



Unitywater

Serving you today, investing in tomorrow.

# Annual Sewage Treatment Plant Performance Report

1 JULY 2020 – 30 JUNE 2021

# Sewage Treatment Plants at a glance

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**307,680**

Number of sewerage  
assets connections

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**6,040**KM

Kilometres of sewer  
main pipes

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**798**

Number of sewage  
pump stations

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**17**

Number of sewage  
treatment plants

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**62,163**ML<sup>1</sup>

Volume of sewage  
collected and treated

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**1st**

use of robotic  
submersible dredge  
by Unitywater to  
remove sludge

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**100%**

of biosolids  
reused

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**2050**

sustainability target  
Net zero carbon  
emissions

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**98%**

Quality and quantity  
compliance

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<sup>1</sup> Does not include 1140 ML diverted to Urban Utilities (UU) via the Kedron Brooke Sewerage Scheme. This sewage would be treated to meet UU's licence requirements.

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# Message from the CEO

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I am pleased to share Unitywater's Sewage Treatment Plant Performance Report for 2020-21. This report highlights the quality sewage treatment services that we continue to provide to Noosa, Moreton Bay and the Sunshine Coast.

As our region undergoes significant growth, we continue to invest millions of dollars in renewing and upgrading our 17 sewage treatment plants (STPs) within our region. This investment has assisted us in maintaining our high-quality service and achieve an internal combined compliance result of 98% for 2020-21.

We invested in several projects over this financial year, including an innovative remote controlled robotic submersible dredge at our South Caboolture STP, commencement of upgrades at our Burpengary and Brendale STP's, as well as renewal work at the Maroochy STP and upgrades at the Kawana STP.

Last year we reported on the commencement of our 7-year energy management plan that seeks to reduce Unitywater's carbon footprint, costs and dependence on the electricity grid. This year we added to our goal of reducing our carbon footprint to Zero by launching our aspirational goals to divert 100% of phosphorous and nitrogen from receiving waterways as well as creating beneficial re-use outcomes for 100% for our recycled water.

These bold and aspirational goals we have set to be achieved by 2050 will be realised by finding new and innovative ways to deliver services in partnership with our customers, community and stakeholders.

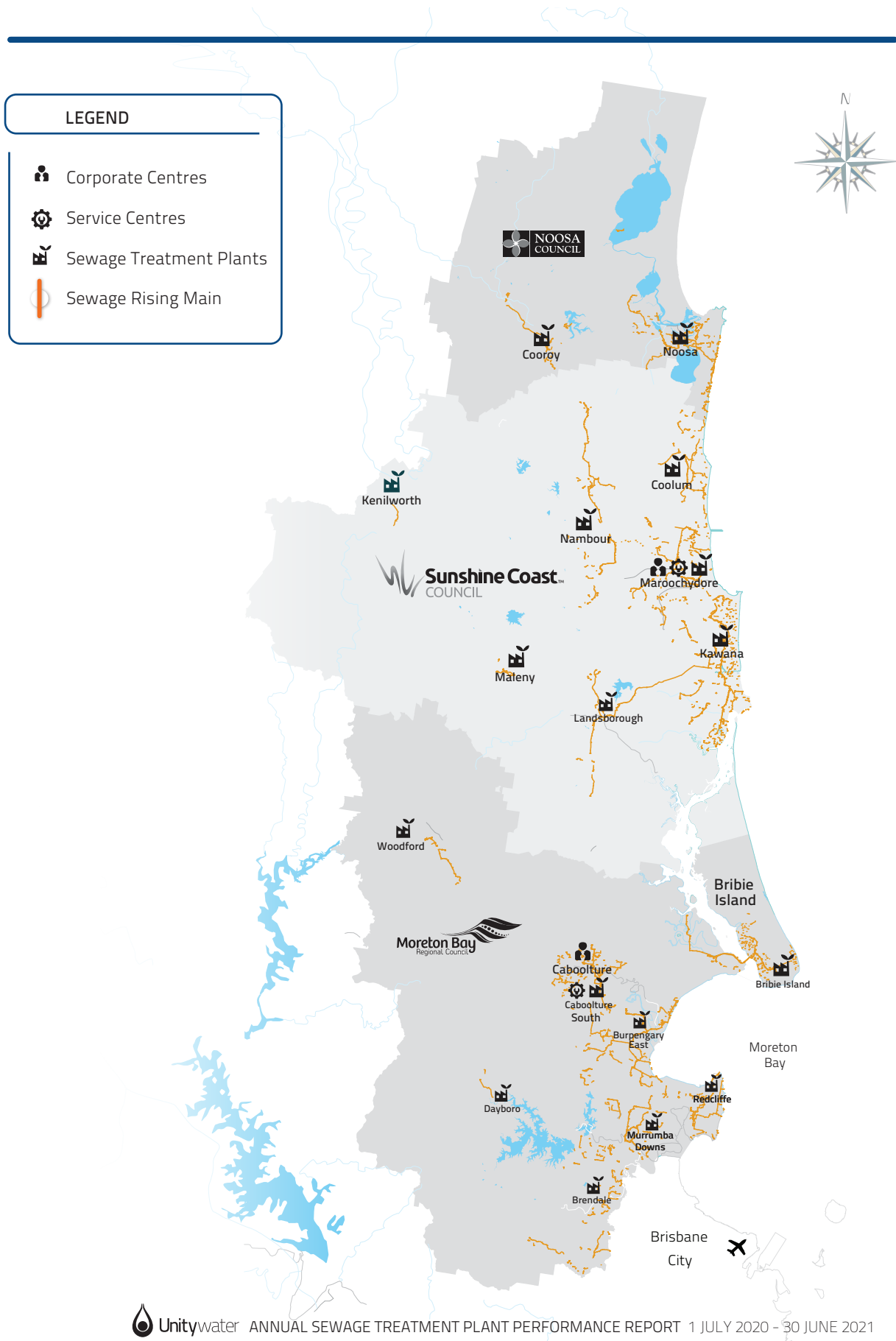
I trust the information in this report demonstrates our strong track record and commitment to quality sewage treatment.



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George Theo  
Chief Executive Officer

# Our supply area



# 1. Introduction

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## Unitywater supplies more than 826,645 people across 5,223 square kilometers 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        | ➤ Kawana         | ➤ Nambour                   |
| ➤ Burpengary East | ➤ Kenilworth     | ➤ Noosa                     |
| ➤ Bribie Island   | ➤ Landsborough   | ➤ Redcliffe                 |
| ➤ Coolum          | ➤ Maleny         | ➤ South Caboolture          |
| ➤ Cooroy          | ➤ Maroochydore   | ➤ Suncoast (decommissioned) |
| ➤ Dayboro         | ➤ Murrumba Downs | ➤ 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 Mass load releases

Graphs of mass loads released from sites with load discharge limits to the environment are shown below for information purposes. All treatment plants are within their mass load limits and are licence compliant.

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 affect 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 decline in the community's use of phosphate containing detergents.



