Mackay Regional Council

Sarina Water Recycling Facility EPBC Report

2020 – 2021 Financial Year

GRIT SLURRY
PU-230-10
GRIT PUMP

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1 - INTRODUCTION

This is the 2020-2021 financial year (FY) report for the Sarina Water Recycling Facility (SWRF).
This report has been prepared by Mackay Regional Council (council) to meet the requirements of EPBC Approval 2011/6005 Condition 9.

2 - BACKGROUND

The SWRF is a biological nutrient removal membrane bioreactor plant. The plant design capacity is 8000 Equivalent Persons (EP), however the current loading is around 3000 EP. The plant is owned and operated by council.

The plant was designed and built by TS SKM JV (a joint venture comprising Transfield Services and SKM). Construction of the plant commenced on February 4, 2013. The first inflow into the plant was on August 1, 2014. The plant was handed over to council on November 14, 2014.

Treated effluent from the SWRF can be discharged from site in two ways:

1. Direct discharge to Plane Creek
2. Transfer to the following recycled water users:
   - Sarina Golf Club for irrigation of the ground
   - A local farmer for irrigation of vegetation on the farmer's property.

The construction and operation of the SWRF was deemed a controlled action under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to the potential for adverse impacts to the Great Barrier Reef Marine Park (GBRMP) (located 1km downstream of the treated effluent outfall). The action was approved under the EPBC Act by the Department of Sustainability, Environment, Water, Population and Communities (the Department) subject to the conditions of EPBC Approval 2011/6005.

The location of the SWRF, the treated effluent outfall and the recycled water irrigation areas is shown in Figure 3.1.

