WARRIEWOOD VALLEY LAND RELEASE
NARRABEEN CREEK BELOW BRANDS LANE

PRE-CONSTRUCTION CREEK WATER QUALITY MONITORING DATA FOR 53A & 53B WARRIEWOOD ROAD FOR THE PERIOD NOV 2017 TO JUNE 2019, MAY 2021, JUNE to AUG 2022 & ANNUAL DRY WEATHER SURVEY FEB 2023

Looking upstream at site NC5.

Report Prepared for Willowtree Planning

Marine Pollution Research Pty Ltd

March 2023

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1 INTRODUCTION

Willowtree Planning on behalf of *Sekisui House* requested MPR to provide a report on the MPR WMS sampling results for Narrabeen Creek upstream, adjacent to, and downstream of a new development currently being proposed at Nos 53A and 53B Warriewood Road Warriewood to meet the conditions of a Northern Beaches Council Request for water quality monitoring data as set out in Section 4.2 of the WMS.

Marine Pollution Research Pty Ltd (MPR) has been undertaking combined water quality, annual sediment and RBA monitoring program as per the Pittwater Council Water Management Specification (WMS) prepared by Lawson & Treloar (2001) for a number of urban construction projects for lands alongside the lower section of Narrabeen Creek between Brands Lane and McPherson Street Warriewood. Following an agreement with Pittwater (now Northern Beaches) Council, these combined Lower Narrabeen Creek projects share a common set of three Upstream, Mid-Stream and Down Stream in-stream sites (see MPR 2016c). **Table 1** shows the annual WMS sampling schedule for this program.

Table 1 Lower Narrabeen Creek Annual WMS Sampling Schedule

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Water Samples												
Creek Dry WQ												
NC3		D			D			D+			D	
NC4		D			D			D+			D	
NC5		D			D			D+			D	
Creek Wet WQ												
NC3		2W+			2W+			2W+				
NC4		2W+			2W+			2W+				
NC5		2W+			2W+			2W+				
RBA & Sediment Chemicals (R+S)												
NC3								R+S				
NC4								R+S				
NC5								R+S				

Notes:
Dry = Routine Creek Water Samples over all Construction Phases
Dry+ = Annual Creek Dry Water Samples - Pre-Construction & Construction Phases
Dry++ = Annual Creek Dry Water Samples Post-Construction Phase Only
Wet+ = SQID & Routine Wet Weather samples (with F coliforms)
Wet - = ESC Wet Weather samples (- F coliforms)
R = Annual Rapid Biological Assessment + algae counts & S = Annual Sediments

In terms of available data, MPR combined continuous project work for this section of the creek ceased in June 2019, and MPR subsequently undertook *ad hoc* additional WMS surveys

including a full annual survey in My 2021 and dry plus wet weather pre-development sampling between June and August 2022 for previous proposals at No 53B. Given that the annual WMS dry weather sampling is normally scheduled for February each year and that there has not been a dry weather sampling event since 2021, this present WMS pre-development water quality data report includes the results of WMS dry weather sampling undertaken in February 2023. For reference, the pre-2022 data provided in this report were previously supplied by MPR as four-monthly reports to Pittwater (now Northern Beaches) Council as MPR (2015, 2016a to c, 2017a-c, 2018a-c and 2019a&b).

Figure 1 Location of Narrabeen Creek Designated Water Quality, Sediment Quality and Rapid Biological Assessment sampling sites for projects in the lower creek.
The 53A&B Warriewood Road Project site is located downstream of Creek Monitoring Up Stream site NC3 and upstream of creek monitoring sites NC4 (mid) and NC5 (down)

2 WATER QUALITY RESULTS – NOV 2017 TO JUL 2022

2.1 Site description

On 10 February 2023, during the annual dry weather sampling, the properties were still undeveloped with no construction apparent. The land at No 53A slopes down from Warriewood Road and comprises a series of grassed terraces and transverse swales feeding into a main down-slope swale drain along the southern side of the property (between 53A and 53B) that terminates in a small ditch with pooled water. Most of the lower riparian flat lying parts of the property were either saturated or boggy, with some macrophyte coverage, particularly in the drains (*Cyprus*, *Ludwigia*, *Hydrocotyle, Nasturtium* and *Persicaria* macrophytes) - see Figures 109 and 110 in **Appendix A.** The lower portion of No53B has been levelled previously and is now grassed and is separated from No 53A by a low berm. The riparian edge comprises a level grassy bank with a sandstone block retaining wall (see Plate 6 in **Appendix A).**

2.2 Sampling Weather Conditions

As noted in **Section 1,** this report provides the data collected for previous pre-development proposals for these properties plus additional water quality data collected for the present proposal in February 2023. **Tables 2 to 7** provide daily rainfall data for the combined data presented in this report between 2017 and February 2023.

	Table 2 Daily Rainfall 2017 (Long Reef Golf Club Station BoM 66126).											
Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	0	0.8	8.6	0	0	0	0	4.8	1.2	0	0	0
2nd	1.4	10	4.2	0	0	0	0	0	0	0	0	0
3rd	1	0	3.8	31.3	0.6	0	0	0	0	0	0	11.8
4th	0	0	6	6.2	9.8	1.2	1	10.4	0	0	4	0
5th	10.2	0	2.4	6.8	0	0	0	0	0	0	24	6.2
6th	2.8	0	1.2	0	0	0	0	0	0	0	22.8	0
7th	0	3.2	0	0	0.6	42.4	0	0	0	0	5.4	14.6
8th	0	28.2	0.8	0	0	64.8	0	0	0	0	0	0
9th	0	0	1.6	0	0	8.8	0	0	0	0.2	0	0
10th	0	0	0	9.6	0	9.2	0	0	0	0	0	0
11th	0	0	0	0	0	5.8	0	0	0	1.6	0	0
12th	0	0	0	9	0	0	10.6	0	0	1.2	0	0
13th	0	0	0	11.2	4.6	0	10.2	0	0	0	0	0
14th	0	0	1.6	1.4	0	5.2	0	0	0	1	0	0
15th	0	35.2	47.2	0	2.8	0	0	0	0	0.4	0	0
16th	0	0	3.2	0	0	0	0	0.6	0	0	0	0
17th	0	0	17.6	0	0	2.6	0	0	0	0	0	0
18th	0	17.2	19.6	0	0	0.2	0	0	0	0	0.4	0
19th	0	21.4	7.8	0	0	11	0	0	0	0	0.2	2.4
20th	0	1.8	0	1	22.4	2.6	0	0	0	6	4.2	0
21st	7.2	0	0	0	1	0	0	0	0	7.4	0	7.6
22nd	0	0	8.6	0	0	0	0	0	0	0	0	0
23rd	0	0	4.8	0	0	0	0	0	0	4.4	0	0
24th	0	0	4.8	0	2.4	0	0	0	0	0	0	0
25th	0.4	2	6.8	0	0	0	0	2	0	0	0	0
26th	0	38.4	0	3.6	0	0	0	0	0	0	0	2.6
27th	0	45.6	0	1.6	3.4	0	0	0	0	7.4	0	3.4
28th	0	1.8	0.4	0	0	0	0	1	0	0	0	0
29th	0		0	0	0.4	3	0	0	0	0	3	0
30th	0		0	0	0		0	0	0	0	7.4	5
31st	1.6		45.2		0		0	0		0		0.6
Total	24.6	205.6	196.2	81.7	48	156.8	21.8	18.8	1.2	29.6	71.4	54.2

	Table 3 Daily Rainfall 2018 (Long Reef Golf Club Station BoM 66126).											
Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	0	0.4	0	0	0	0	0	0	1	0	0	0
2nd	0	0	0	0	0	0	1.2	0	0	0	0	0
3rd	1	13.4	0	2.2	0	1.2	1	0	3.6	0	2.4	0
4th	0	10.6	0	0	0	0.4	0	0	4.2	2.2	0	0
5th	0	0.8	0	0	0	17.2	0	0	0	23.4	0	0
6th	0	0	8.4	0	0	34.6	0	0	1.8	13.4	0	0
7th	0	0	3.6	0	0	17.4	0	0	3.8	1.6	0	0
8th	0	0	0	0	0	1.2	0	0	1.6	15.6	14.4	0
9th	38.8	0	0	0	0	3.2	0	0	1.2	2	0	0
10th	0.6	2	0	0	0	3.6	0	0	0	0	0	0
11th	0	3.2	0	0	0	7.2	0	0	0	10.2	0	0
12th	0	0	0	0	4.2	0	0	0	0	7	0	0
13th	0	0	50.8	0	0.4	0	0	0	0	1.8	0	0
14th	5.5	0	17.8	0	10.8	0	0	0	0	25.4	0	2
15th	2.5	0	0	0	0	0	0	0	0	7.2	0	10
16th	0	0	0	0	0.4	0	0	0	0	8.4	3.4	12.2
17th	0	0	0	0	0	0	0	0	0	0	0	0
18th	0	0	0	0	0	0	0	0	0	1.8	7.6	0
19th	0	0	0	0	0	20.2	0	0	0	0	0	0
20th	0	0	0	0	0	43.2	0	0	9	0	0	12
21st	0	0	1.2	0	0	4.2	0	0	2.4	3.2	0	18.8
22nd	0	0	0.8	0	0	0	0	0	0	0	0	1
23rd	0	0	0.8	0	0	0	0	0	0	0	0	6.4
24th	0	0	0	0	0	0	0	7.2	1.2	0	0	0
25th	0	0	1	0	0	0	0	3	4.8	0.4	0	0
26th	0	46.2	15.4	0	0	0	0	0	4.6	0	1.2	0
27th	0	3.6	0	2.6	0	2.4	0	2.8	11.6	0	0	0
28th	0	0	0	1.6	0	27.2	0	0	0	2.8	27.2	0
29th	0		0	8.2	0	7.6	0.4	0	0	0	26.4	0
30th	0		0	31.6	4.2	0	0	0	0	0		0
31st	2.2		0		2.8		0	0		0		0
Total	50.6	80.2	99.8	46.2	22.8	190.8	2.6	13	50.8	126.4	82.6	62.4

	Table 4 Daily Rainfall 2019 (Long Reef Golf Club Station BoM 66126).											
Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2	0	0	0	0	0	0	6.8	4.2	4.2	0	0
2nd	0	4	3.8	7.2	0	0	0	1.2	0	0	0	0
3rd	0	0	2	1	0	0	0	0	0	0	0	0
4th	0	0	0	0	19.4	14.8	1.2	0	0	0	9.4	0
5th	0	0	0	9.8	0	25.4	9.8	0	0	7.6	0	0
6th	9.8	0.8	0	0	7	9.2	2.4	0	0	5.2	0	0
7th	0	0	2.8	0	0	1.4	4	0	0	0	0	0
8th	2.6	0	0	0	0	6	0.2	0	0	0	0	0
9th	4.4	16	0	0	0	0	0	0	0.2	0	0	0
10th	0	0	0.8	0.4	0	0	0	0	0.8	0	0	0
11th	0	0	0	0	0	0	0	0	0	4.2	0	0
12th	1.8	0	0	0	0	0	0	0	0	19.4	0	0
13th	0	0	0	0	0	0	0	0	0	1	0	0
14th	0	0	13.2	0	0	0	0	0	0	0	0	0
15th	0	0	61.2	0	0	0	0	0	0	0	0	0.4
16th	0	0	5.4	0	0	14.8	0	0	0	0	0	0
17th	0	0	15.2	0	0	6.4	0	0	12.6	0	0	0
18th	0	0	65.8	0	0	26.6	0	0	32.2	0	1.8	0
19th	0	0	2.2	0	0	0	0	0	17.2	0	0	0
20th	0	9.6	5.2	0	0	0	0	0	0	0	0	0
21st	2.2	3.4	1.4	0	0	0	0	0	0	0	0	0
22nd	0	3.4	1.2	0	0	0	0	0	0	0	0	0
23rd	0	9.6	0	0	0	4.8	0	0	0	0	5.4	0
24th	0	5.2	2.8	0	0	20.6	0	0	0	0	0	0
25th	0	0	2.6	0	0	7.2	0	0	0	0	0	3.4
26th	0	0	0	0	0	11.4	0	3	0	0	13.8	0
27th	0	0	0	0	0	14	0	34.6	0	0	7.2	0
28th	8.4	4.8	0	0	0	1.2	0	0	0	0	0	0
29th	0		0	0	0	0	0	2.6	0	0	0	0
30th	0		24.4	0	0	0	6.6	38.8	11.2	0	0	0
31st	0		1.2		0		9.8	34.4		0		0
Total	31.2	56.8	211.2	18.4	26.4	163.8	34	121.4	78.4	41.6	37.6	3.8

	Table 5 Daily Rainfall 2020 (Long Reef Golf Club Station BoM 66126).											
Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	0	0	0	0	13.2	0	0	0	0	2.2	12.4	0
2nd	0	0	0	0	0	3.8	0	0	0	0	6.8	5.8
3rd	0	10.8	0	2.2	0	0	0	0	0	0	0	0
4th	0	2.6	24.8	11	0	0	2.6	0	0	0	0	0
5th	0	0	2.4	0	4.4	0	0	0	9.4	0	2.8	0
6th	0	0	50.6	0	0	1.4	0	0	1.4	0	19.2	11
7th	8.8	90.8	0	1.2	0	0	0	0	0	0	0	0
8th	0	37.6	7.6	0	0	0	6.2	16.2	0	0.4	0.2	0
9th	0	35.6	6.8	13.2	0	6.2	0	2.2	0	0	2.2	0
10th	0	138.2	1.8	0	0	15.4	0	18.4	3.2	0	0	0
11th	0	0	0	1.2	0	2.8	4.8	0.4	1	0	0	0
12th	0.4	0	2.8	0	0	2.2	4.2	0	0	0	0	0
13th	1	11.6	0	0	0	7.6	3.6	0.6	0	0	2.4	0
14th	0	7	0	0	15	6.4	9.2	0	0	0	0	1.8
15th	0	0	8.8	0	11.4	0	8.8	3.2	0	0	0	7.2
16th	0	2	7.6	0	2.6	0	0	0.4	0	0	0	9.4
17th	0	0	10.6	0	0.2	0	0	0	0	0	0	0
18th	62.2	0	0	0	1.8	0	0	0	0	1.6	0	0
19th	7.4	6.2	0	0	1	0	0	0	2.2	5	0	3.2
20th	0.2	0	0	0	0	0	0	0	0.8	8.2	0	3.4
21st	8.2	0	0	0	0	1.6	0	0	11.2	0	0	0
22nd	0	0	0	0	23	1.4	0	0	0	0	0	25.6
23rd	0	10.2	0	0	1.4	1	0	0	0	0	1.4	0
24th	1.4	0	6.2	0	0	0	0	0	0	6.4	1.6	0
25th	0	0	0	0	0	0	0	0	0	25.4	0	1.2
26th	0	0	8.4	0	40	0	3.4	0	2.8	18.8	0	4.8
27th	0	0	2	1.2	1.2	2.6	50.4	0	0	3	0	2.6
28th	0	0	1	0	0	1.2	31.4	0	0	0	0	0
29th	0	0	6.8	3.2	1.8	7.8	2.8	0	0	0	0	8
30th	0		2.2	0	3.2		0	0	0	3.6	0	36.8
31st	0						0	0		5.4		0.4
Total	89.6	352.6	150.4	33.2	120.2	61.4	127.4	41.4	32	80	49	121.2

	Table 6 Daily Rainfall 2021 (Long Reef Golf Club Station BoM 66126).											
Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	0	0.8	0	4.4	0	0	4	0	0	0	0	2.4
2nd	0.8	8.4	0	0	0	0	2.2	0	0	0	0	0
3rd	5.8	4.2	15.2	0	0	0	0	3.2	0	7	0	0
4th	1.2	0	0	0	0	8.4	0	0	0	0	0	0
5th	8.2	0	0	0	12.6	5.4	0	0	10	0	11.2	1.4
6th	42.6	0	0	1.2	11.6	0	0	0	1.6	0	0	1.6
7th	0	2.2	0	7	6.2	0	0	0	0	0	0	0
8th	0	0	0	13.6	0	0	0	0	0	0	7.6	1.8
9th	0	0	0	0	0	8.8	0	3	0	0	1.2	8.4
10th	0	5.2	1.8	1	0	0	2.8	0	0	0	0	8.8
11th	0	0	13.6	0	0	6.6	15.2	0	0	5.6	24.8	5.4
12th	0	0	0.8	0	0	0	4.8	0	0	2.2	10.2	0
13th	0	9.8	5.2	0	1.8	0	0	0	0	4.4	0	0
14th	0	13.6	4.2	0	0	0	0	0	20.8	10.8	1	0
15th	2	0	26.8	0	0	0	1.2	0	3.2	13.8	1.8	0
16th	0	4.8	0	0	0	0	0	0	1.6	0.4	0	0.4
17th	0	0	5.8	0	0	4.8	2	0	0	0	0	1.2
18th	0	4.8	6.8	0	0	0	0	0	0	0	0	0
19th	0	14.6	51	0	0	2.2	0	0	0	0	0	4.8
20th	2	0.8	32	0	0	8.6	0	0	0	1.4	0	5.2
21st	0	0.4	152.2	0	8.6	22.4	0	0.4	0	0	9.4	0
22nd	0	0	31.4	0	1.4	3.8	0	0	0.6	0	12.6	0
23rd	0	0.4	41.8	0	0.2	0	0	0	0	0	2.4	20.2
24th	0	34	12.6	0	9.8	0.2	0	25.2	0	0.2	2.6	6.8
25th	0	0	0	0	0	0	0	22.8	0	0	10.6	0
26th	0	0.6	1	0	0	0	0	0	1.8	0	15.8	0
27th	0	0	0	0	0	0	0	0	8.4	0	5.6	0.8
28th	8.4	0.8	0	0	0	3.6	0	0	0	0	4.8	7.2
29th	8.6		0	0	0	7.4	0	0	0	0	0	9.6
30th	19.4		1.2	0	0	16.2	0	0	3.4	0	0	1.2
31st	0.6		7.6		0		0	0		0		
Total	99.6	105.4	411	27.2	52.2	98.4	32.2	54.6	51.4	45.8	121.6	87.2

	Table 7 Daily Rainfall 2022 (Long Reef Golf Club Station BoM 66126).						
Date	Jan	Feb	Mar	Apr	May	Jun	Jul
1st	0	0	21.8	21.8	3.4	0	7.4
2nd	0	11.2	27.4	3	0	0	19.4
3rd	0	5.4	30.2	0	0	0	62.4
4th	0	9.8	10.4	0	0	0	12.6
5th	6.4	21.6	28.8	0	0	0	17.4
6th	13	0	33.6	8.2	0	0	14.2
7th	1.4	5.2	48.2	83.2	0	0	19.6
8th	18.8	6.8	120.2	65.6	0	0	0
9th	0.8	1.4	194.8	4.2	2.2	0	0
10th	1.8	0	1.8	4.6	17.2	0	24.2
11th	0	9	0.4	0	16.2	0	6.8
12th	0	22.2	0	1.4	19.4	0	5.2
13th	0.8	1.2	2.8	3.6	7.2	0	0
14th	0	0	0	46.8	0	0	18.4
15th	0	0	0	1.6	0	0	6.2
16th	0	0	7.2	0	0	0	0
17th	0	0	0	0	0	0	0
18th	0	11.6	0	0	0	0	0
19th	7.8	0.4	17.2	0	0	1.8	4.6
20th	1.6	0	0.4	10.2	4.2	26.4	8.2
21st	1.2	0	0	0	2.2	1	7.6
22nd	0	2.8	0	7.2	1.2	0.8	16.8
23rd	1.8	88.6	0	11.2	45	0	3.6
24th	1.8	27.8	3.2	1	59.2	0	4.4
25th	0	55.2	13.4	3.2	10.8	0	0
26th	0	88.4	9.8	6.4	0.4	0	4.6
27th	0	48	4.6	6.4	0	0	0.2
28th	0	2.4	8.2	7.6	0	2.2	
29th	0		58.6	5.2	0	3.8	
30th	0		22.8		0		
31st	0		19.8		3.4		
Total	57.2	419	685.6	302.4	192	36	263.8

Table 8 Rainfall January to February 2023 (BoM Station 66126 Long Reef Golf Course).		
Date	Jan	Feb
1st	9.2	0
2nd	0	0
3rd	0	0
4th	2.2	0
5th	6.2	0
6th	5.2	0
7th	17.4	0
8th	0.8	0
9th	0	43.6
10th	0	11.2
11th	0	0
12th	0	0
13th	0	0
14th	0.2	2.4
15th	3.8	20.8
16th	0	0
17th	0.2	0
18th	0	0
19th	8.4	3.6
20th	9.2	0
21st	0	0
22nd	1.4	50.8
23rd	7.8	1.2
24th	0	1
25th	29.4	
26th	0	
27th	0	
28th	4.2	
29th	0	
30th	0	
31st	19.6	
Total	125.2	134.6

2.3 Event Sampling Results

The following sub-sections provide the field notes and metered water quality results for each survey plus the results of annual RBAs where applicable. Site photographs for each of the surveys are provided in **Appendix A** and each sub-section references the relevant ALS laboratory reports, with the full laboratory reports attached at **Appendix B**.

