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The General Manager
Nambucca Valley Council
PO Box 177
MACKSVILLE NSW 2447

J/N : 26098

21st October 2021

Attention: Mr Simon Chapman

Dear Sir

Old Nambucca Waste Management Facility
Landfill Environmental Monitoring Program
EPA Annual Return – 18 September 2020 to 17 September 2021

The EPA Annual Return for the landfill environmental monitoring program at the Old Nambucca Waste Management Facility is provided below. The Annual Return covers the period 18 September 2020 to 17 September 2021, and has been prepared in accordance with the requirements set out in the NSW EPA (Environmental Protection Authority) Annual Return correspondence forwarded to Nambucca Valley Council for the subject period.

A. LICENCE DETAILS

A1. Licence Holder

Licence Number	6268
Licence Holder	Nambucca Valley Council
ABN	71 323 535 981

A2. Premises to which Licence Applies

Old Nambucca Waste Management Facility
Old Coast Road, Nambucca Heads, NSW, 2448

A3. Activities to which Licence Applies

Waste Processing (non-thermal treatment)
Waste Storage

A4. Other Activities

Not Applicable

A5. Fee Based Activity Classification

Waste storage – other types of waste
Non thermal treatment of general waste

A6. Assessable Pollutants

Not Applicable

B. MONITORING AND COMPLAINTS SUMMARY

B1. Number of Pollution Complaints

Discussions with Mr Simon Chapman (Co-ordinator of Civil Services, NVC) confirmed that no pollution complaints had been received for the Old Nambucca Waste Management Facility during the subject Annual Return period.

B2. Concentration Monitoring Summary

Water-Based Concentration Monitoring

A summary of the water-based concentration monitoring results for the site is provided in Attachment A.

The summary data is generally in the same format as shown in the EPA Annual Return correspondence, except for the following differences:

- The results from each monitoring period are also included in the summary tables to provide a single reference point for any future review of the results.
- The order of the parameters given in the summary sheets has been established to assist in the analysis of the parameters, and may not be in the same order as the EPA correspondence.

The monitoring of surface water is event-based, and occurs during or immediately after rainfall events of a nominated intensity (i.e. 20 mm over the previous 24 hour period). However, occasionally the rainfall event will not generate sufficient runoff within the catchment to cause discharges along the intermittent creek, resulting in some of the surface water sites being dry.

Leachate and groundwater samples are taken on or near nominated dates. Some groundwater bores are often dry, and this is reflected in the summary sheets as blank entries for the particular sampling point during the subject monitoring period. In addition, if there is insufficient water in a borehole for the full range of tests to be carried out, then some parameters for the subject monitoring period may be blank.

Air-Based Concentration Monitoring

A summary of the air-based concentration monitoring results (i.e. methane monitoring) for the site is provided in Attachment B.

The methane sampling was carried out using a landfill gas meter operated in accordance with Sections 17 and 18 of the *EPA Environmental Guidelines : Solid Waste Landfills (1996)*. Testing was carried out on a six monthly basis for Monitoring Points 14, 15 and 16.

Individual ppm or % methane V/V results for every location were not recorded due to the numerous sites tested. Instead, the meter was constantly monitored, and if methane levels approached or exceeded the threshold levels, then these incidences were recorded. It is confirmed that the threshold levels were neither approached nor exceeded at any location during the annual monitoring period.

C. COMPLIANCE WITH LICENCE CONDITIONS

C1. Compliance with Licence Conditions

1. Were all conditions of the licence complied with (including monitoring and reporting) ?

The following conditions of the licence were not fully complied with:

i). Number of monitoring rounds at Monitoring Points 4 (BH4), 12 (SW2) and 19 (BH6A).

ii). Exceedance of various constituents at Monitoring Points 1 (BH1), 2 (BH2), 3 (BH3), 5 (BH5), 8 (BH8), 9 (BH9), 10 (Wetland Outlet), 11 (SW1) and 12 (SW2).

iii). Miscellaneous non-compliances.

iv). Other comments

Each of these is discussed below.

C2. Details of Non-Compliance with Licence

i) Number of Monitoring Rounds at Various Monitoring Points

No monitoring was undertaken at Monitoring Points 4 (BH4) and 19 (BH6A), instead of the required one (1) monitoring round, as specified in the Licence Condition M2.1. This was due to these boreholes being dry during the sampling round of 09/10/2020.

Monitoring was only undertaken three (3) times at Monitoring Point 12 (SW2), instead of the required four (4) monitoring rounds, as specified in the Licence Condition M2.1. This was due to the borehole being dry during the sampling round of 11/12/2020.

ii) Exceedance of Various Constituents at Monitoring Points

Trigger levels have been determined for the ONWMF, based on the detailed analysis of historical water quality data at the ONWMF site, and presented in the *"Surface Water Characterisation Study"* and the *"Leachate Characterisation Study"* prepared by Enginuity Design in 2008. The trigger levels for the ONWMF are provided below in Table 1.

