

MAREEBA SHIRE COUNCIL

MAREEBA SEWAGE TREATMENT PLANT UPGRADE

Draft Transitional Environmental Program

1. Introduction

The Mareeba Sewage Treatment Plant (STP) services the township of Mareeba. Mareeba is located approximately 60 km north west of Cairns in Far North Queensland. The local authority for Mareeba is the Mareeba Shire Council (MSC) which owns and operates the existing STP.

MSC seeks to provide improvement to the treatment process particularly focusing on hydraulic capacity and discharge effluent quality. The works are intended to provide Mareeba with a sustainable future for the plant to cater for future growth in the Mareeba region.

2. Background

Process

The existing STP is a trickle filter plant which was built in 1967. Flow to the plant is directed through an inlet box to a Primary Sediment Tank as well as two Sedimentation Digester Imhoff Tanks. Sludge from the Primary Sedimentation Tank is recycled to the Inlet box and sludge from the Imhoff Tanks are directed to the sludge drying beds. Clarified flow from the Sedimentation and Imhoff Tanks pass through a distribution box onto the Trickle Filter. If flow to the Distribution Box is too high it bypasses the Trickle Filter to the Chlorine Dosing Facility. Part of the forward flow from the Trickle Filter is recycled back to the distribution box and the other part is directed to the Secondary Sedimentation Tanks. Settled humus is directed back to the Inlet Box. Forward flow from the clarifiers is directed to the Chlorine Dosing Plant and the Effluent Polishing Ponds. Effluent from the Ponds discharges to the Mitchell River Catchment via Two Mile Creek.

Statutory Obligations

The existing STP at Mareeba is an aging facility and is hydraulically overloaded. It does not meet current DEHP license conditions for several parameters including ammonia-N and BOD. Table 1 nominates the release quality characteristic limits for the effluent.

QUALITY CHARACTERISTICS	RELEASE LIMIT	LIMIT TYPE
5-day Biochemical Oxygen Demand (mg/l)	20 25 60	80th percentile (long term) 80th percentile (short term) maximum
Suspended Solids (mg/l)	30 60 90	80th percentile (long term) 80th percentile (short term) maximum
pH (pH Units)	6.5 to 8.5	range
Dissolved Oxygen (mg/l)	2	minimum
Free Residual Chlorine (mg/l)	0.7 ⁽¹⁾	maximum
Ammonia Nitrogen (mg/l)	1	maximum
Total Oxidised Nitrogen (mg/l)	tbs tbs	50th percentile maximum
Total Phosphorus as P (mg/l)	tbs tbs	50th percentile maximum
Oil and Grease (mg/l)	10	maximum
Faecal Coliforms (receiving waters) (Organisms/100 ml)	1000 ⁽²⁾ 5000	median ⁽³⁾ 80th percentile ⁽⁴⁾

Table 1 Environmental Authority EPPR01792213 Water Quality Characteristic Limits

- Notes:**
- “tbs” means to be specified following consideration of the results of studies yet to be carried out.
 - ⁽¹⁾ Measured at the inlet to the polishing lagoons.
 - ⁽²⁾ ANZECC standards for stock watering
 - ⁽³⁾ Median for this quality characteristic must be based on the results of at least five samples, with individual samples being collected at intervals of not less than thirty (30) minutes.
 - ⁽⁴⁾ “80th percentile” for this quality characteristic means that the measured values of the quality characteristic must not be greater than the release limit for any more than one out of five consecutive samples.

The Mareeba STP also requires a reliable effluent flow meter to measure the quantity of effluent discharged to the environment to achieve compliance with the Environmental Authority.

An Environmental Impact Monitoring Program (EIMP) must also be redesigned and implemented to measure the environmental impact of the STP's operation on the environmental values of the receiving environment, namely Two Mile Creek.

3. Objectives

MSC intends to refurbish the existing STP to achieve compliance with the conditions of the current Environmental Authority. Namely, conditions 5F.C3 (Quality Characteristics of Release to Waters), 5F.H15 (Monitoring of Volume of Release) and 5F.A9(f)(ii)(1a)(1b)(Site Based Management Plan).

The upgrade will also provide opportunities for Council to add process technology to improve effluent quality as future standards tighten. MSC will engage a specialist process design, geotechnical and civil construction consultants and contractors to deliver a refurbished Mareeba Sewage Treatment Plant.