2.3.1 November 2017 Dry Weather Sampling

Dry weather sampling was undertaken on the 3rd of November 2017. **Table 9** below provides field notes recorded during the dry sampling, and **Table 10** provides the metered water quality results for the dry sampling event. The chemical analysis results (**ALS Report ES1727600**) for collected water samples (TDS, TSS, nutrients, and faecal coliform counts) are attached in **Appendix B** to this report.

Table 9 Field Comments – November 2017 Dry Weather

Site	Comments
NC3	Water was relatively clear with a very low flow throughout site length. Bank vegetation was still mostly cleared. Macrophytes observed included: *Percicaria deipiens* (Slender Knot Weed), *Ludwigia periviana* (Peruvian Primrose), *Nastertiom officinalle* (Watercress) and *Ludwigia peploides* (Floating Water Primrose). No filamentous green alga was observed.
NC4	Water was fairly clear with a low flow throughout site. Vegetation was cleared on both banks as in former survey. Macrophytes observed: River Clubrush, Slender Knot Weed, Watercress and *Myriophyllum sp* and *Ludwigia peploides* (Floating Water Primrose). Filamentous green alga was not observed.
NC5	Water was slightly turbid with no observable surface flow through the site. No macrophytes were observed. Site consisted of muddy channel with leafy debris scattered throughout. Filamentous green alga not observed.

Table 10 Lower Narrabeen Creek Dry Weather Sample 3rd November 18 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC3	14:23	0.1	26.51	489	135.5	6.83	7.1	20	250	0.14	
NC4	14:12	0.1	20.14	480	18.7	6.22	4.7	40	100	0.14	
NC5	13:14	0.3	18.79	392	1.7	6.2	2.6	0.9	250	0.00	

2.3.2 November 2017 Wet Weather Sampling

Wet weather sampling was undertaken on the 6th of November 2017. Whilst this sample was to be a Raising Limb there was no follow-up rainfall so the sample became a Falling Limb sample for the rainfall flows from the previous two days, as per the WMS. As noted above, there was no flow from ESC-53B.

Table 11 below provides field notes recorded during the wet weather sampling. In addition to the sampling site notes provided below it was also noted that construction works were underway along the riparian bank for the development downstream at Nos 29 to 31 Warriewood Road.

Table 11 Field Comments – November 2017 Wet Weather

Site	Comments
NC3-U	Water was clear with a low flow through site. Vegetation still fairly clear along the banks. Macrophytes observed included: *Percicaria deipiens* (Slender Knot Weed), *Ludwigia periviana* (Peruvian Primrose), *Carex, Nastertiom officinalle* (Watercress) and *Ludwigia peploides* (Floating Water Primrose). No filamentous green alga was observed.
NC4-U	Water was relatively clear, however dark in colour. Site had a low flow throughout. Vegetation was cleared on both banks. Macrophytes observed: River Clubrush, *Ludwigia peploides* (Floating Water Primrose), Slender Knot Weed, Watercress and *Myriophyllum sp*. Filamentous green alga was not observed.
NC5-U	Water was dark in colour no observable surface flow. Site conditions similar to previous surveys. Filamentous green alga not observed.
53B-ESC	No flow entering Narrabeen creek via 53B. No observable surface flow in Narrabeen Creek.

Table 12 provides the metered water quality results for the falling wet weather sampling event. The chemical analysis results (**ALS Report ES1727794**) for collected water samples (TDS, TSS, nutrients, and faecal coliform counts) are attached in **Appendix B** to this report.

Table 12 Wet Weather Samples 6th November 2017 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	
Falling Limb 19th May		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC3	13:18	0.1	20.88	266	100.7	6.57	16.5	40	240	0.1	
NC4	13:30	0.1	19.94	220	65.9	6.42	16.7	50	100	0.5	
53C-ESC	14:17	0.1	20.62	259	73.2	6.61	32.1				0
NC5	13:49	0.1	19.56	198	55.1	6.25	32	80	300	0.00	

2.3.3 February 2018 Annual Dry Weather Sampling

Table 13 provides field notes recorded during the annual dry weather sampling on 6th of February 2018 and **Table 14** provides the metered water quality results. **Table 15** provides the results of the annual Rapid Biological Assessment (RBA) sampling. The chemical analysis

results (ALS Report **ES1804021**) for collected water and sediment samples and for algae speciation plus counts are attached in **Appendix B** to this report.

Table 13 Field Comments – February 2018 Dry Weather Sampling

Site	Comments
NC3	Water was clear with a low flow throughout site length. Large proliferation of Watercress along the bank. Macrophytes observed included: *Nastertiom officinalle* (Watercress), *Percicaria deipiens* (Slender Knot Weed), *Ludwigia periviana* (Peruvian Primrose) and *Ludwigia peploides* (Floating Water Primrose). Filamentous green alga was abundant.
NC4	Water was relatively clear with no observable surface flow throughout. Increased masses of macrophytes, choking sections of the site, particularly downstream. Macrophytes included: Peruvian Primrose, *Carex*, River Clubrush, Slender Knot Weed, Watercress and *Myriophyllum sp*. Filamentous green alga was abundant.
NC5	Similar site conditions to previous survey. Water was fairly clear with with no observable surface flow. Still plenty of canopy cover. Lots of *Lemna* (Duck Weed) covering the surface of the water. Filamentous green alga was present in small amounts.

Table 14 Lower Narrabeen Creek Dry Weather Sample 06 February 18 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC3	13:53	0.1	28.6	412	153.8	7.43	3.9	0.1	70	0.08	
NC4	15:24	0.1	23	289	29.4	6.53	5	20	80	0.00	
NC5	15:29	0.1	23.36	549	4.7	7.26	18.1	0.6	250	0.00	

Table 15 Aquatic Macroinvertebrate Sampling Results Narrabeen Creek 6 February 2018

Phylum	Class				Common	19/2/18	19/2/18	19/2/18		
		Family	Sub-Family	Species	Name	NC3	NC4	NC5	Occur	SIG-2
Arthropoda	Insecta	Dytiscidae			Diving Beetles		1	1	2	2
Arthropoda	Insecta	Ceratopogonidae			Biting Midges				0	4
Arthropoda	Insecta	Chironomidae	Chironominae		Bloodworms			1	1	3
Arthropoda	Insecta	Gelastocoridae			Toad Bugs		1		1	5
Arthropoda	Insecta	Gerridae			Pond Skaters	1		1	2	4
Arthropoda	Insecta	Veliidae			Small Water Treaders	1	1	1	3	3
Arthropoda	Insecta	Aeshnidae			Dragonflies	1			1	4
Arthropoda	Insecta	Hemicorduliidae			Dragonflies		1		1	5
Arthropoda	Insecta	Coenagrionidae			Damselflies		1		1	2
Arthropoda	Insecta	Megapodagrionidae			Damselflies				0	5
Arthropoda	Insecta	Sciritidae			Marsh beetles			1	1	6
Arthropoda	Insecta	Sciritidae			Crane flies			1	1	5
Arthropoda	Arachnida				Freshwater Mites	1	1	1	3	6
Arthropoda	Crustacea	Cyclopidae			Copepods	1	1		2	*
Arthropoda	Ostracoda				Seed Shrimps			1	1	*
Annelida	Oligochaeta				Freshwater Worms	1	1	1	3	2
Annelida	Hirudinea	Glossiphoniidae			Leeches				0	1
Mollusca		Hydrobiidae			Freshwater Snails	1			1	4
Mollusca		Physidae			Freshwater Snails	1			1	1
Mollusca		Lymnaeidae			Freshwater Snails	1		1	2	2
Mollusca	Bivalva	Sphaeriidae			Freshwater Bivalve				0	5
Platyhelminthes		Dugesiidae			Flatworms	1			1	2
Chordata	Osteichtyes	Poeciliidae	*Gambusia holbrooki*		Plague Minnow	1	1	1	2	*
				Total number of invertebrate taxa:		10	8	10	18	16
				Site SIGNAL scores:		3.11	3.57	3.67		3.50

2.3.4 March 2018 Wet Weather Sampling

Wet weather sampling was undertaken on the 21st of March 2018 (rising limb) and on the 23rd of March 2018 (falling limb). **Table 16** provides field notes recorded during the wet sampling and site photographs for both the rising and falling limb surveys are attached in **Appendix A**. There was no overland flow from the No 563B property and no flow from the ESC-53B location. Whilst there were construction works underway at the adjoining ARH site at Number 53C Warriewood Road, no discharge flow from ESC-53C was observed during the rising or falling limb surveys. In addition to the sampling site notes provided below it was also noted that construction works were underway along the riparian bank for the development at Nos 29 to 31 Warriewood Road. These works were noted to have contributed turbid waters to the creek downstream.

Table 17 provides the metered water quality results for the wet sampling event. The chemical analysis results (ALS Reports **ES1808499 & ES1808753**) for collected water samples (TDS, TSS, nutrients, and faecal coliform counts) are attached in **Appendix B** to this report.

Table 16 Field Comments – March 2018 Wet Weather Rising

Site	Comments
NC3-U	Water was clear with a low flow through site. Vegetation had been cleared like previous survey. Soft sands in the upstream sections of site. Orange staining found in upstream sections. Macrophytes observed included: *Percicaria deipiens* (Slender Knot Weed), *Ludwigia periviana* (Peruvian Primrose), *Nastertiom officinalle* (Watercress) and *Ludwigia peploides* (Floating Water Primrose). Moderate Filamentous green alga observed.
NC4-U	Water fairly clear and dark in colour. Vegetation was cleared on both banks as in former surveys. Macrophytes observed: River Clubrush, Slender Knot Weed, Watercress and *Myriophyllum sp*. Filamentous green alga was not observed.
NC5-U	Water was dark in colour. Very low surface flow. Traces of Duck weed, *Lemna*. Filamentous green algae not observed.
NC3-D	Conditions like the rising limb sample. Water clear, with a greater flow throughout site. Filamentous green alga not observed.
NC4-D	Water fairly clear. Slightly greater flow through site. Filamentous green alga not observed.
NC5-D	Water dark in colour. Similar conditions with an increased flow. Filamentous green alga not observed.

Table 17 Lower Narrabeen Creek Wet Weather Samples 21st and 23rd March 18 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
Raising Sample		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC3-U	12:38	0.1	20.98	325	84	7.01	4.5	30	70	0.14	
NC4-U	12:56	0.02	21.09	308	27.8	6.74	8	25	70	0.16	
NC5-U	13:12	0.11	20.91	362	22.4	6.46	7.8	0.9	250	0.00	
ESC-53C										No flow	
Falling Sample 23rd March 2018											
NC3-D	10:33	0.12	20.48	338	95.8	7.05	4.1	30	180	0.2	
NC4-D	10:49	0.05	20.1	281	35.7	6.5	6.6	40	120	0.2	
NC5-D	11:36	0.09	20.04	308	24.1	6.47	6.9	80	300	0.14	
ESC-53C										No flow	

2.3.5 May 2018 Dry Weather Sampling

Table 18 provides field notes recorded during the final annual dry weather sampling on 11th of May 2018 and site photographs for survey are attached in **Appendix A**. **Table 19** provides the metered water quality results. The chemical analysis results (ALS Report **ES1813538**) for collected water samples are attached in **Appendix B** to this report.

Table 18 Field Comments – May 2018 Dry Weather Sampling

Site	Comments
NC3	Water was clear with a low flow and brown silt covering most of the rocky sediment. An established sandbar was present just downstream of the sediment curtain that is in place. In the deeper sections of the creek the water was turbid and a yellowish-grey in colour. Macrophytes observed included: *Nastertiom officinalle* (Watercress), *Percicaria deipiens* (Slender Knot Weed), *Ludwigia periviana* (Peruvian Primrose), *Ludwigia peploides* (Floating Water Primrose), *Typha* sp. (Cumbunji) and River Clubrush. No filamentous green algae observed.

NC4	Very low flow with the downstream section chocked by *Myriophyllum* sp. The water was turbid with a thin layer of scum on the surface. Water levels were lower than previous surveys. Macrophytes included: Floating Water Primrose, River Clubrush, Slender Knot Weed, Watercress, *Juncas acutus* sp and *Myriophyllum sp*. Downstream sections choked with Watercress and *Myriophyllum sp*. Filamentous green alga was not observed.
NC5	Substrate covered in a brown silt. Filamentous green alga was present in moderate amounts. There was a small amount of water entering the site from a storm water pipe. Macrophytes started to grow in-between rocks. Water levels were low with a small amount of water trickling through the rock riffle. Water was clear and not turbid. Macrophytes observed included: Slender Knot Weed, Carex, Peruvian Primrose and Cyprus

Table 19 Lower Narrabeen Creek Dry Weather Sample 11th May 18 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC3	12:46	0.1	12.2	514	105.6	7.47	4.3	15	1.5	0.1	
NC4	13:00	0.1	14.82	495	27.9	7.19	9.2			-	
NC5	13:18	0.1	13.34	564	34.1	7.34	7.6			-	

2.3.6 August 2018 Dry Weather Sampling

Table 19 provides field notes recorded during the dry weather sampling on 14th of August 2018 and site photographs for survey are attached in **Appendix A**. **Table 21** provides the metered water quality results. The chemical analysis results (ALS Report **ES1823842**) for collected water samples are attached in **Appendix B** to this report.

Table 20 Field Comments – August 2018 Dry Weather Sampling

Site	Comments
NC3	Water fairly clear with a low flow throughout the site length. Macrophytes observed included: *Nastertiom officinalle* (Watercress), *Percicaria deipiens* (Slender Knot Weed), *Ludwigia periviana* (Peruvian Primrose), *Ludwigia peploides* (Floating Water Primrose), *Typha* sp. (Cumbungi) and River Clubrush. Filamentous green alga was present in small amounts

NC4	Water fairly clear with no observable surface flow. Creek choked with macrophytes: Floating Water Primrose, River Clubrush, Slender Knot Weed, Watercress, Pennywort and *Myriophyllum sp*. Downstream sections choked with Watercress and *Myriophyllum sp*. Filamentous green alga was present in small amounts.
NC4.5	Water very turbid, with no observable surface flow. Upstream sections choked with macrophytes. Small traces of ferny Azolla.
NC5	Water slightly turbid with a very low flow. alga was present in moderate amounts. Increase in macrophytes. Macrophytes observed included: Slender Knot Weed, Carex, Peruvian Primrose and Cyprus. Substrate covered in a brown silt. Filamentous green alga present in small amounts.

Table 21 Lower Narrabeen Creek Dry Weather Sample 14th August 18 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC3	15:57	0.1	11.76	554	71.6	6.28	12.2	10	1.1		
NC4	11.92	0.1	11.92	520	50.8	6.3	6.5	10	60		
NC4.5	15:08	0.1	15.76	545	74.9	5.92	100	50	600		
NC5	15:23	0.1	12.27	576	49.5	6.19	53.3	60	300	0.045	

2.3.7 September 2018 Wet Weather Sample

Wet sampling was undertaken on the 20th of September 2018 (rising limb) and on the 20th of September 2018 (falling limb). **Table 22** below provides field notes recorded during the wet sampling and site photographs for both the rising and falling limb surveys are attached in **Appendix A**. In addition to the sampling site notes provided below it was also noted that construction works were underway along the riparian bank for the development at Nos 29 to 31 Warriewood Road. Whilst there were construction works underway at Number 53C Warriewood Road there was no flow from ESC-53C observed during the rising or falling limb surveys.

Table 23 provides the metered water quality results for the wet sampling event. The chemical analysis results (ALS Report **ES1827935 & ES1828050**) for collected water samples (TDS, TSS, nutrients, and faecal coliform counts) are attached in **Appendix B** to this report.

Table 22 Field Comments – September 2018 Wet Weather Rising	
Site	Comments
NC3-U	Water was slightly turbid with a low flow through site. Vegetation had been cleared like previous survey. Orange staining found in upstream sections. Macrophytes observed included: *Percicaria decipiens* (Slender Knot Weed), *Schoenoplectus Validus* (River Club Rush), *Ludwigia periviana* (Peruvian Primrose), *Nastertiom officinalle* (Watercress), *Ludwigia peploides* (Floating Water Primrose) and *Typha .Sp* (Cumbungi). Substrates covered in brown silt. Small amounts of Filamentous green alga observed.
NC4-U	Water fairly clear with good flow. Vegetation was cleared on both banks as in former surveys. Macrophytes observed: River Clubrush, Floating Water Primrose, *Hydrocotyle bonariensis* (Pennywort), Watercress and *Myriophyllum sp*. Filamentous green alga was not observed.
NC4.5-D	Low flow with water slightly turbid. Upstream sections with less canopy cover have an increase in macrophytes: Watercress, Slender Knot Weed and Cumbungi.
NC5-U	Water is slightly turbid, with the increased flow stirring the silt/algal matrix that situs upon the rock substrates upstream. Sand coming from the stormwater pipe under the road bridge. Increase of instream macrophytes: Slender Knot Weed, Peruvian Primrose, Water cress, Cumbungi and *Carex .Sp*.
NC3-D	Conditions like the rising limb sample. Water clear, with no flow throughout site. Filamentous green alga present in small amounts.
NC4-D	Water fairly clear. No flow through site. Filamentous green alga not observed.
NC4.5-D	Water fairly clear. No flow through site. Filamentous green alga not observed.
NC5-D	Similar conditions with clear water and a slightly lesser flow. Filamentous green alga not observed

Table 23 Lower Narrabeen Creek Wet Weather Rising Sample 20th and 21st September 18 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC3-U	15:21	0.1	15.96	314	87.3	7.39	9.9	15	200	0.06	
NC4-U	13:49	0.1	14.79	476	37.7	7.28	10.2	12	80	0.14	
NC4.5-U	13:15	0.1	14.27	448	34.9	7.27	12.6	70	600	0.03	
NC5-U	14:23	0.1	15.10	518	41.7	7.41	9.1	20	400	0.09	
Falling Sample 21st September 2018											
NC3-D	11:42	0.1	13.03	405	73.0	7.23	6.4	10	190		
NC4-D	12:16	0.1	15.43	387	46.9	7.22	8.3	12	60		
NC4.5-D	12:07	0.1	13.04	449	33.8	7.32	6.2	60	600		
NC5-D	12.31	0.1	14.71	494	40.5	7.36	6.7	80	300	0.03	

2.3.8 November 2018 Dry Weather Sampling

Table 24 provides field notes recorded during the dry weather sampling on 26th of November 2018 and site photographs for survey are attached in **Appendix A**. **Table 25** provides the metered water quality results. The chemical analysis results (ALS Report **ES1835246**) for collected water samples are attached in **Appendix B** to this report.

Table 24 Field Comments – November 2018 Dry Weather Sampling

Site	Comments
NC3	Water fairly clear with a low flow throughout the site length. Orange Precipitate found throughout channel sections. Macrophytes observed included: *Nastertiom officinalle* (Watercress), *Percicaria deipiens* (Slender Knot Weed), *Ludwigia periviana* (Peruvian Primrose), *Ludwigia peploides* (Floating Water Primrose), *Typha* sp. (Cumbungi) and River Clubrush. Filamentous green alga was present in moderate amounts

NC4	Water slightly turbid with an unmeasurable flow. Downstream sections had a slight scum or sheen on the surface. Iron precipitate coming from the inner channel. Contractors pulling out trees on the northern bank. Creek choked with macrophytes: Floating Water Primrose, River Clubrush, Slender Knot Weed, Watercress, Pennywort and *Myriophyllum sp*. Downstream sections choked with Watercress and *Myriophyllum sp*. Filamentous green alga was abundant.
NC4.5	No observable surface flows. Water was slightly turbid with surface sheen/scum on the bank edges. Macrophytes upstream of the site, chocking channel sections. Filamentous green alga was abundant.
NC5	Water slightly turbid with a very low flow. Iron precipitate and staining throughout the site. Surface/sheen on the surface of most waters. Macrophytes observed included: *Percicaria deipiens* (Slender Knot Weed), *Ludwigia periviana* (Peruvian Primrose), *Ludwigia peploides* (Floating Water Primrose), *Typha* sp. (Cumbungi) and River Clubrush. Large proliferation of Peruvian Primrose in the upstream sections. Filamentous green alga was abundant.

