Moreton Bay Research Station (MBRS)
Water Management Program

1. Program Scope

The Water Management Program incorporates all the water used throughout the Moreton Bay Research Station in the following ways:

- Stormwater;
- Irrigation water;
- Saltwater;
- Water Outfalls;
- Activities on Moreton Bay;
- Wastewater; and
- Potable water.

2. Objectives

- To provide conservation strategies by following environmental quality procedures;
- To introduce water minimisation practices through identification of problem areas;
- To ensure that all relevant licences, permits and approvals are in place for water management activities;
- To set procedures in line with Quality Management in order to provide the Moreton Bay Research Station "Best Environmental Practices" for water management;
- To determine the Moreton Bay Research Station's environmental performance when judged against current environmental legislation and licence conditions; and
- Conduct auditing program of water streams to ensure compliance with environmental legislation, standards and guidelines.

3. Procedures

The Water Management Program is written to address the use of water of various qualities and purposes with in the research station.

3.1 Ecologically Sustainable Principles

Ecologically sustainable principles aim at allowing development and activities of an organisation such as the research station whilst conserving resources such that the ecological processes and environment are maintained to meet the needs of future generations. The principles used at the research station are discussed below.

3.2 Resource Saving

Fresh water is a resource consumed by the research station generally as potable water. The following practices are aimed at reducing consumption of this resource:

- Reducing water usage through waste minimisation technologies and practices and educational strategies.

3.2.1 Community Participation

The Utilities Management Committee represents EMS stakeholders in order to enhance the environmental decision making process including water management issues. Interaction takes place with the North Stradbroke Island community as required.

3.2.2 Research into Water Practices and Management

Part of promoting the best management of the community's resources is assistance and support, where feasible, of research into issues related to water usage, treatment and management practices.

3.3 Water Management Strategies

3.3.1 Minimisation Strategies

Water minimisation strategies incorporate a hierarchical approach to water management. The strategy utilises the following four principles:

- **Source Reduction** is the most beneficial strategy as it reduces the amount of water consumed. The primary focus is to ensure that water is not wasted.
- **Recycling** involves the re-use of the water resources for another purpose.
- **Treatment** of water refers to processing the water or wastewater so that the contaminant load discharged is reduced to acceptable levels. This includes the treatment of sewage by the local council sewage treatment plant.
- **Disposal** of water into natural receiving waters is the least preferred option and is used when it is not feasible to use any of the above strategies due to environmental, economic and technological constraints.

3.3.2 Application

Table 1 lists the current application of the above strategies. This list is not exhaustive and the research station is always looking for new ways to increase the implementation of the beneficial end of the waste management hierarchy.

Table 1. Water Minimisation Practices at The University of Queensland

Strategy	Process	Means	Results
Source Reduction (potable water reduction)	Use of low flow devices	Fitting all showers and taps (were appropriate) with low flow heads and nozzles	Reduction in amount of water consumed
Recycling	No processes in place		
Treatment	Wastewater treatment	All sewered wastes are contained, cleaned and pumped out.	Cleaner, less noxious discharge to natural systems. Some reuse for irrigation (refer above)
Disposal	Direct Discharge	Stormwater only that cannot be contained. Discharged to natural systems.	N/A

3.4 Water Management Control

3.5 Grease Traps and Oil Interceptors

All sewer wastes from the research station are directed through a grease trap prior to discharge to the holding tanks.

The grease trap shall be maintained in good condition. It is serviced on a monthly basis through Property and Facilities and the trap is also pumped out on a yearly basis. If the volume is such that it is likely to 'flow through' the system before the next yearly check, arrangements shall be made to have the trap pumped out.

3.6 Bunding

A bund is a wall used to contain or exclude solids and all liquid material. Bunding is used at the research station in the following cases:

- Chemical storage; and
- Wet labs.

The bunded area and volumes will depend upon the design requirements. The Workplace Health and Safety Act (1995) specifies that bunding should be sufficient to contain the contents of the largest tank in a compound (or 25% of the volume of liquid specified dangerous goods where tanks are not used).

In the wet labs, bunding and gradient is used to direct waters to appropriate drains.

