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Warrell Creek to Nambucca Heads – Pacific Highway Upgrade Project

ENVIRONMENT PROTECTION AUTHORITY MONTHLY REPORT

- October 2017

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 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 October 2017 included the following:

- Bitumen sealing work
- Earthworks
- Continuing bridge works including deck unit installation and deck concrete pours
- Continuing works in the Pergola area near Upper Warrell Creek
- Continuing drainage works
- Scour rock installation
- Batter stabilisation using hydromulch (permanent design seed mix)
- Topsoil Amelioration and Blending
- Concrete Lined Drains and turnouts
- Basin Decommissioning
- Basin Maintenance including dewatering and desilting
- Permanent Basin Fit-out
- Installation and maintenance of Erosion and Sediment Controls
- Pavement (Asphalt and Concrete)
- Line marking
- Decommissioning of the Precast Facility
- Verge / Median Placement including median Topsoil Placement
- Operation of concrete and asphalt batch plants
- Glider Pole and Rope Bridge Installation
- Landscape Planting Works

Works scheduled for next month include

- Bitumen sealing work
- Earthworks
- Continuing bridge works including deck unit installation and deck concrete pours

- Continuing works in the Pergola area near Upper Warrell Creek
- Continuing drainage works
- Scour rock installation
- Batter stabilisation using hydromulch (permanent design seed mix)
- Topsoil Amelioration and Blending
- Concrete Lined Drains and turnouts
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1.2 Consultation Activities

The project's consultation activities during October 2017 included the following:

Table 1 – Consultation Activities

Groups	Date	Key Topics
Environmental Review Group	10th October	Project update, environmental monitoring, upcoming out of hours, site inspection
Toolboxes	Wednesday each week	Environmental and community issues communicated to the workforce.
North Facing Ramps group	Meet every 3 weeks	Matters pertaining to ongoing works nearby

Other Consultation Activities:

- Appropriate notification about out of hours work at the north facing ramps;
- Obtained 14 agreements for the asphalt batch plant OOH;
- Emailed database with notification for the exhibition period for the North Facing Ramps Urban Design and Landscape plan;
- Organized and placed material for the NFR UDLP exhibition period at the Nambucca Shire Council Chambers, Nambucca Plaza shopping centre and Pacifico Community Information Centre;
- Obtained further agreements from residents for project wide OOHW activities through to March 2018;
- Notified of traffic changes around Letitia Close;
- 2 tri weekly NFR residents meeting (16th and 30th October);

- Consulting with stakeholders and providing resolution or information on issues such as visual mounds, bores, driveways and fences; and
- Conducted 2 property adjustment inspections with PV and RMS;

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 during November 2017:

- Conduct next Nambucca Shire Council liaison meeting – 28th November;
- Conduct next North Facing Ramps tri-weekly roadside community meetings scheduled for Monday 20th November;
- Issue notification for opening of quarry access bridge;
- Continue to seek project wide agreements with potentially impacted residents for all anticipated Out of Hours construction works through to March 2018;
- Continue to consult stakeholders impacted by visual mounds along the entire alignment;
- Develop communications for southern interchange traffic switch in December 2017;
- Draft and present communications material and collateral for the opening event for the new highway to be held on 16th December; and
- Draft and present communications material in relation to the new highway opening to traffic pre-Christmas 2017;

2. Weather

2.1 Discussion

The automatic recording weather stations 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 – Rainfall recorded at the two weather stations operated by Pacifico

Month	Total monthly rainfall	Location
1/09/2017 – 30/09/2017	180.8mm	Northern Compound
1/09/2017 – 30/09/2017	187.0mm	Albert Drive Compound

The site experienced a total of nineteen (19) rain days throughout the month of October 2017.

During October 2017, rainfall received on site was higher than the October monthly average of 92.6mm. 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 September 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

October 2017

Date	Time	TOTAL Rain Gauge (mm)
1/10/2017	9:00:00	0
2/10/2017	9:00:00	0
3/10/2017	9:00:00	21
4/10/2017	9:00:00	18.6
5/10/2017	9:00:00	0
6/10/2017	9:00:00	0.2
7/10/2017	9:00:00	16.4
8/10/2017	9:00:00	0
9/10/2017	9:00:00	24.4
10/10/2017	9:00:00	0
11/10/2017	9:00:00	5.4
12/10/2017	9:00:00	9.2
13/10/2017	9:00:00	0.4
14/10/2017	9:00:00	39.8
15/10/2017	9:00:00	28.4
16/10/2017	9:00:00	0
17/10/2017	9:00:00	2
18/10/2017	9:00:00	1.6
19/10/2017	9:00:00	0.2
20/10/2017	9:00:00	0
21/10/2017	9:00:00	16
22/10/2017	9:00:00	0.6
23/10/2017	9:00:00	0
24/10/2017	9:00:00	0
25/10/2017	9:00:00	0
26/10/2017	9:00:00	0
27/10/2017	9:00:00	0.6
28/10/2017	9:00:00	0
29/10/2017	9:00:00	1.2
30/10/2017	9:00:00	0.4
31/10/2017	9:00:00	0.6

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

October 2017

Date	Time	TOTAL Rain Gauge (mm)
1/10/2017	9:00:00	0
2/10/2017	9:00:00	0
3/10/2017	9:00:00	22.2
4/10/2017	9:00:00	9.8
5/10/2017	9:00:00	0
6/10/2017	9:00:00	0
7/10/2017	9:00:00	13.8
8/10/2017	9:00:00	2.2
9/10/2017	9:00:00	28.4
10/10/2017	9:00:00	0
11/10/2017	9:00:00	1.8
12/10/2017	9:00:00	10.4
13/10/2017	9:00:00	0.8
14/10/2017	9:00:00	57.8
15/10/2017	9:00:00	9
16/10/2017	9:00:00	0
17/10/2017	9:00:00	3.2
18/10/2017	9:00:00	0.4
19/10/2017	9:00:00	0
20/10/2017	9:00:00	0
21/10/2017	9:00:00	18.6
22/10/2017	9:00:00	0.8
23/10/2017	9:00:00	0
24/10/2017	9:00:00	0
25/10/2017	9:00:00	0
26/10/2017	9:00:00	0
27/10/2017	9:00:00	0.2
28/10/2017	9:00:00	0
29/10/2017	9:00:00	0.2
30/10/2017	9:00:00	0.2
31/10/2017	9:00:00	1

Table 2.3: Weather conditions recorded in October 2017 at Smoky Cape by the Bureau of Meteorology.

October 2017

Date	Minimum temperature (°C)	Maximum temperature (°C)	Rainfall (mm)
1/10/2017	17	23.6	0
2/10/2017	16	19.1	0
3/10/2017	15.2	21	22
4/10/2017	15.5	25.8	12.2
5/10/2017	18	26	0
6/10/2017	18.5	25.3	0
7/10/2017	15	23	3.2
8/10/2017	15.3	22.6	2.8
9/10/2017	18	25	18
10/10/2017	18.5	23	0
11/10/2017	19.8	26.9	0.6
12/10/2017	20.5	25.5	8
13/10/2017	18.1	27	1.4
14/10/2017	19.8	20.6	2.2
15/10/2017	18	24.4	0.6
16/10/2017	17.5	24.1	0
17/10/2017	18.1	25.6	0.4
18/10/2017	18.7	24.8	0
19/10/2017	18.8	24.6	0
20/10/2017	18	25.9	0
21/10/2017	13.5	17	22
22/10/2017	13.4	24.6	1.6
23/10/2017	13.4	24.1	3.4
24/10/2017	13.5	24	0
25/10/2017	17.9	26.1	0.4
26/10/2017	20	26.2	0
27/10/2017	18	27	0
28/10/2017	16.5	26.7	0
29/10/2017	18.4	27.6	1.6
30/10/2017	21	27	1.8
31/10/2017	15	24.1	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 of October 2017 after an event was triggered (>10mm of rain in 24 hour period). Field testing and lab sampling was undertaken. Results are attached in Appendix A.

pH levels noted to be outside of trigger levels at:

Lower Warrell Creek recorded slightly elevated pH levels upstream and downstream (7.18 upstream, 7.35 downstream, 6.86 trigger level for both sites). It is noted that these levels are within ANZECC criteria (pH 6.5-8.0). These results are consistent with previous results for the site (pH 7.33 upstream, pH 7.3 downstream recorded February 2017).

