WATER NETWORK ASSET MANAGEMENT PLAN

December 2015

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Yellow highlighting *– text captured that requires review and/or comment/decision*

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Water Network
Asset Management Plan

December 2014

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March 2016	Midge Point and Seaforth Rechlorination Scheme Added	i	Don Pidsley	
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Appendix 27 Sarina Minimum Pressure Failure

Note: Appendices appear as separate documents and are not contained within the Water Network Asset Management Plan.

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TABLE OF ABBREVIATIONS

Abbreviation	Description
AC	Asbestos Cement
ADWG	Australian Drinking Water Guidelines
AMR	Automatic Water Meter Reader
CEO	Chief Executive Officer
CCP	Critical Control Point
CICL	Cast Iron Concrete Lined
CSS	Client Service Standards
DEWS	Department of Energy and Water Supply (Queensland Government)
DICL	Ductile Iron Concrete Lined
DWQMP	Drinking Water Quality Management Plan
ECI	Engineering and Commercial Infrastructure
EHP	Department of Environment and Heritage Protection (Queensland Government)
ERA	Environmentally Relevant Activity
GAL	Galvanised steel
GIS	Geographic Information System
GRP	Glass reinforced plastic
GS	Galvanised steel
GWI	Galvanised wrought iron
HACCP	Hazard Analysis Critical Control Point
HDPE	High Density Polyethylene
JAG	Department of Justice and Attorney-General (Queensland Government)
MDMM	Mean Day Max Month
MDPE	Medium Density Polyethylene
MPVC	Modified Polyvinyl Chloride
MRC	Mackay Regional Council
MSCL	Mild Steel Cement Lined
MWS	Mackay Water Services
NRM	Department of Natural Resources and Mines (Queensland Government)
OPVC	Oriented Polyvinyl Chloride
PIA	Planning Infrastructure Area
POLY	Polyethylene

Abbreviation	Description
PVC	Polyvinyl chloride
QLD	Queensland
QMS	Quality Management System
RMIP	Risk Management Improvement Program
SCADA	Supervisory Control and Data Acquisition
SOP	Standard Operating Procedures
the plan	Water Network Asset Management Plan
uPVC	Un-plasticised Polyvinyl Chloride
VSD	Variable Speed Drive
WHS	Work Place Health and Safety
WPS	Water Pump Station

1. INTRODUCTION

1.1 Purpose

This document is the Water Network Asset Management Plan (the plan) for Mackay Water Services (MWS). MWS is a business unit of the Mackay Regional Council (MRC).

The purpose of the plan is to outline the management framework employed by MWS to manage their water network assets to deliver the service outcomes for the community.

This document:

- is a documented risk based system for managing the water network assets held by MWS.
- sets out the strategies to ensure that the performance and maintenance of assets meets regulatory requirements, organisational and client needs, and that systems and processes are in place to address any emerging issues that may arise.
- communicates funding requirements to provide the required levels of service.
- is a living document which is actioned through MWS day to day activities.

1.2 Framework

This plan is prepared under the direction of MRC's and MWS's vision, mission, goals and objectives as captured in the organisation's Operational Plan (Appendix 3), Corporate Plan (Appendix 4) and Water Services Business Plan (Appendix 5).

MRC, as an organisation, is committed to the effective and efficient management of the community's assets for present and future generations. MRC understands that the assets form the basis for the majority of Council's service delivery and recognises the importance of the assets to communities and the significance of the assets to financial and strategic planning. This commitment is communicated through MRC's Asset Management Policy (Appendix 2). The policy is freely accessible on the MRC website.

This plan forms a component of MWS Quality Management System (QMS) and sits within business functions and is associated with the Drinking Water Quality Management Plan (DWQMP) (Appendix 6) as depicted in Figure 1.

