Unitywater

Serving you today, **investing in tomorrow.**

# Annual Sewage Treatment Plant Performance Report

1 JULY 2021 – 30 JUNE 2022

# Sewage Treatment Plants at a glance

**311,514**
**Number of sewerage assets connections**

**6,101 KM**
**Kilometres of sewer main pipes**

**800**
**Number of sewage pump stations**

**17**
**Number of sewage treatment plants**

**73,784ML**[1]
**Volume of sewage collected and treated**

**99.8%**
**of biosolids reused**

**2050**
**sustainability target**
Net zero carbon emissions

**97%**
**Quality and quantity compliance**

[1] Does not include 1070 ML diverted to Urban Utilities via the Kedron Brook Sewerage Scheme. This sewage would be treated to UU's licence requirements

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# Message from the CEO

Dear Customers

This year was like no other for Unitywater's network of 17 Sewage Treatment Plants (STPs).

Our STPs were put to the test early in 2022 when an extreme weather event caused flooding and widespread damage throughout South East Queensland.

Despite the widespread impacts, our team's planned response kicked in to ensure we achieved 96.6% of our sewage treatment plant effluent compliance measures for the year as a clear demonstration of our resilience and ability to deliver sewerage services, day in and day out.

While part of our team weathered the storm, the other had our shared future in mind. We continued to plan for the projected growth of our region and sewerage network with two major plants approved for upgrades in the Moreton Bay region.

Brendale and Burpengary East STPs are set to undergo major upgrades that will increase capacity until 2051 and 2032 respectively. These upgrades will position our network for the additional capacity of emerging communities.

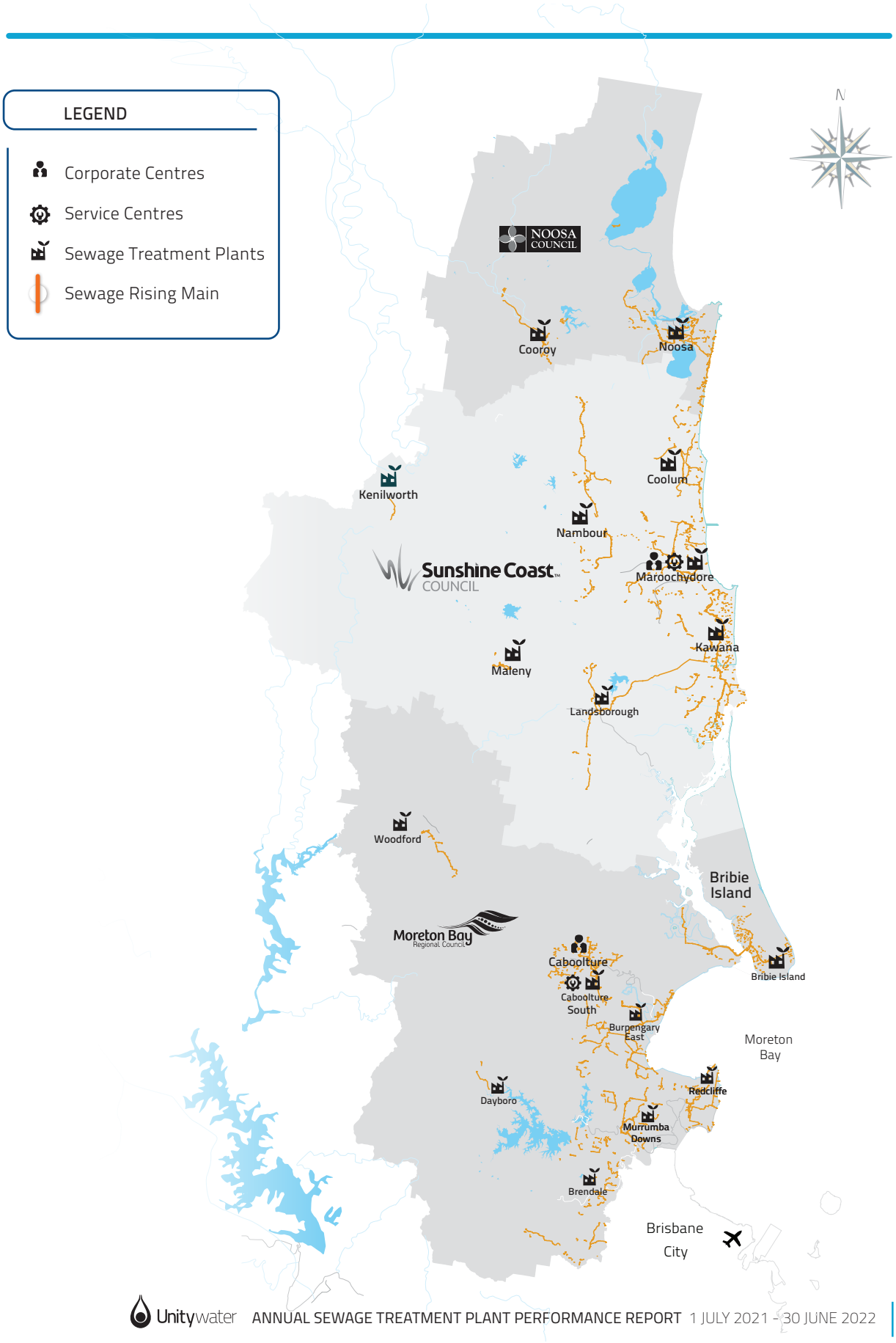
This year we continued to invest in sustainable projects that provide clever solutions to the reuse of wastewater. Nearly half of the 22km pipeline was laid as part of the Wamuran Irrigation Scheme that will carry 2.6GL (gigalitres) of Class A recycled water per year from our South Caboolture STP to the local agricultural community.

Wamuran Irrigation Scheme is one of the ways that our STPs will contribute to our pledge to reach net zero emissions by 2050. Upgrades to our STPs are also set to save the equivalent of $2.5 million per annum in energy costs from 2020 to 2027, as well as reduce landfill from STPs to zero.

I am certain that the challenges and opportunities presented by our growing region and changing climate will continue. Based on our strong sewage treatment plant performance, I am confident the Unitywater team will continue to meet these changes into the future.

**Chief Executive Officer**
Anna Jackson

# Our supply area



# 1 INTRODUCTION

# 1. Introduction

## Unitywater supplies more than 830,000 people across 5,223 square kilometres with sewerage and water services.

We monitor effluent quality from each sewage treatment plant to assess compliance with conditions specified under the licence granted by the Department of Environment and Science (DES). We hold the following DES registration and approval:

a. A single Registration Certificate, authorising Unitywater to operate sewage treatment plants; and
b. A single Environmental Authority (Environmental Licence) for the following sewage treatment plants:

- Brendale
- Burpengary East
- Bribie Island
- Coolum
- Cooroy
- Dayboro
- Kawana
- Kenilworth
- Landsborough
- Maleny
- Maroochydore
- Murrumba Downs
- Nambour
- Noosa
- Redcliffe
- South Caboolture
- Suncoast (decommissioned)
- Woodford

Should we not meet our obligations as set out in the licence, penalties may apply in accordance with the *Sustainable Planning Act 2009* and *Environmental Protection Act 1994*. We report our compliance results each month to the Department of Environment and Science and provide detailed commentary as required to address specific items of note.

This report is published to provide information about effluent quality and some licence compliance statistics from our sewage treatment plants. By meeting licence conditions, we ensure high quality service, minimising impacts on waterways in our local communities.

## 1.1 Quick Statistics July 2021 - June 2022

| | |
|---|---|
| KILOMETRES OF SEWER MAIN PIPES | **6,101KM** |
| NUMBER OF SEWAGE PUMP STATIONS | **800** |
| NUMBER OF SEWAGE TREATMENT PLANTS | **17** |
| VOLUME OF SEWAGE COLLECTED AND TREATED | **73,784 ML[1]** |

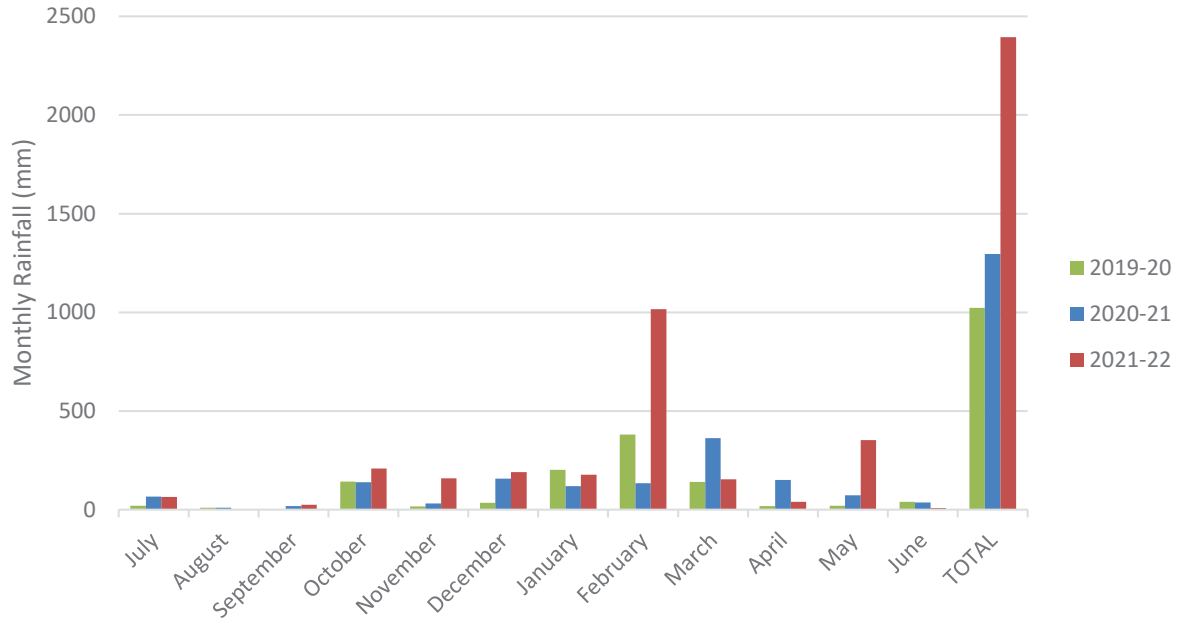
1. Does not include 1070 ML diverted to Urban Utilities via the Kedron Brook Sewerage Scheme. This sewage would be treated to UU's licence requirements.

## 1.2. Rainfall

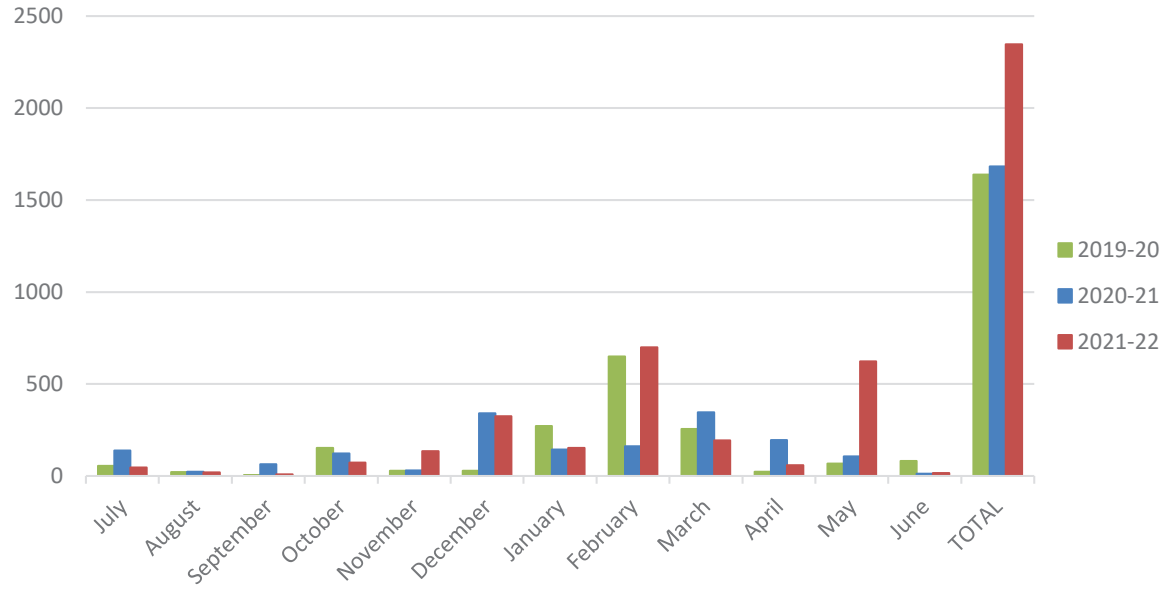
Significant rainfall in the 2021-22 financial year, as shown graphically in Figure 1 and Figure 2, has been a major contributor to the reported non-compliances. For example, in the southern region, the rain received in the month of February 2022 was only 6mm less than of the total annual rainfall of 2019-20. Analysis presented in the *Special Climate Statement 67* from the Bureau of Meteorology stated, "The multi-day accumulation of intense rainfall resulted in many areas receiving more than half their average annual (over the 1961–1990 period) rainfall total in just a week."[1]

1. http://www.bom.gov.au/climate/current/statements/scs76.pdf?20220525

### Figure 1 – Southern Region Rainfall



## Figure 2 – Northern Region Rainfall




Intense or prolonged rainfall affects treatment plants in various ways. The primary effect is the reduction of hydraulic retention time, meaning water spends less time on site and therefore has less opportunity to be treated. Whilst treatment plants are designed to produce compliant effluent during these events, they are not over designed for such unprecedented rain events. Therefore during these events, equipment and processes are pushed to capacity.

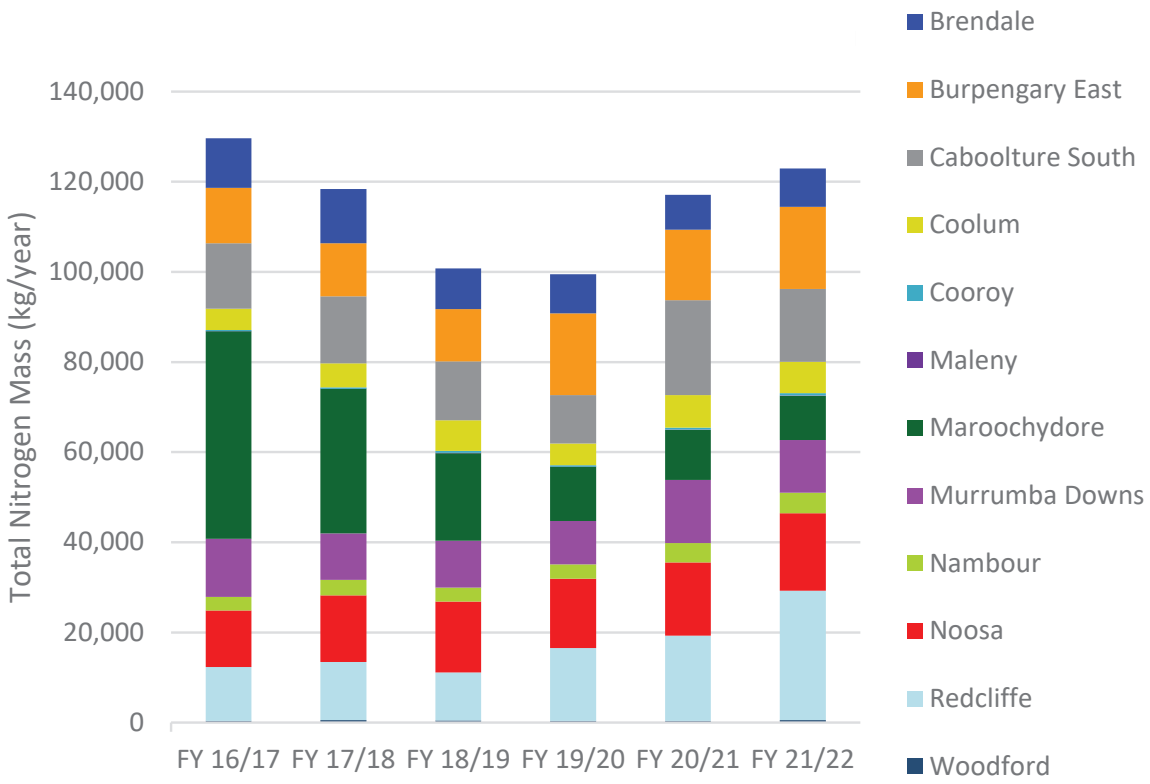
## 1.3. Mass Load Releases

Graphs of mass loads (see Table 31 for definition) released from sites with load discharge limits to the environment are shown below for information purposes. All treatment plants are within their licenced mass load limits for the 2021-22 period.

The graphs show variability from year to year. Nitrogen and phosphorus mass discharge varies for several reasons, including:

- Annual rainfall (variability of mass load due to the effect of wet weather flows on treatment processes).
- Increasing plant raw sewage loads (as the community grows, influent nutrient mass load will gradually increase).
- Balancing nitrogen and phosphorus removal with the associated power and chemical consumption and their environmental impacts, through plant optimisation and improvement activities.
- The continuing decline in the community's use of phosphate containing detergents.

