



# **WDL 151 Katherine Waste Stabilisation Ponds Monitoring Report**

October 2023

**PowerWater**

# Executive Summary

This report has a comprehensive analysis of the environmental impact of sewage discharge into a freshwater creek which reveals dynamic changes in response to discharge volume fluctuations. Year-on-year comparisons illustrate shifts in effluent loads and influent loads for critical analyses.

Included are demonstration of direct correlation between mass loads and discharge volume from the Katherine sewage ponds, highlighting significant dilution potential as the discharge flows into the Katherine River. It's worth noting that no gross pollutants were detected during a previous inspection, corroborated by recent photographs from the final evaporation pond outlet, indicating the effectiveness of the treatment system in containing such pollutants.

The assessment of water quality encompasses various field parameters. Dissolved oxygen levels, despite their wide range, generally meet standards, with a median of 91.5%. Electrical conductivity, while variable, remains mostly within acceptable limits, with a median value of 5.582 mS/cm. pH levels, with a median of 9.18, indicate slightly alkaline conditions, typical for water with significant algae. Temperature exhibits a broad range, with a median of 29.05°C, reflecting seasonal influences.

Reviewing the data against Australian and New Zealand Environment and Conservation Council (*ANZECC*) guideline values for water quality, it becomes evident that sewage discharge into the freshwater creek is influenced by various factors. While many parameters meet acceptable standards, variations and occasional spikes indicate the importance of ongoing monitoring and management to ensure consistent compliance with environmental guidelines. In conclusion, this assessment suggests minimal potential environmental impact from sewage discharge into the river.

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# Background

Power and Water Corporation operate the Katherine Waste Stabilisation Ponds (KWSP) to treat and evaporate the wastewater created by the Katherine Community. The KWSP is located approximately along the banks of the Katherine River (Figure 1) 8km from town. The configuration of ponds includes 3 facultative, 2 maturation and 7 evaporative ponds; the latter having capacity to manage all inflows therefore only needing to discharge during high flow monsoonal events. See Figure 2 for a map of the ponds with flow directions.



Figure 1: Katherine Waste Stabilisation Ponds (Google Image, 2022)

Discharges from KWSP are regulated under conditions specified in WDL151-07, which is granted under provisions of the *Water Act 1992*. Condition 22 of WDL 151-07 states:

- All discharge events at authorised discharge points must take place when Katherine River at Gauging Station G814-0001, is at a minimum flow of 66.78kL/s.

A monitoring report is required to be submitted to the Administering Agency by October 31 of each year according to condition 39 of the Waste Discharge Licence (WDL). This licence report supersedes the report completed for the 2020-21 reporting period (PWC, 2021).

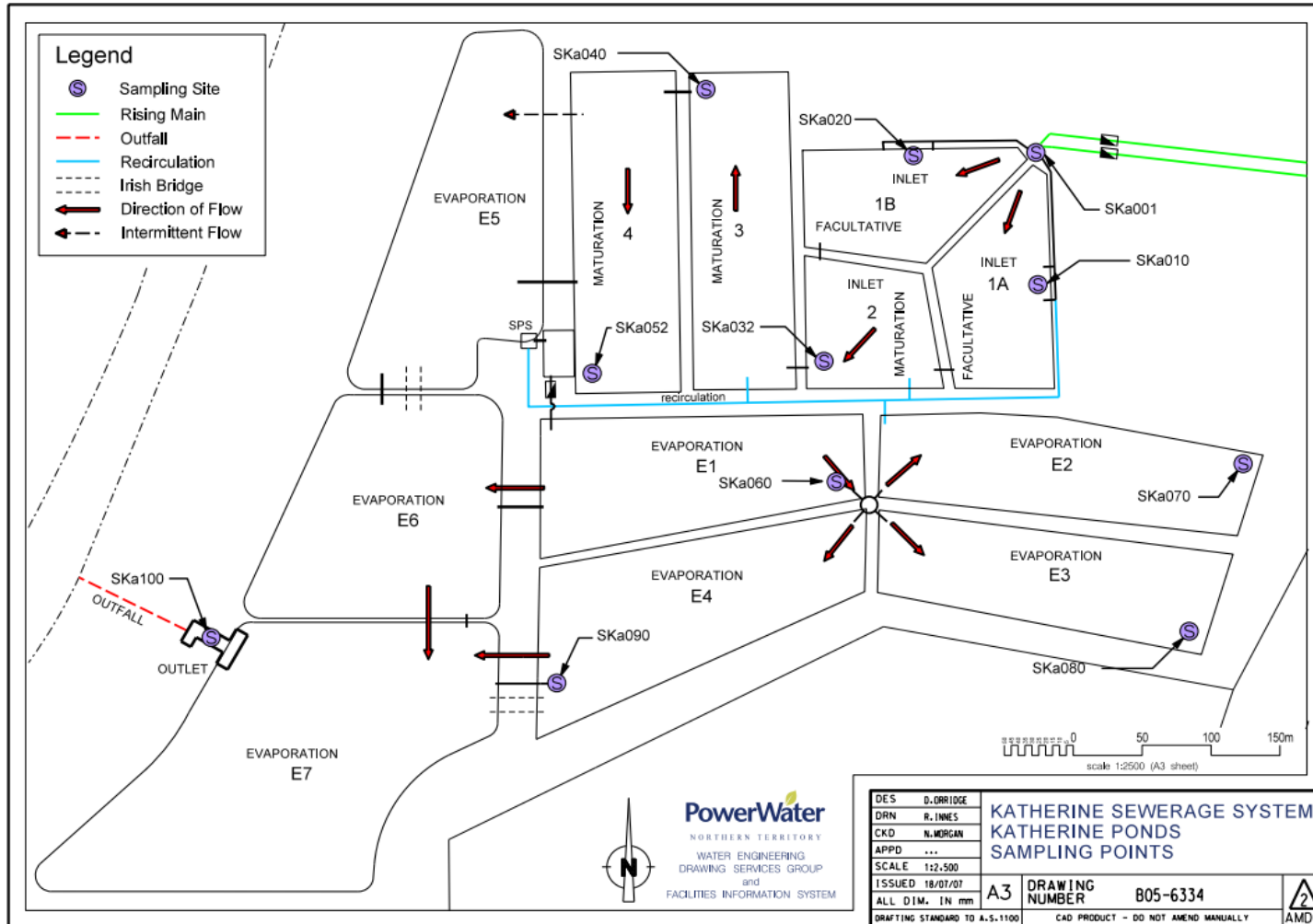


Figure 2: Katherine Waste Stabilisation Ponds Sampling Points and flow direction

# Monitoring Objectives and Method

## 1.1. Monitoring Objectives

The main objective of effluent monitoring, as is the case with all of Power and Water's WDLs, is to attempt to quantify and reduce harm to the receiving environment. By coupling an understanding of the effluent concentration with an understating of the receiving environment, environmental risk can be assessed.

## 1.2. Monitoring Method

WDL 151-07 requirements stipulate, monitoring of the KWSP effluent is limited to sampling at the discharge point during discharge events (Condition 25). Licenced discharge is only allowed to occur at times when the Katherine River flow exceeds 66.78kL/s (Condition 22) and as a result it is not safe to sample from any potential downstream sites. The high flow means the minimum dilution of the effluent when discharged in to the Katherine River is 1:575, greatly reducing the risk posed by any discharged contaminants.

As discharges have reduced (**Error! Reference source not found.**) in frequency the number of samples collected annually has also decreased. This limits the quality of statistical comparison of data collected with ANZECC guideline values and any long term trend analysis. However it is still important to analyse and identify any remarkable trends in the long term sampling data (Section 0) and mass loads of key contaminants (Section 1.3).

Monitoring is conducted in accordance with the licence conditions and are as follows:

25. *The licensee must conduct monitoring in accordance with Appendix 2 from the commencement date of the licence.*
26. *The licensee must ensure that all samples and field environmental data are representative of the conditions at the time of sampling.*
27. *The licensee must ensure that all samples and field environmental data recollected in accordance with recognised Australian Standards and guidelines (such as AS/NZS 5667, ANZECC 2018)*
28. *The licensee must ensure that all monitoring samples are analysed at a laboratory with current NATA accreditation or equivalent, for the parameters to be measured.*
29. *The licensee must for all land based monitoring sites monitoring points specified in Appendix 1:*
  - 29.1. *install and maintain appropriate identification signage so that they are reasonable identifiable at all times; and*
  - 29.2 *maintain safe access and egress, as is reasonably practicable*
30. *The licensee must ensure any samples collected in accordance with this license, are obtained by, or under the supervision of a qualified sampler*
31. *The licensee must ensure that, for each sample collected in accordance with this licence that the following information must be recorded and retained:*
  - 31.1. *the date on which the sample was collected;*
  - 31.2. *the time at which the sample was collected;*

- 31.3. the location at which the sample was collected;
- 31.4. the name of the person who collected the sample;
- 31.5. the chain of custody forms relating to the sample;
- 31.6. the field measurements (if any) and analytical results (if any) relating to the sample; and
- 31.7. laboratory quality assurance and quality control documentation.

## Discharge Regime

Discharge from the KWSP to the Katherine River is restricted by conditions 20 – 24 of WDL151-07. All previous flow volumes since 2011 are detailed in Table 1.