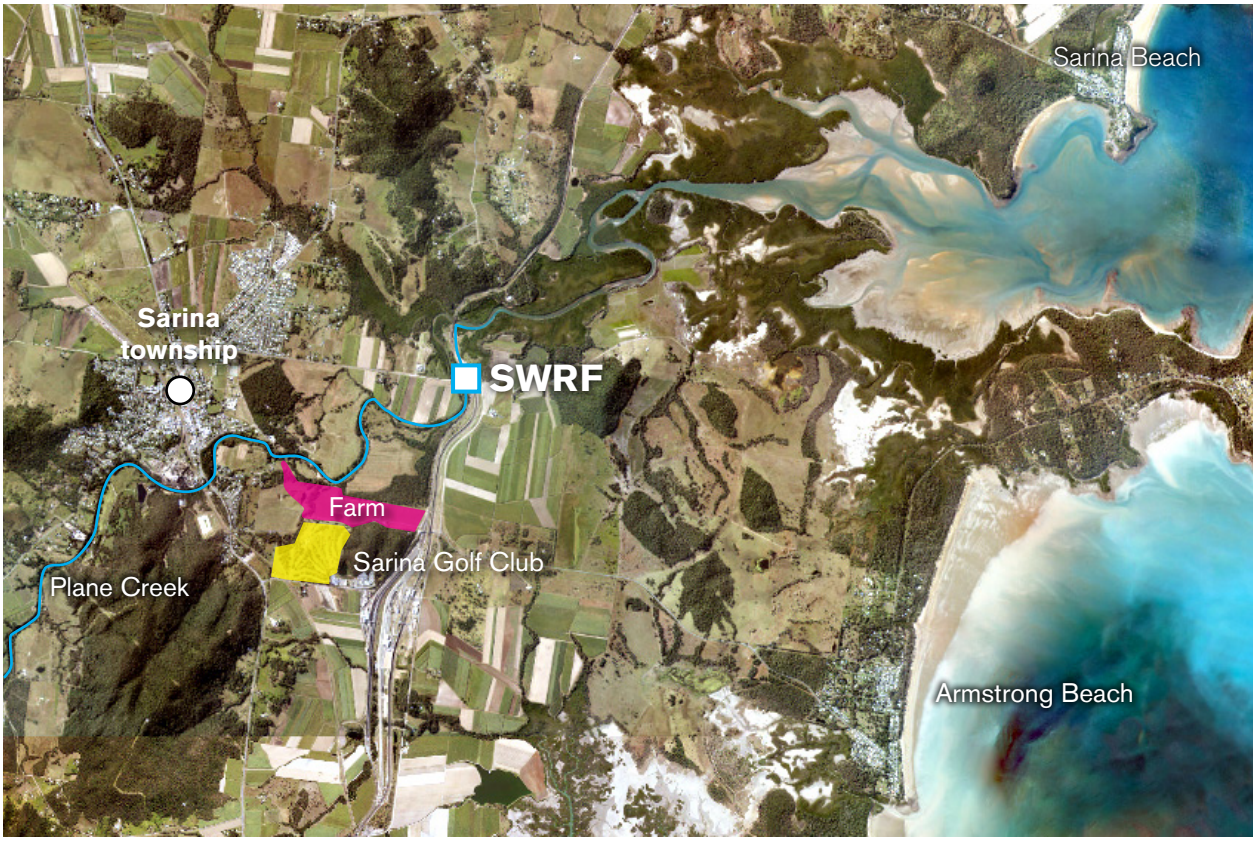
3 - EPBC APPROVAL COMPLIANCE

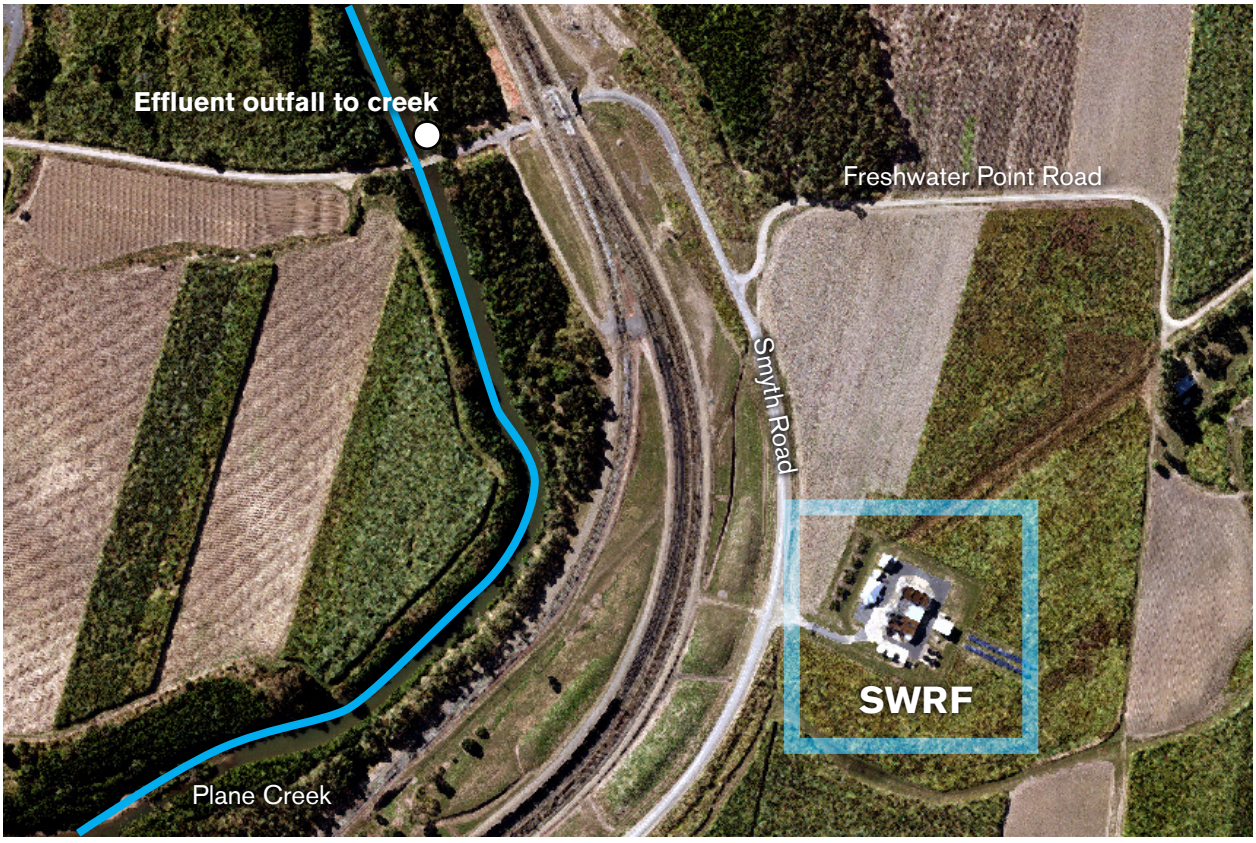
An EPBC approval compliance assessment was conducted for the 2020–2021 FY. The assessment is documented in Appendix 1.

Evidence of compliance with EPBC approval conditions relating to effluent flows and effluent quality is provided in the sections below.

The overall outcome of the compliance assessment was that SWRF complied with all EPBC approval conditions throughout the 2020 – 2021 FY with the exception of EPBC approval condition 6. EPBC approval condition 6 stipulates nitrogen and phosphorus concentration limits for effluent quality. A non-routine effluent sample recorded nitrogen and phosphorous concentrations which exceeded the set limits. These exceedances were reported to the Department and are not considered to have resulted in environmental harm due to the short-term nature of the exceedances. The Department did not take any action in response to the reported exceedances.

Figure 3-1 Location of SWRF





4 - INFLUENT AND EFFLUENT FLOWS

The SWRF accepted a total of 387 ML of influent throughout the 2020 – 2021 FY period. A monthly breakdown of influent and effluent flows and rainfall recorded at site for the 2020 – 2021 FY period is provided in Figure 4-1.

A breakdown of daily effluent release to creek volumes is provided in Figure 4-2 and Figure 4-3 with releases categorised as either a 'dry weather day release' or a 'wet weather day release'.

The following definitions for dry and wet weather days were applied (based on council's Environmental Authority EPPR00541413 definitions).

Dry and wet weather days

'Dry weather day' means a day during which less than 1 mm of rainfall is recorded at the SWRF site. The term also excludes days during which recorded rainfall over the 14 preceding days exceed 50 mm.

'Wet weather day' means a day during which greater than 1 mm of rainfall is recorded at the SWRF site. The term also includes days during which recorded rainfall over the 14 preceding days exceed 50 mm.

Daily release to waters volumes were consistently below the corresponding maximum flow as stipulated in the EPBC Approval.

Figure 4-1 SWRF Monthly Influent and Effluents Flows and Rainfall for 2020-2021 FY

