Warrell Creek to Nambucca Heads – Pacific Highway Upgrade Project

ENVIRONMENT PROTECTION AUTHORITY MONTHLY REPORT

- May 2015

Pacifico Project Number: WC2NH

A team consisting of RMS and Pacifico (ACCIONA Ferrovial JV)
to upgrade the Pacific Highway at Warrell Creek to Nambucca Heads

Contents

1. Introduction

Environmental Protection Licence (EPL) 20533 was issued to ACCIONA Infrastructure for the Warrell Creek to Nambucca Heads Pacific Highway Upgrade project on the 16th December 2014. Condition R1.8 of the EPL requires the licensee to provide the EPA with a monthly report containing the following information:

a) details of all non-compliances with the conditions of this licence and measures taken, or proposed, to prevent a recurrence of such a non-compliance; and
b) details of all discharges from the sediment basins where the water quality results exceed the limits prescribed by Condition L2.4 including the results of rainfall measurements to demonstrate compliance with Condition M4.1; and

The report referred to in this condition must be received by the EPA within 10 working days of the end of each month.

This document has been prepared to fulfil the requirements of Condition R1.8.

1.1 Description of Works

The project's construction activities during May 2015 were limited to the following:

- Vegetation clearing for installation of fencing;
- Installation of permanent boundary fencing;
- Vegetation clearing for access tracks;
- Vegetation clearing for sediment basins and other sediment controls;
- Mainline clearing and grubbing;
- Excavation for sediment basins and other sediment controls;
- Topsoil stripping;
- Installation of temporary waterway crossings;
- Commencement of bridge works including temporary work platforms;
- Clearing through Flying Fox area;
- Drainage culvert installation;
- Site compound establishment;
- Installation of Frog Fencing;
- Geotechnical Investigations; and
- Site Survey

The works scheduled for next month include:

- Clearing and Grubbing;
- Topsoil stripping;
- Earthworks including crushing;
- Continuing clearing through the Flying Fox area;
- Continuing bridge works including temporary work platforms;
- Installation of erosion and sediment controls;
- Installation of permanent boundary fencing;
- Continuing culvert installation;
- Site compound establishment (Northern Compound);

- Geotechnical Investigations;
- Installation of temporary waterway crossings; and
- Site Survey.

1.2 Consultation Activities

The project's consultation activities during May 2015 included various community letterbox drop notifications and the following:

Groups	Date	Key Topics
Environmental Review Group	19/05/15	Construction Progress, Design Update, Upcoming works, EWMS discussion, Environmental Update, Monitoring update.
Nambucca Rotary Club	14/05/15	Project Update. Nambucca River Festival – planned for November 2015

Other consultation activities:

- Pre-consultation with affected residents regarding temporary stockpiles
- Consultation with property owners regarding proposed property adjustments
- Consultation with property owners regarding proposed utility adjustments
- Consultation with affected residents regarding clearing activities
- Consultation with affected residents regarding concrete crushing activities
- Consultation with affected residents about construction impacts
- Consultation with affected residents of Nursery regarding expected increased traffic

At House Noise Treatments

The At House noise treatment program is currently being managed by RMS and is not part of the ACCIONA (Pacifico) Scope of Works and Technical Criteria.

Upcoming community and stakeholder activities for June 2015

- Consultation with residents within 200m of the controlled blasting zones
- Consultation with residents regarding increasing the blast limits
- Mail out of preconstruction condition reports to residents within controlled blasting zones.
- Notification to residents within controlled blasting zones as per Community Involvement Plan (letterbox drop, SMS, email)
- Ongoing consultation with property owners regarding property works
- Consultation with affected residents regarding temporary stockpiles
- Consultation with affected residents regarding First Flush Systems
- Drop in sessions to notify residents and river user groups of the change to the navigation rules during the construction of the new Nambucca River Bridge
- Fact Sheet on the construction activities for the new Nambucca River Bridge
- Consultation with affected residents about Out Of Hours Works

- Letterbox drop of June 2015 Construction update
- Updating community displays at the various display locations

2. Weather

2.1 Discussion

The automatic recording weather station at the main site compounds (north and south) records rainfall totals daily at 9AM. The daily summaries for rainfall received in April at the Albert Drive compound and Northern Compound are shown below in Table 2.1 and 2.2. The total rainfall received for the month is as follows:-

Month	Total monthly rainfall	Location
01/05/15 – 31/05/15	207mm	Northern Compound
01/05/15 – 31/05/15	199.2mm	Albert Drive Compound

The site experienced a total of 12 rain days throughout the month of May 2015.

During May, rainfall received on site was higher than the May monthly average of 132.5mm. A summary of weather conditions recorded over the month for Smoky Cape by the Bureau of Meteorology is detailed below in Table 2.2.

Table 2.1 – Rainfall recorded at Albert Drive compound automated weather station

Site Name: Southern Compound		
Date	Time	TOTAL Rain Gauge
1/05/2015	9:00:00	41.2
2/05/2015	9:00:00	93
3/05/2015	9:00:00	21.8
4/05/2015	9:00:00	4.2
5/05/2015	9:00:00	0.2
6/05/2015	9:00:00	0.2
7/05/2015	9:00:00	0.2
8/05/2015	9:00:00	0
9/05/2015	9:00:00	0
10/05/2015	9:00:00	0
11/05/2015	9:00:00	0
12/05/2015	9:00:00	0
13/05/2015	9:00:00	0
14/05/2015	9:00:00	0

15/05/2015	9:00:00	0
16/05/2015	9:00:00	5.8
17/05/2015	9:00:00	0.2
18/05/2015	9:00:00	6.8
19/05/2015	9:00:00	5.8
20/05/2015	9:00:00	0.2
21/05/2015	9:00:00	3.6
22/05/2015	9:00:00	6.6
23/05/2015	9:00:00	5.2
24/05/2015	9:00:00	0.2
25/05/2015	9:00:00	0
26/05/2015	9:00:00	0
27/05/2015	9:00:00	0
28/05/2015	9:00:00	0
29/05/2015	9:00:00	1
30/05/2015	9:00:00	0
31/05/2015	9:00:00	3

Table 2.2 – Rainfall recorded at the Northern compound automated weather station

Site Name: Northern Compound		
Date	Time	TOTAL Rain Gauge
1/05/2015	9:00:00	61.2
2/05/2015	9:00:00	77
3/05/2015	9:00:00	15.6
4/05/2015	9:00:00	0.2
5/05/2015	9:00:00	0
6/05/2015	9:00:00	0.2
7/05/2015	9:00:00	0.2
8/05/2015	9:00:00	0
9/05/2015	9:00:00	0
10/05/2015	9:00:00	0
11/05/2015	9:00:00	0
12/05/2015	9:00:00	0
13/05/2015	9:00:00	0
14/05/2015	9:00:00	0
15/05/2015	9:00:00	0
16/05/2015	9:00:00	4.4
17/05/2015	9:00:00	0.4
18/05/2015	9:00:00	12.2
19/05/2015	9:00:00	8.2
20/05/2015	9:00:00	0.2

21/05/2015	9:00:00	5.2
22/05/2015	9:00:00	8.2
23/05/2015	9:00:00	5.2
24/05/2015	9:00:00	0
25/05/2015	9:00:00	0
26/05/2015	9:00:00	0
27/05/2015	9:00:00	0
28/05/2015	9:00:00	0.4
29/05/2015	9:00:00	1.8
30/05/2015	9:00:00	0.6
31/05/2015	9:00:00	5.8

Table 2.2: Weather conditions recorded in May 2015 at Smoky Cape by the Bureau of Meteorology.