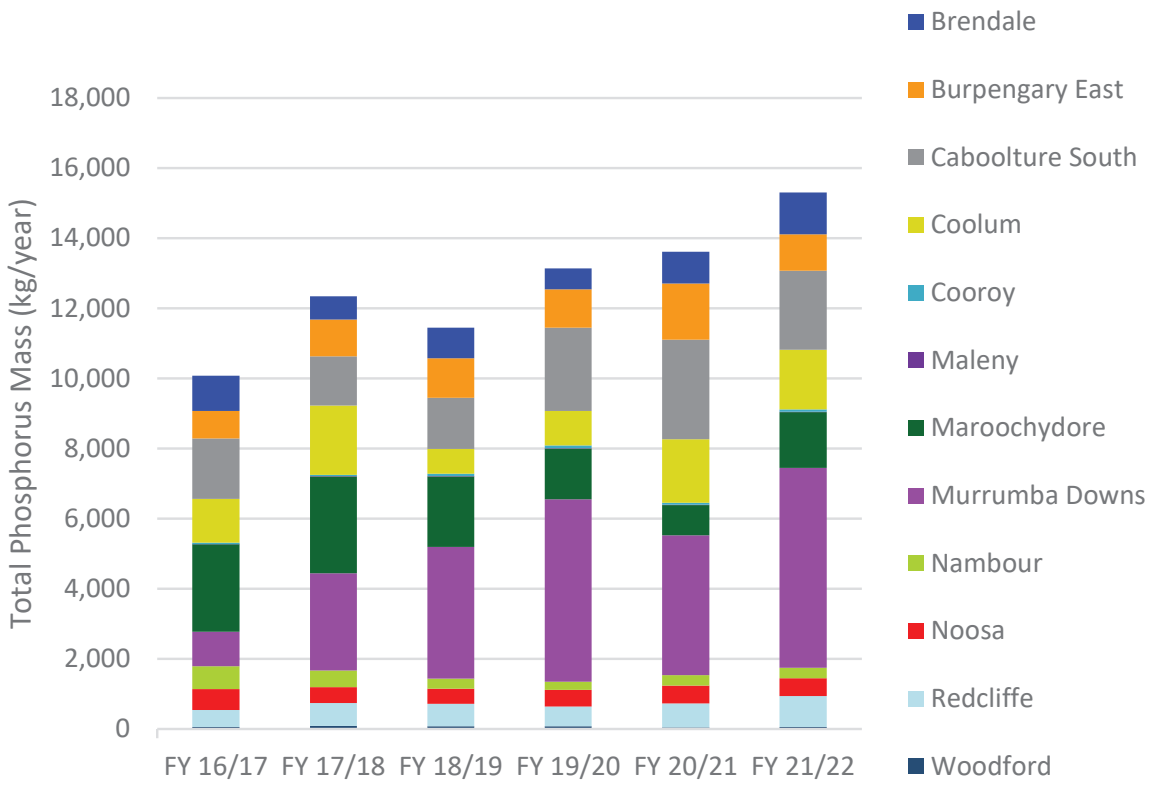
## Figure 3 – STP with Mass Licence – Total Nitrogen




It is worth noting the changes in effluent quality due to Unitywater's continued optimisation, renewal and upgrade activities. In relation to Total Nitrogen:

- Burpengary STP is approaching its design capacity and planning is currently underway for a plant upgrade due for completion in 2024.
- Maroochydore STP has experienced increasing sewage load due to population growth in the region. Unitywater has invested in improving the technology and reliability of the plant resulting in improved nutrient removal performance.
- Redcliffe STP has continued to undergo construction, renewal and refurbishment works, with various process units offline across the year, impacting the nutrient removal capabilities. The plant continues to operate compliant with its mass licence.

## Figure 4 – STP with Mass Licence – Total Phosphorus




In relation to Total Phosphorus;

- Coolum STP is nearing its capacity limits and hence higher nutrient levels however within licence limits. Unitywater is currently in the planning phase of upgrading the biological nutrient reduction process.
- Murrumba Downs STP's phosphorus removal is primarily biologically based (not dependent on chemical usage) and is therefore affected by significant wet weather events, of which 2021-22 has had many, increasing the total effluent phosphorous mass.

# 2 EFFLUENT QUALITY SUMMARY

# 2. Effluent Quality Summary

DES requires that all sewage treatment plants discharge effluent that meets quality and quantity conditions to minimise impacts on the health of waterways in Queensland. Concentrations of contaminants such as organic matter, suspended solids, chlorine and pathogens are measured and reported. Release volumes and mass loads are also evaluated to compare with limits specified by DES.

In the 2021-22 financial year, Unitywater achieved 97% quality and quantity compliance for sewage discharged from its sewage treatment plants against overall effluent standards. DES allows fluctuations in effluent quality parameters (DEHP, 2014) and therefore all plants performed within the quality standards set by the Environmental Licence. The table below provides a summary of where treated effluent is discharged and overall effluent quality compliance in the 2021-22 financial year.

*Table 1 – Effluent Compliance*

| Sewage Treatment Plant | Catchment Equivalent Population | Treatment Process | Discharge to: | | | Effluent and Flow Compliance |
|---|---|---|---|---|---|---|
| | | | Freshwater Body | Ocean | Irrigation, Wetlands or Groundwater | |
| Brendale | 40,717 | BNR[1] | ✓ | | | 99% |
| Bribie Island | 31,451 | Biological nitrogen removal and chemical phosphorus removal | | | ✓ | 98% |
| Burpengary East | 65,546 | BNR | ✓ | | | 100% |
| Coolum | 31,106 | BNR | ✓ | | | 100% |
| Cooroy | 5,072 | BNR | ✓ | | ✓ | 99% |
| Dayboro | 1,053 | Biological nitrogen removal | | | ✓ | 94% |
| Kawana | 150,722 | Biological nitrogen removal | ✓ | ✓ | | 91%[3] |
| Kenilworth | 372 | Oxidation Pond | ✓ | | ✓ | 100% |
| Landsborough[2] | 11,805 | BNR | ✓ | ✓ | | 100% |
| Maleny | 2,684 | Biological nitrogen removal and chemical phosphorus removal | ✓ | | ✓ | 100% |
| Maroochydore | 86,459 | BNR | ✓ | | | 96% |
| Murrumba Downs | 147,003 | BNR | ✓ | | | 98% |
| Nambour | 49,102 | BNR | ✓ | | | 96% |
| Noosa | 48,792 | BNR | ✓ | | | 100% |
| Redcliffe | 65,377 | BNR | | ✓ | | 100% |
| South Caboolture | 73,067 | BNR | ✓ | | | 97% |
| Woodford | 3,264 | Biological nitrogen removal and chemical phosphorus removal | ✓ | | | 100% |
| | Overall Compliance (flow weighted) | | | | | 97% |

Notes:
1. Biological Nutrient Reduction (BNR) – Reduces nitrogen and phosphorus biologically.
2. A separate 'Performance in Detail' table is not provided for Landsborough Sewage Treatment Plant as effluent from this facility is combined with Kawana Sewage Treatment Plant effluent before being released to the outfall.
3. Percent compliance reduction due to discharge flow limits exceedances. Effluent quality continues to meet licence requirements. A licence amendment is in progress.

# 3 PERFORMANCE IN DETAIL

# 3. Performance in Detail

JULY 2021 – JUNE 2022

Note that the release parameters differ from plant to plant (e.g. Brendale STP has mass load limits while Bribie Island STP does not). This is often due to the nature of the discharge point (e.g. waterway or land) or when the plant was issued DES approval to operate. Indication of level of compliance is provided as per Table 2 below.

*Table 2 – Compliance Range Legend*

| Symbol | Compliance Range |
|---|---|
| ✓ | > 90% |
| ✓ | 80% - 90% |
| ✗ | < 80% |

## 3.1 Brendale Sewage Treatment Plant

*Table 3 - Brendale STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| BOD | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓[1] |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| Free Chlorine Residual | mg/L | 52 | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 260 | median | ✓[2] |
| | | | 80th percentile | ✓[2] |

1. TSS Maximum was exceeded one time in the 2021-22 financial year. Please refer to the next page for further details.
2. Faecal Coliforms Median was exceeded four times and the 80th Percentile was exceeded one time. Please refer to the next page for further details.

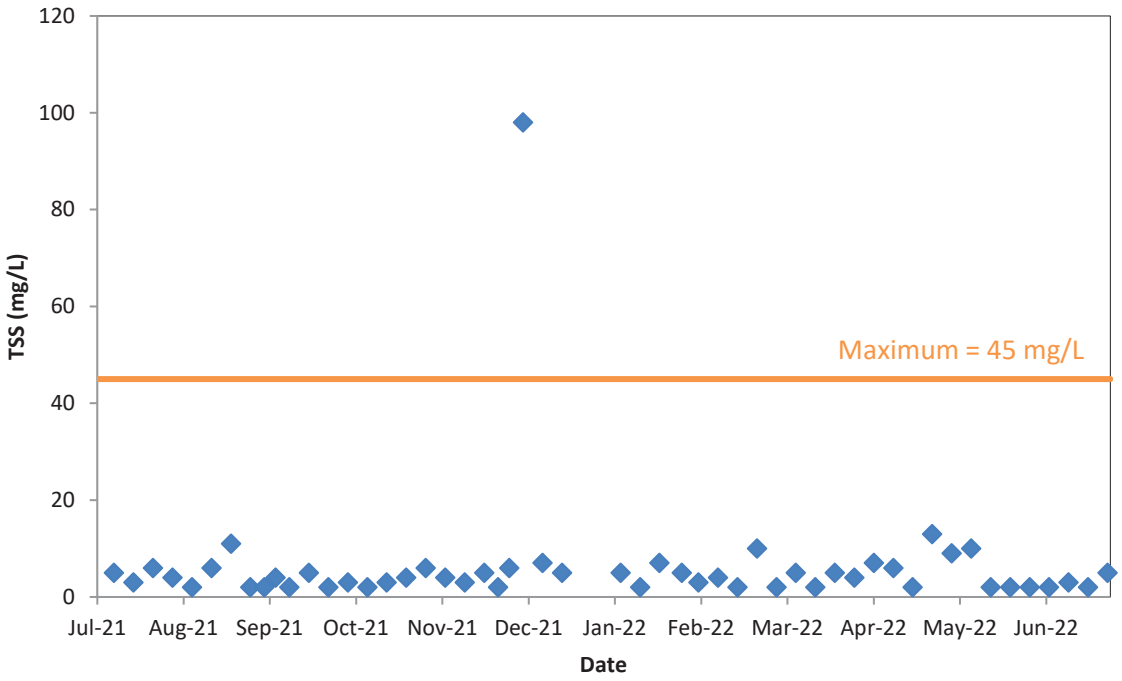
*Table 4 – Brendale STP Mass Limits*

| Parameter | Unit | Number of Days | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | - | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | - | maximum | ✓ |

## TSS

TSS Maximum was exceeded once. A significant rainfall event, with 217mm of rain over 3 days in December 2021 caused the TSS exceedance. Overall 98% compliance with TSS Maximum targets was achieved in the 2021-22 financial year.

*Figure 5 – Brendale STP – TSS – Maximum*




## FAECAL COLIFORMS

Target Median Faecal Coliforms was exceeded four times and the 80th Percentile Faecal Coliforms exceeded once. Significant rainfall events, totalling 217mm of rain over 3 days in December 2021, 805mm in the catchment in February 2022, and greater than 90mm over three days in March 2022 caused the non-compliances. In June 2022, preventative maintenance on the UV system, requiring components to be temporarily turned off, was undertaken at the time of sampling. 92% compliance with the Faecal Coliforms median and 98% with Faecal Coliforms 80th Percentile limits were achieved in the 2021-22 financial year.

*Figure 6 – Brendale STP – Faecal Coliforms – Median*

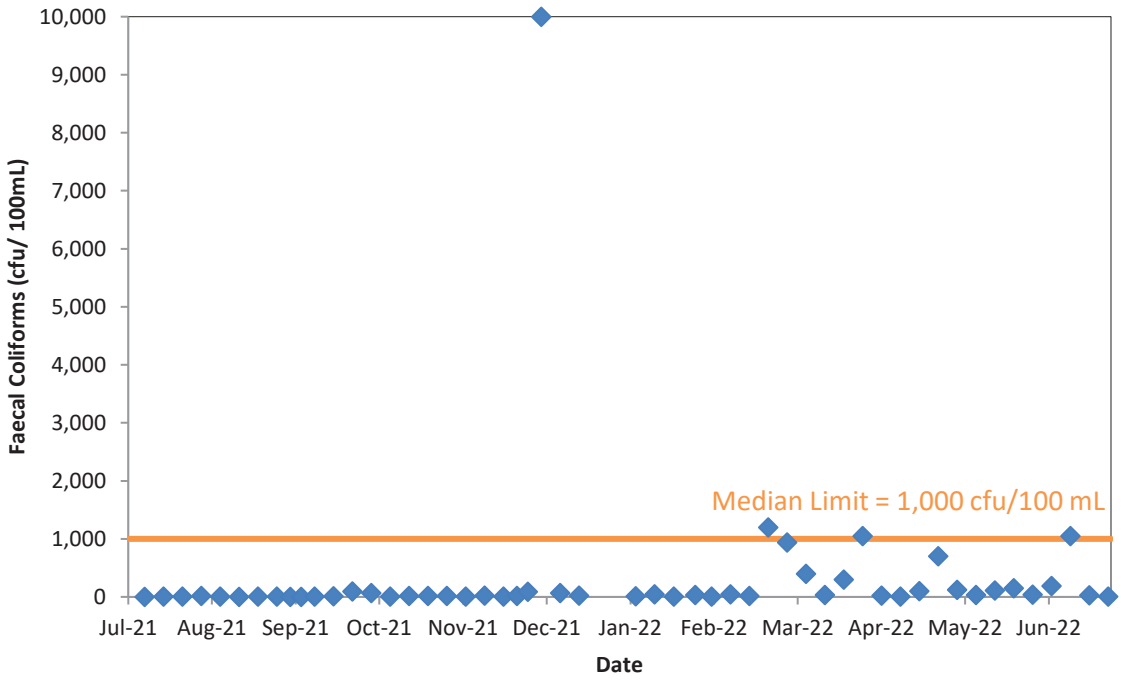
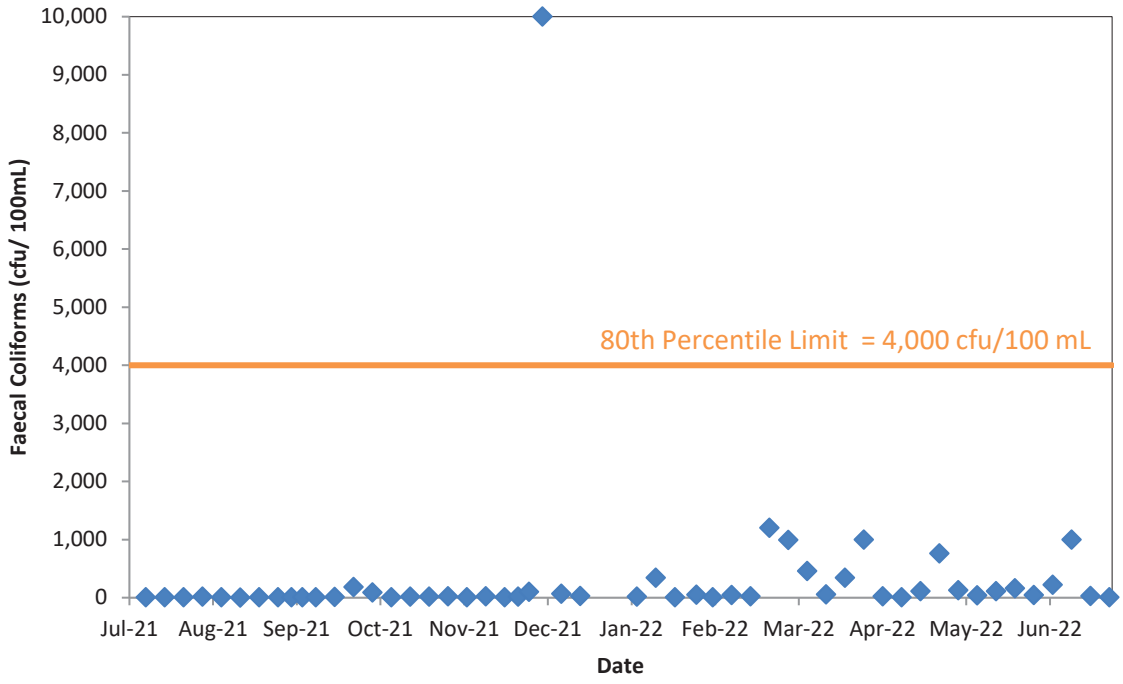



*Figure 7 – Brendale STP – Faecal Coliforms – 80th Percentile*



## 3.2 Bribie Island Sewage Treatment Plant

*Table 5 – Bribie Island STP Contaminant Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| BOD | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| TN | mg/L | 52 | long term 50th percentile | ✓ |
| | | | short term 50th percentile | ✓ |
| | | | maximum | ✓ |
| TP | mg/L | 52 | long term 50th percentile | ✓ |
| | | | short term 50th percentile | ✓ |
| | | | maximum | ✓[1] |