Figure 1 – STP with Mass Licence – Total Nitrogen

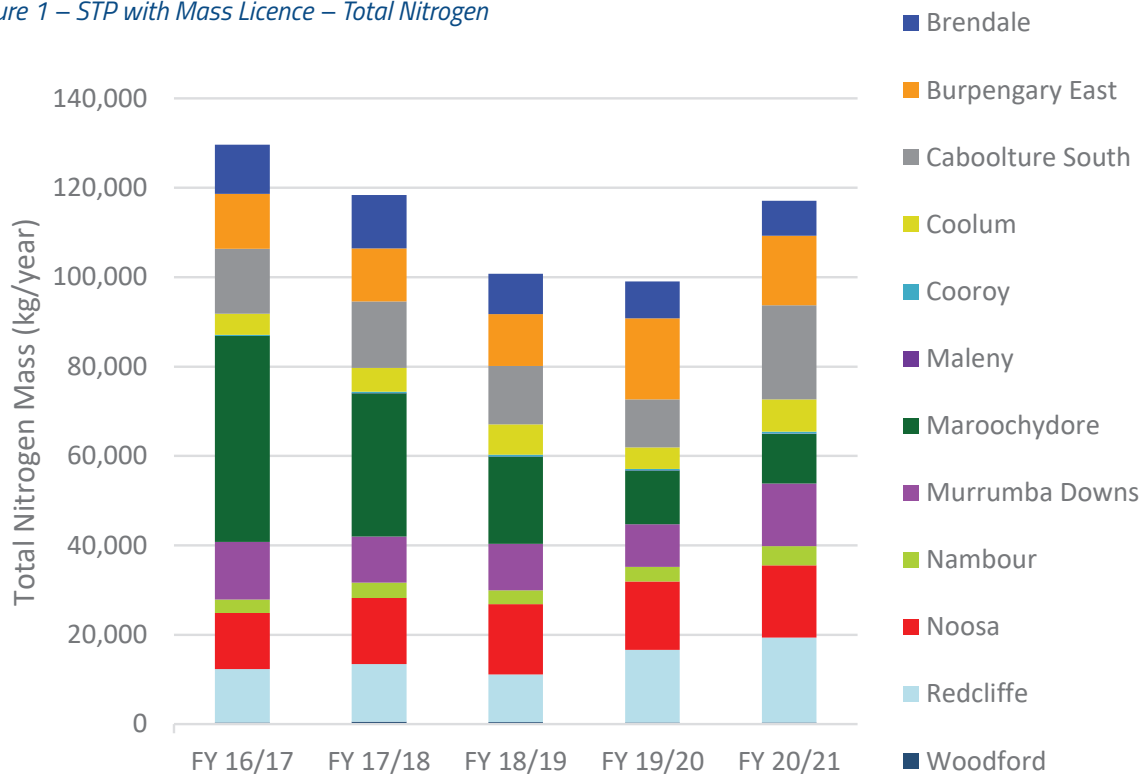
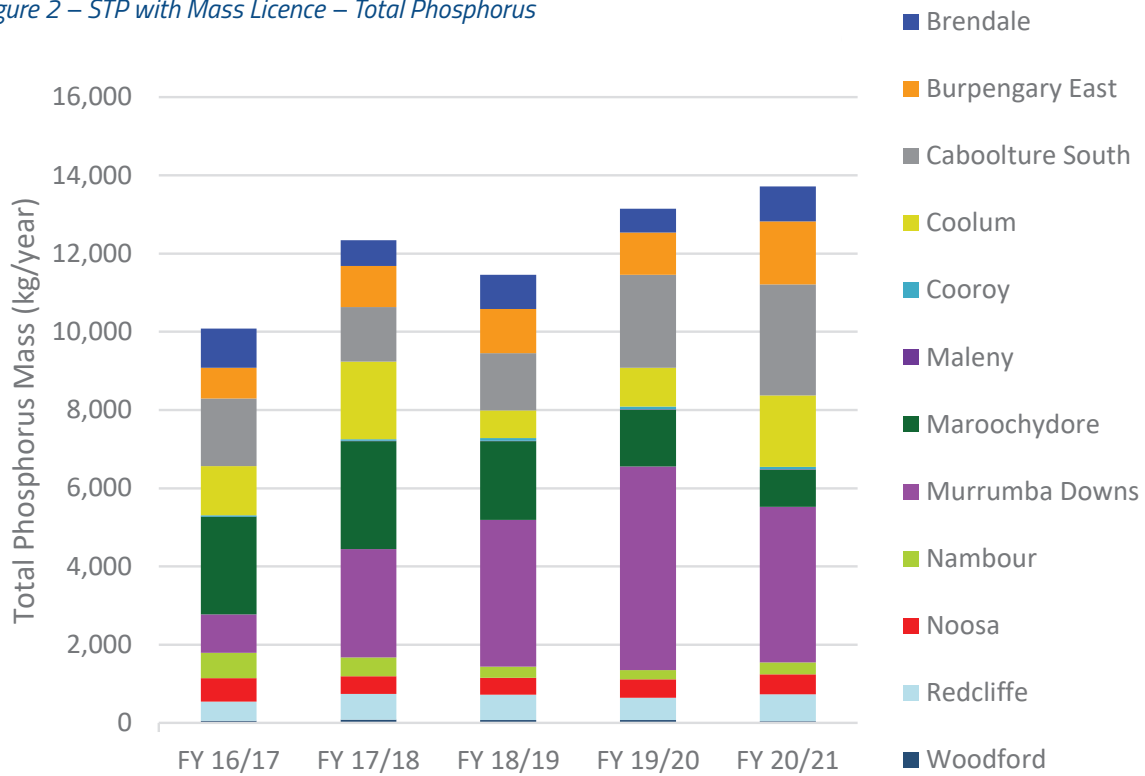


Figure 1 shows:

- Maroochydore STP nitrogen levels have decreased due to renewals of equipment to improve plant performance as well as diversion of sewage as part of the Kawana STP upgrade.
- South Caboolture STP nitrogen levels have increased due to the effects of an accumulation of sludge affecting the availability of downstream nutrient removal processes. Cleaning activities could not occur until the end of the wet season. Nutrient discharge remains within mass licence limits.
- Murrumba Downs STP nitrogen levels have increased due to balance tank renewal works.
- Redcliffe STP nitrogen levels have increased slightly due to upgrade works.
- Coolum STP is nearing its capacity limits and hence nitrogen levels are up but within licence limits. Unitywater is currently in the planning phase of upgrading the biological nutrient reduction process.

Figure 2 – STP with Mass Licence – Total Phosphorus



It is worth noting the changes in effluent quality due to Unitywater’s continued optimisation, renewal and upgrade activities.

- Burpengary East STP phosphorus mass load increased from FY19/20 to FY20/21. The plant is approaching its design capacity and planning is currently underway for a plant upgrade due for completion in 2024.
- Murrumba Downs STP’s effluent phosphorus mass load has reduced due to improved biosolids dewatering performance and reduced solids return (due to the use of liquid polymer since October 2020).
- Maroochydore STP phosphorus levels decreased due to better performance from asset renewals and the Kawana diversion.
- At South Caboolture STP sludge accumulation affected plant performance which has been addressed via cleaning activities.
- Phosphorus levels at Coolum STP are increasing as the plant nears capacity.

The impacts of the remaining nutrients discharged after sewage treatment is balanced with the ongoing work to seek alternative avenues to assist with improving the quality of receiving waterways. One of Unitywater's objectives is to reduce our operational impacts on the surrounding environment. We do this through offsetting solutions and diverting nutrients through recycled water solutions.

We set both long term and short term targets as detailed in the table below. Unitywater's program of nutrient diversion and offsetting initiatives for 2020-21 as detailed in the table below shows that we are already hitting and going beyond short-term targets.

#### *Sustainability Pillar: Waterway health*

Sustainability Goals	Total Nitrogen offset or diverted from waterways (Tonnes)	Total Phosphorus or diverted from waterways (Tonnes)
<b>Long Term Goal: Net zero nutrients to waterways by 2050</b> (baseline of 2019-20)	100	13
<b>Interim targets by 2025-26*</b> (baseline of 2019-20)	6.0	0.78
<b>Sustainability Achievements for 2020-21</b>		
<b>Nutrients offset from Yandina Creek Wetland</b> Unitywater is transforming a former cane farm into an estuarine wetland and using natural wetland processes to remove nutrients and sediments from the waterway.	5.3	0.3
<b>Nutrients offset from Bellmere Caboolture</b> Unitywater has stabilised a 250 metre section of eroding riverbank preventing over 2,000 cubic metres of soil being washed into the river.	1.5	0.8
<b>Nutrients diverted from waterways via recycled water use</b> Unitywater supplies fit-for-purpose recycled water to a range of customers across its service region, including sportfields, golf courses and turf farms.	3.1	0.3
<b>Total nutrients offset or diverted from waterways in 2020-21</b>	<b>9.9</b>	<b>1.4</b>

\* Targets will be reset over the course of the next 12 months.

## 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 2020–21 financial year, Unitywater achieved 98% quality and quantity compliance for effluent discharged from its sewage treatment plants against overall effluent standards. The internal Unitywater compliance target is 99%. This is a calculated target used to give an indication of performance. DES allows fluctuations in effluent quality parameters (DEHP, 2014) and therefore the 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.

*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	39,962	BNR <sup>1</sup>	✓			100%
Bribie Island	26,710	Biological nitrogen removal and chemical phosphorus removal			✓	100%
Burpengary East	57,363	BNR	✓			100%
Coolum	33,461	BNR	✓			99.9%
Cooroy	8,615	BNR	✓		✓	99.5%
Dayboro	1,036	Biological nitrogen removal			✓	98.8%
Kawana	157,169	Biological nitrogen removal	✓	✓		93.2% <sup>3</sup>
Kenilworth	469	Oxidation Pond	✓		✓	98.2%
Landsborough <sup>2</sup>	12,145	BNR	✓	✓		100%
Maleny	2,461	Biological nitrogen removal and chemical phosphorus removal	✓		✓	100%
Maroochydore	91,615	BNR	✓			96.3%
Murrumba Downs	142,152	BNR	✓			99.9%
Nambour	47,265	BNR	✓			100%
Noosa	48,574	BNR	✓			100%
Redcliffe	63,955	BNR		✓		100%
South Caboolture	70,578	BNR	✓			96.9%
Woodford	2,453	Biological nitrogen removal and chemical phosphorus removal	✓			99.9%
		Overall Compliance (Unitywater target is 99%)				98.0%

- 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

JULY 2020 – JUNE 2021

Note that the release parameters often differ from plant to plant (e.g. Brendale STP has mass load limits and 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.

