



## effluent infrastructure industry profile

**frc environmental** has the expertise and experience to deliver insight across the full range of aquatic environments, from freshwater and estuarine to marine ecosystems. Our wide-ranging capabilities in survey, assessment, management, monitoring and reporting enable us to give you absolute clarity and the confidence for action.

**If it involves water, it involves frc environmental.**

### Effluent Infrastructure

**frc environmental's** deep understanding of water-sediment-biota nutrient dynamics underpins our delivery of clear, insightful analyses of effluent-related impacts and practical management advice.

The discharge of treated sewage effluent to either riverine or coastal waters impacts water quality, by elevating turbidity and concentrations of nutrients and pollutants, which can in turn affect phytoplankton and macrophyte communities, benthic infaunal community structure, the health and diversity of coral communities, and ultimately fishes, turtles and dugong.

Increased turbidity reduces available light, affects the efficiency of filter feeders, may smother sessile organisms and may reduce the extent of habitat available for larval settlement.

Increases in nutrient (nitrogen and phosphorus) concentrations however often pose the greatest threat to aquatic ecosystem health. Whilst nitrogen and phosphorous are essential nutrients for the growth and function of aquatic plants, changes in nutrient availability can contribute to substantial changes in the structure, function and health of aquatic plant communities. Phytoplankton blooms can reduce dissolved oxygen concentration to critical levels and produce toxins; whilst increased macroalgal cover, often associated with an increase in nutrients, may reduce coral recruitment, survivorship and growth.

Climate change, and in particular the gradual warming of the seas will exacerbate the impact of nutrient enrichment.



*Macroalgae readily take up available nutrients from the water column and can provide a useful indication as to the extent of effluent influence*



*Macroinvertebrate community structure provides a strong indication of nutrient enrichment*

**“Understanding the relationship between water – sediment – biota nutrient dynamics is the key to effective, responsible effluent disposal.”**

**John Thorogood, Principal Ecologist**

The effective consideration of effluent-related impacts requires an understanding of the character of the effluent, the behaviour of the receiving environment and the ecology of aquatic flora and fauna. For over twenty-five years, our team of highly qualified ecologists and environmental scientists have used a diverse range of techniques to deliver to our clients the clarity of understanding essential to support confident action.

## Pioneer Bay Monitoring Program

For over a decade, **frc environmental** has worked with Whitsunday Regional Council, building an understanding of the impact of treated sewage effluent on the coastal environment. Focusing on the distribution and health of seagrasses, corals and mangroves, **frc environmental** has used a combination of cost-effective field survey methods and cutting-edge laboratory analyses to intelligently assess the relative impact of effluent discharge within the broader context of the catchment.

The insights delivered have supported Council's ongoing refinement of its treatment and discharge strategy, infrastructure planning and budgeting, and negotiations regarding licensing with the DERM and GBRMPA.

## Tasmanian Waste Water Treatment Plant

Working with Simmonds & Bristow on behalf of Huon Valley Council, **frc environmental** assessed the scope and extent of impacts of treated effluent discharge on the aquatic ecosystem health of the Kermadie River. Seasonal surveys enabled **frc environmental's** ecologists to 'read' the river's macrophyte, macroinvertebrate and fish communities to provide the insight and confidence necessary to support proposed changes to Council's environmental licence.

With a defensible appreciation of the river's resilience to effluent discharge, Council is now able to confidently optimise treatment and discharge strategies.

## Mornington Island Sewage Treatment Plant

Supporting Cardno Pty Ltd, **frc environmental** undertook studies essential to the effective upgrading of the Gununa sewage treatment plant on Mornington Island. **frc environmental** ecologists determined the extent and magnitude of historic nutrient enrichment, using a range of techniques including nutrient isotope analysis. Both seagrass meadows and fringing coral reef had been directly impacted by the discharge.

Using the results of our field survey, and our intimate understanding of the ecology of the region's biota, we guided the alignment and installation methods for the discharge pipe, and the location of the diffuser. Working closely with Cardno's hydrodynamic modellers, our ecologists were able to develop confident predictions of effluent-related impact under a number of treatment and discharge scenarios, enabling the client to maximise the benefit of the upgrade on the surrounding seagrass and coral reef communities.

"Whitsunday Regional Council has been engaged with **frc environmental** for well over a decade to monitor the health of the marine environment in our off-shore waters. The aim is to chart over the long term the effect human activity has on the environment as development and population grows.

**frc environmental's** work has a direct connection to decision-making and funding of many millions of dollars in infrastructure that is required to protect our environmental heritage. Dr John Thorogood of **frc environmental** has steered this research with integrity and has produced a sequence of valuable reports that are noteworthy in that they convey technical findings that are readily understood by the expert and the layman together. **frc environmental's** recent reports have even been sent to schools in the Region where school teachers access them as valuable instructional classroom learning material. This is only possible because the reports are easily understood and they lead to the encouragement of local children to take interest in their local environment.

In so doing they spread that interest to the rest of their family and throughout the wider community. Perhaps some of the children will take up a career in environmental science."

## David Warnock,

Program Manager Infrastructure  
Whitsunday Regional Council

### industry experience

- Ports & Maritime Operations
- Mining, Oil & Gas
- Linear Infrastructure
- Power Generation & Distribution
- Waste Management
- Water Infrastructure
- Effluent Infrastructure
- Urban, Industrial & Agricultural Development
- Government
- International Development & Aid
- Fisheries & Aquaculture
- Wetland Construction & Rehabilitation
- Tourism
- Defence
- Forensic & Legal