Table 25 Lower Narrabeen Creek Dry Weather Sample 26th November 18 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC4	12:03	0.1	18.79	488	25.3	6.77	10	0.2	0.3	N/A	
NC4.5	12:26	0.1	18.09	545	8.5	6.81	12.5	0.5	3.0	N/A	
NC5	13:01	0.1	23.69	533	67.5	6.8	12.6	0.5	2.5	N/A	

2.3.9 November 2018 Wet Weather Sampling

Wet sampling was undertaken on the 28th of November 2018 (rising limb) and on the 29th of November 2018 (falling limb). **Figure 2** shows hourly rainfall for Warriewood in November, and **Table 26** provides field notes recorded during the wet sampling rising and falling. Site photographs for both wet rising and falling limb surveys are attached in **Appendix A**. **Table 26** provides the metered water quality results for the wet sampling event (rising and falling). The chemical analysis results (ALS Report **ES1835494 & ES1835745**) for collected water samples (TDS, TSS, nutrients, and faecal coliform counts) are attached in **Appendix B** to this report.

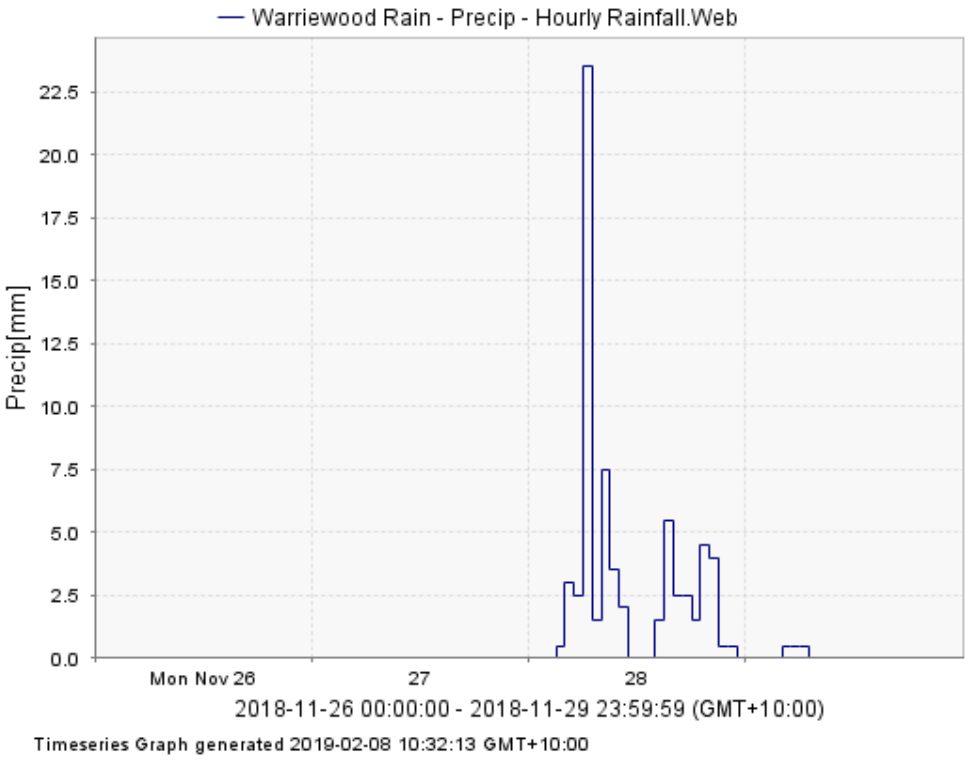

Figure 2 Hourly Rainfall at Warriewood 26 to 29 November 2018

Table 26 Field Comments – November 2018 Wet Weather Rising	
Site	Comments
NC4-U	Water fairly clear with low - moderate flow. Vegetation was cleared on both banks as in former surveys. Macrophytes observed: River Clubrush, Floating Water Primrose, *Hydrocotyle bonariensis* (Pennywort), Watercress and *Myriophyllum sp*. Filamentous green alga was not observed.
NC4.5-D	Unmeasurable flow with water slightly turbid. Upstream sections with less canopy cover have slight increase in macrophytes: Watercress, Slender Knot Weed and Cumbungi.
NC5-U	Water is slightly turbid, with a low to moderate flow, most of the flow from the ESC. Sand coming from the stormwater pipe under the road bridge with flow. Increase of instream macrophytes: Slender Knot Weed, Peruvian Primrose, Water cress, Cumbungi and *Carex .Sp*. Filamentous green alga present in small amounts. Algae being stirred up and taken downstream.
NC3-D	Conditions like the rising limb sample, with elevated water levels. Evidence of water levels 20-30cm greater than current. Water slightly turbid. Filamentous green alga present in small amounts.
NC4-D	Water slightly turbid covering entire site width. Slightly greater flow. Filamentous green alga not observed.
NC4.5-D	Water turbid with no measurable flow. Filamentous green alga not observed.
NC5-D	Similar conditions with fairly clear water. Sand sediments have benn pushed futher downstream.

	Water covering full riffle sections under the bridge. Storm water pipe flowing. Filamentous green alga present in small amounts.

Table 27 Lower Narrabeen Creek Wet Weather Rising Sample 28th November 18- Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC4-U	6:33	0.1	19.14	489	9.2	6.68	10.2	0.2	1.2	N/A	
NC4.5-U	6:18	0.1	19.44	553	6.2	6.77	11.6	0.5	3.0	N/A	
NC5-U	5:57	0.1	20.16	434	39.6	6.92	98.5	0.37	1	0.11	
Falling Sample 29th November 2018											
NC4-D	14:32	0.1	18.94	292	38.9	6.83	11	0.5	0.8	0.25	
NC4.5-D	14:11	0.1	18.51	288	37.5	6.92	12.2	0.5	3.0	0.13	
NC5-D	14:50	0.1	18.7	298	41	6.9	18.6	2.5	0.3	0.13	

2.3.10 February 2019 Dry Weather Sampling

Table 28 provides field notes recorded during the annual dry weather sampling on 4th of February 2019 and site photographs for survey are attached in **Appendix A**. **Table 29** provides the metered water quality results. **Table 30** provides the results of the annual Rapid Biological Assessment (RBA) sampling. The chemical analysis results (ALS Report **ES1903393**) for collected water and sediment samples and for algae speciation plus counts are attached in **Appendix B** to this report.

Table 28 Field Comments – February 2019 Dry Weather

Site	Comments
NC4	Water fairly clear with no observed surface flow. Small surface sheen throughout. Water levels lower compared to former surveys. Increased amounts of macrophytes throughout especially *Myriophyllum sp* and *Persicaria decipiens*. Vegetation was cleared on northern banks as in former surveys. Macrophytes observed: River Clubrush, Floating Water Primrose, *Hydrocotyle bonariensis* (Pennywort), Watercress and *Myriophyllum sp*. Filamentous green alga was moderate to abundant (greater in areas of sunlight).
NC4.5	No observable with water slightly turbid. Upstream sections with less canopy cover have an increase in macrophytes: Watercress, Slender Knot Weed and Cumbungi.
NC5	Water was clear with a small trickle flow. Large increase in macrophytes especially *Myriophyllum sp*. downstream and 100% cover of Peruvian Primrose upstream. Increase of instream macrophytes: Slender Knot Weed, Peruvian Primrose, Water cress, Cumbungi and

	Carex .Sp. Greater amounts of silt and algae throughout. Filamentous green alga was abundant.

Table 29 Lower Narrabeen Creek Dry Weather Sample 4th February 19 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC4-U	11:07	0	24.17	349	11.5	6.81	8.4	0.2	1.2	N/A	
NC4.5-U	14:09	0	23.77	379	7.3	6.94	13.4	0.5	3.0	N/A	
NC5-U	12:39	0	24.44	380	26.9	7.02	9.7	0.3	1.0	N/A	

Table 30 Macroinvertebrate and Fish Sampling Results Narrabeen Creek 4 February 2019

Phylum	Class				Common	4/2/19	4/2/19	Total	
		Family	Sub-Family	Species	Name	NC4	NC5	Occur	SIG-2
Arthropoda	Insecta	Dytiscidae			Diving Beetles	1		1	2
Arthropoda	Insecta	Ceratopogonidae			Biting Midges	1	1	2	4
Arthropoda	Insecta	Chironomidae	Chironominae		Bloodworms	1	1	2	3
Arthropoda	Insecta	Chironomidae	Orthocladiinae		Bloodworms	1		1	4
Arthropoda	Insecta	Culicidae			Mosquitoes	1		1	3
Arthropoda	Insecta	Belostomatidae			Giant Water Bugs		1	1	1
Arthropoda	Insecta	Veliidae			Small Water Treaders	1	1	2	3
Arthropoda	Insecta	Libellulidae			Dragonflies	1	1	2	4
Arthropoda	Insecta	Coenagrionidae			Damselflies	1	1	2	2
Arthropoda	Insecta	Sciomyzidae			Marsh Flies	1		1	2
Arthropoda	Arachnida				Freshwater Mites	1	1	2	6
Arthropoda	Crustacea	Cyclopidae			Copepods	1		1	*
Annelida	Oligochaeta				Freshwater Worms	1	1	2	2
Annelida	Hirudinea	Glossiphoniidae			Leeches	1		1	1
Mollusca		Lymnaeidae			Freshwater Snails	1	1	2	2
Platyhelminthes		Dugesiidae			Flatworms	1		1	2
Chordata	Osteichtyes	Poeciliidae	*Gambusia holbrooki*		Plague Minnow	1	1	2	*
Chordata	Osteichtyes	Gobiidae	*Hypseleotris compressa*		Empirefish	1		1	
Chordata	Osteichtyes	Gobiidae	*Gobiomorphus australis*		Striped Gudgeon	1		1	
				Total number of invertebrate taxa:		15	9	16	
					Site SIGNAL scores:	2.86	3.00		2.73

2.3.11 May 2019 Dry Weather Sampling

Table 31 provides field notes recorded during the dry weather sampling on 1st of May 2019 and site photographs for survey are attached in **Appendix A**. **Table 32** provides the metered water quality results. The chemical analysis results (ALS Report **ES1913104**) for collected water samples are attached in **Appendix B** to this report.

Table 31 Field Comments – May 2019 Dry Weather Sampling

Site	Comments
NC4	Water fairly clean, however a thin layer of scum was present on the surface of the site. There was no observable flow and water levels were significantly lower than previous surveys. The banks were fairly eroded. Fish species Gambusia was also observed. Filamentous green algae was present in moderate amounts, downstream was chocked with Macrophytes. Macrophytes that were observed include: *Nastertiom officinalle* (Watercress), *Percicaria deipiens* (Slender Knot Weed), *Ludwigia peruviana* (Peruvian Primrose), *Ludwigia peploides* (Floating Water Primrose), *Myriophyllum (*Milfoil), *Schoenoplectus Validus* (River Clubrush) and *Hydrocotyle bonariensis* (Kurnell Curse).
NC4.5	There was no observable surface flow and water was fairly turbid. Appears as though works had been initiated, with banks being widened and 26tabilization works had been put in place. The clearing of shrubs and plants on the construction side of the bank paired with the widening of the bank will increase the sunlight that the river has previously had, likely to produce a greater growth in macrophytes. Filamentous green algae on the Northern bank was abundant, due to high exposure to sunlight and high disturbance from construction works. Water levels were significantly low. On the south bank there were small amounts of Persicaria decipiens (slender knot weed) and Carex. There were also traces of *Lemna* (Duck weed) throughout the site.
NC5	Water was heavily choked by mcrophytes downstream, flow was low. Water was slightly turbid with a layer on scum on the surface. The water escape had no flow coming from it. Substrates were covered in brown silt, filamentous green algae was present in small amounts. The macrophytes observed at this site include: *Ludwigia peruviana* (Peruvian Primrose), *Myriophyllum, Carex* and *Cumbunji*. There were small amounts of *Lemna* (Duck weed) gathered in eddies downstream. Gambusia fish were also observed in small amounts in shallow areas. Macrophytes on the South bank upstream have all grown significantly, possibly due to the clearing on the North side and widening, increasing the sunlight exposure.

Table 32 Lower Narrabeen Creek Dry Weather Sample 1st May 19 – Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC4	16:02	0.14	17.36	517	12.9	7.12	8.3	0.2	0.3	N/A	
NC4.5	16:16	0.1	18.64	582	12	7.08	31.8	0.5	3.0	N/A	
NC5	16:36	0.25	19.95	594	69.9	7.33	32.6	0.5	3	0.8	

2.3.12 June 2019 Wet Weather Sampling

Wet sampling was undertaken on the 4th of June 2019 (rising limb) and on the 5th of June 2019 (falling limb). **Figures 3** and **4** shows hourly rainfall for Warriewood in from May through to June, and **Table 33** provides field notes recorded during the wet sampling rising and falling. Site photographs for both wet rising and falling limb surveys are attached in **Appendix A**. **Table 34** provides the metered water quality results for the wet sampling event (rising and falling). The chemical analysis results (ALS Reports **ES1917059 & ES1917222**) for collected water samples (TDS, TSS, nutrients, and faecal coliform counts) are attached in **Appendix B** to this report.

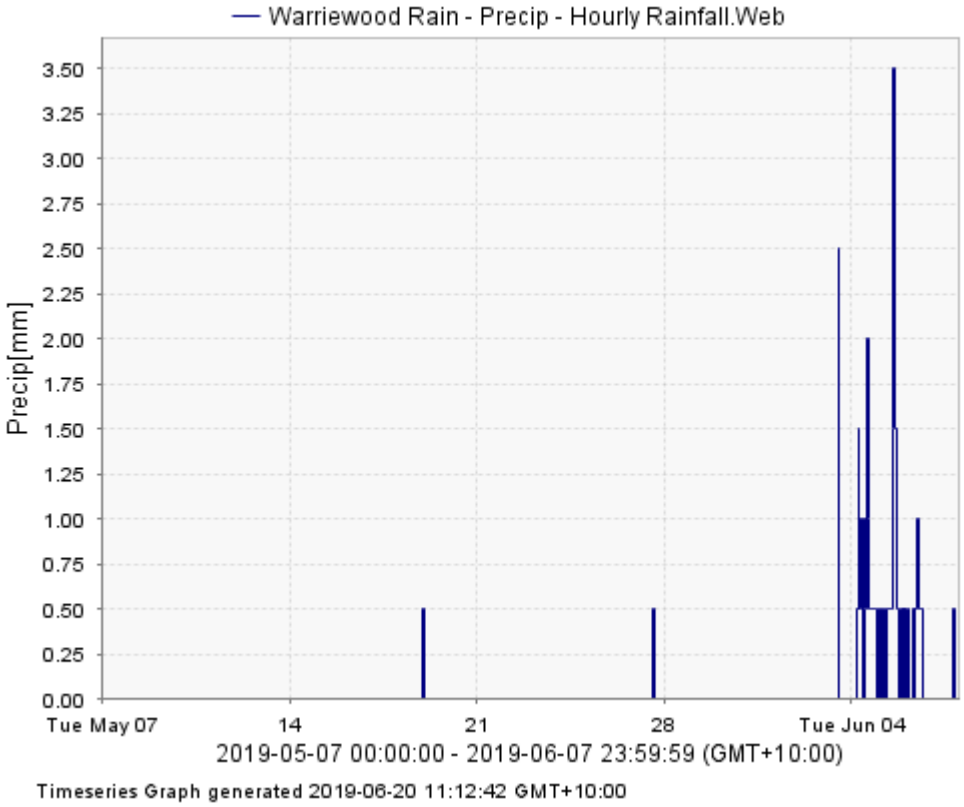

Figure 3 Hourly Rainfall for Warriewood for 7 May 19 – 7 June 19

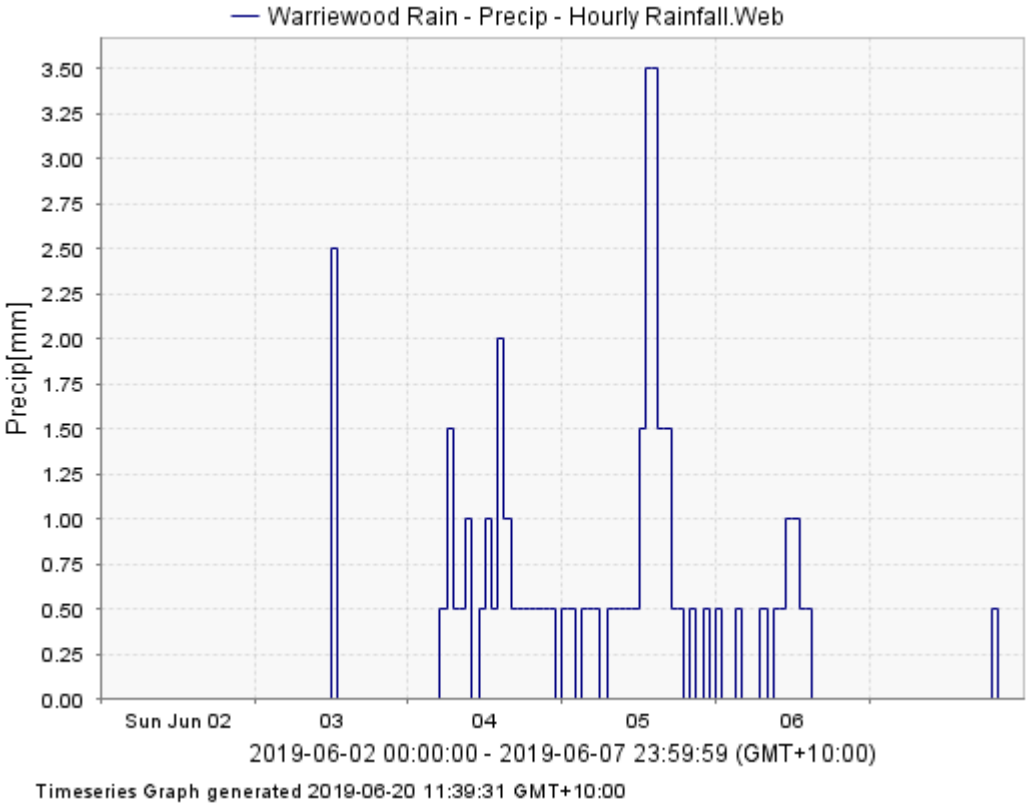

Figure 4 Hourly Rainfall at Warriewood 2 to 7 June 2019

Table 33 Field Comments – June 2019 Wet Weather Rising & Falling Limbs

Site	Comments
NC4-U	Water fairly clear with a moderate - high flow. Water was spilling over and flowing through the inner channel. Vegetation was cleared on both banks as in former surveys. Macrophytes observed: River Clubrush, Slender Knot Weed, Floating Water Primrose, *Hydrocotyle bonariensis* (Pennywort), Watercress and *Myriophyllum sp*.
NC4.5-U	Low flow with water slightly turbid. Upstream sections with less canopy cover have slight increase in macrophytes: Watercress, Slender Knot Weed and Cumbungi. The creek section is wider with the bank work complete on the eastern side. Filamentous green alga was not observed.
NC5-U	Water was slightly turbid, with a moderate flow. The escape pipe (NC5-ESC) has turbid water entering NC5. Sand coming from the stormwater pipe under the road bridge with flow. Increase of instream macrophytes: Slender Knot Weed, Peruvian Primrose, Water cress, Cumbungi and *Carex .Sp*. Filamentous green alga present in small amounts.
NC4-D	Water slightly turbid covering entire site width. High flow throughout. Water spilling over the bank and into the cleared dirt patch on the northern bank. Filamentous green alga not observed.

NC4.5-D	Water slightly turbid with a low flow. Very similar to the rising limb conditions. Filamentous green alga not observed.
NC5-D	Water turbid with a high flow throughout. Water covering full riffle sections under the bridge. Storm water pipe flowing with extremely turbid waters. The Mericon site to the west did not seem to have efficient runoff measures. Numerous points were observed where water flowing over dirt was entering Narrabeen creek from the Mericon site. Creek waters did start to clear up within the short time present while sampling.

Table 34
Lower Narrabeen Creek Wet Weather Rising Sample 4th June 2019 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (m)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC4-U	12:50	0.18	11.28	129	81.5	6.41	17.9	0.6	1.3	0.5	
NC4.5-U	13:15	0.2	11.30	177	67.0	6.40	17.5	0.5	12	0.07	
NC5-U	13:35	0.16	11.39	175	77.2	6.52	63.4	0.37	2	0.5	
NC5-ESC-U	13:38	0.24	13.00	380	96.4	8.98	49.4	0.4	0.8	0.1	
Falling Limb Sample 5th June 2019											
NC4-D	12:03	0.43	11.74	162	89	6.42	15.8	0.6	2.0	0.5	
NC4.5-D	12:44	0.39	12.07	220	74.4	6.48	11.5	0.5	12	0.08	
NC5-D	12:23	0.34	11.87	208	82.1	6.56	161.8	0.4	4.0	0.67	
NC5-ESC-U	12:27	0.43	12.34	200	98.6	8.9	577.3	0.8	0.8	0.2	

2.3.13 May 2021 Dry Weather Sampling

T**able 35** provides field notes recorded during the annual dry weather sampling on 27 May of 2021 and site photographs for survey are attached in **Appendix A**. **Table 36** provides the metered water quality results. **Table 37** provides the results of the annual Rapid Biological Assessment (RBA) sampling. The chemical analysis results (ALS Report **ES2120014**) for collected water and sediment samples and for algae speciation plus counts are attached in **Appendix B** to this report.