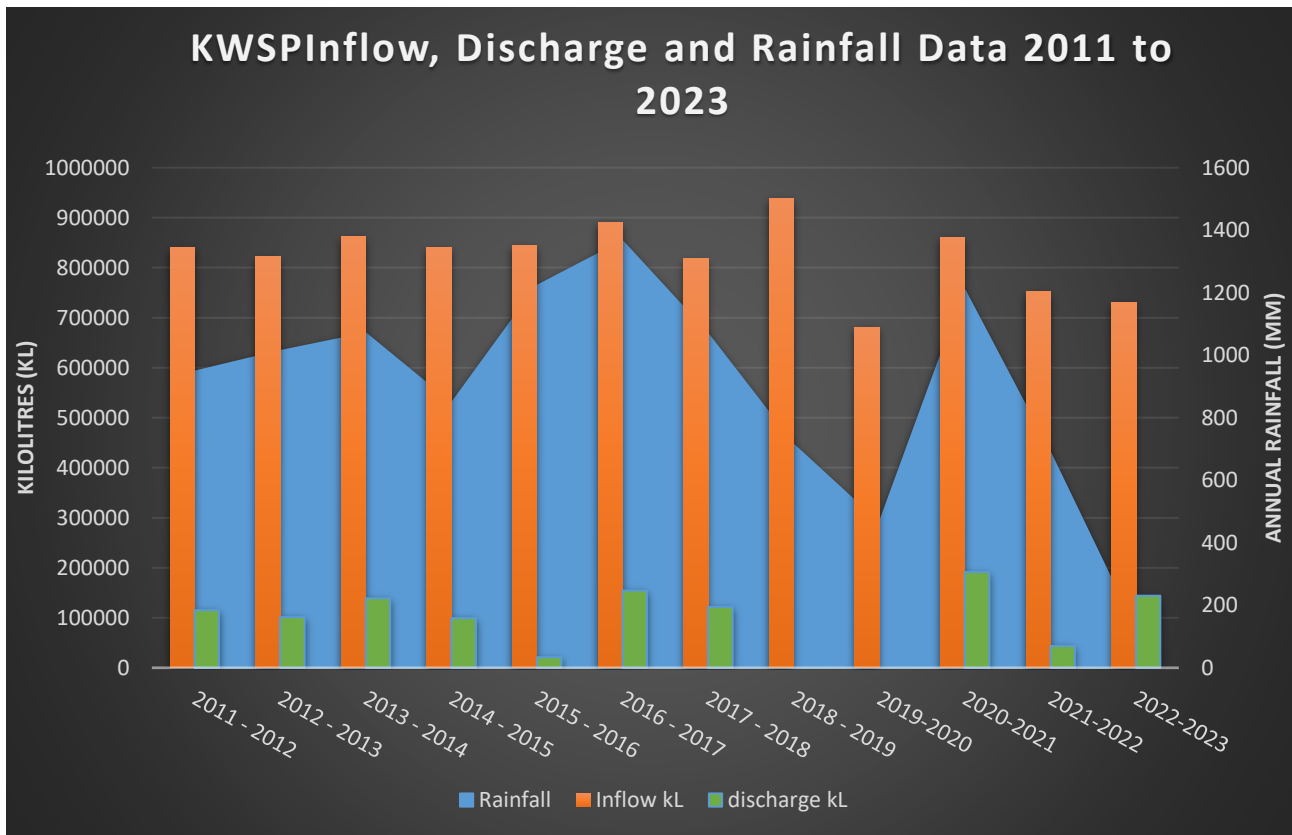


Table 1. KWSP flow volumes and rainfall 2011 – 2023

**Error! Reference source not found.** gives a statistical assessment of the inflow and outflow of the KWSP and rainfall in the area showing this year’s discharge was above the median values of data from 2011 to 2023 monitoring.

| Financial Year                | Inflow to Katherine WSP (kL) | Discharge to Katherine River (kL) | Rainfall (mm) |
|-------------------------------|------------------------------|-----------------------------------|---------------|
| 2022-2023                     | 729832                       | 144407                            | 1118.8        |
| 2021-2022                     | 751908                       | 43600                             | 686.5         |
| 2020-2021                     | 860638                       | 191582                            | 1207.3        |
| 2019-2020                     | 680559                       | 0                                 | 461.8         |
| 2018-2019                     | 938674                       | 0                                 | 713.5         |
| 2017-2018                     | 817941                       | 120960                            | 1067.4        |
| 2016-2017                     | 890563                       | 181345                            | 1364.3        |
| 2015-2016                     | 845299                       | 21531                             | 1222.1        |
| 2014-2015                     | 840358                       | 102352                            | 845.2         |
| 2013-2014                     | 861393                       | 136200                            | 1069.8        |
| 2012-2013                     | 821491                       | 101158                            | 1013.6        |
| 2011-2012                     | 840292                       | 115275                            | 947.3         |
| <b>Statistical Assessment</b> |                              |                                   |               |
| 10 <sup>th</sup> percentile   | 732039.6                     | 2153.1                            | 689.2         |
| Median                        | 840325                       | 108813.5                          | 1040.5        |
| 60 <sup>th</sup> percentile   | 843322.6                     | 118686                            | 1068.84       |
| 75 <sup>th</sup> percentile   | 860826.8                     | 138251.8                          | 1140.925      |
| 80 <sup>th</sup> percentile   | 861242                       | 142765.6                          | 1189.6        |
| 90 <sup>th</sup> percentile   | 887646                       | 177651.2                          | 1220.62       |
| 95 <sup>th</sup> percentile   | 912213                       | 185951.7                          | 1286.09       |

Table 2. KWSP flow volumes and rainfall statistical assessment table.

- According to the Bureau of Meteorology, the total rainfall in Katherine from July 2022 to June 2023 was **1,118.8 mm<sup>1</sup>**.
- The wettest month was **January 2023** with **403.4 mm** of rainfall, followed by **February 2023** with **287.6 mm<sup>1</sup>**.
- The highest daily rainfall was recorded on **January 18, 2023** with **128.6 mm**, followed by **February 5, 2023** with **107.8 mm<sup>1</sup>**.

# Long Term Discharge Monitoring Trends

## 1.3. Mass Loads

Following a change in discharge volume, it follows that the mass loads of environmental stressors had also changed during this reporting period. Figure 3 shows the year on year changes to effluent loads and their respective influent loads for key parameters.

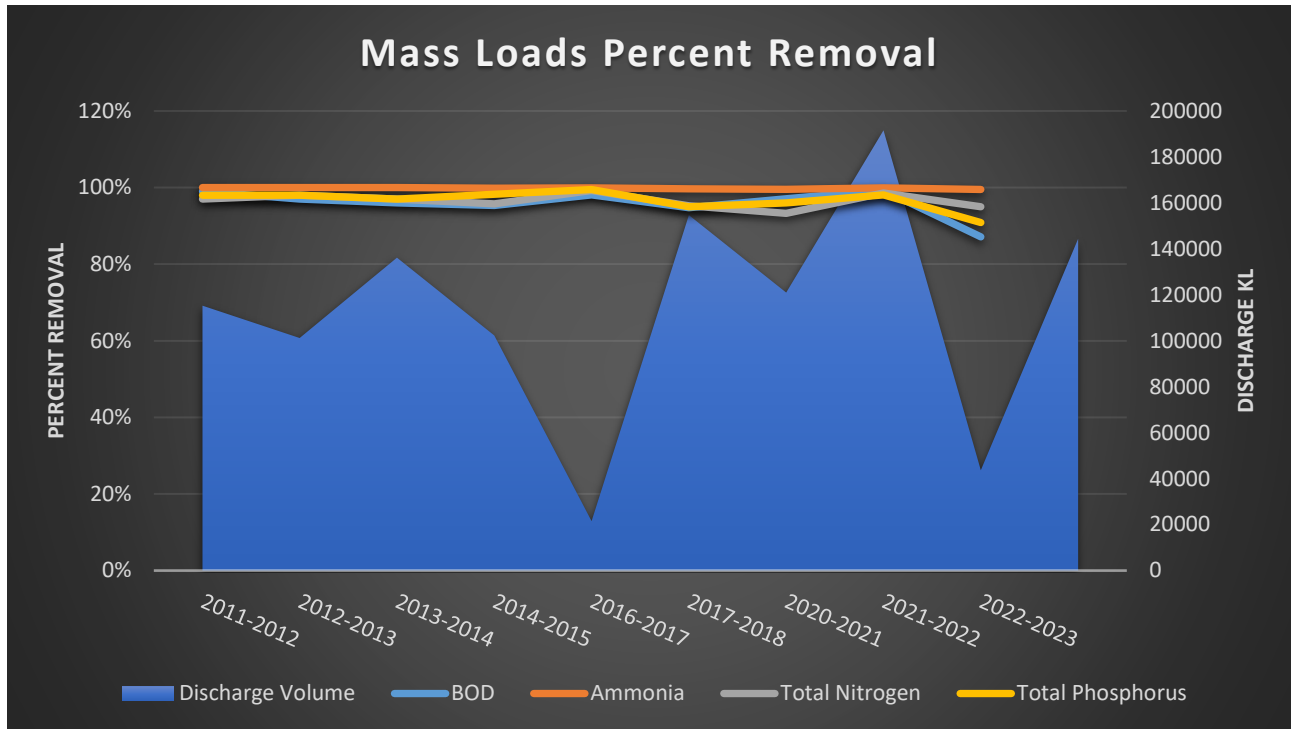


Figure 3. KWSP Mass Loads percent removal 2011 – 2023

The visual representation in Figure 4 clearly illustrates a direct and proportional relationship between the mass loads discharged and the volume of discharge from the KWSP. This observation strongly suggests that the discharge has undergone substantial dilution, and further dilution is likely to take place upon its entry into the Katherine River.

It's noteworthy that during a prior inspection, no significant gross pollutants were observed. Furthermore, recent photographs (Figure 5) taken at the final evaporation pond outlet confirm the absence of gross pollutants. This strongly indicates the effectiveness of the treatment system in containing and preventing the release of gross pollutants from the treatment facility.

