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Warrell Creek to Nambucca Heads – Pacific Highway Upgrade Project

ENVIRONMENT PROTECTION AUTHORITY MONTHLY REPORT

- June 2018

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 June 2018 included the following:

- The WC2NH project stage 2b (Scott Head Road to Browns crossing) opened to traffic from 29th June 2018.
- Bitumen sealing work
- Earthworks
- Continuing drainage works
- Batter stabilisation using hydromulch (permanent design seed mix)
- Topsoil Amelioration and Blending
- Concrete Lined Drains and turnouts
- Basin Maintenance including dewatering and desilting
- Installation and maintenance of Erosion and Sediment Controls
- Pavement (Asphalt and Concrete)
- Decommissioning of the Precast Facility
- Verge / Median Placement including median Topsoil Placement
- Operation of asphalt batch plant
- Landscape Planting Works including Upper Warrell Creek
- Installation of Flood Alleviation Channel – Upper Warrell Creek
- Removal of temporary crossing at Upper Warrell Creek
- Fauna fencing
- Line Marking

Works scheduled for next month includes the following:

- Fauna fencing
- Batter stabilisation using hydromulch (permanent design seed mix)
- Topsoil Amelioration and Blending
- Concrete Lined Drains and turnouts
- Basin Maintenance including dewatering and desilting
- Permanent Basin Fit-out
- Maintenance of Erosion and Sediment Controls
- Pavement (Asphalt and Concrete)
- Line marking
- Decommissioning of the Precast Facility
- Operation of asphalt batch plant

1.2 Consultation Activities

The project's consultation activities during June 2018 included the following:

Table 1 – Consultation Activities

Groups	Date	Key Topics
Toolboxes	Wednesday each week	Environmental and community issues communicated to the workforce.
RMS	Fortnightly	Communications look ahead, stakeholder issues.

Other Consultation Activities:

The following notifications were made to the community during June 2018.

- Appropriate notification about out of hours work at the southern interchange
- Appropriate notification about out of hours work at Williamson Creek

On-site meetings:

- 7 onsite meetings were held with community members in June 2018 regarding proposed property adjustments, boundary fencing, out of hours work, construction impacts, vegetation, flooding and other various matters.

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:

- Notifications submitted regarding future road works
- Notifications concerning highway closures for maintenance work
- Property adjustment works, liaising with stakeholders for fencing and driveway works
- Responding to community issues and concerns

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
1/06/2018 – 30/06/2018	70.80 mm	Northern Compound
1/06/2018 – 30/06/2018	66.20 mm	Albert Drive Compound

The site experienced a total of Seven (7) rain days throughout the month of June 2018.

During June 2018, rainfall received on site was lower than the June monthly average of 139.9mm. 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 June 2018 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

June 2018

Date	Time	TOTAL Rain Gauge (mm)
1/06/2018	9:00 AM	0
2/06/2018	9:00 AM	0
3/06/2018	9:00 AM	0.8
4/06/2018	9:00 AM	0
5/06/2018	9:00 AM	1
6/06/2018	9:00 AM	11.6
7/06/2018	9:00 AM	45.6
8/06/2018	9:00 AM	3.6
9/06/2018	9:00 AM	0
10/06/2018	9:00 AM	2.2
11/06/2018	9:00 AM	0.2
12/06/2018	9:00 AM	0.2
13/06/2018	9:00 AM	0
14/06/2018	9:00 AM	0
15/06/2018	9:00 AM	0
16/06/2018	9:00 AM	0
17/06/2018	9:00 AM	0
18/06/2018	9:00 AM	0
19/06/2018	9:00 AM	0
20/06/2018	9:00 AM	0
21/06/2018	9:00 AM	0.2
22/06/2018	9:00 AM	0
23/06/2018	9:00 AM	0.2
24/06/2018	9:00 AM	0
25/06/2018	9:00 AM	0
26/06/2018	9:00 AM	0
27/06/2018	9:00 AM	0
28/06/2018	9:00 AM	0.4
29/06/2018	9:00 AM	0.2
30/06/2018	9:00 AM	0