Observations from Smoky Cape Lighthouse.

Smoky Cape Daily Summaries

May 2015

date	min to 9am	anomaly	max from 9am	anomaly	rain to 9am
	°C	°C	°C	°C	mm
Fri 01/05/2015	**14.9**	+0.5	**21.0**	-0.6	**73.0**
Sat 02/05/2015	**15.6**	+1.2	**24.0**	+2.4	**67.0**
Sun 03/05/2015	**18.0**	+3.6	**24.6**	+3.0	**27.2**
Mon 04/05/2015	**17.5**	+3.1	**25.0**	+3.4	**9.2**
Tue 05/05/2015	**17.8**	+3.4	**24.5**	+2.9	**0.0**
Wed 06/05/2015	**19.5**	+5.1	**25.2**	+3.6	**0.0**
Thu 07/05/2015	**12.5**	-1.9	**22.1**	+0.5	**0.0**
Fri 08/05/2015	**12.1**	-2.3	**20.7**	-0.9	**0.0**
Sat 09/05/2015	**14.1**	-0.3	**21.4**	-0.2	**0.0**
Sun 10/05/2015	**14.0**	-0.4	**23.4**	+1.8	**0.0**
Mon 11/05/2015	**15.8**	+1.4	**25.0**	+3.4	**0.0**
Tue 12/05/2015	**9.2**	-5.2	**23.4**	+1.8	**0.0**
Wed 13/05/2015	**15.7**	+1.3	**22.6**	+1.0	**0.0**
Thu 14/05/2015	**9.9**	-4.5	**19.0**	-2.6	**0.0**
Fri 15/05/2015	**11.5**	-2.9	**21.8**	+0.2	**0.0**
Sat 16/05/2015	**13.8**	-0.6	**21.2**	-0.4	**12.4**
Sun 17/05/2015	**14.0**	-0.4	**17.8**	-3.8	**1.4**
Mon 18/05/2015	**14.9**	+0.5	**21.2**	-0.4	**29.2**
Tue 19/05/2015	**15.2**	+0.8	**22.5**	+0.9	**13.0**
Wed 20/05/2015	**16.9**	+2.5	**24.3**	+2.7	**0.0**
Thu 21/05/2015	**14.4**	+0.0	**16.8**	-4.8	**3.6**
Fri 22/05/2015	**14.0**	-0.4	**18.9**	-2.7	**5.4**
Sat 23/05/2015	**11.8**	-2.6	**19.3**	-2.3	**19.2**
Sun 24/05/2015	**13.3**	-1.1	**21.2**	-0.4	**0.2**
Mon 25/05/2015	**13.5**	-0.9	**22.0**	+0.4	**0.0**
Tue 26/05/2015	**15.2**	+0.8	**21.2**	-0.4	**0.0**
Wed 27/05/2015	**13.9**	-0.5	**22.1**	+0.5	**0.0**
Thu 28/05/2015	**15.0**	+0.6	**23.0**	+1.4	**0.0**
Fri 29/05/2015	**14.9**	+0.5	**20.2**	-1.4	**0.0**

Sat 30/05/2015	**15.5**	+1.1	**21.3**	-0.3	**0.2**
Sun 31/05/2015	**16.0**	+1.6	**17.2**	-4.4	**3.8**
May 2015 Average	**14.5**	+0.1	**21.7**	+0.1	
May 1957-2014 Average	14.4		21.6		
May 1957-2014 Highest	20.6	25th 1958	29.5	4th 2007	
May 1957-2014 Lowest	5.9	15th 1968	14.4	30th 2011	

3. Surface Water Monitoring

Sampling was undertaken by ACCIONA (Pacifico) on the 4th May during a wet period and 20th May during a dry period. Field tests and laboratory samples were taken. The results are available in Appendix A.

The May "Wet" event was monitored on the 4th of May after the site had received 21mm of rainfall.

Dissolved oxygen levels were noted to be below ANZECC criteria at:

- Lower Warrell Creek upstream and downstream (background ranges from 5 – 9.7mg/L);
- Gumma Wetlands upstream and downstream (background ranges from 0.6 – 13.6mg/L);
- Nambucca River upstream and downstream (background ranges from 6.8 to 10mg/L).

The low dissolved oxygen levels are consistent with baseline water quality data collected by RMS prior to the commencement of construction activities at Gumma Wetlands.

Low dissolved oxygen levels were recorded at Nambucca River and Lower Warrell Creek both upstream and downstream of the worksite. It is likely that the change in monitoring location between the baseline sampling and the construction sampling is the cause of the lower recorded dissolved oxygen levels.

A low pH level was also recorded at all monitoring locations during the wet monitoring period. The low pH levels recorded are consistent with the baseline pre-construction monitoring undertaken.

Elevated Aluminium levels were also recorded at all monitoring locations above ANZECC criteria. Slightly elevated levels of copper and zinc were also recorded. It is noted that Aluminium was not monitored during the baseline water quality monitoring. Higher levels of Copper and Zinc were recorded during the baseline sampling. The elevated levels recorded were consistent both upstream and downstream and were not contributed to from site activities.

Elevated Total Nitrogen levels were recorded at all monitoring locations. High TSS readings were recorded at Lower Warrell Creek and Nambucca River. High TSS and Total Nitrogen levels are consistent with the baseline monitoring undertaken.

The May "dry" event was monitored on the 20th of May.

Low pH was recorded at the following locations:

- Upper Warrell Creek;
- Stony Creek;
- Gumma Wetlands.

The low pH levels recorded are consistent with the baseline pre-construction monitoring undertaken.

Low dissolved oxygen levels were recorded at:

- Upper Warrell Creek;
- Stony Creek;
- Lower Warrell Creek;
- Gumma Wetland

The low dissolved oxygen levels are consistent with the baseline pre-construction monitoring undertaken.

