



Warrell Creek to Nambucca Heads – Pacific Highway Upgrade Project

ENVIRONMENT PROTECTION AUTHORITY MONTHLY REPORT

■ December 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

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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 L2.5; and
- c) details of results of any acoustic investigation made in relation to Condition L4.2d); 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 December 2015 were limited to the following:

- Clearing and Grubbing;
- Topsoil stripping;
- Earthworks including crushing;
- Production blasting;
- Continuation 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;
- Installation of monitoring instruments – extensometers, inclinometers and piezometers
- Continuing culvert installation;
- Site compound establishment (Northern Compound);
- Geotechnical Investigations;
- Installation of temporary waterway crossings; and
- Site Survey.
- Drainage works including shotcreting of permanent drains
- Topsoil placement
- Landscaping
- Scour rock installation
- Williamson Creek Realignment works

The works scheduled for next month include:

- Earthworks including crushing;
- Production blasting;

- Continuing of piling including driven piling;
- Continuing bridge works including temporary work platforms;
- Installation of erosion and sediment controls;
- Continuing culvert installation;
- Geotechnical Investigations;
- Clearing and grubbing;
- Topsoil stripping
- Drainage works including shotcreting of permanent drains
- Topsoil placement
- Landscaping
- Scour rock installation

1.2 Consultation Activities

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

Table 1 – Consultation Activities

Groups	Date	Key Topics
Environmental Review Group	15/12/15	Construction Progress, Design Update, Upcoming works, EWMS discussion, Environmental Update, Monitoring update, Christmas Shutdown and Site Inspections

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:

- Quarterly community information sessions will be held in 2016, the first being held in the first week of February.
- Community Construction Tours will commence in late February 2016. The free tours will be held monthly (bookings are essential).

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 total rainfall received for the month is as follows: -

Table 2 - Precipitation

Month	Total monthly rainfall	Location
01/12/15 – 31/12/15	213mm	Northern Compound
01/12/15 – 31/12/15	150.2mm	Albert Drive Compound

The site experienced a total of 13 rain days throughout the month of December 2015.

During December, rainfall received on site was higher than the December monthly average of 117.6mm. A summary of weather conditions recorded over the month for Smoky Cape by the Bureau of Meteorology is detailed below in Table 2.3.

The daily summaries for rainfall received in December at the Albert Drive Compound and Northern Compound are shown below in Table 2.1 and 2.2.

Table 2.1 – Rainfall recorded at Albert Drive Southern Compound Automated Weather Station

Date	Time	TOTAL Rain Gauge (mm)
1/12/2015	9:00:00	0.2
2/12/2015	9:00:00	2
3/12/2015	9:00:00	12.2
4/12/2015	9:00:00	0
5/12/2015	9:00:00	0
6/12/2015	9:00:00	0
7/12/2015	9:00:00	0
8/12/2015	9:00:00	0
9/12/2015	9:00:00	0
10/12/2015	9:00:00	5
11/12/2015	9:00:00	0
12/12/2015	9:00:00	0
13/12/2015	9:00:00	0.4
14/12/2015	9:00:00	0
15/12/2015	9:00:00	0
16/12/2015	9:00:00	0
17/12/2015	9:00:00	7.8
18/12/2015	9:00:00	0
19/12/2015	9:00:00	0
20/12/2015	9:00:00	0

Date	Time	TOTAL Rain Gauge (mm)
21/12/2015	9:00:00	0
22/12/2015	9:00:00	0
23/12/2015	9:00:00	56.2
24/12/2015	9:00:00	35.8
25/12/2015	9:00:00	29.4
26/12/2015	9:00:00	0
27/12/2015	9:00:00	0.8
28/12/2015	9:00:00	0
29/12/2015	9:00:00	0
30/12/2015	9:00:00	0.2
31/12/2015	9:00:00	0.2

Table 2.2 – Rainfall recorded at the Northern Compound Automated Weather Station

Date	Time	TOTAL Rain Gauge (mm)
1/12/2015	9:00:00	0.2
2/12/2015	9:00:00	4.2
3/12/2015	9:00:00	3.6
4/12/2015	9:00:00	0.2
5/12/2015	9:00:00	4.4
6/12/2015	9:00:00	0
7/12/2015	9:00:00	0
8/12/2015	9:00:00	0
9/12/2015	9:00:00	0
10/12/2015	9:00:00	11.8
11/12/2015	9:00:00	0
12/12/2015	9:00:00	0.2
13/12/2015	9:00:00	0
14/12/2015	9:00:00	0
15/12/2015	9:00:00	0
16/12/2015	9:00:00	0
17/12/2015	9:00:00	14
18/12/2015	9:00:00	0
19/12/2015	9:00:00	0
20/12/2015	9:00:00	0
21/12/2015	9:00:00	0
22/12/2015	9:00:00	0
23/12/2015	9:00:00	89
24/12/2015	9:00:00	27.4
25/12/2015	9:00:00	55.8
26/12/2015	9:00:00	0.2
27/12/2015	9:00:00	2
28/12/2015	9:00:00	0

29/12/2015	9:00:00	0
30/12/2015	9:00:00	0
31/12/2015	9:00:00	0

Table 2.3: Weather conditions recorded in December 2015 at Smoky Cape by the Bureau of Meteorology.