Table 35 Field Comments – 27/5/21 Annual Dry Weather	
Site	Comments
NC3	Water was slightly turbid with a low flow throughout the site length. Channel sections were deeper than former surveys. Upstream the channel was still shallow with less sands and increased boulder rock. Sediments were mostly clay with sands and small boulders and cobbles. Maximum width was to 2m with an average width of 1.3m. The maximum depth was to 1.3m with an average depth of 0.6m. A foot bridge had been built across the site since previous surveys. Habitats sample were: undercut banks, macrophytes, detritus and trailing bank vegetation. Macrophytes included: River Clubrush *Schoenoplectus validus*, Floating Water Primrose *Ludwigia peploides,* Pest weed – *Ludwigia peruviana* Watercress *Nasturtium officinale,* Cumbungi *Typha sp*. and *Myriophyllum sp*. Filamentous green alga was moderate to abundant (greater in areas of sunlight).
NC4	Water was slightly turbid with a low flow throughout the site. Sediments mainly consisted of sands and silts. Downstream, sections were choked with macrophytes, *Nasturtium officinale* and *Myriophyllum sp*. Macrophytes observed: Kurnell curse *Hydrocotyle bonariensis,* Slender knot weed *Persicaria Decipiens*, River Clubrush *Schoenoplectus validus,* Pest weed – *Ludwigia peruviana*, Watercress *Nasturtium officinale,* Cumbungi *Typha sp*. and *Myriophyllum sp*. Filamentous green alga was moderate.
NC5	Water was slightly turbid with a low flow. Upstream sections were choked with macrophytes, particularly cumbungi. Down stream sections were similar to former surveys, though macrophyte coverage had increased. Sediments consisted of sands, silts boulders and cobbles. Brown silts covered most substrates. Maximum width was to 4m with and average width of 1.2m. Maximum depth was 0.9m with an average depth of 0.5m. Habitats sample were: macrophytes, detritus and trailing bank vegetation. Macrophytes included: Slender knot weed *Persicaria Decipiens*, River Clubrush *Schoenoplectus validus,* Pest weed – *Ludwigia peruviana*, Watercress *Nasturtium officinale,* Cumbungi *Typha sp*. and *Myriophyllum sp*. Filamentous green alga was abundant

Table 36 Lower Narrabeen Creek Annual Dry Weather Sample 27 May 21 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC3	12:45	0.1	14.73	503	52.2	7.33	3.4	0.20	1.2	0.16	
NC4	12:15	0.1	14.28	418	41.4	7.27	9.6	0.18	1.0	0.11	
NC5	14:15	0.1	14.43	307	61.2	7.58	6.1	0.20	1.0	0.16	

Table 37 Macroinvertebrate Results Narrabeen Creek 27 May 2021									
Phylum	Class				Common	27/5/21	27/5/21	Combined	
		Family	Sub-Family	Species	Name	NC3	NC5	Occur	SIG-2
Arthropoda	Insecta	Ceratopogonidae			Biting Midges	1		1	4
Arthropoda	Insecta	Chironomidae	Chironominae		Bloodworms	1	1	2	3
Arthropoda	Insecta	Simuliidae			Black Flies		1	1	5
Arthropoda	Insecta	Gerridae			Water Striders	1		1	4
Arthropoda	Insecta	Libellulidae			Dragonflies	1	1	2	4
Arthropoda	Insecta	Argiolestidae			Damselflies	1		1	5
Arthropoda	Insecta	Coenagrionidae			Damselflies	1	1	2	2
Arthropoda	Arachnida				Freshwater Mites	1		1	6
Arthropoda	Crustacea	Cyclopidae			Copepods		1	1	*
Annelida	Oligochaeta				Freshwater Worms	1	1	2	2
Annelida	Hirudinea	Glossiphoniidae			Leeches		1	1	1
Mollusca		Physidae			Freshwater Snails	1	1	2	1
Platyhelminthes		Dugesiidae			Flatworms	1	1	2	2
Chordata	Osteichtyes	Poeciliidae	*Gambusia holbrooki*		Plague Minnow	1	1	2	*
					Total number of invertebrate taxa:	10	9		12
					Site SIGNAL scores:	3.30	2.50		3.25

2.3.14 July 2022 Dry Weather Sampling

Table 38 provides field notes recorded during the dry weather sampling on 13th of July 2022 and site photographs for survey are attached in **Appendix A**. **Table 39** provides the metered water quality results. The chemical analysis results (ALS Report **ES2224714**) for collected water samples are attached in **Appendix B** to this report.

Table 38 Field Comments – 13/7/22 Dry Weather

Site	Comments
NC3	Water was turbid with a low flow throughout. A brown surface scum was observed in some edge areas. Maximum depth appeared to be approximately 1.2m with an average depth of around 0.7m. Evidence of flows 1m above current water levels. Four trees had fallen over down stream possibly from saturated grounds and high winds. Sediments were mostly clay with sands and small boulders and cobbles. Bank vgetation was failry dense (mostly with *Ludwigia peruviana*). Macrophytes included: River Clubrush *Schoenoplectus validus*, Pest weed – *Ludwigia peruviana* Watercress *Nasturtium officinale* and some Slender knot weed *Persicaria Decipiens*. Filamentous green alga was moderate.
NC4	Water was grey in colour and slightly to moderately turbid. Bank slumping throughout channel sections present. Evidence of flows 0.6m higher than current water levels. Some sand deposits on bank edges. Macrophytes observed included: Kurnell curse *Hydrocotyle bonariensis,* Slender knot weed *Persicaria Decipiens*, River Clubrush *Schoenoplectus validus*, Watercress *Nasturtium officinale,* and *Myriophyllum sp*. Filamentous green alga was moderate.
NC5	Water was grey in colour and turbid. Flow was fairly high underneath the road bridge and downstream. Evidence of flows to 1m above current water levels. The Arcare storm water was full of water, but not discharging. Maximum width was to 12m (upstream pool) with an average width of 1.2m. Maximum depth was 0.9m with an average depth of 0.5m. Macrophytes included: River Clubrush *Schoenoplectus validus,* Pest weed – *Ludwigia peruviana*, Watercress *Nasturtium officinale,* Cumbungi *Typha sp*. and *Myriophyllum sp*. Sediments consisted of sands, silts boulders and cobbles. Brown silts covered most substrates. Filamentous green alga was moderate.

Table 39 Lower Narrabeen Creek Dry Weather Sample 13 July 22 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC3	10:59	0.1	12.46	344	88.2	6.99	19.6	0.90	2.60	0.07	
NC4	11:20	0.1	12.48	366	75.4	7.01	19.9	0.65	0.75	0.18	
NC5	11:41	0.1	11.78	385	54.6	7..05	18.2	0.20	1.20	0.30	

2.3.15 July 2022 Wet Weather Sampling

Wet weather sampling was undertaken on the 21st of July 2022 (rising limb) and on the 22nd of July 2022 (falling limb). **Figure 5** shows hourly rainfall for Curl Curl (closest coastal hourly rainfall station) across both the rising and falling limb period. Field notes recorded during the wet sampling are provided in **Table 40** and site photographs for both wet rising and falling limb surveys are attached in **Appendix A**. **Table 41** provides the metered water quality results for the wet sampling event (rising and falling). The chemical analysis results (ALS Reports **ES2225829 & ES2225976**) for collected water samples (TDS, TSS, nutrients, and faecal coliform counts) are attached in **Appendix B** to this report.

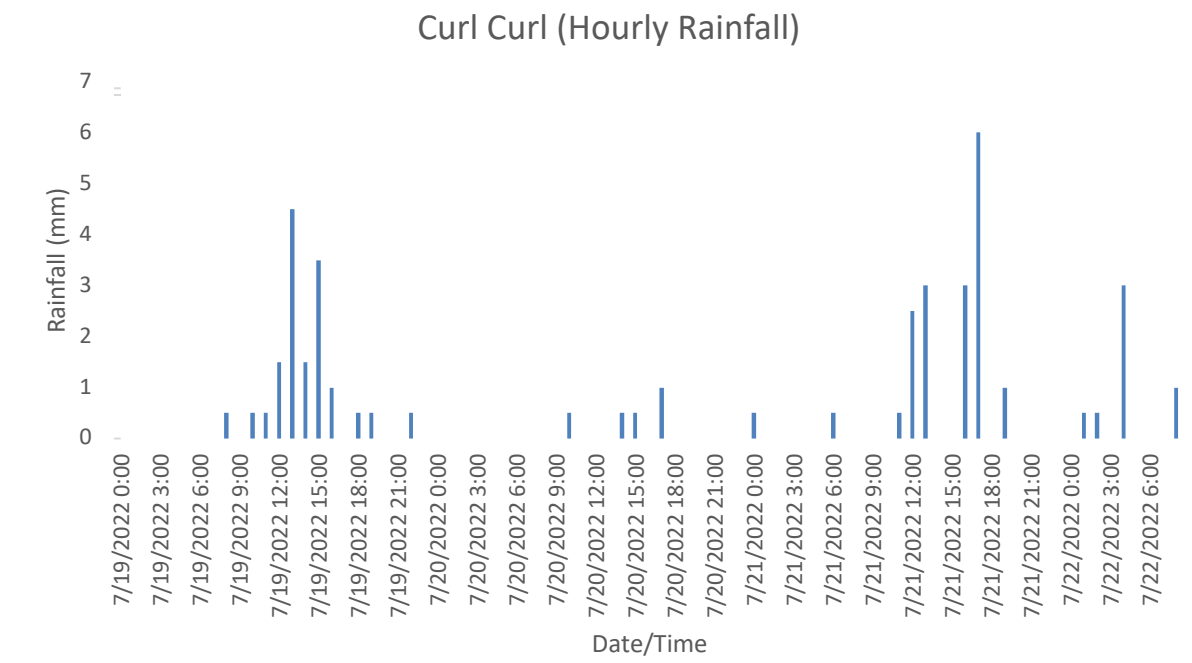

Figure 5 Hourly rainfall at Curl Curl between 19 July 22 – 22 July 22

Table 40 Field Comments – July 2022 Wet Weather Rising & Falling Limbs	
Site	Comments
NC3-U	Water was extremely turbid with a moderate flow throughout the site length. Water had breached the banks on either side of the channel and had submerged much of the bank vegetation. Macrophytes and habitats were the same as the July 22 dry weather survey.
NC4-U	Like upstream at NC3 water was brown and turbid, with a moderate to high flow. Water had breached the banks and started to run on a small inner channel. Macrophytes and habitats were the same as the July 22 dry weather survey.
NC5-U	Water was slightly to moderate turbid, with a decent flow. The Arcare storm water pipe had water in it, though it wasn't discharging. Macrophytes and habitats were the same as the July 22 dry weather survey.
NC3-D	Water was brown and turbid with a lower flow than the rising survey. Water levels had receded to nearer dry weather conditions. Macrophytes and habitats were the same as the July 22 dry weather survey.
NC4-D	Water was brown and turbid, similar to site NC3. Water levels had receded to nearer the dry weather conditions. Macrophytes and habitats were the same as the July 22 dry weather survey.
NC5-D	Water flow and levels were similar to the rising sample. Water was slightly less turbid than the upstream sites. Macrophytes and habitats were the same as the July 22 dry weather survey.

Table 41
Lower Narrabeen Creek Wet Weather Rising Sample 21 July 2022 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (m)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC3-U	16:36	0.2	13.75	108	99.0	6.62	191	0.9	3.2	0.20	
NC4-U	16:49	0.2	13.58	173	89.2	6.9	176.2	0.7	1.8	0.33	
NC5-U	16:59	0.16	13.53	273	71.8	6.93	41.9	0.3	4.5	0.28	
Falling Limb Sample 22 July 2022											
NC3-D	14:52	0.2	13.59	223	100.6	6.91	230.8	0.8	3.0	0.10	
NC4-D	15:06	0.2	13.63	224	91.3	7.05	228.8	0.6	1.0	0.33	
NC5-D	15:22	0.15	14.16	223	80.6	6.99	46.6	0.25	4.0	0.28	

2.3.16 February 2023 Dry Weather Sampling

T**able 42** provides field notes recorded during the annual dry weather sampling on 10 February of 2023 and site photographs for survey are attached in **Appendix A**. **Table 43** provides the metered water quality results. **Table 44** provides the results of the annual Rapid Biological Assessment (RBA) sampling. The chemical analysis results (ALS Report **ES2304472**) for collected water and sediment samples and for algae speciation plus counts are attached in **Appendix B** to this report.

Table 42 Field Comments – 10/2/23 Annual Dry Weather

Site	Comments
NC3	Water was brown and turbid with a very low flow throughout the site length. Channel dimensions were similar to former surveys. The maximum depth was to 1.2m with an average depth of 0.6m. Channel bank vegetation was relatively dense and slightly greater than the July 2022 wet weather survey. There were large amounts of sand throughout the site with some sections being very soft, suggesting recent deposition. Habitats sampled were: undercut banks, macrophytes, detritus and trailing bank vegetation. Macrophytes included: Floating Water Primrose *Ludwigia peploides,* Pest weed – *Ludwigia peruviana,* Watercress *Nasturtium officinale,* Cumbungi *Typha sp*. and Slender Knot Weed *Persicaria sp*. Filamentous green alga was present in small amounts,
NC4	Water was grey in colour and slightly turbid. Site conditions were similar to former surveys. Low flow throughout the site with evidence of recent water levels reaching 20cm above current water levels. Sediments consisted of sands, gravels and some cobbles. Downstream, sections were choked with macrophytes, mostly *Nasturtium officinale* and *Myriophyllum sp*. Macrophytes observed: Kurnell curse *Hydrocotyle bonariensis,* Slender knot weed *Persicaria Decipiens*, River Clubrush *Schoenoplectus validus,* Pest weed – *Ludwigia peruviana*, Watercress *Nasturtium officinale,* Cumbungi *Typha sp*. and *Myriophyllum sp*. Filamentous green alga was present in small amounts.
NC5	Water was slightly turbid with a low flow. Large increase in bank vegetation since the July 22 wet weather survey. Up stream sections were heavily choked with macrophytes. Sediments comprised of mostly sands, silts, boulders and cobbles. Habitats sampled included: macrophytes, detritus and trailing bank vegetation. Macrophytes included: Water Primrose *Ludwigia peploides,* Slender knot weed *Persicaria Decipiens*, River Clubrush *Schoenoplectus validus,* Pest weed – *Ludwigia peruviana*, Watercress *Nasturtium officinale,* Cumbungi *Typha sp*. and *Myriophyllum sp*. Filamentous green alga was observed in small to moderate amounts.

Table 43 Lower Narrabeen Creek Annual Dry Weather Sample 10 February 23 - Metered Water Quality

Site	Time	Depth	Temp	Cond	DO	pH	Turb	Channel (cm)		Flow	Flow
		(m)	°C	µS/cm	%Sat	Units	NTU	Depth	Width	m/sec	L/sec
NC3	12:45	0.1	22.89	325	92.1	6.82	98.1	0.20	1.0	0.2	
NC4	12:00	0.1	20.78	262	38.7	6.85	58.4	0.30	0.30	0.25	
NC5	13:40	0.1	22.97	261	43.7	6.64	34.8	0.20	0.8	0.16	

Table 43 Macroinvertebrate Results Narrabeen Creek February 2023									
Phylum	Class				Common	10/02/2023	10/02/2023		
		Family	Sub-Family	Species	Name	NC3	NC5	Occur	SIG-2
Arthropoda	Insecta	Chironomidae	Chironominae		Bloodworms	1	1	2	3
Arthropoda	Insecta	Tipulidae			Crane Flies		1	1	5
Arthropoda	Insecta	Gerridae			Water Striders	1		1	4
Arthropoda	Insecta	Gelastocoridae			Toad Bugs	1		1	5
Arthropoda	Insecta	Argiolestidae			Damselflies	1		1	5
Arthropoda	Insecta	Coenagrionidae			Damselflies		1	1	2
Arthropoda	Insecta	Ecnomidae			Caddisflies	1		1	4
Arthropoda	Arachnida				Freshwater Mites	1	1	2	6
Annelida	Oligochaeta				Freshwater Worms	1	1	2	2
Annelida	Hirudinea	Glossiphoniidae			Leeches	1	1	2	1
Mollusca		Physidae			Freshwater Snails		1	1	1
Chordata	Osteichtyes	Poeciliidae		*Gambusia holbrooki*	Plague Minnow	1		1	
Chordata	Osteichtyes	Gobiidae		*Gobiomorphus australis*	Striped Gudgeon	1		1	
Chordata	Osteichtyes	Gobiidae		*Philypnodon grandiceps*	Flathead Gudgeon		1		
					Total number of invertebrate taxa:	8	7	13	
					Site SIGNAL scores:	3.75	2.86		3.45

3 REFERENCES

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Warriewood Valley Urban Land Release Water Management Specification. Revised Version, February 2001. Prepared for Pittwater Council.

MPR (2015)

Warriewood Land Release Sector 4, ARV Stage 3 & 4 Construction Water Quality Monitoring, July to October 2015. Report 20, prepared for GHD Sydney, Marine Pollution Research Pty Ltd, October 2015.

MPR 2016a)

Warriewood Land Release Sector 4, ARV Stage 3 & 4 Construction Water Quality Monitoring, November 2015 To February 2016. Report 21, prepared for GHD Sydney, Marine Pollution Research Pty Ltd, February 2016.

MPR (2016b)

Warriewood Land Release Sector 4, ARV Stage 3 & 4 Construction Water Quality Monitoring, March 2016 to June 2016. Report No 22, prepared for GHD Sydney, Marine Pollution Research Pty Ltd, June 2016.

MPR (2016c)

Northern Beaches Council Warriewood Valley Water Management Specification (WMS) Narrabeen Creek WMS Data – Sites NC3 And NC4, November 2015 To June 2016. Report prepared for Merrin Developments, Arcare (Knowles Group) and ARH.

MPR (2017a)

Warriewood Land Release Narrabeen Ck Below Brands Lane, Pre-construction Water Quality Monitoring, July 2016 to December 2016. Report No 02; prepared for Arcare (Knowles Group) by Marine Pollution Research Pty Ltd, March 2017.

MPR (2017b)

Warriewood Land Release Narrabeen Ck Below Brands Lane, Construction Water Quality Monitoring, January 2017 to March 2017. Report No 03; prepared for Arcare (Knowles Group) by Marine Pollution Research Pty Ltd, April 2017.

MPR (2017c)

Warriewood Land Release Narrabeen Ck Below Brands Lane, Construction Water Quality Monitoring, April 2017 to June 2017. Report No 04; prepared for Arcare (Knowles Group) by Marine Pollution Research Pty Ltd, July 2017.

MPR (2018a)

Warriewood Land Release Narrabeen Ck Below Brands Lane, Construction Water Quality Monitoring, July 2017 to February 2018. Report No 05&06; prepared for Arcare (Knowles Group) by Marine Pollution Research Pty Ltd, June 2018.

MPR (2018b)

Warriewood Land Release Narrabeen Ck Below Brands Lane, Construction Water Quality Monitoring, March 2018 to June 2018. Report No 07; prepared for Arcare (Knowles Group) by Marine Pollution Research Pty Ltd, May 2018.

MPR (2018c)

Warriewood Land Release Narrabeen Ck Below Brands Lane, Construction Water Quality Monitoring, July 2018 to Oct 2018. Report No 08; prepared for Arcare (Knowles Group) by Marine Pollution Research Pty Ltd, Oct 2018.

MPR (2019a)

Warriewood Land Release Narrabeen Ck Below Brands Lane, Post-construction Water Quality Monitoring, Nov 2018 to Feb 2019. Report No 09; prepared for Arcare (Knowles Group) by Marine Pollution Research Pty Ltd, Feb 2019.

MPR (2019b)

Warriewood Land Release Narrabeen Ck Below Brands Lane, Post-construction Water Quality Monitoring, March to June 2019. Report No 10; prepared for Arcare (Knowles Group) by Marine Pollution Research Pty Ltd, July 2019.