Table 1 : Trigger Levels for ONWMF

Constituent	***TRIGGER LEVELS (mg/l)***	
	Median (LTV)	**Maximum (STV)**
pH	-	5.1 – 8.0
Ammonia	0.9	1.4
Nitrate	0.7	3.4
Phosphorus	0.05	0.10
Potassium	4.1	6.2
BOD	15	20
TOC	30	40
TSS	-	50
Arsenic	0.024	0.094
Zinc	0.08	0.15

Due to the environmental attributes for the creek downstream of the ONWMF, including its intermittent nature and limited aquatic ecosystem, it is not considered necessary to impose the most restrictive trigger levels on all discharges. Instead, trigger levels based on the median and maximum values of the subject constituents in the downstream creek flows are considered more appropriate:

- The "median trigger level" applies the most restrictive trigger value for a constituent, so as to ensure the median value of the discharges in the creek result in minimal potential downstream environmental impacts.

- The "maximum trigger level" allows for occasional discharges which exceed the median trigger levels, but due to the short-term duration of the discharge, is unlikely to cause any potential long-term downstream environmental impacts.

The "median trigger level" can be considered to be a long-term trigger value (i.e. LTV), whereas the "maximum trigger level" is a short-term trigger value (i.e. STV).

The exceedances of the STV (i.e. short-term trigger values or "maximum trigger levels") for the individual monitoring events are summarised below. Exceedances of the LTV (i.e. long-term trigger values or "median trigger levels") are not included, as they are used for the analysis of longer term time periods, rather than specific individual events.

The STV were exceeded for various constituents at the following monitoring points:

Groundwater Monitoring Points

Monitoring Point 1 (BH1)
- Phosphorus on 09/10/2020

Monitoring Point 2 (BH2)
- Phosphorus on 09/10/2020

Monitoring Point 3 (BH3)
- Arsenic on 09/10/2020

Monitoring Point 5 (BH3)
- Phosphorus on 09/10/2020
- Zinc on 09/10/2020

Monitoring Point 8 (BH8)
- Phosphorus on 09/10/2020

Monitoring Point 9 (BH9)
- Phosphorus on 09/10/2020

Surface Water Monitoring Points

Monitoring Point 10 (Wetland Outlet)
- Ammonia on 04/03/2021
- Phosphorus on 20/10/2020
- Potassium on 29/10/2020, 11/12/2020, 04/03/2021, 11/05/2021 and 03/08/2021
- TSS on 29/10/2020

Monitoring Point 11 (SW1)
- Potassium on 11/12/2020 and 03/08/2021
- Zinc on 03/08/2021
- TSS on 29/10/2020 and 03/08/2021

Monitoring Point 12 (SW2)
- Phosphorus on 03/08/2021
- Potassium on 03/08/2021

Groundwater

Discussion on the exceedances for the various constituents at the groundwater monitoring points is provided below.

Phosphorus

The STV for phosphorus (i.e. 0.10 mg/l) was exceeded on 09/10/2020 at the groundwater monitoring bores BH1, BH2, BH5, BH8 and BH9 (i.e. Monitoring Points 1, 2, 5, 8 and 9) with exceedances between 0.17 and 0.46 mg/l. Exceedances of phosphorus at these groundwater monitoring points is a common occurrence, and has been observed during previous monitoring rounds.

The phosphorus levels in the groundwater are not considered to be caused by leachate contamination from the landfill site, as the phosphorus levels recorded in the monitoring bores were higher than the phosphorus concentrations measured in the leachate (which varied between 0.05 to 0.06 mg/l during the subject Annual Return period). In addition, there has been no consistent confirmation of elevated levels from other more mobile pollutants typically associated with landfill sites (e.g. nitrate, ammonia, potassium) at these bores.

An investigation previously completed at the site, *"Assessment on Impacts and Options for the Leachate Intercept Trench", (Enginuity Design, 2009)*, identified that elevated levels of phosphorus measured at the groundwater boreholes were probably due to factors such as the localised properties of the soil types intercepted by the boreholes, including a potential influence from the bentonite placed around the piezometers during the installation of the bores.

Zinc

There was one (1) exceedances of the STV for zinc (i.e. 0.15 mg/l) on 09/10/2020 at BH5 (i.e. 0.88 mg/l).

The zinc readings at all the other groundwater bores were satisfactory, ranging between 0.02 and 0.10 mg/l.