3.7 Water Quality Standards

Any waters (excluding sewer wastes) released from the research station must meet the requirements of the Australian and New Zealand Environment Council's *Guidelines for Fresh and Marine Water Environments*. Refer to Appendix one for indicative measures.

3.8 Audits

Water audits shall be carried out in accordance with the procedures set out in The University of Queensland Auditing Program. Water audits will be conducted as necessary to determine the quality of water being discharged from the research station.

Streams that may be audited include:

- Wastewater (sewer);
- Stormwater; and
- Return Seawater.

It is the responsibility of the Property and Facilities Division to conduct water audits at the Moreton Bay Research Station.

3.9 Monitoring

The amount of water utilised at the Moreton Bay Research Station is monitored through the weekly meter readings. The demand and consumption are noted in a database maintained by Moreton Bay Research Station, with copy forwarded to Property and Facilities Division.

It is the responsibility of the Environmental Engineer of the Property and Facilities Division to set up a water monitoring program when required.

4. Training

It is the responsibility of the Manager Moreton Bay Research Station to ensure that their personnel are adequately trained in environmental management issues. Refer to the training program for further information.

5. Budget

It is the responsibility of Operations Manager, Property and Facilities Division and the Manager, Moreton Bay Research Station to allocate the necessary resources to the water management program at the Moreton Bay Research Station on a yearly basis.

6. Records

All documents issued with respect to water management are to be held by the Property and Facilities Division (St Lucia) and/or Moreton Bay Research Station as appropriate. The term documents, for the purpose of the water management program, refers to:

- Operational Procedures;
- Checklists;
- Reports;
- Notes/ Memoranda;
- Letters; and
- Invoices.

7. Water Program Responsibilities

The following table lists the responsibility of those at different levels at the research station in regard to water management.

Table 7 Responsibilities

Responsible Person	Duties
Users	• Not to dispose of chemical wastes down laboratory sinks; • Be aware of the water management procedures applicable to their work; and • Attend environmental management training seminars.
Manager Moreton Bay Research Station	• Ensure that users are aware of the water management procedures; • Arrange adequate environmental management training; • Ensure that water management is carried out according to the Management System; • Arrange for pump out of Holding Tank; and • Review the water management plan as necessary.
Property and Facilities Division	• Provide technical and engineering advice regarding water management to the research station; • Liaise with the Manager, Moreton Bay Research Station to ensure that water management is effectively carried out; • Conduct water auditing and/or monitoring to evaluate the efficiency of the water management program; • Ensure that bunding is maintained in relevant areas; and • Develop and implement environmental management training.

8. Contacts

The first point of contact in regards to any water management issue is the Environmental Engineer who is based at the St. Lucia campus with Property and Facilities Division: Phone: 3365 1587. Otherwise refer to contacts in each of the operating procedures.

9. Definitions

9.1 Waters

Under Section 4 of the *Environmental Protection Act, 1994*, **waters** means "Queensland waters".

9.2 Waste Water

Under the Guidelines for Sewerage Systems - Acceptance of Trade Waste, 1994, **domestic wastewater** is defined as "the water borne waste derived from human origin comprising faecal matter, urine and liquid household waste from closet pans, sinks, baths, basins and similar fixtures designed for use in private dwellings".

9.3 Trade Waste and Sewage

Under Schedule I b.2 of the *Sewerage and Water Supply Act 1949-1982*, the following definitions are given:

- **Trade waste** is defined as "The wastes from any industry, business, trade or manufacturing premises, other than domestic sewage."; and
- **Sewage** is defined as " The used water supply of the community: the term includes faecal matter, urine, household slops, and polluted waters.".

9.4 Background Levels

The background level of a parameter of interest is defined as the concentration of that parameter would be observed if no activity which caused contamination (to any extent) had occurred. For example, the background level of COD of wastewater is equal to the concentration of COD in the tap water supplied by the council.

9.5 Non-point Source

A non-point source is a source of waste that is not directly regulated, is not mandated, and no permit can be held for its release. Examples of non-point sources of waste include:

- Urban runoff from unsewered urban areas;
- Unconfined pastures of animals;
- Runoff from range land; and
- Wet and dry atmospheric fallout over a water surface.