### 3.1 Brendale Sewage Treatment Plant

Table 2 - 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	✓
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	✓

Table 3 – 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	✓

## 3.2 Bribie Island Sewage Treatment Plant

Table 4 – Bribie Island STP Contaminant Release Targets

Parameter	Unit	Number of Samples	Target Type	Compliant
BOD	mg/L	53	long term 80th percentile	✓
			short term 80th percentile	✓
			maximum	✓
TSS	mg/L	53	long term 80th percentile	✓
			short term 80th percentile	✓
			maximum	✓
pH	pH units	53	range	✓*
DO	mg/L	53	minimum	✓
TN	mg/L	53	long term 50th percentile	✓
			short term 50th percentile	✓
			maximum	✓**
TP	mg/L	53	long term 50th percentile	✓
			short term 50th percentile	✓
			maximum	✓

\* pH was outside of the compliance range one time. Please refer to the next page for further details.

\*\* TN maximum was outside of the compliance range twice. Please refer to the next page for further details.

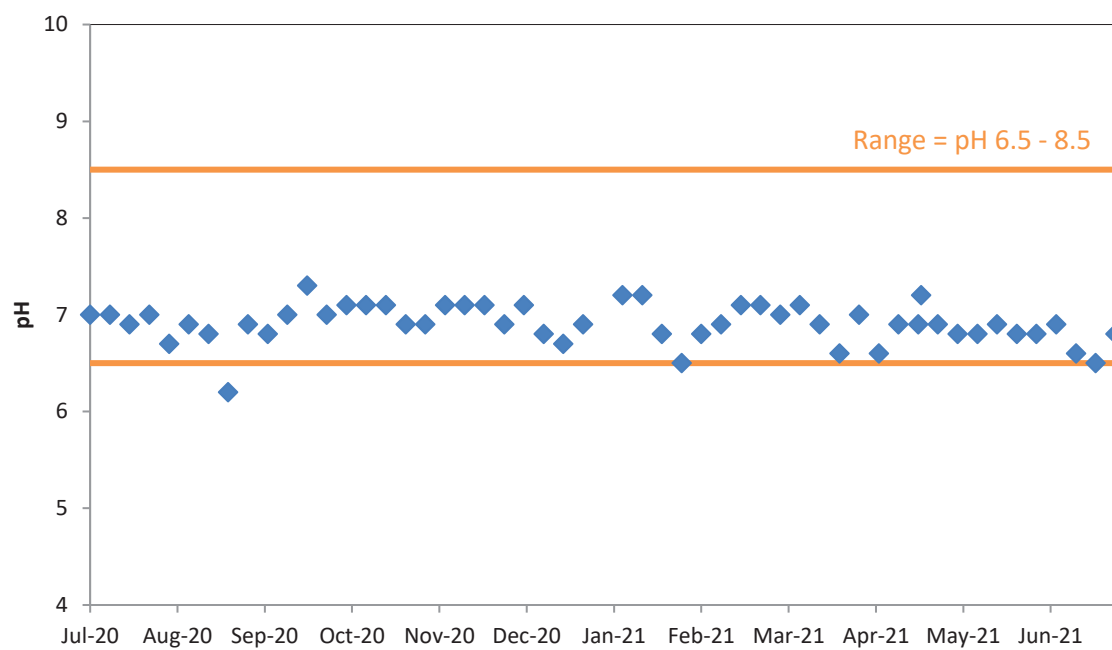
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*Exceedances*

**pH**

pH was outside the required range once at Bribie Island Sewage Treatment Plant. STP equipment and processes were within normal ranges during this period, therefore in all likelihood this exceedance is believed to be due to a sampling or analysis error. Overall 98% compliance in pH targets was achieved.

*Figure 3 – Bribie Island STP – pH– Minimum*

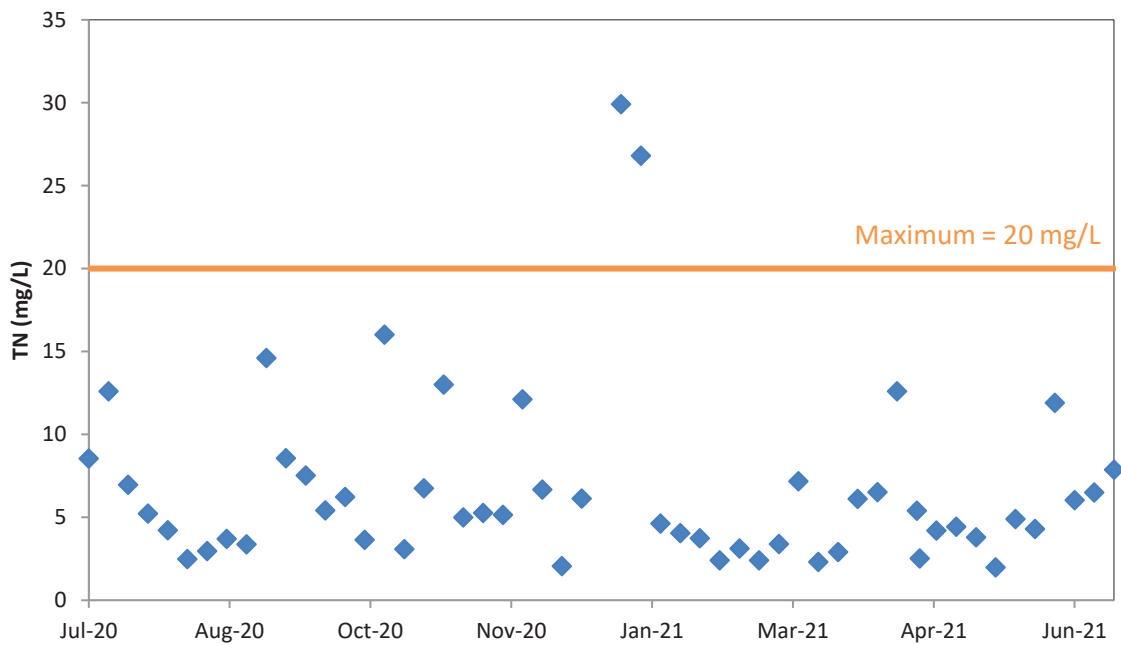


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### Total Nitrogen

Total Nitrogen Maximum was exceeded twice at Bribie Island Sewage Treatment Plant. These occurred during a peak holiday load. This issue will be resolved by the upgrade of the Bribie Island STP aeration system which is currently in the planning stage. Overall 96% compliance with the Total Nitrogen Maximum limit was achieved.

Figure 4 – Bribie Island STP – Total Nitrogen – Maximum





### 3.3 Burpengary East Sewage Treatment Plant

Table 5 – 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	✓
			80th percentile	✓

Table 6 – Burpengary East 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	✓

### 3.4 Coolum Sewage Treatment Plant

Table 7 – Coolum STP Release Targets

Parameter	Unit	Number of Samples	Target Type	Compliant
BOD	mg/L	51	long term 80th percentile	✓
			short term 80th percentile	✓
			maximum	✓
TSS	mg/L	51	long term 80th percentile	✓
			short term 80th percentile	✓
			maximum	✓
pH	pH units	51	range	✓
DO	mg/L	51	minimum	✓
NH <sub>3</sub> -N	mg/L	51	long term 50th percentile	✓
			maximum	✓*
Free Chlorine Residual	mg/L	51	maximum	✓
Faecal Coliforms	cfu/100 mL	51	median	✓
			80th percentile	✓

\*Ammonia maximum was exceeded once. Please refer to the next page for further details.

