



Warrell Creek to Nambucca Heads – Pacific Highway Upgrade Project

ENVIRONMENT PROTECTION AUTHORITY MONTHLY REPORT

■ June 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	2
1.1 Description of Works.....	2
1.2 Consultation Activities.....	3
2. Weather	5
2.1 Discussion.....	5
3. Surface Water Monitoring	9
4. Sediment Basin Water Monitoring	10
5. Noise Monitoring	11
6. Vibration Monitoring	11
7. Dust Monitoring	11
8. Groundwater Monitoring	11
9. Complaints	13
9.1 Summary of Complaints for the month.....	13
10. Non-Compliance	13
10.1 Summary of Non-compliances.....	13

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 June 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;
- 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;
- Production blasting;
- Commencement of piling including driven piling;
- Continuing bridge works including temporary work platforms;
- Earthworks through the flying fox area;
- 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 June 2015 included various community letterbox drop notifications and the following:

Groups	Date	Key Topics
Environmental Review Group	16/06/15	Construction Progress, Design Update, Upcoming works, EWMS discussion, Environmental Update, Monitoring update.
Local community	01/07/15	Controlled blasting – Community Briefing Session

Other consultation activities:

- Pre-consultation with affected residents regarding temporary stockpiles
- Consultation ongoing with property owners regarding proposed property adjustments
- Consultation with property owners regarding proposed utility adjustments
- Consultation with affected residents regarding concrete crushing activities
- Consultation with affected residents about construction impacts
- Consultation with residents within 200m of the controlled blasting zones
- 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)
- Consultation with affected residents about Out Of Hours Works

At House Noise Treatments

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

Upcoming community and stakeholder activities for July 2015

- Consultation with residents regarding increasing the blast limits
- 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

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- Letterbox drop of Quarterly 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 June 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
01/06/15 – 30/06/15	21mm	Northern Compound
01/06/15 – 30/06/15	17mm	Albert Drive Compound

The site experienced a total of 14 rain days throughout the month of June 2015.

During June, rainfall received on site was lower than the June monthly average of 139.6mm. 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
1/06/2015	9:00:00	4.6
2/06/2015	9:00:00	0.2
3/06/2015	9:00:00	0
4/06/2015	9:00:00	0
5/06/2015	9:00:00	0.2
6/06/2015	9:00:00	0.6
7/06/2015	9:00:00	0.6
8/06/2015	9:00:00	0
9/06/2015	9:00:00	0
10/06/2015	9:00:00	0
11/06/2015	9:00:00	4.2
12/06/2015	9:00:00	0
13/06/2015	9:00:00	0.4
14/06/2015	9:00:00	0.2
15/06/2015	9:00:00	0.4

16/06/2015	9:00:00	2.8
17/06/2015	9:00:00	0.4
18/06/2015	9:00:00	1.2
19/06/2015	9:00:00	0
20/06/2015	9:00:00	0
21/06/2015	9:00:00	0
22/06/2015	9:00:00	0
23/06/2015	9:00:00	0
24/06/2015	9:00:00	0
25/06/2015	9:00:00	0
26/06/2015	9:00:00	1
27/06/2015	9:00:00	0.2
28/06/2015	9:00:00	0
29/06/2015	9:00:00	0
30/06/2015	9:00:00	0

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

SiteName: Northern Compound		
Date	Time	TOTAL Rain Gauge
1/06/2015	9:00:00	4
2/06/2015	9:00:00	0
3/06/2015	9:00:00	0
4/06/2015	9:00:00	0
5/06/2015	9:00:00	0.2
6/06/2015	9:00:00	0.6
7/06/2015	9:00:00	2.8
8/06/2015	9:00:00	0.2
9/06/2015	9:00:00	0.2
10/06/2015	9:00:00	0
11/06/2015	9:00:00	6.2
12/06/2015	9:00:00	0
13/06/2015	9:00:00	1.6
14/06/2015	9:00:00	0.4
15/06/2015	9:00:00	1.2
16/06/2015	9:00:00	0.2
17/06/2015	9:00:00	0.2
18/06/2015	9:00:00	1.6
19/06/2015	9:00:00	0
20/06/2015	9:00:00	0
21/06/2015	9:00:00	0
22/06/2015	9:00:00	0
23/06/2015	9:00:00	0