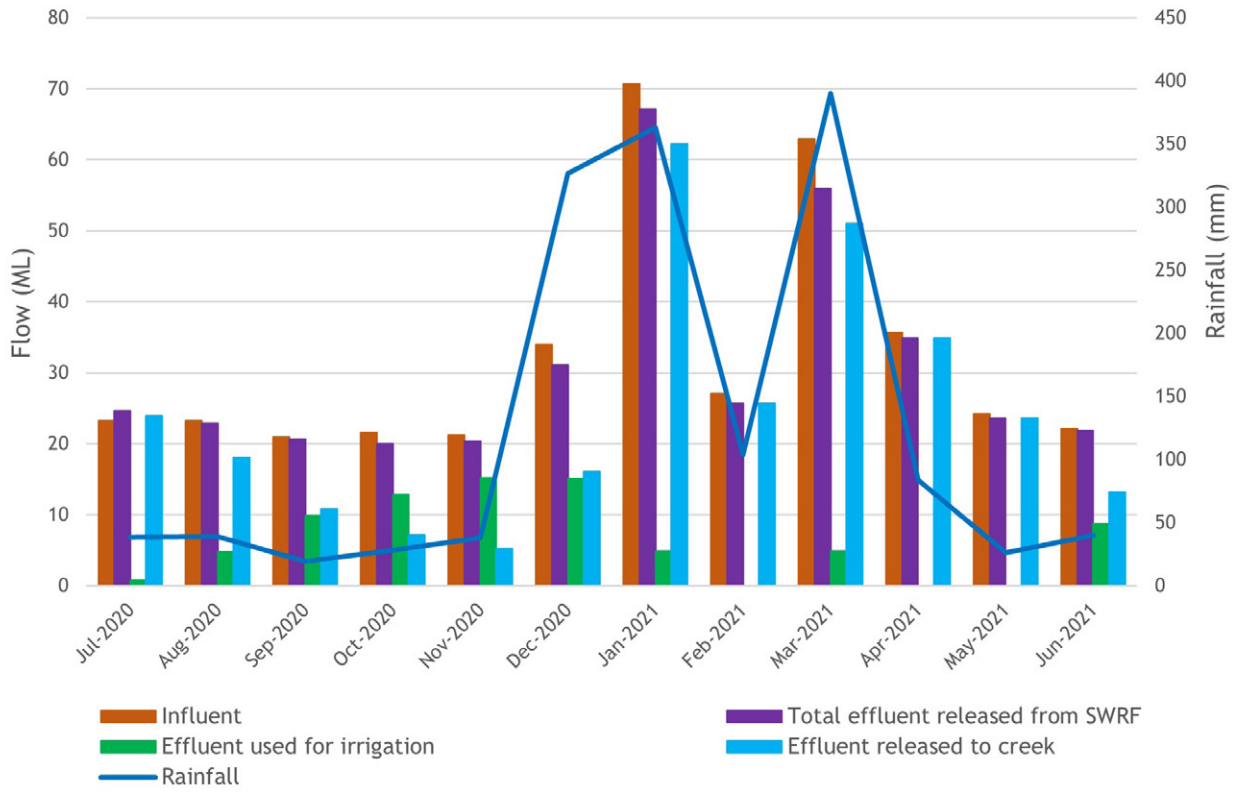


Figure 4-2 SWRF Dry weather day release to waters volume for 2020-2021 FY

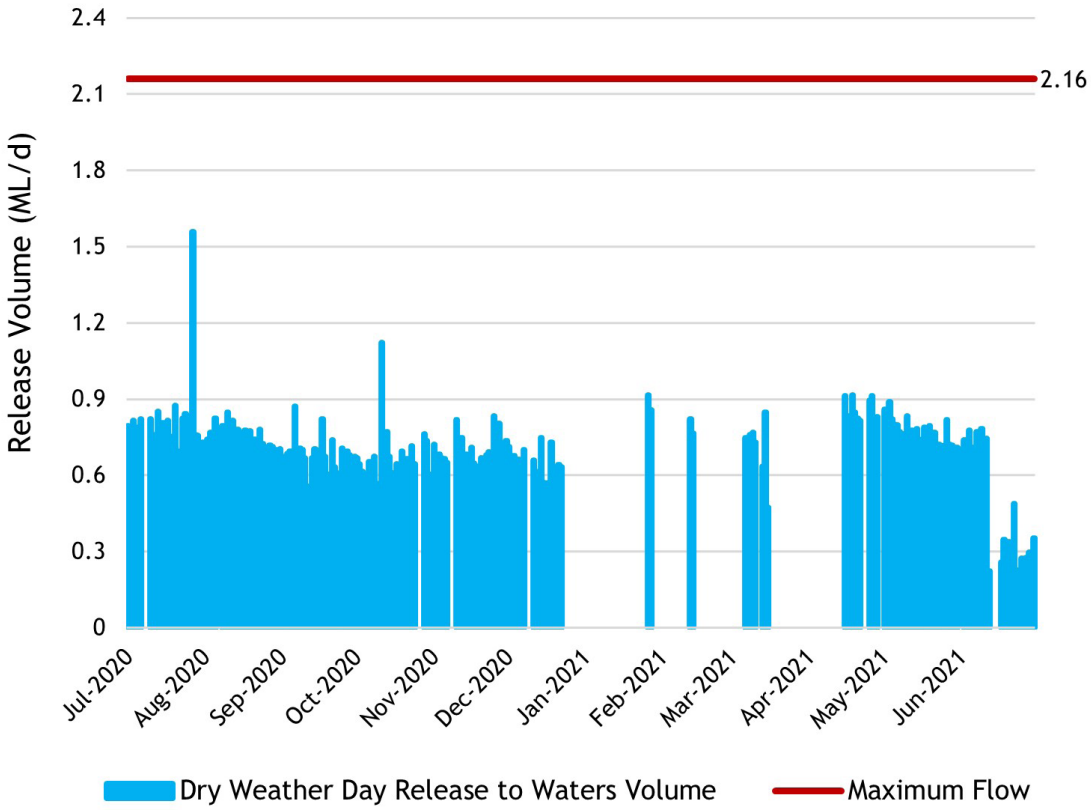
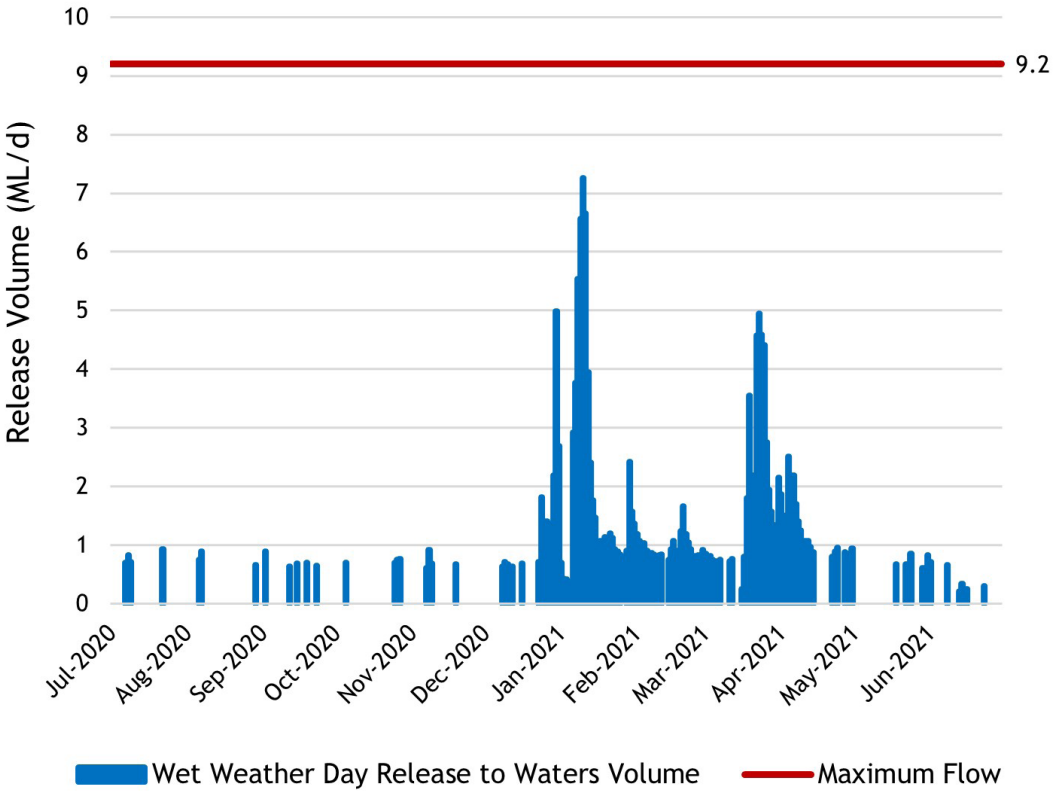