December 2015			
Date	Minimum temperature (°C)	Maximum temperature (°C)	Rainfall (mm)
1/12/2015	21.5	27.2	0
2/12/2015	20.6	25	1.6
3/12/2015	17.4	24.2	3.7
4/12/2015	15.4	26	0.2
5/12/2015	16.6	27	0.4
6/12/2015	17.5	27.8	0
7/12/2015	19	28	0
8/12/2015	20.9	26.1	0
9/12/2015	21.6	25.6	0
10/12/2015	19.3	28.2	2
11/12/2015	20.5	32.8	0
12/12/2015	20.5	26.5	0
13/12/2015	18.5	26.1	1.8
14/12/2015	20.2	26.2	0
15/12/2015	21	27	0
16/12/2015	21.5	27.5	0
17/12/2015	16.6	28.5	5
18/12/2015	19.4	28.5	0
19/12/2015	19.3	27.6	0
20/12/2015	21	26.6	0
21/12/2015	21	26.8	0
22/12/2015	20.8	23.3	11
23/12/2015	19	21.4	33
24/12/2015	18.2	23.1	76
25/12/2015	17.3	27.8	3.2
26/12/2015	19.2	27.9	0
27/12/2015	21.1	24.7	4.4
28/12/2015	16.3	24.4	0
29/12/2015	14.9	23	2.2
30/12/2015	16.6	26	2
31/12/2015	17.5	27.5	0

3. Surface Water Monitoring

Pacifico have been provided trigger levels for baseline monitoring from RMS, these will be compared against monthly data as well as between upstream and downstream sites to determine works impact.

Monthly sampling was undertaken by ACCIONA (Pacifico):

Wet Sampling Event

A "wet" sampling event was undertaken on the 3rd December after >10mm of rainfall in a 24 hour period, field and lab tests were undertaken. Results are available in Appendix A.

Dissolved oxygen (DO) levels noted to be below trigger values at:

Lower Warrell Creek upstream and downstream sites. This is attributed to the low-flow environment as well as decomposing vegetative matter in the waterbody.

pH levels noted to be outside trigger levels at:

Stony Creek downstream (6.06), this was only marginally below pH trigger value (6.21).

Lower Warrell Creek upstream and downstream sites. There is minimal difference between upstream and downstream sites (7.32 upstream, 7.5 downstream), and the elevated pH is therefore unlikely to be attributable to construction works.

Nambucca River both sites. Comparing upstream and downstream values show that the difference between them is minimal (7.76 upstream, 7.85 downstream), and is therefore unlikely to be as a result of construction works.

Metals noted to be above trigger levels at:

Upper Warrell Creek upstream and downstream for manganese and zinc. It is noted that the values are within ANZECC criteria.

Stony Creek downstream for manganese. It is noted that this value is within ANZECC criteria.

Elevated levels were recorded at Gumma Wetlands upstream for nickel and zinc. It is noted that Nickel was within ANZECC criteria, and that zinc was only marginally above the trigger level of 0.011mg/L (0.018mg/L).

Nutrient levels above trigger levels at:

Upper Warrell Creek for ammonia (0.06mg/L). It is noted that this is well within ANZECC criteria (0.9mg/L).

Stony Creek downstream and upstream recorded elevated levels of nitrate and total nitrogen. It is noted that the values for both of these parameters decreased from

upstream to downstream and are therefore unlikely to be attributed to construction works, with vegetative matter in the waterway possibly contributing to the results.

Lower Warrell Creek had elevated levels of total nitrogen downstream. It is noted that this was only a minor exceedance of the trigger value (0.54mg/L trigger, 0.6mg/L result). This is possibly due to the decomposing vegetative material in the waterway at the downstream site.

Dry Sampling Event

On the 9th December a “dry” monitoring event was undertaken, field and lab tests were undertaken. The results are available in Appendix A.

Below exceedances of trigger levels are discussed:

Dissolved oxygen (DO) levels noted to be below trigger values at:

Nambucca River upstream and downstream. It is noted that DO levels increased from between upstream to downstream site and so is unlikely to be attributed to construction works.

pH levels noted to outside trigger levels at:

Lower Warrell Creek upstream and downstream. It is noted that there was a minimal change from upstream to downstream locations (7.56 US to 7.61 DS – within ANZECC guidelines), and so the levels are unlikely to be as a result of construction works.

Gumma wetlands upstream and downstream, it is noted that there was a minor increase from upstream to downstream sites (7.12 to 7.64) and that these results were within ANZECC guidelines.

Turbidity levels noted to be above trigger levels at:

All downstream sites were below trigger levels.

Wet Sampling Event

A “wet” monitoring event was conducted on the 24th of December 2015 after >10mm of rainfall in a 24 hour period, field tests were undertaken. Below exceedances of trigger levels are discussed.

Dissolved oxygen (DO) levels noted to be below trigger values at:

Upper Warrell Creek downstream, although it is noted that the DO levels increased from upstream to downstream, and so the low levels are unlikely to be attributed to construction impacts.

Nambucca River upstream and downstream, although there was minimal change from upstream to downstream sites (5.15 to 4.67).

pH noted to be outside trigger values at:

Gumma wetlands upstream and downstream, although it is noted that these values were within ANZECC criteria (7.03, 7.2 upstream, 7.34 downstream).

Turbidity noted to be outside trigger values at:

Stony Creek upstream and downstream, although it is noted that turbidity levels decreased from upstream to downstream sites (76 US to 61.2 DS) and are therefore unlikely to be attributable to construction.

Gumma Wetlands upstream and downstream. ERSED controls were verified to be in place, with multiple controls in place including double-layered geofabric fencing, bunds on batters, batter chutes with rock dissipaters as well as P47 polymer on batters for stabilisation. The site experienced heavy rainfall before the event (>60mm, above the 85th percentile 5 day rainfall event) which may have contributed to the elevated levels. It is noted that these results are also within baseline values pre-construction (2.4-951 NTUs variable background readings).