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

June 2018

Date	Time	TOTAL Rain Gauge (mm)
1/06/2018	9:00 AM	0
2/06/2018	9:00 AM	0
3/06/2018	9:00 AM	0.4
4/06/2018	9:00 AM	0
5/06/2018	9:00 AM	1.6
6/06/2018	9:00 AM	9.6
7/06/2018	9:00 AM	52.2
8/06/2018	9:00 AM	4
9/06/2018	9:00 AM	0.2
10/06/2018	9:00 AM	1
11/06/2018	9:00 AM	0
12/06/2018	9:00 AM	0.2
13/06/2018	9:00 AM	0
14/06/2018	9:00 AM	0
15/06/2018	9:00 AM	0.2
16/06/2018	9:00 AM	0
17/06/2018	9:00 AM	0
18/06/2018	9:00 AM	0
19/06/2018	9:00 AM	0
20/06/2018	9:00 AM	0
21/06/2018	9:00 AM	0
22/06/2018	9:00 AM	0
23/06/2018	9:00 AM	0.2
24/06/2018	9:00 AM	0
25/06/2018	9:00 AM	0
26/06/2018	9:00 AM	0.2
27/06/2018	9:00 AM	0
28/06/2018	9:00 AM	0.8
29/06/2018	9:00 AM	0.2
30/06/2018	9:00 AM	0

Table 2.3: Weather conditions recorded in June 2018 at Smoky Cape by the Bureau of Meteorology.

June 2018

Date	Minimum temperature (°C)	Maximum temperature (°C)	Rainfall (mm)
1/06/2018	11.6	19	0
2/06/2018	12	19	0
3/06/2018	13	20.5	1.2
4/06/2018	13	21	2.2
5/06/2018	12	21	0
6/06/2018	12	17.6	62
7/06/2018	12.1	21.6	67.6
8/06/2018	13.1	21	2.2
9/06/2018	14.2	20	0
10/06/2018	12.5	20.1	3.2
11/06/2018	12.8	19.9	0
12/06/2018	12.5	20.6	0
13/06/2018	15.5	18.3	0
14/06/2018	13.5	21	0
15/06/2018	14.2	21.1	0
16/06/2018	14.5	21	0
17/06/2018	12.2	16.6	0
18/06/2018	10	16.2	0
19/06/2018	9.9	17.5	0
20/06/2018	11	18.8	0
21/06/2018	11.8	19.5	0
22/06/2018	12.5	19.9	0
23/06/2018	12.5	21.6	0
24/06/2018	10.5	20.4	0
25/06/2018	11.4	20.2	0
26/06/2018	11.8	20	0
27/06/2018	11	*	1.2
28/06/2018	*	20.1	*
29/06/2018	11.1	20.8	8.2
30/06/2018	13	22.5	0

*No data recorded on BOM Daily weather observation for Smoky Cape

3. Surface Water Monitoring

Pacifico have been provided trigger levels from 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

1. 6th June 2018

Field and laboratory testing - results are attached in Appendix A – Table 1a.

pH levels noted to be outside of trigger levels at:

Lower Warrell Creek recorded elevated pH levels upstream and downstream (pH 7.61 upstream, pH 7.31 downstream, pH 6.86 80th percentile trigger). It is noted that these levels are within ANZECC criteria (pH 6.5-8.0).

Nambucca River South recorded elevated pH levels (pH 7.77 upstream, pH 7.72 downstream, pH 7.56 80th percentile trigger). It should be noted that this section of the alignment has been operational since December 2017 with no major construction activities being undertaken at this location.

Dissolved Oxygen

Lower Warrell Creek upstream recorded low DO levels (4.61mg/L recorded, 5.02mg/L 20th percentile trigger). Results were within trigger levels downstream and therefore are not likely to be due to construction works.

Metals noted to be outside trigger levels at:

Stony creek upstream recorded low aluminium levels (<0.01mg/L recorded, 0.02mg/L 20th percentile trigger) and low levels of iron downstream (<0.05mg/L recorded, 0.35mg/L 20th percentile trigger).

Nutrients noted to be outside trigger levels at

Upper Warrell Creek recorded elevated levels of Phosphorus (0.06mg/L recorded, 0.05mg/L 80th percentile trigger), Nitrogen (1mg/L recorded, 0.56mg/L 80th percentile trigger) and Ammonia (0.05mg/L recorded, 0.036mg/L 80th percentile trigger). These results decreased to within trigger levels downstream and are therefore unlikely to be from construction impacts. Nitrate exceeded trigger levels downstream (0.09mg/L recorded, 0.054mg/L 80th percentile trigger).

