented in the majority of hydrogeological textbooks (e.g., Fetter et al):

$H_f = H_n(\rho_n/\rho_f) * H_n + Z$ , where:

$H_f$  – fresh groundwater head (m)

$\rho_f$  – freshwater density ( $\text{kg/m}^3$ )

$\rho_n$  – density of water in the well “n” ( $\text{kg/m}^3$ )

$H_n$  – water head in well “n” (m)

$Z$  – reference point (m Australian Height Datum, AHD)

**Table 7 – April 2021 GME Groundwater Levels**

Well ID	Easting	Northing	Well Elevation (mAHD)	Standing Water Level (mbtoc)	Depth to LNAPL (mbtoc)	SWL Elevation (mAHD)	Calculated Water Density* ( $\text{kg/m}^3$ )	Density corrected levels (mAHD)
MW01	708423.825	8620973.001	5.958	2.678	2.624	NC	NC	NC
MW01A	708416.945	8620986.556	5.921	2.585	-	3.336	1019	3.391
MW02	708491.822	8620929.677	5.026	1.288	-	3.738	1004	3.767
MW03	708498.128	8621016.708	5.891	2.557	-	3.334	996	3.335
MW04	708460.568	8621002.703	5.931	2.596	-	3.335	998	3.337
MW05	708374.723	8621004.469	5.249	1.926	-	3.323	1009	3.342
MW06	708470.486	8621039.916	5.262	1.942	-	3.320	999.5	3.329
MW07	708398.119	8620980.232	5.906	2.567	-	3.339	1000	3.350
MW08	708521.037	8621025.589	5.970	2.646	-	3.324	998	3.331

NC not calculated; \*Calculated based on field measured salinity and temperature.

Groundwater level contours were constructed using the density corrected gauging results. Groundwater level gauging results are shown on a plan included in **Figure 6**. Based on the gauging results the direction of groundwater flow is to the north towards mangroves which is consistent with the majority of the previous results.

### 5.3.2 QA/QC Results

#### Groundwater Duplicate Analysis

Field duplicates (QC01 and QC01A, duplicates of MW03) were collected during the April 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 **Appendix B**).

#### Blank Analyses

Rinsate blank samples (RB01, RB02 and RB01) was collected on 30 April, 5 May and 20 May 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.

Trip blank samples (TB01 and TB02) were 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 **Appendix B**).

#### 5.4 Annual 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 during all monitoring events. The results are included in **Appendix B** and summarised in Table 8. Laboratory certificates for the April 2021 GME are included in **Appendix D**. Other laboratory certificates are included in previous GME reports.

**Table 8 – Annual Analytical Results (µg/L)**

Monitoring Well	Sampling Dates	F2: TRH (C <sub>10</sub> -C <sub>16</sub> less naphthalene)	F3: TRH (>C <sub>16</sub> -C <sub>34</sub> )	TRH (>C <sub>10</sub> -C <sub>34</sub> )	Ethylbenzene	O-Xylene
Trigger Value	-	-	-	300	50	350
MW01	30-Jul-20	140	<100	140	2	3
	14-Oct-20	Not sampled due to presence of ~6cm of LNAPL				
	21-Jan-21	Not sampled due to presence of ~2cm of LNAPL				
	05-May-21	Not sampled due to presence of ~5cm of LNAPL				
MW01A	14-Oct-20	<50	600	640	2	3
	21-Jan-21 / 05-May-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
	05-May-21	<50	<100	<100	<1	<1
MW04	30-Jul-20	240	400	640	<1	1
	14-Oct-20	520	1,300	1,820	<1	1
	21-Jan-21	<50	<100	<100	<1	<1
	05-May-21	240	<100	<100	<1	<1
MW05	14-Oct-20 / 21-Jan-21 / 30-Apr-21	<50	<100	<100	<1	<1
MW06	14-Oct-20 / 21-Jan-21 / 30-Apr-21	<50	<100	<100	<1	<1
MW07	14-Oct-20 / 21-Jan-21 / 30-Apr-21	<50	<100	<100	<1	<1
MW08	14-Oct-20	<50	<100	<100	<1	<1
	21-Jan-21	<50	100	100	<1	<1
	05-May-21	<50	<100	<100	<1	<1

Over four monitoring events diesel related hydrocarbon impacts were reported as follows:

- at MW01 in a form of LNAPL since October 2020.
- at MW01A in October 2020. However, no impacts were reported in January and April 2021.
- at MW04 in July, October 2020 and May 2021 with no impacts reported in January 2021.

The reported hydrocarbon impacts at MW03 and MW08 in January 2021 were not repeated during the April/May 2021 GME with results reported below laboratory detection levels.

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

During the January and April 2021 GMEs, groundwater samples were also tested for a suite of analytes to assess natural attenuation of petroleum hydrocarbons in groundwater. This includes methane, ferrous iron ( $\text{Fe}^{2+}$ ), manganese, nitrate (N), sulphate ( $\text{SO}_4$ ) and alkalinity as  $\text{CaCO}_3$ . Results are presented in the Table 9 below.

**Table 9 – January/April 2021 Natural Attenuation Parameter Results (mg/L)**

Well ID	Sample Date	$\text{Fe}^{2+}$	$\text{NO}_3$	$\text{SO}_4$	$\text{CaCO}_3$	Manganese	Methane
MW01A	21-Jan-21	20	0.63	2900	90	1.2	<0.05
	5-May-21	7.6	0.11	2800	87	2.2	<0.05
MW02	21-Jan-21	<0.05	0.46	480	<20	3.8	<0.05
	30-Apr-21	0.08	0.11	920	<20	9.8	<0.05
MW03	21-Jan-21	<0.05	1	180	<20	1.1	<0.05
	5-May-21	0.4	1.7	190	<20	1.1	<0.05
MW04	21-Jan-21	0.18	1.2	290	21	1.2	<0.05
	5-May-21	0.36	0.78	410	24	2.4	<0.05
MW05	21-Jan-21	5.8	<0.02	2100	35	0.88	<0.05
	30-Apr-21	2.6	0.13	1600	28	0.96	<0.05
MW06	21-Jan-21	<0.05	1.1	320	<20	1	<0.05
	30-Apr-21	0.08	0.66	490	<20	1.5	<0.05
MW07	21-Jan-21	3.8	0.69	850	37	1	<0.05
	5-May-21	6.2	0.7	530	21	1.4	<0.05
MW08	21-Jan-21	1	1.2	290	<20	1.3	<0.05
	5-May-21	2.3	1.3	430	24	1.6	<0.05

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.