Elevated Aluminium levels were recorded at Lower Warrell Creek and Gumma Wetland. It is noted that Aluminium levels were not measured during baseline monitoring. One elevated Zinc reading was recorded at Upper Warrell Creek which is consistent with baseline monitoring levels.

Total Nitrogen was also elevated at Lower Warrell Creek and Gumma Wetland, which is consistent with the baseline monitoring results.

Low pH levels were recorded at Upper Warrell Creek, Stony Creek and Gumma Wetland. Low dissolved oxygen was also recorded at these locations and Lower Warrell Creek, which is consistent with baseline monitoring results.

4. Sediment Basin Water Monitoring

Water was released from commissioned sediment basins between the 4th May – 11th May after a rainfall event, and the 20th – 28th May after a subsequent rainfall event. Table 4 below has the water quality results recorded for the water release events:

Table 4 – Water Release Register

Water Release Register

Date	Basin ID	Oil and Grease (visible)	pH	Turbidity (NTU)	TSS (mg/L)	Approx Volume Discharged (kL)	Comments
4/05/2015	B55.8	N	7.13	82.8		300	Under construction - not yet taking water from site
6/05/2015	B56.7	N	7.97	45.1	11	500	Under construction - not yet taking water from site
6/05/2015	B47.14	N	7.01	53.7	13	400	Commissioned
6/05/2015	B55.8	N	8.01	4.1		700	Under construction - not yet commissioned
6/05/2015	B56.5	N	6.89	54.7		500	Under construction - not yet commissioned
7/05/2015	B57.3	N	7.6			290	Under construction - not yet taking water from site - land irrigation (IR1)
7/05/2015	B47.14	N	6.63	64.5	33	400	Commissioned
7/05/2015	B49.07	N	6.52	25	9	1100	Commissioned
7/05/2015	B56.9	N	7.71	39.7	19	600	Under construction - not yet commissioned
7/05/2015	B55.17	N	7.01	41	21	465	Commissioned
7/05/2015	B46.35	N	6.56	0		540	Under construction - not yet taking water from site
8/05/2015	B46.35	N	6.78	53.9		360	Under construction - not yet taking

							water from site
8/05/2015	B49.67	N	6.52			1000	Under construction - land irrigation (IR5)
8/05/2015	B42.3	N	6.63	47.8		900	Under construction - not yet commissioned
8/05/2015	B48.46	N	6.53			600	Commissioned - Land irrigation (IR6)
8/05/2015	B44.55	N	6.54			300	Under construction - not yet taking water from site - land irrigation (IR9)
8/05/2015	B45.00	N	6.74	98		480	Under construction - not yet commissioned
9/05/2015	B48.46	N	6.51			440	Commissioned - Land irrigation (IR6)
9/05/2015	B54.3	N	6.9	42.6		500	Construction underway - not yet commissioned
9/05/2015	B56.5	N	6.84			545	Under construction - not yet commissioned - land irrigation (IR3)
11/05/2015	B54.7	N	7.16			1100	Commissioned - land irrigation (IR4)
11/05/2015	B49.67	N	7	33.2		800	Under construction - Not yet commissioned
11/05/2015	B56.5	N	6.76			500	Under construction - not yet commissioned - land irrigation (IR3)
12/05/2015	B57.3	N	6.84			290	Not yet taking water from site - Land

							irrigation (IR1)
12/05/2015	B54.7	N	6.9			600	Commissioned - land irrigation (IR4) (below sediment storage level)
12/05/2015	B55.8	N	6.96	82.5		700	Under construction - not yet commissioned
12/05/2015	B55.0	N	7.01			900	Commissioned - Land irrigation (level below sediment storage level) (IR4)
13/05/2015	B54.7	N	7.02			700	Under construction - not yet taking water from site - Land irrigation (IR4)
13/05/2015	B55.0	N	6.73			450	Commissioned - Land irrigation (level below sediment storage level) (IR4)
14/05/2015	B54.7	N	6.77			200	Under construction - not yet taking water from site - Land irrigation (IR4)
15/05/2015	B56.7	N	6.84			400	Under construction - not yet taking water from site - Land irrigation (IR3)
19/05/2015	B56.7	N	6.76	8.5		160	Under construction - not yet taking water from site
20/05/2015	B47.14	N	6.76	0		400	Commissioned
20/05/2015	B47.6	N	6.97	41.2		250	Commissioned

20/05/2015	B56.9	N	6.93	24.9		480	Under construction - not yet taking water from site
25/05/2015	B54.3	N	6.65	5.7		300	Under construction - not yet taking water from site
26/05/2015	B49.07	N	7.57	23.4		800	Commissioned
26/05/2015	B45.00	N	6.65	100	41	500	Under construction - not yet taking water from site
26/05/2015	B47.14	N	7.32	49.5		400	Commissioned
26/05/2015	B44.55	N	7.06	41.8		450	Under construction - not yet taking water from site
26/05/2015	B57.3	N	6.69			200	Under construction - not yet taking water from site - Land Irrigation (IR1)
26/05/2015	B56.4	N	6.9			300	Under construction - not yet taking water from site - Land Irrigation (IR3)
26/05/2015	B56.9	N	6.54	60.5		400	Under construction - not yet taking water from site
26/05/2015	B56.5	N	6.66			500	Under construction - not yet taking water from site - Land Irrigation (IR3)
27/05/2015	B47.14	N	7.5	47.7		600	Commissioned
27/05/2015	B48.06	N	7.06	36.7		6000	Commissioned
27/05/2015	B46.96	N	7.49	2		100	Under construction - not yet taking water from site

27/05/2015	B57.3	N	6.61			100	Under construction - not yet taking water from site
28/05/2015	B49.07	N	7.14	123		120	Commissioned - Land irrigation (IR6)
28/05/2015	B47.6	N	6.57	25.6		200	Commissioned

Green = Water released from sediment trap.

5. Noise Monitoring

Monthly routine construction noise monitoring was undertaken on the 13th -15th May at eight locations near to the construction works. Noise monitoring results are indicative of background noise levels and construction noise levels in some locations. The Noise monitoring results are available in Appendix A.

The noise levels recorded at Cockburns Lane, Bald Hill Road and Mattick Road were marginally elevated above the Noise Management Levels. The levels recorded are consistent with the predicted modelled levels.

The elevated noise levels experienced at Mattick Road are temporary in nature and will reduce once the construction of the Precast Yard is complete.

6. Vibration Monitoring

No vibration monitoring was undertaken in May 2015.