Lower Warrell Creek recorded elevated levels of nitrogen (0.6mg/L recorded, 0.54mg/L 80th percentile trigger), Nitrate (0.07mg/L recorded, 0.05mg/L 80th percentile trigger). Nitrogen decreased from upstream to within trigger levels downstream. Nitrate results were consistent from upstream to downstream. Therefore these results are unlikely to be due to construction impacts.

Unnammed Creek Gumma East recorded low upstream phosphorus (0.01mg/L recorded, 0.03mg/L 20th percentile trigger). High levels of ammonia were recorded upstream (unnamed gumma West 0.08mg/L recorded, unnamed gumma east 0.07mg/L recorded,

0.06mg/L 80th percentile trigger). Downstream results for phosphorus and ammonia were within trigger levels and are therefore are unlikely to be a result of construction. Low levels of nitrogen (0.4mg/L recorded, 0.9mg/L 20th percentile trigger) and high levels of Nitrate (0.04mg/L recorded, 0.03mg/L 80th percentile trigger) was recorded downstream at unnamed creek gumma north.

Dry Sampling Event

1. 12th June 2018

Field testing - results are attached in Appendix A – Table 1b.

pH levels noted to be outside of trigger levels at:

Nambucca River South recorded elevated pH levels (7.61pH upstream, 7.56pH downstream, 7pH trigger). It should be noted that this section of the alignment is now operational with no major construction activities being undertaken at this location.

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

Upper Warrell Creek recorded elevated DO levels outside of trigger values downstream (5.67mg/L recorded, 4.8mg/L trigger).

Stony creek recorded elevated DO levels upstream (6.21mg/L recorded, 4.8mg/L trigger) and downstream (6.42mg/L recorded, 6.34mg/L trigger).

Nambucca River South recorded low DO levels upstream (6.14mg/L recorded, 7.4mg/L 20th percentile trigger) and downstream (6.89mg/L recorded, 7.4mg/L 20th percentile trigger). Results increased from upstream to downstream. It should also be noted that construction works at this location have been completed with no major construction work occurring within the area.

Turbidity noted to be outside trigger levels at:

Stony creek recorded high turbidity readings upstream (11.3NTU recorded, 9.9NTU 80th percentile trigger) and downstream (9.7NTU recorded, 5.97 NTU 80th percentile trigger). Results decreased from upstream to downstream and are therefore unlikely to be a result of construction impacts as works are complete.

Lower Warrell Creek recorded elevated turbidity levels upstream (13.2NTU recorded, 6.82 NTU 80th percentile trigger) and downstream (13.6NTU recorded, 6.82 NTU 80th percentile trigger). All controls were verified to be in place and downstream results were marginally higher than upstream therefore elevated levels are unlikely to be due to construction works as no instream works and it is a dry event so no runoff from site.

4. Sediment Basin Water Monitoring

Water was released from commissioned basin B42.80 and B49.45 after rainfall on the 6th June. 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 June 2018

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)
7/06/2018	B42.80	N	6.81	32.2		800
7/06/2018	B49.45	N	7.03	38.7		2000

5. Noise Monitoring

Monthly routine construction noise monitoring was undertaken on 19th of June 2018 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 on 15th June at 4227 Pacific Highway, Warrell Creek. Monitoring was undertaken at the property during the use of vibratory roller and graders. Results at the property were below vibration criteria of 5mm/s (2.864mm/s).

7. Dust Monitoring

Dust deposition gauges (DDG) were collected at nearby sensitive receivers on 31st May 2018. DDG results are available in Appendix A, Table 3.

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.

8. Groundwater Monitoring

ACCIONA (Pacifico) undertook groundwater monitoring on the 20th of June 2018. Field and laboratory testing was undertaken. Groundwater monitoring results are available in Appendix A.

pH levels noted to be outside of trigger levels at:

4BH037a – Fill 15 west bore recorded an elevated pH reading (7.05pH recorded, 6.51pH 80th percentile trigger). It is noted that this bore had to be relocated from its original location due to it being within the construction footprint, with t rigger levels not necessarily corresponding with the new bore location. This is consistent with previous results for the bore (pH 7.15 recorded May 2018, pH 7.18 recorded April 2018).