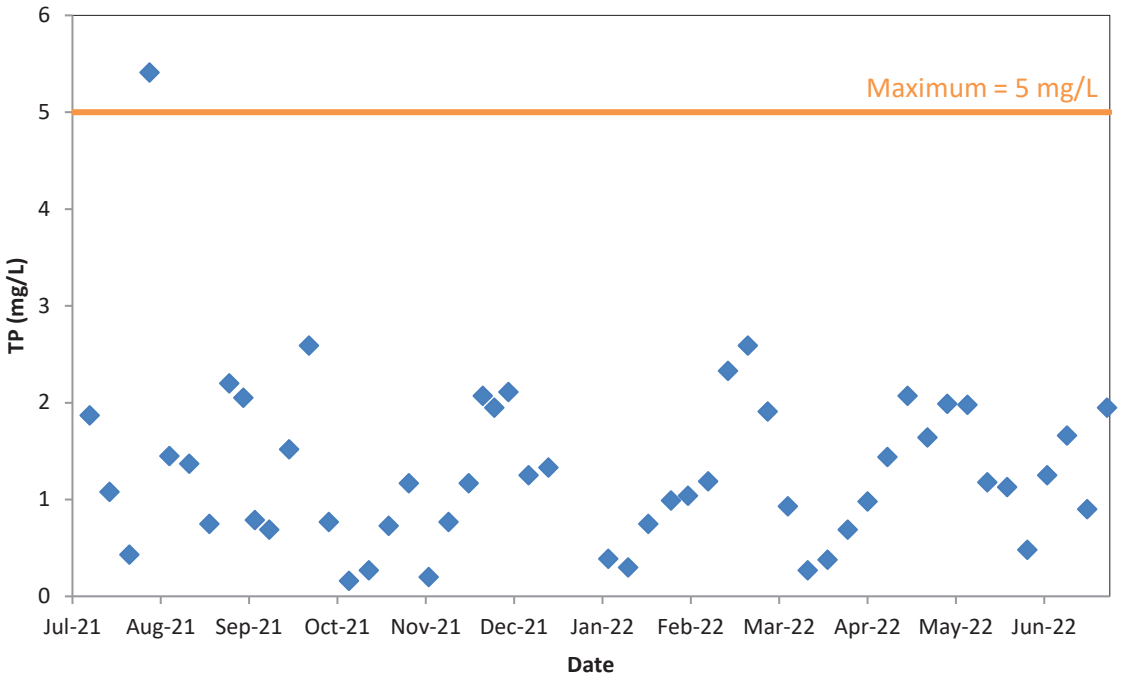
1. Total Phosphorus Maximum was exceeded one time in the 2021-22 financial year. Please refer to the next page for further details

*Exceedances*

## TOTAL PHOSPHORUS

Total Phosphorus Maximum was outside the required range once.. A pump failure caused a total phosphorus exceedance. The pump was immediately fixed. Overall 98% compliance in Total Phosphorus targets was achieved in the 2021-22 financial year.

*Figure 8 – Bribie Island STP – Total Phosphorus – Maximum*



## 3.3 Burpengary East Sewage Treatment Plant

*Table 6 – Burpengary East STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| BOD | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| Free Chlorine Residual | mg/L | 52 | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 260 | median | ✓[1] |
| | | | 80th percentile | ✓ |

1. Faecal Coliforms median was exceeded one time in the 2021-22 financial year. Please refer to the next page for further details.

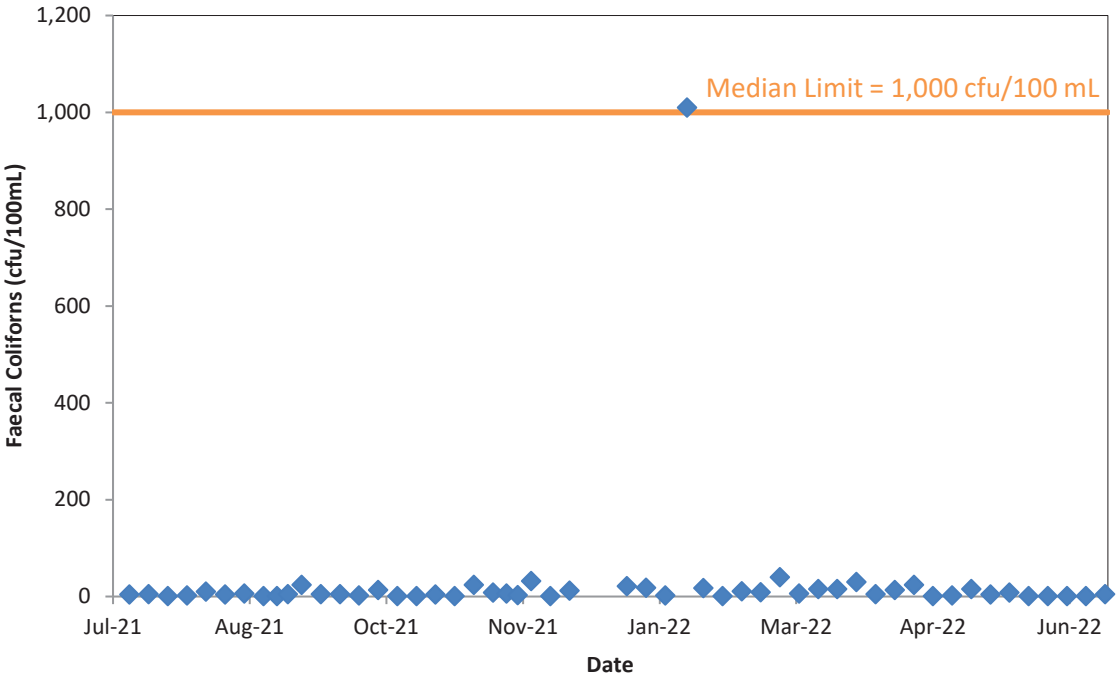
*Table 7 – Burpengary STP Mass Limits*

| Parameter | Unit | Number of Days | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | - | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | - | maximum | ✓ |

## FAECAL COLIFORMS

Target Median Faecal Coliforms was exceeded once. This Faecal Coliform exceedance was due to high flows associated with 824mm of rainfall received in three days. 98% compliance with the Faecal Coliforms median was achieved in the 2021-22 financial year.

*Figure 9 – Burpengary East STP – Faecal Coliforms – Median*



## 3.4 Coolum Sewage Treatment Plant

*Table 8 – Coolum STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| BOD | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓[1] |
| $NH_3$-N | mg/L | 52 | long term 50th percentile | ✓ |
| | | | maximum | ✓[2] |
| Free Chlorine Residual | mg/L | 52 | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 52 | median | ✓ |
| | | | 80th percentile | ✓ |

1. Dissolved Oxygen Minimum was exceeded once in the 2021-22 financial year. Please refer to the next page for further details.
2. Ammonia maximum was exceeded once in the 2021-22 financial year. Please refer to the next page for further details.

*Table 9 – Coolum STP Mass Limits*

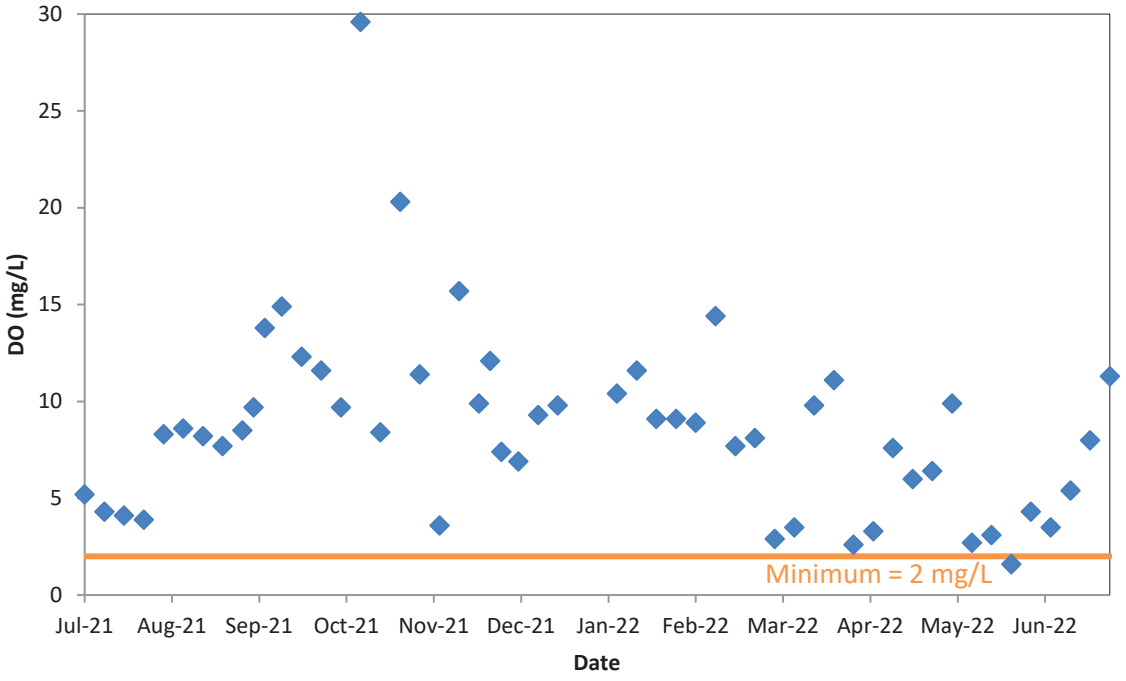
| Parameter | Unit | Number of Days | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | - | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | - | maximum | ✓ |

*Exceedances*

## DISSOLVED OXYGEN

Dissolved Oxygen Minimum was exceeded once following 205mm of rain. Overall 98% compliance with the Dissolved Oxygen Minimum limit was achieved in the 2021-22 financial year.

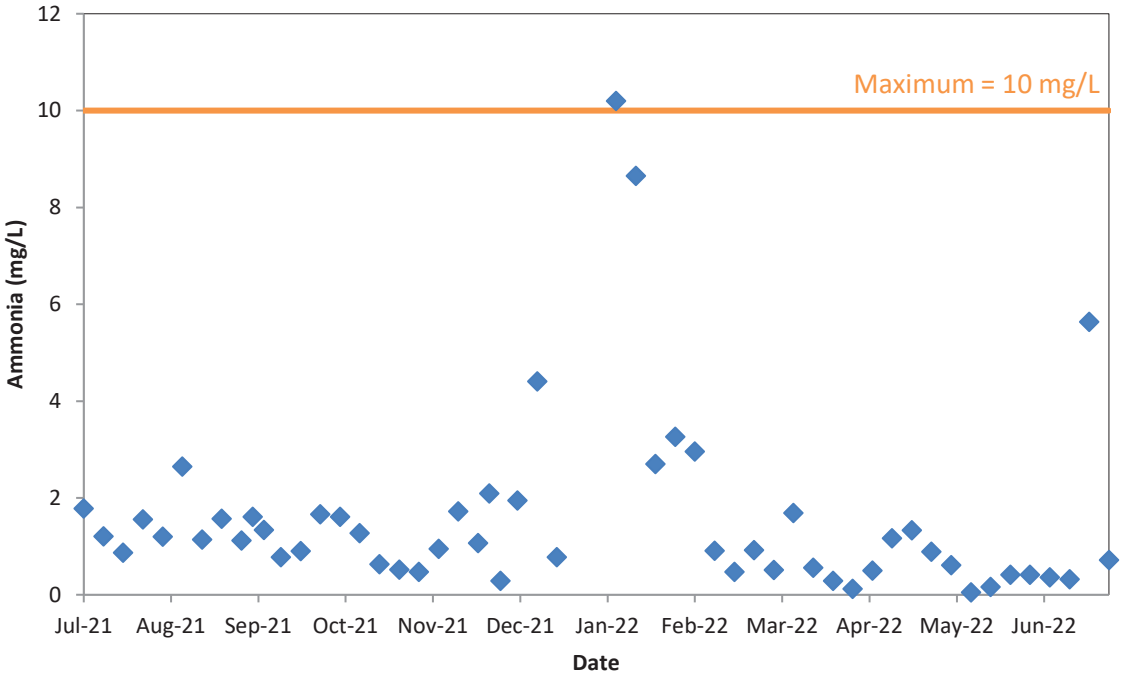
*Figure 10 – Coolum STP – DO – Minimum*



## AMMONIA

Ammonia Maximum was exceeded once during the Christmas holiday period, a period in which there are significant sewage loads to the plant.  Unitywater is currently developing the design for the upgrade to increase plant capacity. Overall 98% compliance with the Ammonia Maximum limit was achieved in the 2021-22 financial year.

*Figure 11 – Coolum STP – Ammonia – Maximum*



## 3.5 Cooroy Sewage Treatment Plant

*Table 10 – Cooroy STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| TN | mg/L | 52 | long term 50th percentile | ✓ |
| | | | maximum | ✓[1] |
| TP | mg/L | 52 | long term 50th percentile | ✓ |
| | | | maximum | ✓ |
| Intestinal Enterococci | mg/L | 52 | long term 50th percentile | ✓ |
| | | | maximum | ✓[2] |

1. Total Nitrogen maximum was exceeded once in the 2021-22 financial year. Please refer to the next page for further details.
2. Intestinal Enterococci Maximum was exceeded twice in the 2021-22 financial year. Please refer to the next page for further details.

*Table 11 – Cooroy STP Mass Limits*

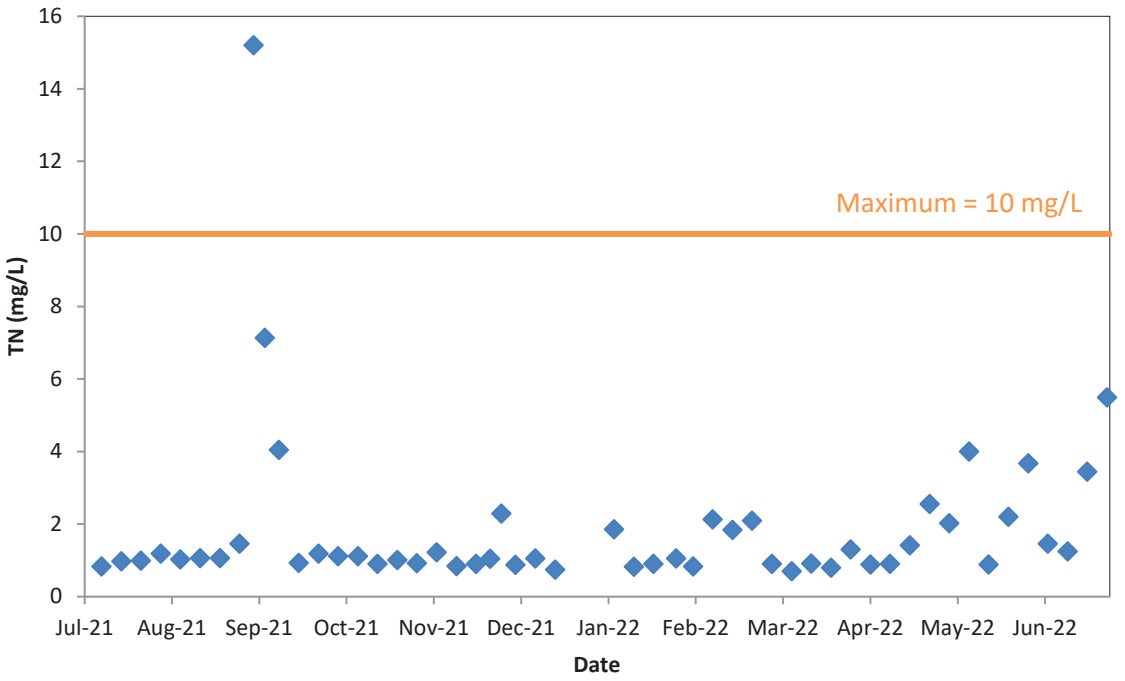
| Parameter | Unit | Limit Type | Compliant |
|---|---|---|---|
| Nitrogen Mass Load | kg/yr | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | maximum | ✓ |

*Exceedances*

### TOTAL NITROGEN

Total Nitrogen Maximum was exceeded once following a dissolved oxygen probe fault. Nitrogen levels promptly reduced to compliance levels following repairs to the probe. Overall 98% compliance with the Total Nitrogen Maximum limit was achieved in the 2021-22 financial year.