APPENDIX A

WARRIEWOOD VALLEY
LOWER NARRABEEN CREEK MONITORING

SITE PHOTOGRAPHS FOR THE PERIOD OCT 16 TO JUNE 19 & FOR 27 MAY 21 & JUNE 22 TO AUG 22

Dry Weather November 2017
Wet Weather Falling Limb November 2017
Annual Dry Weather February 2018
Wet Weather Rising Limb March 2018
Wet Weather Falling Limb March 2018
Dry Weather May 2018
Dry Weather August 2018
Wet Weather Rising Limb September 2018
Wet Weather Falling Limb September 2018
Dry Weather November 2018
Wet Weather Rising Limb November 2018
Wet Weather Falling Limb November 2018
Annual Dry Weather February 2019
Dry Weather May 2019
Wet Weather Rising Limb June 2019
Wet Weather Falling Limb June 2019
Annual Dry Weather May 2021
Dry Weather July 2022
Wet Weather Rising Limb July 2022
Wet Weather Falling Limb July 2022
Annual Dry Weather February 2023

SITE PHOTOGRAPHS - DRY WEATHER SAMPLING NOVEMBER 2017

Plate 1: Looking upstream at site NC3 during dry sample on 03/11/17

Plate 2: Looking downstream at site NC3 during dry weather sampling 03/11/17.

Plate 3: Looking across NC4 during the dry sample on 03/11/17.

Plate 4: Looking upstream NC4 during the dry sample on 03/11/17.

Plate 5: Dry weather sample, looking downstream at NC5 on the 03/11/17.

Plate 6: Site 53C-ESC downstream of No 53B during dry sample 03/11/17

SITE PHOTOGRAPHS – WET WEATHER SAMPLING NOVEMBER 2017

Plate 7: Looking upstream at site NC3 during wet weather sampling, falling limb on 06/11/17.

Plate 8: Looking downstream at site NC3 during wet weather sampling, falling limb on 06/11/17.

Plate 9: Looking upstream at site NC4 during the wet weather sample, falling limb on 06/11/17.

Plate 10: Looking across NC4 during the wet weather sample, falling limb on 06/11/17.

Plate 11: Wet weather sample during falling limb, looking downstream at NC5 on the 06/11/17.

Plate 12: Upstream at Site 53B-ESC during the wet weather falling limb 06/11/17.

SITE PHOTOGRAPHS – ANNUAL DRY WEATHER SAMPLING FEBRUARY 2018

Plate 13: Looking upstream at site NC3 during dry weather sampling, 6/02/17.

Plate 14: Looking downstream at site NC3 during dry weather sampling, 6/02/17.

Plate 15: Looking downstream at site NC4 during dry weather sampling, 6/02/17.

Plate 16: Looking upstream at site NC4 during dry weather sampling, 6/02/17.

Plate 17: Looking downstream at site NC5 during dry weather sampling, 6/02/17.

SITE PHOTOGRAPHS - WET WEATHER RISING SAMPLES 21st MARCH 2018

Plate 18: Looking upstream at site NC3 during rising wet sample on 21/03/18

Plate 19: Looking downstream at site NC3 during rising wet sample on 21/03/18

Plate 20: Looking across NC4 during rising wet sample on 21/03/18

Plate 21: Looking upstream NC4 during rising wet sample on 21/03/18

Plate 22: Dry weather sample, looking downstream during rising wet sample on 21/03/18

SITE PHOTOGRAPHS – WET WEATHER SAMPLING MARCH 2018

Plate 23: Looking upstream at site NC3 during wet weather sampling, falling limb on 23/03/18.

Plate 24: Looking downstream at site NC3 during wet weather sampling, falling limb.

Plate 25: Looking upstream at site NC4 during the wet weather sample, falling limb on 23/03/18.

Plate 26: Looking downstream at site NC4 during the wet weather sample, falling limb on 23/03/18.

Plate 27: Wet weather sample during falling limb, looking downstream at NC5 on the 23/03/18.

Plate 28: Site 53B (looking upstream) during the wet weather falling limb 23/03/18.

Plate 29: Site 53C-ESC during the wet weather falling limb 23/03/18.

SITE PHOTOGRAPHS – DRY WEATHER SAMPLING MAY 2018

Plate 30: Looking upstream at site NC3 during dry weather sampling 11/05/18.

Plate 31: Looking downstream at site NC3 during dry weather sampling, 11/05/18.

Plate 32: Looking downstream at site NC4 during dry weather sampling, 11/05/18.

Plate 33: Looking upstream at site NC4 during dry weather sampling, 11/05/18.

Plate 34: Looking downstream at site NC5 during dry weather sampling, 11/05/18.

SITE PHOTOGRAPHS –DRY WEATHER SAMPLING AUGUST 2018

Plate 35: Looking upstream at site NC3 during dry weather sampling 14/08/18.

Plate 36: Looking downstream at site NC3 during dry weather sampling, 14/08/18.

Plate 37: Looking downstream at site NC4 during dry weather sampling, 14/08/18.

Plate 38: Looking upstream at site NC4 during dry weather sampling, 14/08/18.

Plate 39: Looking downstream at site NC4.5 during dry weather sampling, 14/08/18.

Plate 40: Looking upstream at site NC4.5 during dry weather sampling, 14/08/18.

Plate 41: Looking downstream at site NC5 during dry weather sampling, 14/08/18.

Plate 42: Looking across site NC5 during dry weather sampling, 14/08/18.

SITE PHOTOGRAPHS - WET WEATHER RISING SAMPLES 20th SEP 2018

Plate 43: Looking upstream at site NC3 during rising wet sample on 20/09/18

Plate 44: Looking downstream at site NC3 during rising wet sample on 20/09/18

Plate 45: Looking across NC4 during rising wet sample on 20/09/18

Plate 46: Looking upstream NC4 during rising wet sample on 20/09/18

Plate 47: Looking across site NC4.5 during rising wet sample on 20/09/18

Plate 48: Looking downstream at site NC4.5 during rising wet sample on 20/09/18

Plate 49: Stormwater outlet at site NC5 during rising wet sample on 20/09/18

Plate 50: Looking downstream at site NC5 during rising wet sample on 20/09/18

Plate 51: Looking downstream at site 53C-ESC during rising wet sample on 20/09/18

Plate 52: Looking upstream at site NC3 during wet weather sampling, falling limb on 21/09/18.

Plate 53: Looking downstream at site NC3 during wet weather sampling, falling limb on 21/09/18.

Plate 54: Looking upstream at site NC4 during the wet weather sample, falling limb on 21/09/18.

Plate 55: Looking downstream at site NC4 during the wet weather sample, falling limb on 21/09/18.

Plate 56: Wet weather sample during falling limb, looking across NC4.5 on the 21/09/18.

Plate 57: Looking upstream at NC5 during the wet weather falling limb 21/09/18.

Plate 58: Site NC5 during the wet weather falling limb 21/09/18.

Plate 59: 53C-ESC during the wet weather falling limb 21/09/18.

DRY WEATHER SAMPLING NOVEMBER 2018

Plate 60: Looking downstream at site NC4 during dry weather sampling, 26/11/18.

Plate 61: Looking upstream at site NC4 during dry weather sampling, 26/11/18.

Plate 62: Looking downstream at site NC4.5 during dry weather sampling, 26/11/18.

Plate 63: Looking upstream at site NC4.5 during dry weather sampling, 26/11/18.

Plate 64: Looking downstream at site NC5 during dry weather sampling, 26/11/18.

Plate 65: Looking upstream at site NC5 during dry weather sampling, 26/11/18.

WET WEATHER RISING SAMPLES 28th NOVEMBER 2018

Plate 66: Looking across NC4 during rising wet sample on 28/11/18.

Plate 67: Looking upstream NC4 during rising wet sample on 28/11/18.

Plate 68: Looking across site NC4.5 during rising wet sample on 28/11/18.

Plate 69: Looking downstream at site NC4.5 during rising wet sample on 28/11/18.

Plate 70: Stormwater outlet at site NC5 during rising wet sample on 28/11/18.

Plate 71: Looking downstream at site NC5 during rising wet sample on 28/11/18.

WET WEATHER FALLING LIMB 29th Nov 2018

Plate 72: Looking upstream at site NC4 during the wet weather sample, falling limb on 29/11/18.

Plate 73: Looking downstream at site NC4 during the wet weather sample, falling limb.

Plate 74: Wet weather sample during falling limb, looking across NC4.5 on the 29/11/18.

Plate 75: Wet weather sample during falling limb, looking downstream at NC4.5 on the 29/11/18.

Plate 76: Looking upstream at NC5 during the wet weather falling limb 29/11/18.

Plate 77: Site NC5 during the wet weather falling limb 29/11/18.

DRY WEATHER SAMPLING 4th FEBRUARY 2019

Plate 78: Looking downstream at site NC4 during dry weather sampling, 04/02/19

Plate 79: Looking upstream at site NC4 during dry weather sampling, 04/02/19

Plate 80: Looking downstream at site NC4.5 during dry weather sampling, 04/02/19

Plate 81: Looking across site NC4.5 during dry weather sampling, 04/02/19

Plate 82: Looking downstream at site NC5 during dry weather sampling, 04/02/19

Plate 83: Looking upstream at site NC5 during dry weather sampling, 04/02/19

SITE PHOTOGRAPHS –DRY WEATHER SAMPLING MAY 2019

Plate 84: Looking downstream at site NC4 during dry weather sampling, 01/05/19.

Plate 85: Looking upstream at site NC4 during dry weather sampling, 01/05/19.

Plate 86: Looking downstream at site NC4.5 during dry weather sampling, 01/05/19.

Plate 87: Looking upstream at site NC4.5 during dry weather sampling, 01/05/19.

Plate 88: Looking downstream at site NC5 during dry weather sampling, 01/05/19.

Plate 89: Looking upstream at site NC5 during dry weather sampling, 01/05/19.

WET WEATHER RISING SAMPLES 4th JUNE 2019

Plate 90: Looking across NC4 during rising wet sample on 04/06/19.

Plate 91: Looking upstream NC4 during rising wet sample on 04/06/19.

Plate 92: Looking across site NC4.5 during rising wet sample on 04/06/19.

Plate 93: Looking downstream at site NC4.5 during rising wet sample on 04/06/19

Plate 94: Stormwater outlet at site NC5 during rising wet sample on 04/06/19.

Plate 95: Looking downstream at site NC5 during rising wet sample on 04/06/19.

WET WEATHER FALLING LIMB 5th JUNE 2019

Plate 96: Looking upstream at site NC4 during the wet weather sample, falling limb on 05/06/19.

Plate 97: Looking downstream at site NC4 during the wet weather sample, falling limb.

Plate 98: Wet weather sample during falling limb, looking across NC4.5 on the 05/06/19.

Plate 99: Wet weather sample during falling limb, looking downstream at NC4.5 on the 05/06/19.

Plate 100: Looking upstream at NC5 during the wet weather falling limb 05/06/19.

Plate 101: Site NC5 during the wet weather falling limb 05/06/19.

Plate 102: Site NC5 during the wet weather falling limb 05/06/19.

ANNUAL DRY WEATHER SAMPLING 27 MAY 2021

Plate 103: NC3 looking upstream.

Figure 104: NC3 looking Down stream

Figure 105: NC4 looking downstream

Figure 106: NC4 looking upstream

Figure 107: NC5 looking upstream

Figure 108: NC5 looking downstream

Figure 109: No 53A at Narrabeen Creek Bank Looking Back up the Block (No 53 developed and to the left and No 53B undeveloped to right. Note drainage swale between 53A and 53B.

Figure 110: No 53A, overgrown Narrabeen Creek bank

Figure 111: Looking upstream at No 53A left and No 53B right, showing constructed berm between the two properties.

Figure 112: View down No 53A side swale drain showing ponded water and macrophytes

DRY WEATHER SAMPLING 13 JULY 2022

Figure 113: Looking upstream at NC3 during the dry weather sample.

Figure 114: Looking downstream at NC3.

Figure 115: Looking upstream at NC4.

Figure 116: Looking downstream at NC4.

Figure 117: Looking downstream underneath the road bridge at NC5.

Figure 118: Looking upstream towards the open pool above NC5.

Figure 119: Looking up over the property of 53A, across the saturated low-lying sections and drains.

Figure 120: Looking towards Narrabeen Creek down along the 53A drain.

WET WEATHER RISING LIMB 21 JULY 2022

Figure 121: Looking upstream at NC3.

Figure 122: Looking downstream at NC3.

Figure 123: Looking upstream at NC4.

Figure 124: Looking downstream at NC4.

Figure 125: Looking upstream at NC5.

Figure 126: Looking downstream at NC5.

WET WEATHER FALLING LIMB 22 JULY 2022

Figure 127: Looking upstream at NC3.

Figure 128: Looking downstream at NC3.

Figure 129: Looking upstream at NC4.

Figure 130: Looking downstream at NC4.

Figure 131: Looking upstream at NC5.

Figure 132: Looking downstream at NC5.

ANNUAL DRY WEATHER SAMPLING 10 FEBRUARY 2023

Figure 133: Looking upstream at NC3.

Figure 134: Looking downstream at NC3.

Figure 135: Looking upstream at NC4.

Figure 136: Looking downstream at NC4.

Figure 137: Looking upstream at NC5.

Figure 138: Looking downstream at NC5.

APPENDIX B

WARRIEWOOD VALLEY
LOWER NARRABEEN CREEK MONITORING

LABORATORY CHEMICAL ANALYSIS REPORTS

FOR THE PERIOD OCT 17 TO JUN 19:

Legacy Data 2017 to 2019:

ES1727600 Dry Weather November 2017
ES1727794 Wet Weather Falling Limb November 2017
ES1804021 Annual Dry Weather February 2018
ES1808499 Wet Weather Rising Limb March 2018
ES1808753 Wet Weather Falling Limb March 2018
ES1813538 Dry Weather May 2018
ES1823842 Dry Weather August 2018
ES1827935 Wet Weather Rising Limb September 2018
ES1828050 Wet Weather Falling Limb September 2018
ES1835246 Dry Weather November 2018
ES1835494 Wet Weather Rising Limb November 2018
ES1835745 Wet Weather Falling Limb November 2018
ES1903393 Annual Dry Weather February 2019
ES1913104 Dry Weather May 2019
ES1917059 Wet Weather Rising Limb June 2019
ES1917222 Wet Weather Falling Limb June 2019

New Data for No 53A & 53b Warriewood Road 2021-2023:

ES2120014 Annual Dry Weather May 2021
ES2224714 Dry Weather Sample July 2022
ES2225829 Wet Weather Rising Limb July 2022
ES2225976 Wet Weather Falling Limb July 2022
ES2304472 Annual Dry Weather Sampling February 2023

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1727600**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK (imetro)	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 03-Nov-2017 16:15
Order number	: ----	Date Analysis Commenced	: 03-Nov-2017
C-O-C number	: ----	Issue Date	: 13-Nov-2017 10:24
Sampler	: Jacob Broom		
Site	: ----		
Quote number	: SYBQ/360/17		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
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

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	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Somlok Chai	Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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

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

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

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.

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	NC3	NC4	NC5	----	----
			Client sampling date / time	03-Nov-2017 00:00	03-Nov-2017 00:00	03-Nov-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1727600-001	ES1727600-002	ES1727600-003	--------	--------
				Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**254**	**239**	**206**	**----**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	**9**	**----**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.03**	**0.10**	**0.19**	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.06**	<0.01	<0.01	**----**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.06**	<0.01	<0.01	**----**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.4**	**0.5**	**1.0**	**----**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.5**	**0.5**	**1.0**	**----**	**----**
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	**0.02**	**0.03**	**0.10**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.02**	**0.04**	**0.14**	**----**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.01**	<0.01	**0.02**	**----**	**----**
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**160**	**82**	**72**	**----**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1727794**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK (imetro)	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 06-Nov-2017 16:15
Order number	: ----	Date Analysis Commenced	: 07-Nov-2017
C-O-C number	: ----	Issue Date	: 24-Nov-2017 14:09
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: SYBQ/360/17		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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This Certificate of Analysis contains the following information:

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- Analytical Results

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	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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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.

- MF = membrane filtration
- CFU = colony forming unit
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	NC3-U	NC4-U	NC5-U	53C-ESC-U	----
			Client sampling date / time	06-Nov-2017 00:00	06-Nov-2017 00:00	06-Nov-2017 00:00	06-Nov-2017 00:00	----
Compound	CAS Number	LOR	Unit	ES1727794-001	ES1727794-002	ES1727794-003	ES1727794-004	--------
				Result	Result	Result	Result	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	187	153	124	178	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	7	7	11	14	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.15	0.06	0.04	0.05	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.02	0.02	0.04	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.60	0.50	0.39	0.60	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.62	0.52	0.41	0.64	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.4	0.4	0.5	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.0	0.9	0.8	1.1	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	0.03	0.06	0.08	0.06	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.07	0.10	0.11	0.09	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	~14000	4500	1600	7600	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

CERTIFICATE OF ANALYSIS

BATCH NUMBER: ES1727794
CLIENT: MARINE POLLUTION RESEARCH PTY LTD

ADDRESS: PO BOX 279 CHURCH POINT:
SYDNEY NSW 2105
CONTACT: MR PAUL ANINK (imetro)

ANALYSIS:	Non Filterable Phosphorus

Sub-Matrix			WATER	WATER	WATER	WATER
Sample Name			NC3-U	NC4-U	NC5-U	53C-ESC-U
Depth Type						
Depth in metres						
Analyte			6/11/2017 0:00	6/11/2017 0:00	6/11/2017 0:00	6/11/2017 0:00
	Units	Rep. LOR	ES1727794-001	ES1727794-002	ES1727794-003	ES1727794-004
Non Filterable Phosphorus (mg/L)	mg/L	0.01	0.04	0.04	0.03	0.03

Wisam Marassa (22-11-2017)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1804021**	Page	: 1 of 11
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 06-Feb-2018 16:45
Order number	: ----	Date Analysis Commenced	: 07-Feb-2018
C-O-C number	: ----	Issue Date	: 12-Feb-2018 17:12
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 6		
No. of samples analysed	: 6		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sunitha Kannampilli	Phycologist	Sydney Phycology, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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

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

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

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.