4. Sediment Basin Water Monitoring

Water was released from commissioned sediment basins between the 2nd and 31st of December 2015 after rainfall. Water pumped into basins was treated and released as soon as possible, especially if rainfall is predicted in the 5 day forecast. Table 3 below has the water quality results recorded for the water release events:

Table 3 – Water Release Register

Date	Basin ID	Oil and Grease (visible)	pH	Turbidity (NTU)	TSS (mg/L)	Approx Volume Discharged (kL)
2/12/2015	B43.21	N	7.49	36.1		200
2/12/2015	B45.50	N	6.54	11.1		450
3/12/2015	B43.21	N	7.35	18.4		200
3/12/2015	B43.37	N	8.25	32.8		300
4/12/2015	B42.8	N	6.61	19.2		500
4/12/2015	B42.87	N	6.5	4.7		330
7/12/2015	B42.3	N	6.89	36.9		800
14/12/2015	B42.3	N	7.41	60.9		3
14/12/2015	B44.55	N	7.92	9.3		5
14/12/2015	B49.67	N	7.43	75.5		4
15/12/2015	B42.3	N	7.41	60.9		3
16/12/2015	B45.00	N	7.71	24.9		4
16/12/2015	B43.37	N	8.29	24.7	39	4
26/12/2015	B42.87	N	6.8	82.7		750
26/12/2015	B43.37	N	6.63	31.4		650
26/12/2015	B45.64	N	7.02	17.1	5	1600
27/12/2015	B42.8	N	8	5.9	11	700

Date	Basin ID	Oil and Grease (visible)	pH	Turbidity (NTU)	TSS (mg/L)	Approx Volume Discharged (kL)
27/12/2015	B47.6	N	7.73	30.1		400
27/12/2015	B49.67	N	8.35	31.3		800
27/12/2015	B60.1	N	6.6	55		350
27/12/2015	B59.6	N	6.8	73		300
27/12/2015	B59.5	N	6.6	56.4		200
27/12/2015	B59.24	N	7.2	37.9		400
27/12/2015	B60.85	N	6.9	66		350
27/12/2015	B60.80	N	6.77	83		350
27/12/2015	B54.3	N	6.87	38		400
27/12/2015	B55.5	N	6.99	83.8		350
27/12/2015	B55.4	N	7.08	25.5		170
27/12/2015	B60.5	N	6.74	35.8		270
27/12/2015	B60.58	N	6.85	37		170
27/12/2015	B57.25	N	7.66	53.2		550
27/12/2015	B53.9	N	7.66	31.7		1000
27/12/2015	B54.42	N	7.91	16.2		600
27/12/2015	B58.10	N	6.72	32.6		700
28/12/2015	B44.55	N	8.11	6.1		600
28/12/2015	B45.00	N	7.24	72.8	16	600
28/12/2015	B48.87	N	6.96	21.1		300
28/12/2015	B48.5	N	6.62	0	16	700
28/12/2015	B59.5	N	6.93	53.8		170
28/12/2015	B60.3	N	6.93	72.4		120
28/12/2015	B59.78	N	6.85	28.6		700
28/12/2015	B59.0	N	6.85	24.1		800
28/12/2015	B55.17	N	6.67	48.1		350
28/12/2015	B58.45	N	7.62	31.3		700
28/12/2015	B58.6	N	6.92	55.6		550
28/12/2015	B57.8	N	7.1	42.7		300
28/12/2015	B55.9	N	6.87	41.6		800
28/12/2015	B55.8	N	7.13	22.4		800
28/12/2015	B54.00	N	6.98	48.2		2000
29/12/2015	B44.55	N	7.57	8.9		350
29/12/2015	B49.07	N	8.26	55	24	600
29/12/2015	B43.75	N	8.5	45.5		500
29/12/2015	B57.7	N	6.56	42.7		600
29/12/2015	B54.7	N	6.61	26.3		1500
29/12/2015	B59.24	N	8.33	6.87		450
29/12/2015	B57.3	N	7.17	56.7		350
29/12/2015	B55.0	N	7.08	88		1800
29/12/2015	B60.1	N	6.9	61.9		350
29/12/2015	B58.03	N	7.65	26.5		400

Date	Basin ID	Oil and Grease (visible)	pH	Turbidity (NTU)	TSS (mg/L)	Approx Volume Discharged (kL)
29/12/2015	B56.7	N	7.32	87.5		380
29/12/2015	B56.9	N	7.39	47.6		700
30/12/2015	B42.3	N	7.94	64.9	46	1000
30/12/2015	B49.67	N	7.66	42.4		700
30/12/2015	B56.5	N	7.5	35		400
30/12/2015	B56.4	N	7.1	76.5		380
30/12/2015	B53.8	N	7.01	22.6		1200
31/12/2015	B46.35	N	7.62	5		540
31/12/2015	B48.06	N	7.82	2		1000
31/12/2015	B53.0	N	6.76	39.3		300
31/12/2015	B59.85	N	7.51	88.5		800
31/12/2015	B61.2	N	6.8	88		600

5. Noise Monitoring

Monthly routine construction noise monitoring was undertaken on the 8th and 9th December 2015 at eight locations near to construction works. Monitoring results are available in Appendix A.

All sites were within predicted levels for the activity being undertaken.

One (1) high noise generating activity, monitored on the 8th of December 2015 (Impact Piling, Nambucca River Bridge) resulted in the implementation of respite periods due to the monitoring result being above the high noise threshold for intermittent noise (70dBA).

6. Vibration Monitoring

Vibration monitoring was undertaken as part of blasting works during December 2015. Monitoring Results are available in Appendix A, Table 5.

6.1 Blasting

Four blasting events occurred in December 2015 – 1st, 2nd, 8th and 15th December. No exceedances of overpressure or vibration limits occurred from these blasts.

There were no exceedances for overpressure from these four blasts, the highest recorded was 120.6dB on the 1st of December 2015 at Cut 10 (this occurred at a residence with agreement for 125dB blasting).

There was no exceedance for peak particle velocity from these four blasts, the highest recorded was 15.39mm/s on the 15th of December 2015 at Cut 10, however it should be noted that this reading is associated with a monitoring

device at a Power Pole and that a peak particle velocity of 6.275mm/s was recorded at the nearest receiver (this occurred at a resident with an agreement for 25mm/s).

We are required to achieve less than 5% exceedance (of 5mm/s limit) within a 12month period for those sensitive receptors that have not agreed to the 25mm/s limit. We have anticipated a total of 49 blasts. At the end of December our percentage is 10.00% from commencement of production blasting.

7. Dust Monitoring

Dust deposition gauges (DDG) were placed at nearby sensitive receivers from the 12th October 2015 to 12th to 13th November 2015. DDG results are available in Appendix A.