Table 8 – Coolum STP Mass Limits

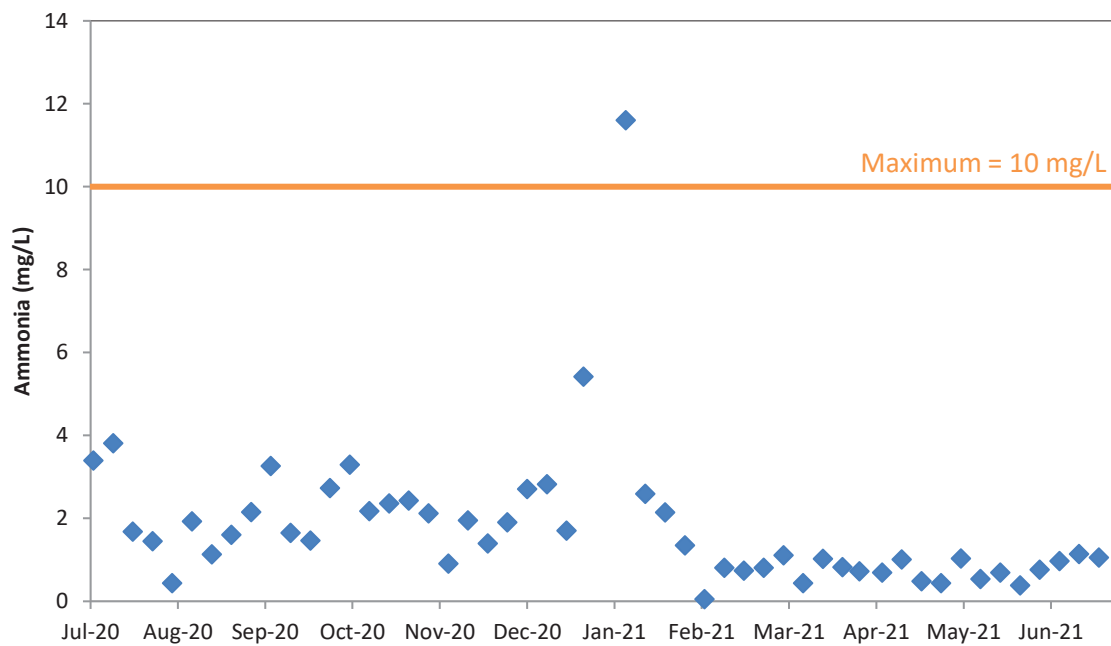
Parameter	Unit	Number of Days	Limit Type	Compliant
Average Annual Flow	ML/yr	365	maximum	✓
Nitrogen Mass Load	kg/yr	-	maximum	✓
Phosphorus Mass Load	kg/yr	-	maximum	✓

*Exceedances*

**AMMONIA**

Ammonia Maximum was exceeded once at Coolum Sewage Treatment Plant. This occurred during a peak school holiday load. This issue will be resolved by the upgrade of the Coolum STP which is currently in the planning stage. Overall 98% compliance with the Ammonia Maximum limit was achieved.

*Figure 5 – Coolum STP – Ammonia – Maximum*



### 3.5 Cooroy Sewage Treatment Plant

Table 9 – 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	✓*
TP	mg/L	52	long term 50th percentile	✓
			maximum	✓
Intestinal Enterococci	mg/L	52	long term 50th percentile	✓
			maximum	✓

\* Total Nitrogen maximum was exceeded. Please refer to the next page for further details.

Table 10 – Cooroy STP Mass Limits

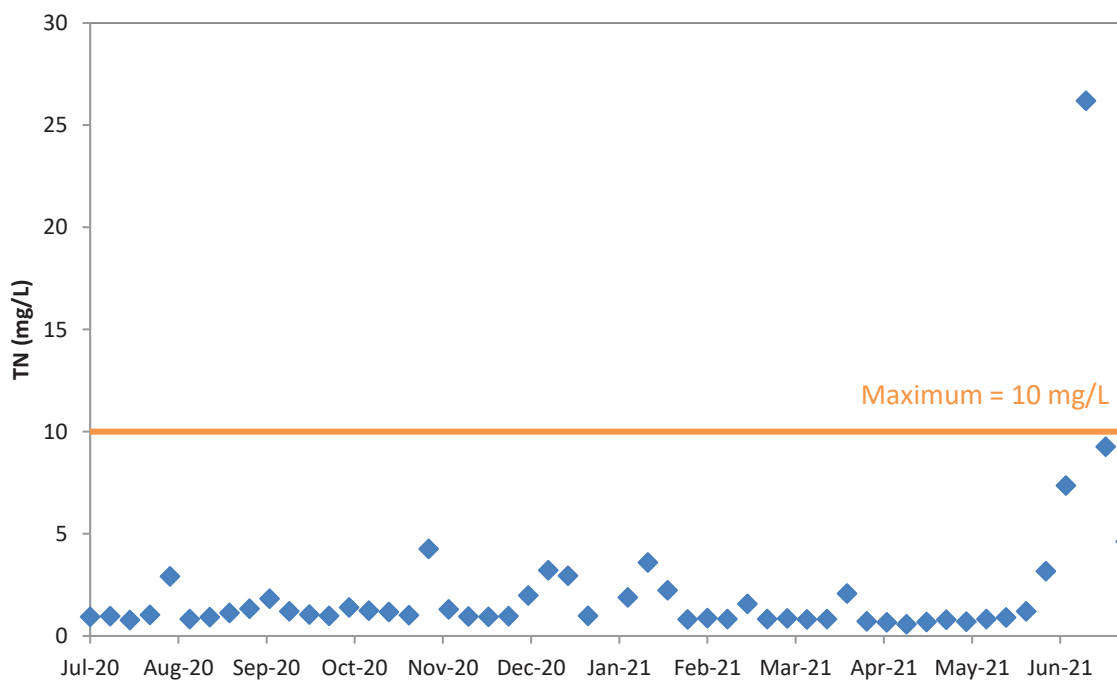
Parameter	Unit	Limit Type	Compliant
Nitrogen Mass Load	kg/yr	maximum	✓
Phosphorus Mass Load	kg/yr	maximum	✓

*Exceedances*

**TOTAL NITROGEN**

Total Nitrogen Maximum was exceeded once at Cooroy Sewage Treatment Plant. This was caused by a communication system failure across most of the site which impacted the nutrient removal process. The fault was promptly repaired. Overall 98% compliance with the Total Nitrogen Maximum limit was achieved.

*Figure 6 – Cooroy STP – Total Nitrogen – Maximum*



### 3.6 Dayboro Sewage Treatment Plant

Table 11 – 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 <sub>3</sub> -N	mg/L	12	50th percentile	✓
			maximum	✓*
<i>E. coli</i>	mg/L	60	median	✗**
			80th percentile	✗**

\* Maximum Ammonia was exceeded twice. Please refer to the next page for further details.

\*\* Median *E. coli* and 80th Percentile *E. coli* were each exceeded three times. Please refer to the next page for further details.

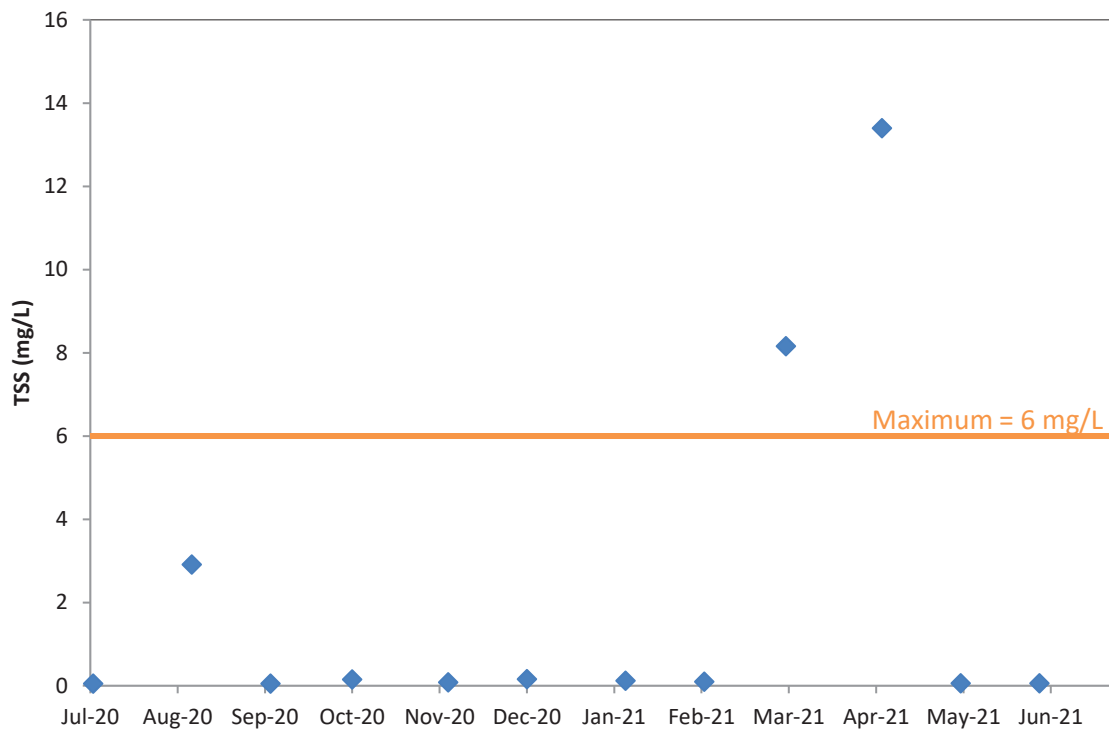
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*Exceedances*

**AMMONIA**

Maximum Ammonia was exceeded at Dayboro Sewage Treatment Plant twice. This was due to aeration system faults that were rectified promptly after detection. There is no risk to the environment nor the community because effluent is diluted in a large effluent storage dam and then disposed of via on-site land irrigation.