Figure 4-3 SWRF Wet weather day release to waters volume for 2020-2021 FY



5 - INFLUENT AND EFFLUENT QUALITY

The nutrients nitrogen and phosphorus were identified by the Department as two of the principal influences on water quality and ecosystem health in the GBRMP. EPBC Approval compliance conditions relating to effluent quality therefore stipulate limits for these two nutrient parameters.

The sub-sections below present influent and effluent nitrogen and phosphorous quality in terms of concentration and mass loads. Nutrient concentrations based on routine eight-day sampling and calculated nutrient mass loads for the 2020 – 2021 FY are presented in the sections below along with comparison to the maximum limits stipulated in the EPBC Approval.

Nutrient mass loads were calculated using the methodology adopted for council's National Pollutant Inventory (NPI) reporting, specifically the methodology detailed in Example 7 of the NPI Emission Estimation Technique Manual for Sewage and Wastewater Treatment.

As already noted above, nutrient concentrations presented in the sections below are based on routine eight-day sampling. It should be noted however, that non-routine sampling of influent and effluent samples was undertaken on January 28, 2021, following the identification of a suspected trade waste incident (indicated by elevated influent pH). The effluent sample recorded elevated nitrogen and phosphorous concentrations (19.7 mg/L and 4.4 mg/L respectively) which exceeded the maximum limits stipulated in EPBC approval condition 6 (15 mg/L and 3 mg/L respectively). These nitrogen and phosphorous exceedances were reported to the Department as a breach of the EPBC approval (council incident number 20/21_35). No adverse impacts to the GBRMP were expected due to the short-term nature of the exceedances.

5.1 - NUTRIENT CONCENTRATIONS

5.1.1 - Nitrogen

The SWRF influent and effluent total nitrogen concentrations, based on routine eight-day sampling for the 2020 – 2021 FY, are shown in Figure 5-1 and Figure 5-2.

Effluent total nitrogen concentrations ranged from 1.1 mg/L to 5.2 mg/L, well below the 15 mg/L maximum concentration stipulated in the EPBC Approval.