In comparing the results between the January and April GMEs, there has been an increase in ferrous iron and manganese concentrations at the locations of diesel impacts (except MW01A) possibly indicating some biodegradation of hydrocarbons. Some reduction in nitrate but no reduction in sulfate and no presence of methane may indicate that the biodegradation has not reached the methanogenic stage.

Change in concentrations of these chemicals will be further reviewed and biodegradation potential will be assessed during subsequent monitoring rounds.

## 5.5 Trend Analysis

### Plume Stability

Plume stability has been evaluated via Mann-Kendall statistical analysis.

Trend analysis has been undertaken to assess whether the concentrations of chemicals of concern show any discernible trends indicative of an increase in the level of risks to the human health or the environment.

The trend analysis was conducted using the industry recognised Mann-Kendall statistical tool. This can only be used for the groundwater monitoring wells which have been sampled at least four times to provide a statistically viable dataset, i.e., four results above laboratory limits of reporting (LOR) are available. Only MW03 and MW04 were considered suitable for the trend analyses.

The results of the Mann-Kendall analyses are presented in Table 10 and the output tables are presented in **Appendix C** (note: half LORs were used where one out of three results reported below LOR).

**Table 10 – Mann-Kendall Analyses**

Well ID	Trend (Confidence Factor)		
	F2: TRH (C <sub>10</sub> -C <sub>16</sub> less naphthalene)	F3: TRH (>C <sub>16</sub> -C <sub>34</sub> )	TRH (>C <sub>10</sub> -C <sub>34</sub> )
MW03	Stable (37.5%)	No Trend (50.0%)	No Trend (50.0%)
MW04	Stable (50.0%)	No Trend (72.9%)	No Trend (72.9%)

As shown in Table 10 no increasing trends were identified. The concentrations of the diesel-related hydrocarbons are reported as 'stable' for the F2 fraction and 'no trend' for the F3 fraction and TRH (>C<sub>10</sub>-C<sub>34</sub>) in both wells.

The trends will continue to be monitored as more data will be collected from future sampling events.

## 5.6 Groundwater Seepage Velocity

The direction of the groundwater flow was inferred to be to generally to the north, north west towards Bleasers Creek (refer Figure 7 attached) which discharges into Frances Bay of the Darwin Harbour. To assess potential groundwater seepage velocity an estimation of hydraulic conductivity of the uppermost aquifer has been undertaken.

The hydraulic conductivity was estimated using data collected during groundwater sampling (using low-flow sampling techniques, see Appendix A for April 2021 records and relevant appendices in previous GME reports). This is considered an appropriate method as during sampling the purging (pumping) rates and groundwater levels were stable. Therefore, Thiem's equation, developed for steady state conditions during pumping tests can be used as follows:

$$K = 2.3 * Q * \log(R/r) / 2 * \pi * s * m, \text{ where}$$

K = hydraulic conductivity

Q = purging (pumping) rate

R = radius of influence from the purging

r = radius of well

s = drawdown achieved during purging (pumping)

m = aquifer thickness

The radius of influence (R) was estimated using the empirical Sichardt equation  $R=3000*s*\sqrt{K}$ . It was calculated that radius of influence is about 10 times the drawdown for expected ranges of K. The minimum value for radius of influence used was 0.5m. The radius of influence is not considered to be an overly sensitive parameter because the radius value in the above formula is a logarithm rather than the actual number.

The results of hydraulic conductivity estimations conducted using groundwater purging results during the groundwater sampling events July 2020, October 2020, January 2021 and April 2021 are presented in Table 11.

**Table 11 – Hydraulic Conductivity Estimates**

Well ID	Sample Date	Pump rate (L/min)	*Drawdown (m)	Radius of influence (m)	Aquifer thickness ** (m)	K (m/day)	K (m/sec)	K, m/day-average/well
MW01	Jul-20	0.38	0.01	0.5	5	5.14	5.95E-05	5.14
MW02	Jul-20	0.39	0.01	0.5	5	5.33	6.17E-05	6.05
	Oct-20	0.40	0.01			5.49	6.35E-05	
	Jan-21	0.50	0.01			6.86	7.94E-05	
	Apr-21	0.48	0.01			6.53	7.56E-05	
MW03	Jan-21	0.42	0.70	7	5	0.16	1.80E-06	0.16
MW04	Jan-21	0.58	0.16	2	5	0.73	8.47E-06	0.64
	Apr-21	0.44	0.16			0.55	6.42E-06	
MW05	Jan-21	0.50	0.01	0.5	5	6.86	7.94E-05	5.72
	Apr-21	0.33	0.01			4.57	5.29E-05	
MW06	Jan-21	0.53	0.01	0.5	5	7.32	8.47E-05	5.53
	Apr-21	0.27	0.01			3.74	4.33E-05	
MW07	Jan-21	0.28	0.01	0.5	5	3.78	4.38E-05	4.28
	Apr-21	0.35	0.01			4.77	5.52E-05	
MW08	Jan-21	0.46	0.05	1	5	1.56	1.80E-05	1.15
	Apr-21	0.35	0.08			0.75	8.67E-06	
Geometric mean value adopted for the site (m/day)						2.7		

\* denotes difference between standing water level and water level during purging (pumping); \*\* assumed to be 5 metres based on well logs included in the DSI.

The estimated well-specific average hydraulic conductivity values range between 0.16m/day and 7.3m/day likely representing variable proportions of coarse material within the aquifer matrix (refer well logs included in the DSI). The geometric mean for hydraulic conductivity at the site was calculated to be 2.7 m/day.

The groundwater seepage velocity at the site was estimated using the calculated hydraulic conductivity geometric mean, a hydraulic gradient of 0.005 (refer attached **Figure 6**) and an effective porosity of 0.2 (published data for sandy aquifers). The groundwater flow velocity was estimated to be in order of 25m/year. As shown on **Figure 7** the nearest environmental receptor is likely to be aquatic ecosystem of Blesers Creek which is located approximately 350-400 metres down inferred hydraulic gradient of the site area. Therefore, un-retarded travel time for the plume to reach the receptor is estimated to be greater than 10 years.

## 6 SURFACE WATER AND SEDIMENT SAMPLING

As per the GMMP, surface water and/or sediment samples were collected during the January and April 2021 monitoring events to assess for potential migration of hydrocarbon impacts.