*Figure 7 – Dayboro STP – Ammonia – Maximum*



## E. COLI

Target Median *E. coli* and 80th Percentile *E. coli* were each exceeded at Dayboro Sewage Treatment Plant three times. The plant relies on sunlight to naturally disinfect the effluent prior to on-site irrigation. Hence, disinfection performance is impacted by lack of sunlight (i.e. during wet weather days) and algae present in the effluent storage dam (excessive algae prevents sunlight from penetrating the water column). 77% compliance with the *E. coli* median was achieved, matching the 2019–20 result. Overall 77% compliance with *E. coli* 80th Percentile limits were achieved. There is no risk to the environment nor the community due to reduced disinfection performance because effluent is disposed of via on-site land irrigation.

Figure 8 – Dayboro STP – *E. coli* – Median

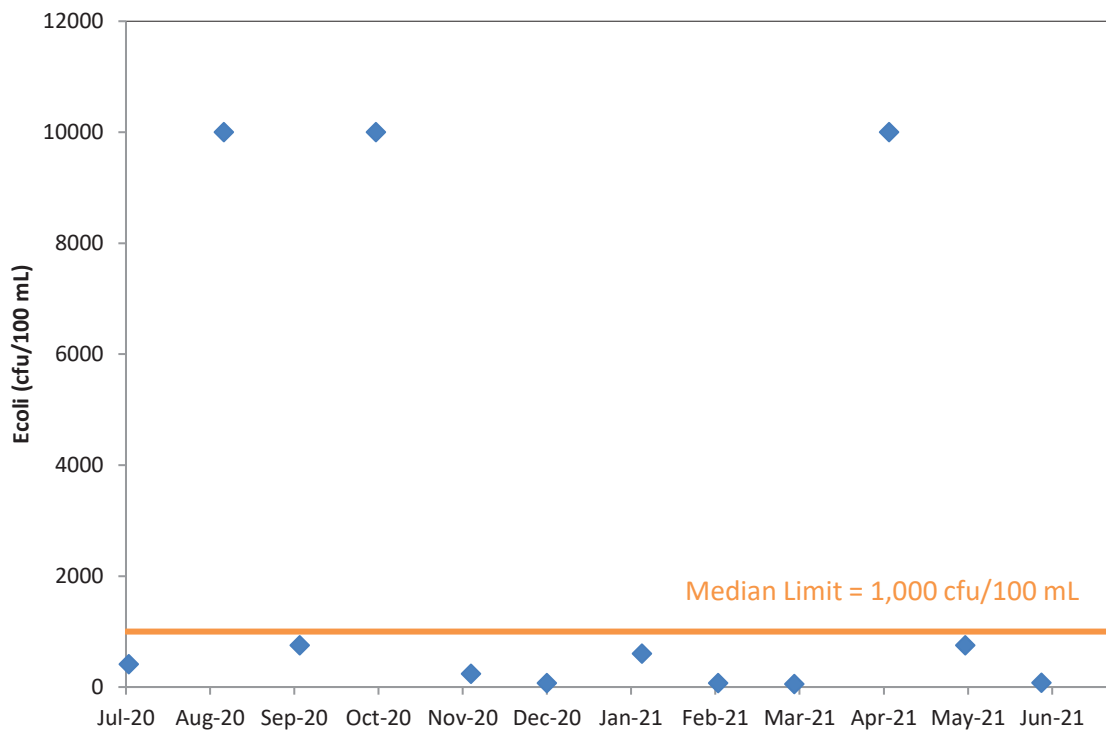
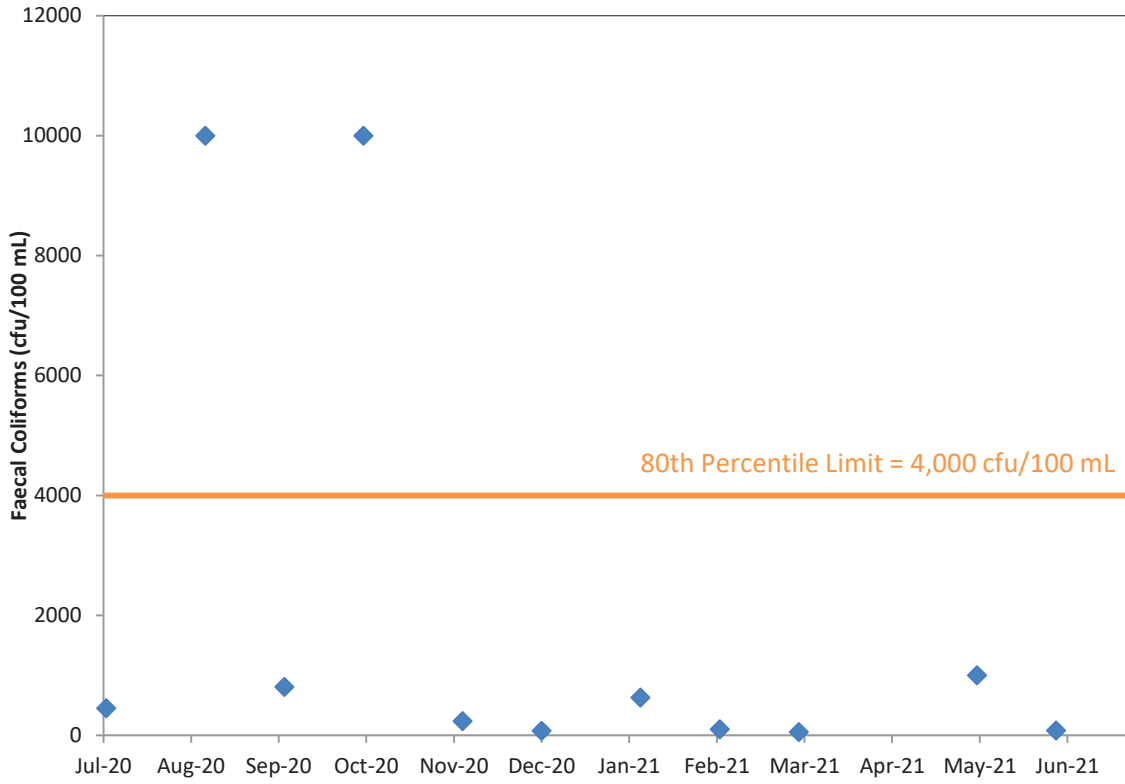




Figure 9 – Dayboro STP – E. coli – 80th Percentile



### 3.7 Kawana-Landsborough Sewage Treatment Plants

Table 12 – Kawana-Landsborough STP Release Targets<sup>^</sup>

Parameter	Unit	Number of Samples	Target Type	Compliant
BOD	mg/L	51	long term 80th percentile	✓
			maximum	✓
TSS	mg/L	51	long term 80th percentile	✓
			maximum	✓
pH	pH units	51	range	✓
DO	mg/L	51	minimum	✓
NH <sub>3</sub> -N	mg/L	51	long term 50th percentile	✓
			maximum	✓
Free Chlorine Residual	mg/L	51	maximum	✓
Faecal Coliforms	cfu/100 mL	51	median	✓
			80th percentile	✓

<sup>^</sup> Note that effluent to the main outfall contains flow from both Kawana and Landsborough Sewage Treatment Plants.

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 has applied for an amendment for the environmental authority and hence the definition and data considered in the definition of a dry weather day is under review.