4BH038 – Fill 15 East recorded elevated pH reading (7.60pH recorded, 7.30pH 80th percentile trigger). It is noted that bulk earthworks have been completed in this area, with no groundwater seepage from cut faces or groundwater ingress noted.

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

4BH037a – Fill 15 west bore recorded elevated conductivity levels (10.50mS/cm recorded, 5.55mS/cm 80th percentile 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 (9mS/cm recorded May, 9.36mS/cm recorded April, 9.9 mS/cm recorded in March and February 2018).

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

4BH022c Cut 11 upgradient bore and 4BH021 down gradient bore - recorded elevated TDS levels (0.81g/L recorded 4BH022c, 0.1306g/L 80th percentile trigger, 0.142g/L recorded 4BH021, 0.0946 80th percentile trigger). It should also be noted that Cut 11 has had construction works completed and was included within the Partial Opening of the Project to traffic in December 2017.

4BH037A - Fill 15 west bore recorded an elevated TDS (6.51g/L recorded, 0.1326g/L 80th percentile 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 is consistent with previous results for the bore (5.67g/L recorded May 2018, 5.90 g/L recorded April, 6.26g/L recorded March 2018 and 6.23 g/L in February 2018).

Water depth noted to be below trigger levels at:

4BH037A – Fill 15 west bore recorded low water depth (1.27m from top of casing recorded, 1.2 m 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. This result is consistent with previous results for the bore (1.33m recorded May, 1.69m recorded April and 1.39m from top of casing recorded in March 2018).

4BH058C – Cut 15 upslope bore recorded low water depth (15.38m from top of casing recorded, 13.84 m 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. This result is consistent with previous results for the bore (15.13m recorded May, 15.21m April, 15.63m recorded from top of casing recorded March 2018).

9. Acoustic Investigations

No Out of Hours Works undertaken during the month of June 2018 under Condition L4.2(d) of the EPL that have not already been monitored.

10. Complaints

10.1 Summary of Environmental Complaints for the month of June 2018

No complaints for month of June.

11. Non-Compliance

11.1 Summary of Non-compliances

No Non-compliances were raised against ACCIONA's Environmental Protection Licence during the month of June 2018.