Figure 5-1 SWRF Influent and Effluent Nitrogen Concentrations for 2020-2021 FY

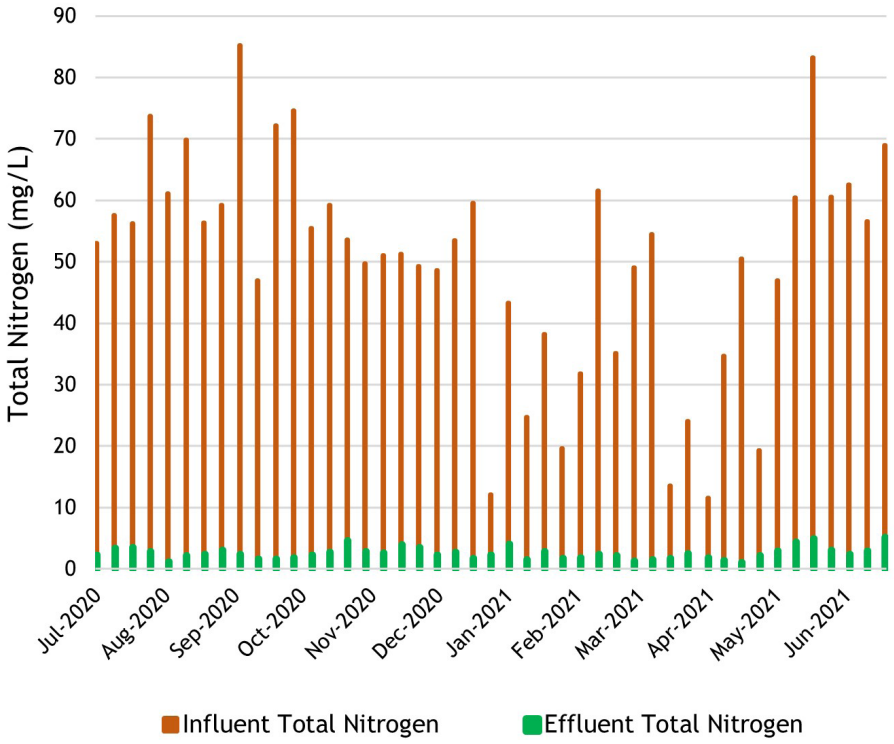
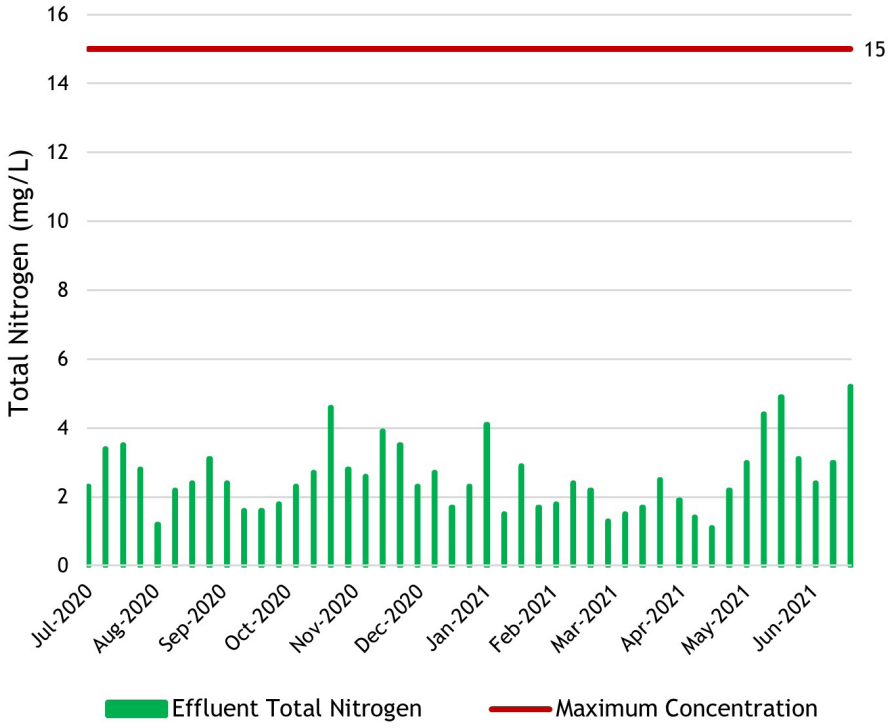


Figure 5-2 SWRF Effluent Nitrogen Concentrations for 2020-2021 FY



5.1 - NUTRIENT CONCENTRATIONS

5.1.2 - Phosphorous

Influent and effluent total phosphorus concentrations, based on routine eight-day sampling for the 2020 – 2021 FY, are shown in Figure 5-3 and Figure 5-4.

Effluent total phosphorous concentrations ranged from <0.1 mg/L to 1.05 mg/L, well below the 3 mg/L maximum concentration stipulated in the EPBC Approval.

Figure 5-3 SWRF Influent and Effluent Phosphorous Concentrations for 2020-2021 FY

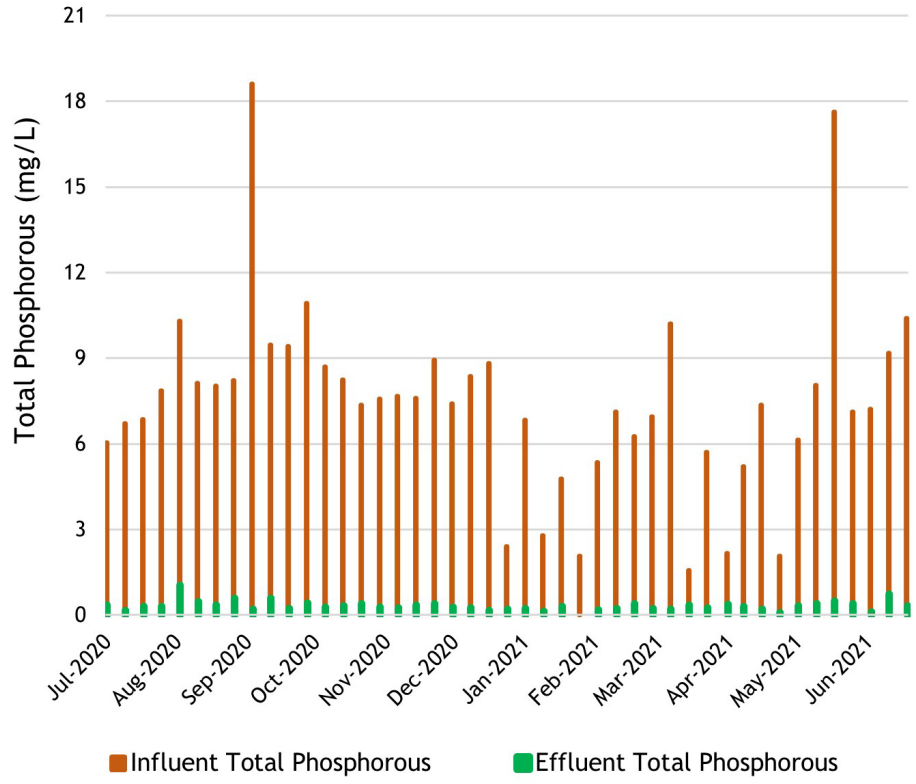
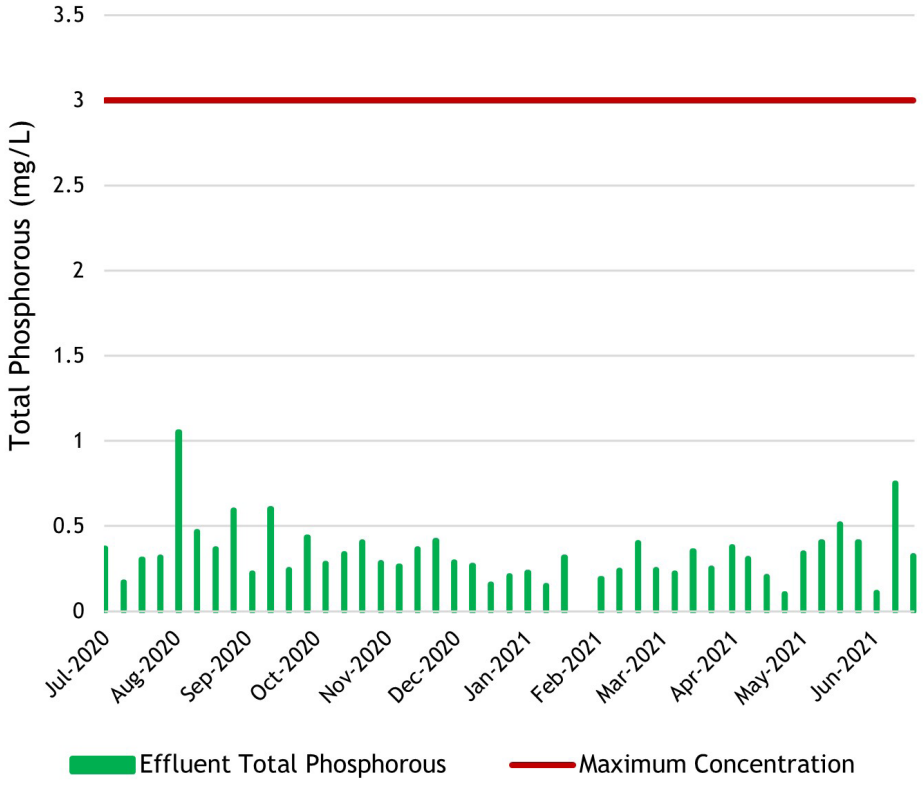