### 3.8 Kenilworth Sewage Treatment Plant

Table 13 – Kenilworth STP Release Targets<sup>^</sup>

Parameter	Unit	Number of Samples	Target Type	Compliant
BOD	mg/L	53	long term 80th percentile	✓
			short term 80th percentile	✓
			maximum	✓
TSS	mg/L	53	long term 80th percentile	✓
			short term 80th percentile	✓
			maximum	✓
pH	pH units	53	range	✓*
DO	mg/L	53	minimum	✓
Conductivity	µs/cm	53	long term 50th percentile	✓
			maximum	✓
Faecal Coliforms	cfu/100 mL	53	median	✓
			80th percentile	✓

<sup>^</sup> Note that no discharge to the nearby creek was released from Kenilworth Sewage Treatment Plant (i.e. treated effluent was released to the disposal area). Thus discharge to waters limits are not assessed and therefore 100% compliance with release to waters limits was attained.

\* pH limits for discharge to land were exceeded twelve times. Please refer to the next page for further details.

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*Non-Compliance*

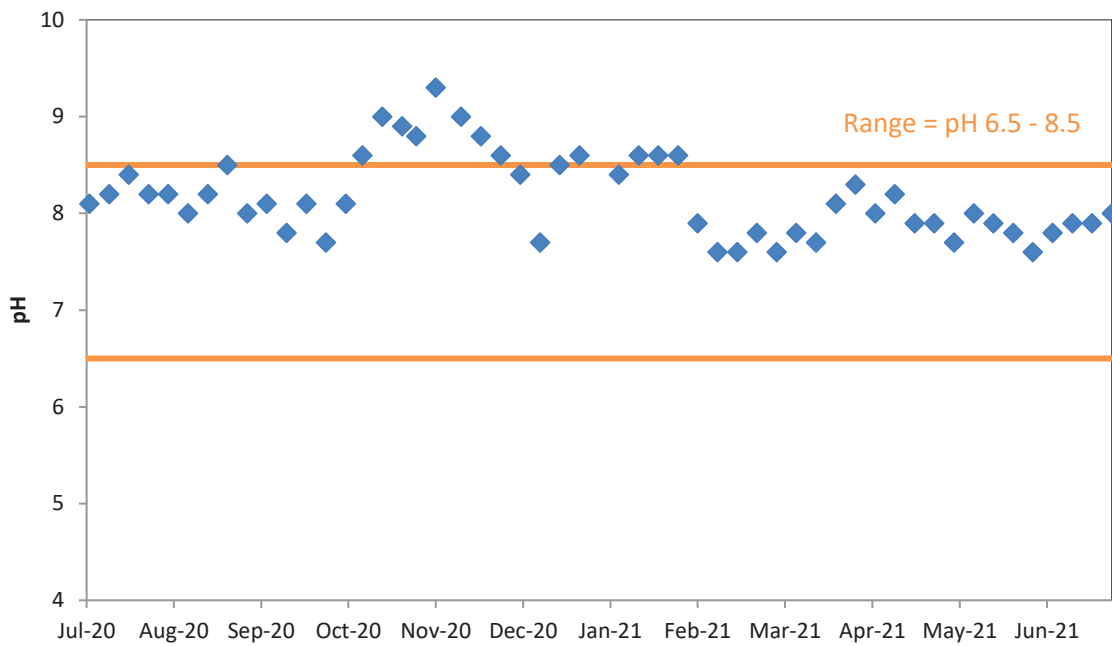
**PH**

The pH limit was exceeded twelve times due to the impacts of algae in the facultative treatment lagoons. The original licence for the plant did not include a pH limit and hence the plant was not designed with pH control.

Unitywater trialled an algicide from April to June 2021. Unfortunately, the product's effectiveness was impacted by wet weather and the trial determined that the required daily dosage was significant. As a result, Unitywater is currently in the process of seeking tenders for a chemical pH correction system. Once installed, pH will reduce to within the required range. The system is expected to be commissioned by March 2022.

Overall 77% compliance with the pH limits were achieved.

*Figure 10 – Kenilworth STP – pH*



### 3.9 Maleny Sewage Treatment Plant

Table 14 – Maleny STP Release Targets to Constructed Wetlands

Parameter	Unit	Number of Samples ^	Target Type	Compliant
TSS	mg/L	51	long term 80th percentile	✓
			short term 80th percentile	✓
pH	pH units	51	range	✓
DO	mg/L	51	minimum	✓
TN	mg/L	51	long term 50th percentile	✓
TP	mg/L	51	long term 50th percentile	✓
<i>E. coli</i>	cfu/100mL	51	median	✓

Table 15 – Maleny STP Release Targets to Forest Irrigation

Parameter	Unit	Number of Samples ^	Limit Type	Compliant
pH	pH units	51	range	✓
Electrical Conductivity	µs/cm	51	maximum	✓
TN	mg/L	51	maximum	✓
TP	mg/L	51	maximum	✓
<i>E. coli</i>	cfu/100 mL	51	median	✓

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

### 3.10 Maroochydore Sewage Treatment Plant

Table 16 – Maroochydore STP Release Targets

Parameter	Unit	Number of Samples	Target Type	Compliant
Faecal Coliforms	cfu/100 mL	51	median	✓
			80th percentile	✓

Table 17 – Maroochydore STP Mass Limits

Parameter	Unit	Number of Samples	Limit Type	Compliant
Average Annual Flow	ML/yr	365	maximum	✓
Nitrogen Mass Load	kg/yr	51	maximum	✓
Phosphorus Mass Load	kg/yr	51	maximum	✓

### 3.11 Murrumba Downs Sewage Treatment Plant

Table 18 – 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	✓
			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	✓
Faecal Coliforms	cfu/100 mL	260	median	✓
			80th percentile	✓

\* Maximum TSS was exceeded once. Please refer to the next page for further details.

Table 19 – Murrumba Downs STP Volumetric Limits

Parameter	Unit	Number of Samples	Limit Type	Compliant
Dry Weather Flow	ML/d	255	maximum	✓
			average	✓
Volumetric Release	ML/d	365	maximum on any one day	✓

Table 20 – 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	✓



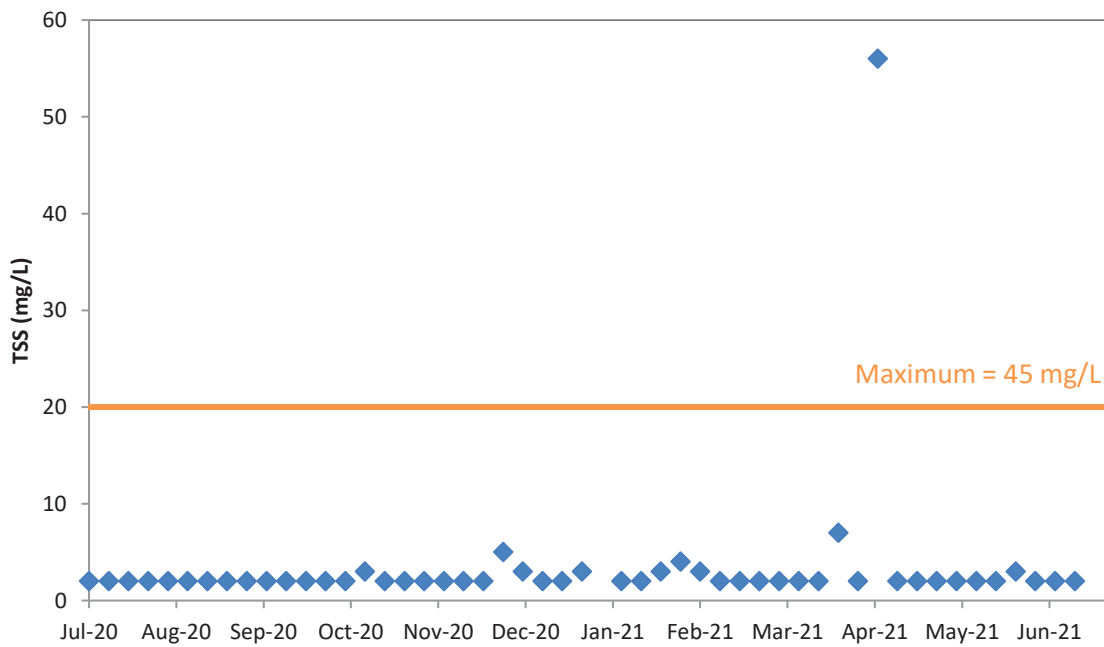
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*Exceedances*

**TSS**

A short duration of non-compliance was due to extreme wet weather. Due to significant rainfall, the plant experienced high inflow of 125ML compared to the Average Dry Weather Flow of 24ML/day. 98% compliance was attained for Maximum TSS.