7. Dust Monitoring

Dust gauges were placed at nearby sensitive receivers on the 10/04/15 – 12/05/15. Dust gauge results are available in Appendix A. An elevated level of 6.9mg/m2/month was recorded near the vicinity of Rosewood Road. An investigation into the exceedance was undertaken. The gauge had been located along the Project Boundary adjacent to a haul road and was not reflective of the dust levels experienced by the sensitive receiver located over 100m away. The dust gauge has now been relocated to the vicinity of the sensitive receivers dwelling.

Works on site in the vicinity of DDG1 during April/May included clearing and mulching, haul road establishment, basin excavation and stockpile and bund installation. Mitigation measures currently in place to reduce the level of dust include water trucks, stabilisation of exposed soil areas with grass cover and minimisation of exposed areas until earthworks commence. The Project is currently investigating and procuring chemical dust suppressants for use on the haul roads. The Project is also in the process of seeding of basin batters, stockpiles and bunds to reduce exposed surfaces.

8. Groundwater Monitoring

ACCIONA (Pacifico) have undertaken groundwater monitoring on the 04/05/15 - 05/05/15 (known as April's monitoring round) and the 30/05/15. The results from the sampling undertaken on the 30/05/15 are still pending. The results from the groundwater monitoring is available in Table 4 of Appendix A.

The groundwater monitoring results have been provided to RMS to provide advice on the trigger levels determined during the baseline sampling. The results from the baseline sampling are currently not available to Pacifico to assess construction impacts.

9. Acoustic Investigations

No acoustic investigations were undertaken in May 2015.

10. Complaints

9.1 Summary of Complaints for the month

The following is a brief summary of environmental complaint received in May 2015.

A complaint was received on Tuesday 12 May via email from a resident of Letitia Close regarding dust monitoring and management as well as the perceived lack of visual and noise mitigation measures around the property. The community team responded to the complainant within the day after clarifications were sought. Noise monitoring was undertaken on the following day with the noise levels recorded below the Noise Management Levels (noise results are available in Appendix A). Dust monitoring in the area is also compliant with Project requirements (DDG6). The Project is investigating providing the resident with screening vegetation to reduce visual impacts.

The community team is in regular contact with the complainant in an attempt to maintain an efficient communication channel and address all issues raised in a timely and structured manner.

11. Non-Compliance

10.1 Summary of Non-compliances

No non-compliances with the EPL conditions were recorded in May 2015.

Appendix A – Monitoring Results

Table 1 - Surface Water Sampling Results – 1 dry and 1 wet event.

04 May 2015 - Wet Event Weather: Overcast With Showers Low Tide: 2:33PM

Location	LOR	Units	Levels of Concern		Upper Warrell Creek	Upper Warrell Creek	Stony Creek	Stony Creek	Lower Warrell Creek	Lower Warrell Creek	Flying Fox Gumma Wetlands E	Flying Fox Gumma Wetlands W	Flying Fox Gumma Wetlands N	Nambucca River	Nambucca River
Type					Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Upstream	Downstream	Upstream	Downstream
Freshwater / Estuarine			ANZECC 2000 95% species protected		Freshwater	Freshwater	Freshwater	Freshwater	Estuarine	Estuarine	Freshwater	Freshwater	Freshwater	Estuarine	Estuarine
Date of Sampling					4-May-15	4-May-15	4-May-15	4-May-15	4-May-15	4-May-15	4-May-15	4-May-15	4-May-15	4-May-15	14-May-15
Time of Sampling			Freshwater	Saline	12:15 PM	11:50 AM	9:50 AM	9:10 AM	1:30 PM	1:50 PM	3:40 PM	4:30 PM	4:08 PM	2:30 PM	2:50 PM
Laboratory data															
Metals															
Aluminium	0.01	mg/L	0.055	-	0.28	0.32	0.11	0.56	0.76	0.34	0.62	0.29	0.24	0.11	0.13
Arsenic	0.001	mg/L	0.024	-	<0.001	<0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	0.0001	mg/L	0.0002	0.0055	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0004	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	0.001	mg/L	0.001	0.0044	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	0.001	mg/L	0.0014	0.0013	0.001	0.002	0.001	0.001	0.006	0.003	0.001	<0.001	<0.001	<0.001	<0.001
Lead	0.001	mg/L	0.0034	0.0044	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	0.001	mg/L	1.9	-	0.032	0.044	0.033	0.031	0.388	0.604	0.182	0.046	0.06	0.177	0.11
Nickel	0.001	mg/L	0.011	0.07	0.001	0.001	<0.001	<0.001	0.006	0.01	0.002	<0.001	<0.001	<0.001	<0.001
Selenium	0.01	mg/L	11	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silver	0.001	mg/L	0.00005	0.0014	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	0.005	mg/L	0.008	0.015	0.008	0.015	0.007	<0.005	0.046	0.087	0.008	0.285	0.005	<0.005	<0.005
Iron	0.05	mg/L	-	-	0.36	0.37	0.23	0.51	0.8	0.33	1.45	0.64	1.04	0.22	0.24
Mercury	0.0001	mg/L	0.0006	0.0004	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Recoverable Hydrocarbons (dependant on visual insp.)															
Naphthalene		mg/L	0.016	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH >C10-C16		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH >C10-C16 (F2)		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH >C16-C34		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH >C34-C40		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH C6-C10		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH C6-C10 (F1)		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BTEX (dependent on visual insp.)															
Benzene		mg/L	0.95	0.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene		mg/L	0.08	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m&p-Xylenes		mg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene		mg/L	0.35	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene		mg/L	0.18	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes - Total		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nutrients															
Total Phosphorus	0.01	mg/L	0.5	0.3	0.02	0.04	0.02	0.03	0.08	0.02	0.07	0.04	0.03	0.06	0.11

Phosphate (reactive phosphorus)	0.01	mg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Total Nitrogen	0.1	mg/L	0.5	0.3	1	1	0.8	1	1.9	0.7	1.3	0.8	0.9	0.7	0.9
Total Kjeldahl Nitrogen	0.1	mg/L			0.8	0.8	0.4	0.6	1.8	0.6	1	0.8	0.8	0.5	0.7
					TBA	TBA	TBA	TBA	TBA	TBA	TBA	TBA	TBA	TBA	TBA
Nitrate	0.01	mg/L	0.7	-	0.18	0.17	0.39	0.36	0.1	0.1	0.32	0.02	0.07	0.23	0.18
Nitrite	0.01	mg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia	0.01	mg/L	0.9		0.02	0.02	0.02	0.07	0.1	0.03	0.04	0.01	0.05	0.05	0.06
TSS															
Turbidity			50	10											
TSS	5	mg/L	<40	<10	<5	8	<5	<5	20	19	11	8	<5	71	71
Field Physical data															
Temperature		°C			19.58	19.67	20.03	20.29	21.15	20.53	20.75	20.49	20.2	21.27	21.2
pH		pH	6.5-8	6.5-8	5.91	5.98	6.17	6.05	5.72	5.27	5.68	5.65	5.58	6.43	6.41
pHmV		pHmV			29	25	14	21	40	65	42	44	48	-1	-10
ORPmV		ORPmV			2.71	240	207	201	268	285	157	89	144	214	264
Conductivity		mS/cm	125-2,200	-	0.118	0.117	0.164	0.165	0.167	0.163	0.217	0.295	0.181	0.467	0.506
Turbidity		NTU	50	10	42.6	45.4	14.5	17.7	48	50.3	24.9	40.6	16.1	166	150
Dissolved Oxygen		mg/L	>5	>5	7.43	7.22	8.46	7.82	1.19	0.9	0	1.37	0	5.02	3.3
TDS		g/L			0.072	0.076	0.106	0.107	0.109	0.106	0.141	0.192	0.118	0.303	0.812