- Results apply to sample(s) as submitted.
- MF = membrane filtration
- CFU = colony forming unit
- It has been noted that filtered TP is greater than Reactive P for sample 1, however this difference is within the limits of experimental variation.
- KEY: PTP=Potential Toxin Producers
; ND=Not Detected; NS=Not Specified
; cf. = comparable from
- Samples were preserved with Lugols Iodine solution.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- Membrane filtration results for MW006 for No. 3 are reported as an estimate (~) due to the presence of many non-target organism colonies that may have inhibited the growth of the target organisms on the filter membrane. It may be informative to record this fact.
- Note: Recent reports from Australia have included Geitlerinema spp. as a Potential Toxin Producer (PTP); however, the toxins produced by this spp. is currently unknown
- Under microscopic observation, debris present is sample#01, #02 and #03
- MW006 is ALS's internal code and is equivalent to AS4276.7.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Client sample ID	NC3	NC4	NC5	----	----
			Client sampling date / time	06-Feb-2018 00:00	06-Feb-2018 00:00	06-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1804021-004	ES1804021-005	ES1804021-006	--------	--------
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**22.1**	**28.8**	**43.4**	**----**	**----**
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	**----**	**----**
Chromium	7440-47-3	2	mg/kg	<2	<2	**8**	**----**	**----**
Copper	7440-50-8	5	mg/kg	<5	<5	**25**	**----**	**----**
Lead	7439-92-1	5	mg/kg	<5	<5	**19**	**----**	**----**
Zinc	7440-66-6	5	mg/kg	**14**	**24**	**255**	**----**	**----**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	**----**	**----**
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	**----**	**----**
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
^ **Total Chlordane (sum)**	----	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	**----**	**----**
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	**----**	**----**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Client sample ID	NC3	NC4	NC5	----	----
				Client sampling date / time	06-Feb-2018 00:00	06-Feb-2018 00:00	06-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1804021-004	ES1804021-005	ES1804021-006	--------	--------
					Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**115**	**130**	**103**	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**92.1**	**110**	**108**	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**73.3**	**86.1**	**87.9**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC3	NC4	NC5	----	----
				Client sampling date / time	06-Feb-2018 00:00	06-Feb-2018 00:00	06-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1804021-001	ES1804021-002	ES1804021-003	--------	--------
					Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		189	192	171	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	<5	6	----	----
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L		100	69	61	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	1	µg/L		1	<1	5	----	----
Chromium	7440-47-3	1	µg/L		<1	<1	<1	----	----
Copper	7440-50-8	1	µg/L		2	<1	<1	----	----
Lead	7439-92-1	1	µg/L		<1	<1	<1	----	----
Zinc	7440-66-6	5	µg/L		7	<5	9	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	µg/L		<0.1	<0.1	<0.1	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	0.03	0.02	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.01	<0.01	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.01	<0.01	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.4	0.6	0.5	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.4	0.6	0.5	----	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser									
Filtered Total Phosphorus as P	----	10	µg/L		<10	50	100	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	10	µg/L		20	80	120	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.01	0.02	0.03	----	----
EP008: Chlorophyll a & Pheophytin a									
Chlorophyll a	----	0.001	mg/L		0.009	0.003	0.006	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC3	NC4	NC5	----	----
				Client sampling date / time	06-Feb-2018 00:00	06-Feb-2018 00:00	06-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1804021-001	ES1804021-002	ES1804021-003	--------	--------
					Result	Result	Result	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	<5	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDT	50-29-3	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	<2.0	<2.0	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC3	NC4	NC5	----	----
				Client sampling date / time	06-Feb-2018 00:00	06-Feb-2018 00:00	06-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1804021-001	ES1804021-002	ES1804021-003	--------	--------
					Result	Result	Result	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued									
Diazinon	333-41-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Parathion	56-38-2	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Ethion	563-12-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L		<0.5	<0.5	<0.5	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2-Chlorophenol	95-57-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2-Methylphenol	95-48-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L		<2.0	<2.0	<2.0	----	----
2-Nitrophenol	88-75-5	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4-Dimethylphenol	105-67-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4-Dichlorophenol	120-83-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.6-Dichlorophenol	87-65-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Pentachlorophenol	87-86-5	2.0	µg/L		<2.0	<2.0	<2.0	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC3	NC4	NC5	----	----
				Client sampling date / time	06-Feb-2018 00:00	06-Feb-2018 00:00	06-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1804021-001	ES1804021-002	ES1804021-003	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
MW006: Faecal Coliforms & E.coli by MF									
Faecal Coliforms	----	1	CFU/100mL		~18000	420	~230	----	----
MW024: Bacillariophytes (Diatoms) - Centrales									
Cyclotella spp.	----	5	cells/ml		25	75	50	----	----
Melosira spp.	----	5	cells/ml		150	----	----	----	----
MW024: Bacillariophytes (Diatoms) - Pennales									
Amphora spp.	----	5	cells/ml		50	----	----	----	----
Cylindrotheca closterium	----	5	cells/ml		125	25	----	----	----
Fragilaria spp.	----	5	cells/ml		225	----	----	----	----
Navicula spp.	----	5	cells/ml		25	----	50	----	----
Nitzschia spp.	----	5	cells/ml		350	25	15	----	----
MW024: Bacillariophytes (Diatoms) - TOTAL BACILLARIOPHYTES									
Total Bacillariophytes	----	5	cells/ml		950	125	115	----	----
MW024: Chlorophytes (Green Algae) - Chlorococcales									
Ankistrodesmus spp.	----	5	cells/ml		100	----	----	----	----
Coelastrum spp.	----	5	cells/ml		175	----	----	----	----
Dictyosphaerium spp.	----	5	cells/ml		450	----	400	----	----
Kirchneriella spp.	----	5	cells/ml		75	----	----	----	----
Monoraphidium spp.	----	5	cells/ml		75	25	----	----	----
Oocystis spp.	----	5	cells/ml		75	50	25	----	----
Scenedesmus spp.	----	5	cells/ml		700	575	175	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC3	NC4	NC5	----	----
				Client sampling date / time	06-Feb-2018 00:00	06-Feb-2018 00:00	06-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1804021-001	ES1804021-002	ES1804021-003	--------	--------
					Result	Result	Result	----	----
MW024: Chlorophytes (Green Algae) - Chlorococcales - Continued									
Sphaerocystis spp.	----	5	cells/ml		25	25	----	----	----
Tetraedron spp.	----	5	cells/ml		25	----	----	----	----
MW024: Chlorophytes (Green Algae) - TOTAL CHLOROPHYTES									
Total Chlorophytes	----	5	cells/ml		1880	705	600	----	----
MW024: Chlorophytes (Green Algae) - Volvocales									
Chlamydomonas spp.	----	5	cells/ml		175	25	----	----	----
MW024: Chlorophytes (Green Algae) - Zygnematales									
Closterium spp.	----	5	cells/ml		10	5	----	----	----
MW024: Cyanophytes (Blue Green Algae) - Chroococcales									
Chroococcus spp.	----	5	cells/ml		100	----	----	----	----
Merismopedia spp.	----	5	cells/ml		100	----	----	----	----
Microcystis spp.	----	5	cells/ml		600	----	----	----	----
Radiocystis spp.	----	5	cells/ml		----	----	750	----	----
Total Chroococcales	----	5	cells/ml		800	----	1600	----	----
Aphanocapsa spp. > 2µm	----	5	cells/ml		----	----	850	----	----
MW024: Cyanophytes (Blue Green Algae) - Nostocales									
Unidentified Nostocales	----	5	cells/ml		----	90	----	----	----
Total Nostocales	----	5	cells/ml		----	90	----	----	----
MW024: Cyanophytes (Blue Green Algae) - Oscillatoriales									
Geitlerinema spp.	----	5	cells/ml		----	480	----	----	----
Pseudanabaena spp.	----	5	cells/ml		1100	825	450	----	----
Total Oscillatoriales	----	5	cells/ml		1100	1300	450	----	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL CYANOPHYTES									
Total Cyanophytes	----	5	cells/ml		1900	1400	2050	----	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL POTENTIALLY TOXIC CYANOPHYTES									
Total Potentially Toxic Cyanophytes	----	5	cells/ml		<5	480	<5	----	----
MW024: Flagellates - Cryptophytes									
Chroomonas spp.	----	5	cells/ml		----	----	25	----	----
Cryptomonas spp.	----	5	cells/ml		50	100	75	----	----
MW024: Flagellates - Euglenophytes									
Euglena spp.	----	5	cells/ml		25	50	175	----	----
Phacus spp.	----	5	cells/ml		----	----	25	----	----
Trachelomonas spp.	----	5	cells/ml		25	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC3	NC4	NC5	----	----
				Client sampling date / time	06-Feb-2018 00:00	06-Feb-2018 00:00	06-Feb-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1804021-001	ES1804021-002	ES1804021-003	--------	--------
					Result	Result	Result	----	----
MW024: Flagellates - TOTAL FLAGELLATES									
Total Flagellates	----	5	cells/ml		100	150	300	----	----
MW024T: TOTAL ALGAE									
Total Algae Count	----	5	cells/ml		4840	2380	3060	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		127	118	104	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		105	104	91.0	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		106	97.9	83.7	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		22.0	18.5	19.6	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		49.8	46.2	50.6	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		48.8	44.1	43.6	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		71.3	61.2	71.2	----	----
Anthracene-d10	1719-06-8	1.0	%		96.2	91.8	67.6	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		96.8	92.5	85.6	----	----

Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	29	129
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	67	111
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	67	111
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1808499**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 21-Mar-2018 15:00
Order number	:	Date Analysis Commenced	: 22-Mar-2018
C-O-C number	: ----	Issue Date	: 28-Mar-2018 19:03
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222/17		
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

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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

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

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

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.

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	NC3-U	NC4-U	NC5-U	----	----
			Client sampling date / time	21-Mar-2018 00:00	21-Mar-2018 00:00	21-Mar-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1808499-001	ES1808499-002	ES1808499-003	--------	--------
				Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**202**	**204**	**221**	**----**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	**----**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.02**	**0.02**	<0.01	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.11**	**0.18**	**0.14**	**----**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.11**	**0.18**	**0.14**	**----**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.3**	**0.4**	**0.4**	**----**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.4**	**0.6**	**0.5**	**----**	**----**
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	**0.01**	**0.03**	**0.03**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.02**	**0.04**	**0.04**	**----**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.01**	**0.02**	**0.02**	**----**	**----**
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**1400**	**2800**	**2000**	**----**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1808753**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK (imetro)	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 23-Mar-2018 13:09
Order number	:	Date Analysis Commenced	: 23-Mar-2018
C-O-C number	: ----	Issue Date	: 29-Mar-2018 18:05
Sampler	: JACOB BROOM (hotmail)		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

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- General Comments
- Analytical Results

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Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Somlok Chai	Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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^ = 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.

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	NC3-D	NC4-D	NC5-D	----	----
			Client sampling date / time	23-Mar-2018 00:00	23-Mar-2018 00:00	23-Mar-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1808753-001	ES1808753-002	ES1808753-003	--------	--------
				Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**224**	**206**	**202**	**----**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	**----**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.05**	**0.12**	**0.06**	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	**0.02**	<0.01	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.06**	**0.05**	**0.05**	**----**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.06**	**0.07**	**0.05**	**----**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.2**	**0.3**	**0.1**	**----**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.3**	**0.4**	**0.2**	**----**	**----**
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	**0.01**	**0.02**	**0.04**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.02**	**0.03**	**0.05**	**----**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**330**	**710**	**270**	**----**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1813538**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK (imetro)	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 11-May-2018 13:20
Order number	:	Date Analysis Commenced	: 12-May-2018
C-O-C number	: ----	Issue Date	: 17-May-2018 15:18
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 3		
No. of samples analysed	: 3		

Accreditation No. 825
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ISO/IEC 17025 - Testing

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- Analytical Results

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Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	Sydney Microbiology, Smithfield, NSW

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- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	NC3	NC4	NC5	----	----
			Client sampling date / time	11-May-2018 00:00	11-May-2018 00:00	11-May-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1813538-001	ES1813538-002	ES1813538-003	--------	--------
				Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**294**	**278**	**324**	**----**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	**----**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.04**	**0.39**	**0.09**	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	**0.07**	**----**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	**0.07**	**----**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.3**	**0.6**	**0.3**	**----**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.3**	**0.6**	**0.4**	**----**	**----**
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	<0.01	**0.03**	**0.01**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.02**	**0.06**	**0.02**	**----**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.01**	**0.01**	<0.01	**----**	**----**
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**65**	**~16000**	**42**	**----**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1823842**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 14-Aug-2018 16:15
Order number	:	Date Analysis Commenced	: 15-Aug-2018
C-O-C number	: ----	Issue Date	: 17-Aug-2018 20:25
Sampler	: Jacob Broom		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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- General Comments
- Analytical Results

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Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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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.

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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.

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC3	NC4	NC4.5	NC5	----
				Client sampling date / time	14-Aug-2018 00:00	14-Aug-2018 00:00	14-Aug-2018 00:00	14-Aug-2018 00:00	----
Compound	CAS Number	LOR	Unit		ES1823842-001	ES1823842-002	ES1823842-003	ES1823842-004	--------
					Result	Result	Result	Result	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**336**	**310**	**361**	**364**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	<5	**52**	**12**	**----**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.31**	**0.01**	**0.06**	**0.05**	**----**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	**----**
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.11**	**0.01**	**0.03**	**0.10**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.11**	**0.01**	**0.03**	**0.10**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	**0.1**	**1.8**	**0.6**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.5**	**0.1**	**1.8**	**0.7**	**----**
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser									
Filtered Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.02**	**0.06**	**0.03**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.02**	**0.23**	**0.07**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	**----**
MW006: Faecal Coliforms & E.coli by MF									
Faecal Coliforms	----	1	CFU/100mL		**~8**	<1	**100**	**50**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1827935**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 20-Sep-2018 15:34
Order number	:	Date Analysis Commenced	: 21-Sep-2018
C-O-C number	: ----	Issue Date	: 26-Sep-2018 18:45
Sampler	: JACOB BROOM		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Accreditation No. 825
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Signatories

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Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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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.

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~ = Indicates an estimated value.

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	NC3	NC4	NC4.5	NC5	----
			Client sampling date / time	20-Sep-2018 00:00	20-Sep-2018 00:00	20-Sep-2018 00:00	20-Sep-2018 00:00	----
Compound	CAS Number	LOR	Unit	ES1827935-001	ES1827935-002	ES1827935-003	ES1827935-004	--------
				Result	Result	Result	Result	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**198**	**289**	**269**	**314**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	**18**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.04**	**0.02**	**0.03**	**0.04**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.05**	**0.06**	**0.09**	**0.04**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.05**	**0.06**	**0.09**	**0.04**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.2**	**0.3**	**0.3**	**0.3**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.2**	**0.4**	**0.4**	**0.3**	**----**
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	**0.03**	**0.04**	**0.03**	**0.03**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.04**	**0.05**	**0.04**	**0.05**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	**0.02**	**0.01**	<0.01	**----**
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**1800**	**~1100**	**540**	**210**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1828050**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR JACOB BROOM (gmail)	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 21-Sep-2018 12:50
Order number	:	Date Analysis Commenced	: 21-Sep-2018
C-O-C number	: ----	Issue Date	: 27-Sep-2018 16:05
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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Signatories

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Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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~ = Indicates an estimated value.

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	NC3-D	NC4-D	NC4.5-D	NC5-D	----
			Client sampling date / time	21-Sep-2018 00:00	21-Sep-2018 00:00	21-Sep-2018 00:00	21-Sep-2018 00:00	----
Compound	CAS Number	LOR	Unit	ES1828050-001	ES1828050-002	ES1828050-003	ES1828050-004	--------
				Result	Result	Result	Result	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**215**	**240**	**274**	**290**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	**9**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.09**	<0.01	**0.03**	**0.04**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.04**	**0.01**	<0.01	**0.05**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.04**	**0.01**	<0.01	**0.05**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.2**	**0.3**	**0.3**	**0.3**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.2**	**0.3**	**0.3**	**0.4**	**----**
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	<0.01	**0.01**	**0.01**	**0.01**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.01**	**0.02**	**0.01**	**0.02**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	**----**
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**250**	**430**	**170**	**40**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1835246**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 26-Nov-2018 19:20
Order number	:	Date Analysis Commenced	: 27-Nov-2018
C-O-C number	: ----	Issue Date	: 03-Dec-2018 13:02
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

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Accreditation No. 825
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Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Sarah Griffiths	Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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^ = 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.

- MF = membrane filtration
- CFU = colony forming unit
- EK067G/EK067FG: It is recognised that Total Phosphorus is less than Filtered Total Phosphorus for samples 1 & 2. However, the difference is within experimental variation of the methods.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC 4	NC 4.5	NC 5	----	----
				Client sampling date / time	26-Nov-2018 00:00	26-Nov-2018 00:00	26-Nov-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1835246-001	ES1835246-002	ES1835246-003	--------	--------
					Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		298	335	366	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	8	6	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.02	0.06	0.06	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.3	0.3	0.5	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.3	0.3	0.5	----	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser									
Filtered Total Phosphorus as P	----	0.01	mg/L		0.04	0.11	0.06	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.04	0.11	0.08	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	0.01	0.02	----	----
MW006: Faecal Coliforms & E.coli by MF									
Faecal Coliforms	----	1	CFU/100mL		110	140	210	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1835494**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR JACOB BROOM (gmail)	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 28-Nov-2018 11:00
Order number	:	Date Analysis Commenced	: 28-Nov-2018
C-O-C number	: ----	Issue Date	: 04-Dec-2018 17:32
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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Signatories	*Position*	*Accreditation Category*
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Sarah Griffiths	Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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~ = Indicates an estimated value.

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	NC4_M	NC45_M	NC5_M	NC5_ESC_M	----
			Client sampling date / time	28-Nov-2018 00:00	28-Nov-2018 00:00	28-Nov-2018 00:00	28-Nov-2018 00:00	----
Compound	CAS Number	LOR	Unit	ES1835494-001	ES1835494-002	ES1835494-003	ES1835494-004	--------
				Result	Result	Result	Result	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	302	330	324	310	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	17	71	143	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.11	0.06	0.05	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.01	0.03	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.02	0.57	1.20	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.02	0.58	1.23	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.4	0.5	1.0	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.3	0.4	1.1	2.2	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	0.03	0.16	0.27	0.24	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.04	0.20	0.39	0.25	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.03	0.15	0.22	----
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	380	320	4800	8400	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1835745**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 29-Nov-2018 16:15
Order number	:	Date Analysis Commenced	: 30-Nov-2018
C-O-C number	: ----	Issue Date	: 05-Dec-2018 16:10
Sampler	: JACOB BROOM		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Somlok Chai	Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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

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

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

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.

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- Membrane filtration results for MW006 are reported as an estimate (~) due to the growth of bacteria on the filter membrane being counted <10cfu and/or >100cfu and due to the presence of many non-target organism colonies that may have inhibited the growth of the target organisms on the filter membrane. It may be informative to record this fact.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC4-D	NC4-5-D	NC5-ESC-D	NC5-D	----
				Client sampling date / time	29-Nov-2018 00:00	29-Nov-2018 00:00	29-Nov-2018 00:00	29-Nov-2018 00:00	----
Compound	CAS Number	LOR	Unit		ES1835745-001	ES1835745-002	ES1835745-003	ES1835745-004	--------
					Result	Result	Result	Result	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		201	194	472	109	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	<5	<5	<5	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.01	0.02	0.10	0.04	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	0.23	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.18	0.16	3.33	0.23	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.18	0.16	3.56	0.23	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.5	0.5	1.2	0.5	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.7	0.7	4.8	0.7	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser									
Filtered Total Phosphorus as P	----	0.01	mg/L		0.04	0.04	0.10	0.04	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.05	0.05	0.12	0.06	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.03	0.03	0.10	0.03	----
MW006: Faecal Coliforms & E.coli by MF									
Faecal Coliforms	----	1	CFU/100mL		~400	~480	~360	~100	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1903393**	Page	: 1 of 11
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 04-Feb-2019 16:06
Order number	:	Date Analysis Commenced	: 05-Feb-2019
C-O-C number	: ----	Issue Date	: 13-Feb-2019 14:53
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sunitha Kannampilli	Phycologist	Sydney Phycology, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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

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

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

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.