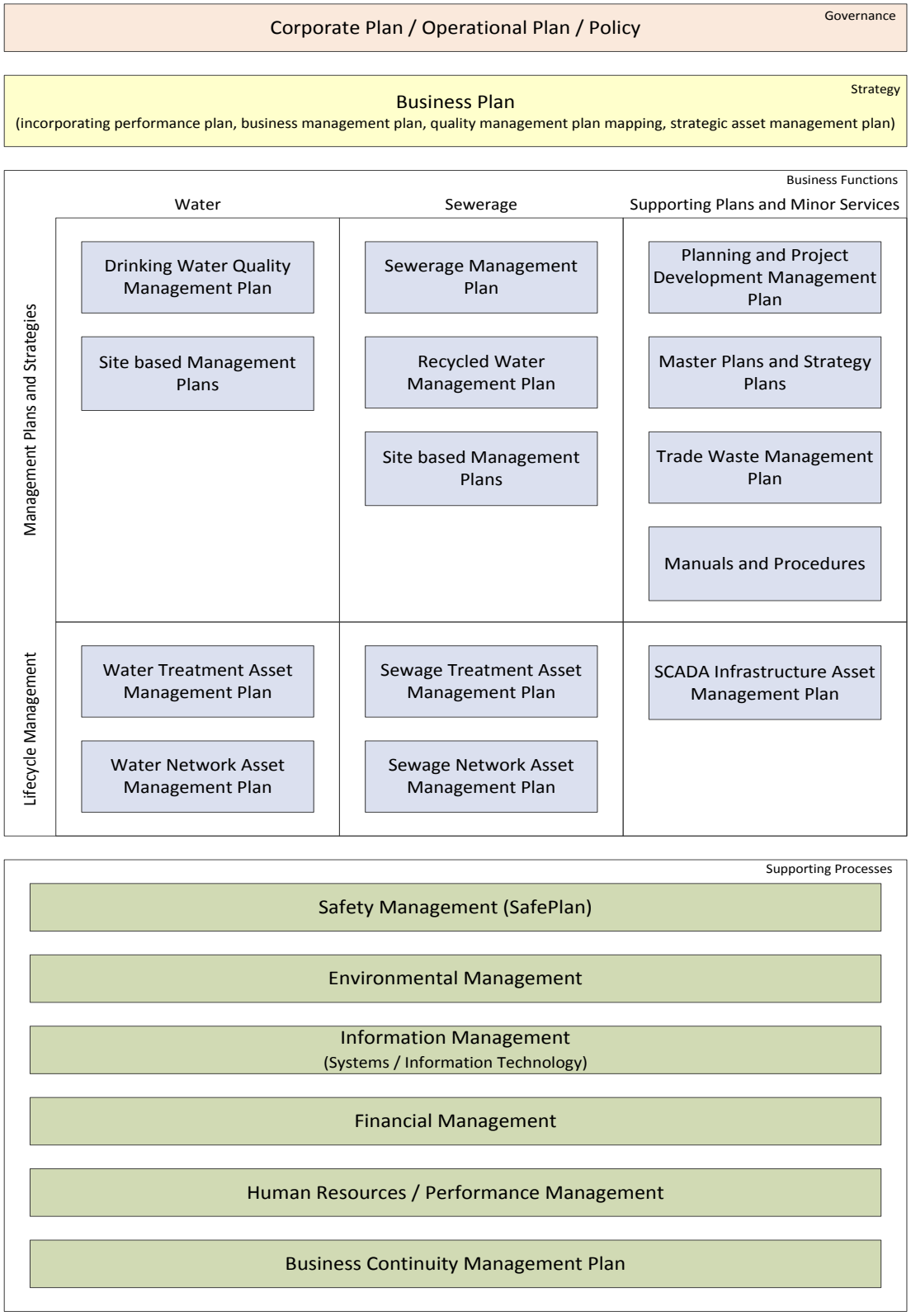

Figure 1 Mackay Water Services Quality Management System

1.3 Scope

This Water Network Asset Management Plan applies to management of all MWS water network assets. Table 1 summarises the infrastructure assets of MWS water network covered in this plan. Greater detail on the infrastructure listed in Table 1 can be found in the relevant sections of this plan.

Table 1 Existing MWS Water Network Assets Covered by this Plan

Asset Category	Quantity
Service Reservoirs	39
Pump Stations	37
Mains Network (km)	1,138
Re-chlorination systems (chlorine gas dosing)	4
Water services and meters	42,020

Note that this plan does not encompass water treatment assets, any wastewater assets and associated Supervisory Control and Data Acquisition (SCADA) software and hardware.