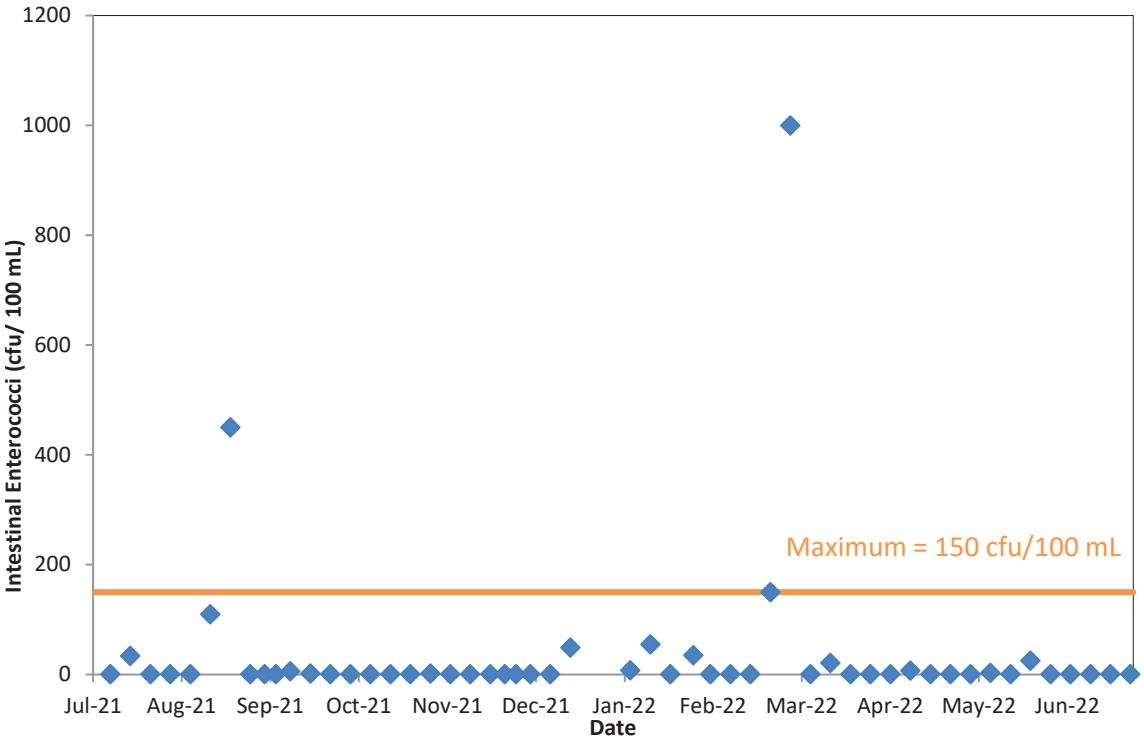
*Figure 12 – Cooroy STP – Total Nitrogen – Maximum*



## INTESTINAL ENTEROCOCCI

Target Maximum Intestinal Enterococci was exceeded twice. In August, a leak in the chlorine system temporarily resulted in reduced effluent disinfection. In March, a significant rain event (832mm of rainfall) resulted in the non-compliance. 96% compliance with the Intestinal Enterococci Maximum was achieved, in the 2021-22 financial year.

*Figure 13 – Cooroy STP – Intestinal Enterococci – Maximum*



## 3.6 Dayboro Sewage Treatment Plant

*Table 12 – Dayboro STP Contaminants Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| BOD | mg/L | 12 | 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 12 | 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 12 | range | ✓ |
| $NH_3$-N | mg/L | 12 | 50th percentile | ✗[1] |
| | | | maximum | ✓[1] |
| *E. coli* | mg/L | 60 | median | ✓[2] |
| | | | 80th percentile | ✓[2] |

1. 50th Percentile Ammonia was exceeded five times and Maximum Ammonia was exceeded twice in the 2021-22 financial year. Please refer to the next page for further details.
2. Median *E. coli* was exceeded two times and 80th Percentile *E. coli* was exceeded once in the 2021-22 financial year. Please refer to the next page for further details.

*Exceedances*

### AMMONIA

50th Percentile Ammonia was exceeded five times and Maximum Ammonia was exceeded twice. Each exceedance was related to rainfall affecting plant performance. Overall 83% compliance with the Ammonia Maximum and 58% compliance with the Ammonia 50th Percentile limit was achieved in the 2021-22 financial year. There is no risk to the environment nor the community as effluent is diluted in a large effluent storage dam and then disposed of via on-site land irrigation.

*Figure 14 – Dayboro STP – Ammonia – 50th Percentile*

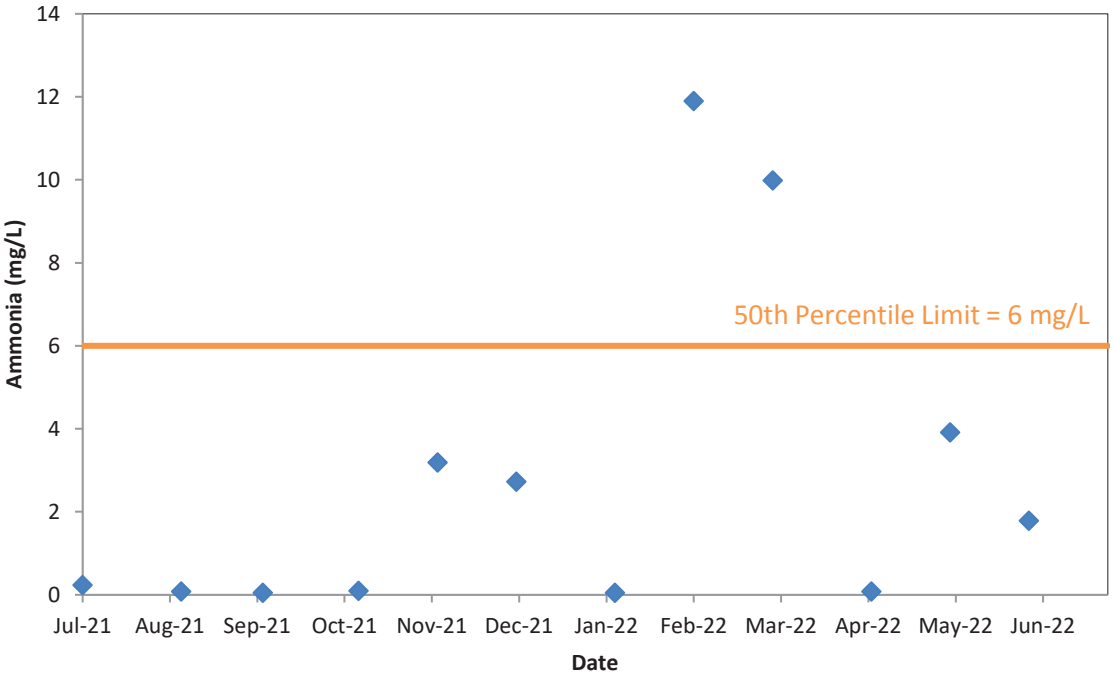
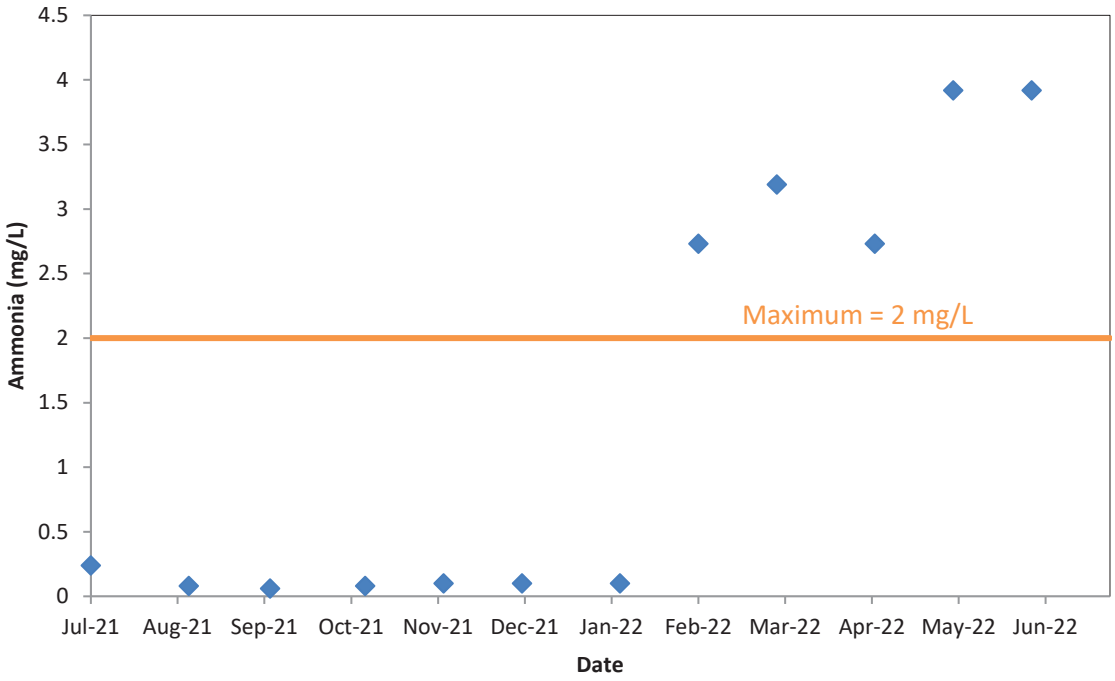


*Figure 15 – Dayboro STP – Ammonia – Maximum*




### *E. COLI*

Target Median *E. coli* was exceeded twice and 80th Percentile *E. coli* was exceeded once. The December and March exceedances were associated with rainfall events of 172mm over 3 days and 866mm of rain respectively. 83% compliance with the *E. coli* median was achieved, improving on the 2020-21 result of 77%. 92% compliance with *E. coli* 80th Percentile limits were achieved in the 2021-22 financial year, improving on the 2020-21 result of 77%. There is no risk to the environment nor the community due to reduced disinfection performance as effluent is disposed of via on-site land irrigation.

*Figure 16 – Dayboro STP – E. coli – Median*

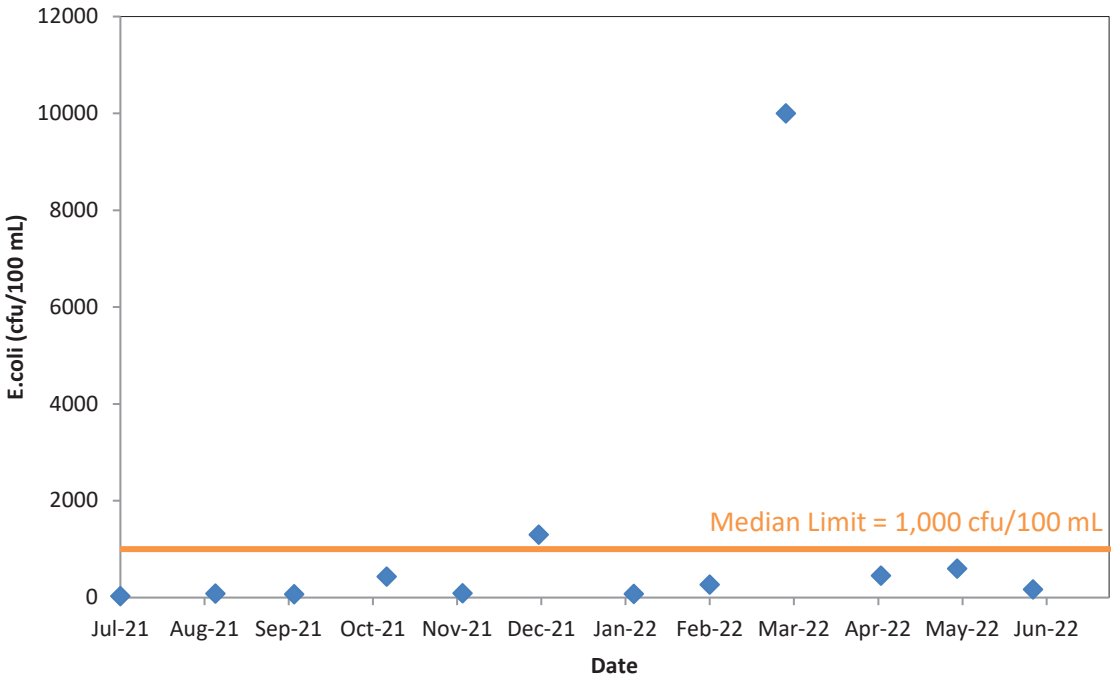
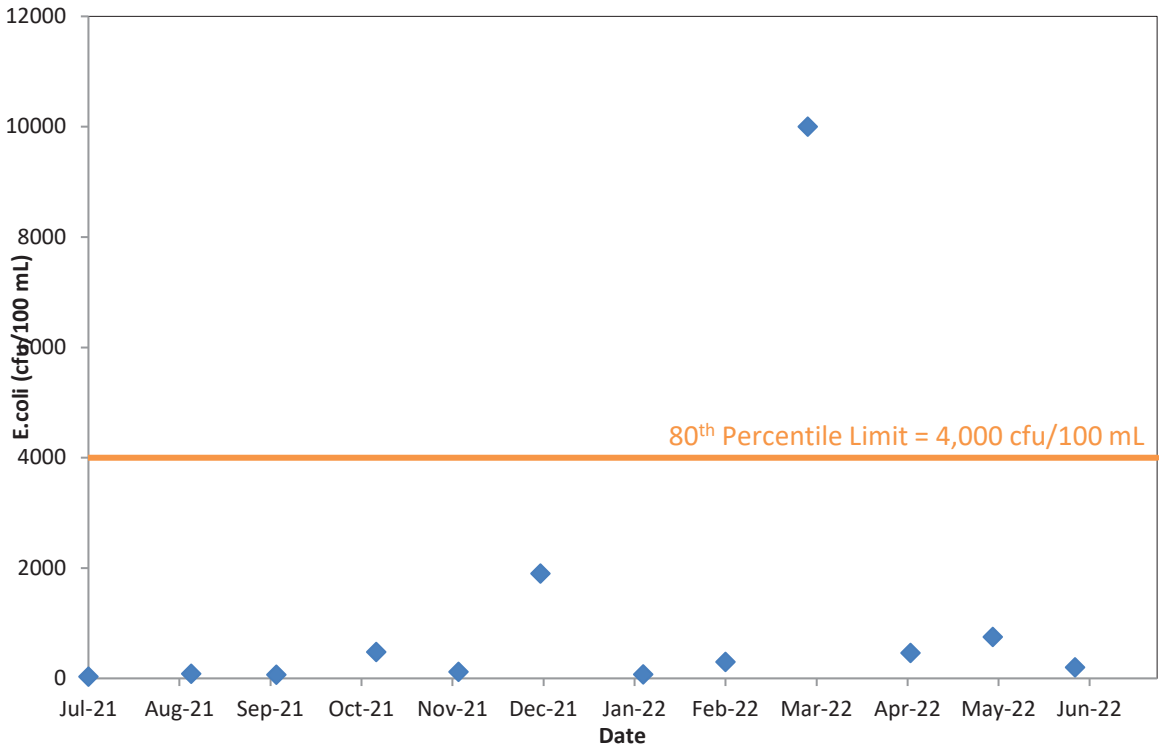



*Figure 17 – Dayboro STP – E. coli – 80th Percentile*



## 3.7 Kawana-Landsborough Sewage Treatment Plants

*Table 13 – Kawana-Landsborough STP Release Targets[1, 3]*

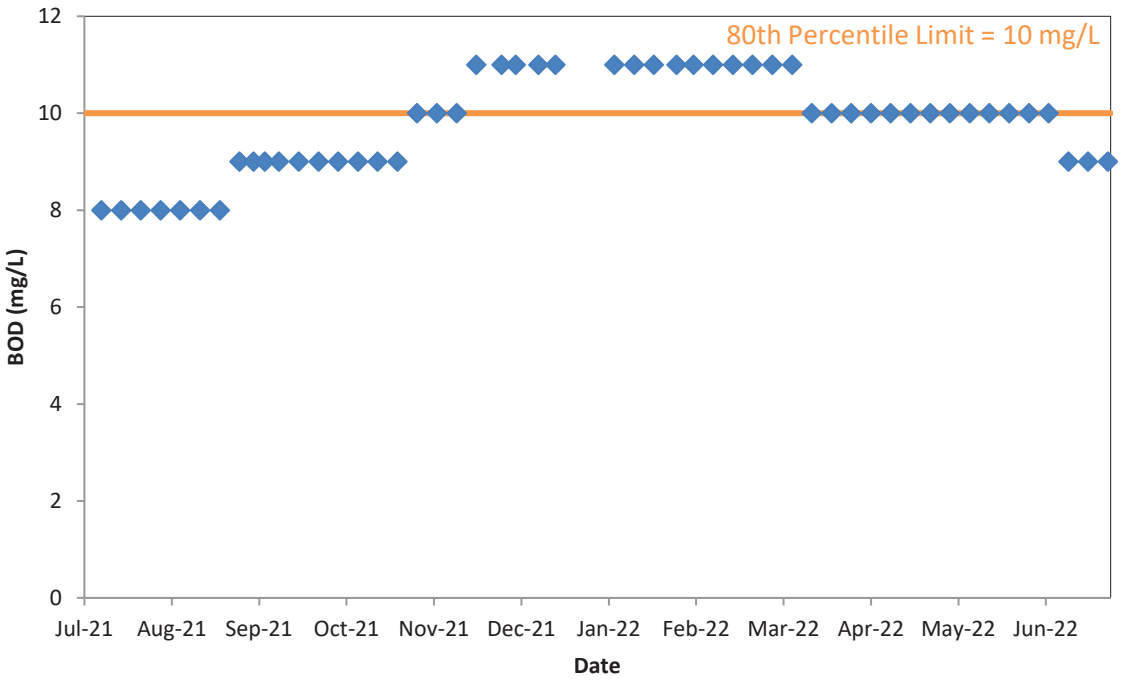
| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| BOD | mg/L | 52 | long term 80th percentile | ✗[2] |
| | | | maximum | ✓ |
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| $NH_3$-N | mg/L | 52 | long term 50th percentile | ✓ |
| | | | maximum | ✓ |
| Free Chlorine Residual | mg/L | 52 | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 52 | median | ✓ |
| | | | 80th percentile | ✓ |

1. Note that effluent to the main outfall contains flow from both Kawana and Landsborough Sewage Treatment Plants.
2. BOD Long term 80th Percentile was exceeded 15 times in the 2021-22 financial year. Please refer to the next page for further details.
3. The dry weather flow limit in the Environmental Authority has been exceeded and reported. This is due to diverting flows from Maroochydore STP to Kawana STP in advance of undertaking important renewal work at Maroochydore STP. Unitywater is currently investigating the future capacity requirements of the plant to meet the local community's significant growth. With this information, Unitywater will apply for an amendment to the Environmental Authority.