During the previous Annual Return period (i.e. September 2019 to September 2020), there were exceedances of the STV for zinc at three (3) boreholes (i.e. BH5, BH8 and BH9), ranging between 0.44 and 1.70 mg/l. However there had not been any prior exceedances of zinc going back to 2015, with values ranging from < 0.01 to 0.10 mg/l.

The exceedances of zinc during the previous Annual Return period were considered unusual in that they were about an order of magnitude higher than any previous readings, and occurred simultaneously in three boreholes.

For the current Annual Return period, the zinc levels in BH5 have reduced by about 50% from the previous Annual Return period, whereas the zinc levels in BH8 and BH9 are now satisfactory, ranging between 0.06 and 0.10 mg/l.

The reason for the recent zinc exceedances is currently unknown, as no obvious ongoing trends in zinc values can be identified. In addition, there is no consistent confirmation of elevated levels from other more mobile pollutants typically associated with landfill sites (e.g. nitrate, ammonia, potassium) at these bores. Lastly, review of historical monitoring of zinc in the leachate showed levels were typically < 0.10 mg/l in the leachate (zinc has not been monitored in the leachate for a number of years now, as the levels were always very low, and were not considered a useful analyte for identification of potential leachate contamination).

However, future monitoring data for zinc will continue to be reviewed so as to determine whether or not the exceedances were just isolated incidents.

Arsenic

There was one (1) exceedance of the STV for arsenic (i.e. 0.094 mg/l) on 09/10/2020 at the groundwater monitoring bore BH3 (i.e. Monitoring Point 3) with a level of 0.130 mg/l.

The exceedance of arsenic at the groundwater monitoring bore BH3 (i.e. Monitoring Point 3) has been previously identified in the *"Assessment on Impacts and Options for the Leachate Intercept Trench"* report as being a particular characteristic of BH3. The arsenic levels at BH3 have often previously been higher than in the leachate by a factor of ten (10). In addition, there has not been any confirmation of elevated levels from other more mobile pollutants typically associated with landfill sites (e.g. nitrate, ammonia, potassium). The elevated arsenic at BH3 is therefore considered to be due to factors such as localised properties of the soil types intercepted by the borehole.

<u>Surface Water</u>

Discussion on the exceedances for the various constituents at the surface water monitoring points is provided below.

Ammonia

There was one (1) exceedance of the STV for ammonia (i.e. 1.4 mg/l) at the Wetland Outlet on 16/03/2020, with a reading of 5.37 mg/l. This was associated with a satisfactory ammonia level of 0.39 mg/l at SW1 (the downstream monitoring site for the landfill), indicating there was unlikely to have been any potential environmental impacts to downstream waters from the excedance at the Wetland Outlet.

All other ammonia readings at the Wetland Outlet were satisfactory, ranging from < 0.05 to 0.24 mg/l, with one reading of 1.28 mg/l. In addition, all ammonia readings at SW1 (the downstream monitoring site for the landfill) were satisfactory, ranging between 0.20 and 1.35 mg/l.

Phosphorus

There was one (1) marginal exceedance of the STV for phosphorus (i.e. 0.10 mg/l) at the Wetland Outlet on 29/10/2020 (i.e. 0.16 mg/l). This was associated with a satisfactory phosphorus level of < 0.03 mg/l at SW1 (the downstream monitoring site for the landfill), indicating there was unlikely to have been any potential environmental impacts to downstream waters from the excedance at the Wetland Outlet.

All other phosphorus readings at the Wetland Outlet were satisfactory, and ranged between < 0.03 and 0.10 mg/l. In addition, all phosphorus readings at SW1 (the downstream monitoring site for the landfill) were satisfactory, ranging between < 0.03 and 0.05 mg/l.

It is noted that there was a exceedance of the STV for phosphorus at SW2 (the upstream monitoring site) on 03/08/2021 (i.e. 0.51 mg/l), indicating elevated phosphorus levels can be a potential background surface water characteristic.

Potassium

Exceedances of the STV for potassium (i.e. 6.2 mg/l) at the surface water monitoring sites during the subject monitoring period occurred at:

- The Wetland Outlet on 29/10/2020 (13.0 mg/l), 11/12/2020 (14.0 mg/l), 04/03/2021 (7.1 mg/l), 11/05/2021 (7.7 mg/l) and 03/08/2021 (8.1 mg/l);
- SW1 (the downstream monitoring site for the landfill) on 11/12/2020 (6.9 mg/l) and 03/08/2021 (7.1 mg/l); and
- SW2 (the upstream monitoring site for the landfill) on 03/08/2021 (7.7 mg/l).