Sampling locations are associated with drains downgradient of the spill site and presented in **Figure 5**.

Surface water (stormwater) samples were only collected when stormwater was present in the drains. Sediment samples were collected during both sampling events.

### 6.1 Sampling Methodology

The following sampling methodology was applied:

- Surface water samples were collected from the stormwater drains directly into the appropriate sampling containers by an analytical laboratory with the aid of an extension pole equipped with a bottle holder.
- The collected samples were 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.

### 6.2 Field Observations

Surface water and sediment samples were collected in January and April 2021 from sample locations 3 (SW03) and 4 (SW04) because no water was present at the primary sample locations 1 and 2 (refer **Figure 5**).

### 6.3 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 and sediment samples with the exception of the January result for sample SS01 which reported a presence of hydrocarbons exceeding the adopted trigger level. As a result of the exceedance, approximately one ton of potentially impacted ballast and sediment material was excavated from the SS01 location which is adjacent the culvert near the former temporary sump. This location was resampled on 5 February 2021 with results reported below LORs.

The results for the January and April monitoring events are included in **Appendix B**. Laboratory certificates for April 2021 are included in **Appendix D**.

## 7 Conclusions and Recommendations

### 7.1 Conclusions

Greencap was commissioned by One Rail Australia to prepare an annual Groundwater Monitoring Event report in accordance with the Groundwater Monitoring and Management Plan developed for the Site.

Four groundwater monitoring events have been conducted in July 2020, October 2020, January 2021 and April 2021 since the diesel spill which occurred in May 2020.

Although concentrations of diesel-related petroleum hydrocarbons were periodically reported in groundwater samples collected along the location of the diesel spill (MW01A, MW03, MW04 and MW08) no increasing trends were noted indicating no increased or ongoing unacceptable risk to human health and the environment. Results of the April/May 2021 GME reported no hydrocarbon concentrations above respective limit of reporting with the exception of MW01 where the presence of several centimetres of floating diesel (LNAPL) has been present since the October 2020 GME. The presence of LNAPL in MW01, however, has not resulted in the development of a contaminated plume that has the potential to reach the closest downgradient monitoring wells MW01A and MW07 beyond which lies in intertidal mangrove zone. Further monitoring is required to demonstrate the stability is maintained.

Analysis of the biodegradation indicators showed a potential for the biodegradation of hydrocarbons to occur, however this is based on a limited dataset. Further monitoring will inform the presence and progress of natural attenuation.

No impacts were reported for the surface water samples collected to date and a single exceedance in the sediment sampling was reported. The impacted sediments were excavated and verification sampling showed no residual impacts.

No unacceptable risks to human health and/or the environment are considered present following the first year of monitoring.

### 7.2 Recommendations

Based on the above conclusions the following is recommended:

- Review and update the GMMP. This review is to include at a minimum:
  - Frequency and nature of future more groundwater monitoring events.
  - Monitoring of changes in thickness of LNAPL in MW01 and/or occurrence in other monitoring wells.
  - Continue to monitor for and assess trends for the occurrence of natural attenuation.
  - Continue to monitor surface water and sediment to assess for potential migration of diesel from in situ impacted materials.
  - Determine if there are any changes in land use or pathway.
- Undertake surface water and sediment monitoring until the contaminated stockpile has been completely relocated.

## Groundwater Monitoring Event and Annual Review

One Rail Australia

BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL

Figures

DRAFT



**Legend**  
 Site boundary

Client: One Rail Australia  
 Client No: C105292  
 Project: Diesel Spill Targeted Site Contamination Investigation  
 Job No: J148829

Title: Site Locality Plan  
 Address: Berriham Freight Terminal - Export Drive, Berriham NT

Drawn: KTK  
 Date: 19/06/2020  
 File Name: SC  
 Site Locality

Approximate Scale  
 0 200 600m

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

Figure No: 1

Source Data Collected: 18 May, 2020  
 Source: Background PhotoMap courtesy of [nearmap.com](http://nearmap.com)



**Legend**  
 Site boundary

Client: One Rail Australia  
 Client No: C105292  
 Project: Diesel Spill Targeted Site Contamination Investigation  
 Job No: J148829

Title: Site Location Plan  
 Address: Berimath Freight Terminal - Export Drive, Berimath NT