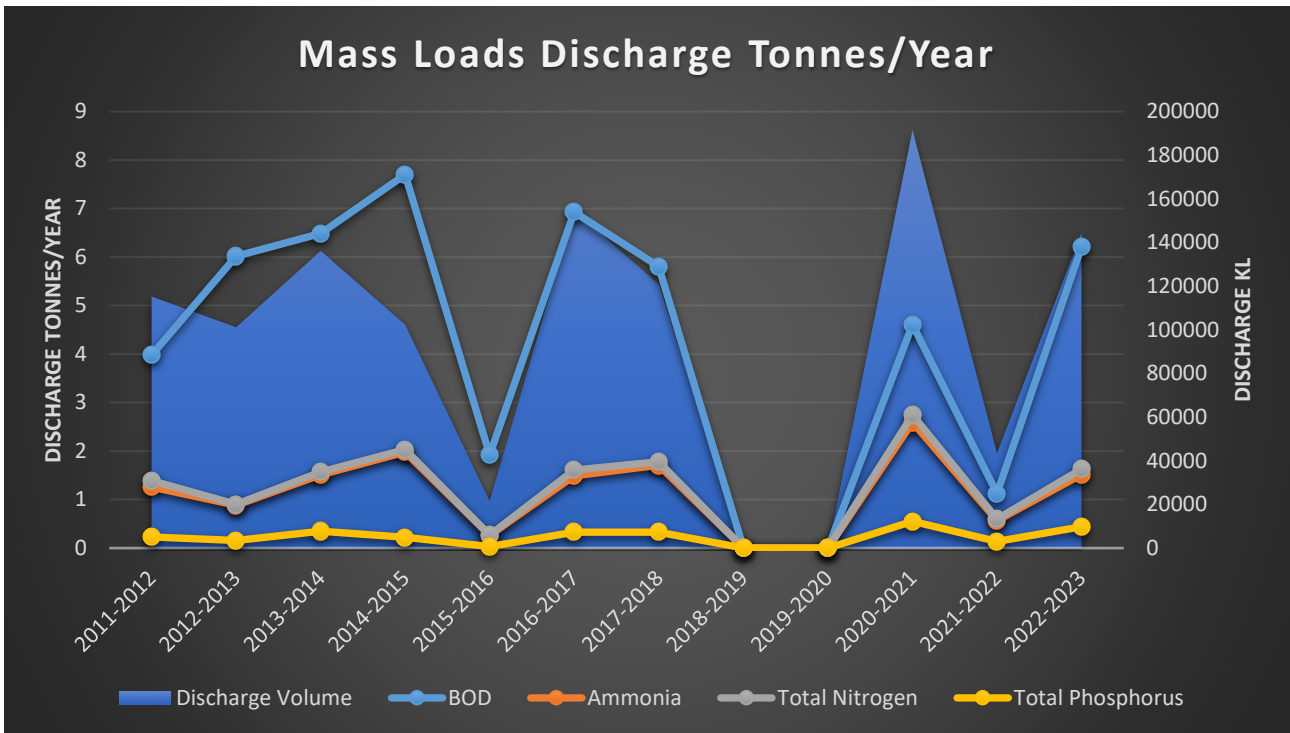


Figure 4. KWSP Mass Loads Discharge Volumes Tonnes per Year 2011 – 2023



Figure 5. KWSP Evaporation Pond 7 Outlet (Photo Taken: 26/10/2023)

## Long term discharge quality

The effluent discharge typically contains no gross pollutants, a moderately high nutrient content and a green colour. No odour is usually present at the discharge point as the biodegradable carbon has been stabilised and transformed into algae, contributing to the prevailing green colour.

| Parameter                     | Units             | Detection Limits | ANZECC Guideline | Median | 80 <sup>th</sup> percentile | 95 <sup>th</sup> percentile |
|-------------------------------|-------------------|------------------|------------------|--------|-----------------------------|-----------------------------|
| pH                            | pH                | 0.01             | 6.0-8.0          | 9.17   | 9.576                       | 9.848                       |
| EC                            | µScm <sup>2</sup> | 0.1              | 250              | 5.253  | 7.2182                      | 7.761                       |
| DO                            | %sat              | 0.01             | 80-110           | 89.65  | 124.66                      | 172.55                      |
| Temp                          | °C                | 0.01             | -                | 29.22  | 30.964                      | 33.615                      |
| FRP                           | mg/L              | 0.05             | 0.004            | 0.91   | 1.56                        | 2.1                         |
| TP                            | mg/L              | 0.05             | 0.01             | 2.4    | 2.78                        | 4.01                        |
| NH3-N Total                   | mg/L              | 0.1              | 0.01             | 12     | 15.6                        | 22.7                        |
| NO2                           | mg/L              | 0.1              | -                | 0.1    | 0.1                         | 0.17                        |
| NO3                           | mg/L              | 0.1              | -                | 0.1    | 0.1                         | 0.121                       |
| NOx                           | mg/L              | 0.1              | 0.005            | 0.1    | 0.1                         | 0.287                       |
| TN                            | mg/L              | 0.1              | 0.2              | 12.6   | 16.5                        | 25.447                      |
| E coli                        | org/100ml         | 10               | 200*             | 10     | 1274                        | 17564.9                     |
| Enterococci                   | org/100ml         | 10               | 41-200           | 908    | 5912.4                      | 24410.9                     |
| As                            | µg/L              | 0.5              | 13               | 0.5    | 1.1                         | 1.58                        |
| Cd                            | µg/L              | 0.2              | 0.2              | 0.2    | 0.2                         | 0.2                         |
| Cr                            | µg/L              | 5                | 3.3              | 5      | 5                           | 5                           |
| Cu                            | µg/L              | 10               | 1.4              | 10     | 10                          | 12                          |
| Pb                            | µg/L              | 1                | 3.4              | 1      | 1                           | 1.232                       |
| Hg                            | µg/L              | 0.1              | 0.06             | 0.1    | 0.2                         | 0.56                        |
| Ni                            | µg/L              | 2                | 11               | 2      | 2                           | 2                           |
| Zn                            | µg/L              | 10               | 8                | 7.1    | 10                          | 20                          |
| BOD                           | mg/L              | 2                | -                | 50     | 70.8                        | 103.7                       |
| COD                           | mg/L              | 2                | -                | 200    | 300                         | 47.53                       |
| SS                            | mg/L              | 1                | 15               | 103    | 144                         | 206.6                       |
| VSS                           | mg/L              | 1                | -                | 95     | 134                         | 193.6                       |
| Hardness (CaCO <sub>3</sub> ) | mg/L              | 1                | -                | 70.8   | 83.86                       | 178.3                       |

Table 3. KWSP Water Quality Assessment Table (Data Period 2011 to 2023).

## Water Quality

Since sampling data is collected during discrete events rather than regular intervals, it isn't appropriate to formulate a long term trend and instead, the discharge quality will be compared to the long term median and ANZECC (ANZECC, 2018) values. Tables 5-9 show the data from this reporting period against their respective medians and guideline values (if applicable).

### **In-situ Physical Chemical Parameters**

The measurements indicate a wide range of dissolved oxygen values, from as low as 24.7% to as high as 280.2%. The median DO value is 91.5%, suggesting relatively good oxygen levels. Additionally, the 80th and 95th percentile values, 127.38% and 176.21%, respectively (Table 4).

Electrical conductivity values exhibit variability, with the highest recorded at 7.678 mS/cm. The median electrical conductivity value is 5.582 mS/cm. The 80th and 95th percentile values indicate slightly elevated electrical conductivity levels.

The pH values span a range from 6.94 to 9.94. The median pH is 9.18, indicating slightly alkaline conditions, which can be typical for freshwater discharge with significant algae levels. Moreover, the 80th and 95th percentile pH values fall within the expected range for freshwater river systems.

Temperature measurements exhibit a wide range from 27.2°C to 40.07°C. The median temperature is 29.05°C, indicating relatively warm conditions. The 80th and 95th percentile temperature values reflect the influence of seasonality.

### **Nutrient Parameters**

The Nutrient analysis of the data pertaining to sewage discharge into a freshwater river reveals several key insights (Table 5). Ammonia levels in the discharge exhibit significant variation, ranging from 0.3 mg/L to 8.1 mg/L, with occasional spikes. The median ammonia concentration is 0.5 mg/L, indicating a moderate presence, while the 95th percentile value reaches 2.46 mg/L, suggesting instances of elevated ammonia concentration. Fortunately, nitrate and nitrite levels remain consistently low, below 0.1 mg/L, which is positive for the river's health. Total nitrogen in the sewage discharge varies widely, with a median concentration of 12.6 mg/L. The 80th and 95th percentile values indicate elevated total nitrogen levels during specific occurrences. Phosphorus concentrations also vary, with both filterable reactive and total phosphorus at moderate levels.

### **Bacteriological Parameters**

Analysing the data on sewage discharge into a freshwater creek with a focus on bacteriological parameters, specifically E. coli and Enterococci levels, reveals several important findings (Table 6). E. coli concentrations in the creek water exhibit significant variation over the recorded years, with instances of exceptionally high levels exceeding 24,196 MPN/100 mL. The 80th percentile E. coli concentration is relatively high at 1,274 MPN/100 mL, indicating that during a significant portion of the data points, contamination is at elevated levels. The 95th percentile E. coli concentration reaching 17,564.9 MPN/100 mL, suggesting that specific events result in high levels.

Similar trends are observed in Enterococci levels, with occasional spikes exceeding 24,196 MPN/100 mL. The 80th percentile Enterococci concentration is 5,912.4 MPN/100 mL, indicating relatively high levels during many recorded instances. The 95th percentile Enterococci concentration is substantial, at 24,410.9 MPN/100 mL.

On the other hand, the median concentrations for both E. coli and Enterococci are relatively low, at 10.0 MPN/100 mL and 908.0 MPN/100 mL, respectively, which suggests that, on average, the water quality meets acceptable standards.

This data highlights the considerable variability in levels of E. coli and Enterococci during discharge. While median levels appear to be within acceptable limits, the instances of extremely high contamination during specific events signifies the effect of meteorological and influent variation to the sewage ponds.

### **Metals Parameters**

When analysing metal samples, it's essential to consider that the detection levels for chromium, copper, mercury, and zinc often surpass the ANZECC guideline values. While this value might not be a specific part of any license condition, it holds significant importance in assessing the discharge's alignment with environmental guidelines. Examining the dataset concerning various heavy metal concentrations in sewage discharged into a freshwater creek offers valuable insights into potential environmental impacts. This dataset covers measurements of Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, and Zinc levels (Table 7).

Fortunately, the heavy metal concentrations within the sewage discharge into the freshwater creek do not pose immediate environmental risks. The levels of these heavy metals, encompassing Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, and Zinc, generally comply with regulatory standards. This suggests that the sewage discharge is operating within acceptable parameters, which is reassuring from an environmental perspective.