Over the past few years, exceedances of potassium at the Wetland Outlet have followed a cyclical pattern with either occasional exceedances or short-periods of consistent exceedances, followed by extended periods of no exceedances. The cause for this cyclical pattern is not known, but is thought to be a background surface water characteristic, as discussed further below.

The potassium exceedances at the Wetland Outlet during the current Annual Return period were within the general range of exceedances measured during previous Annual Return periods (i.e. up to approximately 20 mg/l).

Additionally, the potassium levels are generally satisfactory at the downstream monitoring site, SW1, with only occasional exceedances being measured at the downstream site. For the current Annual Return period, the potassium levels at the downstream site, SW1, ranged between 2.8 and 4.7 mg/l, with two (2) marginal exceedances of 6.9 mg/l on 11/12/2020 and 7.1 mg/l on 03/08/2021. This would indicate there is unlikely to have been any potential environmental impacts to downstream waters from potassium.

There was one (1) exceedance of the STV for potassium at SW2 (the upstream monitoring site for the landfill) on 03/08/2021 (i.e. 7.7 mg/l). During previous Annual Return periods there have also been exceedances of the STV for potassium at SW2 (the upstream monitoring site for the landfill). Because SW2 is located upstream from the ONWMF site (and is therefore not influenced by the ONWMF), these potassium exceedances indicate elevated potassium levels can be a background surface water characteristic.

As stated in previous Annual Return reports, the potassium exceedances in the surface water at the Wetland Outlet, SW1 and SW2 all appear to be a potential background surface water characteristic, as there has been no consistent confirmation from other more mobile pollutants typically associated with landfill sites (e.g. nitrate, ammonia) at these surface water monitoring sites to indicate the potassium is being generated from landfill discharges.

TSS

Exceedances of the 50 mg/l STV for TSS during the subject monitoring period occurred at:

- The Wetland Outlet on 29/10/2020 (116 mg/l);
- SW1 (the downstream monitoring site for the landfill) on 29/10/2020 (59 mg/l) and 03/08/2021 (110 mg/l).

The TSS concentration limits for discharges from the ONWMF site should be met when less than 74 mm of rain falls over a consecutive 5-day period. Based on the rainfall data for the site, the exceedance at the Wetland Outlet on the 29/10/2020 was associated with a rainfall event of 42 mm over 5 days. As the 29/10/2020 monitoring round was associated with a rainfall event less than the 74 mm total, the TSS concentration limit should have been met.

All other TSS levels at the Wetland Outlet were satisfactory, ranging between 17 and 34 mg/l. There has been an ongoing reduction in TSS exceedances over recent years at the Wetland Outlet, indicating previously implemented mitigation works to reduce TSS levels from the landfill site have been satisfactory.

There were two (2) TSS exceedances at SW1 (the downstream monitoring site for the landfill) on 29/10/2020 (59 mg/l) and 03/08/2021 (110 mg/l). The exceedance on 29/10/2020 was only marginal, and the exceedance on 03/08/2021 does not appear to be associated with the ONWMF, as the TSS level in the Wetland on the 03/08/2021 was only 19 mg/l.

For the current Annual Return period, there were nil (0) TSS exceedances at SW2 (the upstream monitoring site for the landfill), although there have been TSS exceedances at SW2 during previous Annual Return periods. As SW2 is located upstream of the ONWMF site, this implies that elevated TSS levels are sometimes a background surface water characteristic.

iii) Miscellaneous Non-Compliances

There were no miscellaneous non-compliances at the Old Nambucca Waste Management Facility during the subject Annual Return period.

iv) Other Comments

Nil

D. LOAD-BASED FEE CALCULATIONS

D1 to D8 Not Applicable

E. POLLUTION INCIDENT RESPONSE MANAGEMENT PLAN (PIRMP)

The compliance questions regarding the Pollution Incident Response Management Plan (PIRMP) have been entered directly in the relevant EPA Annual Return website fields.

The monitoring, inspection and reporting procedures and requirements for the PIRMP were reviewed and updated by Enginuity Design in 2019.

F. PUBLISHING OF POLLUTION MONITORING DATA

The compliance questions regarding the Publishing of Pollution Monitoring Data have been entered directly in the relevant EPA Annual Return website fields.

G. ENVIRONMENTAL MANAGEMENT SYSTEMS AND PRACTICES

The compliance questions regarding Environmental Management Systems and Practices have been entered directly in the relevant EPA Annual Return website fields.

H. SIGNATURE AND CERTIFICATION

The Signature and Certification requirements have been undertaken in accordance with the EPA Annual Return website requirements.

I trust that I have satisfactorily addressed the EPA Annual Return requirements for the current period. If you have any questions regarding this letter, please do not hesitate to contact me on 6655 0141.