Gumma Wetlands downstream recorded slightly low pH levels (5.96 recorded downstream, 6.21 recorded upstream, 6.08 trigger level). A potential cause of this is the decaying vegetation within the waterway. These results are consistent with previous results for the site (pH 5.79 recorded downstream March 2017).

Conductivity (mS/ cm) noted to be outside of trigger levels at:

Gumma Wetlands recorded elevated conductivity upstream (0.934mS/cm recorded, 0.842mS/com trigger) and downstream (2.84mS/cm recorded, 0.842mS/cm trigger). These levels are consistent with previous results for the site (1.03mS/cm recorded upstream and 3.89mS/cm recorded downstream in October 2015).

Turbidity (NTU) noted to be outside of trigger levels at:

Nambucca River recorded elevated NTU upstream (22.4 NTU) and downstream (22.6 NTU). It is noted that levels were consistent between upstream and downstream sites, with construction impacts unlikely to be the cause of the elevated levels. These levels are consistent with previous results for the site (26.1 NTU recorded upstream, 43.6 NTU recorded downstream in May 2017).

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

Lower Warrell Creek recorded low DO levels downstream (4.67mg/L recorded downstream, 5.02mg/L trigger, 5.65mg/L recorded upstream). A potential cause for these levels is decaying vegetation within the waterway. These levels are consistent with previous results for the site (1.27mg/L recorded upstream, 1.8mg/L recorded downstream in June 2017).

Metals noted to be above trigger levels at:

Lower Warrell Creek recorded slightly elevated levels of manganese upstream and downstream (0.419mg/L recorded upstream, 0.474mg/L recorded downstream, 0.35mg/L trigger), elevated levels of nickel upstream and downstream (0.006mg/L recorded upstream and downstream, 0.0034mg/L trigger) and slightly elevated levels of zinc downstream (0.02mg/L recorded downstream, 0.014mg/L recorded upstream, 0.018mg/L

trigger). It is noted that nickel and manganese levels are within ANZECC criteria (1.9mg/L for manganese and 0.011mg/L for nickel).

Gumma Wetlands recorded elevated levels of nickel upstream and downstream (0.003mg/L recorded upstream, 0.022mg/L downstream, 0.002mg/L trigger), zinc upstream and downstream (0.021mg/L recorded upstream, 0.096mg/L recorded downstream, 0.011mg/L trigger), manganese downstream (2.07mg/L recorded downstream, 0.49mg/L trigger) and copper downstream (0.003mg/L recorded downstream, 0.001mg/L trigger).

Nutrients noted to be above trigger levels at:

Upper Warrell Creek recorded elevated levels of ammonia downstream (0.06mg/L recorded downstream, 0.02mg/L trigger). A potential source for this is from the adjacent agricultural paddocks.

Gumma Wetlands recorded elevated levels of nitrate downstream (0.3mg/L recorded, 0.03mg/L trigger) and ammonia downstream (0.9mg/L recorded, 0.06mg/L trigger). A potential source for this is from the adjacent agricultural paddocks.

2nd Wet Sampling Event

A second “wet” sampling event was undertaken on the 12th October 2017 after the event was triggered (>10mm of rain in 24 hour period). Field testing was undertaken. Results are attached in Appendix A.

pH levels noted to be outside of trigger levels at:

Gumma Wetlands recorded slightly elevated pH levels upstream and downstream (7.0 recorded upstream, 7.2 recorded downstream, trigger levels 6.9). Levels were consistent between upstream and downstream sites and are unlikely to be due to construction impacts. It is also noted that these levels are within ANZECC criteria (6.5-8.0).

Conductivity (mS/cm) noted to be outside of trigger levels at:

Gumma Wetlands recorded slightly elevated conductivity levels upstream and downstream (0.998mS/cm and 1.17mS/cm recorded upstream, 1.04mS/cm recorded downstream, 0.842mS/cm trigger). It is noted that levels were consistent between upstream and downstream sites and are unlikely to be due to construction impacts.

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

Nambucca River recorded low DO levels upstream and downstream (4.44mg/L recorded upstream, 6.81mg/L downstream). It is noted that levels increased from upstream to downstream sites and are unlikely to be due to construction impacts. Decaying organic matter is a potential cause for the low levels. It is also noted that downstream levels are above ANZECC criteria (5mg/L).

Dry Sampling Event

A “dry” sampling event was undertaken on the 25th October 2017, field testing was undertaken. Results are attached in Appendix A.

pH levels noted to be outside of trigger levels at:

Lower Warrell Creek recorded elevated pH levels upstream and downstream (7.46 recorded upstream, 7.48 recorded downstream, 7.02 trigger). It is noted that levels were consistent between upstream and downstream sites and are unlikely to be due to construction impacts.

Nambucca River recorded elevated levels upstream (pH 7.09) and downstream (pH 7.47). It is noted that trigger levels are pH 7.00, with any value outside of this being outside of trigger levels. It is also noted that these levels are within ANZECC criteria (6.5-8.0). These results are consistent with previous results for the site (pH 7.88 upstream, pH 7.73 downstream in August 2017, pH 7.93 upstream, pH 7.96 downstream in July 2017).

Conductivity (mS/cm) noted to be outside of trigger levels at:

Gumma Wetlands downstream recorded elevated conductivity levels (1.64mS/cm recorded, 0.808mS/cm trigger). It is noted that these levels are within ANZECC criteria (0.125-2.2 mS/cm).

Turbidity (NTU) noted to be outside of trigger levels at:

Upper Warrell Creek recorded slightly elevated NTU levels downstream (11.4 NTU recorded, 9.9 NTU trigger). This was compared with the upstream result of 8.3 NTU which shows a minimal increase noted of 3.1 NTU between upstream and downstream. Controls were noted to be installed onsite as per the Progressive Erosion and Sediment Control Plan with no site runoff or dewatering activities being undertaken during the monitoring session. Pacifico believe this minor exceedance is most likely due to localised NTU changes within the waterway at the sampling locations.

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

Nambucca River recorded low levels upstream (5.97mg/L recorded, trigger level 7.4mg/L) and downstream (6.14mg/L recorded, trigger level 7.4mg/L). It is noted that levels increased between upstream and downstream sites and works within the waterway had been completed (i.e. piling, headstocks etc). It is also noted that these levels are within ANZECC criteria (5mg/L). These levels are consistent with previous results for the site (2.99mg/L upstream, 2.68mg/L downstream in April 2017).

4. Sediment Basin Water Monitoring

Water was released from commissioned basins after rainfall on the 3rd – 4th, 9th, 11th-15th, 17th-19th, 21st-22nd, 27th and 29th-31st of October 2017. A statistical correlation has been developed which identified the relationship between Turbidity (NTU) and Total Suspended Solids (TSS) for water quality in the WC2NH Project sediment basins in order to determine the NTU equivalent of 50mg/L TSS. This statistical correlation has been developed to meet EPL Licence No 20533 Condition L2.7 to determine compliance with the Water and/or Land Concentration Limits Condition L2.4. A positive correlation has been calculated between Total Suspended Solids (TSS) and Turbidity (NTU) (R^2 = 0.4941, $p < 0.00001$, $n = 227$). The regression equation for the analytical results calculates a turbidity (NTU) value of 120.716 for a TSS value of 50mg/L. A safety factor of 30% has been applied to the NTU result of the correlation, providing a turbidity (NTU) value of 84.50, rounded to an NTU value of 85. To measure NTU in the field a Horiba U-52G multi-parameter water quality meter has been utilised, which is maintained and calibrated in accordance with

manufacturer's specifications. TSS sampling is being undertaken to ensure compliance with 1 in 10 sampling to validate the correlation.