Weather:

20 May 2015 - Dry Event

Overcast With Showers

Fine

Low Tide: 3:48PM

Location			Levels of Concern		Upper Warrell Creek	Upper Warrell Creek	Stony Creek	Stony Creek	Lower Warrell Creek	Lower Warrell Creek	Flying Fox Gumma Wetlands E	Flying Fox Gumma Wetlands W	Flying Fox Gumma Wetlands N	Nambucca River	Nambucca River
Type	LOR	Units			Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Upstream	Downstream	Upstream	Downstream
Freshwater / Estuarine			ANZECC 2000 95% species protected		Freshwater	Freshwater	Freshwater	Freshwater	Estuarine	Estuarine	Freshwater	Freshwater	Freshwater	Estuarine	Estuarine
Date of Sampling					20-May-15	20-May-15	20-May-15	20-May-15	20-May-15	20-May-15	20-May-15	20-May-15	20-May-15	20-May-15	20-May-15
Time of Sampling			Freshwater	Saline	1:51 PM	2:36 PM	12:58 PM	1:33 PM	3:24 PM	3:53 PM	5:00 PM	5:20 PM	5:44 PM	4:11 PM	4:37 PM
Laboratory data															
Metals															
Aluminium	0.01	mg/L	0.055	-	0.04	0.05	0.03	0.02	0.1	0.13	0.08	0.1	0.12	0.02	0.01
Arsenic	0.001	mg/L	0.024	-	<0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.002
Cadmium	0.0001	mg/L	0.0002	0.0055	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	0.001	mg/L	0.001	0.0044	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	0.001	mg/L	0.0014	0.0013	0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	0.001	mg/L	0.0034	0.0044	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	0.001	mg/L	1.9	-	0.043	0.044	0.036	0.07	0.115	0.126	0.082	0.052	0.107	0.153	0.15
Nickel	0.001	mg/L	0.011	0.07	0.002	<0.001	<0.001	<0.001	0.002	0.002	<0.001	<0.001	0.001	<0.001	<0.001

Selenium	0.01	mg/L	11	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silver	0.001	mg/L	0.00005	0.0014	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Zinc	0.005	mg/L	0.008	0.015	0.009	<0.005	<0.005	<0.005	0.009	0.01	0.005	<0.005	<0.005	<0.005	<0.005
Iron	0.05	mg/L	-	-	0.63	0.73	0.42	0.57	0.83	0.84	1.19	1.28	2.86	0.09	0.06
Mercury	0.0001	mg/L	0.0006	0.0004	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Recoverable Hydrocarbons (dependant on visual insp.)															
Naphthalene		mg/L	0.016	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH >C10-C16		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH >C10-C16 (F2)		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH >C16-C34		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH >C34-C40		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH C6-C10		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRH C6-C10 (F1)		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BTEX (dependent on visual insp.)															
Benzene		mg/L	0.95	0.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene		mg/L	0.08	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m&p-Xylenes		mg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene		mg/L	0.35	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene		mg/L	0.18	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes - Total		mg/L			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nutrients															
Total Phosphorus	0.01	mg/L	0.5	0.3	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.06	0.08	0.07	0.06	0.04
Phosphate (reactive phosphorus)	0.01	mg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Nitrogen	0.1	mg/L	0.5	0.3	0.3	0.3	0.1	0.2	0.4	0.5	1.1	1.3	1	0.1	0.3
Total Kjeldahl Nitrogen	0.1	mg/L			0.2	0.2	<0.1	0.1	0.3	0.4	1.1	1.3	1	<0.1	0.2
Nitrate	0.01	mg/L	0.7	-	0.07	0.08	0.1	0.07	0.09	0.08	<0.01	<0.01	<0.01	0.12	0.08
Nitrite	0.01	mg/L	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia	0.01	mg/L	0.9		0.02	0.02	<0.01	<0.01	0.08	0.06	<0.01	<0.01	<0.01	0.04	0.03
TSS															
Turbidity			50	10	9.7	8.8	2.9	3.4	6.4	8	8.1	20	19.2	9.8	11.1
TSS	5	mg/L	<40	<10	5	<5	<5	<5	<5	5	14	47	43	26	<5
Field Physical data															
Temperature		°C			16.17	16.93	17.61	17.62	19.32	19.41	16.37	15.91	16.81	20.37	20.41
pH		pH	6.5-8	6.5-8	6.45	6.51	6.58	6.42	6.5	6.52	5.97	6.25	6.12	7.62	7.35
pHmV		pHmV			16	13	9	17	13	13	42	27	34	-48	-34
ORPmV		ORPmV			-127	-98	-156	-158	-113	-122	-151	-142	-159	-21	-19
Conductivity		mS/cm	125-2,200	-	0.253	0.243	0.216	0.209	0.435	0.471	0.245	0.397	0.262	20.3	20.5
Turbidity		NTU	50	10	0	0	0	0	0	0	5.5	4.8	0	5.4	7.1
Dissolved Oxygen		mg/L	>5	>5	4.15	7.55	6.79	4.81	4.34	4.36	0	4.65	4.82	6.35	6.55
TDS		g/L			0.164	0.158	0.14	0.136	0.282	0.306	0.159	0.258	0.17	12.6	12.7