Yours faithfully

Richard Green
BEng(Civil) MIE(Aust) CPEng

ATTACHMENT A : Water-Based Concentration Monitoring Summary

Period : Sept 2020 to Sept 2021
Monitoring Point : 1 (NLF-1)
Location : BH1 (Refer Nambucca LEMP Plan B) – Western Side of Landfill
Type : Groundwater
Sampling Frequency : Yearly

Parameter	Unit of Measure	Date Sampled				No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		09/10/20								
pH		6.4				1	1	6.4	6.4	6.4
Ammonia	mg/l	0.09				1	1	0.09	0.09	0.09
Nitrate	mg/l	< 0.05				1	1	< 0.05	< 0.05	< 0.05
Nitrogen (Total)	mg/l	0.62				1	1	0.62	0.62	0.62
Phosphorus	mg/l	0.28				1	1	0.28	0.28	0.28
Potassium	mg/l	3.4				1	1	3.4	3.4	3.4
Arsenic	mg/l	< 0.018				1	1	< 0.018	< 0.018	< 0.018
Zinc	mg/l	0.09				1	1	0.09	0.09	0.09
Dissolved Oxygen	mg/l	4.9				1	1	4.9	4.9	4.9
Total Organic Carbon	mg/l	7				1	1	7	7	7
Temperature	C	16.3				1	1	16.3	16.3	16.3
Standing Water Level	m	0.9				1	1	0.9	0.9	0.9

Period : Sept 2020 to Sept 2021
Monitoring Point : 2 (NLF-2)
Location : BH2 (Refer Nambucca LEMP Plan B) – South-West Corner of Landfill
Type : Groundwater
Sampling Frequency : Yearly

Parameter	Unit of Measure	Date Sampled				No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		09/10/20								
pH		6.5				1	1	6.5	6.5	6.5
Ammonia	mg/l	< 0.05				1	1	< 0.05	< 0.05	< 0.05
Nitrate	mg/l	1.98				1	1	1.98	1.98	1.98
Nitrogen (Total)	mg/l	2.07				1	1	2.07	2.07	2.07
Phosphorus	mg/l	0.17				1	1	0.17	0.17	0.17
Potassium	mg/l	4.1				1	1	4.1	4.1	4.1
Arsenic	mg/l	< 0.018				1	1	< 0.018	< 0.018	< 0.018
Zinc	mg/l	0.02				1	1	0.02	0.02	0.02
Dissolved Oxygen	mg/l	6.2				1	1	6.2	6.2	6.2
Total Organic Carbon	mg/l	7				1	1	7	7	7
Temperature	C	16.6				1	1	16.6	16.6	16.6
Standing Water Level	m	1.2				1	1	1.2	1.2	1.2

Period : Sept 2020 to Sept 2021
Monitoring Point : 3 (NLF-3)
Location : BH3 (Refer Nambucca LEMP Plan B) – Southern Side of Landfill
Type : Groundwater
Sampling Frequency : Yearly

Parameter	Unit of Measure	Date Sampled				No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		09/10/20								
pH		6.5				1	1	6.5	6.5	6.5
Ammonia	mg/l	0.68				1	1	0.68	0.68	0.68
Nitrate	mg/l	0.19				1	1	0.19	0.19	0.19
Nitrogen (Total)	mg/l	1.39				1	1	1.39	1.39	1.39
Phosphorus	mg/l	< 0.03				1	1	< 0.03	< 0.03	< 0.03
Potassium	mg/l	1.8				1	1	1.8	1.8	1.8
Arsenic	mg/l	0.130				1	1	0.130	0.130	0.130
Dissolved Oxygen	mg/l	4.9				1	1	4.9	4.9	4.9
Total Organic Carbon	mg/l	13				1	1	13	13	13
Temperature	C	17.3				1	1	17.3	17.3	17.3
Standing Water Level	m	1.0				1	1	1.0	1.0	1.0

Period : Sept 2020 to Sept 2021
Monitoring Point : 4 (NLF-4)
Location : BH4 (Refer Nambucca LEMP Plan B) – Southern Side of Landfill, Across Creek
Type : Groundwater
Sampling Frequency : Yearly

Parameter	Unit of Measure	Date Sampled				No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		09/10/20								
pH						1	0	0.0	#DIV/0!	0.0
Ammonia	mg/l					1	0	0.00	#DIV/0!	0.00
Nitrate	mg/l					1	0	0.00	#DIV/0!	0.00
Nitrogen (Total)	mg/l					1	0	0.00	#DIV/0!	0.00
Phosphorus	mg/l					1	0	0.00	#DIV/0!	0.00
Potassium	mg/l					1	0	0.0	#DIV/0!	0.0
Arsenic	mg/l					1	0	0.00	#DIV/0!	0.00
Zinc	mg/l					1	0	0.00	#DIV/0!	0.00
Dissolved Oxygen	mg/l					1	0	0.0	#DIV/0!	0.0
Total Organic Carbon	mg/l					1	0	0	#DIV/0!	0
Temperature	C					1	0	0.0	#DIV/0!	0.0
Standing Water Level	m					1	0	0.0	#DIV/0!	0.0