24/06/2015	9:00:00	0
25/06/2015	9:00:00	0
26/06/2015	9:00:00	1
27/06/2015	9:00:00	0
28/06/2015	9:00:00	0.2
29/06/2015	9:00:00	0.2
30/06/2015	9:00:00	0.2

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

Observations from Smoky Cape Lighthouse.

Smoky Cape Daily Summaries

June 2015

Date	Min to 9am	Anomaly	Max from 9am	Anomaly	Rain to 9am
	°C	°C	°C	°C	mm
Mon 01/06/2015	12.2	+0.0	18.9	-0.5	12.4
Tue 02/06/2015	8.1	-4.1	16.8	-2.6	0.0
Wed 03/06/2015	9.6	-2.6	18.8	-0.6	0.0
Thu 04/06/2015	10.8	-1.4	20.3	+0.9	0.0
Fri 05/06/2015	11.0	-1.2	14.5	-4.9	0.0
Sat 06/06/2015	10.2	-2.0	20.0	+0.6	0.4
Sun 07/06/2015	13.8	+1.6	21.9	+2.5	7.2
Mon 08/06/2015	15.6	+3.4	22.1	+2.7	0.0
Tue 09/06/2015	16.0	+3.8	22.6	+3.2	0.0
Wed 10/06/2015	13.6	+1.4	22.1	+2.7	0.0
Thu 11/06/2015	13.5	+1.3	17.8	-1.6	5.8
Fri 12/06/2015	13.2	+1.0	16.7	-2.7	0.2
Sat 13/06/2015	13.0	+0.8	18.0	-1.4	4.2
Sun 14/06/2015	14.0	+1.8	21.6	+2.2	0.2
Mon 15/06/2015	14.3	+2.1	19.0	-0.4	1.6
Tue 16/06/2015	14.5	+2.3	19.0	-0.4	5.6
Wed 17/06/2015	15.6	+3.4	19.2	-0.2	9.4
Thu 18/06/2015	14.9	+2.7	20.9	+1.5	1.4
Fri 19/06/2015	13.3	+1.1	18.8	-0.6	0.0
Sat 20/06/2015	10.9	-1.3	17.3	-2.1	0.0
Sun 21/06/2015	10.3	-1.9	18.9	-0.5	2.0
Mon 22/06/2015	11.5	-0.7	19.5	+0.1	0.0
Tue 23/06/2015	12.5	+0.3	21.4	+2.0	0.0
Wed 24/06/2015	14.4	+2.2	20.3	+0.9	0.0
Thu 25/06/2015	13.2	+1.0	19.4	+0.0	0.0

Date	Min to 9am °C	Anomaly °C	Max from 9am °C	Anomaly °C	Rain to 9am mm
Fri 26/06/2015	12.6	+0.4	18.2	-1.2	21.4
Sat 27/06/2015	13.1	+0.9	21.8	+2.4	0.4
Sun 28/06/2015	10.9	-1.3	20.7	+1.3	0.0
Mon 29/06/2015	12.3	+0.1	20.9	+1.5	0.0
Tue 30/06/2015	13.5	+1.3	21.7	+2.3	0.0

3. Surface Water Monitoring

Sampling was undertaken by ACCIONA (Pacífico) on the 3rd June during a dry period. Field tests were taken. The results are available in Appendix A. No wet events were recorded in June.

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

- Upper Warrell Creek downstream (background ranges from 1.5mg/L – 7.1mg/L);
- Stoney Creek downstream (background ranges from 4.4mg/L to 9.7mg/L);
- 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 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 the locations noted above.