WCU = Upper Warrell Creek Upstream

WCD = Upper Warrell Creek Downstream

SCU = Stony Creek Upstream

SCD = Stony Creek Downstream

LWCU = Lower Warrell Creek Upstream

LWCD = Lower Warrell Creek Downstream

NRU = Nambucca River Upstream

NRD = Nambucca River Downstream

Table 2 - Noise Monitoring Results

Monthly Noise Monitoring Results May

Date	Time	Location	Rec ID	NCA	LAeq	LAFMAX	LAFMIN	LAF05	LAF10	LAF50	LAF90	Principal sources/ operations	Measurements exceeding criteria, plant/ operations causing	Corrective actions	NML	Notes
13/05/2015	1:42pm	Albert Drive	74	1	58.9	95.9	35.7	49.2	47.1	42.5	39.1	Background - birds, highway traffic	NA		50	
13/05/2015	2:06pm	Cockburns Lane	16	1	52.5	74.3	44.8	63.3	55	54.1	50.8	Backhoe reversing, clearers	Minor exceedence from backhoe reversing towards receiver beeper - temporary		50	
13/05/2015	2:35pm	Bald Hill Rd	197	3	56.4	81.5	43.5	57.2	54	49.9	46.9	Pump, excavator, reversing beeper			50	Temporary works
14/05/2015	9:42am	Letitia Rd	410	4	54.9	80.9	39.8	53.5	51.5	46.3	42.8	Highway traffic dominant, minimal construction activity			59	
14/05/2015	10:39am	Mattick Rd	442	6	52	74.9	43.2	56.5	54.4	49.3	46.1	PCY earthworks	Earthworks with reversing beeper (moxies, front loader, compactor, excavators, positrack)	Investigate construction impacts and whether the noise levels can be reduced	44	
14/05/2015	11:12am	Nursery Rd	415	4	53	68.7	46.4	56.1	55.3	52.5	49.9	Background - mower, highway traffic		NA	59	
15/05/2015	12:30pm	Wallace St	148	3	63.8	89.5	45.7	66.9	61.7	52.5	48.8	Background - industrial estate, private traffic	NA	NA	50	Construction visible, not audible

15/05/2015	2:15pm	Gumma Rd	383	3	65.4	89.6	38.6	69.8	63.9	47.9	44	Private traffic, reversing beeper (excavator across river)	Reversing beeper below NML - major noise from private traffic (trucks)	NA	50	

Table 3 - Dust monitoring results

Monthly Dust Monitoring Results - April/May 2015

		Unit	Levels of Concern	LOR								
DDG ID					DDG1	DDG2	DDG3	DDG4	DDG5	DDG6	DDG7	DDG A1	DDG A2
Apr-15	Start date of sampling				10/04/2015	10/04/2015	10/04/2015	10/04/2015	10/04/2015	10/04/2015	10/04/2015	10/04/2015	10/04/2015
	Finish date of sampling				12/05/2015	12/05/2015	12/05/2015	12/05/2015	12/05/2015	12/05/2015	12/05/2015	12/05/2015	12/05/2015
	Total Soluble Matter	g/m².month	N/A	0.1	2.1	2.1	1.3	1.7	5.8	2.9	2.6	----	----
		mg	N/A	1	39	39	25	33	110	54	49	----	----
	Total Insoluble Matter	g/m².month	4 or increase of 2	0.1	6.9	1.2	1.3	2	1.9	1	0.5	----	----
		mg	N/A	1	131	23	25	37	36	18	10	----	----
	Total Solids	g/m².month	N/A	0.1	9	3.3	2.6	3.7	7.7	3.9	3.1	----	----
		mg	N/A	1	170	62	50	70	146	72	59	----	----
	Arsenic	mg/L	0.001	0.001	----	----	----	----	----	----	----	0.003	<0.001
	Comments				Exceedance recorded - Monitor to be relocated to better representative location							Background - haven't started Arsenic rock excavation	

Table 4 – Groundwater Monitoring results

April 2015 Groundwater Monitoring

Location	Units	Groundwater Investigation Levels (GILs)	4BH010	4BH011	1BH04	4LDBH009	4LDBH011	4LDBH012	1BH10	1BH12	2BH12	4BH022	4BH021	4BH024	4LDBH015
Cut			6	6	7	7	8	9	9	10	10 (replicate)	11	11	12	12
Date of Sampling			4-May-15	4-May-15	5-May-15	5-May-15	4-May-15	4-May-15	4-May-15	5-May-15	5-May-15	4-May-15	5-May-15	4-May-15	4-May-15
Laboratory data															
Metals															
Aluminium	mg/L	0.055	0.170	DRY	0.105	0.005	0.007	0.056	<0.005	0.078	0.098	0.387	0.025	0.052	0.020
Arsenic	mg/L	0.024	0.001	DRY	0.009	<0.001	0.003	<0.001	<0.001	0.002	0.002	0.001	0.002	<0.001	0.004
Cadmium	mg/L	<LOR	<0.001	DRY	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.001	0.001	DRY	<0.001	<0.001	0.002	<0.001	<0.001	0.001	0.002	<0.001	<0.001	<0.001	0.001
Copper	mg/L	0.0014	0.182	DRY	0.002	0.065	0.001	0.008	<0.001	0.001	0.003	0.004	0.006	0.03	0.02
Lead	mg/L	0.0034	0.001	DRY	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	-	0.139	DRY	0.042	0.013	1.202	0.036	3.539	0.2	0.205	0.028	0.011	0.005	0.113
Nickel	mg/L	0.011	0.014	DRY	0.002	0.001	0.003	0.002	0.009	0.001	0.001	0.002	0.002	0.002	0.042
Selenium	mg/L	-	<0.002	DRY	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Silver	mg/L	<LOR	<0.001	DRY	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/L	0.008	0.039	DRY	0.033	0.007	0.002	0.088	0.023	0.008	0.034	0.019	0.016	0.015	0.046
Iron	mg/L		1.311	DRY	0.069	0.009	0.256	0.087	5.315	0.221	0.212	0.135	0.014	0.027	0.058
Mercury	mg/L	0.0006	<0.0005	DRY	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Antimony	mg/L	0.009	..	DRY	..	..	..	..	..	..	..	..	..	..	..
Beryllium	mg/L	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..
Boron	mg/L	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..
Cobalt	mg/L	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..
Molybdenum	mg/L	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..
Tin	mg/L	0.005	..	DRY	..	..	..	..	..	..	..	..	..	..	..
Inorganics															
Cyanide	ug/L or ppb	0.007	..	DRY	..	..	..	..	..	..	..	..	..	..	..
Total Recoverable Hydrocarbons (dependant on visual insp.)															
C10-C14 Fraction (µg/L or ppb)	ug/L or ppb	-	<50	DRY	<50	<50	**79**	<50	<50	**190**	**160**	<50	<50	<50	<50
C15-C28 Fraction (µg/L or ppb)	ug/L or ppb	-	<100	DRY	<100	<100	<100	<100	<100	**1900**	**1400**	<100	<100	<100	<100
C29-C36 Fraction (µg/L or ppb)	ug/L or ppb	-	<100	DRY	<100	<100	<100	<100	<100	**860**	**470**	<100	<100	<100	<100
C10-C16 Fraction (µg/L or ppb)	ug/L or ppb	-	<50	DRY	<50	<50	**93**	<50	<50	**1300**	**1200**	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (µg/L or ppb)	ug/L or ppb	-	**N/A**	DRY	..	..	..	..	..	**N/A**	**N/A**	**N/A**	..	..	..
C16-C34 Fraction (µg/L or ppb)	ug/L or ppb	-	<100	DRY	**100**	<100	<100	<100	<100	**1400**	**720**	<100	<100	<100	<100
C34-C40 Fraction (µg/L or ppb)	ug/L or ppb	-	<100	DRY	<100	<100	<100	<100	<100	**500**	**300**	<100	<100	<100	<100
BTEX (dependent on visual insp.)															
Benzene	ug/L or ppb	950	..	DRY	..	..	..	..	..	..	..	..	..	..	..
Toluene	ug/L or ppb	180	..	DRY	..	..	..	..	..	..	..	..	..	..	..
Ethylbenzene	ug/L or ppb	80	..	DRY	..	..	..	..	..	..	..	..	..	..	..