1.3.1 Critical Assets

Critical assets held by MWS are defined as having a criticality rating of 5. A register of assets and their criticality identified by MWS has been provided in Appendix 7 and includes those which form part of the water network.

1.3.2 Non-Critical Assets

All assets which are not classed as critical according to the criteria described in section 1.3.1.

1.4 Document Ownership, Approval and Review

This plan is owned by the Manager Planning and Sustainability; and approved by the Chief Operating Officer Water and Waste Services.

The Manager Planning and Sustainability is responsible for ensuring that this plan is reviewed every two (2) years.

The implementation of this plan is undertaken through the roles and responsibilities of those in governance of the water network assets as detailed in section 2.4.

Post the First Issue Revision 0 of this plan all amendments and changes to this plan and its associated appendices for the subsequent revisions will be recorded and captured in Appendix 1.

2. BUSINESS PRESSURES

2.1 Statutory Obligations

MRC is a registered Service Provider under the Water Supply (Safety and Reliability) Act 2008 (the Act). The Act details the powers, rights and obligations a Service Provider has under the Act. The main obligation in relation to the water network is the protection of public health through the supply of safe drinking water. Safe drinking water is considered drinking water that is not likely to cause physical harm to a person who might consume it. The water quality criteria prescribed under the Act which a Service Provider is required to meet includes the standards covered under the Public Health Act 2005, the Australian Drinking Water Guidelines 2011 (ADWG) and the Water Fluoridation Act 2008.

Furthermore under the Act, Local Government Act 2009, Environment Protection Act 1994 and Water Act 2000; MRC is obliged to appoint authorised persons/officers/inspectors to act on behalf of MRC. This is integral to the operation and maintenance activities performed in the water network where access to assets must be gained by way of residential or commercial clients' properties.

2.2 Demand, Growth and Other Factors

The factors captured in Table 2 have been identified as elements that impact on water network infrastructure[1].

Table 2 Factors Affecting Water Network Infrastructure[1]

Factor	Impact
Peak Hour (PH) and Maximum Day (MD) water consumption	Water network infrastructure downstream of the service reservoirs is designed to meet the PH and MD water demand including fire flow. If consumption exceeds the peak demand service pressures are likely to be impacted.
MD and Mean Day Maximum Month (MDMM) water consumption	Ground level water reservoirs are sized to supply 3 consecutive MDs with MDMM supply input, that is, 3 x (MD-MDMM). This ensures reservoirs to do empty under consecutive MD conditions.
MDMM water consumption	Water network trunk infrastructure supplying reservoirs is designed to accommodate MDMM water consumption under 20 hour operation.
Growth rate	Construction of new reticulation infrastructure and of new water trunk mains is programmed to align with expected growth rates. A detailed summary of population and demand changes for the MWS water supply schemes can be found in Section 2.2 of the DWQMP (Appendix 6).

[1] Sourced from CAC No. 8 Sensitivity to Planning Parameters

Factor	Impact
Out of sequence / out of Planning Infrastructure Area (PIA) development	Out of sequence or out of PIA development may bring forward the construction of new reticulation infrastructure and could increase the number of growth fronts.
Hydraulic modelling / design assumptions	Hydraulic modelling and design assumptions are relied on and incorporated into the planning and designing processes of new water network infrastructure.
Donated assets	Operations and maintenance programs and augmentation projects are influenced by donated water network assets.
Client behaviour	Overall demand is impacted by large changes in water use by clients.
Water quality requirements	The requirements for monitoring and testing and specification limits for new infrastructure are influenced by legislative requirements on safe drinking water quality criteria.
Third party asset damage	Operations and maintenance programs are adversely affected by damage to water network assets by third parties.

2.3 Business Capability

There are many factors which influence the business capability of MWS; therefore the following is a snapshot of the factors that can have an effect on the MWS's business capability in relation to the water network infrastructure operation and maintenance.