Figure 5-4 SWRF Effluent Phosphorous Concentrations for 2020-2021 FY



5.2 - NUTRIENT MASS LOADS

5.2.1 - Nitrogen

The SWRF influent and effluent total nitrogen mass loads calculated for the 2020-2021 FY are presented in Figure 5-7 and Figure 5-8.

The SWRF treated 17,610 kg of total nitrogen in the 2020 – 2021 FY. Total effluent flows from the SWRF in the 2020 – 2021 FY contained 904 kg of total nitrogen. This equates to a 95% reduction in total nitrogen.

701 kg of total nitrogen in the SWRF effluent flows was released to Plane Creek in the 2020 – 2021 FY, well below the 4338 kg/year maximum load stipulated in the EPBC Approval.

Figure 5-5 SWRF Influent and Effluent Nitrogen Mass Loads for 2020-2021 FY

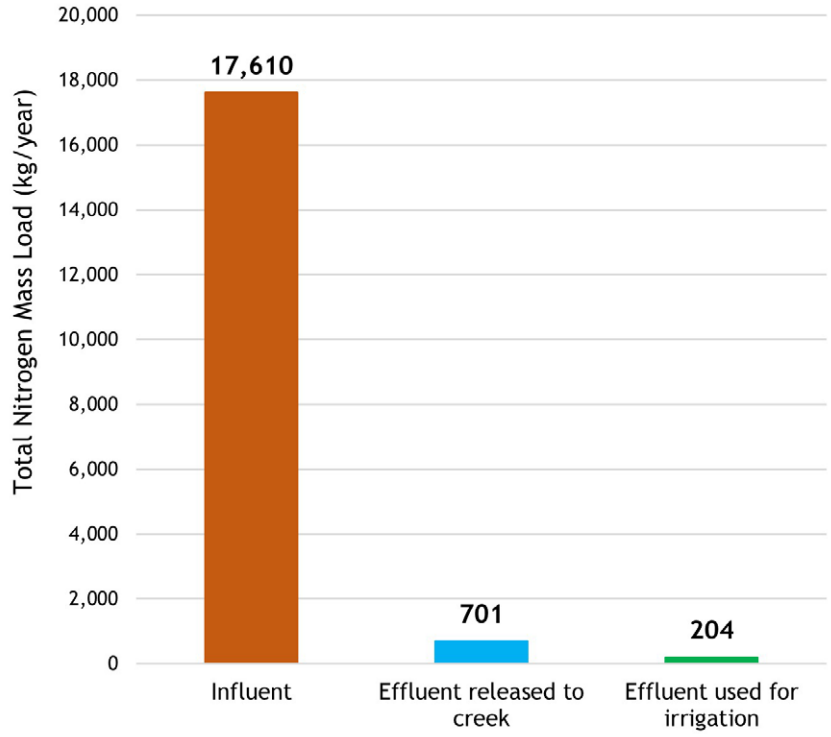
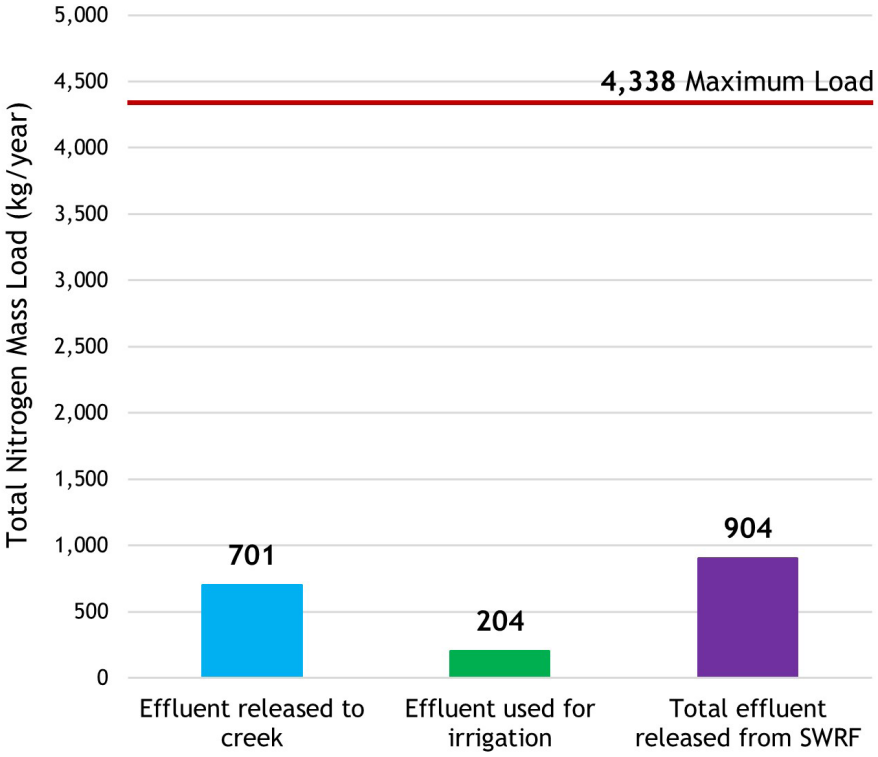