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 except Nambucca River during the dry monitoring period. The low pH levels recorded are consistent with the baseline pre-construction monitoring undertaken.

A high turbidity reading was also recorded at Gumma Wetlands. This location has variable background readings ranging from 2.4 – 951 ntu's.

4. Sediment Basin Water Monitoring

Water was released from commissioned sediment basins and sediment traps between the 19th June – 25th June after small rainfall events during the month. 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
9/06/2015	B56.9	N	7.15	26.7		270	Under construction - not yet taking water from site
10/06/2015	B49.67	N	7.76			50	Land irrigation (IR5)
17/06/2015	B55.9	N	6.93	11		200	Under construction - not yet taking water from site
19/06/2015	B56.9	N	6.82	13.4		240	Under construction - not yet taking water from site
19/06/2015	B56.5	N	7.15				Land irrigation (IR3)
22/06/2015	B56.7	N	8.3	26.3		490	Under construction - not yet taking water from site
22/06/2015	B56.5	N	7.23			110	Land irrigation (IR3)
23/06/2015	B54.3	N	7.3	14.7		20	Under construction - not yet taking water from site
25/06/2015	B42.3	N	6.82	8.5		42	Under construction - not yet taking

								water from site
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Green = Water released from sediment trap.

5. Noise Monitoring

Monthly routine construction noise monitoring was undertaken on the 23rd and 24th June 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 Albert Drive were marginally elevated above the Noise Management Levels. The levels recorded are consistent with the predicted modelled levels.

6. Vibration Monitoring

No vibration monitoring was undertaken in June 2015.

7. Dust Monitoring

Dust deposition gauges (DDG) were placed at nearby sensitive receivers from the 12/05/2015 to the 09/06/2015. DDG results are available in Appendix A.

An elevated level of 8.1mg/m²/month was recorded at dust deposition gauge DDG3, which is located at a sensitive receiver near the vicinity of Scotts Head Road and the Pacific Motorway. It was noted numerous times during the monitoring period that sediment was being tracked by trucks exiting the Quarry on to the Motorway resulting in dust generation by passing traffic. This is considered to be a contributing factor to the elevated dust level at this location. Project works in the vicinity of DDG3 include the excavation of clean water drains, increasing the embankment adjacent to Scotts Head Road, and installation of bunds and spillways. The clean water drains and embankment have since been secured with geofabric, reducing the amount of exposed ground and potential dust generation.

An elevated level of 11.8mg/m²/month was recorded at DDG5 which is located at a sensitive receiver adjacent to Gumma Road. Works that occurred in this area include the delivery and spreading of rock in preparation of wick drain installation which commenced on 9 June. No topsoil stripping has or will occur in this area as it is located within the flood plain. It is noted that the DDG5 is in close proximity to the Council compound which contains stockpiles and unsealed roads. Mitigation measures being utilised on site to reduce the level of dust include water trucks, stabilisation of exposed soil areas with fabric, jute and/or grass cover. 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 (Pacífico) have undertaken groundwater monitoring on the 30/05/15 and the 18/06/15. 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 Pacífico to assess construction impacts.

9. Acoustic Investigations

No acoustic investigations were undertaken in June 2015.

10. Complaints

9.1 Summary of Complaints for the month

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

A complaint was received on Tuesday 2 June via a site engineer from a resident of Bellevue Drive (Macksville) regarding vibrations being felt throughout his house. The complainant visually linked the vibrations to the vibrating roller being used on Nursery Road. Several attempts were made within the same day to contact the resident on the number he provided in order to understand whether the vibrations were still occurring. The resident was successfully reached and met on Thursday 18 June. He advised that the vibrations had been felt on two occasions during the week commencing Monday 1 June without any other occurrences since then. The community team invited the complainant to call the project's free toll number in the event of a new occurrence, in which case Pacifico would investigate the possibility of installing a vibration monitor on the resident's property to try establish a link to the vibrations. No further concerns were raised about the vibrations during following interactions.