m+p-Xylene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
o-Xylene	ug/L or ppb	350	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Polynuclear Aromatic Hydrocarbons																
Acenaphthene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Acenaphthylene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Anthracene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Benz(a)anthracene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Benzo(a)pyrene	ug/L or ppb	0.2	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Benzo(b) & (k) flouranthene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Benzo(g.h.i)perylene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Chrysene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Dibenz(a.h)anthracene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Fluoranthene	ug/L or ppb	1.4	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Fluorene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Indeno(1.2.3-cd)pyrene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Naphthalene	ug/L or ppb	16	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Phenanthrene	ug/L or ppb	2	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Pyrene	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Sum of reported PAHs	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Pesticides																
Methoxychlor	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
4,4 DDT	ug/L or ppb	<LOR	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Organochlorin (OC) Pesticides	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Organophosphate (OP) Pesticides	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Polychlorinated Biphenyls (PCB's)	ug/L or ppb	-	..	DRY	..	..	..	..	..	..	..	..	..	..	..	..
Nutrients																
Total Phosphorus	mg/L	-	0.022	DRY	0.188	0.099	0.104	0.026	0.021	0.173	0.202	0.019	0.02	0.011	0.06	
Phosphate	mg/L	-	0.002	DRY	0.098	0.08	0.03	0.004	0.012	0.06	0.067	0.002	0.011	0.001	0.042	
Total Nitrogen	mg/L	-	0.418	DRY	1.16	0.984	2.859	1.559	0.88	3.794	4.124	0.493	0.09	0.286	0.278	
Total Kjeldahl Nitrogen	mg/L	-	0.411	DRY	0.6	0.285	2.798	0.212	0.549	3.766	4.052	0.07	0.011	0.057	0.173	
Nitrate	mg/L	-	0.003	DRY	0.446	0.686	0.06	1.344	0.321	0.025	0.066	0.421	0.079	0.228	0.103	
Nitrite	mg/L	-	0.004	DRY	0.114	0.013	0.001	0.003	0.01	0.003	0.006	0.002	<0.001	0.001	0.002	
Ammonia	mg/L	-	0.116	DRY	0.54	0.193	0.662	0.068	0.301	0.357	0.34	0.035	0.005	0.008	0.01	
Major anions																
Chloride	mg/L	-	1,095	DRY	12	17	164	18	879	310	288	31	16	23	101	
Sulfate	mg/L	-	3,285	DRY	35	50	492	53	2,637	930	864	93	47	69	303	
Bicarbonate	mg/L	-	70	DRY	40	4	440	60	200	175	170	9	48	6	55	
Major cations																
Sodium	mg/L	-	580	DRY	25	11	241	16	330	230	226	9	18	13	136	
Potassium	mg/L	-	2	DRY	4	0	2	4	18	4	4	1	1	0	1	
Calcium	mg/L	-	5.55	DRY	0.83	0.45	76.6	127	239	27.2	27.7	3.43	8.01	0.29	3.09	
Magnesium	mg/L	-	90	DRY	1.8	0.79	28.8	5.06	85.2	18	17.9	2.02	3.73	1.51	3.05	
Physical																
Total Dissolved Solids	mg/L	-	..	DRY	106.7	66.7	960	540	2746.7	780	773.3	73.3	116.7	73.3	466.7	
TSS	mg/L	-	..	DRY	24	27	13	59	63	6	25	24	10	102	25	
Turbidity	NTU	-		DRY												
Conductivity	dS/m	-	3.76	DRY	0.155	0.088	1.619	0.738	3.685	1.402	1.41	0.097	0.158	0.096	0.722	
pH		-	6.06	DRY	6.03	5.06	6.95	6.58	6.59	6.71	6.75	5.69	6.24	5.32	6.11	
Field Physical data																
Temperature	°C	-	21.53	DRY	22.83	22.31	22.47	22.36	22.24	21.41	-	20.44	19.75	20.9	20.89	
pH	pH	-	7.35	DRY	7.37	7.22	7.83	7.73	7.73	7.66	-	7.17	7.56	7.21	7.34	
Conductivity	mS/cm	-	1.87	DRY	0.169	0.164	1.51	0.689	3.52	1.31	-	0.93	0.144	0.109	0.708	
Turbidity	NTU	-	73.8	DRY	5.8	8.3	31.5	27.7	13.7	5.3	-	6.8	3.7	7.3	2.3	

Dissolved Oxygen	mg/L	-	1.85	DRY	2.25	115%	7.25	3.07	1.9	7.36	-	5.09	1.85	2.6	1.46