Drawn: KTK  
 Date: 19/06/2020  
 File Name: Site Location

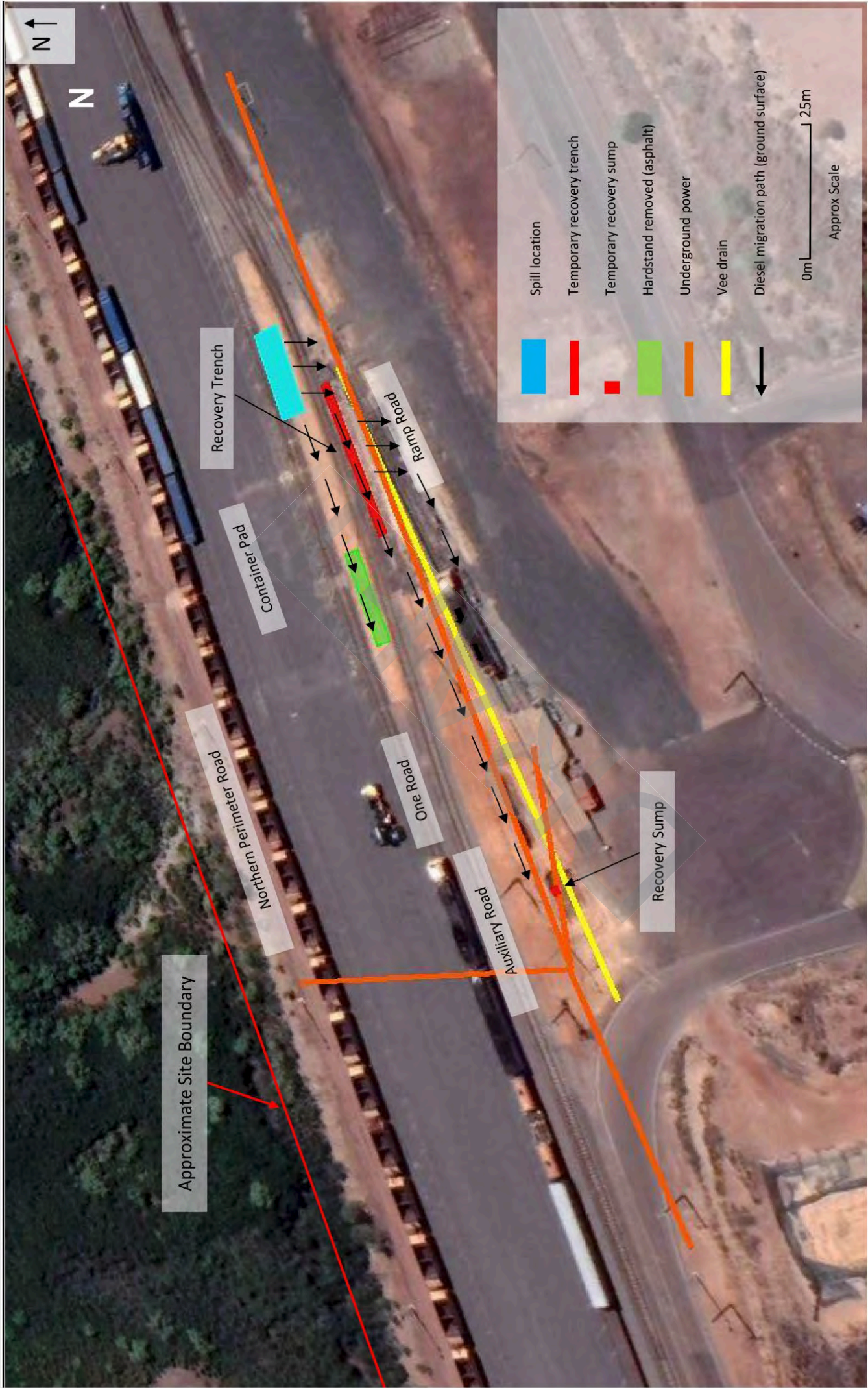
Approximate Scale  
 0 50 100 150m

Figure No. 2

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

© 2020 Mapbox Technologies  
 Google

Source Data Collected: 18 May, 2020  
 Source: Background Imagery courtesy of [nearmap.com](http://nearmap.com)

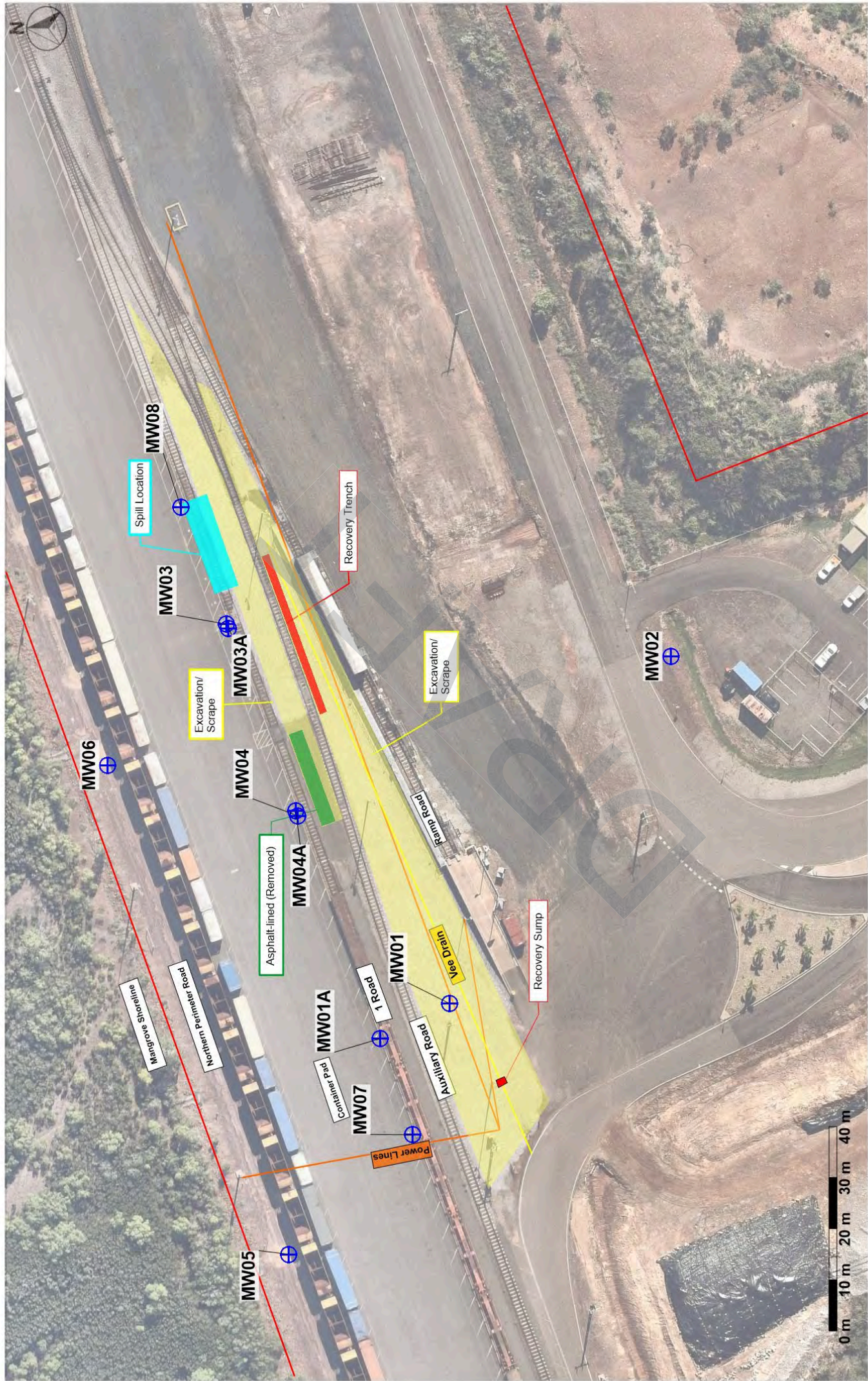


**Legend**

- █ Spill location
- █ Temporary recovery trench
- █ Temporary recovery sump
- █ Hardstand removed (asphalt)
- █ Underground power
- █ Vee drain
- Diesel migration path (ground surface)