Period : Sept 2020 to Sept 2021
Monitoring Point : 5 (NLF-5)
Location : BH5 (Refer Nambucca LEMP Plan B) – Downstream Site at Property Boundary
Type : Groundwater
Sampling Frequency : Yearly

Parameter	Unit of Measure	Date Sampled				No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		09/10/20								
pH		5.7				1	1	5.7	5.7	5.7
Ammonia	mg/l	0.65				1	1	0.65	0.65	0.65
Nitrate	mg/l	0.06				1	1	0.06	0.06	0.06
Nitrogen (Total)	mg/l	2.12				1	1	2.12	2.12	2.12
Phosphorus	mg/l	0.46				1	1	0.46	0.46	0.46
Potassium	mg/l	3.4				1	1	3.4	3.4	3.4
Arsenic	mg/l	0.065				1	1	0.065	0.065	0.065
Zinc	mg/l	0.88				1	1	0.88	0.88	0.88
Dissolved Oxygen	mg/l	4.3				1	1	4.3	4.3	4.3
Total Organic Carbon	mg/l	8				1	1	8	8	8
Temperature	C	13.1				1	1	13.1	13.1	13.1
Standing Water Level	m	1.2				1	1	1.2	1.2	1.2

Period : Sept 2020 to Sept 2021
Monitoring Point : 8 (NLF-8)
Location : BH8 (Refer Nambucca LEMP Plan B) – South-East Corner of Landfill
Type : Groundwater
Sampling Frequency : Yearly

Parameter	Unit of Measure	Date Sampled				No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		09/10/20								
pH		6.4				1	1	6.4	6.4	6.4
Ammonia	mg/l	0.15				1	1	0.15	0.15	0.15
Nitrate	mg/l	< 0.05				1	1	< 0.05	< 0.05	< 0.05
Nitrogen (Total)	mg/l	1.31				1	1	1.31	1.31	1.31
Phosphorus	mg/l	0.18				1	1	0.18	0.18	0.18
Potassium	mg/l	4.6				1	1	4.6	4.6	4.6
Arsenic	mg/l	< 0.018				1	1	< 0.018	< 0.018	< 0.18
Zinc	mg/l	0.10				1	1	0.10	0.10	0.10
Dissolved Oxygen	mg/l	4.9				1	1	4.9	4.9	4.9
Total Organic Carbon	mg/l	15				1	1	15	15	15
Temperature	C	17.6				1	1	17.6	17.6	17.6
Standing Water Level	m	1.1				1	1	1.1	1.1	1.1

Period : Sept 2020 to Sept 2021
Monitoring Point : 9 (NLF-9)
Location : BH9 (Refer Nambucca LEMP Plan B) – Upstream Site Across Road
Type : Groundwater
Sampling Frequency : Yearly

Parameter	Unit of Measure	Date Sampled				No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		09/10/20								
pH		6.2				1	1	6.2	6.2	6.2
Ammonia	mg/l	0.07				1	1	0.07	0.07	0.07
Nitrate	mg/l	< 0.05				1	1	< 0.05	< 0.05	< 0.05
Nitrogen (Total)	mg/l	0.42				1	1	0.42	0.42	0.42
Phosphorus	mg/l	0.20				1	1	0.20	0.20	0.20
Potassium	mg/l	1.6				1	1	1.6	1.6	1.6
Arsenic	mg/l	< 0.018				1	1	< 0.018	< 0.018	< 0.018
Zinc	mg/l	0.06				1	1	0.06	0.06	0.06
Dissolved Oxygen	mg/l	4.6				1	1	4.6	4.6	4.6
Total Organic Carbon	mg/l	4				1	1	4	4	4
Temperature	C	16.2				1	1	16.2	16.2	16.2
Standing Water Level	m	1.4				1	1	1.4	1.4	1.4

Period : Sept 2020 to Sept 2021
Monitoring Point : 10 (NLF-10)
Location : Point SW – Outlet of Wetland (Refer Nambucca LEMP Plan B)
Type : Surface Water
Sampling Frequency : Quarterly