April 2015 Groundwater Monitoring

Location	Units	Groundwater Investigation Levels (GILs)	1BH49	4BH058	4BH065	4BH066	5BH066	4BH064
Cut			17	17	28 / Landfill	28 / Landfill	28 / Landfill (replicate)	28/Landfill
Date of Sampling			4-May-15	4-May-15	4-May-15	5-May-15	5-May-15	5-May-15
Laboratory data								
Metals								
Aluminium	mg/L	0.055	<0.005	<0.005	0.519	..	..	DRY
Arsenic	mg/L	0.024	0.001	<0.001	0.001	..	..	DRY
Cadmium	mg/L	<LOR	<0.001	<0.001	<0.001	..	..	DRY
Chromium	mg/L	0.001	<0.001	<0.001	0.001	..	..	DRY
Copper	mg/L	0.0014	0.001	0.004	0.021	..	..	DRY
Lead	mg/L	0.0034	<0.001	<0.001	<0.001	..	..	DRY
Manganese	mg/L	-	0.256	0.053	0.037	..	..	DRY
Nickel	mg/L	0.011	0.003	0.003	0.002	..	..	DRY
Selenium	mg/L	-	<0.002	<0.002	<0.002	..	..	DRY
Silver	mg/L	<LOR	<0.001	<0.001	<0.001	..	..	DRY
Zinc	mg/L	0.008	0.016	0.007	0.007	..	..	DRY
Iron	mg/L		0.024	0.03	0.922	..	..	DRY
Mercury	mg/L	0.0006	<0.0005	<0.0005	<0.0005	..	..	DRY
Antimony	mg/L	0.009	..	..	<0.001	0.001	0.001	DRY
Beryllium	mg/L	-	..	..	<0.001	<0.001	<0.001	DRY
Boron	mg/L	-	..	..	0.034	0.094	0.09	DRY
Cobalt	mg/L	-	..	..	0.002	0.005	0.004	DRY
Molybdenum	mg/L	-	..	..	0.001	<0.001	<0.001	DRY
Tin	mg/L	0.005	..	..	<0.001	<0.001	<0.001	DRY
Inorganics								
Cyanide	ug/L or ppb	0.007	..	..	<0.004	<0.004	<0.004	DRY
Total Recoverable Hydrocarbons (dependant on visual insp.)								
C10-C14 Fraction (µg/L or ppb)	ug/L or ppb	-	<50	<50	<50	<50	<50	DRY
C15-C28 Fraction (µg/L or ppb)	ug/L or ppb	-	<100	<100	<100	<100	<100	DRY
C29-C36 Fraction (µg/L or ppb)	ug/L or ppb	-	<100	<100	<100	<100	<100	DRY
C10-C16 Fraction (µg/L or ppb)	ug/L or ppb	-	<50	<50	<50	<50	<50	DRY
C10-C16 less Naphthalene Fraction (µg/L or ppb)	ug/L or ppb	-	..	..	<50	<50	<50	DRY
C16-C34 Fraction (µg/L or ppb)	ug/L or ppb	-	<100	<100	<100	<100	<100	DRY
C34-C40 Fraction (µg/L or ppb)	ug/L or ppb	-	<100	<100	<100	<100	<100	DRY

BTEX (dependent on visual insp.)								
Benzene	ug/L or ppb	950	..	..	<1	<1	<1	DRY
Toluene	ug/L or ppb	180	..	..	<1	<1	<1	DRY
Ethylbenzene	ug/L or ppb	80	..	..	<1	<1	<1	DRY
m+p-Xylene	ug/L or ppb	-	..	..	<2	<2	<2	DRY
o-Xylene	ug/L or ppb	350	..	..	<1	<1	<1	DRY
Polynuclear Aromatic Hydrocarbons								
Acenaphthene	ug/L or ppb	-	..	..	<1	<1	<1	DRY
Acenaphthylene	ug/L or ppb	-	..	..	<1	<1	<1	DRY
Anthracene	ug/L or ppb	-	..	..	<1	<1	<1	DRY
Benz(a)anthracene	ug/L or ppb	-	..	..	<1	<1	<1	DRY
Benzo(a)pyrene	ug/L or ppb	0.2	..	..	<5	<5	<5	DRY
Benzo(b) & (k) flouranthene	ug/L or ppb	-	..	..	<2	<2	<2	DRY
Benzo(g.h.i)perylene	ug/L or ppb	-	..	..	<1	<1	<1	DRY
Chrysene	ug/L or ppb	-	..	..	<1	<1	<1	DRY
Dibenz(a.h)anthracene	ug/L or ppb	-	..	..	<1	<1	<1	DRY
Fluoranthene	ug/L or ppb	1.4	..	..	<1	<1	<1	DRY
Fluorene	ug/L or ppb	-	..	..	<1	<1	<1	DRY
Indeno(1.2.3-cd)pyrene	ug/L or ppb	-	..	..	<1	<1	<1	DRY
Naphthalene	ug/L or ppb	16	..	..	<1	<1	<1	DRY
Phenanthrene	ug/L or ppb	2	..	..	<1	<1	<1	DRY
Pyrene	ug/L or ppb	-	..	..	<1	<1	<1	DRY
Sum of reported PAHs	ug/L or ppb	-	..	..	<2	<2	<2	DRY
Pesticides								
Methoxychlor	ug/L or ppb	-	..	..	<0.2	<0.2	<0.2	DRY
4,4 DDT	ug/L or ppb	<LOR	..	..	<0.2	<0.2	<0.2	DRY
Organochlorin (OC) Pesticides	ug/L or ppb	-	..	..	<0.2	<0.2	<0.2	DRY
Organophosphate (OP) Pesticides	ug/L or ppb	-	..	..	<0.2	<0.2	<0.2	DRY
Polychlorinated Biphenyls (PCB's)	ug/L or ppb	-	..	..	<2	<2	<2	DRY
Nutrients								
Total Phosphorus	mg/L	-	0.011	0.014	0.038	0.24	0.23	DRY
Phosphate	mg/L	-	0.005	0.001	0.013	0.031	0.039	DRY
Total Nitrogen	mg/L	-	0.135	0.13	0.387	0.9	0.982	DRY
Total Kjeldahl Nitrogen	mg/L	-	0.059	0.095	0.361	0.221	0.386	DRY

Nitrate	mg/L	-	0.076	0.035	0.021	0.664	0.583	DRY
Nitrite	mg/L	-	<0.001	<0.001	0.005	0.015	0.013	DRY
Ammonia	mg/L	-	0.007	0.013	0.052	0.012	0.038	DRY
Major anions								
Chloride	mg/L	-	16	12	43	..	..	DRY
Sulfate	mg/L	-	48	36	128	..	..	DRY
Bicarbonate	mg/L	-	24	52	72	52	48	DRY
Major cations								
Sodium	mg/L	-	9	45	34	..	..	DRY
Potassium	mg/L	-	1	0	2	..	..	DRY
Calcium	mg/L	-	2.8	1.21	16	..	..	DRY
Magnesium	mg/L	-	6.01	1.9	4.07	..	..	DRY
Physical								
Total Dissolved Solids	mg/L	-	106.7	146.7	200	..	..	DRY
TSS	mg/L	-	61	23	344	..	..	DRY
Turbidity	NTU	-						DRY
Conductivity	dS/m	-	0.128	0.241	0.273	0.361	0.326	DRY
pH		-	5.65	6.07	6.26	6.16	6.27	DRY
Field Physical data								
Temperature	°C	-	20.68	20.49	20.35	19.68	-	DRY
pH	pH	-	7.42	7.3	6.91	7.68	-	DRY
Conductivity	mS/cm	-	0.15	2.18	0.084	0.263	-	DRY
Turbidity	NTU	-	6.4	42	252	103	-	DRY
Dissolved Oxygen	mg/L	-	1.98	2.96	4.7	2.79	-	DRY