Appendix A – Monitoring Results

Table 1a – Surface Water Results May 2018 – Wet Event

Surface Water Results -JUNE 2018 - Wet

Location	Units	Levels of Concern		SW01 Upper Warrell Creek Upstream			SW01 Upper Warrell Creek Upstream			SW03 Stony Creek Upstream			SW04 Stony Creek Downstream			SW05 Lower Warrell Creek Upstream			SW06 Lower Warrell Creek Downstream			SW07 Unnamed Creek Gumma West Upstream			SW08 Unnamed Creek Gumma East Upstream			SW09 Unnamed Creek Gumma North Downstream			SW10 Nambucca River South Upstream			SW11 Nambucca River South Downstream		
Freshwater / Estuarine		ANZECC 2000 95% species protected		Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Freshwater			Estuarine			Estuarine		
Date of Sampling				6-Jun-18			6-Jun-18			6-Jun-18			6-Jun-18			6-Jun-18			6-Jun-18			6-Jun-18			6-Jun-18			6-Jun-18			6-Jun-18			6-Jun-18		
Time of Sampling		Freshwater	Marine	1:45PM			1:30PM			1:15PM			1:00PM			11:45AM			11:30AM			12:15PM			12:30PM			12:00PM			10:45AM			10:30AM		
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	<0.01	0.114	0.01	<0.01	0.28	0.01	0.01	0.28	0.01	<0.01	0.25	0.02	0.03	0.25	0.02	0.02	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	-	-	<0.0001	-	-	<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	<0.001	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	0.054	0.158	0.0178	0.053	0.0726	0.0218	0.051	0.083	0.0164	0.051	0.35	0.087	0.144	0.35	0.087	0.142	0.49	0.011	0.285	0.49	0.011	0.267	0.49	0.011	0.118	0.076	0.006	0.042	0.076	0.006	0.05
Nickel	mg/L	0.011	0.07	-	-	<0.001	-	-	0.001	-	-	<0.001	-	-	<0.001	0.0034	0.001	0.001	0.0034	0.001	0.001	0.002	0.001	0.001	0.002	0.001	0.001	0.002	0.001	0.001	-	-	<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	<0.005	0.018	0.005	<0.005	0.011	0.005	<0.005	0.011	0.005	<0.005	0.011	0.005	<0.005	0.005	0.005	<0.050	0.005	0.005	<0.050
Iron	mg/L	-	-	1.38	0.48	<0.05	0.99	0.366	<0.05	1.4	0.41	<0.05	1.48	0.35	<0.05	0.52	0.05	0.06	0.52	0.05	0.05	1.65	0.37	0.44	1.65	0.37	0.35	1.65	0.37	0.19	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	0.06	0.044	0.016	0.01	0.03	0.016	<0.01	0.034	0.01	<0.01	0.04	0.01	0.02	0.04	0.01	<0.01	0.11	0.03	0.02	0.11	0.03	0.01	0.11	0.03	0.08	0.07	0.02	<0.05	0.07	0.02	<0.05
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	<0.01	0.013	0.005	<0.01	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	1	0.52	0.2	0.3	0.48	0.2	<0.1	0.63	0.2	<0.1	0.54	0.31	0.6	0.54	0.31	0.3	3.1	0.9	1	3.1	0.9	0.8	3.1	0.9	0.4	0.46	0.2	<0.5	0.46	0.2	<0.5
Total Kjeldahl Nitrogen	mg/L	-	-	0.5	0.3	0.9	0.5	0.2	0.2	0.34	0.2	<0.1	0.6	0.2	<0.1	0.5	0.2	0.5	0.5	0.2	0.2	2.8	0.8	1	2.8	0.8	0.8	2.8	0.8	0.4	0.3	0.2	<0.5	0.3	0.2	<0.5
Nitrate	mg/L	0.7	-	0.102	0.01	0.09	0.054	0.01	0.09	0.208	0.01	0.04	0.2	0.01	0.06	0.05	0.01	0.07	0.05	0.01	0.07	0.03	0.01	0.02	0.03	0.01	0.02	0.03	0.01	0.04	0.04	0.01	0.04	0.04	0.01	<0.01
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	0.05	0.02	0.01	0.02	0.046	0.02	0.03	0.062	0.012	0.02	0.116	0.022	0.06	0.116	0.022	0.06	0.06	0.01	0.08	0.06	0.01	0.07	0.06	0.01	0.05	0.15	0.024	0.13	0.15	0.024	0.08
TSS																																					
TSS	mg/L	<40	<10	19	5	<5	12.8	5	<5	14.8	5	<5	8.7	5	8	25	5.5	<5	25	5.5	<5	350	9	<5	350	9	17	350	9	<5			8			10
Field Physical data																																					
Temperature	°C	-	-	24.3	16.27	14.92	24.52	16.79	14.3	23.98	17.36	14.66	24.7	17.65	14.57	25.9	19.5	16.25	25.9	19.5	16.31	25.84	19.1	15.23	25.84	19.1	15.01	25.84	19.1	15.8	26.56	21.32	17.14	26.56	21.32	17.26
pH	pH	-	6.5-8	7.478	6.23	7.02	7.192	6.42	6.71	7.138	6.61	6.92	6.98	6.21	6.68	6.86	6.46	7.16	6.86	6.46	7.31	6.9	6.08	6.86	6.9	6.08	6.83	6.9	6.08	6.7	7.56	6.58	7.77	7.56	6.58	7.72
Conductivity	mS/cm	0.125-2.2	-	0.3204	0.20184	0.25	0.3242	0.19076	0.229	0.313	0.2024	0.218	0.309	0.20188	0.222	20.918	0.50928	6.35	20.918	0.50928	6.55	0.842	0.334	0.643	0.842	0.334	0.618	0.842	0.334	0.831	48.42	12.65	39.7	48.42	12.65	37.8
Turbidity	NTU	50	10	26.16	5.94	8.8	27.32	3.72	6.9	14.98	3.34	7.9	17.16	4.59	5.8	26.1	2.4	5.6	26.1	2.4	5.3	66.8	11.6	4.9	66.8	11.6	11.2	66.8	11.6	5.7	19.04	5.81	5.4	19.04	5.81	4.4
Dissolved Oxygen	mg/L	5	5	7.43	1.5	7.42	6.88	2.28	6.31	8.472	5.08	7.5	7.59	2.63	6.64	6.65	5.02	4.61	6.65	5.02	5.07	7.3	1.78	5.23	7.3	1.78	5.14	7.3	1.78	5.81	8.47	6.88	6.89	8.47	6.88	6.96
Dissolved Oxygen	%			-		76	-		63.7	-		76.4	-		67.4	-		49.4	-		54.4	-		54	-		52.7	-		60.6	-		79.2	-		83.4
TDS	g/L	-	-	-		0.162	-		0.149	-		0.142	-		0.144	-		4.00	-		4.13	-		0.411	-		0.395	-		0.544	-		24.2	-		23.1