All dust deposition gauges were below the level of concern (4g/m²/month) during the monitoring period, as stipulated above. Surfactant additives have been utilised and will continue to be utilised onsite in water carts to assist with dust mitigation. Additional water carts have also been sources to assist with dust mitigation during the Christmas Shutdown Period. The utilisation of water carts outside of standard construction hours to assist with reducing dust emissions from the project.

The highest recorded level during the monitoring period was 3.3g/m²/month Total Insoluble Matter (TIM) recorded at dust deposition gauge DDG3, with an Ash Content of 2.3g/m²/month.

8. Groundwater Monitoring

ACCIONA (Pacifico) have undertaken groundwater monitoring on the 16th and 17th of December 2015. 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 finalised groundwater report from the baseline sampling has not been issued from RMS to Pacifico including groundwater triggers.

9. Acoustic Investigations

Acoustic Investigations (modelling) have been conducted and approved for several Out of Hours Works proposed to model impact on residents during the month of December 2015. A summary of these approvals is below in Table 4.

Acoustic Investigation (field monitoring) was conducted for Out of Hours Works undertaken in December 2015. These results are attached in Appendix A (Table 6), no works were found to exceed the modelled noise levels.

Table 4 – December Out of Hours Works Assessed

OOH Request Title	Residential Agreements Required (Y/N)	Approval Date
Pacific Highway Line Marking	N	14/12/2015
Out of Hours Basin Treatment and Release	N	19/12/2015

10. Complaints

10.1 Summary of Complaints for the month

The following is a brief summary of environmental complaints received in December 2015.

On the first of December, a resident of Macksville (Bellevue Drive) contacted AFJV regarding noise brake noise pollution. The resident believed that the increase noise pollution from truck's air brakes was due to varying speed limits north of Macksville. AFJV noted the resident's observations and passed this information on the AFJV Traffic Manager. The speed was dropped through this section to 60km/hr as part of the programmed project works to facilitate the Nambucca River Bridge Construction on the existing Pacific Highway at this problematic area.

On the seventeenth of December, a resident of Donnellyville (Henry's Lane) contacted AFJV regarding dust generation, specifically dust in his swimming pool and water tanks. AFJV discussed the issue with the resident following the complaint and is investigating the installation of a First Flush System, to be installed in January 2016.

11. Non-Compliance

11.1 Summary of Non-compliances

At the anniversary date of the EPL on the 16th December 2015, the 5mm/s vibration criteria (where agreements are not in place) was exceeded for 10% of the blasts during the first 12 month period of the EPL. This result exceeds the 5% target in condition L3.4 and L3.5 of the EPL which requires less than 5% of the total blasts to exceed 5mms/s (where agreements are not in place) for the reporting period.

Due to the following reasons the 5% criteria was not met:

- Blasting did not commence until approximately half way through the reporting period which does not allow the lessons learnt (exceedance of criteria) from the initial blasts to be averaged over a 12 month period
- During the initial blasting when we were learning how the rock behaved, we had two exceedances in June / July
- Works ceased until the Secretary of the Department of Planning and Environment approved increased blasting limits with residential agreements in place
- We have only had one exceedance of the criteria in the last 28 blasts during the reporting period following the two initial exceedances"

This exceedance during this 12mth reporting period will be discussed in the Annual Return due in February 2016.