### **General Chemistry Parameter**

Overall, the indicators from the most recent discharge have not strayed far from the long term medians showing no deterioration of treatment performance over the years (Table 8). Although many of the analyte exceed the ANZECC guidelines for a freshwater marine environment, it is important to note the samples are taken from the undiluted effluent stream whereas the values are derived for diluted flows in the environment.

# Discharge Impact Assessment

The analysis of various field parameters reveals important information about the water quality in the context of sewage discharge into a freshwater river. Dissolved oxygen levels, despite their wide range, generally align with acceptable standards, with a median value of 91.5%. Electrical conductivity, while variable, mostly falls within acceptable limits, with a median value of 5.582 mS/cm. pH levels, with a median of 9.18, indicate slightly alkaline conditions, common in water with significant algae. Temperature exhibits a broad range, with a median of 29.05°C, reflecting seasonal influences.

Considering ANZECC guideline values for water quality guidelines, the sewage discharge into the freshwater creek demonstrates a complex interplay of parameters. While many metrics meet acceptable standards, variations and occasional spikes suggest the need for careful monitoring and management to ensure consistent compliance with environmental guidelines. This assessment provides an overview of potential minimal impact of sewage discharge into the river.

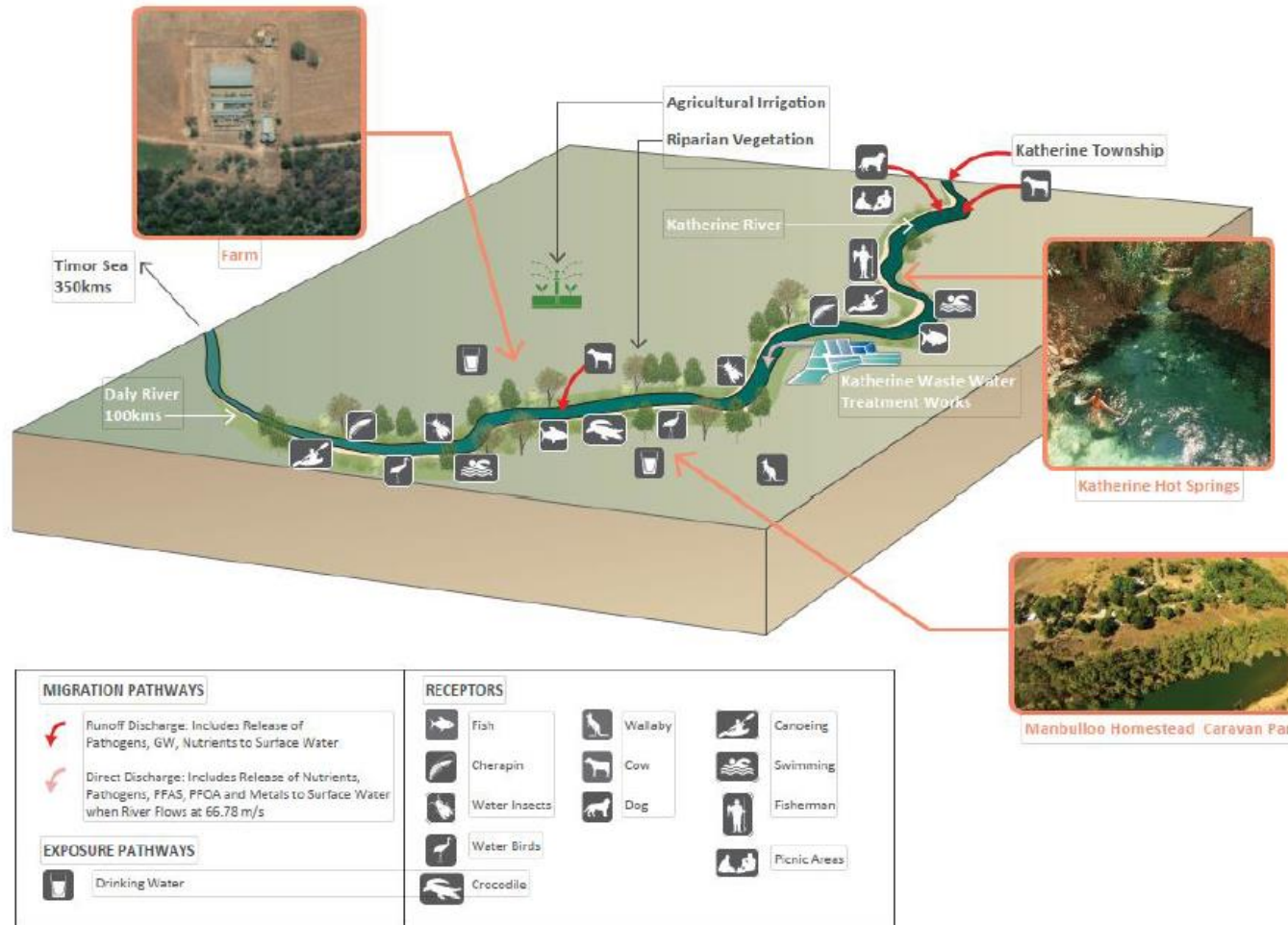


Figure 6: Conceptual site model (SLR, 2022)

## References

ANZECC. (2018). *Australian and New Zealand guidelines for fresh and marine water quality*. Retrieved from Water Quality Australia: <https://www.waterquality.gov.au/guidelines/anz-fresh-marine>

PWC. (2021). *WDL 151-07 Katherine WSP 2021 Monitoring Report*.

PWC. (2022). *Katherine Improvement Plan 2022 (D2022/410836)*. Darwin: PWC.

SLR. (2022). *2022 Katherine Environmental Risk Assessment*. Darwin.

# Appendices

## Appendix 1 Water Quality Data Tables

*Excel file copy is also included as an attachment with the submission.*

| Sample Date         | Location | Status          | Field Measurements                   |                                      |   |                       |                          |  |
|---------------------|----------|-----------------|--------------------------------------|--------------------------------------|---|-----------------------|--------------------------|--|
|                     |          |                 | Dissolved oxygen (field)             |                                      | Electrical Conductivity (field)         | pH (field)            | Temperature (field)      |  |
|                     |          |                 | Dissolved Oxygen (DO) - field (%sat) | Dissolved Oxygen (DO) - field (mg/L) | Electrical Conductivity (field) (mS/cm) | pH (field) (pH units) | Temperature (field) (°C) |  |
| 27/02/2023 10:00:00 | SKA100   | Valid           | 137.8                                | 10.74                                | 0.398                                   | 8.9                   | 28.02                    |  |
| 14/02/2023 14:10:00 | SKA100   | Valid           | 280.2                                | 19.99                                | 0.448                                   | 9.36                  | 33.65                    |  |
| 18/01/2022 10:00:00 | SKA100   | Valid           | 56.2                                 | 4.13                                 | 0.463                                   | 7.33                  | 30.61                    |  |
| 23/02/2021 12:39:00 | SKA100   | Valid           | 128.1                                | 13.55                                | 266.0                                   | 9.19                  | 28.41                    |  |
| 01/02/2021 10:06:00 | SKA100   | Valid           | 53.2                                 | 3.93                                 | 0.387                                   | 9.41                  | 29.93                    |  |
| 30/01/2018 13:20:00 | SKA100   | Valid           | 33.8                                 | 2.35                                 | 0.471                                   | 6.94                  | 27.2                     |  |
| 28/03/2017 13:31:00 | SKA100   | Valid           | 174.1                                | 11.57                                | 0.422                                   | 9.57                  | 36.54                    |  |
| 22/02/2017 11:35:00 | SKA100   | Valid           | 49.0                                 | 3.58                                 | 0.346                                   | 9.94                  | 31.81                    |  |
| 24/01/2017 10:00:00 | SKA100   | Valid           | 36.4                                 | 2.8                                  | 0.361                                   | 9.17                  | 28.5                     |  |
| 02/02/2016 10:05:00 | SKA100   | Valid           | 24.7                                 | 1.83                                 | 5.702                                   | 8.93                  | 29.79                    |  |
| 30/12/2015 10:00:00 | SKA100   | Valid           | 34.8                                 | 2.61                                 | 7.221                                   | 8.78                  | 28.65                    |  |
| 31/03/2015 08:05:00 | SKA100   | Valid           | 33.4                                 | 2.56                                 | 7.162                                   | 9.62                  | 27.16                    |  |
| 30/03/2015 08:30:00 | SKA100   | Valid           | 35.4                                 | 2.6                                  | 7.214                                   | 9.59                  | 27.81                    |  |
| 28/01/2015 08:05:00 | SKA100   | Valid           | 70.1                                 | 5.3                                  | 7.678                                   | 9.09                  | 28.14                    |  |
| 27/01/2015 08:45:00 | SKA100   | Valid           | 49.5                                 | 3.67                                 | 7.608                                   | 8.91                  | 29.05                    |  |
| 21/01/2015 08:00:00 | SKA100   | Valid           | 108.3                                | 8.08                                 | 7.522                                   | 9.24                  | 29.22                    |  |
| 20/01/2015 08:10:00 | SKA100   | Valid           | 73.4                                 | 5.24                                 | 7.574                                   | 9.12                  | 29.77                    |  |
| 19/01/2015 08:10:00 | SKA100   | Valid           | 91.0                                 | 6.65                                 | 7.566                                   | 9.18                  | 29.86                    |  |
| 05/01/2015 08:10:00 | SKA100   | Valid           | fld instrument playing up            | fld instrument playing up            | 10.4                                    | 9.33                  | 27.76                    |  |
| 05/03/2014 08:40:00 | SKA100   | Valid           | 84.5                                 | 6.5                                  | 4.048                                   | 8.65                  | 27.96                    |  |
| 04/03/2014 09:15:00 | SKA100   | Valid           | 87.7                                 | 6.73                                 | 4.02                                    | 7.41                  | 28.55                    |  |
| 25/02/2014 08:30:00 | SKA100   | Valid           | 101.2                                | 7.83                                 | 5.582                                   | 9.21                  | 27.76                    |  |
| 24/02/2014 09:45:00 | SKA100   | Valid           | 139.7                                | 10.35                                | 5.74                                    | 9.85                  | 30.31                    |  |
| 19/02/2014 08:50:00 | SKA100   | Valid           | 77.1                                 | 5.9                                  | 5.253                                   | 9.25                  | 28.13                    |  |
| 18/02/2014 09:10:00 | SKA100   | Valid           | 92.7                                 | 7.16                                 | 5.151                                   | 9.41                  | 28.13                    |  |
| 17/02/2014 10:00:00 | SKA100   | Valid           | 92.0                                 | 7.09                                 | 5.081                                   | 9.56                  | 28.25                    |  |
| 13/02/2014 10:45:00 | SKA100   | Valid           | 127.2                                | 9.06                                 | 5.852                                   | 9.93                  | 33.07                    |  |
| 10/02/2014 10:00:00 | SKA100   | Valid           | 216.3                                | 15.46                                | 5.817                                   | 9.83                  | 31.4                     |  |
| 05/02/2014 08:35:00 | SKA100   | Valid           | 106.9                                | 8.23                                 | 5.793                                   | 9.03                  | 27.48                    |  |
| 04/02/2014 10:40:00 | SKA100   | Valid           | 105.1                                | 8.11                                 | 5.791                                   | 9.1                   | 27.83                    |  |
| 03/02/2014 09:15:00 | SKA100   | Valid           | 110.2                                | 8.5                                  | 5.923                                   | 9.31                  | 28.0                     |  |
| 30/01/2014 08:50:00 | SKA100   | Valid           | 107.1                                | 7.92                                 | 7.037                                   | 9.12                  | 30.05                    |  |
| 29/01/2014 08:25:00 | SKA100   | Valid           | 82.0                                 | 6.0                                  | 7.132                                   | 9.05                  | 29.93                    |  |
| 28/01/2014 08:10:00 | SKA100   | Valid           | 88.3                                 | 6.57                                 | 7.44                                    | 9.0                   | 29.66                    |  |
| 09/04/2013 08:40:00 | SKA100   | Valid           | 114.5                                | 8.68                                 | 0.349                                   | 9.63                  | 29.33                    |  |
| 25/02/2013 10:05:00 | SKA100   | Valid           | 103.3                                | 7.33                                 | 0.448                                   | 9.58                  | 33.3                     |  |
| 25/02/2013 09:55:00 | SKA100   | Valid           | 97.0                                 | 7.13                                 | 0.439                                   | 9.05                  | 32.16                    |  |
| 14/03/2012 11:40:00 | SKA100   | Valid           | 128.5                                | 10.07                                | 0.332                                   | 8.96                  | 27.18                    |  |
| 13/03/2012 09:10:00 | SKA100   | Valid           | 46.1                                 | 3.52                                 | 0.426                                   | 7.75                  | 28.2                     |  |
| 08/03/2012 12:41:00 | SKA100   | Valid           | 143.1                                | 9.15                                 | 0.371                                   | 9.05                  | 40.07                    |  |
| 04/01/2012 08:30:00 | SKA100   | Valid           | 27.2                                 | 2.0                                  | 0.429                                   | 9.58                  | 31.2                     |  |
|                     |          | Median          | 91.5                                 | 6.91                                 | 5.582                                   | 9.18                  | 29.05                    |  |
|                     |          | 80th Percentile | 127.38                               | 9.078                                | 7.221                                   | 9.58                  | 31.2                     |  |
|                     |          | 95th Percentile | 176.21                               | 13.6455                              | 7.678                                   | 9.85                  | 33.65                    |  |