- Results apply to sample(s) as submitted.
- MF = membrane filtration
- CFU = colony forming unit
- EP068: LOR for sample raised due to the high amount of moisture present.
- EK067FG: It has been noted that Filtered Total P is greater than Total P on sample No 2, however this difference is within the limits of experimental variation.
- KEY: PTP=Potential Toxin Producers
; ND=Not Detected; NS=Not Specified
; cf. = comparable from
- Samples were preserved with Lugols Iodine solution.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- Under microscopic observation, debris present in sample #01, #02 and #03
- MW006 is ALS's internal code and is equivalent to AS4276.7.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NC4	NC4-5	NC5	----	----
				Client sampling date / time	04-Feb-2019 00:00	04-Feb-2019 00:00	04-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1903393-004	ES1903393-005	ES1903393-006	--------	--------
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**35.7**	**25.8**	**79.2**	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	**42**	----	----
Chromium	7440-47-3	2	mg/kg		**4**	**7**	**30**	----	----
Copper	7440-50-8	5	mg/kg		**7**	<5	**92**	----	----
Lead	7439-92-1	5	mg/kg		**6**	**8**	**104**	----	----
Zinc	7440-66-6	5	mg/kg		**86**	**21**	**868**	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	**0.1**	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
beta-BHC	319-85-7	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
delta-BHC	319-86-8	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
Heptachlor	76-44-8	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
Aldrin	309-00-2	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	<0.06	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.3	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.06	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NC4	NC4-5	NC5	----	----
				Client sampling date / time	04-Feb-2019 00:00	04-Feb-2019 00:00	04-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1903393-004	ES1903393-005	ES1903393-006	--------	--------
					Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.3	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**81.0**	**72.9**	**72.9**	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**114**	**126**	**116**	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**80.9**	**72.6**	**76.8**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	NC4	NC4-5	NC5	----	----
			Client sampling date / time	04-Feb-2019 00:00	04-Feb-2019 00:00	04-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1903393-001	ES1903393-002	ES1903393-003	--------	--------
				Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**164**	**194**	**188**	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	----	----
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	**78**	**80**	**80**	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.001**	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	**0.006**	<0.005	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.06**	**0.08**	**0.07**	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.4**	**0.4**	**0.4**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.4**	**0.4**	**0.4**	----	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	**0.09**	**0.17**	**0.20**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.10**	**0.16**	**0.20**	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.02**	**0.05**	**0.13**	----	----
EP008: Chlorophyll a & Pheophytin a								
Chlorophyll a	----	1	mg/m³	**5**	**3**	**2**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC4	NC4-5	NC5	----	----
				Client sampling date / time	04-Feb-2019 00:00	04-Feb-2019 00:00	04-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1903393-001	ES1903393-002	ES1903393-003	--------	--------
					Result	Result	Result	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		**5**	<5	<5	----	----
EP066: Polychlorinated Biphenyls (PCB)									
^ **Total Polychlorinated biphenyls**	----	1	µg/L		<1	<1	<1	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDT	50-29-3	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	<2.0	<2.0	----	----
^ **Total Chlordane (sum)**	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC4	NC4-5	NC5	----	----
				Client sampling date / time	04-Feb-2019 00:00	04-Feb-2019 00:00	04-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1903393-001	ES1903393-002	ES1903393-003	--------	--------
					Result	Result	Result	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued									
Diazinon	333-41-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Parathion	56-38-2	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Ethion	563-12-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L		<0.5	<0.5	<0.5	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2-Chlorophenol	95-57-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2-Methylphenol	95-48-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L		<2.0	<2.0	<2.0	----	----
2-Nitrophenol	88-75-5	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4-Dimethylphenol	105-67-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4-Dichlorophenol	120-83-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.6-Dichlorophenol	87-65-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Pentachlorophenol	87-86-5	2.0	µg/L		<2.0	<2.0	<2.0	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC4	NC4-5	NC5	----	----
				Client sampling date / time	04-Feb-2019 00:00	04-Feb-2019 00:00	04-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1903393-001	ES1903393-002	ES1903393-003	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
MW006: Faecal Coliforms & E.coli by MF									
Faecal Coliforms	----	1	CFU/100mL		280	720	770	----	----
MW024: Bacillariophytes (Diatoms) - Pennales									
Navicula spp.	----	5	cells/ml		----	25	25	----	----
Pinnularia spp.	----	5	cells/ml		----	----	50	----	----
MW024: Bacillariophytes (Diatoms) - TOTAL BACILLARIOPHYTES									
Total Bacillariophytes	----	5	cells/ml		----	25	75	----	----
MW024: Chlorophytes (Green Algae)									
Chlamydomonas spp.	----	5	cells/ml		75	25	25	----	----
Kirchneriella spp.	----	5	cells/ml		----	----	25	----	----
Oocystis spp.	----	5	cells/ml		75	----	----	----	----
Scenedesmus spp.	----	5	cells/ml		450	225	----	----	----
MW024: Chlorophytes (Green Algae) - TOTAL CHLOROPHYTES									
Total Chlorophytes	----	5	cells/ml		600	250	50	----	----
MW024: Cyanophytes (Blue Green Algae)									
Anabaena spp. (straight)	----	5	cells/ml		600	----	----	----	----
Cyanogranis libera	----	5	cells/ml		----	----	375	----	----
Planktolyngbya minor	----	5	cells/ml		----	----	250	----	----
Pseudanabaena spp.	----	5	cells/ml		1550	1080	1250	----	----
Merismopedia spp.	----	5	cells/ml		----	----	200	----	----
Romeria spp.	----	5	cells/ml		----	----	100	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC4	NC4-5	NC5	----	----
				Client sampling date / time	04-Feb-2019 00:00	04-Feb-2019 00:00	04-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1903393-001	ES1903393-002	ES1903393-003	--------	--------
					Result	Result	Result	----	----
MW024: Cyanophytes (Blue Green Algae) - Continued									
Microcystis spp.	----	5	cells/ml		----	----	175	----	----
Rhabdoderma spp.	----	5	cells/ml		----	----	300	----	----
Synechococcus spp.	----	5	cells/ml		----	250	----	----	----
Geitlerinema spp. (possible PTP)	----	5	cells/ml		225	----	----	----	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL CYANOPHYTES									
Total Cyanophytes	----	5	cells/ml		2380	1330	2650	----	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL POTENTIALLY TOXIC CYANOPHYTES									
Total Potentially Toxic Cyanophytes	----	5	cells/ml		225	<5	<5	----	----
MW024: Flagellates - Cryptophytes									
Chroomonas spp.	----	5	cells/ml		25	----	----	----	----
Cryptomonas spp.	----	5	cells/ml		175	50	25	----	----
MW024: Flagellates - Euglenophytes									
Euglena spp.	----	5	cells/ml		50	25	75	----	----
Strombomonas spp.	----	5	cells/ml		50	----	----	----	----
Trachelomonas spp.	----	5	cells/ml		75	75	----	----	----
MW024: Flagellates - Pyrrophytes									
Peridinium spp.	----	5	cells/ml		5	----	----	----	----
MW024: Flagellates - TOTAL FLAGELLATES									
Total Flagellates	----	5	cells/ml		380	150	100	----	----
MW024T: TOTAL ALGAE									
Total Algae Count	----	5	cells/ml		3360	1760	2880	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		93.8	81.9	112	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		70.4	78.8	77.1	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		100	83.8	106	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		19.6	20.3	25.5	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		43.3	48.4	60.1	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		41.7	44.1	64.6	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		65.4	72.6	86.7	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC4	NC4-5	NC5	----	----
				Client sampling date / time	04-Feb-2019 00:00	04-Feb-2019 00:00	04-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1903393-001	ES1903393-002	ES1903393-003	--------	--------
					Result	Result	Result	----	----
EP075(SIM)T: PAH Surrogates - Continued									
Anthracene-d10	1719-06-8	1.0	%		**91.1**	**95.4**	**88.0**	**----**	**----**
4-Terphenyl-d14	1718-51-0	1.0	%		**74.8**	**76.8**	**85.9**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	29	129
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	67	111
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	67	111
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1913104**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR JACOB BROOM (gmail)	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 01-May-2019 16:50
Order number	:	Date Analysis Commenced	: 02-May-2019
C-O-C number	: ----	Issue Date	: 07-May-2019 21:16
Sampler	: ----		
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

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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

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

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

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.

- MF = membrane filtration
- CFU = colony forming unit
- EK067FG: It has been noted that Filtered Total P is greater than Total P on sample No 1, however this difference is within the limits of experimental variation.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	NC 4	NC 4.5	NC 5	----	----
			Client sampling date / time	01-May-2019 00:00	01-May-2019 00:00	01-May-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1913104-001	ES1913104-002	ES1913104-003	--------	--------
				Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**264**	**299**	**310**	**----**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	**16**	**7**	**----**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.08**	**0.06**	**0.02**	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.08**	**0.01**	**0.06**	**----**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.08**	**0.01**	**0.06**	**----**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.4**	**0.6**	**0.5**	**----**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.5**	**0.6**	**0.6**	**----**	**----**
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	**0.06**	**0.05**	**0.05**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.04**	**0.08**	**0.09**	**----**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**200**	**210**	**190**	**----**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1917059**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: Warriwood	Date Samples Received	: 04-Jun-2019 13:55
Order number	: ----	Date Analysis Commenced	: 05-Jun-2019
C-O-C number	: ----	Issue Date	: 11-Jun-2019 17:35
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 4		
No. of samples analysed	: 4		

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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

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Vyoma Tailor	Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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

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

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

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.

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	NC4-u	NC45-u	NC5-ESS-u	NC5-u	----
				Client sampling date / time	04-Jun-2019 00:00	04-Jun-2019 00:00	04-Jun-2019 00:00	04-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1917059-001	ES1917059-002	ES1917059-003	ES1917059-004	--------
					Result	Result	Result	Result	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		116	168	262	133	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		10	14	20	22	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.09	0.13	0.13	0.22	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	0.02	0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.30	0.35	0.35	0.36	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.30	0.35	0.37	0.37	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.4	0.5	0.7	0.5	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.7	0.8	1.1	0.9	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser									
Filtered Total Phosphorus as P	----	0.01	mg/L		0.06	0.08	0.15	0.12	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.07	0.09	0.16	0.15	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.06	0.08	0.14	0.08	----
MW006: Faecal Coliforms & E.coli by MF									
Faecal Coliforms	----	1	CFU/100mL		4500	6400	280	4800	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1917222**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9997 6541	Telephone	: +61-2-8784 8555
Project	: Warriewood	Date Samples Received	: 05-Jun-2019 13:15
Order number	:	Date Analysis Commenced	: 06-Jun-2019
C-O-C number	: ----	Issue Date	: 12-Jun-2019 19:27
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Tony DeSouza	Senior Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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

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

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

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.

- MF = membrane filtration
- CFU = colony forming unit
- EK067FG/EK071G: It has been noted that Reactive Phosphorus is greater than Filtered Total Phosphorus on samples 1 & 2, however this difference is within the limits of experimental variation.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- Membrane filtration results for MW006 No. 4 are reported as an estimate (~) due to the presence of many non-target organism colonies that may have inhibited the growth of the target organisms on the filter membrane. It may be informative to record this fact.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	NC4-D	NC45-D	NC5-ESC-D	NC5-D	----
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit	ES1917222-001	ES1917222-002	ES1917222-003	ES1917222-004	--------
				Result	Result	Result	Result	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	109	136	196	162	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	10	7	115	55	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.04	0.06	0.02	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.32	0.22	0.54	0.26	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.32	0.22	0.55	0.26	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.3	1.0	0.5	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.4	0.5	1.6	0.8	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	0.08	0.04	0.15	0.10	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.25	0.08	0.28	0.18	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.09	0.06	0.10	0.07	----
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	6600	2000	2700	~4600	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2120014**	Page	: 1 of 10
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Paul Anink	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Warriewood	Date Samples Received	: 27-May-2021 16:00
Order number	: ----	Date Analysis Commenced	: 28-May-2021
C-O-C number	: ----	Issue Date	: 07-Jun-2021 18:57
Sampler	: Jacob Broom		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Somlok Chai	Microbiologist	Sydney Microbiology, Smithfield, NSW
Sunitha Kannampilli	Phycologist	Sydney Phycology, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

- Results apply to sample(s) as submitted.
- MF = membrane filtration
- CFU = colony forming unit
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- KEY: PTP=Potential Toxin Producers
; ND=Not Detected; NS=Not Specified
; cf. = comparable form
- Samples were preserved with Lugols Iodine solution.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW024: Under microscopic observation, debris present in sample #01 and #03
- MW024: Under microscopic observation, 'No Algae' detected in sample #01
- MW006 is ALS's internal code and is equivalent to AS4276.7.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	NC3	NC5	----	----	----
				Sampling date / time	27-May-2021 00:00	27-May-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2120014-004	ES2120014-005	--------	--------	--------
					Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		28.5	60.1	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	----	----	----
Chromium	7440-47-3	2	mg/kg		8	4	----	----	----
Copper	7440-50-8	5	mg/kg		<5	16	----	----	----
Lead	7439-92-1	5	mg/kg		13	9	----	----	----
Zinc	7440-66-6	5	mg/kg		<5	79	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	<0.05	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	<0.05	----	----	----
beta-BHC	319-85-7	0.05	mg/kg		<0.05	<0.05	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	<0.05	----	----	----
delta-BHC	319-86-8	0.05	mg/kg		<0.05	<0.05	----	----	----
Heptachlor	76-44-8	0.05	mg/kg		<0.05	<0.05	----	----	----
Aldrin	309-00-2	0.05	mg/kg		<0.05	<0.05	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	<0.05	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	<0.05	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	<0.05	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	----	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	<0.05	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	NC3	NC5	----	----	----
			Sampling date / time	27-May-2021 00:00	27-May-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES2120014-004	ES2120014-005	--------	--------	--------
				Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	----	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	----	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	----	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**108**	**99.7**	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**93.1**	**76.6**	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**93.3**	**82.1**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	NC3	NC4	NC5	----	----
			Sampling date / time	27-May-2021 00:00	27-May-2021 00:00	27-May-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2120014-001	ES2120014-002	ES2120014-003	--------	--------
				Result	Result	Result	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	6	7	<5	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	139	----	85	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	0.002	----	0.002	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	0.013	----	0.006	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	<0.0001	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.16	0.07	0.06	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.40	0.39	0.12	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.40	0.39	0.12	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.1	0.2	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.6	0.5	0.3	----	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	<0.01	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.05	0.06	0.04	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	----	<5	----	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	<1	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	NC3	NC4	NC5	----	----
				Sampling date / time	27-May-2021 00:00	27-May-2021 00:00	27-May-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2120014-001	ES2120014-002	ES2120014-003	--------	--------
					Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	----	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	----	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	----	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	----	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	----	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	----	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	----	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	----	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	----	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	----	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	----	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	----	<0.5	----	----
4.4`-DDE	72-55-9	0.5	µg/L		<0.5	----	<0.5	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	----	<0.5	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	----	<0.5	----	----
4.4`-DDD	72-54-8	0.5	µg/L		<0.5	----	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	----	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	----	<0.5	----	----
4.4`-DDT	50-29-3	2.0	µg/L		<2.0	----	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	----	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	----	<2.0	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	----	<0.5	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	----	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	----	<0.5	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	----	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	----	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	----	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	----	<0.5	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	----	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	----	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	----	<2.0	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	----	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	----	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	NC3	NC4	NC5	----	----
			Sampling date / time	27-May-2021 00:00	27-May-2021 00:00	27-May-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2120014-001	ES2120014-002	ES2120014-003	--------	--------
				Result	Result	Result	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued								
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	<0.5	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	<0.5	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	<0.5	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0	----	<1.0	----	----
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	----	<1.0	----	----
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	----	<1.0	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	----	<2.0	----	----
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	----	<1.0	----	----
2.4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	----	<1.0	----	----
2.4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	----	<1.0	----	----
2.6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	----	<1.0	----	----
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L	<1.0	----	<1.0	----	----
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	----	<1.0	----	----
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	----	<1.0	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	----	<2.0	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	<1.0	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	<1.0	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	<1.0	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	NC3	NC4	NC5	----	----
			Sampling date / time	27-May-2021 00:00	27-May-2021 00:00	27-May-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2120014-001	ES2120014-002	ES2120014-003	--------	--------
				Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	<0.5	----	----
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**110**	**100**	**180**	----	----
Escherichia coli	----	1	CFU/100mL	**110**	**100**	**180**	----	----
MW024: Bacillariophytes (Diatoms) - Centrales								
Cyclotella spp.	----	5	cells/ml	----	----	**25**	----	----
MW024: Bacillariophytes (Diatoms) - TOTAL BACILLARIOPHYTES								
Total Bacillariophytes	----	5	cells/ml	----	----	**25**	----	----
MW024: Chlorophytes (Green Algae)								
Mougeotia spp.	----	5	cells/ml	----	----	**50**	----	----
MW024: Chlorophytes (Green Algae) - TOTAL CHLOROPHYTES								
Total Chlorophytes	----	5	cells/ml	----	----	**50**	----	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL CYANOPHYTES								
Total Cyanophytes	----	5	cells/ml	<5	----	<5	----	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL POTENTIALLY TOXIC CYANOPHYTES								
Total Potentially Toxic Cyanophytes	----	5	cells/ml	<5	----	<5	----	----
MW024: Flagellates - Euglenophytes								
Euglena spp.	----	5	cells/ml	----	----	**50**	----	----
Trachelomonas spp.	----	5	cells/ml	----	----	**25**	----	----
MW024: Flagellates - TOTAL FLAGELLATES								
Total Flagellates	----	5	cells/ml	----	----	**75**	----	----
MW024T: TOTAL ALGAE								
Total Algae Count	----	5	cells/ml	<5	----	**150**	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	**82.6**	----	**91.3**	----	----
EP068S: Organochlorine Pesticide Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	NC3	NC4	NC5	----	----
				Sampling date / time	27-May-2021 00:00	27-May-2021 00:00	27-May-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2120014-001	ES2120014-002	ES2120014-003	--------	--------
					Result	Result	Result	----	----
EP068S: Organochlorine Pesticide Surrogate - Continued									
Dibromo-DDE	21655-73-2	0.5	%		**111**	----	**102**	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		**86.2**	----	**80.4**	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		**35.2**	----	**36.9**	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		**63.8**	----	**66.8**	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		**68.0**	----	**67.2**	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		**82.8**	----	**88.7**	----	----
Anthracene-d10	1719-06-8	1.0	%		**108**	----	**110**	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		**98.4**	----	**89.9**	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	45	134
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	67	111
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	67	111
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2224714**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Warriewood	Date Samples Received	: 13-Jul-2022 13:00
Order number	: ----	Date Analysis Commenced	: 13-Jul-2022
C-O-C number	: ----	Issue Date	: 19-Jul-2022 12:41
Sampler	: JACOB BROOM (gmail)		
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, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Somlok Chai	Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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

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

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

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

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

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	NC3	NC4	NC5	----	----
			Sampling date / time	13-Jul-2022 00:00	13-Jul-2022 00:00	13-Jul-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2224714-001	ES2224714-002	ES2224714-003	--------	--------
				Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**185**	**195**	**207**	**----**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**7**	<5	<5	**----**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.05**	**0.06**	**0.06**	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.49**	**0.44**	**0.42**	**----**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.49**	**0.44**	**0.42**	**----**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.4**	**0.5**	**0.7**	**----**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.9**	**0.9**	**1.1**	**----**	**----**
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	**0.02**	**0.02**	**0.02**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.03**	**0.03**	**0.05**	**----**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**68**	**84**	**110**	**----**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2225829**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Paul Anink	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Warriewood	Date Samples Received	: 21-Jul-2022 16:40
Order number	: ----	Date Analysis Commenced	: 21-Jul-2022
C-O-C number	: ----	Issue Date	: 28-Jul-2022 15:28
Sampler	: JACOB BROOM		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

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- Analytical Results

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Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Sarah Griffiths	Microbiologist	Sydney Microbiology, Smithfield, NSW

General Comments

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

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ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- MF = membrane filtration
- CFU = colony forming unit
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	NC3-U	NC4-U	NC5-U	----	----
			Sampling date / time	21-Jul-2022 00:00	21-Jul-2022 00:00	21-Jul-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2225829-001	ES2225829-002	ES2225829-003	--------	--------
				Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**68**	**97**	**144**	**----**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**122**	**106**	**27**	**----**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.03**	**0.03**	**0.03**	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.14**	**0.20**	**0.29**	**----**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.14**	**0.20**	**0.29**	**----**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**1.0**	**0.2**	**0.4**	**----**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**1.1**	**0.4**	**0.7**	**----**	**----**
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	**0.12**	**0.11**	**0.06**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.22**	**0.11**	**0.07**	**----**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**2100**	**2200**	**1300**	**----**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2225976**	Page	: 1 of 3
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Warriewood	Date Samples Received	: 22-Jul-2022 18:45
Order number	: ----	Date Analysis Commenced	: 22-Jul-2022
C-O-C number	: ----	Issue Date	: 29-Jul-2022 16:33
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

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- Analytical Results

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Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Sarah Griffiths	Microbiologist	Sydney Microbiology, Smithfield, NSW

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^ = 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.