Parameter	Unit of Measure	Date Sampled					No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		29/10/20	11/12/20	04/03/21	11/05/21	03/08/21					
pH		7.3	7.4	6.8	6.8	7.4	4	5	6.8	7.1	7.4
Ammonia	mg/l	< 0.05	< 0.05	5.37	1.28	0.24	4	5	< 0.05	1.38	5.37
Nitrate	mg/l	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	4	5	< 0.05	< 0.05	< 0.05
Nitrogen (Total)	mg/l	3.26	1.75	7.32	2.39	0.92	4	5	0.92	3.13	7.32
Phosphorus	mg/l	0.16	0.10	0.07	0.06	< 0.03	4	5	< 0.03	0.08	0.16
Potassium	mg/l	13.0	14.0	7.1	7.7	8.1	4	5	7.1	10.0	14.0
Arsenic	mg/l	< 0.018	< 0.018	0.024	0.020	< 0.018	4	5	< 0.018	0.020	0.024
Zinc	mg/l	0.01	0.02	0.02	< 0.01	0.02	4	5	< 0.01	0.01	0.02
Dissolved Oxygen	mg/l	2.8	6.5	4.2	3.4	8.5	4	5	2.8	5.1	8.5
Total Organic Carbon	mg/l	31	30	21	15	17	4	5	15	23	31
Total Suspended Solids	mg/l	116	17	34	20	19	4	5	17	41	116
Temperature	C	21.2	20.5	20.9	19.2	18.9	4	5	18.9	20.1	21.2

Period : Sept 2020 to Sept 2021
Monitoring Point : 10 (NLF-10)
Location : Point SW – Outlet of Wetland (Refer Nambucca LEMP Plan B)
Type : Surface Water
Sampling Frequency : Special Frequency

Parameter	Unit of Measure	Date Sampled				No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		29/10/20	11/12/20	12/12/20	16/12/20					
Prior Daily Rainfall	mm	30	30	275	134	4	4	30	117	275
pH		7.3	7.3	6.6	6.7	4	4	6.6	7.0	7.3
Total Suspended Solids	mg/l	116	17	38	20	4	4	17	48	116
Prior Total Rainfall	mm	42	30	305	532	4	4	30	227	532
No of Days	days	5	1	2	5	4	4	1	3	5
Period :		25/10-29/10	11/12-11/12	11/12-12/12	12/12-16/12					

Period : Sept 2020 to Sept 2021
Monitoring Point : 11 (NLF-11)
Location : SW1 – Offsite Discharge Point (Refer Nambucca LEMP Plan B)
Type : Surface Water
Sampling Frequency : Quarterly

Parameter	Unit of Measure	Date Sampled					No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		29/10/20	11/12/20	04/03/21	03/08/21						
pH		6.7	6.7	6.9	7.4		4	4	6.7	6.9	7.4
Ammonia	mg/l	0.20	1.35	0.39	0.32		4	4	0.20	0.57	1.35
Nitrate	mg/l	0.10	0.14	< 0.05	0.54		4	4	< 0.05	0.20	0.54
Nitrogen (Total)	mg/l	0.78	2.37	1.21	1.27		4	4	0.78	1.41	2.37
Phosphorus	mg/l	< 0.03	0.03	< 0.03	0.05		4	4	< 0.03	0.03	0.05
Potassium	mg/l	4.7	6.9	2.8	7.1		4	4	2.8	5.4	7.1
Arsenic	mg/l	< 0.018	< 0.018	< 0.018	< 0.018		4	4	< 0.018	< 0.018	< 0.018
Zinc	mg/l	0.02	0.01	< 0.01	0.41		4	4	< 0.01	0.11	0.41
Dissolved Oxygen	mg/l	6.7	6.0	6.8	9.5		4	4	6.0	7.3	9.5
Total Organic Carbon	mg/l	10	22	19	12		4	4	10	16	22
Total Suspended Solids	mg/l	59	23	< 2	110		4	4	< 2	48	110
Temperature	C	21.3	20.1	20.4	18.9		4	4	18.9	20.2	21.3

Period : Sept 2020 to Sept 2021
Monitoring Point : 12 (NLF-12)
Location : SW2 – Upstream Reference Point (Refer Nambucca LEMP Plan B)
Type : Surface Water
Sampling Frequency : Quarterly