Table 4. KWSP in-situ Phys-Chem

| Sample Date         | Location | Description                       | Status          | Nutrients                            |                               |                             |                                       |                             |       | Total Nitrogen (mg/L) | Phosphorus - Filterable Reactive as P (mg/L) | Phosphorus - Total (mg/L) |      |      |
|---------------------|----------|-----------------------------------|-----------------|--------------------------------------|-------------------------------|-----------------------------|---------------------------------------|-----------------------------|-------|-----------------------|--|---------------------------|------|------|
|                     |          |                                   |                 | Ammonia                              | Ammonia as N                  | Nitrate (NO3)               | Nitrate + Nitrite as N (NOx)          | Nitrite (NO2)               |       |                       |  |                           |      |      |
|                     |          |                                   |                 | Ammonia as N (NH3 un-ionized) (mg/L) | Ammonia as N (Organic) (mg/L) | Nitrate as N (NO3-N) (mg/L) | Nitrate + Nitrite as N (NOx-N) (mg/L) | Nitrite as N (NO2-N) (mg/L) |       |                       |  |                           |      |      |
| 28/02/2023 11:14:39 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.8                                  | 10.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 10.9                      | 2.3  | 3.4  |
| 14/02/2023 14:10:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.7                                  | 11.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 11.8                      | 1.4  | 2.7  |
| 18/01/2022 10:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.7                                  | 13.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 13.8                      | 1.8  | 3.1  |
| 23/02/2021 12:39:04 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.9                                  | 8.5                           | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 9.5                       | 0.7  | 2.3  |
| 01/02/2021 10:06:53 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           |                                      |                               |                             |                                       |                             |       |                       |  |                           |      |      |
| 01/02/2021 10:06:03 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.4                                  | 25.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 25.5                      | 1.6  | 4.2  |
| 29/01/2018 10:16:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.8                                  | 14.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 14.9                      | 2.1  | 2.6  |
| 29/01/2018 10:11:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           |                                      |                               |                             |                                       |                             |       |                       |  | 0.0                       |      |      |
| 28/03/2017 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.9                                  | 8.7                           | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 9.7                       | 2.0  | 2.1  |
| 28/03/2017 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.9                                  | 8.7                           | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 9.7                       | 2.0  | 2.1  |
| 23/02/2017 10:30:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.5                                  | 10.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 10.6                      | 0.4  | 1.3  |
| 23/02/2017 10:25:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.5                                  | 10.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 10.6                      | 0.4  | 1.9  |
| 24/01/2017 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.35                                 | 12.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 12.45                     | 1.6  | 2.7  |
| 02/02/2016 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.6                                  | 12.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 12.7                      | 0.5  | 1.4  |
| 30/12/2015 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           |                                      |                               |                             |                                       |                             |       |                       |  |                           |      |      |
| 31/03/2015 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | <                                    | 0.3                           | 12.0                        | <                                     | 0.1                         | <     | 0.1                   | <  | 12.4                      | 0.59 | 1.3  |
| 30/03/2015 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.5                                  | 12.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 12.6                      | 0.63 | 1.4  |
| 28/01/2015 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 1.0                                  | 23.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 24.1                      | 1.0  | 2.6  |
| 17/01/2015 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.3                                  | 18.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 18.4                      | 0.78 | 2.1  |
| 21/01/2015 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.55                                 | 20.0                          | <                           | 0.13                                  | <                           | 0.14  | <                     | 0.1  | 20.69                     | 0.68 | 2.2  |
| 20/01/2015 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.45                                 | 20.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 20.55                     | 0.78 | 2.2  |
| 19/01/2015 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | <                                    | 0.3                           | 22.0                        | <                                     | 0.1                         | <     | 0.1                   | <  | 22.4                      | 0.71 | 2.4  |
| 05/01/2015 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.6                                  | 25.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 25.7                      | 0.63 | 2.9  |
| 05/03/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.65                                 | 9.6                           | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 10.35                     | 2.6  | 5.4  |
| 04/03/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.35                                 | 18.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 18.45                     | 2.1  | 4.1  |
| 25/02/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.45                                 | 16.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 16.55                     | 1.6  | 3.4  |
| 24/02/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.35                                 | 12.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 12.45                     | 0.83 | 2.5  |
| 19/02/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.45                                 | 12.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 12.55                     | 1.1  | 2.6  |
| 18/02/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.45                                 | 17.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 17.55                     | 0.93 | 3.8  |
| 17/02/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | <                                    | 0.3                           | 11.0                        | <                                     | 0.1                         | <     | 0.1                   | <  | 11.4                      | 0.89 | 2.2  |
| 13/02/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.35                                 | 9.4                           | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 9.85                      | 0.83 | 1.8  |
| 10/02/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.3                                  | 9.2                           | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 9.6                       | 0.78 | 2.1  |
| 05/02/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.3                                  | 9.7                           | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 10.1                      | 1.2  | 2.3  |
| 04/02/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.4                                  | 11.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 11.5                      | 1.1  | 2.2  |
| 03/02/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.45                                 | 10.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 10.55                     | 0.91 | 2.2  |
| 30/01/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | <                                    | 0.3                           | 11.0                        | <                                     | 0.1                         | <     | 0.1                   | <  | 11.4                      | 1.0  | 2.5  |
| 29/01/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.5                                  | 4.7                           | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 5.3                       | 1.1  | 2.7  |
| 28/01/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.65                                 | 13.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 13.75                     | 1.4  | 2.8  |
| 23/01/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | <                                    | 0.3                           | 12.0                        | <                                     | 0.1                         | <     | 0.1                   | <  | 12.4                      | 1.1  | 2.5  |
| 22/01/2014 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.4                                  | 13.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 13.5                      | 0.79 | 2.6  |
| 09/04/2013 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | <                                    | 0.3                           | 9.0                         | <                                     | 0.1                         | <     | 0.1                   | <  | 9.4                       | 0.68 | 1.7  |
| 05/03/2013 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           |                                      |                               |                             |                                       |                             |       |                       |  | 0.0                       |      |      |
| 25/02/2013 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | <                                    | 0.3                           | 8.2                         | <                                     | 0.1                         | <     | 0.1                   | <  | 8.6                       | 0.57 | 1.4  |
| 15/03/2012 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.95                                 | 8.5                           | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 9.55                      | 0.34 | 1.3  |
| 13/03/2012 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 3.0                                  | 10.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 13.1                      | 1.4  | 2.5  |
| 07/03/2012 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 1.2                                  | 13.0                          | <                           | 0.1                                   | <                           | 0.35  | <                     | 0.24   | 14.55                     | 0.44 | 1.4  |
| 17/02/2012 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.4                                  | 11.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 11.5                      | 1.1  | 2.4  |
| 04/01/2012 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.8                                  | 12.0                          | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 12.9                      | 0.46 | 1.6  |
| 21/06/2011 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 0.6                                  | 9.5                           | <                           | 0.1                                   | <                           | 0.1   | <                     | 0.1  | 10.2                      | 0.8  | 2.0  |
| 04/04/2011 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 8.1                                  | 4.7                           | <                           | 0.2                                   | <                           | 0.5   | <                     | 0.3  | 13.3                      | 1.1  | 2.6  |
| 22/03/2011 00:00:00 | SKA100   | SKA100 Effluent - POND 7 DISCHARG | valid           | 3.0                                  | 14.0                          | <                           | 0.3                                   | <                           | 0.4   | <                     | 0.2  | 17.4                      | 0.9  | 3.5  |
|                     |          |                                   | Median          | 0.5                                  | 12                            |                             | 0.1                                   |                             | 0.1   |                       | 0.1  | 12.6                      | 0.91 | 2.4  |
|                     |          |                                   | 80th Percentile | 0.8                                  | 15.6                          |                             | 0.1                                   |                             | 0.1   |                       | 0.1  | 16.5                      | 1.56 | 2.78 |
|                     |          |                                   | 95th Percentile | 2.46                                 | 22.7                          |                             | 0.121                                 |                             | 0.287 |                       | 0.17   | 25.447                    | 2.1  | 4.01 |