0m | 25m  
Approx Scale

<b>Client:</b> One Rail Australia Client No. C105292	<b>Title:</b> Groundwater Monitoring Plan 0	<b>Approximate Scale:</b> 20 m
<b>Project:</b> Diesel Spill Targeted Site Contamination Investigation	<b>Address:</b> Berrimah Freight Terminal - Export Drive, Berrimah NT	<b>Level 1:</b> 477 High Street Kew East, VIC 3102
<b>Job No.:</b> J168829	<b>Spill Location Plan</b>	<b>File Name:</b> J168829_GMMP
<b>Date:</b> 15/07/2021	<b>Drawn:</b> PM: DB	<b>Figure No.:</b> 3
<b>Source:</b> Background Photomap courtesy of <a href="#">nearmap</a>	<b>Date Data Collected:</b> 30 Oct 2020	<b>Website:</b> <a href="http://www.greencap.com.au">www.greencap.com.au</a>



<b>Legend</b> Site boundary Groundwater Monitoring Well	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 Monitoring Well Locations	Approximate Scale: 20 m Figure No.: 4
	Date Data Collected: 30 Oct 2020 Source: Background Photomap courtesy of  nearmap	Drawn: PM: AS DB: J168829 GW Plan	Date: 15/07/2021 File Name: J168829 GW 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

**Legend**

- Site boundary
- Surface Water and Sediment Sampling Points

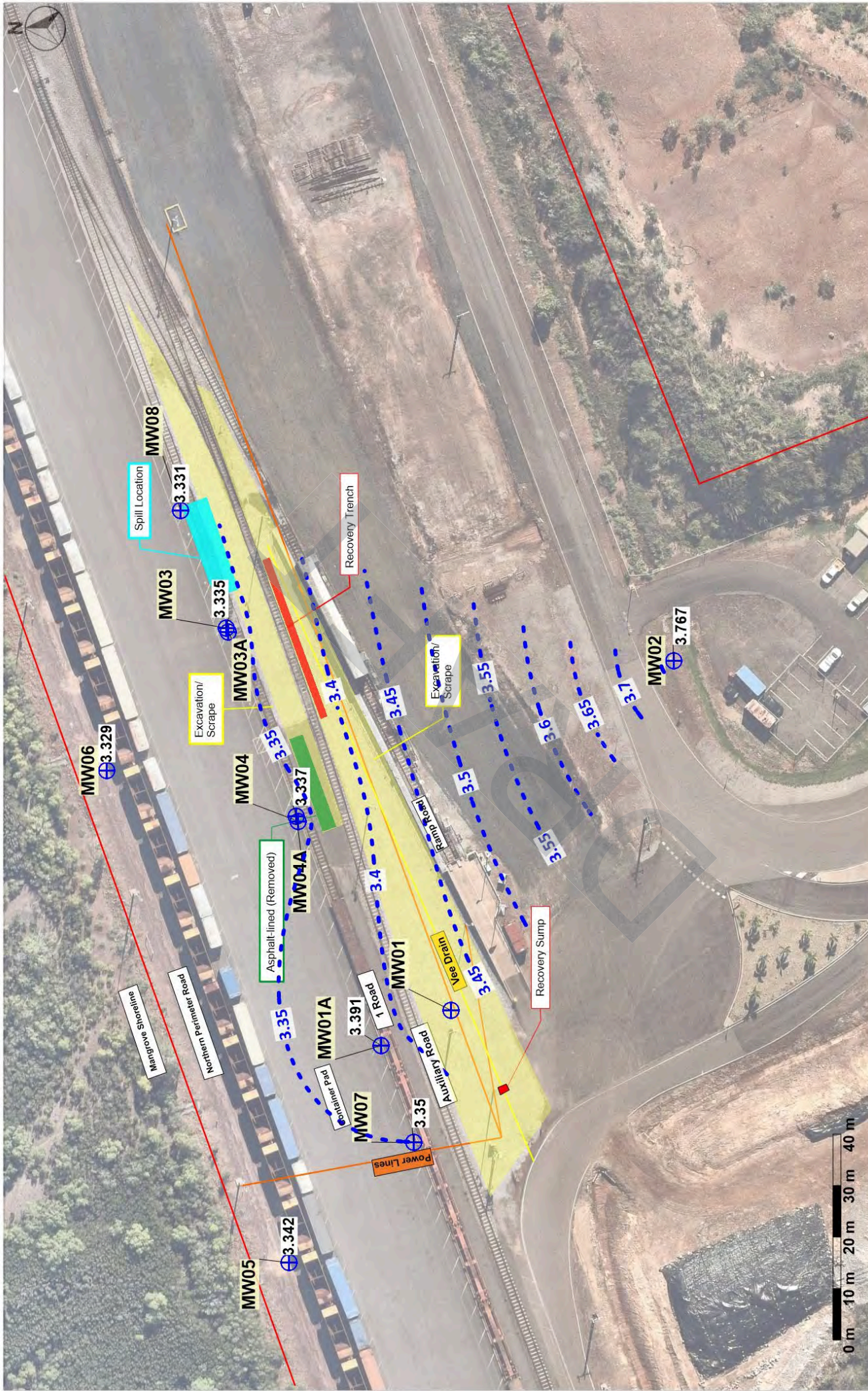
Date Data Collected: 30 Oct 2020  
 Source: Background Photomap courtesy of nearmap

**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  
 Surface Water & Sediment Sampling Locations  
 Drawn: PM: AS DB Date: 15/07/2021 File Name: J168829\_GMMP

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Approximate Scale: 20 m  
 Figure No. 5



**Legend**

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

Date Data Collected: 30 Oct 2020  
Source: Background Photomap: Courtesy of [nearmap.com](http://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:** Berimach Freight Terminal - Export Drive, Berimach NT  
**Groundwater Level Elevations (mAHD) and Flow Direction**

**Drawn:** AS | **PM:** DB | **Date:** 15/07/2021 | **File Name:** J168829 GW Plan | **Figure No.:** 6

**Approximate Scale:** 20 m

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Australia  
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Bleasers Creek

Spill Location

Groundwater Seepage Direction

Client:	One Rail Australia	Title:	Groundwater Monitoring Plan	Approximate Scale	0 m	100 m	200 m
Client No.:	C105292	Address:	Berrimah Freight Terminal - Export Drive, Berrimah NT	Drawn by:	AS	DB	PM
Project:	Diesel Spill Targeted Site Contamination Investigation	Date:	15/07/2021	File Name:	J168829	GW Plan	Figure No.
Job No.:	J168829						7

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## **Groundwater Monitoring Event and Annual Review**