*Figure 11 – Murrumba Downs STP – TSS – Maximum*



### 3.12 Nambour Sewage Treatment Plant

Table 21 – Nambour STP Release Targets

Parameter	Unit	Number of Samples	Target Type	Compliant
TSS	mg/L	51	long term 80th percentile	✓
			short term 80th percentile	✓
			maximum	✓
pH	pH units	51	range	✓
DO	mg/L	51	minimum	✓
NH <sub>3</sub> -N	mg/L	51	long term 50th percentile	✓
			maximum	✓
TN	mg/L	51	long term 50th percentile	✓
TP	mg/L	51	long term 50th percentile	✓
Faecal Coliforms	cfu/100 mL	51	median	✓
			80th percentile	✓

### 3.13 Noosa Sewage Treatment Plant

Table 22 – Noosa STP Release Targets

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

Table 23 – 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 24 – 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	265	median	✓
			80th percentile	✓

Table 25 – 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	✓

### 3.15 South Caboolture Sewage Treatment Plant

Table 26 – 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	✓*
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	✓****
			80th percentile	✓

\* BOD maximum was exceeded once. Please refer to the next page for further details.

\*\* TSS Long term 80th Percentile was exceeded 8 times, Short term 80th Percentile was exceeded 27 times and TSS Maximum was exceeded twice. Please refer to the next page for further details.

\*\*\* Free Chlorine Residual maximum was exceeded twice. Please refer to the next page for further details.

\*\*\*\* There was a single Faecal Coliform exceedance on 24th March 2021 due to high inflow attributable to 226mm of rainfall received in the South Caboolture catchment.

Table 27 – 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	✓

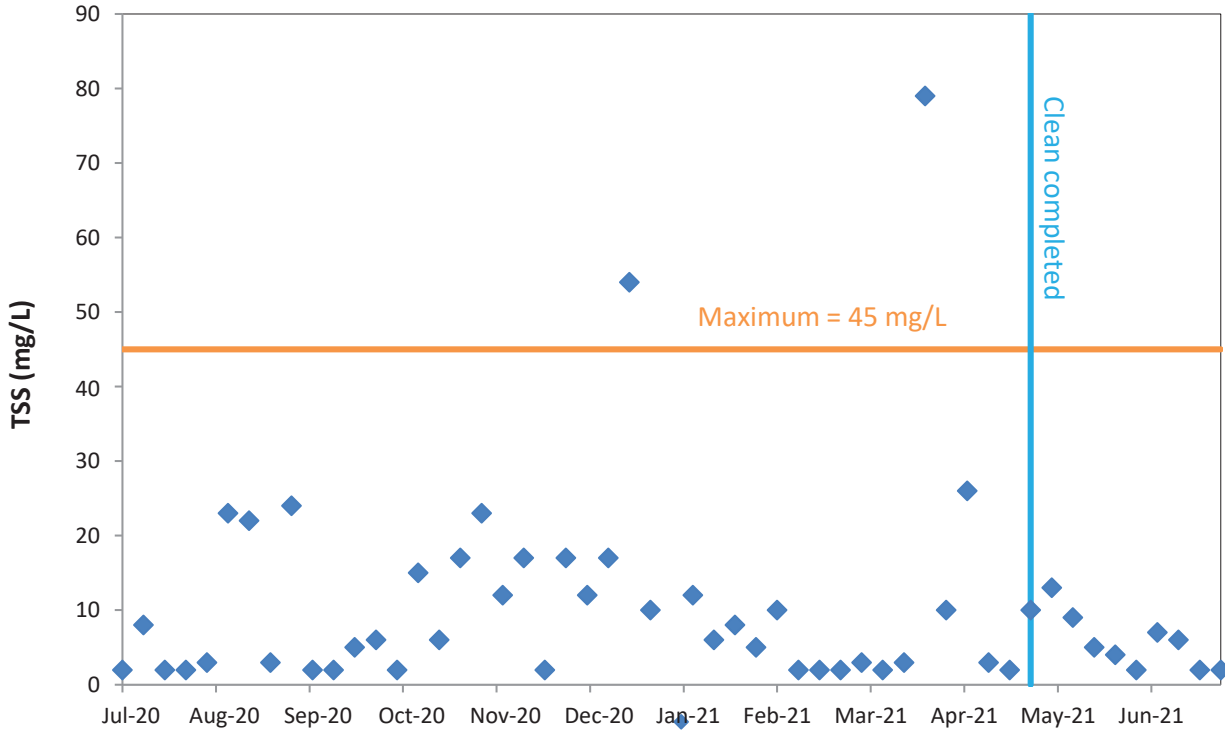
Exceedances

TSS

TSS Long term 80th Percentile was exceeded 8 times, Short term 80th Percentile was exceeded 27 times and TSS Maximum was exceeded twice. South Caboolture Sewage Treatment Plant experienced a build up of solids in a flat floored flow balancing tank over a period of approximately 10 years. Solids reached a level where they began to release to downstream processes. This was identified immediately prior to the wet season. Cleaning utilising traditional methods could not occur until after the wet season, as taking the affected tank offline would reduce plant operational capacity by 50%.

In a first for Unitywater, a remote controlled robotic submersible dredge was utilised to perform the required cleaning. The affected tank was cleaned by the end of April 2021 allowing downstream filtration to be fully recommissioned to improve TSS performance without needing to take the tank off line. As can be seen from the TSS Maximum graph, since the cleaning TSS results have been below all licence limits, however due to the calculation method of the long term 80th Percentile, non-compliance will be observed for this parameter until at least August 2021.

Figure 12 – South Caboolture STP – TSS – Maximum



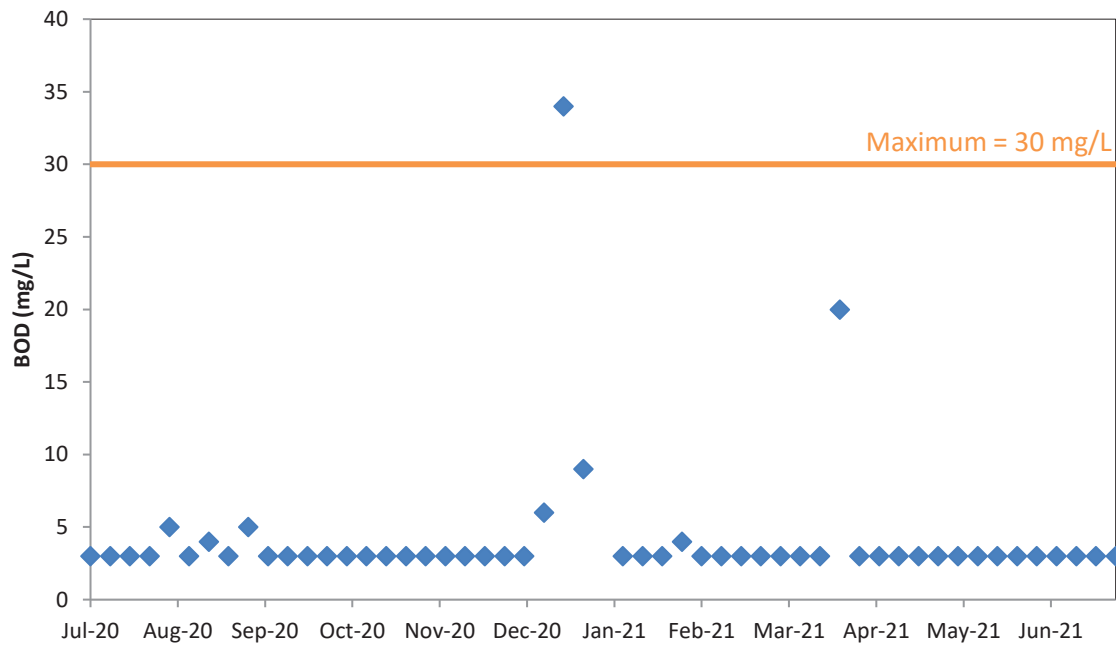


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## BOD

BOD Maximum was exceeded once at South Caboolture Sewage Treatment Plant. Wet weather bypass affected the sample resulting in BOD maximum non compliance. Overall 98% compliance with BOD Maximum limits was achieved.