Table 5. KWSP Nutrients Data 2011 to 2023

| Sample Date         | Location | Description               | Status          | Bacteriological      |                          |
|---------------------|----------|---------------------------|-----------------|----------------------|--------------------------|
|                     |          |                           |                 | E. coli              | Enterococci              |
|                     |          |                           |                 | E. coli (MPN/100 mL) | Enterococci (MPN/100 mL) |
| 27/02/2023 10:00:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 100.0                | 310.0                    |
| 14/02/2023 14:10:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 100.0                    |
| 18/01/2022 10:00:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 327.0                    |
| 23/02/2021 12:39:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 100.0                    |
| 01/02/2021 10:06:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 86.0                     |
| 29/01/2018 11:52:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 16,580.0             | 2,690.0                  |
| 28/03/2017 13:31:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 10.0                     |
| 22/02/2017 11:35:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 630.0                    |
| 24/01/2017 10:00:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 295.0                    |
| 02/02/2016 10:05:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 52.0                     |
| 30/12/2015 10:00:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 10.0                 | 432.0                    |
| 31/03/2015 08:05:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 31.0                     |
| 30/03/2015 08:30:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 10.0                 | 10.0                     |
| 28/01/2015 08:05:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 256.0                    |
| 27/01/2015 08:45:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 30.0                 | 3,654.0                  |
| 21/01/2015 08:00:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 749.0                    |
| 20/01/2015 08:10:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 908.0                    |
| 19/01/2015 08:10:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 591.0                    |
| 05/01/2015 08:10:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 10.0                     |
| 05/03/2014 08:40:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 10.0                 | 7,701.0                  |
| 04/03/2014 09:15:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 171.0                | 141,360.0                |
| 25/02/2014 08:30:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 9,208.0                  |
| 24/02/2014 09:45:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 95.0                     |
| 19/02/2014 08:50:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 263.0                    |
| 18/02/2014 00:00:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 4,541.0                  |
| 17/02/2014 10:00:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 94.0                     |
| 13/02/2014 10:45:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 10.0                     |
| 10/02/2014 10:00:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 20.0                     |
| 05/02/2014 08:35:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 10.0                 | 2,247.0                  |
| 04/02/2014 10:40:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 10.0                 | 1,723.0                  |
| 03/02/2014 09:15:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 41.0                 | 3,654.0                  |
| 30/01/2014 08:50:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 337.0                    |
| 29/01/2014 08:25:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 9,208.0                  |
| 28/01/2014 08:10:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 10.0                 | 24,810.0                 |
| 23/01/2014 09:30:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 121.0                | 377.0                    |
| 22/01/2014 11:30:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 10.0                 | 189.0                    |
| 09/04/2013 09:00:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 218.0                | 155,310.0                |
| 25/02/2013 10:05:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | >                        |
| 25/02/2013 09:55:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 10.0                 | 3,654.0                  |
| 14/03/2012 11:40:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 733.0                | 1,989.0                  |
| 13/03/2012 09:10:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 19,863.0             | 5,794.0                  |
| 05/03/2012 09:15:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 3,076.0              | 2,481.0                  |
| 04/01/2012 08:30:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 10.0                 | 11,199.0                 |
| 04/04/2011 08:55:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 7,890.0              | 730.0                    |
| 21/03/2011 08:30:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 1,782.0              | 908.0                    |
| 14/03/2011 08:16:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 1,274.0              | 327.0                    |
| 07/03/2011 08:30:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 2,460.0              | 6,090.0                  |
| 22/02/2011 08:35:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 26,130.0             | 11,690.0                 |
| 16/02/2011 09:00:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 315.0                | 1,553.0                  |
| 14/02/2011 08:30:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 1,610.0              | 1,990.0                  |
| 07/02/2011 09:00:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | >                    | 1,664.0                  |
| 31/01/2011 08:45:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 9,208.0              | 4,880.0                  |
| 24/01/2011 08:40:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | >                    | 24,196.0                 |
| 11/01/2011 08:40:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | 10,170.0             | 3,680.0                  |
| 04/01/2011 09:05:00 | SKA100   | SKA100 Effluent - POND E7 | Valid           | <                    | 100.0                    |
|                     |          |                           | Median          | 10.0                 | 908.0                    |
|                     |          |                           | 80th Percentile | 1274                 | 5912.4                   |
|                     |          |                           | 95th Percentile | 17564.9              | 24410.9                  |

Table 6. KWSP Bacteriological Data 2011 – 2023.

| Sample Date         | Location | Description                        | Status | Arsenic                |                        | Cadmium                |                        | Chromium                |                         | Copper                |                       | Lead                |                     | Mercury                |                        | Nickel                |                       | Zinc                |                     |
|---------------------|----------|------------------------------------|--------|------------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|-----------------------|-----------------------|---------------------|---------------------|------------------------|------------------------|-----------------------|-----------------------|---------------------|---------------------|
|                     |          |                                    |        | Arsenic - Total (ug/L) | Arsenic - Total (ug/L) | Cadmium - Total (ug/L) | Cadmium - Total (ug/L) | Chromium - Total (ug/L) | Chromium - Total (ug/L) | Copper - Total (ug/L) | Copper - Total (ug/L) | Lead - Total (ug/L) | Lead - Total (ug/L) | Mercury - Total (ug/L) | Mercury - Total (ug/L) | Nickel - Total (ug/L) | Nickel - Total (ug/L) | Zinc - Total (ug/L) | Zinc - Total (ug/L) |
| 27/02/2023 13:30:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.3                    | <                      | 0.05                   | <                      | 0.2                     | <                       | 2.2                   | <                     | 0.1                 | <                   | 0.1                    | <                      | 0.5                   | <                     | 2.0                 | <                   |
| 14/02/2023 14:10:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.2                    | <                      | 0.05                   | <                      | 0.2                     | <                       | 0.8                   | <                     | 0.1                 | <                   | 0.1                    | <                      | 0.5                   | <                     | 3.0                 | <                   |
| 18/01/2022 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.5                    | <                      | 0.2                    | <                      | 5.0                     | <                       | 10.0                  | <                     | 1.0                 | <                   | 0.5                    | <                      | 2.0                   | <                     | 10.0                | <                   |
| 23/02/2021 12:39:04 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.5                    | <                      | 0.2                    | <                      | 5.0                     | <                       | 10.0                  | <                     | 1.0                 | <                   | 0.1                    | <                      | 2.0                   | <                     | 10.0                | <                   |
| 01/02/2021 10:06:53 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.5                    | <                      | 0.2                    | <                      | 5.0                     | <                       | 20.0                  | <                     | 2.0                 | <                   | 0.8                    | <                      | 2.0                   | <                     | 20.0                | <                   |
| 30/01/2018 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.5                    | <                      | 0.2                    | <                      | 5.0                     | <                       | 10.0                  | <                     | 1.0                 | <                   | 0.1                    | <                      | 2.0                   | <                     | 20.0                | <                   |
| 28/03/2017 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.5                    | <                      | 0.2                    | <                      | 5.0                     | <                       | 10.0                  | <                     | 1.0                 | <                   | 0.2                    | <                      | 2.0                   | <                     | 10.0                | <                   |
| 22/02/2017 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.5                    | <                      | 0.2                    | <                      | 5.0                     | <                       | 10.0                  | <                     | 1.0                 | <                   | 0.2                    | <                      | 2.0                   | <                     | 10.0                | <                   |
| 24/01/2017 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.5                    | <                      | 0.2                    | <                      | 5.0                     | <                       | 10.0                  | <                     | 1.0                 | <                   | 0.1                    | <                      | 2.0                   | <                     | 10.0                | <                   |
| 02/02/2016 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.5                    | <                      | 0.2                    | <                      | 5.0                     | <                       | 10.0                  | <                     | 1.0                 | <                   | 0.1                    | <                      | 2.0                   | <                     | 10.0                | <                   |
| 30/12/2015 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 1.5                    | <                      | 0.2                    | <                      | 5.0                     | <                       | 10.0                  | <                     | 1.0                 | <                   | 0.1                    | <                      | 2.0                   | <                     | 10.0                | <                   |
| 22/01/2015 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 1.9                    |                        |                        |                        | 0.2                     |                         | 3.52                  |                       | 0.65                |                     | 0.02                   |                        | 0.59                  |                       | 3.6                 |                     |
| 09/04/2013 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.9                    |                        | 0.02                   |                        | 0.2                     |                         | 2.34                  |                       | 1.04                |                     | 0.02                   |                        | 1.51                  |                       | 7.1                 |                     |
| 25/02/2013 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 1.4                    |                        | 0.02                   |                        | 0.1                     |                         | 4.91                  |                       | 0.06                |                     | 0.02                   |                        | 0.48                  |                       | 1.1                 |                     |
| 05/03/2012 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.45                   |                        | 0.02                   |                        | 0.2                     |                         | 1.2                   |                       | 0.15                |                     | 0.02                   |                        | 0.59                  |                       | 2.1                 |                     |
| 07/02/2012 12:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  |                        |                        |                        |                        |                         |                         |                       |                       |                     |                     |                        |                        |                       |                       | 2.3                 |                     |
| 07/02/2012 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  |                        |                        |                        |                        |                         |                         |                       |                       |                     |                     |                        |                        |                       |                       | 1.4                 |                     |
| 04/01/2011 12:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.4                    | <                      | 0.02                   | <                      | 0.2                     | <                       | 2.55                  | <                     | 0.15                | <                   | 0.02                   | <                      | 1.15                  | <                     | 2.7                 | <                   |
| 04/01/2011 00:00:00 | SKA100   | SKA100 Effluent - POND E7 DISCHARG | Valid  | 0.4                    | <                      | 0.02                   | <                      | 0.2                     | <                       | 2.64                  | <                     | 0.14                | <                   | 0.02                   | <                      | 0.53                  | <                     | 4.8                 | <                   |
|                     |          | Median                             |        | 0.5                    |                        | 0.2                    |                        | 5.0                     |                         | 10.0                  |                       | 1.0                 |                     | 0.1                    |                        | 2.0                   |                       | 7.1                 |                     |
|                     |          | 80th Percentile                    |        | 1.1                    |                        | 0.2                    |                        | 5                       |                         | 10                    |                       | 1                   |                     | 0.2                    |                        | 2                     |                       | 10                  |                     |
|                     |          | 95th Percentile                    |        | 1.58                   |                        | 0.2                    |                        | 5                       |                         | 12                    |                       | 1.232               |                     | 0.56                   |                        | 2                     |                       | 20                  |                     |