**One Rail Australia**

**BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL**

### **Appendix A: Field Record Sheets**



# Groundwater Sampling Record

Client: ORA Job No: 1168829 Well ID: MW01A  
 Project: DIESEL SPILL Sampled by: VB  
 Location: ORA Date: 5/5/21

WELL DETAILS		SAMPLING EQUIPMENT		*Other Sampling Equipment / Method
Well depth: <u>4.890</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>2.585</u> (m bTOC)	Screen (from - to), m: <u>1.890 - 4.890</u>			
Product thickness: <u>-</u> (m)	Pump Depth (m bTOC): <u>-</u>			

**Field observations:** eg. well condition, nearby activities, weather, vegetation, etc  
SUNNY, SLIGHT WIND

**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 (µS/cm / mS/cm)	ORP (mV)	DO (mg/L / ppm / %)	
1207	1NT	2.676	34.0	5.82	57616	31.7	18.3	L-m turbidity, pale brown no sheen/odour ↓
1210	1.5	3.419	34.1	6.03	57586	15.8	4.7	
1215	3.5	3.431	34.1	6.15	50085	5.4	3.4	
1218	5.5	3.590	34.1	6.16	48629	3.6	3.8	
1233	12L	PURGED DRY						
1505	2	4.477	33.6	6.48	54305	38.1	56.1	M-H turbidity, brown no sheen/odour
		SAMPLED						

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

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments * SLOW RECHANGE PURGED 12L TILL DRY ** SAMPLED w/ BAILER AFTER 2L PURGED
Glass amber (100-250ml)	3 2 1	none	Duplicate ID <u>QCO1 QCO1</u>	
Glass vial (40mL)	6 5 6	HCl		
Plastic (60mL) - metals*	3 2 3	HNO3		
Plastic (60mL) - cyanide, CrVI*		NaOH	Triplicate ID <u>QCO1A QCO1A</u>	
Plastic (60mL) - nutrients	3 2 3	H2SO4		
Plastic (500mL) - inorganics	3 2 3	none	Blanks	
Plastic ( ) <u>FL</u>	3 2 3		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 <b>MW02</b>				
Project: <u>DIESEL SPILL</u>		Sampled by: <u>VB</u>						
Location: <u>ORA</u>		Date: <u>30/4/21</u>						
WELL DETAILS			SAMPLING EQUIPMENT					
Well depth:	<u>5.226</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>1.247</u> (m bTOC)	Screen (from - to), m	<u>2.226 - 5.226</u>					
Product thickness	- (m)	Pump Depth (m bTOC)						
Field observations: eg. well condition, nearby activities, weather, vegetation, etc <u>SUNNY</u>								
<b>Purging instructions:</b> 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. <b>Low Flow:</b> 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. <u>4-well volume</u> 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>1246</u>	<u>1NT</u>	<u>1.249</u>	<u>33.1</u>	<u>4.48</u>	<u>37886</u>	<u>172.9</u>	<u>3.7</u>	L-m turbidity pale brown, no sheen/odour ↓
<u>1249</u>	<u>1.5</u>	<u>1.249</u>	<u>33.1</u>	<u>4.56</u>	<u>34172</u>	<u>166.9</u>	<u>2.8</u>	
<u>1253</u>	<u>3</u>	<u>1.249</u>	<u>33.1</u>	<u>4.69</u>	<u>282178</u>	<u>155.8</u>	<u>2.7</u>	
<u>1256</u>	<u>4.5</u>	<u>1.249</u>	<u>33.0</u>	<u>4.78</u>	<u>24516</u>	<u>147.1</u>	<u>2.6</u>	
<u>1259</u>	<u>6</u>	<u>1.249</u>	<u>33.0</u>	<u>4.83</u>	<u>22575</u>	<u>141.1</u>	<u>2.4</u>	
<u>1303</u>	<u>8.5</u>	<u>1.249</u>	<u>33.1</u>	<u>4.87</u>	<u>20914</u>	<u>134.7</u>	<u>2.2</u>	
<u>1307</u>	<u>10</u>	<u>1.249</u>	<u>33.1</u>	<u>4.89</u>	<u>20149</u>	<u>130.7</u>	<u>2.1</u>	
<u>SAMPLED</u>								
Observations during Sampling:- eg. odours, sheens, turbidity, water colour, etc								
Container Volume (L)	No of containers	Preservative	Duplicates				Other Comments	
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>4</u>		<u>RA01</u> <u>TF01</u>					

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



# Groundwater Sampling Record

Client: ORL Job No: 1168829 Well ID: Mw03  
 Project: DIESEL SPILL Sampled by: VB  
 Location: ORL Date: 5/5/21

WELL DETAILS		SAMPLING EQUIPMENT		*Other Sampling Equipment / Method
Well depth: <u>4.345</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 dip</u>			
Casing type: <u>PVC / steel / other</u>	WQM Make: <u>YSI</u>			
Depth to product (m bTOC)	WL Meter: <u>interface</u> <u>non-interface</u>			
Depth to water: <u>2.557</u> (m bTOC)	Screen (from - to), m: <u>1.345 - 4.345</u>			
Product thickness (m)	Pump Depth (m bTOC)			

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

**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)	Stabilisation Criteria (3 readings within ranges)					Comment <i>Turbidity, Colour, Odour, Sheen, etc</i>
			± 0.2 °C	± 0.1 pH unit	± 5%	± 10mv	± 10%	
		Water Level	Temp	pH	Sp. Cond	ORP	DO	
		(m bTOC)	°C	Units	<u>µS/cm</u> mS/cm	mV	mg/L / ppm / %	
1335	1NT	2.624	35.4	4.51	7992	182.5	16.1	↓ ↓ ↓
1338	1.5	2.799	35.5	4.84	9881	147.5	6.1	
1341	3	3.064	35.4	4.69	6284	141.1	3.1	
1346	4.5	3.244	35.8	4.02	8368	209.4	10.3	
1354	6.5	3.314	35.3	3.95	10119	219.8	7.1	
1400	<del>12.5</del>	<del>3.414</del>	<del>35.3</del>	<del>3.95</del>	<del>10119</del>	<del>219.8</del>	<del>7.1</del>	
1556	2	2.542	34.3	6.66	3065	113.6	57.6	
								<b>SAMPLED</b>