Table 3 below has the water quality results recorded for the water release events:

Table 3 – Water Release Register September 2017

Date	Basin ID	Oil and Grease (visible) (Limit = No visible)	pH (6.5-8.5)	Turbidity (NTU) (Limit <85 NTU)	TSS (mg/L) (Limit <50mg/L)	Approx Volume Discharged (kL)	Comments
4/10/2017	B47.96	N	6.61	10.7	<5	600	
5/10/2017	B47.96	N	6.59	13.8		400	
5/10/2017	B53.50	N	8.38	29.2	8	300	
9/10/2017	B42.80	N	7.06	25.6		400	
9/10/2017	B53.80	N	8.34	34.4		300	
10/10/2017	B47.96	N	6.59	40.3		400	
10/10/2017	B53.50	N	7.9	73.8	32	700	
10/10/2017	B53.80	N	8.2	30.2		250	
11/10/2017	B47.96	N	6.59	22.4		400	
11/10/2017	B53.50	N	8.09	74.8		400	
13/10/2017	B53.90	N	8.21	68.6		400	
16/10/2017	B42.80	N	7.18	33		650	
16/10/2017	B47.96	N	6.54	11.6		600	
16/10/2017	B53.80	N	8.06	19.3		390	
17/10/2017	B53.80	N	8.21	17.2		150	
17/10/2017	B53.90	N	7.41	68.2		800	
18/10/2017	B49.45	N	7.53	59.6	34	800	
18/10/2017	B53.50	N	6.61	55.2		400	
18/10/2017	B53.50	N	6.58	58.1		450	
19/10/2017	B42.30	N	6.89	43.6		900	
19/10/2017	B47.96	N	6.63	18.3		350	
19/10/2017	B53.80	N	8.18	28.8		100	
19/10/2017	B53.90	N	7.46	65.1		350	
20/10/2017	B42.30	N	7.52	22.9		800	
20/10/2017	B53.50	N	7.61	42.1		100	
23/10/2017	B53.50	N	7.89	34.4		350	
23/10/2017	B53.80	N	7.98	24.8		200	
24/10/2017	B53.50	N	7.63	36.1		200	
24/10/2017	B53.90	N	7.23	42.1		200	
26/10/2017	B53.50	N	7.75	62.5		80	

5. Noise Monitoring

Monthly routine construction noise monitoring was undertaken on the 19th of October 2017 at five locations near to construction works. Monitoring results are available in Appendix A, Table 2.

All sites were within predicted levels for the activity being undertaken or were not the dominant noise source at the nearest residence.

6. Vibration Monitoring

Vibration monitoring was undertaken during the month of October 2017. Results are available in Appendix A. Results were within compliance levels (5mm/s) for building damage.

7. Dust Monitoring

Dust deposition gauges (DDG) were placed at nearby sensitive receivers from 29th August 2017, 4th and 19th September 2017 to the to the 29th September and 3rd October 2017. DDG results are available in Appendix A.

All dust deposition gauges were below the level of concern for Total Insoluble Matter (TIM) and Ash Content (AC) (4g/m2.month or increase of 2g/m2/month) during the monitoring period with the exception of DDG5.

DDG5 recorded an elevated result (37.3g/m2.month TIM, 32.8g/m2.month AC). The result at this gauge is unusual as the bulk earthworks in this area has completed, with batters hydromulched and the section of alignment closest to the gauge sealed and paved. The high reading from DDG5 during September 2017 is not believed to be due to construction activities, with another source of contamination impacting on the results. Community has contacted the resident and asked for any tampering with the gauge to be reported to AFJV.

Dust mitigation measures including water carts, surfactant additives and wetting of quarry material before arrival and during placement will continue.

8. Groundwater Monitoring

ACCIONA (Pacifico) undertook groundwater monitoring on the 24th of October 2017. Field and laboratory testing was undertaken. The results from the groundwater monitoring is available in Table 4 of Appendix A.

<u>pH levels noted to be outside of trigger levels at:</u>

Cut 11 bores recorded low pH at upslope bore 4BH022c (pH 5.73 recorded, pH 5.93 trigger). It is noted that the upslope bore was relocated from its original location due to it being located within the construction footprint, with the trigger levels not necessarily correlating with the new bore location. These results are consistent with previous results e.g. pH 5.51 at 4BH022c in July 2017.

Fill 15 bores recorded elevated pH at 4BH037a (pH 7.40 recorded, pH 6.51 trigger) and 4BH038 (pH 7.42 recorded, 7.30 trigger). It is noted that 4BH037a has been relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily corresponding with the new bore location. These are consistent with previous results for 4BH037a e.g. pH 7.07 in April 2017 and 4BH038 e.g. pH 8.03 recorded in August 2017.

Cut 15 bore recorded elevated pH at the upgradient bore 4BH058c (pH 7.65 recorded, pH 6.39 trigger). It is noted that 4BH058c has been relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily corresponding with the new bore location. This is consistent with previous results for the bore e.g. pH 8.01 recorded in October 2016. Down gradient bore 4BH057 was dry, with no results recorded for the bore.

Conductivity (mS/cm) noted to be above trigger levels at:

4BH037a – Fill 15 west bore recorded elevated conductivity levels (11.30mS/cm recorded, 5.55mS/cm trigger). It is noted that this bore had to be relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily corresponding with the new bore location. This result is consistent with previous results for the bore e.g. 10.40mS/cm recorded in August 2017.

Total Dissolved Solids (TDS) noted to be above trigger levels at:

Cut 11 bores recorded elevated TDS levels at upgradient bore 4BH022c (1.12g/L recorded, 0.1306 trigger) and downgradient bore 4BH021 (0.104g/L recorded, 0.0946g/L trigger). It is noted that TDS levels decreased from upgradient to downgradient bores and are unlikely to be due to construction impacts.

4BH037a – Fill 15 west bore recorded elevated TDS (6.99g/L recorded, 0.1326g/L trigger level). It is noted that this bore had to be relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily corresponding with the new bore location. This is consistent with previous results for the bore e.g. 6.09g/L in July 2017, 6.20g/L in April 2017, 5.74g/L in January 2017.

4BH058c – Cut 15 upgradient bore recorded elevated TDS (0.206g/L recorded, 0.111g/L trigger). It is noted that this bore had to be relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily corresponding with the new bore location. These results are consistent with previous results in this cut e.g. 0.67g/L recorded November 2015.

Water depth noted to be below trigger levels at:

4BH058c – Cut 15 upslope bore recorded low water depth (15.37m from top of casing recorded, 13.84m trigger). It is noted that this bore had to be relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily corresponding with the new bore location. It is also noted that bulk earthworks have been completed in this area, with no groundwater seepage from cut faces or groundwater ingress noted.

Metals noted to be above trigger levels at:

4BH010 – Cut 6 downgradient bore recorded elevated levels of arsenic (0.001mg/L recorded, 0.0009mg/L trigger) and iron (26.5mg/L recorded, 6.58mg/L trigger). It is noted that bulk earthworks have completed in this area, with no groundwater seepage from any cut faces or groundwater ingress noted.

4BH022c – Cut 11 upgradient bore recorded elevated levels of aluminium (0.510mg/L recorded, 0.0122mg/L trigger), cadmium (0.0093mg/L recorded,

0.0001mg/L trigger), copper (0.009mg/L recorded, 0.003mg/L trigger), manganese (1.880mg/L recorded, 0.486mg/L trigger), nickel (0.1420mg/L recorded, 0.0036mg/L trigger) and zinc (0.507mg/L recorded, 0.0085mg/L trigger). It is noted that this bore had to be relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily corresponding with the new bore location. These results are consistent with previous results for the new location of the bore e.g. 0.410mg/L aluminium, 0.0096mg/L cadmium, 0.008mg/L copper, 2.380mg/L manganese, 0.129mg/L nickel, 0.430mg/L zinc recorded July 2017.

Fill 15 east and west bores 4BH038 and 4BH037a recorded elevated levels of nickel (0.0140mg/L recorded, 0.0068mg/L trigger for 4BH037a and 0.008mg/L recorded, 0.006mg/L trigger for 4BH038) and zinc (0.0360mg/L recorded, 0.196mg/L trigger for 4BH037a, 0.0280mg/L recorded, 0.0132mg/L trigger for 4BH038). It is noted that bore 4BH037a had to be relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily corresponding with the new bore location. These results are consistent with previous results for the bores e.g. 0.015mg/L nickel, 0.030mg/L zinc recorded for bore 4BH037a and 0.007mg/L nickel, 0.092mg/L zinc recorded for 4BH038 in July 2017.