## BOD

BOD short term 80th Percentile was exceeded 15 times due to commissioning of the newly upgraded plant and due to the extreme rainfall received this year. Post-commissioning the plant is meeting its BOD requirements.  71% compliance was attained for Long term 80th Percentile BOD in the 2021-22 financial year.

*Figure 18 – Kawana STP – BOD – Long Term 80th Percentile*



## 3.8 Kenilworth Sewage Treatment Plant

*Table 14 – Kenilworth STP Release Targets*[1]

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| BOD | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| Conductivity | µs/cm | 52 | long term 50th percentile | ✓ |
| | | | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 52 | median | ✓ |
| | | | 80th percentile | ✓ |

1. Note that Kenilworth Sewage Treatment Plant releases treated effluent to land disposal with no discharge to waterways. Discharge to waters limits are not assessed and therefore 100% compliance was attained.

## 3.9 Maleny Sewage Treatment Plant

*Table 15 – Maleny STP Release Targets to Constructed Wetlands*

| Parameter | Unit | Number of Samples ^ | Target Type | Compliant |
|---|---|---|---|---|
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| TN | mg/L | 52 | long term 50th percentile | ✓ |
| TP | mg/L | 52 | long term 50th percentile | ✓ |
| *E. coli* | cfu/100 mL | 52 | median | ✓ |

*Table 16 – Maleny STP Release Targets to Forest Irrigation*

| Parameter | Unit | Number of Samples ^ | Limit Type | Compliant |
|---|---|---|---|---|
| pH | pH units | 52 | range | ✓ |
| Electrical Conductivity | µs/cm | 52 | maximum | ✓ |
| TN | mg/L | 52 | maximum | ✓ |
| TP | mg/L | 52 | maximum | ✓ |
| *E. coli* | cfu/100 mL | 52 | median | ✓ |

1. Total number of samples of effluent. Note that effluent released to the constructed wetlands and forest irrigation is sampled from the same location. Flow is diverted to either outfall on any one day, however not both outfalls.

## 3.10 Maroochydore Sewage Treatment Plant

*Table 17 – Maroochydore STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| Faecal Coliforms | cfu/100 mL | 52 | median | ✓ 1 |
| | | | 80th percentile | ✓ 1 |

1. 1. Faecal Coliforms Median was exceeded two times and 80th percentile was exceeded eight times in the 2021-22 financial year. Please refer to the next page for further details.

*Table 18 – Maroochydore STP Mass Limits*

| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | 52 | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | 52 | maximum | ✓ |

## FAECAL COLIFORMS

Target Median Faecal Coliforms was exceeded two times and 80th Percentile Faecal Coliforms exceeded eight times. Non-compliances were due to equipment faults and repairs combined with the significant rainfall events. 96% compliance with the Faecal Coliforms median and 85% compliance with the Faecal Coliforms 80th Percentile limits were achieved in the 2021-22 financial year.

*Figure 19 – Maroochydore STP – Faecal Coliforms – Median*

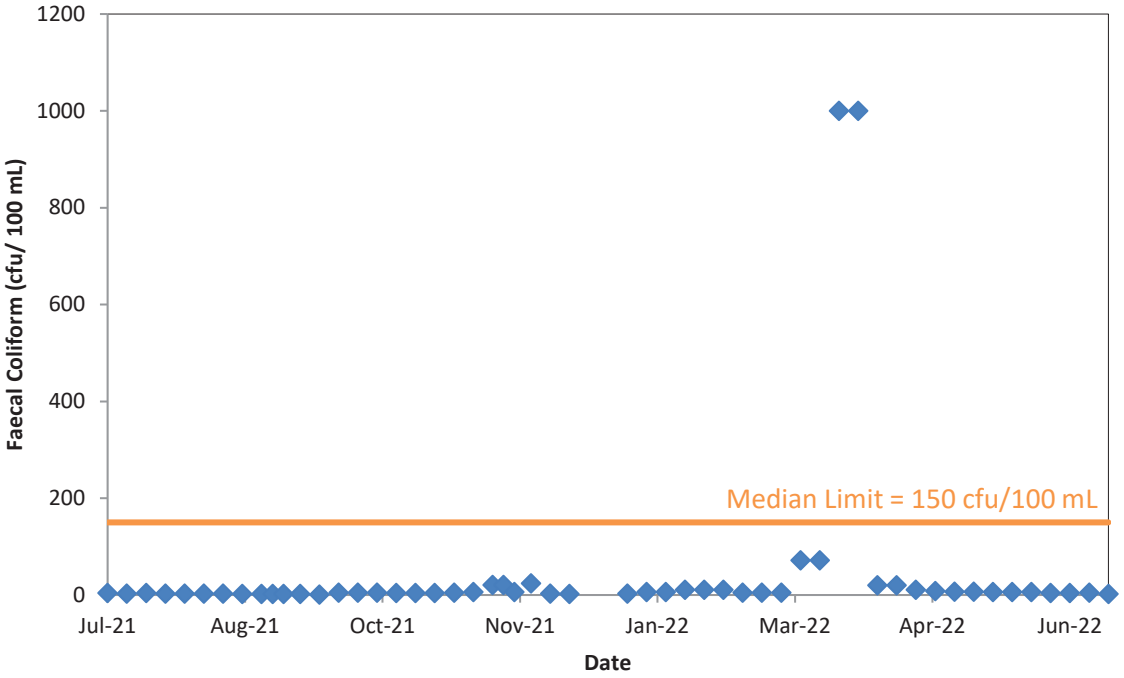
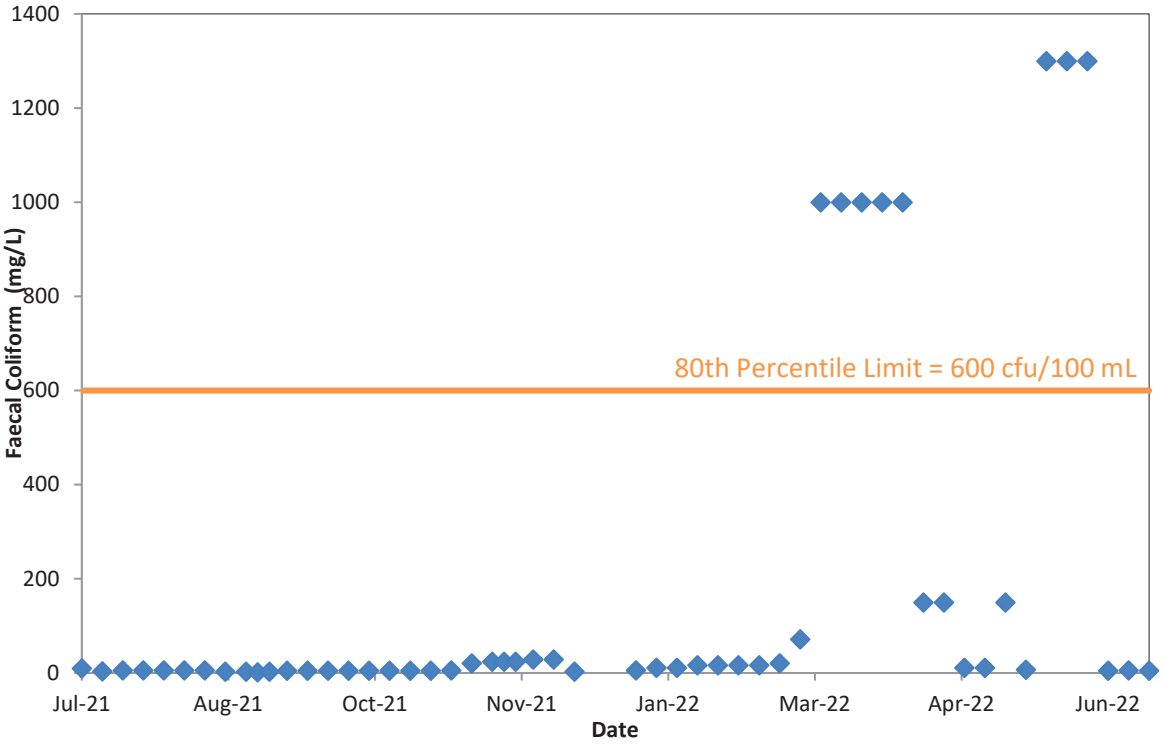


*Figure 20 – Maroochydore STP – Faecal Coliforms – 80th Percentile*



## 3.11 Murrumba Downs Sewage Treatment Plant

*Table 19 – Murrumba Downs STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| BOD | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓[1] |
| | | | maximum | ✓ |
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| Ammonia Nitrogen | mg/L | 52 | maximum | ✓ |
| TN | mg/L | 52 | long term 50th percentile | ✓ |
| | | | short term 50th percentile | ✓ |
| | | | maximum | ✓ |
| TP | mg/L | 52 | long term 50th percentile | ✓ |
| | | | short term 50th percentile | ✓ |
| | | | maximum | ✓[2] |
| Faecal Coliforms | cfu/100 mL | 260 | median | ✓[3] |
| | | | 80th percentile | ✓[3] |

1. Short term 80th Percentile BOD was exceeded five times in the 2021-22 financial year. Please refer to the next page for further details.
2. Total Phosphorus Maximum was exceeded once in the 2021-22 financial year. Please refer to the next page for further details.
3. Faecal Coliforms Median was exceeded six times and 80th Percentile four times in the 2021-22 financial year. Please refer to the next page for further details

*Table 20 – Murrumba Downs STP Volumetric Limits*

| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| Dry Weather Flow | ML/d | 234 | maximum | ✓[1] |
| | | | average | ✓ |
| Volumetric Release | ML/d | 365 | maximum on any one day | ✓ |

1. Dry Weather day exceeded due to the tail effects of a significant rainfall event.

*Table 21 – Murrumba Downs STP Mass Limits*

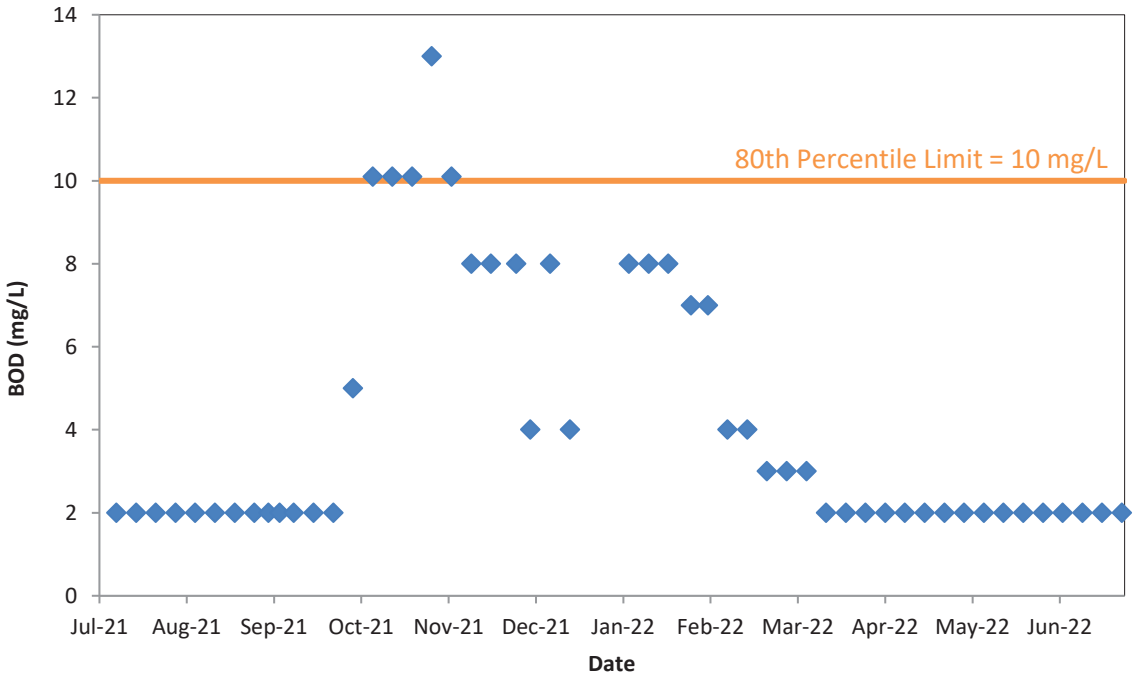
| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| BOD | kg/yr | 52 | annual load | ✓ |
| | kg/d | | 50th percentile load | ✓ |
| TN | kg/yr | 52 | annual load | ✓ |
| | kg/d | | 50th percentile load | ✓ |
| TP | kg/yr | 52 | annual load | ✓ |
| | kg/d | | 50th percentile load | ✓ |

*Exceedances*

### BOD

BOD short term 80th Percentile was exceeded five times. Critical refurbishment works were undertaken on the influent sewage balancing tanks to ensure their longevity resulting in a planned, temporary reduction in plant capacity and reduced BOD removal. The works were completed in December and the plant returned to normal operation. 90% compliance was attained for BOD Short Term 80th Percentile in the 2021-22 financial year.

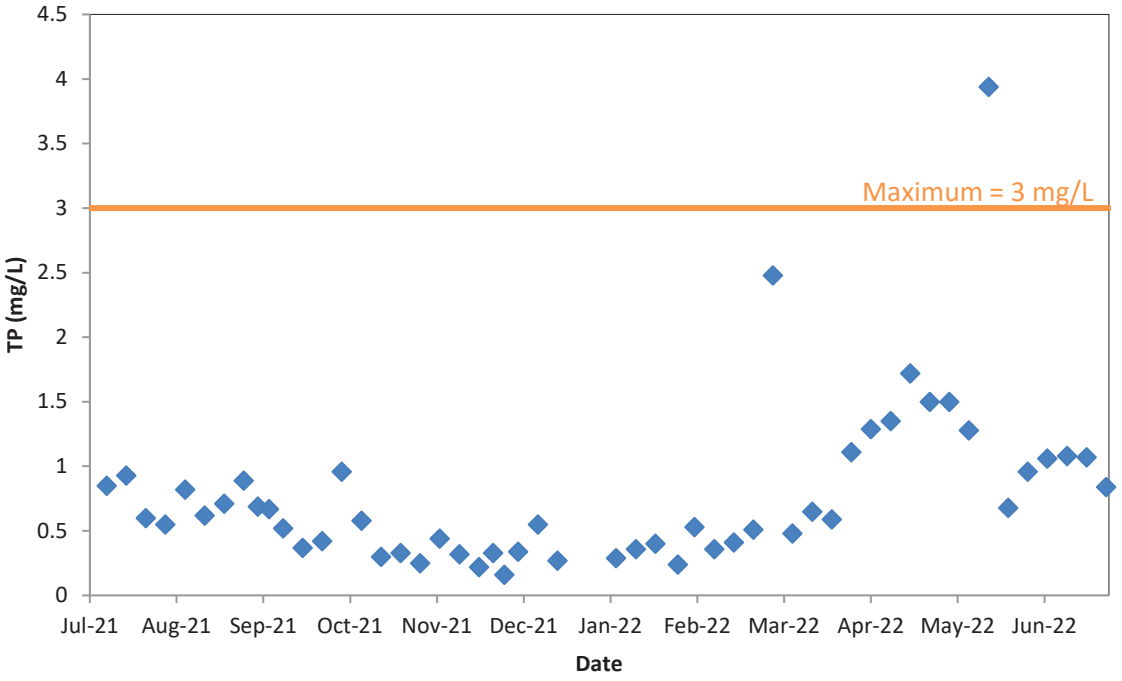
*Figure 21 – Murrumba Downs STP – BOD – Short Term 80th Percentile*



## TOTAL PHOSPHORUS

Total Phosphorus Maximum was exceeded once following a severe wet weather event with 328mm of rain in the two weeks prior to the exceedance. Overall 98% compliance with the Total Phosphorus Maximum limit was achieved in the 2021-22 financial year.

*Figure 22 – Murrumba Downs STP – Total Phosphorus – Maximum*



## FAECAL COLIFORMS

Target Median Faecal Coliforms was exceeded six times and 80th Percentile Faecal Coliforms exceeded four times. The UV disinfection system at Murrumba Downs STP was damaged during the February extreme wet weather event reducing disinfection system reliability. Parts were ordered and installed as quickly as possible to restore full capability. 88% compliance with the Faecal Coliforms median and 92% compliance with the Faecal Coliforms 80th Percentile limits were achieved in the 2021-22 financial year.