Parameter	Unit of Measure	Date Sampled					No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		29/10/20	11/12/20	04/03/21	03/08/21						
pH		7.4		6.9	7.5		4	3	6.9	7.3	7.5
Ammonia	mg/l	< 0.05		0.07	0.68		4	3	< 0.05	0.26	0.68
Nitrate	mg/l	< 0.05		< 0.05	0.07		4	3	< 0.05	0.06	0.07
Nitrogen (Total)	mg/l	0.73		0.85	2.12		4	3	0.73	1.23	2.12
Phosphorus	mg/l	0.03		< 0.03	0.51		4	3	< 0.03	0.18	0.51
Potassium	mg/l	5.9		2.4	7.7		4	3	2.4	5.3	7.7
Arsenic	mg/l	< 0.018		< 0.018	< 0.018		4	3	< 0.018	< 0.018	< 0.018
Zinc	mg/l	< 0.01		0.01	0.01		4	3	< 0.01	0.01	0.01
Dissolved Oxygen	mg/l	8.6		8.1	8.8		4	3	8.1	8.5	8.8
Total Organic Carbon	mg/l	13		19	17		4	3	13	16	19
Total Suspended Solids	mg/l	15		10	16		4	3	10	14	16
Temperature	C	21.3		20.2	18.9		4	3	18.9	20.1	21.3

Period : Sept 2020 to Sept 2021
Monitoring Point : 13 (NLF-13)
Location : Leachate Tank (Refer Nambucca Landfill LEMP Plan B)
Type : Leachate
Sampling Frequency : Twice a Year

Parameter	Unit of Measure	Date Sampled				No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		10/11/20	11/05/21							
Ammonia	mg/l	34.9	17.8			2	2	17.8	26.4	34.9
Biochemical Oxygen Demand	mg/l	10	< 2			2	2	< 2	5	10
Calcium	mg/l	59	44			2	2	44	52	59
Chloride	mg/l	328	161			2	2	161	245	328
Iron	mg/l	32.7	14.4			2	2	14.4	23.6	32.7
Magnesium	mg/l	34	21			2	2	21	28	34
Nitrate	mg/l	6.30	< 0.05			2	2	< 0.05	3.15	6.30
Nitrogen (Total)	mg/l	42.0	17.8			2	2	17.8	29.9	42
pH		6.9	6.8			2	2	6.8	6.9	6.9
Phosphorus (Total)	mg/l	0.06	0.05			2	2	0.05	0.06	0.06
Potassium	mg/l	26	13			2	2	13	20	26
Sodium	mg/l	203	98			2	2	98	151	203
Sulphate	mg/l	12	13			2	2	12	13	13
Total Organic Carbon	mg/l	30	16			2	2	16	23	30

Period : Sept 2020 to Sept 2021
Monitoring Point : 19 (NLF-19)
Location : BH6A (Refer Old Nambucca Landfill Water Sampling Sites Map, received by EPA 28/10/03)
Type : Groundwater
Sampling Frequency : Yearly

Parameter	Unit of Measure	Date Sampled				No of Samples Required by Licence	No of Samples Collected & Analysed	Lowest Sample Value	Mean of Samples	Highest Sample Value
		09/10/20								
pH						1	0	-	-	-
Ammonia	mg/l					1	0	-	-	-
Nitrate	mg/l					1	0	-	-	-
Nitrogen (Total)	mg/l					1	0	-	-	-
Phosphorus	mg/l					1	0	-	-	-
Potassium	mg/l					1	0	-	-	-
Arsenic	mg/l					1	0	-	-	-
Dissolved Oxygen	mg/l					1	0	-	-	-
Total Organic Carbon	mg/l					1	0	-	-	-
Temperature	C					1	0	-	-	-
Standing Water Level	m					1	0	-	-	-

ATTACHMENT B : Air-Based Concentration Monitoring Summary

Period : Sept 2020 to Sept 2021

Type : Methane

EPA Licence MONITORING POINT 14

NLF-14 :– All enclosed buildings at the premises and any building within 250 metres of waste filled areas						
Parameter	**Unit of Measure**	**No of samples required by licence**	**No of samples collected and analysed**	**Lowest sample value**	**Mean sample value**	**Highest sample value**
Methane	% by volume	2	2	Nil	Nil	Nil

Dates monitoring undertaken : 02/12/2020
14/06/2021

EPA Licence MONITORING POINT 15

NLF-15 :– Surface of all waste-filled areas which have been capped						
Parameter	**Unit of Measure**	**No of samples required by licence**	**No of samples collected and analysed**	**Lowest sample value**	**Mean sample value**	**Highest sample value**
Methane	% by volume	2	2	Nil	Nil	Nil

Dates monitoring undertaken : 02/12/2020
14/06/2021

EPA Licence MONITORING POINT 16

NLF-16 :– All groundwater monitoring bores (refer Points 1 - 9)						
Parameter	**Unit of Measure**	**No of samples required by licence**	**No of samples collected and analysed**	**Lowest sample value**	**Mean sample value**	**Highest sample value**
Methane	ppm	2	2	Nil	Nil	Nil

Dates monitoring undertaken : 02/12/2020
14/06/2021