The following actions will be undertaken to develop the process design:

- A technical evaluation of the existing plant infrastructure and identification of which infrastructure can be incorporated into a upgraded plant; and
- Documentation of the proposed process design including plans, drawings and explanatory notes detailing how the proposed process design will meet the objectives of Mareeba Shire Council; and
- Preparation of a Functional Design Brief with the allowance for future augmentation of plant and equipment to increase hydraulic capacity and / or improve effluent water quality; and
- Allowance for a hydraulic capacity for 12500EP which will provide MSC with suitable wastewater treatment infrastructure until approximately 2035; and
- Provision of a detailed cost estimation of the process design, construction and operational costs associated with the Functional Design Brief for Council's budgeting and funding purposes; and
- Sizing, specification and separate construction of a proposed packaged inlet works equipment with odour control that has a hydraulic capacity of 16,500EP; and
- Completion of a mass and energy balance; and
- Specification of the biological reactor volume, operating depth(s) and internal layout; and
- Sizing and positioning of bioreactor mixing systems (if applicable); and
- Sizing of the aeration system including the required degree of turndown for connection and design influent loads if applicable; and
- Sizing of process recycles necessary for nutrient removal; and

- Sizing of sludge settling infrastructure (ie; decant system for intermittent plant and clarifier(s) for continuous processes); and
- Sizing of sludge wasting system; and
- Sizing of sludge digestion system; and
- Consultation with Council's Water and Waste staff to enable Council to decide on a preferred sludge drying / dewatering system; and
- Sizing of the Council's preferred sludge drying / dewatering system; and
- Process design of chemical dosing systems (ie; sizing of storage, dose pump rate/turndown, dose location); and
- An assessment of odour control requirements. If odour control systems are required they will be designed or specified; and
- Inclusion of an effluent flow meter to measure the quantity of discharge to the environment; and
- Concurrent implementation of the proposed process design components with the day to day operation of the existing plant; and

Although there are no limits for Total Nitrogen, Total Phosphorus and Total Oxidised Nitrogen in the current Environmental Authority, Council seeks the best possible nutrient removal outcome within Council budget and funding constraints. It is anticipated that achieving a 1mg/L concentration of ammonia in the effluent discharge waters, will result in a positive outcome for concentrations of nitrogen and phosphorus.

A defects liability period and verification testing period will be provided for to ensure that the objective of this draft TEP, namely compliance with the Environmental Authority water quality limits, are achieved.

Throughout the life of the TEP, Council will continue to implement mitigative measures in accordance with its Operation and Maintenance Manual for the existing Sewage Treatment Plant. Measures include but may not be limited to scheduled maintenance checks and procedures.

Attachment 1 details the minimum objectives, actions, start and completion dates and estimated costs.

4. Relevant Background Reports

Council has a number of reports that have been utilised in the concept development of the proposed Mareeba STP upgrade. These reports are:

- Mareeba STP Standard Operating Procedures, 2011
- Environmental Authority EPPR01792213
- Mareeba STP Influent and Effluent Design Envelope, 2008

- Mareeba STP Planning Report, 2007
- Mareeba Demographic and Socio-economic profile report, 2014
- Cairns Water Laboratory Certificates of results (effluent and influent testing)
- Insitu Process Testing results
- Locality Plans
- Aerial Photographs
- Contour Plans

5. Hold Points and Performance Indicators

To provide better cost outcomes and project management, Council will take direct control in delivering the upgrade project. Council will drive the desired outcomes, implement hold points, monitor performance indicators and report to DEHP.

Performance Indicators	Date	Responsibility	DEHP Report Date
Completion of process design brief, geotechnical and construction plans.	27 April 2015	Director Infrastructure Services	April 2015
Completion of financial modelling for remainder of works.	27 April 2015	Director Infrastructure Services	April 2015
Completion of EIMP design.	27 March 2015	Director Infrastructure Services	April 2015
Completion of packaged Inlet works documentation.	30 June 2015	Director Infrastructure Services	September 2015
Implementation of EIMP	01 July 2015	Director Infrastructure Services	September 2015
Tender and start construction	30 August 2016	Director Infrastructure Services	September 2015
Construction		Director Infrastructure Services	March, Sept, Dec 2016
Completion Construction	December 2016	Director Infrastructure Services	December 2016
Operation and start verification testing	Jan 2017	Director Infrastructure Services	March 2017
End of defects liability & verification testing	November 2017	Director Infrastructure Services	November 2017

6. Monitoring and Reporting

The hold points and performance indicators will be monitored by relevant Water and Waste staff and will report to the Manager Water and Waste. Reports will need to be prepared for Council and DEHP. Reports to DEHP will be prepared on a six monthly basis in March and September each year.