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

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments
Glass amber (100-250ml)	8 1	none	Duplicate ID <u>Q201</u>	
Glass vial (40mL)	6 2	HCl	Triplicate ID <u>Q201A</u>	
Plastic (60mL) - metals*	8 1	HNO3	Blanks	
Plastic (60mL) - cyanide, CrVI*		NaOH	Rinsate ID	
Plastic (60mL) - nutrients	3 1	H2SO4		
Plastic (500mL) - inorganics	8 1	none		
Plastic ( ) <u>fe</u>	8 1			
Plastic ( )	8 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>	<b>Well ID</b> <u>M604</u>
Project: <u>DIESEL SPILL</u>	Sampled by: <u>VB</u>	
Location: <u>ORA</u>	Date: <u>5/5/21</u>	

WELL DETAILS		SAMPLING EQUIPMENT			*Other Sampling Equipment / Method
Well depth: <u>3.793</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>ESI</u>				
Depth to product (m bTOC)	WL Meter: <u>interface</u> non-interface				
Depth to water: <u>2.596</u> (m bTOC)	Screen (from - to), m <u>0.793 - 3.793</u>				
Product thickness (m)	Pump Depth (m bTOC)				

**Field observations:** eg. well condition, nearby activities, weather, vegetation, etc  
SUNNY, SLIGHT WIND

**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 <u>µS/cm / mS/cm</u>	ORP mV	DO mg/L / ppm / <u>µg</u>	
1249	INT	2.594	34.6	7.12	2284	58.3	27.2	L-m turbidity, pale brown, no sheen / odour
1254	2	2.842	34.4	6.24	5712	63.9	4.6	↓
1257	3.5	2.764	34.5	5.63	7159	121.6	2.7	↑
1300	5.0	2.741	34.4	5.55	7222	128.2	2.7	M-h turbidity, brown, no sheen / odour
1304	6.5	2.756	34.4	5.49	7416	126.9	4.0	↓
1307	8.0	2.757	34.4	5.44	7787	128.6	3.4	↓
1312	10	2.757	34.5	5.46	8125	119.6	3.1	↓
1315	11.5	2.757	34.4	5.44	8350	127.0	3.1	↓
				SAMPLED				

**Observations during Sampling:-** eg. odours, sheens, turbidity, water colour, etc  
DROPPED HEAD ≈ 0.2m & SWL STABILISED

Container Volume (L)	No of containers	Preservative	Duplicates	Other Comments
Glass amber (100-250ml)	1	none		
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>PC</u>	1		Rinsate ID	
Plastic ( )				
	(9)			

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

# Groundwater Sampling Record

Client: ORA Job No: 0168829 Well ID: MW05  
 Project: DIESEL SPILL Sampled by: VB  
 Location: ORA Date: 30/4/21

WELL DETAILS		SAMPLING EQUIPMENT			*Other Sampling Equipment / Method
Well depth: <u>3.291</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>1.838</u> (m bTOC)	Screen (from - to), m <u>0.291 - 3.291</u>				
Product thickness (m)	Pump Depth (m bTOC)				

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

**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	± 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 / %	
1101	1NT	1.840	33.4	5.54	29837	45.3	28.1	L-m turbidity, no odour sheen, clear
1105	1	1.840	33.3	5.40	30500	59.1	14.6	
1110	2.5	1.840	33.3	5.38	31107	60.1	8.2	
1115	4	1.840	33.3	5.41	31550	58.1	5.9	
1119	5.5	1.840	33.3	5.42	31637	56.6	5.1	
1122	7	1.840	33.3	5.42	31793	56.6	4.5	
			SAMPLED					

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

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

# Groundwater Sampling Record

Client: ORLA Job No: J168829 Well ID: MW06  
 Project: DIESEL SPILL Sampled by: VB  
 Location: ORLA Date: 30/4/21

WELL DETAILS		SAMPLING EQUIPMENT		*Other Sampling Equipment / Method
Well depth: <u>4.005</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>1.840</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  
SUNNY

**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)	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 /	
1153	INT	1.844	1.844	33.3	5.44	10522	122.3	9.7	L-m turbidity, clear, no sheen/ odour
1157	1	1.844	1.844	33.3	5.29	10721	107.8	3.7	
1201	2	1.844	1.844	33.3	5.27	10687	100.5	2.9	
1205	3	1.844	1.844	33.3	5.27	10772	97.7	2.7	
1209	4	1.844	1.844	33.3	5.26	10779	95.7	2.5	
1212	5	1.844	1.844	33.3	5.26	10784	94.5	2.4	
1215	6	1.844	1.844	33.4	5.25	10792	94.2	2.3	
				SAMPLED					

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

QUICK RECHECK

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		Rinsate ID	
Plastic ( ) <u>⊕</u>	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: MWS7  
 Project: DIESEL SPILL Sampled by: VJB  
 Location: ORA Date: 5/5/21

WELL DETAILS		SAMPLING EQUIPMENT		*Other Sampling Equipment / Method
Well depth: <u>4.652</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>2.567</u> (m bTOC)	Screen (from - to), m: <u>1.652 - 4.652</u>	Product thickness: <u>-</u> (m)	Pump Depth (m bTOC): <u>-</u>	

Field observations: eg. well condition, nearby activities, weather, vegetation, etc  
SUNNY, SLIGHT WIND

**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</u> / mS/cm	ORP mV	DO mg/L / ppm / %	
1125	1 NT	2.567	34.5	6.87	35471	-59.2	31.8	M-H Turbidity, Brown, NO SHEEN/ODOUR
1129	1.5	2.567	34.6	6.38	18669	-15.4	44.8	
1134	3	2.567	34.6	5.78	14113	30.4	19.3	↓
1138	4.5	2.567	34.6	5.56	13164	44.7	14.1	
1142	6	2.567	34.6	5.45	12734	51.9	12.8	L-m turbidity, l. brown, NO SHEEN/ODOUR
1145	7	2.567	34.6	5.42	12688	53.7	11.6	
1148	8	2.567	34.6	5.40	12638	54.2	11.3	↓
				SAMPLED				

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

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>Fe</u>	1			
Plastic ( )			Rinsate ID	

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

# Groundwater Sampling Record

Client: ORA Job No: 0168829 Well ID: MW08  
 Project: DIESEL SPILL Sampled by: VJ  
 Location: ORA Date: 5/5/21

WELL DETAILS		SAMPLING EQUIPMENT			*Other Sampling Equipment / Method
Well depth: <u>5.030</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>PE</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>2.646</u> (m bTOC)	Screen (from - to), m: <u>2.030 - 5.036</u>				
Product thickness: <u>-</u> (m)	Pump Depth (m bTOC): <u>-</u>				