Figure 15 – South Caboolture STP – BOD – Maximum

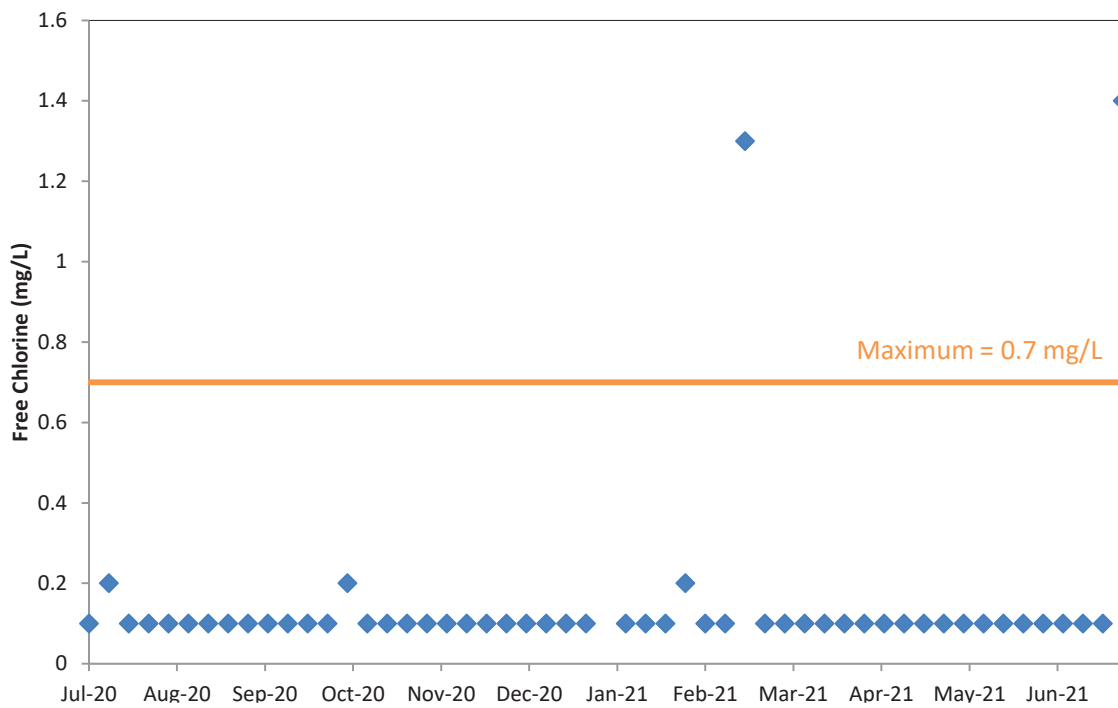


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## FREE CHLORINE

Free Chlorine Maximum was exceeded twice at South Caboolture Sewage Treatment Plant. Additional manual operator water testing has been implemented to support the existing use of online chlorine residual instrumentation to improve dosage reliability. Overall 96% compliance with Free Chlorine Maximum was achieved.

Figure 16 – South Caboolture STP – Free Chlorine – Maximum





### 3.16 Woodford Sewage Treatment Plant

Table 28 – Woodford STP Release Targets

Parameter	Unit	Number of Samples	Target Type	Compliant
BOD	mg/L	53	long term 80th percentile	✓
			short term 80th percentile	✓
			maximum	✓
TSS	mg/L	53	long term 80th percentile	✓
			short term 80th percentile	✓
			maximum	✓
pH	pH units	53	range	✓
DO	mg/L	53	minimum	✓
Free Chlorine Residual	mg/L	53	maximum	✓*
Faecal Coliforms	cfu/100 mL	265	median	✓
			80th percentile	✓

\* Free Chlorine Residual Maximum was exceeded once.  
Please refer to the next page for further details.

Table 29 – Woodford STP Mass Limits

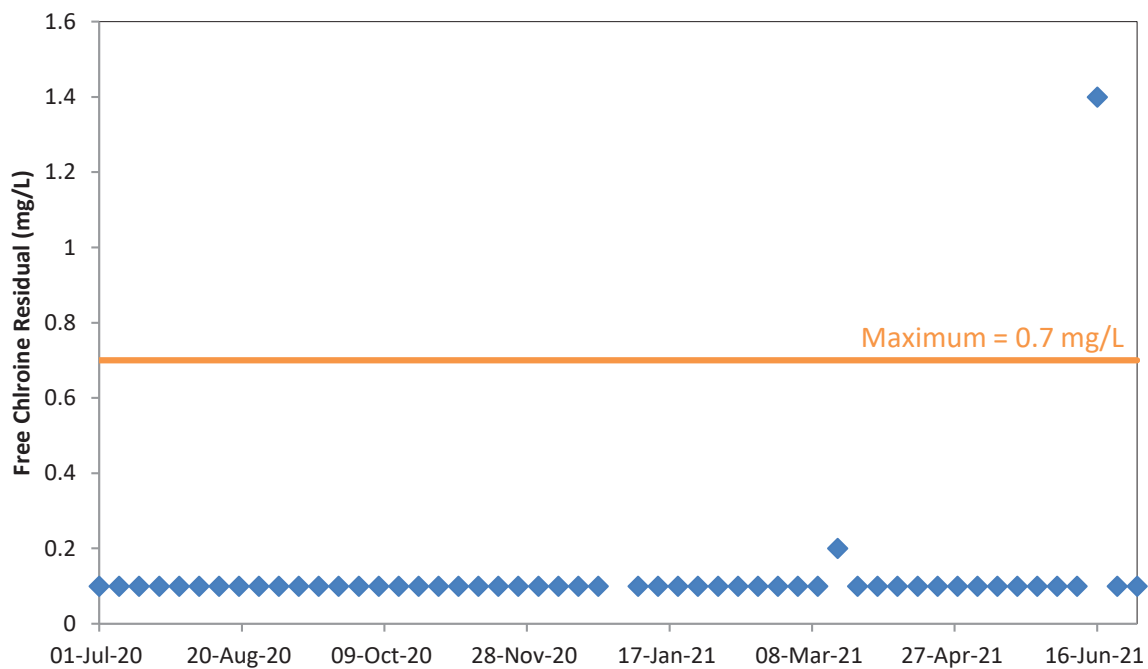
Parameter	Unit	Number of Samples	Limit Type	Compliant
Average Annual Flow	ML/yr	365	maximum	✓
Nitrogen Mass Load	kg/yr	-	maximum	✓
Phosphorus Mass Load	kg/yr	-	maximum	✓

*Exceedances*

**FREE CHLORINE**

Free Chlorine Maximum was exceeded once at Woodford Sewage Treatment Plant. Liquid chlorine effectiveness decreased with time, therefore requiring increasing dose rate to achieve the same result. This non compliance was due to newly delivered chlorine load being received before a sample was taken, where the dosing rate had not yet been lowered to accommodate the increased strength. A procedure has been implemented to prevent reoccurrence. Overall 98% compliance with Free Chlorine Maximum was achieved.

*Figure 17 – Woodford STP – TSS – Free Chlorine Residual Maximum*



## 4. Definitions and Legend

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

*Table 30 – Acronyms and Definitions*

Acronym	Term	Definition
<b>BOD</b>	biochemical oxygen demand after 5 day test	The amount of dissolved oxygen needed by aerobic organisms to break down organic material.
<b>BNR</b>	biological nutrient removal	A biological process used for nitrogen and phosphorous removal from sewage.
<b>DES</b>	Department of Environment and Science	
<b>DO</b>	dissolved oxygen	Gaseous oxygen that is mixed in water and is available to aquatic organisms for respiration.
<b><i>E. coli</i></b>	<i>Escherichia coli</i>	Used as an indicator of pathogenic organisms that may cause diseases.
<b>IDEA</b>	intermittent decanted extended aeration	A three stage wastewater treatment process that involves aeration, settling and decanting.
<b>NH<sub>3</sub> – N</b>	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.
<b>SBR</b>	sequential batch reactors	A draw-and-fill biological treatment process that uses aerobic microorganisms to break down and treat wastewater.
<b>TN</b>	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.
<b>TP</b>	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.
<b>TSS</b>	total suspended solids	Total amount of solid particles that remain suspended within the wastewater.
<b>UV</b>	ultraviolet	A technology using radiation that disinfects wastewater.
	faecal coliform	Used as an indicator of pathogenic organisms that may cause diseases.
<b>pH</b>		A figure expressing the acidity or alkalinity of the water

Table 31 – Definition of Units

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

Table 32 – Legend

Symbol	Compliance value
✓	> 90%
✓	80% - 90%
✗	< 80%



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