Nutrients were noted to be above trigger levels at:

4BH010 – Cut 6 downgradient bore recorded elevated levels of phosphorus (0.04mg/L recorded, 0.0284mg/L trigger) and nitrogen (0.8mg/L recorded, 0.58mg/L trigger). It is noted that bulk earthworks have completed in this area, with no groundwater seepage from any cut faces or groundwater ingress noted. These results are consistent with previous results for the bore e.g. 0.08mg/L phosphorus, 1.0mg/L nitrogen recorded April 2017.

4BH022c – Cut 11 downgradient bore recorded elevated levels of nitrogen (2.2mg/L recorded, 0.58mg/L trigger) and nitrate (1.79mg/L recorded, 0.40mg/L trigger). It is noted that this bore had to be relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily corresponding with the new bore location. These results are consistent with previous results for this bore e.g. 4.2mg/L nitrogen, 3.79mg/L nitrate recorded April 2017.

4BH037a – Fill 15 west bore recorded elevated levels of nitrate (0.75mg/L recorded, 0.40mg/L trigger). It is noted that this bore had to be relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily corresponding with the new bore location.

Major anions and cations noted to be above trigger levels at:

Cut 11 – upgradient bore 4BH022c and downgradient bore 4BH021 recorded elevated levels of chloride (139mg/L recorded, 78.8mg/L trigger at 4BH022c, 16mg/L recorded, 15.2mg/L trigger at 4BH021). Upgradient bore 4BH022c also recorded elevated levels of sulfate (652mg/L recorded, 61.8mg/L trigger), sodium (164mg/L recorded, 72mg/L trigger), calcium (77mg/L recorded, 50.4mg/L trigger) and magnesium (75mg/L recorded, 11.8mg/L trigger). It is noted that bore 4BH022c had to be relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily

corresponding with the new bore location. These results are consistent with previous results for the bores e.g. 252mg/L chloride recorded at 4BH022c and 16mg/L chloride, 735mg/L sulfate, 187mg/L sodium, 73mg/L calcium, 90mg/L magnesium at bore 4BH021 recorded July 2017.

Fill 15 – western bore 4BH037a recorded elevated levels of chloride (1780mg/L recorded, 949mg/L trigger), sulfate (3200mg/L recorded, 2056mg/L trigger), bicarbonate (721mg/L recorded, 61mg/L trigger), sodium (1400mg/L recorded, 720mg/L trigger), potassium (74mg/L recorded, 41mg/L trigger), calcium (381mg/L recorded, 190mg/L trigger) and magnesium (617mg/L recorded, 306mg/L trigger). It is noted that bore 4BH037a had to be relocated from its original location due to it being within the construction footprint, with trigger levels not necessarily corresponding with the new bore location. These results are consistent with previous results for this bore e.g. 1760mg/L chloride, 3700mg/L sulfate, 704mg/L bicarbonate, 1340mg/L sodium, 75mg/L potassium, 382mg/L calcium, 564mg/L magnesium recorded July 2017.

9. Acoustic Investigations

Out of Hours Works undertaken during the month of October 2017 under Condition L4.2(d) of the EPL are outlined in Table 4.

Table 4 – October Out of Hours Works approved under L4.2 (d)

Out of Hours Activity	>5dB(A) above background	Complete? Y/N
Concrete Finishing Works Nambucca River Bridge Abutment A	N	Y
Concrete Finishing Works Nambucca River Bridge Span 10	N	Y
Floodplain Bridges 1 and 2 Stick Pour Preparation Works	N	Ongoing
Nambucca River Bridge Abutment B Expansion Joint	N	Y
Nambucca River Bridge (North Pier 7)	N	Ongoing
Basin B45.00 Concreting	N	Y
Asphalt Paver Servicing (Gate 6N)	N	Y
CC05 Finishing Works	N	Ongoing
Floodplain Bridges 1 and 2 Concreting Works	N	Ongoing

Acoustic Investigations (field monitoring) have been conducted for Out of Hours Works during the month of October 2017, results are included in Appendix A.

10. Complaints

10.1 Summary of Complaints for the month of October 2017

20/10/2017 – A resident contacted Pacifico regarding concerns about cracks in their walls which they believe were related to vibration works at the nearby stockpile site. Community met with the resident and explained that the only works which had been undertaken recently were crushing, with no major works currently being undertaken in the stockpile area. Pacifico recorded the concerns and the possibility of an insurance claim to deal with the issue and this will be explored at the end of the project.

22/10/2017 – A resident contacted Pacifico regarding personnel at the Compound at Albert Drive on a Sunday. Resident stated that the works were not loud but felt that he should have been notified. The personnel were undertaking works at Upper Warrell Creek on Sunday as per the approved Out of Hours Works for this location. Community and Environment team discussed this issue with the site foreman and agreed that in future all works are to be limited to those included within the Out of Hours Works Permit with no small tool collection permitted from the Albert Drive Compound.

11. Non-Compliance

11.1 Summary of Non-compliances

No Non Compliances were raised against ACCIONA's Environmental Protection Licence during the month of October 2017.