Field observations: eg. well condition, nearby activities, weather, vegetation, etc  
SUNNY, SLIGHT WIND

**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)	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>
1415	INT	2.676	36	5.92	10219	-127.6	19.4	L-M turbidity, pale brown, no sheen/colour
1420	2	2.771	36.2	5.73	9589	-31.3	1.7	
1430	5.4	2.734	36.4	5.49	9365	19.1	1.7	
1434	6.5	2.726	36.4	5.43	9151	25.8	1.8	
1439	8	2.726	36.3	5.36	9194	33.6	1.0	
1443	9.5	2.726	36.4	5.36	9222	36.2	1.8	
1446	11.0	2.726	36.4	5.34	9214	36.2	1.0	
			SAMPLED					

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

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 ( )	1			

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

## YSI Calibration Register

Please record initial value (indicates YSI reading when placed in buffer solution prior to calibrating) and final value (indicates any variation post-calibration)

Date	ID	Temp	EC		pH 4		pH 7		ORP		DO 100% Sat		Solution Replaced Y/N	Initials
			Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final		
20/10/20	YSI 1	24.3	12640	12884	4.01	7.00	231.0	229.1	100.1	99.9	N	VB		
Comments:														
20/01/21	YSI 1	24.6	12532	12728	4.02	7.01	229.0	230.1	100.2	100.0	N	VB		
Comments:														
04/04/21	YSI 1	24.4	12632	12877	4.01	7.00	232.0	230.2	100.1	99.9	N	VB		
Comments:														
29/04/21	YSI	24.3	12639	12884	4.01	7.01	230.0	229.1	100.0	100.1	N	VB		
Comments:														
Comments:														
Comments:														
Comments:														

## **Groundwater Monitoring Event Annual Review**

**One Rail Australia**

**BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL**

### **Appendix B: Results Summary Tables**





Method_Type	ChemName	Units	EQL	SDG					
				Field ID	Sampled_Date/Time	Sample Type	14-May-21 RB01 30/04/2021 Rinsate	14-May-21 RB02 5/05/2021 Rinsate	24-May-21 RB01 20/05/2021 Rinsate
Organic	C10-C16	mg/l	0.05		<0.05	<0.05	<0.05	<0.05	
	C16-C34	mg/l	0.1		<0.1	<0.1	<0.1	<0.1	
	C34-C40	mg/l	0.1		<0.1	<0.1	<0.1	<0.1	
	F2-NAPHTHALENE	mg/l	0.05		<0.05	<0.05	<0.05	<0.05	
	Naphthalene	µg/l	10		<10	<10	<10	<10	<10
	C6 - C9	µg/l	20		<20	<20	<20	<20	
	C10 - C40 (Sum of total)	µg/l	100		<100	<100	<100	<100	
	C6-C10 less BTEX (F1)	mg/l	0.02		<0.02	<0.02	<0.02	<0.02	
	C6-C10	mg/l	0.02		<0.02	<0.02	<0.02	<0.02	
TPH	C10 - C14	µg/l	50		<50	<50	<50	<50	
	C15 - C28	µg/l	100		<100	<100	<100	<100	
	C29-C36	µg/l	100		<100	<100	<100	<100	
	+C10 - C36 (Sum of total)	µg/l	100		<100	<100	<100	<100	
Volatile	Benzene	µg/l	1		<1	<1	<1	<1	<1
	Ethylbenzene	µg/l	1		<1	<1	<1	<1	<1
	Toluene	µg/l	1		<1	<1	<1	<1	<1
	Xylenes (m & p)	µg/l	2		<2	<2	<2	<2	<2
	Xylenes (o)	µg/l	1		<1	<1	<1	<1	<1
	Xylenes Total	µg/l	3		<3	<3	<3	<3	<3

## **Groundwater Monitoring Event Annual Review**

**One Rail Australia**

**BERRIMAH FREIGHT RAIL TERMINAL DIESEL SPILL**

### Appendix C: Mann-Kendall Output Tables

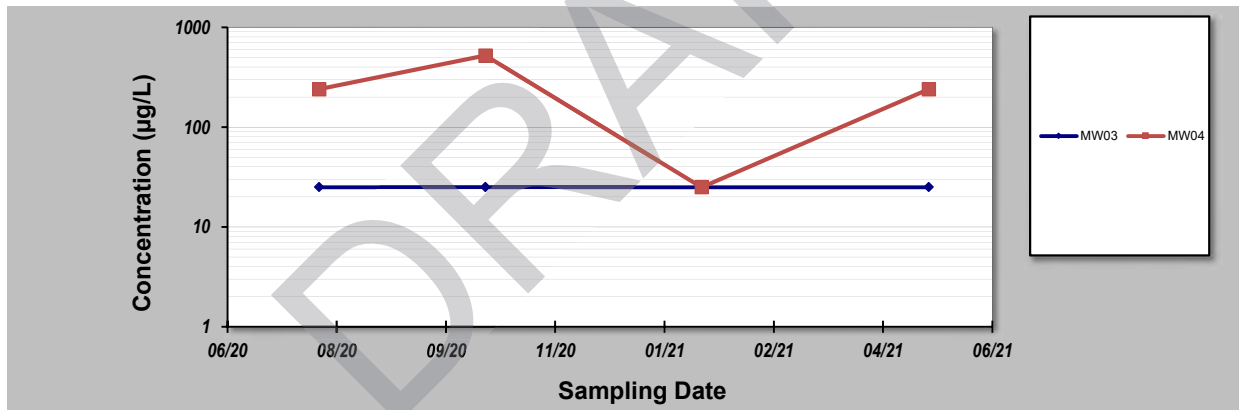
## GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: <b>8-Jul-21</b>	Job ID: <b>J168829</b>
Facility Name: <b>Greencap</b>	Constituent: <b>F2</b>
Conducted By: <b>V Bhagwat</b>	Concentration Units: <b>µg/L</b>

Sampling Point ID:	<b>MW03</b>	<b>MW04</b>				
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Sampling Event	Sampling Date	F2 CONCENTRATION (µg/L)					
1	30-Jul-20	25	240				
2	14-Oct-20	25	520				
3	21-Jan-21	25	25				
4	5-May-21	25	240				
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

Coefficient of Variation:	0.00	0.79				
Mann-Kendall Statistic (S):	0	-1				
Confidence Factor:	37.5%	50.0%				
Concentration Trend:	Stable	Stable				



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

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