Table 7. KWSP Metals Data 2011 - 2023

| Sample Date         | Location | Status | Physical and General Chemistry |                                   |                                     |                           |                            |                                  |                     |                     |                        |                               |  |                                       |                                   |                       |                       |          |
|---------------------|----------|--------|--------------------------------|-----------------------------------|-------------------------------------|---------------------------|----------------------------|----------------------------------|---------------------|---------------------|------------------------|-------------------------------|--|---------------------------------------|-----------------------------------|-----------------------|-----------------------|----------|
|                     |          |        | Suspended Solids (mg/L)        | Volatiles Suspended Solids (mg/L) | Alkalinity as CaCO3 (mg/L as CaCO3) | Bicarbonate (HCO3) (mg/L) | Total Oxygen Demand (mg/L) | Biochemical Oxygen Demand (mg/L) | Calcium (Ca) (mg/L) | Calcium (Ca) (mg/L) | Carbonate (CO3) (mg/L) | Chemical Oxygen Demand (mg/L) | Total Dissolved Solids (from TDS) (mg/L) | Electrical Conductivity (lab) (µS/cm) | Hardness as CaCO3 (mg/L as CaCO3) | Hydroxide (OH) (mg/L) | Magnesium (Mg) (mg/L) | pH (lab) |
| 28/02/2023 11:14:39 | SKA100   | Valid  | 103.0                          | 90.0                              | 110.0                               | 81.0                      | 35.0                       | 15.3                             | 27.0                | 180.0               | 240.0                  | 380.0                         | 63.7                                     | <                                     | 1.0                               | 6.2                   | 9.61                  |          |
| 14/02/2023 14:10:00 | SKA100   | Valid  | 57.0                           | 57.0                              | 120.0                               | 120.0                     | 51.0                       | 13.2                             | 43.0                | 190.0               | 260.0                  | 410.0                         | 58.1                                     | <                                     | 1.0                               | 6.1                   | 9.85                  |          |
| 18/01/2022 10:00:00 | SKA100   | Valid  | 90.0                           | 82.0                              | 120.0                               | 100.0                     | 26.0                       | 12.5                             | 20.0                | 220.0               | 260.0                  | 410.0                         | 51.8                                     | <                                     | 1.0                               | 5.0                   | 9.38                  |          |
| 23/02/2021 12:39:04 | SKA100   | Valid  | 90.0                           | 86.0                              | 74.0                                | 86.0                      | 14.0                       | 10.6                             | <                   | 10.0                | 140.0                  | 160.0                         | 40.9                                     | <                                     | 1.0                               | 3.5                   | 8.5                   |          |
| 01/02/2021 10:06:53 | SKA100   | Valid  |                                |                                   | 110.0                               | 120.0                     |                            | 15.7                             | 10.0                |                     | 240.0                  | 390.0                         |  | <                                     | 1.0                               | 5.8                   |                       |          |
| 01/02/2021 10:06:53 | SKA100   | Valid  | 98.0                           | 92.0                              | 110.0                               | 110.0                     | 47.0                       | 14.0                             | 10.0                | 210.0               | 240.0                  | 390.0                         | 57.6                                     | <                                     | 1.0                               | 5.5                   | 9.07                  |          |
| 29/01/2018 10:16:00 | SKA100   | Valid  | 165.0                          | 135.0                             | 110.0                               | 100.0                     | 48.0                       | 13.8                             | 14.0                | 280.0               | 230.0                  | 370.0                         | 56.3                                     | <                                     | 1.0                               | 5.3                   | 9.27                  |          |
| 29/01/2018 10:11:00 | SKA100   | Valid  |                                |                                   | 110.0                               | 110.0                     |                            | 13.2                             | 11.0                |                     |                        |                               |  | <                                     | 1.0                               | 5.3                   |                       |          |
| 28/03/2017 00:00:00 | SKA100   | Valid  | 92.0                           | 84.0                              | 110.0                               | 60.0                      | 50.0                       | 20.4                             | 34.0                | 180.0               | 210.0                  | 340.0                         | 80.6                                     | <                                     | 1.0                               | 7.2                   | 9.77                  |          |
| 28/03/2017 00:00:00 | SKA100   | Valid  | 92.0                           | 84.0                              | 110.0                               | 60.0                      | 50.0                       | 20.4                             | 34.0                | 180.0               | 210.0                  | 340.0                         | 80.6                                     | <                                     | 1.0                               | 7.2                   | 9.78                  |          |
| 23/02/2017 10:30:00 | SKA100   | Valid  | 74.0                           | 66.0                              | 99.0                                | 61.0                      | 34.0                       | 18.3                             | 30.0                | 180.0               | 200.0                  | 320.0                         | 71.2                                     | <                                     | 1.0                               | 6.2                   | 9.72                  |          |
| 23/02/2017 10:25:00 | SKA100   | Valid  | 72.0                           | 62.0                              | 96.0                                | 58.0                      | 33.0                       | 18.0                             | 30.0                | 180.0               | 200.0                  | 320.0                         | 70.5                                     | <                                     | 1.0                               | 6.2                   | 9.75                  |          |
| 24/02/2017 00:00:00 | SKA100   | Valid  | 82.0                           | 74.0                              | 110.0                               | 43.0                      | 18.0                       | 18.0                             | 14.0                | 200.0               | 226.0                  | 358.0                         | 79.0                                     | <                                     | 1.0                               | 8.4                   | 9.2                   |          |
| 02/02/2016 00:00:00 | SKA100   | Valid  | 68.0                           | 66.0                              | 120.0                               | 90.0                      | 89.0                       | 16.4                             | 25.0                | 200.0               | 216.0                  | 342.0                         | 70.9                                     | <                                     | 1.0                               | 7.26                  | 9.55                  |          |
| 30/12/2015 00:00:00 | SKA100   | Valid  |                                |                                   | 130.0                               | 150.0                     |                            | 11.2                             | <                   | 10.0                |                        |                               |  | <                                     | 1.0                               | 8.16                  |                       |          |
| 31/03/2015 00:00:00 | SKA100   | Valid  | 42.0                           | 42.0                              | 130.0                               | 80.0                      | 57.0                       | 17.9                             | 38.0                | 200.0               | 266.0                  | 422.0                         | 64.7                                     | <                                     | 1.0                               | 4.87                  | 9.82                  |          |
| 30/03/2015 00:00:00 | SKA100   | Valid  | 44.0                           | 50.0                              | 140.0                               | 96.0                      | 78.0                       | 19.5                             | 38.0                | 200.0               | 272.0                  | 432.0                         | 75.2                                     | <                                     | 1.0                               | 6.45                  | 9.7                   |          |
| 28/01/2015 00:00:00 | SKA100   | Valid  | 148.0                          | 144.0                             | 150.0                               | 170.0                     | 80.0                       | 19.3                             | <                   | 10.0                | 350.0                  | 300.0                         | 476.0                                    | 78.2                                  | <                                 | 1.0                   | 7.31                  | 8.71     |
| 27/01/2015 00:00:00 | SKA100   | Valid  | 132.0                          | 124.0                             | 140.0                               | 140.0                     | 72.0                       | 19.2                             | 18.0                | 250.0               | 294.0                  | 466.0                         | 77.6                                     | <                                     | 1.0                               | 7.22                  | 9.19                  |          |
| 21/01/2015 00:00:00 | SKA100   | Valid  | 140.0                          | 134.0                             | 140.0                               | 120.0                     | 70.0                       | 11.0                             | 29.0                | 300.0               | 296.0                  | 470.0                         | 52.2                                     | <                                     | 1.0                               | 6.0                   | 9.5                   |          |
| 20/01/2015 00:00:00 | SKA100   | Valid  | 148.0                          | 148.0                             | 150.0                               | 130.0                     | 44.0                       | 11.0                             | 25.0                | 300.0               | 294.0                  | 466.0                         | 45.8                                     | <                                     | 1.0                               | 6.0                   | 9.38                  |          |
| 19/01/2015 00:00:00 | SKA100   | Valid  | 130.0                          | 123.0                             | 150.0                               | 110.0                     | 68.0                       | 9.0                              | 31.0                | 300.0               | 296.0                  | 468.0                         | 43.1                                     | <                                     | 1.0                               | 5.0                   | 9.54                  |          |
| 05/01/2015 00:00:00 | SKA100   | Valid  | 156.0                          | 154.0                             | 190.0                               | 150.0                     | 120.0                      | 8.0                              | 40.0                | 350.0               | 394.0                  | 624.0                         | 44.7                                     | <                                     | 1.0                               | 6.0                   | 9.54                  |          |
| 05/03/2014 00:00:00 | SKA100   | Valid  | 616.0                          | 412.0                             | 110.0                               | 130.0                     | 130.0                      | 17.8                             | <                   | 10.0                | 600.0                  | 120.0                         | 192.0                                    | 71.8                                  | <                                 | 1.0                   | 6.64                  | 7.78     |
| 04/03/2014 00:00:00 | SKA100   | Valid  | 218.0                          | 208.0                             | 75.0                                | 92.0                      | 110.0                      | 13.5                             | <                   | 10.0                | 450.0                  | 124.0                         | 196.0                                    | 51.4                                  | <                                 | 1.0                   | 4.29                  | 7.62     |
| 25/02/2014 00:00:00 | SKA100   | Valid  | 164.0                          | 160.0                             | 100.0                               | 110.0                     | 77.0                       | 14.7                             | <                   | 10.0                | 350.0                  | 226.0                         | 356.0                                    | 57.0                                  | <                                 | 1.0                   | 4.92                  | 8.96     |
| 24/02/2014 00:00:00 | SKA100   | Valid  | 145.0                          | 135.0                             | 100.0                               | 71.0                      | 57.0                       | 13.5                             | 26.0                | 300.0               | 216.0                  | 344.0                         | 49.3                                     | <                                     | 1.0                               | 3.76                  | 9.71                  |          |
| 19/02/2014 00:00:00 | SKA100   | Valid  | 135.0                          | 133.0                             | 95.0                                | 85.0                      | 71.0                       | 13.8                             | 14.0                | 300.0               | 212.0                  | 336.0                         | 51.9                                     | <                                     | 1.0                               | 4.21                  | 9.55                  |          |
| 18/02/2014 00:00:00 | SKA100   | Valid  | 390.0                          | 260.0                             | 100.0                               | 94.0                      | 72.0                       | 13.8                             | 14.0                | 400.0               | 200.0                  | 316.0                         | 51.7                                     | <                                     | 1.0                               | 4.18                  | 9.33                  |          |
| 17/02/2014 00:00:00 | SKA100   | Valid  | 133.0                          | 128.0                             | 90.0                                | 64.0                      | 56.0                       | 13.7                             | 24.0                | 250.0               | 194.0                  | 306.0                         | 51.7                                     | <                                     | 1.0                               | 4.24                  | 9.7                   |          |
| 13/02/2014 00:00:00 | SKA100   | Valid  | 95.0                           | 95.0                              | 100.0                               | 42.0                      | 46.0                       | 15.2                             | 42.0                | 250.0               | 206.0                  | 326.0                         | 62.7                                     | <                                     | 1.0                               | 6.05                  | 10.1                  |          |
| 10/02/2014 00:00:00 | SKA100   | Valid  | 114.0                          | 110.0                             | 110.0                               | 76.0                      | 50.0                       | 14.7                             | 26.0                | 200.0               | 206.0                  | 326.0                         | 61.9                                     | <                                     | 1.0                               | 6.16                  | 9.61                  |          |
| 05/02/2014 00:00:00 | SKA100   | Valid  | 92.0                           | 92.0                              | 120.0                               | 120.0                     | 31.0                       | 17.6                             | 13.0                | 200.0               | 228.0                  | 362.0                         | 73.0                                     | <                                     | 1.0                               | 7.09                  | 9.16                  |          |
| 04/02/2014 00:00:00 | SKA100   | Valid  | 102.0                          | 94.0                              | 110.0                               | 110.0                     | 39.0                       | 16.9                             | 15.0                | 200.0               | 226.0                  | 360.0                         | 70.7                                     | <                                     | 1.0                               | 6.95                  | 9.2                   |          |
| 03/02/2014 00:00:00 | SKA100   | Valid  | 104.0                          | 100.0                             | 110.0                               | 95.0                      | 58.0                       | 16.8                             | 22.0                | 150.0               | 230.0                  | 366.0                         | 70.8                                     | <                                     | 1.0                               | 7.04                  | 9.47                  |          |
| 30/01/2014 00:00:00 | SKA100   | Valid  | 118.0                          | 110.0                             | 140.0                               | 130.0                     | 21.0                       | 19.1                             | 19.0                | 200.0               | 274.0                  | 434.0                         | 81.6                                     | <                                     | 1.0                               | 8.25                  | 9.23                  |          |
| 29/01/2014 00:00:00 | SKA100   | Valid  | 130.0                          | 112.0                             | 140.0                               | 140.0                     | 31.0                       | 19.0                             | 16.0                | 250.0               | 282.0                  | 446.0                         | 82.1                                     | <                                     | 1.0                               | 8.45                  | 9.16                  |          |
| 28/01/2014 00:00:00 | SKA100   | Valid  | 140.0                          | 134.0                             | 150.0                               | 150.0                     | 64.0                       | 19.4                             | 16.0                | 250.0               | 294.0                  | 466.0                         | 84.5                                     | <                                     | 1.0                               | 8.78                  | 9.13                  |          |
| 23/01/2014 00:00:00 | SKA100   | Valid  | 108.0                          | 105.0                             | 160.0                               | 160.0                     | 65.0                       | 19.6                             | 19.0                | 250.0               | 312.0                  | 492.0                         | 87.5                                     | <                                     | 1.0                               | 9.37                  | 9.18                  |          |
| 22/01/2014 00:00:00 | SKA100   | Valid  | 98.0                           | 92.0                              | 170.0                               | 100.0                     | 37.0                       | 18.7                             | 49.0                | 250.0               | 314.0                  | 500.0                         | 84.3                                     | <                                     | 1.0                               | 9.14                  | 9.77                  |          |
| 09/04/2013 00:00:00 | SKA100   | Valid  | 115.0                          | 100.0                             | 110.0                               | 82.0                      | 63.0                       | 16.4                             | 25.0                | 150.0               | 210.0                  | 332.0                         | 66.8                                     | <                                     | 1.0                               | 6.29                  | 9.54                  |          |
| 05/03/2013 00:00:00 | SKA100   | Valid  |                                |                                   | 150.0                               | 130.0                     |                            | 21.4                             | 26.0                |                     |                        |                               |  | <                                     | 1.0                               | 6.83                  |                       |          |
| 25/02/2013 00:00:00 | SKA100   | Valid  | 74.0                           | 64.0                              | 150.0                               | 120.0                     | 52.0                       | 21.1                             | 29.0                | 150.0               | 276.0                  | 436.0                         | 84.5                                     | <                                     | 1.0                               | 7.75                  | 9.44                  |          |
| 15/03/2012 00:00:00 | SKA100   | Valid  | 57.5                           | 62.5                              | 100.0                               | 110.0                     | 31.0                       | 23.0                             | <                   | 10.0                | 100.0                  | 226.0                         | 356.0                                    | 94.1                                  | <                                 | 1.0                   | 8.9                   | 9.02     |
| 13/03/2012 00:00:00 | SKA100   | Valid  | 70.0                           | 73.0                              | 110.0                               | 130.0                     | 34.0                       | 30.9                             | <                   | 10.0                | 150.0                  | 278.0                         | 442.0                                    | 123                                   |                                   |                       |                       |          |