A complaint was received on Friday 5 June from a resident of Old Coast Road (Macksville) regarding dust having contaminated his water tanks. After several attempts were made to contact the complainant, a meeting was successfully scheduled for Wednesday 17 June at 5:45pm to discuss Pacifico's initiative to install first flush systems on water tanks within 500 metres of the northern batch plant. The community team is in regular contact with the complainant to maintain a good working relationships and address all concerns in a timely and structured manner. The complainant has been really cooperative since meeting with the community team and hasn't expressed any further discontent to date.

11. Non-Compliance

10.1 Summary of Non-compliances

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

Appendix A – Monitoring Results

Table 1 - Surface Water Sampling Results – 1 dry

3 June
2015 -
Dry
Event

Weather: Overcast With Showers

Low Tide: 2:37PM

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	ANZECC 2000 95% species protected		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Upstream	Downstream	Upstream	Downstream
Freshwater / Estuarine					Freshwater	Freshwater	Freshwater	Freshwater	Estuarine	Estuarine	Freshwater	Freshwater	Freshwater	Estuarine	Estuarine
Date of Sampling					3-Jun-15	3-Jun-15	3-Jun-15	3-Jun-15	3-Jun-15	3-Jun-15	3-Jun-15	3-Jun-15	3-Jun-15	3-Jun-15	3-Jun-15
Time of Sampling			Freshwater	Saline	11:22 AM	11:06 AM	10:44 AM	10:20 AM	11:40 AM	11:44 AM	1:31 PM	1:17 PM	1:24 PM	12:41 PM	12:56 PM
<i>Field Physical data</i>															
Temperature		°C			14.22	14.61	14.16	13.59	16.52	16.56	18.13	16.14	14.56	19.02	19.22
pH		pH	6.5-8	6.5-8	6.45	6.45	6.66	6.42	6.38	6.34	5.61	6.47	6.08	7.41	7.81
pHmV		pHmV			-5	-5	-17	-4	-1	1	43	-6	16	-59	-82
ORPmV		ORPmV			280	265	188	171	264	267	234	185	175	305	207
Conductivity		mS/cm	125-2,200	-	0.289	-0.277	0.241	0.232	0.556	0.558	0.377	0.423	0.12	34.9	34.6
Turbidity		NTU	50	10	9.1	5.8	0	0.1	6.5	3.4	180	171	7.5	9.3	16.2
Dissolved Oxygen		mg/L	>5	>5	5.36	4.73	7.84	4.29	4.12	4.33	0.36	0.45	0	6.56	7.31
TDS		g/L			0.18	0.18	0.156	0.151	0.356	0.357	0.245	0.275	0.203	21.3	21.1

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 June 2015

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
23/06/2015	4:40 PM	Albert Drive	74	1	57.7	77.6	47.1	60.5	59.2	55.3	52.2	Dozer tracking, excavator tracking / excavating	Dozer + excavator working at same time	Noise levels consistent with predictions for fill and compaction works	50	
23/06/2015	3:02 PM	Cockburns Lane	16	1	56.3	70.8	48.1	60.8	58.9	54.8	51.8	Moxy / excavator movement	Moxy/ excavator moving, loader reversing	Noise levels consistent with predictions for topsoil strip works.	50	
24/06/2015	8:43 AM	Bald Hill Rd	197	3	59	81	46.6	60.7	57.9	52.3	49.5	Backhoe digging/rolling	Backhoe	Backhoe only working temporarily near sensitive receiver.	50	
24/06/2015	9:37 AM	Letitia Rd	410	4	52.2	68.3	43.5	54.5	53.1	57.5	47.7	Drill rig on truck, birds	NA	NA	59	
24/06/2015	10:00 AM	Mattick Rd	442	6	44.2	66.2	37.5	47.4	46.3	42.5	40	LV movement at northern compound	NA	NA	44	
24/06/2015	9:15 AM	Nursery Rd	415	4	50.1	58.8	43.4	53.9	52.7	49.3	46.3	Highway traffic	NA	NA	59	Background - construction not audible/visible
23/06/2015	3:40 PM	Wallace St	148	3	61.1	81.9	43.4	66.4	62.9	54.3	48.8	Local roads + highway traffic, birds	NA	NA	50	Background - Construction visible - not audible
23/06/2015	4:08 PM	Gumma Rd	383	3	65.4	86.3	45.4	72.9	70.2	53.8	48.3	Private traffic, birds	NA	Truck reversing only briefly dominant noise, minimal exceedence (52- 54)	50	Background - Construction visible across river - no exceedences