Figure 5-6 SWRF Effluent Nitrogen Mass Loads for 2020-2021 FY



5.2 - NUTRIENT MASS LOADS

5.2.2 - Phosphorous

The SWRF influent and effluent total phosphorous mass loads calculated for the 2020 – 2021 FY are presented in Figure 5-7 and Figure 5-8.

The SWRF treated 2618 kg of total phosphorous in the 2020 – 2020 FY. Total effluent flows from the SWRF in the 2020 – 2021 FY contained 113 kg of total phosphorous. This equates to a 96% reduction in total phosphorous.

87 kg of total phosphorous in the SWRF effluent flows was released to Plane Creek in the 2020 – 2021 FY, well below the 868 kg/year maximum load stipulated in the EPBC Approval.

Figure 5-7 SWRF Influent and Effluent Phosphorous Mass Loads for 2020-2021 FY

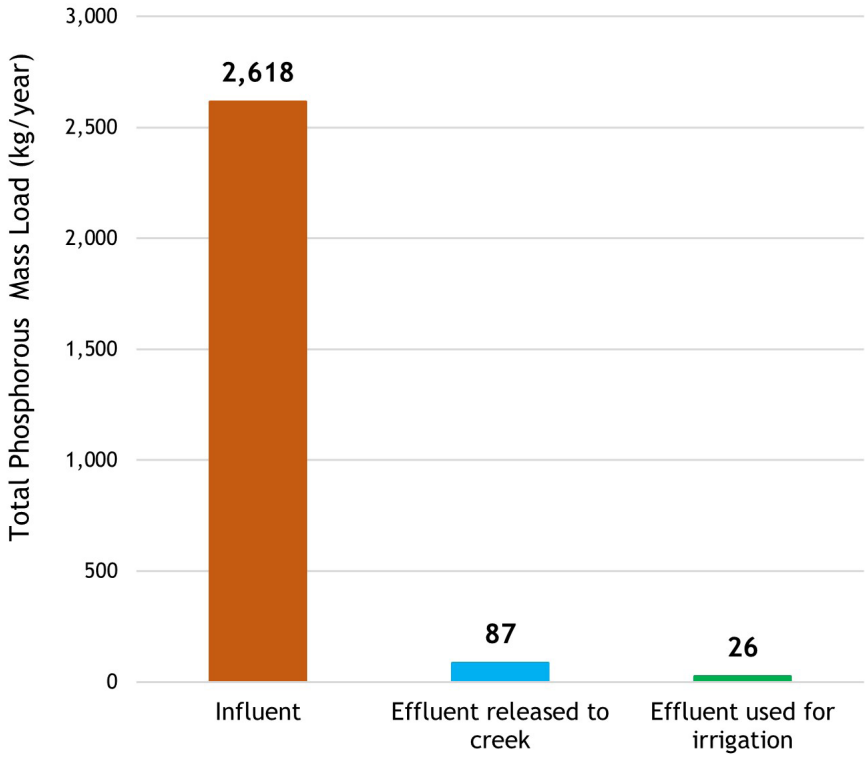
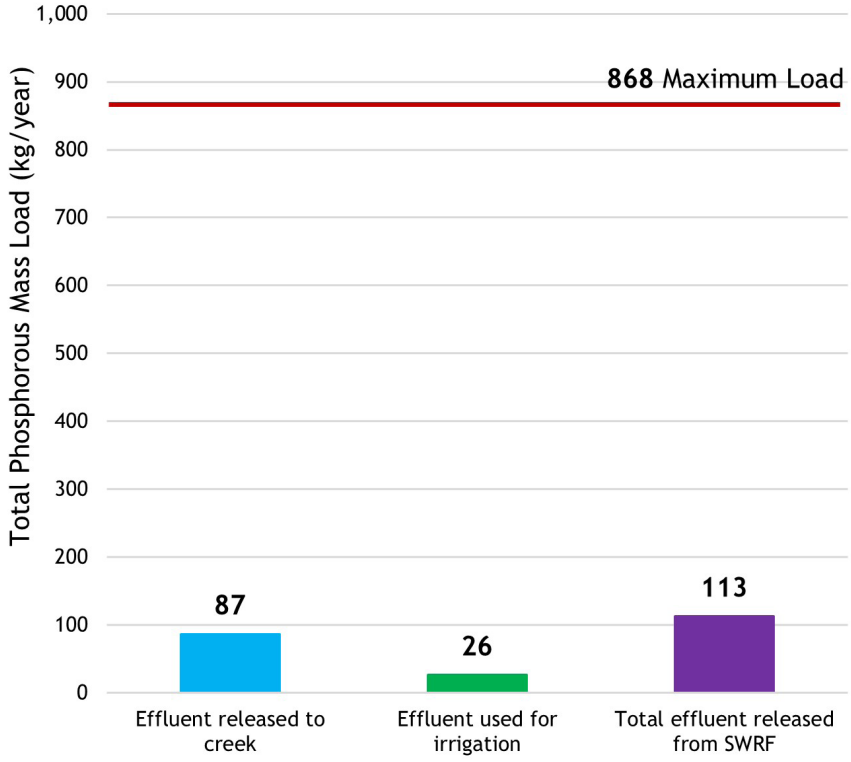