## Appendix 2: Risk Characterisation by analyte

Table 9: Risk characterisation of KSWP effluent by analyte excerpt from 2022 Katherine Environmental Risk Assessment (SLR, 2022)

| Analyte   | Environmental Factors   | Risk                    |
|---|---|-------------------------|
| <b>Physico-chemistry</b>                                      | pH and EC were elevated in the discharge when compared to guidelines. However, the minimum discharge ratio between effluent and river water of 1:575 implies that any observed high pH or EC would be completely absorbed by the environment.   | Low                     |
| <b>BOD and DO</b>   | A healthy receiving water, such as the Katherine River during the Wet Season will contain between 5-7 mg/L of dissolved oxygen. The minimum discharge ratio between effluent and river water of 1:575 implies that any observed oxygen demand or low DO would be completely mitigated by the environment.   | Low                     |
| <b>Suspended Solids</b>                                       | Suspended solids exert an environmental effect by blocking out the sun in an environment. Robson et al. (2010) states that primary productivity in the Katherine and Daly Rivers is already limited by light in the Wet Season. This implies that the suspended solids naturally present in the ecosystem as a result of runoff already block out the light with the potential to reduce plant growth.  | Low                     |
| <b>Aluminium<br/>Chromium<br/>Copper<br/>Mercury<br/>Zinc</b> | The water discharged to the Katherine River will receive a minimum dilution ratio of 1:575 between effluent and river water. However, the KWSP discharges occur at a dilution of 1:1,190, therefore metals are not likely to exert a toxic effect to the ecosystem of the Katherine River in the vicinity of the discharge pipe.  | Low                     |
| <b>PFOS<br/>PFOA</b>  | All results meet the 95% species protection levels (HEPA 2020) and therefore considering the significant dilutions that occur on discharge the risk of environmental harm associated with the KWSP as a PFAS source is low.   | Low                     |
| <b>Pathogens</b>  | <p>A risk assessment workshop was conducted in May 2013 with PWC and DoH to assess the level of risk that exists as a result of the KWSP discharge containing pathogens to the Katherine River. Two scenarios were assessed:</p> <ol style="list-style-type: none"> <li>1. The risk of a person becoming ill as a result of drinking water from the Katherine River when the river height is greater than 3m at G8140001 due to pathogens from catchment sources only.</li> <li>2. The risk of a person becoming ill as a result of drinking water from the Katherine River when the height is greater than 3 m at G8140001 due to pathogens from catchment sources and the KWSP.</li> </ol> <p>The PWC determined that catchment sources of pathogens reduced the quality of the Katherine River in the Wet Season to a point where it was unsafe to drink. As a result, it was judged that any addition of pathogens from the KWSP would not materially increase the likelihood of illness as a result of drinking water from the Katherine River in the Wet Season.</p> <p>The PWC has erected signs stating that untreated water should not be used for drinking.</p> | <p>High</p> <p>High</p> |

<sup>a</sup> DoH = Department of Health

## Contact

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**PowerWater**