Table 3 - Dust monitoring results



Monthly Dust Monitoring Results - May/June 2015

				Unit	Levels of Concern	LOR	DDG1	DDG2	DDG3	DDG4	DDG5	DDG6	DDG7	DDG8	DDG A1	DDG A2	
May-15	DDG ID																
	Start date of sampling																
	Finish date of sampling																
	Total Soluble Matter	g/m ² .month	N/A	0.1	1.8	0.5	1.4	0.4	0.6	0.2	1.9	3.6	----	----			
		mg	N/A	1	30	8	23	6	9	3	32	44	----	----			
	Total Insoluble Matter	g/m ² .month	4 or increase of 2	0.1	0.4	1	8.1	1.6	11.8	1.4	0.4	0.6	----	----			
		mg	N/A	1	7	16	133	27	194	23	7	7	----	----			
Total Solids	g/m ² .month	N/A	0.1	2.2	1.5	9.5	2	12.4	1.6	2.3	4.2	----	----				
	mg	N/A	1	37	24	156	33	203	26	39	51	----	----				
Arsenic	mg/L	0.001	0.001	----	----	----	----	----	----	----	----	<0.001	<0.001				
Comments						Exceedence		Exceedence									

Table 4 – Groundwater Monitoring results



May 2015 Groundwater Monitoring (Geolink)