Table 1b – Surface Water Sampling Results December – Dry

Location	Units	Levels of Concern	Upper Warrell Creek			Upper Warrell Creek			Stony Creek			Stony Creek			Lower Warrell Creek			Lower Warrell Creek			Unnamed Creek Gumma West			Unnamed Creek Gumma East			Unnamed Creek Gumma North			Nambucca River South			Nambucca River South				
			Upstream	Downstream	Estuarine	Upstream	Downstream	Estuarine	Upstream	Downstream	Estuarine	Upstream	Downstream	Estuarine	Upstream	Downstream	Estuarine	Upstream	Downstream	Estuarine	Upstream	Downstream	Estuarine	Upstream	Downstream	Estuarine	Upstream	Downstream	Estuarine	Upstream	Downstream	Estuarine					
Freshwater / Estuarine		ANZECC 2000 95% species protected	Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Estuarine			Estuarine							
Date of Sampling			9-Dec-15			9-Dec-15			9-Dec-15			9-Dec-15			9-Dec-15			9-Dec-15			9-Dec-15			9-Dec-15			9-Dec-15			9-Dec-15							
Time of Sampling			9:00 AM			8:30 AM			10:00 AM			9:30 AM			2:30 PM			2:00 PM			12:00 PM			11:00 AM			11:40 AM			1:00 PM			12:30 PM				
Comments			Unable to sample - w water level too low																																		
Type		ANZECC 2000 95%	80th %ile	20th %ile	Result	80th %ile	20th %ile	Result	80th %ile	20th %ile	Result	80th %ile	20th %ile	Result	80th %ile	20th %ile	Result	80th %ile	20th %ile	Result	80th %ile	20th %ile	Result	80th %ile	20th %ile	Result	80th %ile	20th %ile	Result	80th %ile	20th %ile	Result	80th %ile	20th %ile	Result		
Metals																																					
Aluminium	mg/L	0.055	-	0.06	0.01	0.05	0.01	0.01	0.05	0.01	<0.01	0.04	0.01	<0.01	0.06	0.01	<0.01	0.1	0.01	0.02	0.1	0.01	0.04	0.1	0.01	<0.01	0.02	0.01	<0.10	0.02	0.01	<0.10	0.02	0.01	<0.10		
Arsenic	mg/L	0.024	0.0023	-	<0.001	-	<0.001	-	<0.001	-	<0.001	0.001	0.001	<0.001	0.001	0.001	<0.001	0.002	0.001	0.002	0.002	0.001	<0.001	0.002	0.001	<0.001	0.002	0.001	<0.010	0.002	0.001	<0.010	0.002	0.001	<0.010		
Cadmium	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	-	-	<0.0001	-	-	<0.0001	-	-	<0.0010	-	-	<0.0010	-	-	<0.0010		
Chromium	mg/L	0.001	0.0044	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.010	-	-	<0.010	-	-	<0.010		
Copper	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	<0.010	0.001	0.001	<0.010	0.001	0.001	<0.010		
Lead	mg/L	0.0034	0.0044	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.010	-	-	<0.010	-	-	<0.010		
Manganese	mg/L	1.9	0.08	0.21	0.02	0.319	0.2	0.03	0.205	0.06	0.02	0.132	0.052	0.013	0.121	0.26	0.08	0.159	0.26	0.08	0.143	0.23	0.019	0.212	0.23	0.019	0.114	0.23	0.019	0.31	0.03	0.02	0.018	0.03	0.002	0.014	
Nickel	mg/L	0.011	0.07	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	-	<0.001	0.001	0.001	0.002	0.001	0.001	<0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	-	-	<0.010	-	-	<0.010		
Selenium	mg/L	11	-	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.10	-	-	<0.10	-	-	<0.10		
Silver	mg/L	0.00005	0.0014	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.010	-	-	<0.010	-	-	<0.010		
Zinc	mg/L	0.008	0.015	-	<0.005	-	<0.005	0.005	0.005	<0.005	0.005	0.005	<0.005	0.005	0.005	<0.005	0.005	0.005	<0.005	0.005	0.005	<0.005	0.005	0.005	<0.005	0.005	0.005	<0.005	0.005	0.005	<0.050	0.005	0.005	<0.050	0.005	0.005	<0.050
Iron	mg/L	-	-	0.99	0.46	0.93	0.31	0.47	0.82	0.42	0.25	0.78	0.37	0.06	0.83	0.05	0.09	0.83	0.05	0.07	2.01	0.25	0.5	2.01	0.25	1.01	2.01	0.25	0.22	-	-	<0.50	-	-	<0.50		
Mercury	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	-	-	<0.0001		
Total Recoverable Hydrocarbons																																					
Naphthalene	µg/L	16	50	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
OS - C10 Fraction	µg/L	-	-	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
OS - C10 Fraction minus BTEX (F1)	µg/L	-	-	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
>C10 - C16 Fraction	µg/L	-	-	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
>C16 - C34 Fraction	µg/L	-	-	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
>C34 - C40 Fraction	µg/L	-	-	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
>C10 - C40 Fraction (sum)	µg/L	-	-	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	-	-	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
BTEX																																					
Benzene	µg/L	950	700	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
Toluene	µg/L	180	180	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
Ethylbenzene	µg/L	80	5	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
m&p-Xylenes	µg/L	-	-	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
o-Xylene	µg/L	350	350	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
Xylenes - Total	µg/L	-	-	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
Sum of BTEX	µg/L	-	-	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-	NA		
Nutrients																																					
Total Phosphorus	mg/L	0.05	0.03	0.04	0.01	0.03	0.03	0.01	<0.01	0.04	0.01	<0.01	0.02	0.01	<0.01	0.04	0.01	<0.01	0.04	0.01	<0.01	0.12	0.03	0.04	0.12	0.03	0.08	0.12	0.03	<0.01	0.04	0.02	<0.02	0.04	0.02	<0.05	
Phosphate (reactive phosphorus)	mg/L	-	-	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	0.01	0.0044	<0.01	0.01	0.0044	<0.01	0.01	0.005	<0.01	0.01	0.005	<0.01	0.01	0.005	<0.01	0.01	0.008	<0.01	0.01	0.008	<0.01	
Total Nitrogen	mg/L	0.5	0.3	0.62	0.2	0.5	0.6	0.2	0.5	0.3	0.1	0.2	0.41	0.1	0.2	0.5	0.2	0.4	0.5	0.2	0.5	2.8	1.1	1.7	2.8	1.1	1.7	2.8	1.1	0.6	0.5	0.2	<0.2	0.5	0.2	<0.5	
Total Kjeldahl Nitrogen	mg/L	-	-	0.6	0.2	0.5	0.6	0.2	0.5	0.3	0.1	0.2	0.4	0.1	0.2	0.5	0.2	0.4	0.5	0.2	0.4	2.4	1	1.6	2.4	1	1.7	2.4	1	0.6	0.5	0.2	<0.2	0.5	0.2	<0.5	
Nitrate	mg/L	0.7	-	0.04	0.01	0.01	0.03	0.01	0.02	0.03	0.01	0.02	0.03	0.01	<0.01	0.04	0.01	0.05	0.04	0.01	0.13	0.04	0.01	0.09	0.04	0.01	0.01	0.04	0.01	0.02	0.02	0.01	0.04	0.02	0.01	<0.01	
Nitrite	mg/L	-	-	<0.01	0.01	0.01	0.01	0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	<0.01	0.01	0.01	<0.01	0.05	0.01	<0.01	0.05	0.01	<0.01	0.05	0.01	<0.01	0.02	0.01	<0.01	0.02	0.01	<0.01	
Ammonia	mg/L	0.9	-	-	0.02	-	-	0.05	-	-	0.06	-	-	0.03	0.16	0.06	0.03	0.16	0.06	0.04	0.04	0.01	0.08	0.04	0.01	<0											

