



the WATER & CARBON  
group

## CASE STUDY

# Removing algae, nutrients and organics with a thriving treatment wetland

<b>Client</b>	Mackay Sugar
<b>Date</b>	2021 - 2022
<b>Value</b>	\$2 million
<b>Location</b>	Marian, QLD

## Background

The Mackay Sugar treatment ponds play an important role in treating water from the facility before it enters Perry Creek. Like many North Queensland waterways, the quality of the creek water ultimately impacts the health of the Great Barrier Reef.

In late 2021, Mackay Sugar requested a design solution to integrate a high-density wetland to work with its 40-year-old treatment ponds. The facility's existing treatment ponds were struggling to meet regulatory standards, due to high algae concentrations and occasional spikes in biological oxygen demand.


The Water and Carbon Group's (WCG) proposal included optimising existing ponds, mechanical aeration for high organic loads and converting the final maturation pond into a high-density treatment

wetland. The cutting-edge upgrade delivered a 100% nature-based treatment plant. Planted in September 2022, exceptional growth and water quality results were achieved early in the establishment phase.



## Challenge

WCG had six months to design and assist Mackay Sugar in building a cost-effective solution for the Marian Sugar Mill that delivered best practice water quality for discharge entering Perry Creek. Due to the remote location, the treatment system was required to have minimal operator intervention, with only solar power immediately available while treating up to 3ML of effluent each day.



High concentrations of algae are extremely difficult to remove from wastewater as the algae size is between 2-200 microns and in high concentrations in summer with a 3ML flow. In addition, regulations set a maximum of 0.9mg/L of ammonia in the wastewater.

Ongoing operation of the Marian Sugar Mill is dependent on the 100% nature-based solution successfully removing suspended solids, treating nutrients and pH levels to comply with current and proposed future environmental licence requirements.

In addition, the conversion of maturation ponds to wetlands creates an engineering challenge, given the potential sludge accumulation and ground conditions at the base of the pond after dewatering, and the impact of wet weather to construction programs.



## Solution

Thanks to WCG's expertise, a best practise treatment wetland was designed and built alongside an upgrade to the existing treatment ponds.

The wetland was built during the winter of 2022 and then planted in September 2022. A gravel filter was incorporated into the wetland design for filtration during the typical 12-month establishment period.

However, the high-quality soil used as planting media, excellent wetland plant stock and the tropical climate ensured the wetland was established within a three-month period.

Already the Marian Wetland has become home to bird and frog wildlife, with ducks, egrets, wrens and songbirds frequently spotted at the site.



## Outcome

The sustainable, cutting-edge, nature-based water treatment solution at Marian aligns with Mackay Sugar's vision to protect the environment.

The project has extended the infrastructure life of ageing ponds and provides best practise wastewater treatment. Early water quality results are positive, indicating that regulatory requirements are being met.

**For more information about our nature-based solutions please contact us:**

[enquiry@waterandcarbon.com.au](mailto:enquiry@waterandcarbon.com.au)

1800 42 62 62



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1800 42 62 62

[www.waterandcarbon.com.au](http://www.waterandcarbon.com.au)