Appendix A – Monitoring Results

Table 1a – Surface Water Results October 2017 – 1st Wet Event

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			Upstream			Downstream			Upstream			Downstream			Upstream			Upstream			Downstream			Upstream			Downstream		
Freshwater / Estuarine		ANZECC 2000 95% species protected		Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Estuarine			Estuarine		
Date of Sampling				3-Oct-17			3-Oct-17			3-Oct-17			3-Oct-17			3-Oct-17			3-Oct-17			3-Oct-17			3-Oct-17			3-Oct-17			3-Oct-17			3-Oct-17		
Time of Sampling		Freshwater	Marine	1:30 PM			1:15 PM			1:00 PM			12:30 PM			4:00 PM			3:30 PM			2:30 PM			2:00 PM			2:40 PM			3:15 PM			3:01 PM		
Comments																																				
Type				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
Laboratory data																																				
Metals																																				
Aluminium	mg/L	0.055	-	0.244	0.0162	0.01	0.194	0.016	<0.01	0.098	0.02	0.03	0.114	0.01	0.03	0.28	0.01	<0.01	0.28	0.01	<0.01	0.25	0.02	<0.01	0.25	0.02	0.16	0.25	0.02	0.01	0.11	0.01	<0.10	0.11	0.01	<0.10
Arsenic	mg/L	0.024	0.0023	0.001	0.001	<0.001	0.001	0.001	<0.001	0.002	0.001	0.001	0.002	0.001	<0.001	0.001	0.001	<0.001	0.001	0.001	<0.001	0.002	0.001	0.001	0.002	0.001	0.001	0.002	0.001	<0.001	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	0.0002	0.0001	<0.0001	0.0002	0.0001	<0.0001	-	-	<0.0001	-	-	<0.0001	-	-	0.0018	-	-	<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
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	<0.001	0.001	0.001	0.003	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
Manganese	mg/L	1.9	0.08	0.3	0.01	0.017	0.158	0.0178	0.047	0.0726	0.0218	0.018	0.083	0.0164	0.033	0.35	0.087	0.419	0.35	0.087	0.474	0.49	0.011	0.236	0.49	0.011	0.127	0.49	0.011	2.07	0.076	0.006	0.06	0.076	0.006	0.046
Nickel	mg/L	0.011	0.07	-	-	0.001	-	-	<0.001	-	-	0.001	-	-	<0.001	0.0034	0.001	0.006	0.0034	0.001	0.006	0.002	0.001	0.001	0.002	0.001	0.003	0.002	0.001	0.022	-	-	<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
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
Zinc	mg/L	0.008	0.015	0.007	0.005	0.005	0.0062	0.0042	<0.005	0.0064	0.005	<0.005	0.006	0.005	<0.005	0.018	0.005	0.014	0.018	0.005	0.02	0.011	0.005	<0.005	0.011	0.005	0.021	0.011	0.005	0.096	0.005	0.005	<0.050	0.005	0.005	<0.050
Iron	mg/L	-	-	1.38	0.48	0.25	0.99	0.366	0.3	1.4	0.41	0.94	1.48	0.35	0.97	0.52	0.05	<0.05	0.52	0.05	<0.05	1.65	0.37	0.54	1.65	0.37	0.84	1.65	0.37	0.16	0.26	0.05	<0.10	0.26	0.05	<0.10
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
Total Recoverable Hydrocarbons																																				
Naphthalene	µg/L	16	50	16		NA	16		NA	16		NA	16		NA	16		NA	16		NA	16		NA	16		NA	16		NA	50		NA	50		NA
C6 - C10 Fraction	µg/L	-	-	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA
C6 - C10 Fraction minus BTEX (F1)	µg/L	-	-	-		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
>C16 - C34 Fraction	µg/L	-	-	-		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
>C10 - C40 Fraction (sum)	µg/L	-	-	-		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
BTEX																																				
Benzene	µg/L	950	700	950		NA	950		NA	950		NA	950		NA	950		NA	950		NA	950		NA	950		NA	950		NA	700		NA	700		NA
Toluene	µg/L	180	180	180		NA	180		NA	180		NA	180		NA	180		NA	180		NA	180		NA	180		NA	180		NA	180		NA	180		NA
Ethylbenzene	µg/L	80	5	80		NA	80		NA	80		NA	80		NA	80		NA	80		NA	80		NA	80		NA	80		NA	5		NA	5		NA
m&p-Xylenes	µg/L	-	-	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA	-		NA
o-Xylene	µg/L	350	350	350		NA	350		NA	350		NA	350		NA	350		NA	350		NA	350		NA	350		NA	350		NA	350		NA	350		NA
Xylenes - Total	µg/L	-	-	-		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
Nutrients																																				
Total Phosphorus	mg/L	0.05	0.03	0.05	0.02	0.03	0.044	0.016	0.02	0.03	0.016	0.02	0.034	0.01	0.02	0.04	0.01	<0.02	0.04	0.01	<0.02	0.11	0.03	0.02	0.11	0.03	0.12	0.11	0.03	0.05	0.07	0.02	0.44	0.07	0.02	0.08
Phosphate (reactive phosphorus)	mg/L	-	-	0.01	0.0034	<0.01	0.01	0.004	<0.01	0.018	0.0022	<0.01	0.01	0.003	<0.01	0.011	0.006	<0.01	0.011	0.006	<0.01	0.013	0.005	<0.05	0.013	0.005	<0.05	0.013	0.005	<0.01	0.029	0.01	<0.01	0.029	0.01	<0.01
Total Nitrogen	mg/L	0.5	0.3	0.56	0.3	0.6	0.52	0.2	0.3	0.48	0.2	0.3	0.63	0.2	0.2	0.54	0.31	0.4	0.54	0.31	0.4	3.1	0.9	0.9	3.1	0.9	1.9	3.1	0.9	2.9	0.46	0.2	3.2	0.46	0.2	<0.5
Total Kjeldahl Nitrogen	mg/L	-	-	0.5	0.3	0.6	0.5	0.2	0.3	0.34	0.2	0.3	0.6	0.2	0.2	0.5	0.2	0.4	0.5	0.2	0.4	2.8	0.8	0.9	2.8	0.8	1.9	2.8	0.8	2.6	0.3	0.2	3.2	0.3	0.2	<0.5
Nitrate	mg/L	0.7	-	0.102	0.01	<0.01	0.054	0.01	0.03	0.208	0.01	0.02	0.2	0.01	0.03	0.05	0.01	0.02	0.05	0.01	0.02	0.03	0.01	0.01	0.03	0.01	<0.01	0.03	0.01	0.3	0.04	0.01	0.01	0.04	0.01	0.05
Nitrite	mg/L	-	-	-	-	<0.01	-	-	<0.01	-	-	<0.01	0.02	0.01	<0.01	0.02	0.01	<0.01	0.02	0.01	<0.01	0.02	0.01	<0.01	0.02	0.01	<0.01	0.02	0.01	0.01	0.02	0.01	<0.01	0.02	0.01	<0.01
Ammonia	mg/L	0.9	-	0.036	0.01	0.01	0.02	0.01	0.06	0.046	0.02	0.04	0.062	0.012	<0.01	0.116	0.022	0.05	0.116	0.022	0.11	0.06	0.01	0.03	0.06	0.01	<0.01	0.06	0.01	0.9	0.15	0.024	<0.10	0.15	0.024	<0.10
TSS																																				
TSS	mg/L	<40	<10	19	5	<0.01	12.8	5	0.03	14.8	5	0.02	8.7	5	0.03	25	5.5	0.02	25	5.5	0.02	350	9	0.01	350	9	<0.01	350	9	0.31			0.01			0.05
Field Physical data																																				
Temperature	°C	-	-	24.3	16.27	19.18	24.52	16.79	19.98	23.98	17.36	18.71	24.7	17.65	20.01	25.9	19.5	21.79	25.9	19.5	21.85	25.84	19.1	22	25.84	19.1	20.5	25.84	19.1	22.65	26.56	21.32	22.52	26.56	21.32	22.72
pH	pH	-	6.5-8	7.478	6.23	6.62	7.192	6.42	6.65	7.138	6.61	6.49	6.98	6.21	6.55	6.86	6.46	7.18	6.86	6.46	7.35	6.9	6.08	6.76	6.9	6.08	6.21	6.9	6.08	5.96	7.56	6.58	7.63	7.56	6.58	7.49
Conductivity	mS/cm	0.125-2.2	-	0.3204	0.20184	0.235	0.3242	0.19076	0.245	0.313	0.2024	0.258	0.309	0.20188	0.289	20.918	0.50928	13.4	20.918	0.50928	14.5	0.842	0.334	0.934	0.842	0.334	0.46	0.842	0.334	2.84	48.42	12.65	44.6	48.42	12.65	44.3
Turbidity	NTU	50	10	26.16	5.94	4.4	27.32	3.72	6.3	14.98	3.34	9	17.16	4.59	11.2	26.1	2.4	6.1	26.1	2.4	10	66.8	11.6	9.2	66.8	11.6	39.8	66.8	11.6	33.9	19.04	5.81	22.4	19.04	5.81	22.6
Dissolved Oxygen	mg/L	5	5	7.43	1.5	3.52	6.88	2.28	6.59	8.472	5.08	6.08	7.59	2.63	9.81	6.65	5.02	5.65	6.65	5.02	4.67	7.3	1.78	3.32	7.3	1.78	3.34	7.3	1.78	2.02	8.47	6.88	3.42	8.47	6.88	5.69
Dissolved Oxygen	%			-		39.3	-		74.5	-		67.1	-		101	-		68.8	-		57.1	-		39	-		38.1	-		24.1	-		47.9	-		79.8
TDS	g/L	-	-	-		0.153	-		0.159	-		0.167	-		0.188	-		8.30	-		9	-		0.598	-		0.299	-		1.82	-		27.2	-		27

Taken from ANZECC guidelines 95% protected species levels where no 80/20 trigger values provided

Taken from alternative trigger levels provided in ANZECC Water Guidelines Volume 1 and Volume 2 where insufficient data was available for 95%