*Figure 23 – Murrumba Downs STP – Faecal Coliforms – Median*

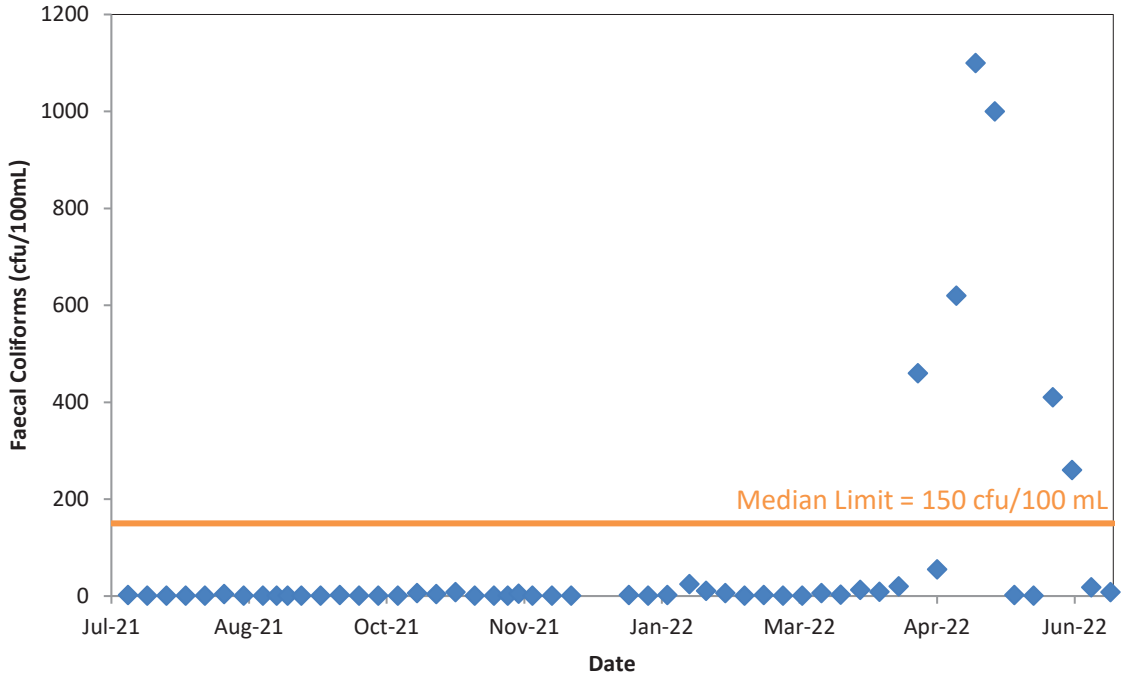
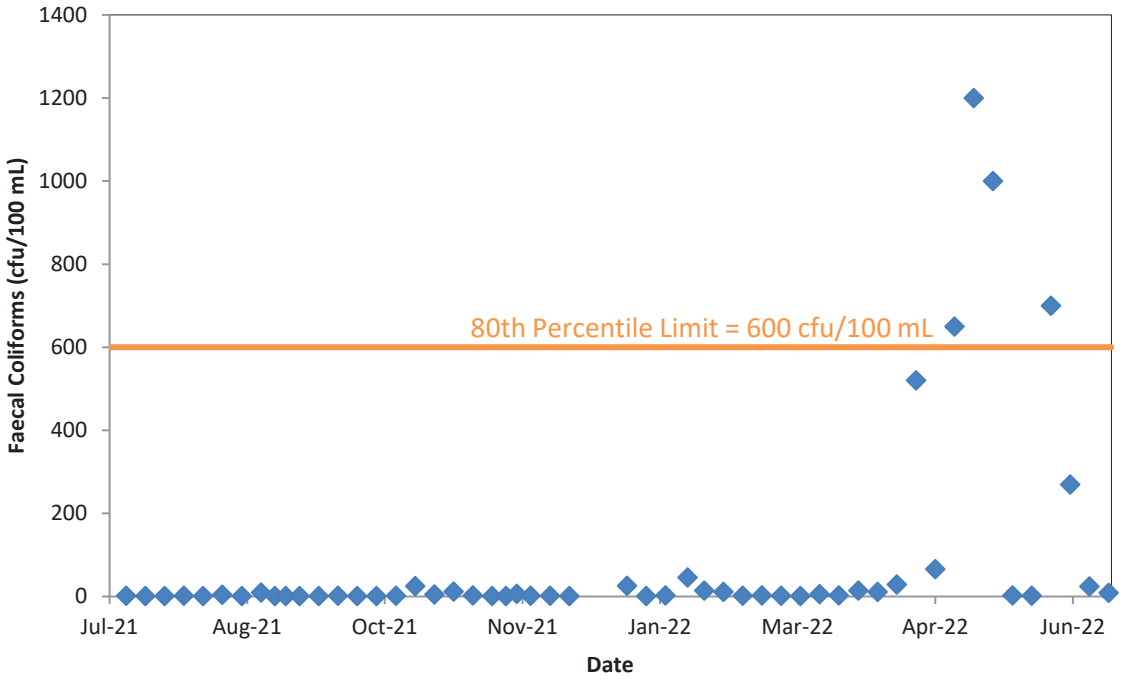


*Figure 24 – Murrumba Downs STP – Faecal Coliforms – 80th Percentile*



## 3.12 Nambour Sewage Treatment Plant

*Table 22 – Nambour STP Release Targets*

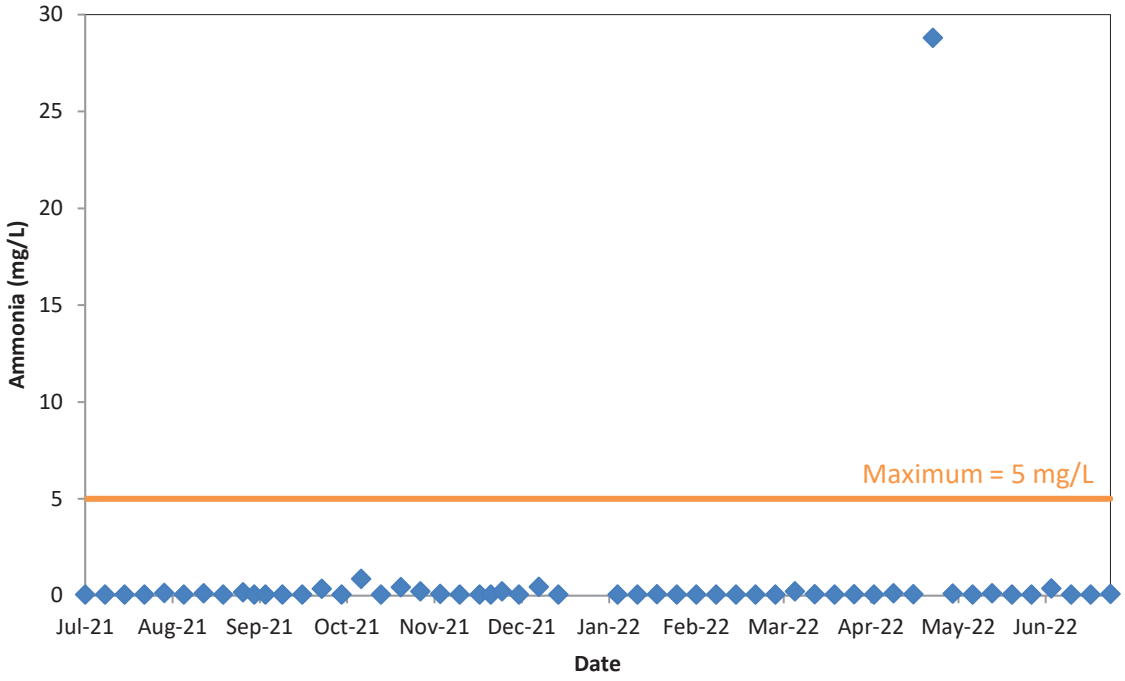
| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| $NH_3$-N | mg/L | 52 | long term 50th percentile | ✓ |
| | | | maximum | ✓[1] |
| TN | mg/L | 52 | long term 50th percentile | ✓ |
| TP | mg/L | 52 | long term 50th percentile | ✓ |
| Faecal Coliforms | cfu/100 mL | 52 | median | ✗[2] |
| | | | 80th percentile | ✗[2] |

1. Ammonia maximum was exceeded once in the 2021-22 financial year. Please refer to the next page for further details.
2. Faecal Coliforms Median was exceeded 16 times and 80th Percentile 11 times in the 2021-22 financial year. Please refer to the next page for further details.

## AMMONIA

Ammonia Maximum was exceeded once. Nambour STP utilises Membrane bioreactors to produce treated effluent. Caustic soda was discharged to the reactor during a membrane cleaning process causing a short-term reduction in ammonia removal. Overall 98% compliance with the Ammonia Maximum limit was achieved in the 2021-22 financial year.

*Figure 25 – Nambour STP – Ammonia – Maximum*



## FAECAL COLIFORMS

Target Median Faecal Coliforms was exceeded 16 times and 80th Percentile Faecal Coliforms exceeded 11 times. The membrane bioreactor technology separates microbiological particles in the wastewater from the effluent. The flexible permeate lines cracked during the February wet weather event, compromising this barrier to microbiological contamination. A temporary liquid chlorine disinfection system was deployed and the failed permeate lines repaired to restore the function of the system. 70% compliance with the Faecal Coliforms median and 79% compliance with the Faecal Coliforms 80th Percentile limits were achieved in the 2021-22 financial year.

*Figure 26 – Nambour STP – Faecal Coliforms – Median*

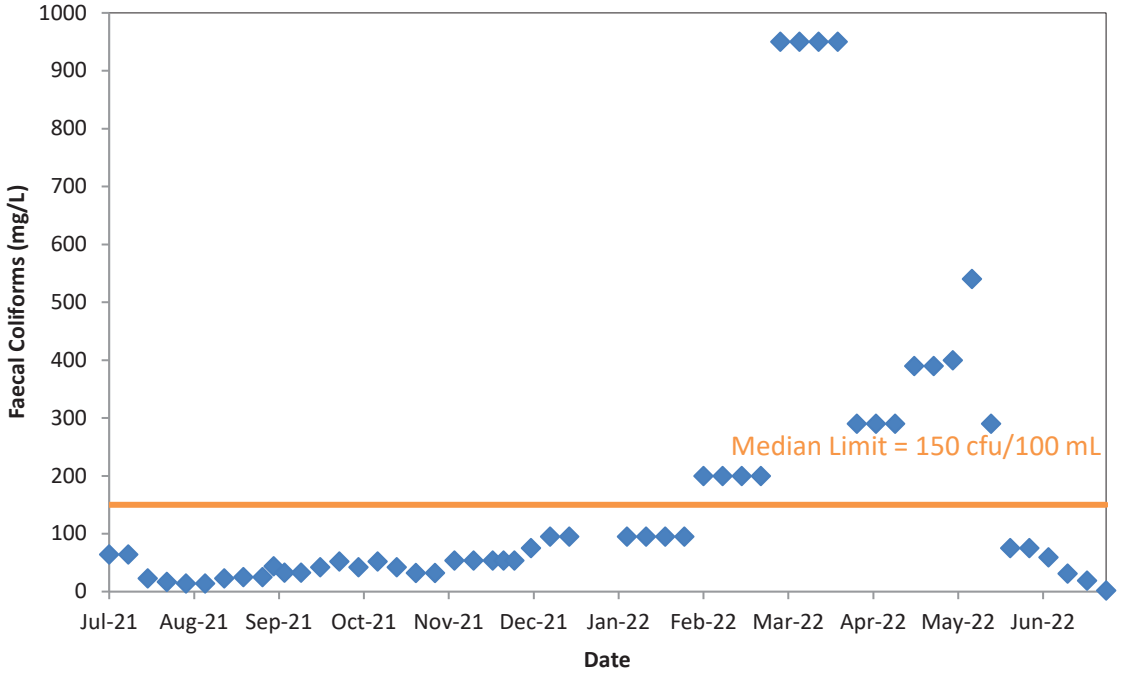
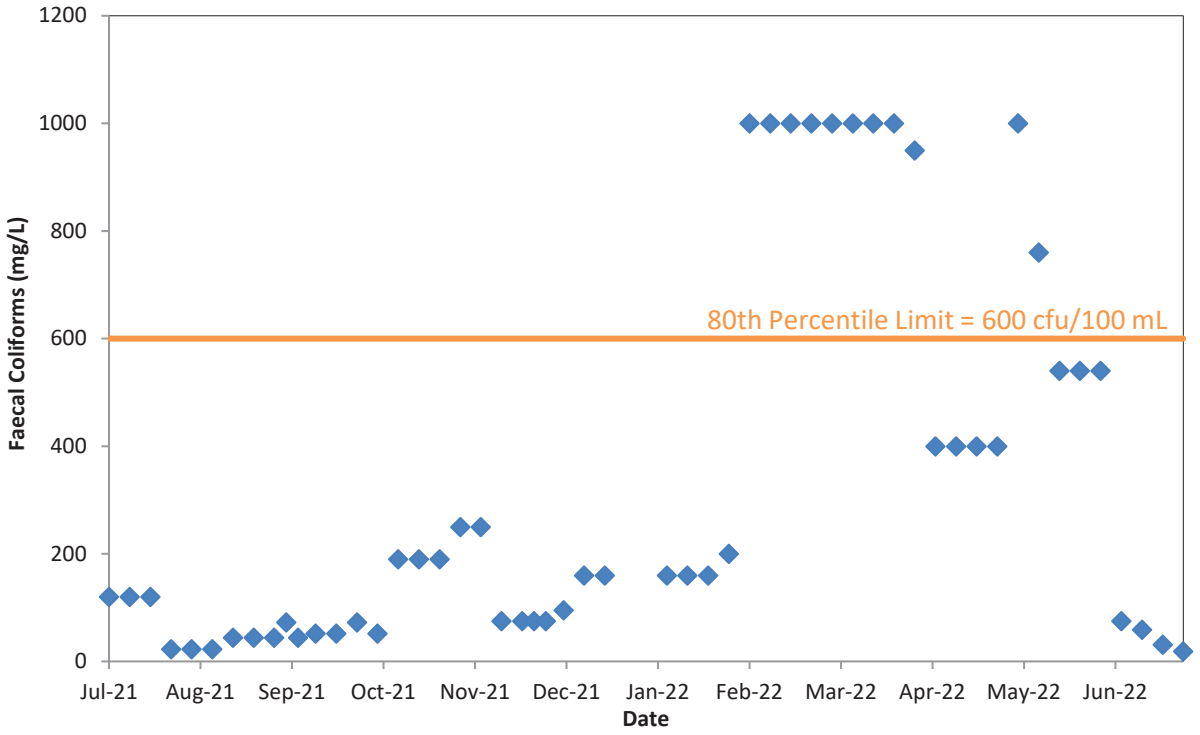


*Figure 27 – Nambour STP – Faecal Coliforms – 80th Percentile*



## 3.13 Noosa Sewage Treatment Plant

*Table 23 – Noosa STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| Faecal Coliforms | cfu/100 mL | 52 | maximum | ✓ |
| | | | 80th percentile | ✓ |

*Table 24 – Noosa STP Mass Limits*

| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | median | ✓ |
| Nitrogen Mass Load | kg/yr | - | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | - | maximum | ✓ |

## 3.14 Redcliffe Sewage Treatment Plant

*Table 25 – Redcliffe STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| BOD | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓ |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| Free Chlorine Residual | mg/L | 52 | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 260 | median | ✓[1] |
| | | | 80th percentile | ✓[1] |

1. Faecal Coliforms Median was exceeded twice and 80th Percentile once in the 2021-22 financial year. Please refer to the next page for further details.

*Table 26 – Redcliffe STP Mass Limits*

| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | - | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | - | maximum | ✓ |

## FAECAL COLIFORMS

Target Median Faecal Coliforms was exceeded twice and 80th Percentile Faecal Coliforms was exceeded once. UV system maintenance in October and a rain event of 127mm in May resulted in reduced disinfection system performance. 96% compliance with the Faecal Coliforms median and 98% Faecal Coliforms 80th Percentile limits were achieved in the 2021-22 financial year.