Table 2 – Noise Monitoring Results December 2015

Date	Time	Location	Rec ID	NCA	NML	Activity	Predicted levels for activity	L _{Aeq}	L _A MAX	L _A MIN	L _{CEQ}	L _A F05	L _A F10	L _A F50	L _A F90	Principal sources/ operations	Measurements exceeding criteria, plant/ operations causing	Corrective actions	Notes
9/12/2015	11:05 AM	Albert Drive	74	1	50	Cut	62	51.6	68.9	44.2	66.8	55.6	53.5	49.2	47	Dozer, moxy, excavators	NA	NA	Within predicted levels for activity
9/12/2015	11:45 AM	Cockburns Lane	16	1	50	Cut	65	63.2	69.3	54.9	64.9	65.8	65.4	63.4	57.1	Construction not audible	NA	NA	Background - cicadas, traffic
9/12/2015	10:30 AM	Bald Hill Rd	197	3	50	Cut	72	48.4	69.3	40.8	68.4	51.7	49.9	46.2	43.5	Truck + dogs, excavators	NA	NA	Within predicted levels for activity
8/12/2015	2:16 PM	Letitia Rd	406	4	59	Cut	74	53	68.9	47.1	67.8	55.9	55	52.2	50	Scrapers, truck + dog	NA	NA	Within predicted levels for activity
8/12/2015	1:13 PM	Mattick Rd	442	6	44	Cut	62	60.7	76.2	47	76.8	65.8	64	54.9	50	Scrapers, truck + dog, dozer, excavators	NA	NA	Within predicted levels for activity
9/12/2015	10:00 AM	Nursery Rd	415	4	59	NA		61.1	79.5	45.5	63.9	64.7	64.4	59.6	49.3	Construction not audible	NA	NA	Background - cicadas, highway + local traffic, birds
8/12/2015	4:45 PM	Wallace St	148	3	50	Cut	47	58.3	72.5	52.4	67.9	62.3	58.4	55.9	54.1	Construction not audible	NA	NA	Background - highway + local traffic, other construction site
8/12/2015	3:00 PM	Gumma Rd	383	3	50	Fill (abutment rock placement)	64	63	76.5	50.9	73.1	68.1	66.3	60.6	55.4	Crane, truck + dogs, backhoe	NA	NA	Within predicted levels - Taken along project boundary to reduce additional noise from traffic

Table 3 - Dust Monitoring Results November/December 2015

			DDG ID		DDG1	DDG2	DDG3	DDG4	DDG5	DDG6	DDG7	DDG8	DDG A1	DDG A2
			Start date of sampling		12/11/2015	13/11/2015	12/11/2015	13/11/2015	13/11/2015	12/11/2015	12/11/2015	12/11/2015	12/11/2015	13/11/2015
			Finish date of sampling		11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015
Analyte	Time Period	Unit	Levels of Concern	LOR										
Ash Content	Current Month	g/m ² .month	4	0.1	0.4	1	2.3	0.5	0.4	1.2	0.6	0.8	----	----
		mg	N/A	1	6	16	40	9	7	20	10	13	----	----
	Change	g/m ² .month	Increase of 2		0.3	1.1	2	0.9	15.8	2.8	0.5	0.8	----	----
Combustible Matter	Current Month	g/m ² .month	N/A	0.1	0.1	0.7	1	0.1	<0.1	0.8	0.3	0.5	----	----
		mg	N/A	1	2	12	17	1	<1	15	6	9	----	----
Total Insoluble Matter (TIM)	Current Month	g/m ² .month	4	0.1	0.5	1.7	3.3	0.6	0.4	2	0.9	1.3	----	----
		mg	N/A	1	8	28	57	10	7	35	16	22	----	----
	Change	g/m ² .month	Increase of 2	0.1	0.5	1.8	2.5	1.3	18.9	8.2	0.6	1.2	----	----
Arsenic	Current Month	mg/L		0.001	----	----	----	----	----	----	----	----	0.002	<.001
Comments														