Exceedances of trigger values

Table 1b – Surface Water Results October 2017 – 2nd Wet Event

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			Upstream			Downstream			Upstream			Downstream			Upstream			Upstream			Downstream			Upstream			Downstream		
Freshwater / Estuarine		ANZECC 2000 95% species protected		Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Estuarine			Estuarine		
Date of Sampling				12-Oct-17			12-Oct-17			12-Oct-17			12-Oct-17			12-Oct-17			12-Oct-17			12-Oct-17			12-Oct-17			12-Oct-17			12-Oct-17			12-Oct-17		
Time of Sampling		Freshwater	Marine	11:00 AM			10:45 AM			10:30 AM			10:15 AM			11:30			11:15 AM			11:45 AM			12:00 PM			11:40 AM			12:30 PM			12:15 PM		
Comments																																				
Type				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
Field Physical data																																				
Temperature	°C	-	-	24.3	16.27	22.08	24.52	16.79	22.85	23.98	17.36	22	24.7	17.65	21.40	25.9	19.5	24.02	25.9	19.5	24.06	25.84	19.1	24.35	25.84	19.1	23.99	25.84	19.1	24.81	26.56	21.32	23.98	26.56	21.32	23.98
pH	pH	-	6.5-8	7.478	6.23	6.67	7.192	6.42	6.86	7.138	6.61	6.58	6.98	6.21	6.56	6.86	6.46	6.88	6.86	6.46	6.81	6.9	6.08	7	6.9	6.08	6.86	6.9	6.08	7.2	7.56	6.58	7.61	7.56	6.58	7.34
Conductivity	mS/cm	0.125-2.2	-	0.3204	0.20184	0.215	0.3242	0.19076	0.221	0.313	0.2024	0.241	0.309	0.20188	0.243	20.918	0.50928	11.5	20.918	0.50928	11.6	0.842	0.334	0.998	0.842	0.334	1.17	0.842	0.334	1.04	48.42	12.65	39.1	48.42	12.65	38.6
Turbidity	NTU	50	10	26.16	5.94	11.6	27.32	3.72	5.2	14.98	3.34	8.3	17.16	4.59	10.4	26.1	2.4	24.5	26.1	2.4	17.9	66.8	11.6	26.5	66.8	11.6	28.4	66.8	11.6	38.1	19.04	5.81	4.9	19.04	5.81	8.5
Dissolved Oxygen	mg/L	5	5	7.43	1.5	2.23	6.88	2.28	6.54	8.472	5.08	8.14	7.59	2.63	8.16	6.65	5.02	3.77	6.65	5.02	6.11	7.3	1.78	4.49	7.3	1.78	4.33	7.3	1.78	6.05	8.47	6.88	4.44	8.47	6.88	6.81
Dissolved Oxygen	%			-		26.2	-		77.8	-		99.1	-		94.7	-		47.4	-		76.9	-		54.9	-		52.7	-		74.6	-		62.1	-		95.1
TDS	g/L	-	-	-		0.139	-		0.144	-		0.149	-		0.158	-		7.15	-		7.22	-		0.639	-		0.746	-		0.665	-		23.8	-		23.5

Taken from ANZECC guidelines 95% protected species levels where no 80/20 trigger values provided

Taken from alternative trigger levels provided in ANZECC Water Guidelines Volume 1 and Volume 2 where insufficient data was available for 95%

Exceedances of trigger values

Table 1c – Surface Water Results October 2017 – Dry Event

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			Upstream			Downstream			Upstream			Downstream			Upstream			Upstream			Downstream			Upstream			Downstream		
Freshwater / Estuarine		ANZECC 2000 95% species protected		Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Estuarine			Estuarine		
Date of Sampling				25-Oct-17			25-Oct-17			25-Oct-17			25-Oct-17			25-Oct-17			25-Oct-17			25-Oct-17			25-Oct-17			25-Oct-17			25-Oct-17			25-Oct-17		
Type				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
Field Physical data																																			
Temperature	°C	-	-	24.86	14.99	21.16	25.1	16.3	21.54	24.4	16	20.11	26.46	15.94	20.86	27.9	18.4	25.725	27.9	18.4	25.51	26.5	16.3	21.95	26.5	16.3	21.54	26.5	16.3	21.87	27.9	18.1	25.72	27.9	18.1	24.86
pH	pH	-	6.5-8	7.25	6.48	6.64	7.3	6.4	6.7	7.5	6.6	6.82	7.33	6.26	6.75	7.02	6.57	7.46	7.02	6.57	7.48	7	6.1	6.33	7	6.1	6.89	7	6.1	6.2	7	7	7.09	7	7	7.47
Conductivity	mS/cm	0.125-2.2	-	0.316	0.232	0.275	0.348	0.227	0.28	0.348	0.227	0.299	0.3338	0.2168	0.265	20.946	0.679	5.2	20.946	0.679	4.64	0.808	0.4234	0.795	0.808	0.4234	0.564	0.808	0.4234	1.64	47.32	29.44	36.6	47.32	29.44	37.4
Turbidity	NTU	50	10	10.96	4	8.3	9.9	3.5	11.4	9.9	3.5	8.3	5.97	3.74	1.3	6.82	1.83	6.3	6.82	1.83	6.8	52.78	11.3	28.1	52.78	11.3	26.8	52.78	11.3	12.9	19.3	6.7	9.1	19.3	6.7	18.3
Dissolved Oxygen	mg/L	5	5	4.98	1.91	3.35	4.8	2.6	3.26	4.8	2.6	7.69	6.34	3.52	6.82	7.98	5.07	5.62	7.98	5.07	5.53	6.4	1.75	4.88	6.4	1.75	1.62	6.4	1.75	4.81	9.1	7.4	5.97	9.1	7.4	6.14
Dissolved Oxygen	%			-	-	38.7	-	-	37.9	-	-	87.2	-	-	78.4	-	-	71.2	-	-	69.6	-	-	57.3	-	-	18.9	-	-	65.8	-	-	85.0	-	-	86.5
TDS	g/L	-	-	-		0.179	-		0.182	-		0.195	-		0.172	-		3.270	-		2.970	-		0.509	-		0.361	-		1.05	-		22.4	-		22.8

Taken from ANZECC guidelines 95% protected species levels where no 80/20 trigger values provided

Taken from alternative trigger levels provided in ANZECC Water Guidelines Volume 1 and Volume 2 where insufficient data was available for 95%

Exceedances of trigger values

Table 2 - Noise Monitoring Results October 2017

Date	Time	Location	Rec ID	NCA	NML	Activity	Predicted levels for activity	L_{Aeq}	L_{AFMAX}	L_{AFMIN}	L_{AF10}	L_{AF50}	L_{AF90}	Principal sources/ operations	Construction noise dominant?	Corrective actions	Notes
19/10/2017	10:50 AM	Albert Drive	74	1	50	Cut	62	50.1	74.9	42.8	51.3	48	45.8	Excavator loading trucks	Y	N/A	Within predicted levels, stockpile area behind cut to mitigate noise impacts.
19/10/2017	11:20 AM	Bald Hill Rd	197	3	50	Road Furniture Installation	73	49.4	69	44.6	51.1	48.1	46.5	Generator, saw, hand tools	Y	N/A	Within predicted levels. Stockpile in place on east side of alignment to reduce noise levels from construction activities.
19/10/2017	2:58 PM	Letitia Rd	406	4	59	Cut	74	63.9	78.3	49.7	67.5	62.6	54.4	Excavator, dozer, roller	Y	N/A	Within predicted levels. Regular consultation undertaken with residents impacted by NFR construction activities.
19/10/2017	12:56 PM	Mattick Rd	442	6	44	Trucks hauli	71	47.5	77.2	39	48.2	43.7	41.6	Truck, bobcat, excavators	N	N/A	Within predicted levels. Dominant noise source house pump (45-50dBA) and birds (50-57dBA). Permanent noise mounds in place to reduce construction noise at sensitive receivers.
19/10/2017	11:55 AM	Gumma Rd	383	3	50	Fill	66	55.7	74.2	50.5	57.2	55.1	53.4	Excavator, hand tools	Y	N/A	Within predicted levels.