Location	Units	Groundwater Investigation Levels (GILs)	4BH007	4BH008	4BH010	4BH011	4BH021	4BH022	4BH024	4LDBH015	5LDBH015	4BH037	4BH038	1BH49	4BH058	4BH061	4BH062
Cut/Fill			4	4	6	6	11	11	12	12	12	15	15	17	17	26	26
Date of Sampling			30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15
Comments			DRY	DRY		DRY						Unable to obtain sample				DRY	DRY
Laboratory data																	
Metals																	
Aluminium	mg/L	0.055	DRY	DRY	0.458	DRY	0.033	0.002	0.011	0.057	0.061	-	0.001	0.001	0.005	DRY	DRY
Arsenic	mg/L	0.024	DRY	DRY	0.003	DRY	0.001	<0.001	<0.001	0.009	0.011	-	0.001	0.001	<0.001	DRY	DRY
Cadmium	mg/L	<LOR	DRY	DRY	<0.001	DRY	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	DRY	DRY
Chromium	mg/L	0.001	DRY	DRY	0.005	DRY	<0.001	<0.001	<0.001	0.003	0.003	-	<0.001	<0.001	<0.001	DRY	DRY
Copper	mg/L	0.0014	DRY	DRY	0.082	DRY	0.004	<0.001	0.166	0.032	0.028	-	0.005	0.001	0.004	DRY	DRY
Lead	mg/L	0.0034	DRY	DRY	0.002	DRY	<0.001	<0.001	<0.001	0.001	0.001	-	<0.001	<0.001	<0.001	DRY	DRY
Manganese	mg/L	-	DRY	DRY	0.091	DRY	0.006	0.779	0.011	0.204	0.215	-	1.582	0.283	0.080	DRY	DRY
Nickel	mg/L	0.011	DRY	DRY	0.012	DRY	0.001	0.001	0.004	0.078	0.081	-	0.006	0.003	0.003	DRY	DRY
Selenium	mg/L	-	DRY	DRY	<0.010	DRY	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010	DRY	DRY
Silver	mg/L	<LOR	DRY	DRY	<0.001	DRY	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	DRY	DRY
Zinc	mg/L	0.008	DRY	DRY	0.037	DRY	0.005	0.003	0.031	0.039	0.037	-	0.006	0.009	0.013	DRY	DRY
Iron	mg/L	-	DRY	DRY	2.035	DRY	0.038	4.802	0.006	1.054	1.524	-	0.022	1.911	0.014	DRY	DRY
Mercury	mg/L	0.0006	DRY	DRY	<0.0005	DRY	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	DRY	DRY
Total Recoverable Hydrocarbons (dependant on visual insp.)																	
C10-C14 Fraction	ug/L or ppb	-	DRY	DRY	<50	DRY	<50	<50	<50	<50	<50	-	<50	<50	<50	DRY	DRY
C15-C28 Fraction	ug/L or ppb	-	DRY	DRY	<100	DRY	<100	<100	<100	<100	<100	-	<100	<100	<100	DRY	DRY
C29-C36 Fraction	ug/L or ppb	-	DRY	DRY	<100	DRY	<100	<100	<100	<100	<100	-	<100	<100	<100	DRY	DRY
C10-C16 Fraction	ug/L or ppb	-	DRY	DRY	<50	DRY	<50	<50	<50	<50	<50	-	<50	<50	<50	DRY	DRY
C16-C34 Fraction	ug/L or ppb	-	DRY	DRY	<100	DRY	<100	<100	<100	<100	<100	-	<100	<100	<100	DRY	DRY
C34-C40 Fraction	ug/L or ppb	-	DRY	DRY	<100	DRY	<100	<100	<100	<100	<100	-	<100	<100	<100	DRY	DRY
Nutrients																	
Total Phosphorus	mg/L	-	DRY	DRY	0.022	DRY	0.016	0.035	0.006	0.122	0.140	-	0.094	0.029	0.023	DRY	DRY
Phosphate	mg/L	-	DRY	DRY	0.011	DRY	0.015	0.017	0.007	0.037	0.050	-	0.034	0.010	0.007	DRY	DRY
Total Nitrogen	mg/L	-	DRY	DRY	0.772	DRY	0.075	0.282	0.337	0.643	0.488	-	1.023	0.245	0.193	DRY	DRY