- MF = membrane filtration
- CFU = colony forming unit
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW006 is ALS's internal code and is equivalent to AS4276.7.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	NC3-D	NC4-D	NC5-D	----	----
			Sampling date / time	22-Jul-2022 00:00	22-Jul-2022 00:00	22-Jul-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2225976-001	ES2225976-002	ES2225976-003	--------	--------
				Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**168**	**172**	**160**	**----**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**82**	**72**	**12**	**----**	**----**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.02**	**0.06**	**0.02**	**----**	**----**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.21**	**0.19**	**0.22**	**----**	**----**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.21**	**0.19**	**0.22**	**----**	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.5**	**0.3**	**0.4**	**----**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.7**	**0.5**	**0.6**	**----**	**----**
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	**0.05**	**0.03**	**0.02**	**----**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.11**	**0.05**	**0.05**	**----**	**----**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	**----**	**----**
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**560**	**430**	**480**	**----**	**----**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2304472**	Page	: 1 of 12
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Telephone	: +61-2-8784 8555
Project	: Warriewood	Date Samples Received	: 10-Feb-2023
Site	: ----	Issue Date	: 24-Feb-2023
Sampler	: JACOB BROOM (gmail)	No. of samples received	: 6
Order number	: ----	No. of samples analysed	: 6

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 QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) NC3, NC4, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	24-Feb-2023	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) NC3, NC4, NC5	**10-Feb-2023**	**20-Feb-2023**	09-Aug-2023	✓	**20-Feb-2023**	09-Aug-2023	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) NC3, NC4, NC5	**10-Feb-2023**	**20-Feb-2023**	10-Mar-2023	✓	**21-Feb-2023**	10-Mar-2023	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066) NC3, NC4, NC5	**10-Feb-2023**	**16-Feb-2023**	24-Feb-2023	✓	**20-Feb-2023**	28-Mar-2023	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) NC3, NC4, NC5	**10-Feb-2023**	**16-Feb-2023**	24-Feb-2023	✓	**20-Feb-2023**	28-Mar-2023	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
NC3, NC4, NC5	**10-Feb-2023**	**----**	----	----	**17-Feb-2023**	17-Feb-2023	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
NC3, NC5	**10-Feb-2023**	**15-Feb-2023**	09-Aug-2023	✓	**15-Feb-2023**	09-Aug-2023	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**17-Feb-2023**	10-Mar-2023	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
NC3, NC4, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	10-Mar-2023	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
NC3, NC4, NC5	**10-Feb-2023**	**----**	----	----	**11-Feb-2023**	12-Feb-2023	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
NC3, NC4, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	10-Mar-2023	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
NC3, NC4, NC5	**10-Feb-2023**	**17-Feb-2023**	10-Mar-2023	✓	**18-Feb-2023**	10-Mar-2023	✓
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067FG)							
NC3, NC4, NC5	**10-Feb-2023**	**17-Feb-2023**	10-Mar-2023	✓	**18-Feb-2023**	10-Mar-2023	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
NC3, NC4, NC5	**10-Feb-2023**	**17-Feb-2023**	10-Mar-2023	✓	**18-Feb-2023**	10-Mar-2023	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
NC3, NC4, NC5	**10-Feb-2023**	**----**	----	----	**11-Feb-2023**	12-Feb-2023	✓
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	10-Mar-2023	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066)							
NC3, NC5	**10-Feb-2023**	**13-Feb-2023**	17-Feb-2023	✓	**14-Feb-2023**	25-Mar-2023	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068)							
NC3, NC5	**10-Feb-2023**	**13-Feb-2023**	17-Feb-2023	✓	**15-Feb-2023**	25-Mar-2023	✓
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068)							
NC3, NC5	**10-Feb-2023**	**13-Feb-2023**	17-Feb-2023	✓	**15-Feb-2023**	25-Mar-2023	✓
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
NC3, NC5	**10-Feb-2023**	**13-Feb-2023**	17-Feb-2023	✓	**14-Feb-2023**	25-Mar-2023	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
NC3, NC5	**10-Feb-2023**	**13-Feb-2023**	17-Feb-2023	✓	**14-Feb-2023**	25-Mar-2023	✓
MW006: Faecal Coliforms & E.coli by MF							
Sterile Plastic Bottle - Sodium Thiosulfate (MW006)							
NC3, NC4, NC5	**10-Feb-2023**	**----**	----	----	**10-Feb-2023**	11-Feb-2023	✓
MW024: Algae Count							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Bacillariophytes (Diatoms) - Centrales							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Bacillariophytes (Diatoms) - Pennales							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Bacillariophytes (Diatoms) - TOTAL BACILLARIOPHYTES							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Chlorophytes (Green Algae)							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Chlorophytes (Green Algae) - TOTAL CHLOROPHYTES							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Cyanophytes (Blue Green Algae)							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
MW024: Cyanophytes (Blue Green Algae) - Other Cyanophytes							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Cyanophytes (Blue Green Algae) - TOTAL CYANOPHYTES							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Cyanophytes (Blue Green Algae) - TOTAL POTENTIALLY TOXIC CYANOPHYTES							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Flagellates - Cryptophytes							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Flagellates - Euglenophytes							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Flagellates - Pyrrophytes							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Flagellates - TOTAL FLAGELLATES							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Golden/Yellow-Green Algae							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Golden/Yellow-Green Algae- TOTAL GOLDEN/YELLOW-GREEN ALGAE							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Haptophytes							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Haptophytes - TOTAL HAPTOPHYTES							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Raphidophyte							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Raphidophyte - TOTAL RAPHIDOPHYTE							
Plastic Bottle - Lugols Iodine (MW024_TOT) NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
MW024: Rhodophytes (Red Algae)							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024: Zooplankton - TOTAL ZOOPLANKTON							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024:Rhodophytes (Red Algae) - TOTAL RHODOPHYTES							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓
MW024T: TOTAL ALGAE							
Plastic Bottle - Lugols Iodine (MW024_TOT)							
NC3, NC5	**10-Feb-2023**	**----**	----	----	**20-Feb-2023**	09-Aug-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Pesticides by GCMS	EP068	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Pesticides by GCMS	EP068	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Pesticides by GCMS	EP068	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	2	9	22.22	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	9	22.22	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	2	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	2	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	12	**25.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	16	**18.75**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	2	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Polychlorinated Biphenyls (PCB)	EP066	0	2	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Hardness as CaCO3	EA065	WATER	In house: Referenced to APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Filtered Total Phosphorus as P By Discrete Analy	EK067FG	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a filtered sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of dissolved or emulsified oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Thermotolerant Coliforms & E.coli by Membrane Filtration	MW006	WATER	AS 4276.7
Total Algae Count	MW024 TOT	WATER	In house: Referenced to Hotzel and Groome, 1999 and APHA 10200

Preparation Methods	Method	Matrix	Method Descriptions

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
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.
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
TKN/TP (filtered) Digestion	EK061F/EK067F	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Hot Block Digest for metals in soils sediments and sludges	EN69	WATER	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
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.
Tumbler Extraction of Solids	ORG17	WATER	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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2304472**	Page	: 1 of 10
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Warriewood	Date Samples Received	: 10-Feb-2023
Order number	: ----	Date Analysis Commenced	: 10-Feb-2023
C-O-C number	: ----	Issue Date	: 24-Feb-2023
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Somlok Chai	Microbiologist	Sydney Microbiology, Smithfield, NSW
Sunitha Kannampilli	Phycologist	Sydney Phycology, Smithfield, NSW

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4881935)									
ES2304357-001	Anonymous	EG005T: Chromium	7440-47-3	2	mg/kg	14	14	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	9	10	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	49	44	11.5	No Limit
ES2304759-002	Anonymous	EG005T: Chromium	7440-47-3	2	mg/kg	<2	3	49.1	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	9	12	27.5	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4881944)									
ES2304357-001	Anonymous	EA055: Moisture Content	----	0.1	%	9.8	11.4	14.3	0% - 50%
ES2304880-002	Anonymous	EA055: Moisture Content	----	0.1	%	1.7	7.9	130	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4881938)									
ES2304357-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2304759-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 4871812)									
ES2304472-004	NC3	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4871811)									
ES2304472-004	NC3	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4871811) - continued									
ES2304472-004	NC3	EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 4878495)									
ES2304472-001	NC3	EA025H: Suspended Solids (SS)	----	5	mg/L	30	25	20.8	No Limit
ES2304634-026	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 4874039)									
ES2304237-003	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.003	0.002	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.014	0.012	11.6	No Limit
ES2304661-001	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.042	0.042	0.0	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4875255)									
ES2304472-001	NC3	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2304617-008	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	0.228	0.250	9.2	0% - 50%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4878606)									
ES2304472-001	NC3	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.05	0.05	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4866900)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4866900) - continued									
ES2304409-010	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.03	0.03	0.0	No Limit
ES2304405-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.04	0.03	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4878607)									
ES2304952-009	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2304472-001	NC3	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.22	0.22	0.0	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4878609)									
ES2304472-001	NC3	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.3	0.0	No Limit
ES2304952-006	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	136	151	10.6	0% - 50%
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser (QC Lot: 4878605)									
ES2304472-001	NC3	EK067FG: Filtered Total Phosphorus as P	----	0.01	mg/L	0.04	0.03	0.0	No Limit
ES2304751-011	Anonymous	EK067FG: Filtered Total Phosphorus as P	----	0.01	mg/L	0.41	0.46	10.2	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4878608)									
ES2304472-001	NC3	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.0	No Limit
ES2304952-006	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	11.1	10.1	9.8	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 4866901)									
ES2304368-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2304479-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4881935)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	107	88.0	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	118	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	111	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	107	82.0	119
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	95.6	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4881938)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	104	70.0	125
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4871812)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	112	62.0	126
EP068A: Organochlorine Pesticides (OC) (QCLot: 4871811)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	95.1	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	98.0	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	100	67.0	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	98.9	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	91.7	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.2	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	96.0	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	98.7	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	102	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	101	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	95.8	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	95.5	66.0	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	96.2	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	101	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	104	69.0	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	102	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	107	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	102	62.0	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	93.6	66.0	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	95.3	64.0	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	97.5	54.0	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 4878495)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	101	83.0	129
				<5	1000 mg/L	97.8	82.0	110
				<5	987 mg/L	102	83.0	118
EG020T: Total Metals by ICP-MS (QCLot: 4874039)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.3	82.0	114
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.0	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.1	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.9	85.0	115
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	88.8	79.0	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4875255)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	101	77.0	111
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4878606)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	90.0	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4866900)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	98.5	82.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4878607)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.8	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4878609)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	84.9	69.0	101
				<0.1	1 mg/L	98.6	70.0	118
				<0.1	5 mg/L	101	70.0	130
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser (QCLot: 4878605)								
EK067FG: Filtered Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	88.6	71.0	115
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4878608)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	87.0	71.3	126
				<0.01	0.442 mg/L	88.7	71.3	126
				<0.01	1 mg/L	99.8	71.3	126
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4866901)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	97.0	85.0	117
EP020: Oil and Grease (O&G) (QCLot: 4881695)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	92.2	81.0	121
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4867978)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	101	68.9	113
EP068A: Organochlorine Pesticides (OC) (QCLot: 4867979)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	87.4	64.9	107
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	105	58.3	111
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	89.4	69.0	117

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4867979) - continued								
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	98.2	70.0	112
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	92.9	68.9	110
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	94.5	65.2	108
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	92.5	65.8	109
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	100	67.1	107
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	100	64.1	110
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	105	66.7	112
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	100	63.2	111
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	94.9	65.2	113
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	95.5	66.0	112
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	106	65.2	113
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	102	67.3	114
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	95.7	72.0	122
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	86.1	66.9	109
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	89.1	65.2	112
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	95.6	65.2	112
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	90.3	63.8	110
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	97.4	61.1	114
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4867979)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	98.5	65.6	114
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	88.2	63.7	113
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	25.2	19.7	48.0
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	94.6	69.5	110
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	96.5	71.1	110
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	98.4	77.0	119
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	100	70.0	124
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	106	68.4	116
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	98.5	68.6	112
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	102	75.0	119
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	98.5	67.0	121
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	97.6	69.0	121
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	100	71.8	110
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	99.8	67.5	112
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	102	64.1	116
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	103	67.8	114
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	95.0	74.0	120
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	97.2	66.2	114
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	100	51.6	128
EP075(SIM)A: Phenolic Compounds (QCLot: 4867977)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)A: Phenolic Compounds (QCLot: 4867977) - continued								
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	34.9	24.5	61.9
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	68.2	52.0	90.0
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	69.2	51.0	91.0
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	64.4	44.0	88.0
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	72.0	48.0	100
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	79.6	49.0	99.0
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	70.2	53.0	105
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	69.7	57.0	105
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	66.1	53.0	99.0
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	70.6	50.0	106
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	92.5	51.0	105
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	34.6	10.0	95.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4867977)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	76.2	50.0	94.0
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	95.6	63.6	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	77.6	62.2	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	89.8	63.9	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	95.8	62.6	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	98.2	64.3	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	88.9	63.6	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	96.2	63.1	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	78.8	64.1	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	77.8	62.5	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	87.9	61.7	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	76.2	63.0	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	86.3	63.3	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	79.0	59.9	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	80.2	61.2	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	86.6	59.1	118

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4881935)							
ES2304357-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	85.7	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	101	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	104	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	104	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	122	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4881938)							
ES2304357-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	107	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4871812)							
ES2304472-004	NC3	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	108	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 4871811)							
ES2304472-004	NC3	EP068: gamma-BHC	58-89-9	0.5 mg/kg	102	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	107	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	96.7	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	98.0	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	96.8	70.0	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	92.6	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4874039)							
ES2304237-004	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	90.8	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	92.8	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	91.6	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	102	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	90.3	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4875255)							
ES2304472-002	NC4	EG035T: Mercury	7439-97-6	0.01 mg/L	102	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4878606)							
ES2304472-001	NC3	EK055G: Ammonia as N	7664-41-7	1 mg/L	115	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4866900)							
ES2304405-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	109	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4878607)							
ES2304472-001	NC3	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	110	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4878609)							
ES2304472-002	NC4	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	104	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser (QCLot: 4878605)							
ES2304472-002	NC4	EK067FG: Filtered Total Phosphorus as P	----	1 mg/L	98.1	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4878608)							
ES2304472-002	NC4	EK067G: Total Phosphorus as P	----	1 mg/L	95.2	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4866901)							
ES2304368-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	101	70.0	130

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2304472**	Page	: 1 of 10
Client	: **MARINE POLLUTION RESEARCH PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL ANINK	Contact	: Customer Services ES
Address	: PO BOX 279 CHURCH POINT SYDNEY NSW 2105	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Warriewood	Date Samples Received	: 10-Feb-2023 15:15
Order number	: ----	Date Analysis Commenced	: 10-Feb-2023
C-O-C number	: ----	Issue Date	: 24-Feb-2023 10:08
Sampler	: JACOB BROOM (gmail)		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Somlok Chai	Microbiologist	Sydney Microbiology, Smithfield, NSW
Sunitha Kannampilli	Phycologist	Sydney Phycology, Smithfield, NSW

General Comments

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

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

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

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

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

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

- MW024: Results apply to sample(s) as submitted.
- MF = membrane filtration
- CFU = colony forming unit
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- MW006 is ALS's internal code and is equivalent to AS4276.5.
- MW024: KEY: PTP = Potential Toxin Producers; cf. = comparable form.
- MW024: Samples were preserved with Lugols Iodine solution.
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- MW024: Algal enumeration values of <5 cells/mL will not be reported.
- MW024: Under microscopic observation, debris present in sample #01 and #03
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	NC3	NC4	NC5	----	----
			Sampling date / time	10-Feb-2023 00:00	10-Feb-2023 00:00	10-Feb-2023 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2304472-004	ES2304472-005	ES2304472-006	--------	--------
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**20.5**	**23.0**	**5.5**	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	----	----
Chromium	7440-47-3	2	mg/kg	<2	**3**	**34**	----	----
Copper	7440-50-8	5	mg/kg	<5	<5	**30**	----	----
Lead	7439-92-1	5	mg/kg	<5	<5	<5	----	----
Zinc	7440-66-6	5	mg/kg	**17**	**23**	**70**	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	NC3	NC4	NC5	----	----
				Sampling date / time	10-Feb-2023 00:00	10-Feb-2023 00:00	10-Feb-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2304472-004	ES2304472-005	ES2304472-006	--------	--------
					Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**88.8**	**84.3**	**96.8**	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**128**	**126**	**139**	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**102**	**102**	**111**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	NC3	NC4	NC5	----	----
			Sampling date / time	10-Feb-2023 00:00	10-Feb-2023 00:00	10-Feb-2023 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2304472-001	ES2304472-002	ES2304472-003	--------	--------
				Result	Result	Result	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**30**	**12**	**13**	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**73**	----	**69**	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	**0.001**	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	**0.002**	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	**0.017**	----	<0.005	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	<0.0001	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.05**	**0.02**	<0.01	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.22**	**0.15**	**0.02**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.22**	**0.15**	**0.02**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.3**	**0.4**	**0.4**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.5**	**0.6**	**0.4**	----	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser								
Filtered Total Phosphorus as P	----	0.01	mg/L	**0.04**	**0.04**	**0.04**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.05**	**0.05**	**0.04**	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	**6**	----	<5	----	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	<1	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	NC3	NC4	NC5	----	----
				Sampling date / time	10-Feb-2023 00:00	10-Feb-2023 00:00	10-Feb-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2304472-001	ES2304472-002	ES2304472-003	--------	--------
					Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	----	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	----	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	----	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	----	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	----	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	----	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	----	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	----	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	----	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	----	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	----	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	----	<0.5	----	----
4.4`-DDE	72-55-9	0.5	µg/L		<0.5	----	<0.5	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	----	<0.5	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	----	<0.5	----	----
4.4`-DDD	72-54-8	0.5	µg/L		<0.5	----	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	----	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	----	<0.5	----	----
4.4`-DDT	50-29-3	2.0	µg/L		<2.0	----	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	----	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	----	<2.0	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	----	<0.5	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	----	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	----	<0.5	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	----	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	----	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	----	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	----	<0.5	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	----	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	----	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	----	<2.0	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	----	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	----	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	NC3	NC4	NC5	----	----
				Sampling date / time	10-Feb-2023 00:00	10-Feb-2023 00:00	10-Feb-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2304472-001	ES2304472-002	ES2304472-003	--------	--------
					Result	Result	Result	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued									
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	----	<0.5	----	----
Parathion	56-38-2	2.0	µg/L		<2.0	----	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L		<0.5	----	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L		<0.5	----	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L		<0.5	----	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L		<0.5	----	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L		<0.5	----	<0.5	----	----
Ethion	563-12-2	0.5	µg/L		<0.5	----	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L		<0.5	----	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L		<0.5	----	<0.5	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	1.0	µg/L		<1.0	----	<1.0	----	----
2-Chlorophenol	95-57-8	1.0	µg/L		<1.0	----	<1.0	----	----
2-Methylphenol	95-48-7	1.0	µg/L		<1.0	----	<1.0	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L		<2.0	----	<2.0	----	----
2-Nitrophenol	88-75-5	1.0	µg/L		<1.0	----	<1.0	----	----
2.4-Dimethylphenol	105-67-9	1.0	µg/L		<1.0	----	<1.0	----	----
2.4-Dichlorophenol	120-83-2	1.0	µg/L		<1.0	----	<1.0	----	----
2.6-Dichlorophenol	87-65-0	1.0	µg/L		<1.0	----	<1.0	----	----
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L		<1.0	----	<1.0	----	----
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L		<1.0	----	<1.0	----	----
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L		<1.0	----	<1.0	----	----
Pentachlorophenol	87-86-5	2.0	µg/L		<2.0	----	<2.0	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	----	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	----	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	----	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	----	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	----	<1.0	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	----	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	----	<1.0	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	----	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	----	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	----	<1.0	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	NC3	NC4	NC5	----	----
				Sampling date / time	10-Feb-2023 00:00	10-Feb-2023 00:00	10-Feb-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2304472-001	ES2304472-002	ES2304472-003	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	----	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	----	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	----	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	----	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	----	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	----	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	----	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	----	<0.5	----	----
MW006: Faecal Coliforms & E.coli by MF									
Faecal Coliforms	----	1	CFU/100mL		1100	1500	~1300	----	----
Escherichia coli	----	1	CFU/100mL		920	840	900	----	----
MW024: Bacillariophytes (Diatoms) - Pennales									
Navicula spp.	----	5	cells/ml		50	----	10	----	----
Nitzschia spp.	----	5	cells/ml		50	----	50	----	----
MW024: Bacillariophytes (Diatoms) - TOTAL BACILLARIOPHYTES									
Total Bacillariophytes	----	5	cells/ml		100	----	60	----	----
MW024: Chlorophytes (Green Algae)									
Chlamydomonas spp.	----	5	cells/ml		10	----	25	----	----
Closterium spp.	----	5	cells/ml		10	----	----	----	----
Monoraphidium spp.	----	5	cells/ml		25	----	----	----	----
Other green cells	----	5	cells/ml		----	----	100	----	----
Scenedesmus spp.	----	5	cells/ml		50	----	----	----	----
Sphaerocystis spp.	----	5	cells/ml		10	----	----	----	----
Tetraedron spp.	----	5	cells/ml		----	----	25	----	----
MW024: Chlorophytes (Green Algae) - TOTAL CHLOROPHYTES									
Total Chlorophytes	----	5	cells/ml		105	----	150	----	----
MW024: Cyanophytes (Blue Green Algae)									
Anabaena spp. (straight)	----	5	cells/ml		----	----	180	----	----
cf. Synechococcus spp.	----	5	cells/ml		100	----	----	----	----
Pseudanabaena spp.	----	5	cells/ml		----	----	50	----	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL CYANOPHYTES									
Total Cyanophytes	----	5	cells/ml		100	----	230	----	----
MW024: Cyanophytes (Blue Green Algae) - TOTAL POTENTIALLY TOXIC CYANOPHYTES									
Total Potentially Toxic Cyanophytes	----	5	cells/ml		<5	----	<5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	NC3	NC4	NC5	----	----
				Sampling date / time	10-Feb-2023 00:00	10-Feb-2023 00:00	10-Feb-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2304472-001	ES2304472-002	ES2304472-003	--------	--------
					Result	Result	Result	----	----
MW024: Flagellates - Cryptophytes									
Cryptomonas spp.	----	5	cells/ml		----	----	75	----	----
MW024: Flagellates - Euglenophytes									
Euglena spp.	----	5	cells/ml		----	----	5	----	----
MW024: Flagellates - TOTAL FLAGELLATES									
Total Flagellates	----	5	cells/ml		----	----	80	----	----
MW024T: TOTAL ALGAE									
Total Algae Count	----	5	cells/ml		305	----	520	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		84.7	----	84.1	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		93.0	----	89.6	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		81.8	----	71.0	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		28.8	----	29.4	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		68.4	----	60.1	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		63.4	----	60.0	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		62.2	----	62.4	----	----
Anthracene-d10	1719-06-8	1.0	%		76.2	----	73.1	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		76.9	----	74.8	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	45	134
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	67	111
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	67	111
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112