Table 3 – Dust Monitoring Results August – October 2017

			DDG ID		DDG1	DDG2	DDG3	DDG4	DDG5	DDG6	DDG6N	DDG7	DDG8A	DDG9NE	DDG9E	DDG10	DDG A1	DDG A2
			Start date of sampling		4/09/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	29/08/2017	19/09/2017	29/08/2017	29/08/2017	4/09/2017	29/08/2017	29/08/2017
			Finish date of sampling		3/10/2017	29/09/2017	29/09/2017	29/09/2017	29/09/2017	29/09/2017	29/09/2017	29/09/2017	3/10/2017	29/09/2017	29/09/2017	3/10/2017	29/09/2017	29/09/2017
Analyte	Time Period	Unit	Levels of Concern	LOR														
Ash Content	Current Month	g/m².month	4	0.1	0.8	0.3	1.6	0.7	32.8	0.8	0.5	0.8	1.1	0.3	0.3	1.8	----	----
		mg	N/A	1	14	6	30	13	599	14	10	14	9	5	5	31	----	----
	Previous Month	g/m².month			0.1	0.4	0.8	0.4	0.3	0.5	0.7	1.8	3.9	0.4	0.3		----	----
	Change	g/m².month	Increase of 2		0.7	-0.1	0.8	0.3	32.5	0.3	-0.2	-1	-2.8	-0.1	0		----	----
Combustible Matter	Current Month	g/m².month	N/A	0.1	0.8	0.9	1.7	0.7	4.5	0.4	0.6	1	1	0.6	0.7	0.6	----	----
		mg	N/A	1	13	15	31	12	82	8	10	19	8	12	13	10	----	----
Total Insoluble Matter (TIM)	Current Month	g/m².month	4	0.1	1.6	1.2	3.3	1.4	37.3	1.2	1.1	1.8	2.1	0.9	1	2.4	----	----
		mg	N/A	1	27	21	61	25	681	22	20	33	17	17	18	41	----	----
	Previous Month	g/m².month		0.1	0.3	0.7	1.1	0.4	0.5	0.9	0.9	2.3	4.9	0.4	0.4		----	----
	Change	g/m².month	Increase of 2	0.1	1.3	0.5	2.2	1	36.8	0.3	0.2	-0.5	-2.8	0.5	0.6		----	----
Arsenic	Current Month	mg/L		0.001	----	----	----	----	----	----	----	----	----	----	----	----	0.001	0.003
Comments					Insects in gauge	House under construction opposite side of road from gauge location. Insects in gauge	Insects in gauge	Insects in gauge	Insects + material in gauge	Insects in gauge	Insects in gauge	Insects in gauge		Insects in gauge	Insects in gauge	Insects in gauge	Insects in gauge	Insects in gauge

Table 4 – Groundwater Monitoring Results October 2017

Location	Units	Groundwater Investigation Levels (GILs) from Interpretive Report	4BH010			4BH021			4BH022c			4BH025a			4BH037a			4BH038			4BH057			4BH058c		
Cut/Fill			Cut 6 - West (DS)			Cut 11 - West (DS)			Cut 11 - East (US)			Cut 12 - West (DS)			Fill 15 - West			Fill 15 - East			Cut 15 - West (DS)			Cut 15 - East (US)		
Date of Sampling			24/10/2017			24/10/2017			24/10/2017			24/10/2017			24/10/2017			24/10/2017			24/10/2017			24/10/2017		
			Trigger levels 80 / 20%ile		Results	Trigger levels 80 / 20%ile		Results	Trigger levels 80 / 20%ile		Results	Trigger levels 80 / 20%ile		Results	Trigger levels 80 / 20%ile		Results	Trigger levels 80 / 20%ile		Results	Trigger levels 80 / 20%ile		Results	Trigger levels 80 / 20%ile		Results
Comments												DRY									DRY					
Laboratory data - awaiting results																										
Metals																										
Aluminium	mg/L	0.055	0.2740		0.1200	0.0216		<0.01	0.0122		0.510	0.0324		-	0.0264		<0.01	0.0050		<0.01	0.0050		-	0.0050		<0.01
Arsenic	mg/L	0.024	0.0009		0.0010	0.0020		<0.001	0.0001		<0.001	0.0005		-	0.0005		<0.001	0.0010		<0.001	0.0010		-	0.0005		<0.001
Cadmium	mg/L	<LOR	0.0005		<0.0001	0.0001		<0.0001	0.0001		0.0093	0.0002		-	0.0002		<0.0001	0.0005		0.0002	0.0005		-	0.0005		<0.0001
Chromium	mg/L	0.001	0.0013		0.0010	0.0001		<0.001	0.0002		<0.001	0.0007		-	0.0010		<0.001	0.0007		<0.001	0.0005		-	0.0005		<0.001
Copper	mg/L	0.0014	0.1620		0.035	0.0108		0.009	0.0030		0.0090	0.0139		-	0.0139		0.0040	0.0026		0.0010	0.0009		-	0.0082		<0.001
Lead	mg/L	0.0034	0.0010		<0.001	0.0002		<0.001	0.0016		<0.001	0.0022		-	0.0005		<0.001	0.0005		<0.001	0.0009		-	0.0005		<0.001
Manganese	mg/L	-	0.2258		0.0930	0.0139		0.0060	0.4856		1.880	0.0124		-	5.2480		1.9400	1.5084		0.0910	0.4518		-	0.0800		0.0670
Nickel	mg/L	0.011	0.0196		0.0020	0.0058		0.0030	0.0036		0.1420	0.0007		-	0.0068		0.0140	0.006		0.008	0.0030		-	0.0033		0.0020
Selenium	mg/L	-	0.0050		<0.01	0.0050		<0.01	0.0050		<0.01	0.0050		-	0.0050		<0.01	0.0050		<0.01	0.0050		-	0.0050		<0.01
Silver	mg/L	<LOR	0.0005		<0.001	0.0001		<0.001	0.0001		<0.001	0.0005		-	0.0005		<0.001	0.0005		<0.001	0.0005		-	0.0005		<0.001
Zinc	mg/L	0.008	0.0532		0.007	0.0176		0.011	0.0085		0.507	0.0102		-	0.0196		0.0360	0.0132		0.0280	0.0090		-	0.0100		<0.005
Iron	mg/L	-	6.5800		26.5000	0.0354		<0.05	1.1600		<0.05	0.0322		-	84.5600		<0.05	1.7500		<0.05	4.6344		-	0.0600		0.0700
Mercury	mg/L	0.0006	0.0003		<0.0001	0.0001		<0.0001	0.0001		<0.0001	0.0001		-	0.0001		<0.0001	0.0003		<0.0001	0.0003		-	0.0003		<0.0001
Total Petroleum Hydrocarbons		-																								
C6-C9 Fraction	µg/L or ppb	-	10		<20	16		<20	16		<20	10		-	10.0000		<20	10.0000		<20	10.0000		-	10.0000		<20
C10-C14 Fraction	µg/L or ppb	-	85		<50	25		<50	45		<50	25		-	219.0000		<50	25.0000		<50	25.0000		-	25.0000		<50
C15-C28 Fraction	µg/L or ppb	-	50		<100	50		<100	50		<100	50		-	190.0000		<100	50.0000		<100	25.0000		-	25.0000		<100
C29-C36 Fraction	µg/L or ppb	-	50		<50	50		<50	50		<50	35		-	35.0000		<50	50.0000		<50	25.0000		-	25.0000		<50
C10-C36 Fraction	µg/L or ppb	-	178		<50	35		<50	226		<50	25		-	556.0000		<50	25.0000		<50	1426.0000		-	149.0000		<50
BTEX		-																								
Benzene	µg/L or ppb	950	0.5		<1	0.5		<1	0.5		<1	0.5		-	0.5000		<1	0.5000		<1	0.5000		-	0.5000		<1
Toluene	µg/L or ppb	-	1		<2	1		<2	1		<2	1		-	1.0000		<2	1.0000		<2	1.0000		-	1.0000		<2
Ethylbenzene	µg/L or ppb	-	1		<2	1		<2	1		<2	1		-	1.0000		<2	1.0000		<2	1.0000		-	1.0000		<2
m+p-Xylene	µg/L or ppb	-	1		<2	1		<2	1		<2	1		-	1.0000		<2	1.0000		<2	1.0000		-	1.0000		<2
o-Xylene	µg/L or ppb	-	1		<2	1		<2	1		<2	1		-	1.0000		<2	1.0000		<2	1.0000		-	1.0000		<2
Naphthalene	µg/L or ppb	-	3		<5	2		<5	2		<5	2		-	2.5000		<5	2.5000		<5	2.0000		-	2.0000		<5
Nutrients		-																								
Total Phosphorus	mg/L	-	0.0284		0.04	0.0568		0.01	0.0480		<0.01	0.0680		-	0.1260		0.02	0.4064		0.04	0.0740		-	0.0300		0.17
Phosphate	mg/L	-	0.0110		<0.01	0.0142		<0.01	0.0126		<0.01	0.0070		-	0.0160		<0.01	0.0410		<0.01	0.0090		-	0.0070		<0.01
Total Nitrogen	mg/L	-	0.5800		0.8	0.3800		0.3	0.5786		2.2	0.7000		-	2.1600		1.8	1.1232		0.5	0.6600		-	0.7000		1.1
Total Kjeldahl Nitrogen	mg/L	-	0.5800		0.8	0.1936		0.1	0.2536		0.4	0.4000		-	2.1600		1.0	0.7752		0.3000	0.3678		-	0.7000		0.70
Nitrate	mg/L	-	0.0250		0.02	0.2460		0.16	0.4000		1.79	0.3840		-	0.4000		0.7500	0.4546		0.1600	0.2712		-	0.1200		0.38
Nitrite	mg/L	-	0.0050		<0.01	0.0050		<0.01	0.0050		<0.01	0.0050		-	0.0130		<0.01	0.0160		<0.01	0.0050		-	0.0050		<0.01
Ammonia	mg/L	-	0.1148		<0.01	0.0640		0.01	0.0940		0.01	0.0440		-	0.7920		0.08	0.2300		0.01	0.0672		-	0.0310		0.07
Major anions																										
Chloride	mg/L	-	1704.3		539	15.2		16	78.8		139	24.4		-	949		1780	2340		151	22.2000		-	39.1000		15
Sulfate	mg/L	-	53.000		22	10.392		7	61.8		652	10.6		-	2056		3200	2752		177	22.9680		-	35.0000		13
Bicarbonate	mg/L	-	63.6		49	27.4		22	142.2		<1	18.4		-	61		721	942		22	34.4000		-	29.0000		6
Major cations																										
Sodium	mg/L	-	866		290	18		17	72.0000		164	29.0800		-	720		1400	1872		68	28.2000		-	52		20
Potassium	mg/L	-	2.00		1.0000	0.96		<1	5.0000		4	0.5000		-	41		74	97		2	1.5509		-	1		<1
Calcium	mg/L	-	5.99		3	1.4797		1	50.4000		77	1.4000		-	190		381	266		65	2.7120		-	1		2.0000
Magnesium	mg/L	-	135		35	2		2	11.8000		75	0.9280		-	306		617	565		20	8.0077		-	3		4
Field Physical data																										
Depth to standing water level from TOC	m	-	16.802		16.16	8.7420		6.95	16.0140		1.57	8.4500		-	1.2000		0.72	1.3520		1.25	17.4120		-	13.84		15.37
pH	pH	-	6.26	4.74	5.81	6.78	5.81	6.00	7.09	5.93	5.91	6.78	6.21	-	6.51	5.92	8.18	7.30	6.77	7.42	6.98	5.24	-	6.3960	5.56	7.65
Conductivity	mS/cm	-	3630.000		2.18	111.300		0.160	231.000		1.75	0.342		-	5.550		11.30	8366.000		0.924	121.100		-	132.660		0.317
Temperature	○C	-	22.4420		21.28	22.3600		21.99	21.1500		24.28	22.6040		-	25.9820		23.23	22.5600		24.57	22.8200		-	23.1940		24.91
Total Dissolved Solids	g/L		3.5720		1.40	0.0946		0.104	0.1306		1.12	0.1326		-	0.1326		6.99	8.10		0.591	0.106		-	0.111		0.206