*Figure 28 – Redcliffe STP – Faecal Coliforms – Median*

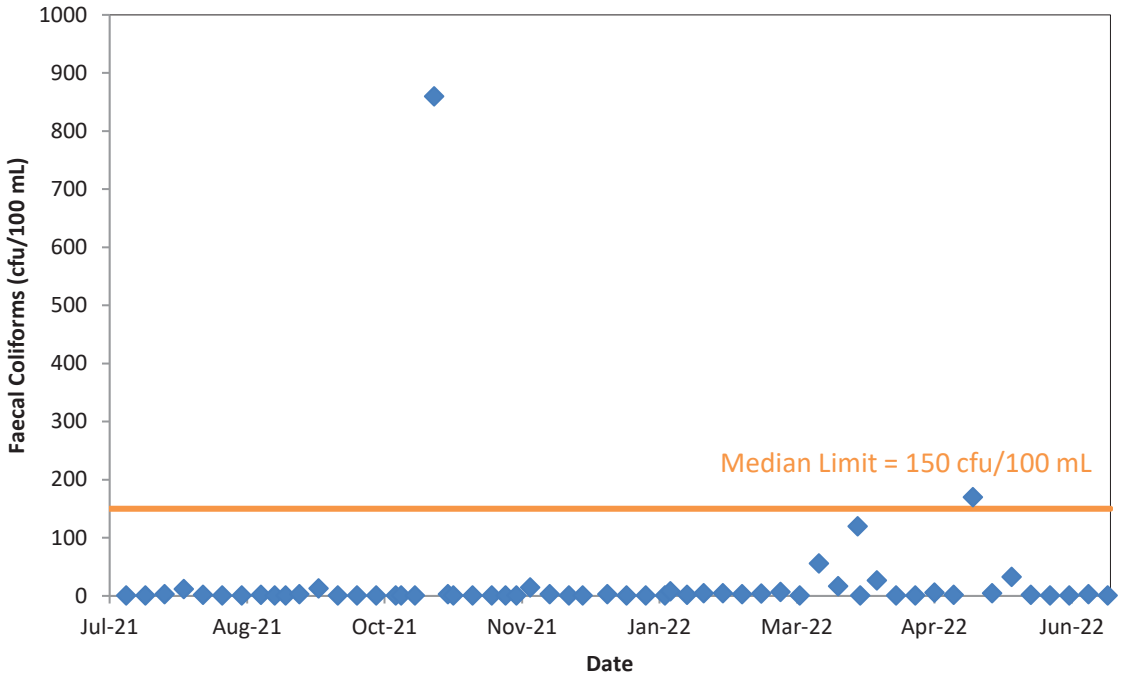
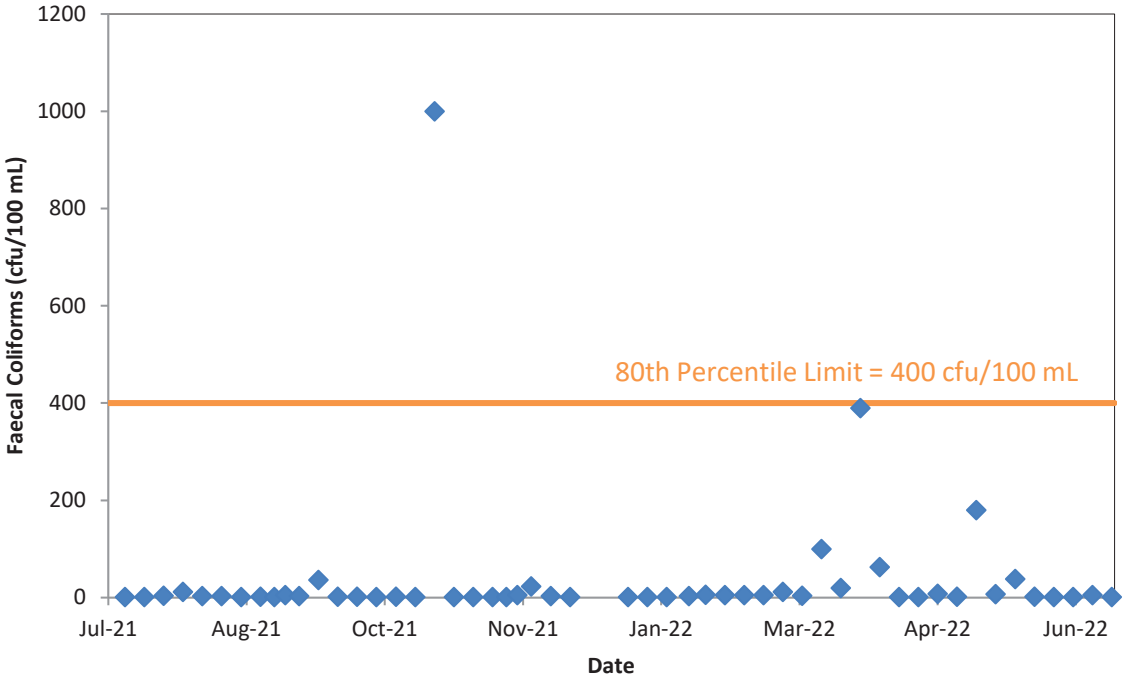


*Figure 29 – Redcliffe STP – Faecal Coliforms – 80th Percentile*



## 3.15 South Caboolture Sewage Treatment Plant

*Table 27 – South Caboolture STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| BOD | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓[1] |
| TSS | mg/L | 52 | long term 80th percentile | ✓[2] |
| | | | short term 80th percentile | ✗[2] |
| | | | maximum | ✓[3] |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| Free Chlorine Residual | mg/L | 52 | maximum | ✓ |
| Faecal Coliforms | cfu/ 100 mL | 260 | minimum | ✓[4] |
| | | | 80th percentile | ✓ |

1. BOD maximum was exceeded once in the 2021-22 financial year. Please refer to the next page for further details.
2. TSS Long term 80th Percentile was exceeded three times, Short term 80th Percentile was exceeded 17 times and TSS Maximum was exceeded twice in the 2021-22 financial year. Please refer to the next page for further details.
3. pH minimum was exceeded once in the 2021-22 financial year. Please refer to the next page for further details.
4. Faecal Coliforms Median and 80th Percentile were each exceeded twice in the 2021-22 financial year. Please refer to the next page for further details.

*Table 28 – South Caboolture STP Mass Limits*

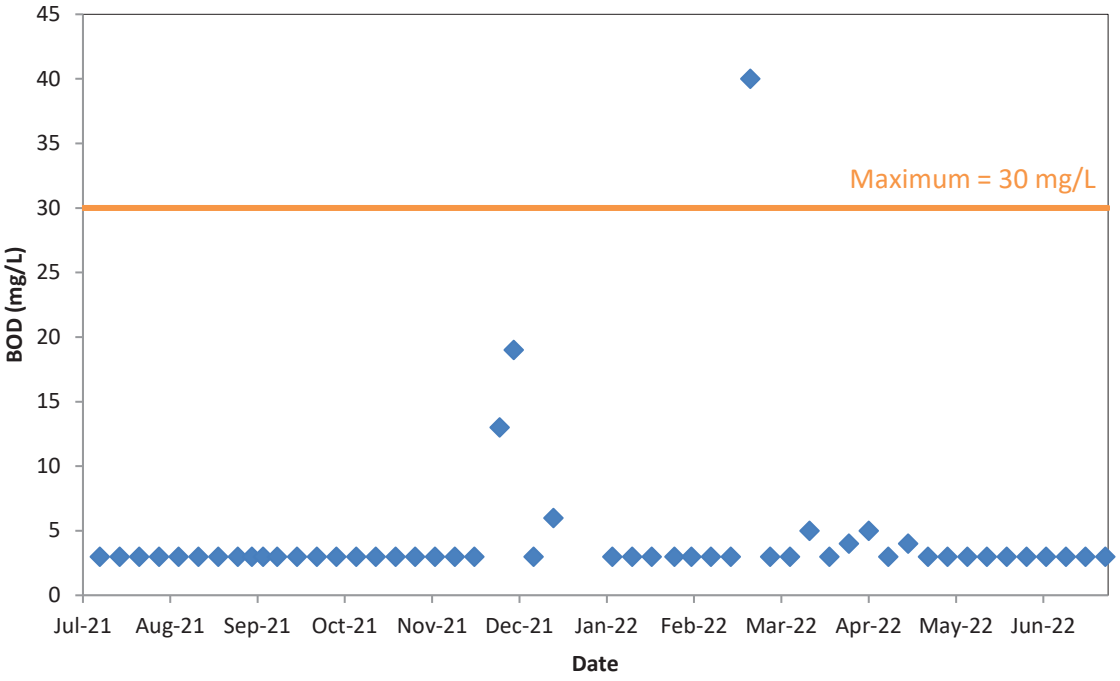
| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 366 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | - | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | - | maximum | ✓ |

*Exceedances*

### BOD

BOD Maximum was exceeded once following an extreme rainfall event where 840mm of rain was recorded at the STP. Overall 98% compliance with BOD Maximum limits was achieved in the 2021-22 financial year.

*Figure 30 – South Caboolture STP – BOD – Maximum*



## TSS

TSS Long term 80th Percentile was exceeded three times. Short term 80th Percentile was exceeded 17 times and TSS Maximum was exceeded twice. Long Term 80th Percentile TSS non-compliance from the previous financial year continued to be reported due to the calculation method of this compliance measure, even though compliant TSS results were being measured onsite. Further the significant rainfall events have contributed to TSS non-compliance. An upgrade project currently in delivery phase will provide the plant with an improved wet weather flow handling capability that will improve TSS compliance and reduce the need for tank cleaning works. Overall TSS Long term 80th Percentile was compliant 94%, Short term 80th Percentile was compliant 67% and TSS Maximum was compliant 96% of the time in the 2021-22 financial year.

*Figure 31 – South Caboolture STP – TSS – Maximum*

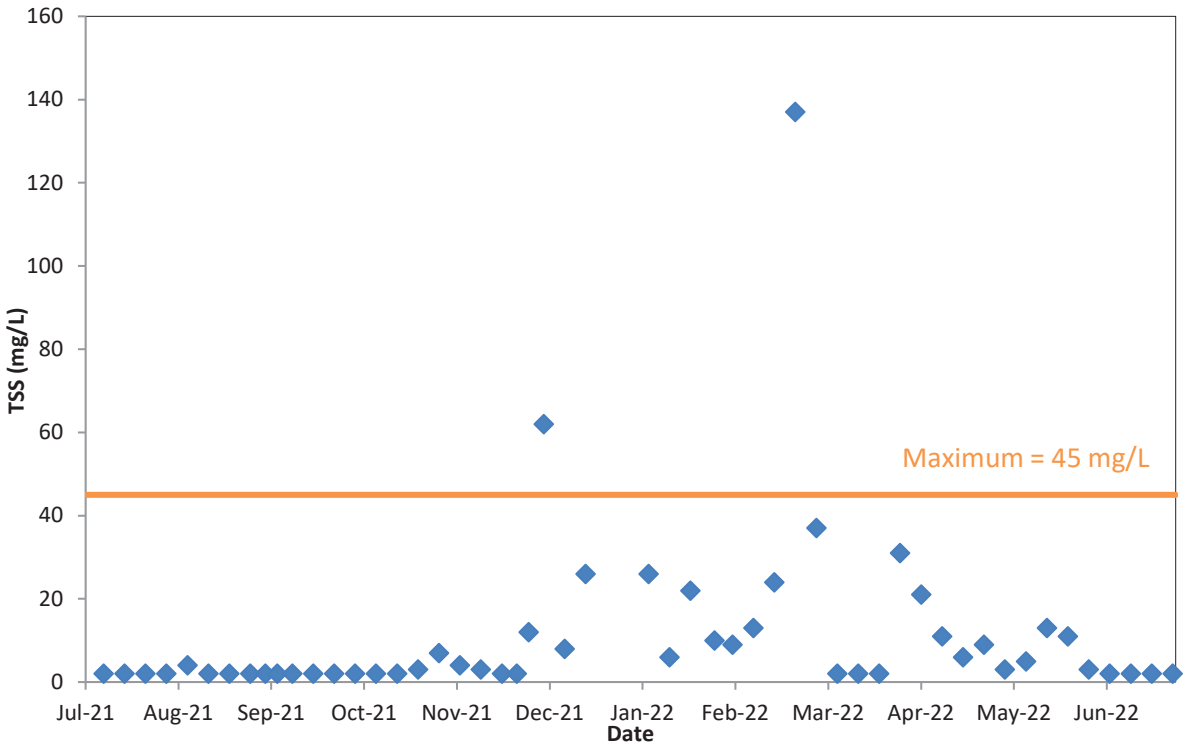


*Figure 32 – South Caboolture STP – TSS – Short Term 80th Percentile*

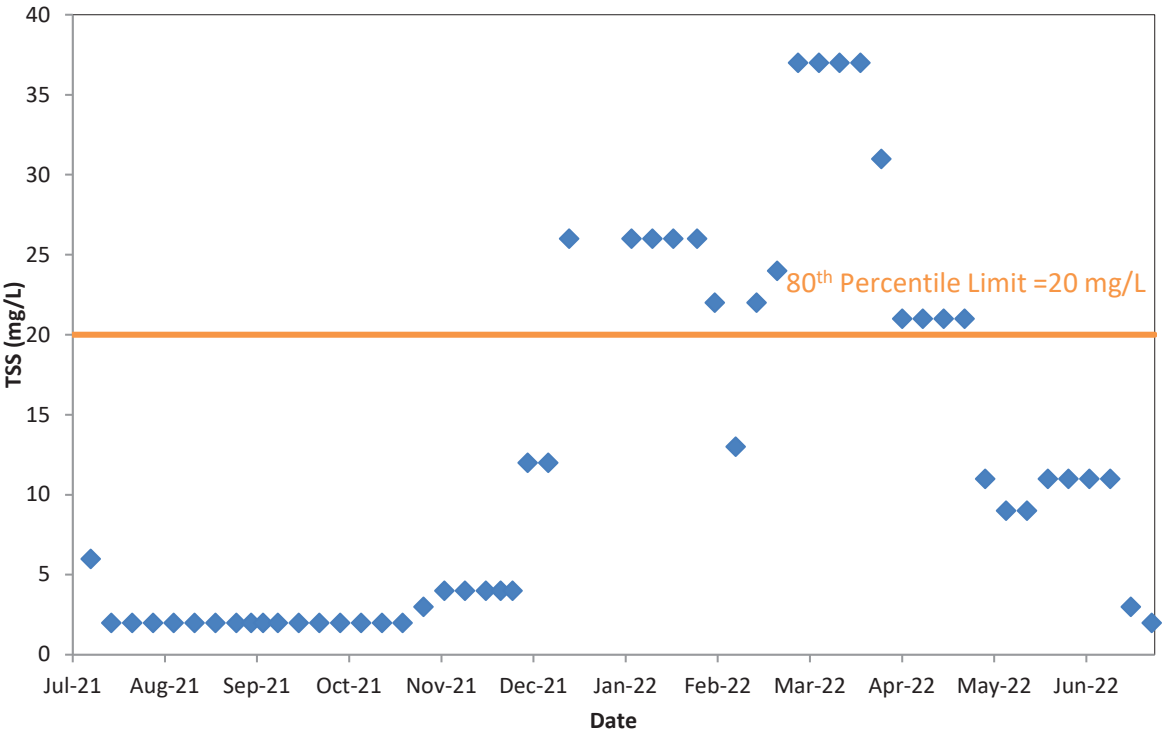
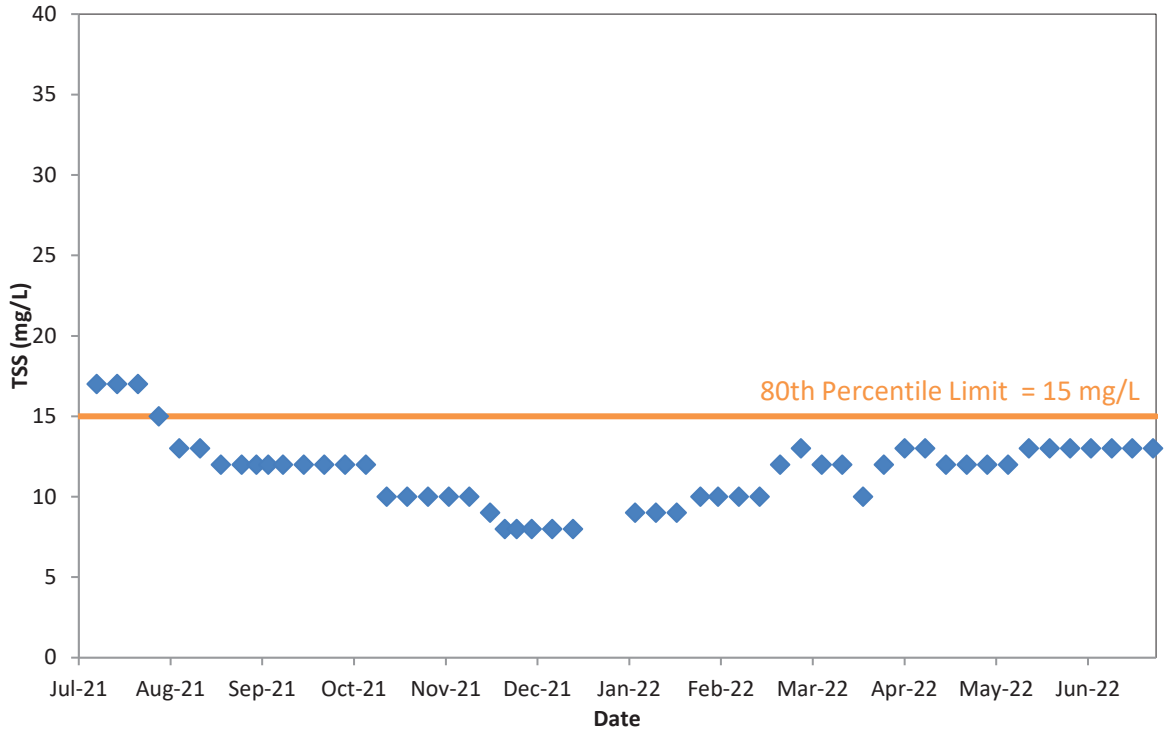