Table 3 Factors Affecting MWS's Business Capability for Water Network

Factor	Impact
Workforce age	Retirement of employees in key positions results in a significant outflow of knowledge of the network and skills from the business.
Poor transmission of knowledge	Skilled employees are reluctant and/or uncertain as to how to share their knowledge and mentor new and existing employees resulting in poor efficiencies.
Reluctance to accept change	Some employees are averse to cultural changes resulting in poor implementation of some projects.
Skills within the business	The availability, accessibility, recruitment and retention of the appropriately skilled workforce have been difficult in recent years. The main reason being competition with the mining sector and its service industries.
Service providers within MWS	There are tasks in the water network dependent on the assistance of service providers within MWS such as Planning & Sustainability and Infrastructure Delivery. Good planning and project management are integral to constructing fit-for-purpose assets.

Factor	Impact
Poor understanding of the MWS business by other MRC departments	MRC departments external to MWS such as Clients Services have a poor understanding of the MWS business resulting in client queries or internal queries not being directed to the correct MWS area. Inaccurate information can be disseminated leading to delays in relaying information or attending to work.
Pathways, Customer Request Management System	Accurate and timely data capture provided by Pathways, the customer service database, is fundamental to reliable data output which is used to assess the business's functionality and capability.
Water Gems, Water Modelling Software	Modelled scenarios are utilised to estimate design requirements and the potential effects of operational changes on the water network.
Esri. Geographic Information System (GIS) Software	Planning of future works and repair or maintenance is dependent on accurate location of existing infrastructure captured in GIS.
Drawing index, Drawing Management Database	Planning of future works and repair or maintenance is dependent on the availability of 'as constructed' drawings contained within the drawing index.
Assetic, Asset Management Software	Under implementation. Each asset will be assigned a unique Assetic identifier as per Appendix 9 and recorded according to Appendix 13 and Appendix 14.
Technology 1, Maintenance management software	Under implementation. The software will assist with the coordination, structuring and recording of maintenance tasks.
SCADA [Clear SCADA, Citect SCADA, RadTel SCADA & Multitrode SCADA]	Clear SCADA is being rolled out and will replace the various SCADA currently in place. Clear SCADA is approximately 80% rolled out over the MWS water network.
MiWater, Automatic water Meter Reading database	Under development. Used to manage Automatic Water Meter Information, District Meter Area Information, Sewer Overflow Alarms and Climatic Information. The database facilitates integration with other systems including Pathways and SCADA.
MonitorPro, operating information database	Is a data store which allows multiple users to input data and view data sets at any one time. Operational data from teams and summaries from SCADA will be manually and automatically imported into the database.
InControl, Safety and Incident Management System	Under implementation. System used to record and report workplace incidents and environmental incidents.
ECM, Document Management System	System designated by MRC as the document storage database for all external correspondence and documents of importance or key significance.
Bruce, intranet [SharePoint]	Document management system for all QMS documents. Allows MRC wide access to documents and controls document revisions. Is the single true 'point of source' for documents.
Donated assets	Many new assets for the water network are received through donation from developers after they complete their development project.

2.3.1 Key Principles, Risk and Drivers

The key principles and risks which drive the management of the water network have been summarised in Table 4. Detailed risk assessments have been performed in relation to the individual asset categories and are provided in Appendix 6 and Appendix 8.

Table 4 Key Principles and Risks Driving Water Network Management[2]

Principle and Risk	Performance Indicator
Safety of employees, stakeholders and the public is protected	No incident or injury Operations performed in accordance with legislation
Water quality is safe for consumption	Drinking water is supplied in accordance with legislated and ADWG Health limits
Water quality meets the Aesthetic Client Service Standard Requirements[3]	Drinking water is supplied in accordance with Client Service Standards[3]
Continuity of water supply meets Client Service Standards[3]	Drinking water is supplied in accordance with Client Service Standards[3]
The environment is protected	Compliance with environmental legislation
Whole of life costs are minimised	Meet planned and adopted budgets

2.4 Governance

Governance of the water network assets aligns with the MWS organisational structure as represented in Figure 2.