Table 4 – Groundwater Monitoring Results December 2015

Location	Units	Groundwater Investigation Levels (GILs) from Interpretive Report	4BH007	4BH008	4BH010	4BH011	4LDBH009	1BH04	4LDBH011	4LDBH012	1BH10	1BH12	4BH021	4BH022	4BH025	4BH026	4BH037	4BH038	1BH49	4BH058	4BH061	4BH062	4BH065	4BH066	4BH064		
Cut/Fill			Cut 4	Cut 4	Cut 6	Cut 6	Cut 7	Cut 7	Cut 8	Cut 9	Cut 9	Cut 10	Cut 11	Cut 11	Cut 12	Cut 12	Fill 15	Fill 15	Cut 17	Cut 17	Cut 26	Cut 26	Cut 28	Cut 28	Cut 28		
Date of Sampling			16/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015	17/12/2015	16/12/2015	17/12/2015	17/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015	16/12/2015		
Comments			DRY	DRY		DRY										DRY			Pungent water (egg)		Dry - no logger	Dry - no logger			Unable to sample - bore not located		
Laboratory data																											
Metals																											
Aluminium	mg/L	0.055	-	-	0.2800	-	<0.01	<0.01	<0.01	0.0200	<0.01	0.0600	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	-	0.0700	<0.01	-		
Arsenic	mg/L	0.024	-	-	<0.001	-	<0.001	<0.001	0.0010	0.0020	<0.001	0.0010	0.0020	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	-		
Cadmium	mg/L	<LOR	-	-	<0.0001	-	<0.0001	<0.0001	<0.0001	0.0003	<0.0001	0.0030	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.0001	<0.0001	-		
Chromium	mg/L	0.001	-	-	<0.001	-	<0.001	<0.001	0.0010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	0.0010	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	-		
Copper	mg/L	0.0014	-	-	0.0420	-	0.0010	<0.001	<0.001	0.0030	<0.001	<0.001	0.0120	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	-		
Lead	mg/L	0.0034	-	-	<0.001	-	0.1360	0.1720	<0.001	0.0020	0.3300	1.2900	0.0020	0.0030	0.0010	-	<0.001	<0.001	<0.001	0.0160	-	-	<0.001	0.5520	-		
Manganese	mg/L	-	-	-	0.2270	-	0.0390	0.1880	0.8840	0.7310	0.0990	5.0200	0.0190	0.2800	0.0220	-	4.9100	1.4600	1.7000	0.0330	-	-	0.4690	0.0890	-		
Nickel	mg/L	0.011	-	-	0.0200	-	0.0040	0.0030	0.0020	0.0110	0.0040	0.1160	0.0060	0.0020	<0.001	-	0.0080	0.0040	0.0120	0.0010	-	-	0.0140	0.0080	-		
Selenium	mg/L	-	-	-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	-		
Silver	mg/L	<LOR	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<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	-	-	0.0860	-	0.0320	0.0240	<0.005	0.0990	0.0240	0.2540	0.0160	0.0090	0.0090	-	0.0180	0.0140	0.0120	0.0110	-	-	0.0310	0.0160	-		
Iron	mg/L	-	-	-	7.0800	-	<0.05	<0.05	0.5000	0.0700	<0.05	1.8200	<0.05	1.3200	<0.05	-	92.6000	0.9400	1.2900	<0.05	-	-	0.1000	<0.05	-		
Mercury	mg/L	0.0006	-	-	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.0001	<0.0001	-		
Total Petroleum Hydrocarbons																											
C6-C9 Fraction	µg/L or ppb	-	-	-	<20	-	<20	<20	<20	<20	<20	---	<20	<20	<20	-	<20	<20	<20	<20	-	-	<20	<20	-		
C10-C14 Fraction	µg/L or ppb	-	-	-	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	<50	<50	<50	<50	-	-	<50	<50	-		
C15-C28 Fraction	µg/L or ppb	-	-	-	<100	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	-	<100	<100	<100	<100	-	-	<100	<100	-		
C290C36 Fraction	µg/L or ppb	-	-	-	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	<50	<50	<50	<50	-	-	<50	<50	-		
C10-C36 Fraction	µg/L or ppb	-	-	-	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	<50	<50	<50	<50	-	-	<50	<50	-		
BTEX																											
Benzene	µg/L or ppb	950	-	-	<1	-	<1	<1	<1	<1	<1	---	<1	<1	<1	-	<1	<1	<1	<1	-	-	<1	<1	-		
Toluene	µg/L or ppb	-	-	-	<2	-	<2	<2	<2	<2	<2	---	<2	<2	<2	-	<2	<2	<2	<2	-	-	<2	<2	-		
Ethylbenzene	µg/L or ppb	-	-	-	<2	-	<2	<2	<2	<2	<2	---	<2	<2	<2	-	<2	<2	<2	<2	-	-	<2	<2	-		
m+p-Xylene	µg/L or ppb	-	-	-	<2	-	<2	<2	<2	<2	<2	---	<2	<2	<2	-	<2	<2	<2	<2	-	-	<2	<2	-		
o-Xylene	µg/L or ppb	-	-	-	<2	-	<2	<2	<2	<2	<2	---	<2	<2	<2	-	<2	<2	<2	<2	-	-	<2	<2	-		
Naphthalene	µg/L or ppb	-	-	-	<5	-	<5	<5	<5	<5	<5	---	<5	<5	<5	-	<5	<5	<5	<5	-	-	<5	<5	-		
Nutrients																											
Total Phosphorus	mg/L	-	-	-	0.0100	-	0.0500	0.0700	0.0700	0.6900	0.0300	0.0200	0.0400	0.0800	0.0800	-	0.0100	0.1000	<0.01	0.0400	-	-	0.0400	<0.01	-		
Phosphate	mg/L	-	-	-	<0.01	-	<0.01	<0.01	0.0300	0.0100	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.05	0.0200	<0.01	<0.01	-	-	0.0100	<0.01	-		
Total Nitrogen	mg/L	-	-	-	0.5000	-	0.4000	0.2000	1.2000	6.2000	0.2000	14.8000	0.3000	0.2000	0.7000	-	2.0000	0.7000	0.4000	0.2000	-	-	0.4000	0.2000	-		
Total Kjeldahl Nitrogen	mg/L	-	-	-	0.5000	-	0.4000	0.2000	1.2000	3.2000	0.2000	4.2000	0.1000	0.2000	0.4000	-	2.0000	0.7000	0.3000	<0.1	-	-	0.3000	0.1000	-		
Nitrate	mg/L	-	-	-	0.0300	-	0.0400	0.0200	0.0300	2.9200	0.0100	8.6000	0.2300	0.0300	0.3300	-	<0.05	0.0300	0.0500	0.2400	-	-	0.0500	0.0500	-		
Nitrite	mg/L	-	-	-	<0.01	-	<0.01	<0.01	<0.01	0.1200	<0.01	2.0000	<0.01	<0.01	<0.01	-	<0.05	0.0100	<0.01	<0.01	-	-	<0.01	<0.01	-		
Ammonia	mg/L	-	-	-	0.1100	-	0.2900	0.0700	0.3000	0.2600	0.0900	0.8600	0.0400	0.1000	0.0400	-	0.8100	0.2300	0.1500	0.0300	-	-	0.0400	0.0500	-		
Major anions																											
Chloride	mg/L	-	-	-	1480.0000	-	47.0000	29.0000	189.0000	62.0000	30.0000	129.0000	14.0000	79.0000	19.0000	-	930.0000	1940.0000	365.0000	22.0000	-	-	162.0000	72.0000	-		
Sulfate	mg/L	-	-	-	49.0000	-	17.0000	14.0000	74.0000	704.0000	56.0000	416.0000	8.0000	53.0000	5.0000	-	2040.0000	2750.0000	35.0000	13.0000	-	-	12.0000	27.0000	-		
Bicarbonate	mg/L	-	-	-	3.0000	-	32.0000	36.0000	382.0000	56.0000	55.0000	75.0000	22.0000	139.0000	16.0000	-	39.0000	859.0000	16.0000	29.0000	-	-	32.0000	39.0000	-		
Major cations																											
Sodium	mg/L	-	-	-	878.0000	-	42.0000	39.0000	227.0000	234.0000	50.0000	179.0000	20.0000	72.0000	21.0000	-	718.0000	1820.0000	210.0000	33.0000	-	-	105.0000	72.0000	-		
Potassium	mg/L	-	-	-	2.0000	-	<1	3.0000	2.0000	14.0000	1.0000	9.0000	1.0000	5.0000	<1	-	41.0000	96.0000	13.0000	<1	-	-	1.0000	1.0000	-		
Calcium	mg/L	-	-	-	5.0000	-	8.0000	2.0000	68.0000	62.0000	9.0000	48.0000	1.0000	52.0000	1.0000	-	188.0000	253.0000	9.0000	<1	-	-	3.0000	4.0000	-		
Magnesium	mg/L	-	-	-	135.0000	-	5.0000	2.0000	27.0000	50.0000	9.0000	53.0000	2.0000	11.0000	<1	-	311.0000	564.0000	17.0000	2.0000	-	-	8.0000	5.0000	-		
Field Physical data																											
Depth to standing water level from TOC	m	-	-	-	15.99	-	11.84	11.75	3.32	10.85	13.82	13.09	18.80	1.07	6.84	-	1.12	1.40	18.77	15.22	-	-	13.74	7.52	-		
pH	pH	-	-	-	4.67	-	6.46	6.75	7.29	6.92	7.33	7.18	6.23	7.09	6.98	-	7.58	7.00	6.69	6.47	-	-	7.68	7.00	-		
Conductivity	mS/cm	-	-	-	2.670	-	0.351	0.195	1.300	1.440	0.334	0.720	0.108	0.682	0.304	-	2.620	10.000	1.050	0.175	-	-	0.339	0.247	-		
Temperature	C	-	-	-	25.78	-	22.95	26.66	23.87	25.43	23.64	22.24	21.45	22.98	22.82	-	25.21	21.90	26.62	24.01	-	-	26.56	27.36	-		
Total Dissolved Solids	mg/L	-	-	-	1.7000	-	0.2280	0.1270	0.8310	0.																	