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 June 2018 – Dry Event

Surface Water Results -JUNE 2018 - Dry				Weather: Fine													Low Tide:																				
				SW01			SW02			SW03			SW04			SW05			SW06			SW07			SW08			SW09			SW10			SW11		
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-Jun-18			12-Jun-18			12-Jun-18			12-Jun-18			12-Jun-18			12-Jun-18			12-Jun-18			12-Jun-18			12-Jun-18			12-Jun-18			12-Jun-18		
Time of Sampling		Freshwater	Marine	10:50AM			10:35AM			9:50AM			9:35AM			2:15PM			2:00PM			12:15PM			12:30PM			12:00PM			2:55PM			2:40PM		
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	-	-	24.86	14.99	14.33	25.1	16.3	14.45	24.4	16	13.35	26.46	15.94	13.55	27.9	18.4	17.81	27.9	18.4	17.52	26.5	16.3	15.54	26.5	16.3	14.66	26.5	16.3	17.26	27.9	18.1	19.35	27.9	18.1	19.36
pH	pH	-	6.5-8	7.25	6.48	6.75	7.3	6.4	6.93	7.5	6.6	6.87	7.33	6.26	6.78	7.02	6.57	6.78	7.02	6.57	6.82	7	6.1	6.66	7	6.1	6.69	7	6.1	6.76	7	7	7.61	7	7	7.56
Conductivity	mS/cm	0.125-2.2	-	0.316	0.232	0.275	0.348	0.227	0.278	0.348	0.227	0.229	0.3338	0.2168	0.224	20.946	0.679	5.67	20.946	0.679	5.68	0.808	0.4234	0.591	0.808	0.4234	0.571	0.808	0.4234	0.672	47.32	29.44	36.2	47.32	29.44	36.6
Turbidity	NTU	50	10	10.96	4	9.8	9.9	3.5	9.4	9.9	3.5	11.3	5.97	3.74	9.7	6.82	1.83	13.2	6.82	1.83	13.6	52.78	11.3	21.5	52.78	11.3	14.7	52.78	11.3	4.1	19.3	6.7	15.7	19.3	6.7	10.1
Dissolved Oxygen	mg/L	5	5	4.98	1.91	4.46	4.8	2.6	5.67	4.8	2.6	6.21	6.34	3.52	6.42	7.98	5.07	6.04	7.98	5.07	6.09	6.4	1.75	4.13	6.4	1.75	5.23	6.4	1.75	6.34	9.1	7.4	6.14	9.1	7.4	6.89
Dissolved Oxygen	%			-	-	45.1	-	-	57.4	-	-	65.7	-	-	63.7	-	-	66.6	-	-	66.8	-	-	42.8	-	-	53.2	-	-	72.5	-	-	78.2	-	-	87.9
TDS	g/L	-	-	-		0.179	-		0.180	-		0.014	-		0.146	-		3.530	-		3.580	-		0.378	-		0.366	-		0.430	-		22.1	-		22.3