Total Kjeldahl Nitrogen	mg/L	-	DRY	DRY	0.756	DRY	0.038	0.267	0.060	0.630	0.474	-	0.527	0.239	0.182	DRY	DRY
Nitrate	mg/L	-	DRY	DRY	<0.005	DRY	0.037	0.009	0.273	0.006	<0.005	-	0.489	<0.005	0.007	DRY	DRY
Nitrite	mg/L	-	DRY	DRY	0.019	DRY	<0.001	0.006	0.004	0.007	0.014	-	0.007	0.003	0.004	DRY	DRY
Ammonia	mg/L	-	DRY	DRY	0.245	DRY	0.007	0.168	0.008	0.005	0.056	-	<0.005	0.007	0.031	DRY	DRY
Major anions																	
Chloride	mg/L	-	DRY	DRY	450.000	DRY	13.5	15.400	18.900	74.700	80.900	-	2,261.000	13.000	14.400	DRY	DRY
Sulfate	mg/L	-	DRY	DRY	37.200	DRY	9.96	11.940	9.600	114.900	115.500	-	2,694.000	18.840	25.020	DRY	DRY
Bicarbonate	mg/L	-	DRY	DRY	90.000	DRY	20	72.000	10.000	55.000	50.000	-	700.000	32.000	17.000	DRY	DRY
Major cations																	
Sodium	mg/L	-	DRY	DRY	278.000	DRY	13.2	17.300	11.900	103.000	106.000	-	1,668.000	9.160	51.900	DRY	DRY
Potassium	mg/L	-	DRY	DRY	1.680	DRY	0.57	1.910	0.400	1.960	1.650	-	87.700	1.010	0.570	DRY	DRY
Calcium	mg/L	-	DRY	DRY	3.970	DRY	1.57	17.000	0.390	7.550	6.160	-	269.000	2.360	1.210	DRY	DRY
Magnesium	mg/L	-	DRY	DRY	31.800	DRY	1.27	4.000	1.370	3.100	2.890	-	505.000	5.960	2.170	DRY	DRY
Physical																	
pH		-	DRY	DRY	6.140	DRY	5.74	6.220	5.760	6.760	6.530	-	7.300	5.940	5.720	DRY	DRY
Conductivity	dS/m	-	DRY	DRY	1.800	DRY	0.102	0.232	0.095	0.604	0.626	-	11.690	0.130	0.130	DRY	DRY
Total Dissolved Solids	mg/L	-	DRY	DRY	955.000	DRY	80	145.000	55.000	390.000	405.000	-	8,135.000	105.000	85.000	DRY	DRY
Field Physical data																	
Depth to standing water level from TOC	m	-	DRY	DRY	13.7	DRY	6.9	14.8	3.33	9.57	9.57	-	0.73	14.38	7.8	-	-
pH	pH	-	DRY	DRY	7.77	DRY	7.71	7.56	7.71	7.75	7.75	-	7.45	7.83	7.61	-	-
Conductivity	mS/cm	-	DRY	DRY	2.27	DRY	0.097	0.144	0.098	0.678	0.678	-	10.4	0.152	0.166	-	-
Temperature	°C	-	DRY	DRY	19.7	DRY	19.7	19.4	20.62	20.12	20.12	-	19.68	18.84	18.88	-	-
Dissolved Oxygen	mg/L	-	DRY	DRY	4.52	DRY	4.3	4.33	5.5	2.49	2.49	-	5.97	2.88	10.38	-	-
Turbidity	NTU	-	DRY	DRY	32.2	DRY	6.8	62.5	4.8	16.3	16.3	-	68.9	6.4	9.6	-	-



June 2015 Groundwater Monitoring (Geolink)

Location	Units	Groundwater Investigation Levels (GILs)	4BH007	4BH008	4BH010	4BH011	4BH021	4BH022	4BH024	4LDBH015	4BH037	4BH038	1BH49	4BH058	4BH061	4BH062	
			Cut 4	Cut 4	Cut 6	Cut 6	Cut 11	Cut 11	Cut 12	Cut 12	Fill 15	Fill 15	Cut 17	Cut 17	Cut 26	Cut 26	
Cut/Fill																	
Date of Sampling			30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	30-May-15	
Comments			DRY	DRY		DRY					Unable to obtain sample				DRY	DRY	
Field Physical data																	
Depth to standing water level from TOC	m	-	-	-	13.98	-	7.2	14.8	7.2	9.7	-	0.38	14.82	10.37	-	-	
pH	pH	-	-	-	5.28	-	6.72	5.86	6.31	6.2	-	7.21	6.64	5.65	-	-	
Conductivity	mS/cm	-	-	-	4.63	-	0	0.182	0.28	0.656	-	10.7	0.169	0.213	-	-	
Temperature	°C	-	-	-	17.8	-	18.7	20.2	20.9	20	-	18.5	17.6	17.5	-	-	

Dissolved Oxygen	mg/L	-	-	-	6.38	-	9.42	5.26	6.29	2.89	-	5.16	3.01	30	-	-
Turbidity	NTU	-	-	-	26.3	-	3.5	8.3	18.2	20	-	31.3	5	7.8	-	-