Table 5 – Blasting Monitoring Results December 2015


Date	Blast no.	Cut	BCM	Monitor 1 (PPV)	Monitor 2 (PPV)	Monitor 3 (PPV)	Monitor 1 (dB)	Monitor 2 (dB)	Monitor 3 (dB)	EPA Exceedances (5mm/s)	EPA Exceedances (10mm/s)	EPA Exceedance (120dB)	EPA Exceedance (115dB) 5%	No. of Blasts
30-Jun	11-001	11	1008	5.46	2.67	2.67	106.00	108.40	101.90	1				1
07-Jul	11-002	11	1622	5.77	3.51	2.35	108.00	103.50	108.40	1				2
27-Jul	11-003	11	7002	6.17	3.96	0.00	104.20	103.50	0.00					3
03-Aug	11-004	11	3616	11.64	3.43	1.03	113.10	107.00	95.92					4
06-Aug	10-001	10	8319	6.08	0.73	0.00	118.20	107.00	0.00					5
10-Aug	11-005	11	7006	14.67	7.68	2.45	114.60	115.60	104.20					6
13-Aug	10-002	10	3500	4.35	1.20	0.47	117.09	103.50	109.90					7
17-Aug	11-006	11	5382	12.99	6.45	1.79	118.20	118.60	104.20					8
20-Aug	10-003	10	10263	4.46	1.35	1.45	107.50	112.10	103.50					9
25-Aug	11-007	11	16100	6.21	1.78	0.00	115.60	98.84	0.00					10
31-Aug	11-008	11	14430	10.07	5.18	5.37	113.50	111.50	106.50	1				11
7-Sep	10-004	10	10281	9.76	1.94	0.70	119.90	112.30	98.84					12
17-Sep	10-005	10	7901.25	16.940	5.520	3.533	119.400	114.800	114.200					13
25-Sep	10-006	10	13200	19.490	6.092	-	113.800	118.800	-					14
1-Oct	11-009	11	8190	5.173	2.831	1.426	110.600	110.200	88.000					15
1-Oct	10-007	10	4485	10.240	1.308	-	118.500	88.000	-					16
13-Oct	10-008	10	6563.75	24.150	6.717	-	117.500	117.900	-					17
16-Oct	11-010	11	4641.25	3.126	1.926	-	109.200	1.926	-					18
20-Oct	10-009	10	9034.375	5.337	1.442	-	116.100	107.000	-					19
27-Oct	10-010	10	12247.5	5.039	3.297	-	97.500	117.500	-					20
27-Oct	11-011	11	11708.75	2.973	1.295	1.308	104.900	107.500	98.840					21
3-Nov	10-011	10	14462.5	6.971	2.012	0.684	124.000	117.200	102.800					22
12-Nov	10-012	10		3.919	0.933	-	88.000	116.300	-					23
16-Nov	8-001	8		*	8.638	4.591	*	112.300	108.800					24
24-Nov	8-002	8		8.875	1.308	1.000	124.900	98.840	107.000					25
26-Nov	10-013	10		12.100	1.024	-	119.800	106.500	-					26
1-Dec	10-014	10		8.371	-	-	120.600	-	-					27
2-Dec	8-003	8		15.39**	1.332	-	106.500	95.120	-					28
8-Dec	10-015	10		8.951	1.157	-	113.800	116.600	-					29
15-Dec	10-016	10		20.120	6.275	3.295	117.200	118.500	112.300					30
17-Dec	10-017	10		4.879	1.301	-	106.000	109.500	-					31

Totals No of Exceedances 3
 December percentage exceedance 9.68%
 Percentage exceedance at 16th December 2015 10.00%

Note 17 July blasting criteria increase approved by DP&E with signed agreements
 16 December is Anniversary date of EPL
 Monitor 3 is the only monitor where an agreement does not exist for 25mm/s

* Flat Battery
 - Did not trigger
 ** Power Pole

Table 6 – Acoustic Investigation December

Out of Hours Works Field Verification											
Permit #	Description of Works	Date	Time	Location	Rec ID	NCA	NML	Predicted levels at receiver	Actual Calculated level	Principal sources/ operations	Notes
29	Albert Drive Connection	14/11/2015	12:45 PM	Albert Drive	19	1	40	35.2	33.1	Positrack, excavator, truck	Backhoe + truck loading material on stockpile during monitoring