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 June 2018

Monthly Noise Monitoring Results June 2018

Date	Time	Location	Rec ID	NCA	NML	Activity	Predicted levels for activity	LAeq	LAFMAX	LAFMIN	LAF10	LAF50	LAF90	Principal sources/ operations	Construction noise dominant?	Corrective actions	Notes
19/06/2018	11:42 AM	Albert Drive	74	1	50	Cut	62	55.9	71.8	50.9	58.1	54.9	52.7	PAC HWY	N	N/A	Within predicted levels and NML. Construction noise not dominant. Stockpile area behind cut to mitigate noise impacts.
19/06/2018	12:36 PM	Bald Hill Rd	197	3	50	KCB	79	54.5	76.9	46.2	55.3	50.4	47.3	Bald Hill Road	N	N/A	Within predicted levels. Construction noise not dominant. Dominant noise sources: BHR (51.1-74.5dB(A)) Noise mound and noise wall in place to reduce impact.
19/06/2018	3:42 PM	Letitia Rd	413	4	59	HTR	58	54.5	65.9	43.2	58.4	51.1	47.4	PAC HWY	N	N/A	Within predicted levels and NML. Construction noise not dominant. HWY dominant (48.9-60.6dB(A))
19/06/2018	4:12 PM	Mattick Rd	442	6	44	HTR	71	65.4	91	46.1	64	54.9	50	PAC HWY	N	N/A	Within predicted levels. Permanent noise mounds in place to reduce construction noise at sensitive receivers. HWY dominant (47.5-59.1dB(A))
19/06/2018	2:34 PM	Gumma Rd	383	3	50	Ser	59	62.5	74.9	41.6	59.3	53.5	47.1	PAC HWY	N	N/A	Construction noise not dominant. Dominant noise sources: highway (61 - 74dB(A)).

Table 3 – Dust Monitoring Results May 2018

Monthly Dust Monitoring Results May 2018

			DDG ID		DDG1	DDG2	DDG3	DDG4	DDG6	DDG6N	DDG7	DDG8A	DDG9NE	DDG9E	DDG10
			Start date of sampling		1/05/2018	1/05/2018	1/05/2018	1/05/2018	1/05/2018	1/05/2018	1/05/2018	1/05/2018	1/05/2018	1/05/2018	1/05/2018
			Finish date of sampling		31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
Analyte	Time Period	Unit	Levels of Concern	LOR											
Ash Content	Current Month	g/m².month	4	0.1	1.5	0.1	0.5	0.2	0.4	0.8	0.5	0.2	0.3	1.3	2.1
		mg	N/A	1	26	2	9	3	7	15	8	4	6	23	37
	Previous Month	g/m².month			0.4	0.2	0.4	0.1	1.8	3.4	3.1	0.1	0.4	0.8	0.6
	Change	g/m².month	Increase of 2		1.1	-0.1	0.1	0.1	-1.4	-2.6	-2.6	0.1	-0.1	0.5	1.5
Combustible Matter	Current Month	g/m².month	N/A	0.1	0.5	0.2	0.3	<0.1	0.9	0.7	0.2	0.4	0.3	0.3	0.2
		mg	N/A	1	10	3	6	<1	16	12	5	7	5	6	4
Total Insoluble Matter (TIM)	Current Month	g/m².month	4	0.1	2	0.3	0.8	0.2	1.3	1.5	0.7	0.6	0.6	1.6	2.3
		mg	N/A	1	36	5	15	3	23	27	13	11	11	29	41
	Previous Month	g/m².month		0.1	0.7	0.4	0.8	0.3	5.8	4.2	4.2	0.6	0.6	1.3	0.8
	Change	g/m².month	Increase of 2	0.1	1.3	-0.1	0	-0.1	-4.5	-2.7	-3.5	0	0	0.3	1.5

Table 4 – Groundwater Monitoring Results June 2018

June 2018 Groundwater Monitoring

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			20/06/2018			20/06/2018			20/06/2018			20/06/2018			21/06/2018			21/06/2018			20/06/2018			20/06/2018		
			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			2.15pm			11am			12.45pm			DRY			11.45am			11-Jan-00			DRY			3pm		
Field Physical data																										
Depth to standing water level from TOC	m	-	16.802		16.70	8.7420		7.53	16.0140		2.40	8.4500		-	1.2000		1.27	1.3520		1.24	17.4120		-	13.84		15.38
pH	pH	-	6.26	4.74	5.94	6.78	5.81	6.27	7.09	5.93	6.16	6.78	6.21	-	6.51	5.92	7.05	7.30	6.77	7.60	6.98	5.24	-	6.3960	5.56	5.76
Conductivity	mS/cm	-	3630		3.05	111.3		0.218	231		1.26	0.342		-	5.550		10.50	8366		6.540	121.100		-	132.660		0.122
Temperature	○C	-	22.4420		17.70	22.3600		20.17	21.1500		13.41	22.6040		-	25.9820		14.97	22.5600		19.34	22.8200		-	23.1940		21.18
Total Dissolved Solids	g/L		3.5720		1.95	0.0946		0.142	0.1306		0.81	0.1326		-	0.1326		6.51	8.10		4.120	0.106		-	0.111		0.079
		Exceedance of trigger level																								