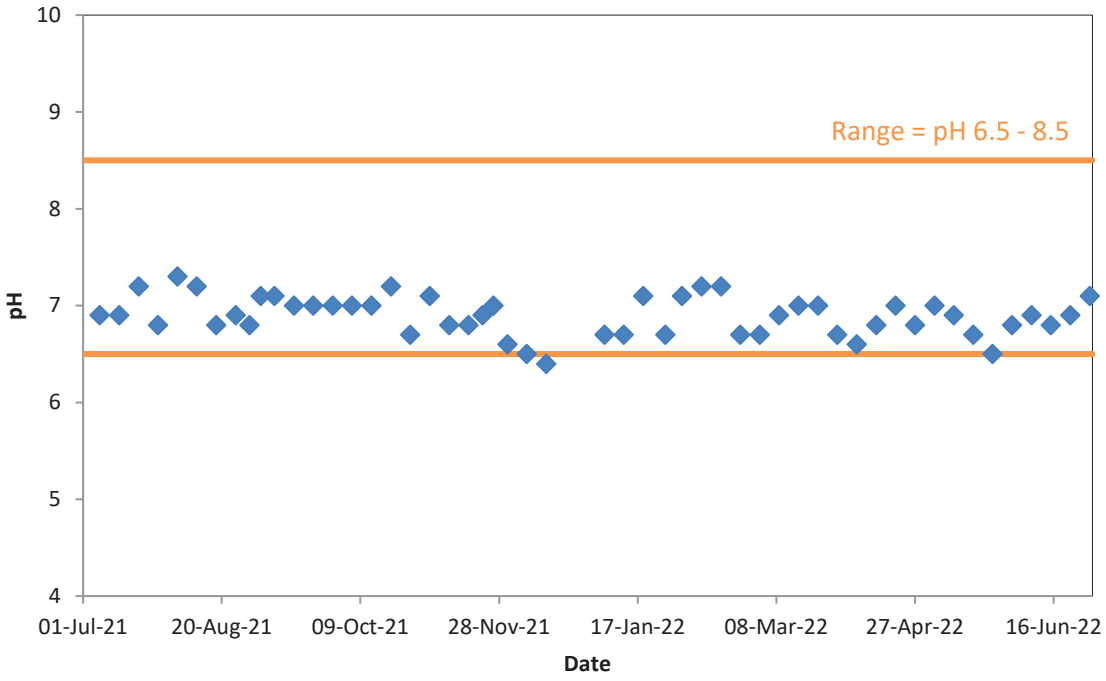

*Figure 33 – South Caboolture STP – TSS – Long Term 80th Percentile*



## pH

pH was outside the required range once. All STP equipment and processes were within normal ranges during this period therefore this exceedance is believed to be due to a change in a raw sewage characteristic. Overall 98% compliance in pH targets was achieved in the 2021-22 financial year.

*Figure 34 – South Caboolture STP – pH – Minimum*




## Faecal Coliforms

Target Median Faecal Coliforms and 80th Percentile Faecal Coliforms were each exceeded twice due to wet weather events with 166mm over 3 days in December 2021 and 805mm over one day in February 2022. 96% compliance with the Faecal Coliforms median and Faecal Coliforms 80th Percentile limits were achieved in the 2021-22 financial year.

*Figure 35 – South Caboolture STP – Faecal Coliforms – Median*

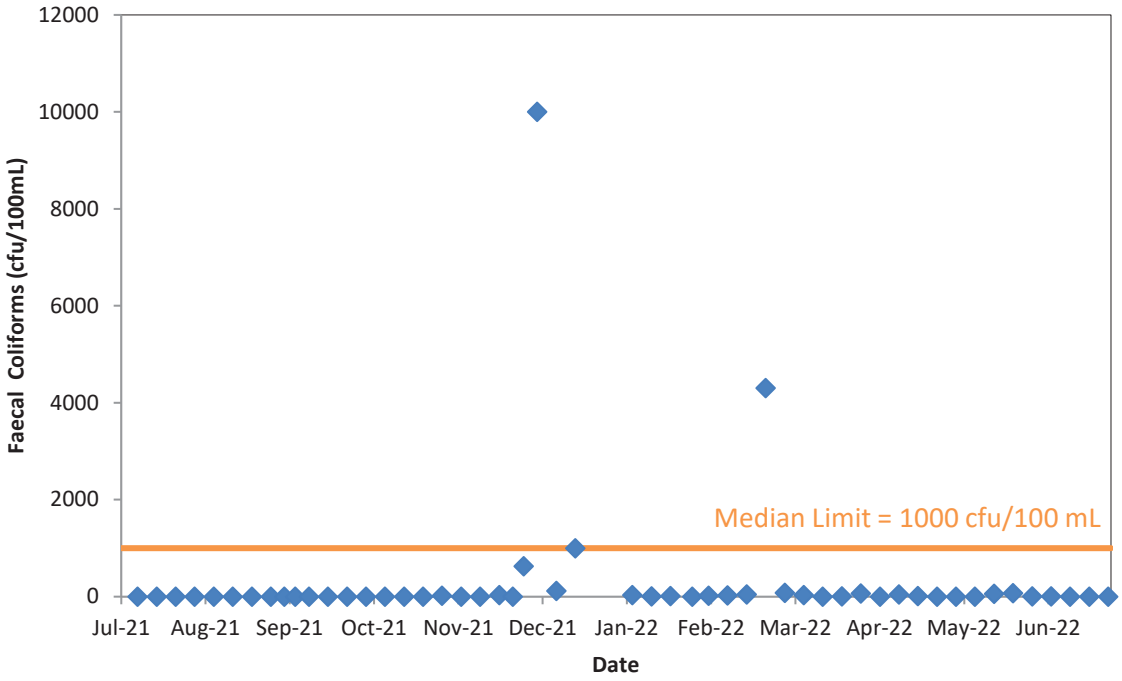
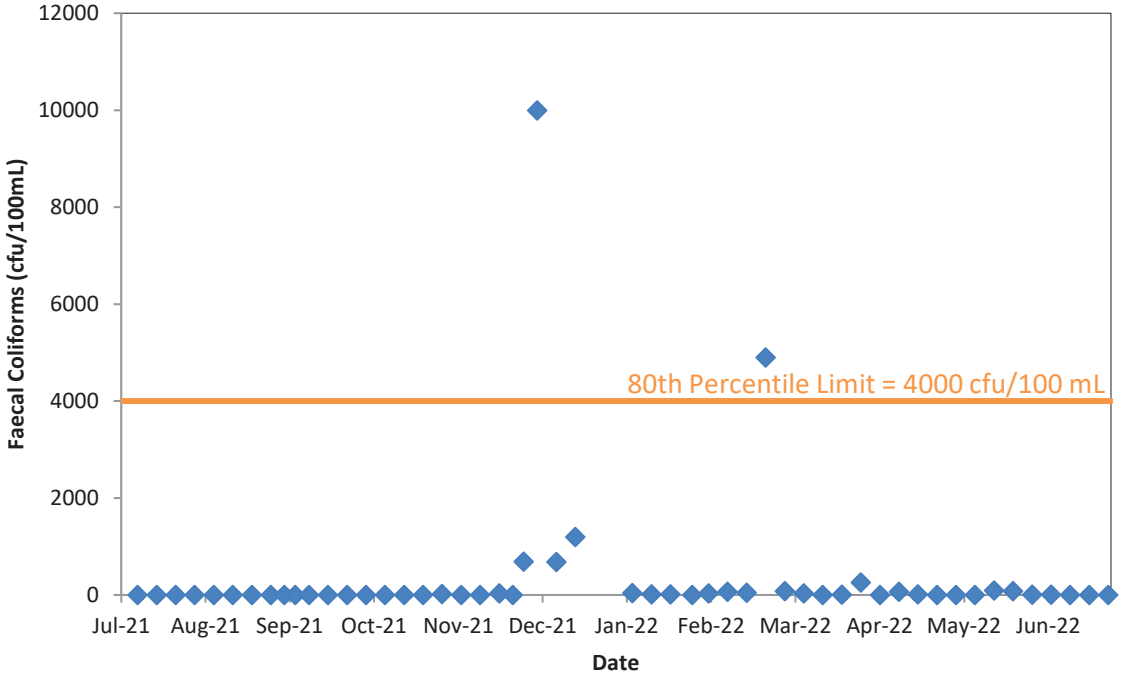



*Figure 36 – South Caboolture STP – Faecal Coliforms – 80th Percentile*



## 3.16 Woodford Sewage Treatment Plant

*Table 29 – Woodford STP Release Targets*

| Parameter | Unit | Number of Samples | Target Type | Compliant |
|---|---|---|---|---|
| BOD | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓[1] |
| TSS | mg/L | 52 | long term 80th percentile | ✓ |
| | | | short term 80th percentile | ✓ |
| | | | maximum | ✓[2] |
| pH | pH units | 52 | range | ✓ |
| DO | mg/L | 52 | minimum | ✓ |
| Free Chlorine Residual | mg/L | 52 | maximum | ✓ |
| Faecal Coliforms | cfu/100 mL | 260 | median | ✓ |
| | | | 80th percentile | ✓ |

1. BOD Maximum was exceeded once in the 2021-22 financial year. Please refer to the next page for further details.
2. TSS Maximum was exceeded once in the 2021-22 financial year. Please refer to the next page for further details.

*Table 30 – Woodford STP Mass Limits*

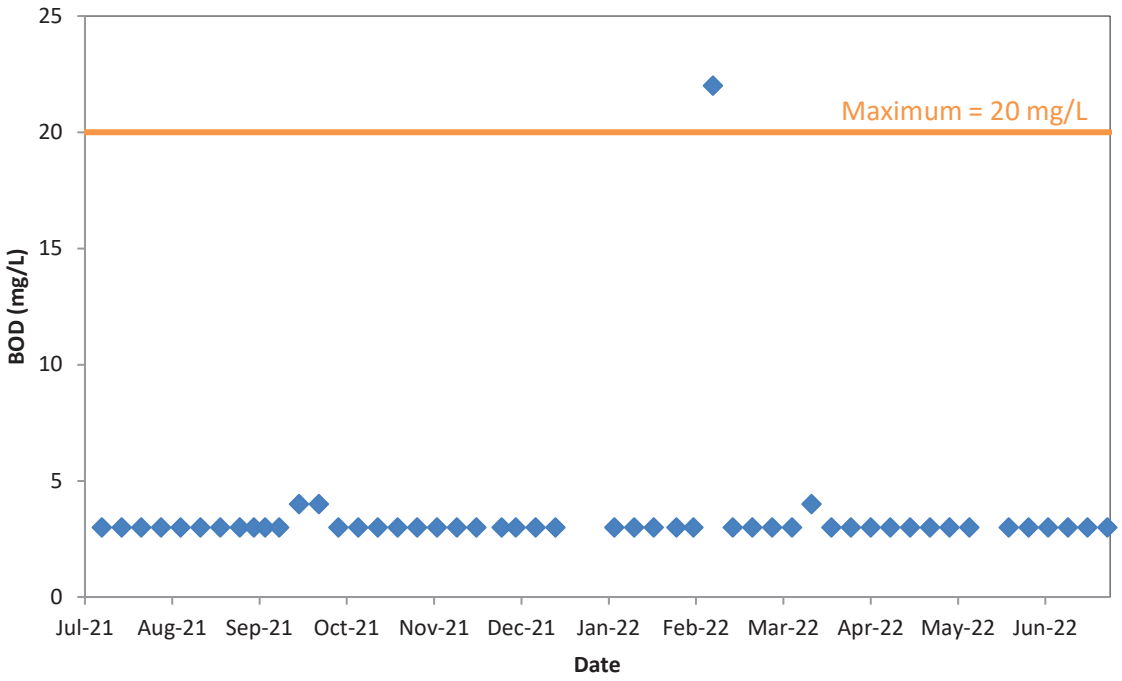
| Parameter | Unit | Number of Samples | Limit Type | Compliant |
|---|---|---|---|---|
| Average Annual Flow | ML/yr | 365 | maximum | ✓ |
| Nitrogen Mass Load | kg/yr | - | maximum | ✓ |
| Phosphorus Mass Load | kg/yr | - | maximum | ✓ |

*Exceedances*

### BOD

BOD Maximum was exceeded once due to the significant wet weather event with 102mm of rain the in the preceding week, combined with a failed balance tank mixer causing solids accumulation. Overall 98% compliance with BOD Maximum limits was achieved in the 2021-22 financial year.

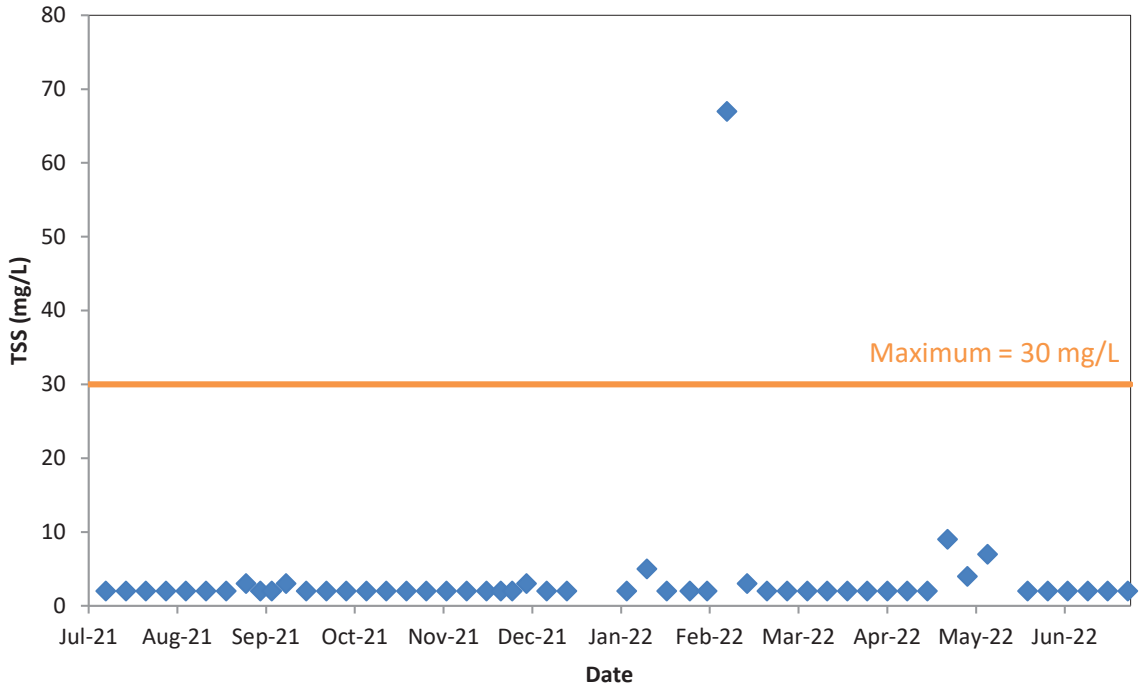
*Figure 37 – Woodford STP – BOD – Maximum*



## TSS

TSS Maximum was exceeded once for the same reasons as the BOD exceedance described above. Overall TSS Maximum was 98% compliant in the 2021-22 financial year.

*Figure 38 – Woodford STP – TSS – Maximum*



# 4 DEFINITIONS AND LEGEND

# 4. Definitions and Legend

Definitions of acronyms, units of measurement and legends throughout this performance report are defined below.

*Table 31 – Acronyms and Definitions*

| Acronym | Term | Definition |
|---|---|---|
| **BOD** | biochemical oxygen demand after 5 day test | The amount of dissolved oxygen needed by aerobic organisms to break down organic material. |
| **BNR** | biological nutrient removal | A biological process used for nitrogen and phosphorous removal from sewage. |
| **DES** | Department of Environment and Science | |
| **DO** | dissolved oxygen | Gaseous oxygen that is mixed in water and is available to aquatic organisms for respiration. |
| ***E. coli*** | *Escherichia coli* | Used as an indicator of pathogenic organisms that may cause diseases. |
| **IDEA** | intermittent decanted extended aeration | A three stage wastewater treatment process that involves aeration, settling and decanting. |
| **$NH_3$ – N** | ammonia nitrogen | A chemical compound that is removed in order to maintain the health of waterways. High levels can cause environmental issues such as eutrophication. |
| **SBR** | sequential batch reactors | A draw-and-fill biological treatment process that uses aerobic microorganisms to break down and treat wastewater. |
| **TN** | total nitrogen | The sum of nitrate, nitrite and ammonia in water. These are removed in order to maintain the health of waterways and prevent environmental issues such as eutrophication. |
| **TP** | total phosphorus | The sum of phosphorus compounds. These are removed in order to maintain the health of waterways and prevent environmental issues such as eutrophication. |
| **TSS** | total suspended solids | Total amount of solid particles that remain suspended within the wastewater. |
| **UV** | ultraviolet | A technology using radiation that disinfects wastewater. |
| | faecal coliform | Used as an indicator of pathogenic organisms that may cause diseases. |
| **pH** | | A figure expressing the acidity or alkalinity of the water |

*Table 32 – Definition of Units*

| Units | Definition |
|---|---|
| µs/cm | micro-Siemens per centimetre |
| cfu/100 mL | colony forming units per 100 millilitre |
| kg/yr | kilograms per year |
| mg/L | milligrams per litre |
| ML | megalitres |
| ML/yr | megalitres per year |
| NTU | Nephelometric Turbidity Units |

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