Exceedance of trigger level

Table 5 – Vibration Monitoring October 2017

Location	DATE	TIME	Triggered	Vector Sum (mm/s)	Comments
53 OCR	2017-10-27	12:30:00	Continuous	0.138	Background
53 OCR	2017-10-27	12:31:00	Continuous	2.671	Light vibe padfoot ~50m
53 OCR	2017-10-27	12:32:00	Continuous	2.325	Light vibe padfoot ~50m
53 OCR	2017-10-27	12:33:00	Continuous	0.1	Background
53 OCR	2017-10-27	12:34:00	Continuous	0.164	Background
53 OCR	2017-10-27	12:35:00	Continuous	1.842	Light vibe padfoot ~50m
53 OCR	2017-10-27	12:36:00	Continuous	3.117	Heavy vibe padfoot ~50m
53 OCR	2017-10-27	12:37:00	Continuous	2.829	Heavy vibe padfoot ~50m
53 OCR	2017-10-27	12:38:00	Continuous	2.18	Light vibe padfoot ~50m
53 OCR	2017-10-27	12:42:00	Continuous	2.793	Light vibe padfoot ~20m
53 OCR	2017-10-27	12:43:00	Continuous	4.127	Heavy vibe padfoot ~20m
53 OCR	2017-10-27	12:44:00	Continuous	4.472	Heavy vibe padfoot ~20m
53 OCR	2017-10-27	12:45:00	Continuous	2.899	Light vibe padfoot ~20m
53 OCR	2017-10-27	12:46:00	Continuous	2.532	Light vibe padfoot ~20m
53 OCR	2017-10-27	12:47:00	Continuous	2.739	Light vibe padfoot ~20m
53 OCR	2017-10-27	12:48:00	Continuous	2.693	Light vibe padfoot ~20m
53 OCR	2017-10-27	12:49:00	Continuous	0.1	Background
53 OCR	2017-10-27	12:50:00	Continuous	0.099	Background

Table 5 – Field Monitoring for Out of Hours Works September 2017 (Acoustic Investigation)

Description of Works	Date	Time	Location	NCA	NML (dB(A))	Laeq (dB(A))	Distance to receiver (m)	Compliant	Notes
Floodplain Bridge 2 Concrete Finishing Works	7/10/2017	1:05pm	Fill 15B	3	41	17.9	620	Yes	Monitoring to verify compliance with L4.2(d)
Nambucca Bridge Abutment A Concrete Finishing Works	11/10/2017	6:15pm	River Street	3	41	51.9	140	Yes	Construction not audible. Highway and local traffic dominant noise source. Monitoring to verify compliance with L4.2(d)
Nambucca Bridge Concrete Finishing Works	13/10/2017	6:05pm	Nursery Road	4	48	49.5	630	Yes	Construction not audible. Highway and birds dominant noise source. Monitoring to verify compliance with L4.2(d)
Floodplain Bridge 1 Stick Pour Preparation	22/10/2017	9:45am	Fill 15B	3	39	36.9	270	Yes	Monitoring to verify compliance with L4.2(d)
Basin B45.00 Concrete Finishing Works	26/10/2017	6:02pm	Cut 6	1	40	29.9	190	Yes	Monitoring to verify compliance with L4.2(d)
Barrier movement Pacific Highway	26/10/2017	6:05pm	Abutment B	4	46	42.0	230	Yes	Monitoring to verify compliance with L4.2(d)
Floodplain Bridge 2 Concrete Preparation	26/10/2017	6:40am	Fill 15C	3	39	38.7	600	Yes	Monitoring to verify compliance with L4.2(d)
Nambucca Bridgeworks North of Pier 7	28/10/2017	7:01am	Nursery Road	4	46	47.2	160	Yes	Construction not audible. Highway and birds dominant noise source. Monitoring to verify compliance with L4.2(d)
CC05 Earthworks	28/10/2017	1:01pm	Fill 32	5	44	36.4	560	Yes	Monitoring to verify compliance with L4.2(d)
Floodplain Bridge 2 Earthworks	28/10/2017	7:44am	Fill 15C	3	39	32.8	630	Yes	Monitoring to verify compliance with L4.2(d)
Nambucca Bridge Abutment B Hand Tools	29/10/2017	11:15am	Abutment B	4	46	49.5	190	Yes	Construction not audible. Highway dominant noise source. Monitoring to verify compliance with L4.2(d)
Asphalt Paving Service Gate 6N	29/10/2017	11:35am	Gate 6N	1	40	54.3	190	Yes	Construction not audible. Highway dominant noise source. Monitoring to verify compliance with L4.2(d)