Figure 5-8 SWRF Effluent Phosphorous Mass Loads for 2020-2021 FY



6 - REFERENCES

- Environmental Authority EPPR00541413, Version 10, approved July 2, 2021
- Environmental Protection and Biodiversity Conservation Act 1999
- Department of Sustainability, Environment, Water, Population and Communities, June 2011, National Pollutant Inventory Emission Estimation Technique Manual for Sewage and Wastewater Treatment, Version 2.1
- SWRF EPBC Approval 2011/6005 signed December 12, 2011
- SWRF EPBC Approval 2011/6005 variation to conditions signed September 27, 2016

7 - ABBREVIATIONS

Term	Definition
Council	Mackay Regional Council
Department	Australian Government Department of Agriculture, Water and the Environment (formerly the Department of Environment and Energy / the Department of Sustainability, Environment, Water, Population and Communities)
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
EPBC Approval	EPBC 2011/6005 – the approval granted (and subsequently varied) by the Department for the SWRF project
FY	Financial year
GBRMP	Great Barrier Reef Marine Park
kg	Kilograms
mg/L	Milligrams per litre
ML	Megalitre
ML/d	Megalitre per day
mm	Millimetre
N/A	Not applicable
NPI	National Pollutant Inventory
SWRF	Sarina Water Recycling Facility

Appendix 1 - EPBC Approval Compliance Assessment

EPBC Approval Condition		Compliance Status for 2020 - 2021 FY
1	Within 20 days from the commencement of the action, the person taking the action must advise the Department in writing of the actual date of commencement.	**N/A**
2	N/A – condition removed as part of 2016 approval variation	**N/A**
3	Upon the direction of the Minister, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Minister. The independent auditor must be approved by the Minister prior to the commencement of the audit. Audit criteria must be agreed to by the Minister and the audit report must address the criteria to the satisfaction of the Minister.	**N/A** There was no request for an independent audit to be undertaken during the reporting period.
4	If, at any time after five years from the date of this approval, the person taking the action has not substantially commenced the action, then the person taking the action must not substantially commence the action without the written agreement of the Minister.	**N/A**
5	The person taking the action must ensure that the maximum Average Dry Weather Flow does not exceed 2.16M/d and that the maximum Peak Wet Weather Flow discharged from the Sarina Water Recycling Facility into Plane Creek does not exceed 9.2ML/d.	**In compliance** See graphs provided in Section 4. 'Average Dry Weather Flow' and 'Peak Wet Weather Flow' were interpreted as 'Dry weather day release to waters volume' and 'Wet weather day release to waters volume', with volumes determined by applying the 'dry weather day' and 'wet weather day' definitions from council's Environmental Authority EPPR00541413.
6	The person taking the action must ensure that the maximum concentration of treated wastewater that passes monitoring point M1of the Sarina Water Recycling Facility does not exceed 15 mg/L for Total Nitrogen and 3 mg/L for Total Phosphorus.	**Non-compliance** A non-routine effluent sample (collected in response to a suspected trade waste incident) recorded exceedances of the Total Nitrogen and Total Phosphorous maximum concentrations. All routine effluent samples complied with the maximum concentrations (see section 5.1)
7	The person taking the action must ensure that the annual load of contaminants that passes monitoring point M1 of the Sarina Water Recycling Facility does not exceed 4338 kg for Total Nitrogen and 868 kg for Total Phosphorus.	**In compliance** See section 5.2
8	The person taking the action must ensure that the discharge of contaminants from the Sarina Water Recycling Facility into Plane Creek does not produce any slick or visible evidence of oil or grease, or contain any visible floating oil, grease, scum, litter or other objectionable matter.	**In compliance** There were no reports of any slick, oil or grease, scum, litter or other objectionable matter in the effluent discharged to Plane Creek.
9	By September 30 each year, the person taking the action must publish a report on their website for the following activities conducted in the previous financial year: a) water quality monitoring undertaken by the person taking the action to ensure maximum concentration, maximum volume of contaminants and annual load limits as previously described are being met in accordance with conditions 6 and 7; and b) compliance with each of the conditions of this approval, including implementation of any management plans as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the Department at the same time as the report is published.	**In compliance** This report has been prepared to address this condition. Following finalisation, the report will be published on council's website and evidence of this provided to the Department.
10	The person taking the action must notify the department as soon as is practicable, but within 48 hours, of the occurrence of a breach of these conditions and provide a written report outlining: when the breach occurred; the suspected cause for this breach; a description of any impacts which may cause environmental harm to any animals and plants in the Great Barrier Reef World Heritage Area; details of any actions taken to mitigate these impacts; and proposed actions to prevent a recurrence.	**In compliance** Council notified the Department within 24 hours of the identification of the breach of EPBC approval condition 6

Mackay REGIONAL COUNCIL

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