10. References

- BCC - The Trade Waste Guide, 2000
- BCC - Industrial Liquid Waste Sewer Acceptance Criteria, 2000
- Sewerage & Water Supply Act 1949
- Workplace Health and Safety Act 1995
- NHMRC & ARMCANZ - Australian Drinking Water Guidelines, 2004
- Water Act 2000
- Marine Parks Act 2004 and Regulations 2006
- Marine Parks (Moreton Bay) Zoning Plan 2008
- Environmental Protection (Water) Policy 2009

Appendix 1

Since there is no way of monitoring the source of sewage that enters treatment plants, table A1.1 lists guidelines that the Shire Council encourages industry to adopt.

Table A1.1: Acceptance Guidelines for Municipal Sewage Treatment Plants.

PARAMETER	GUIDELINE VALUE	UNIT
BOD_5	Determined by Council	mg/L
Temperature	<38	°C
pH	6-10	
Grease and Oil (total)	200	mg/L
Ammonia as N (plus ammonical ion)	100	mg/L
Kjeldahl Nitrogen	150	mg/L
Total Phosphorus as P	50	mg/L
Sulphate as SO_4	2000	mg/L
Sulphite as SO_2	100	mg/L
Chlorine as Cl_2	10	mg/L
Aluminium	100	mg/L
Iron	100	mg/L
Manganese	100	mg/L
SPECIFIC ACCEPTANCE GUIDELINES FOR METALS		
Arsenic	5	mg/L
Cadmium	2	mg/L
Chromium (total)	20	mg/L
Cobalt	10	mg/L
Copper	10	mg/L
Lead	10	mg/L
Mercury	0.05	mg/L
Nickel	10	mg/L
Selenium	5	mg/L
Silver	5	mg/L
Tin	10	mg/L
Zinc	10	mg/L
Boron (as B)	100	mg/L
Bromine (as Br_2)	10	mg/L
Fluoride (as F)	30	mg/L
Cyanide (as CN)	5	mg/L
Sulphide - total (as S^2)	5	mg/L

Table A1.3 shows the relevant extracts from the Redland Shire Council Water Quality Guidelines

Table A1.3: Drinking water Guidelines

PARAMETER	GUIDELINE VALUE	AESTHETIC	UNIT
E. Coli	0		cfu/100mL
Total coliforms	0		cfu/100mL
Dissolved oxygen	**	>85	%
Hardness (as $CaCO_3$)	**	200	mg/L
pH	*	6.5-8.5	
Total Dissolved Solids	**	500	mg/L
Turbidity	*	5	NTU
DISINFECTION AGENTS AD INORGANIC BY-PRODUCTS OF DISINFECTION			
Bromate	0.02		mg/L
Chlorine	5	0.6	mg/L
Chlorine dioxide	1	0.4	mg/L
Chlorite	0.3		mg/L
Chlorate	*		mg/L
Iodine	*		mg/L
Mono-chloramine	3	0.5	mg/L

Table A1.3 continued

OTHER INORGANIC CHEMICALS			
Aluminium (acid soluble)	*	0.2	mg/L
Ammonia (as NH_3)	*	0.5	mg/L
Antimony	0.003		mg/L
Arsenic	0.007		mg/L
Asbestos	*		mg/L
Barium	0.7		mg/L
Beryllium	*		mg/L
Boron	0.3		mg/L
Cadmium	0.002		mg/L
Chloride	**	250	mg/L
Chromium (as Cr(VI))	0.05		mg/L
Copper	2	1	mg/L
Cyanide	0.08		mg/L
Fluoride	1.5		mg/L
Hydrogen sulfide	*	0.05	mg/L
Iodide	0.1		mg/L
Iron	*	0.3	mg/L
Lead	0.01		mg/L
Manganese	0.5	0.1	mg/L
Mercury	0.001		mg/L
Molybdenum	0.05		mg/L
Nickel	0.02		mg/L
Nitrate	50		mg/L
Nitrite	3		mg/L
Selenium	0.01		mg/L
Silver	0.1		mg/L
Sodium	**	180	mg/L
Sulfate	500	250	mg/L
Tin	**		mg/L
Zinc	*	3	mg/L

* Insufficient data to set a guideline based on health considerations

** No health-based guideline is necessary