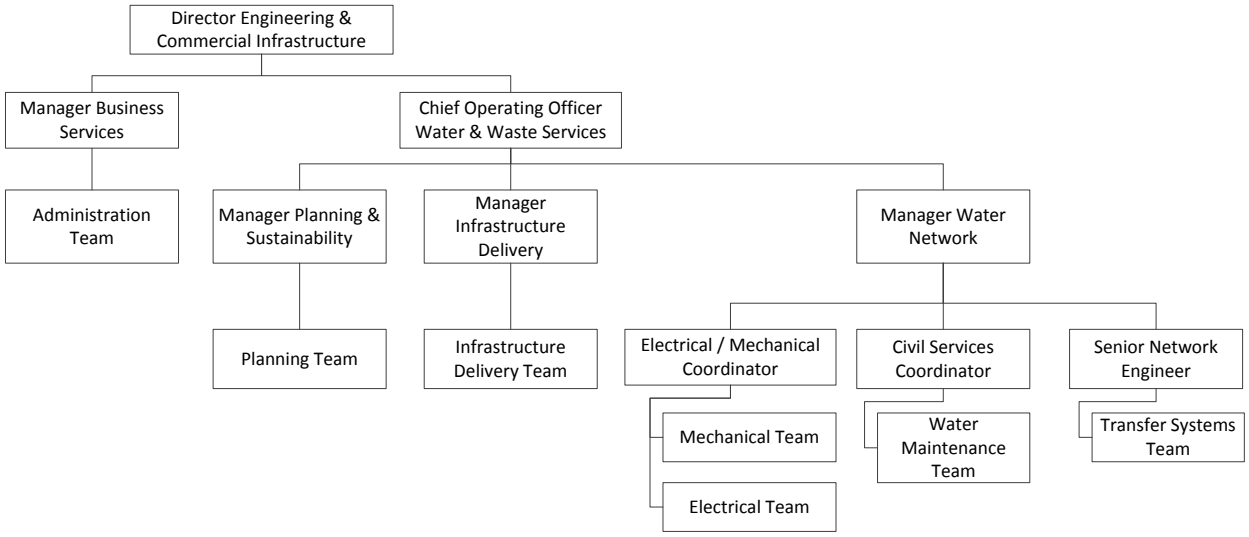

Figure 2 Mackay Water Services Water Network Governance Structure

2.4.1 Roles and Responsibilities

Table 5 provides a summary of the roles and responsibilities in the governance of the water network from the lead roles in key activities to handover activities and support services.

[2] Sourced from CAC No. 9 Information Management
[3] Captured in the Water and Waste Services Performance Plan (Appendix 5)

Table 5 Roles and Responsibilities in the Governance of the Water Network

Role	Responsibility
Director Engineering & Commercial Infrastructure (ECI)	Oversees the ECI program and communicates for the program to the Chief Executive Officer (CEO) and Council and vice versa.
Manager Business Services	Manages and coordinates the support services for MWS and the interface with clients.
Administration Team	Provide the administrative support to the water network teams in performing the scheduling and dispatch function.
Chief Operating Officer Water and Waste Services	Oversees the coordination of planning, infrastructure delivery and water network operations ensuring budget and statutory requirements are met.
Manager Planning & Sustainability	Oversees the planning of infrastructure projects, the strategic direction of MWS and allocation of capital budget in consultation with infrastructure delivery and water network teams.
Planning Team	Carry out the ground work for the investigation into and costing of options for infrastructure projects. Develop the MWS strategic plans. Maintain and run the models of the water network.
Manager Infrastructure Delivery	Oversees the delivery of infrastructure projects identified by the Planning Team and the handover of completed infrastructure to water network teams.
Infrastructure Delivery Team	Project manage the delivery of infrastructure projects.
Manager Water Network	Oversees and coordinates of the operation and maintenance of the water network.
Electrical / Mechanical Coordinator	Coordinates and supervises the programmed and reactive work required on water network electrical and mechanical assets.
Mechanical Team	Undertake the mechanical works required on water network assets.
Electrical Team	Undertake the electrical works required on water network assets.
Civil Services Coordinator	Coordinates and supervises the programmed and reactive work required on water network civil assets.
Water Maintenance Team	Undertake the civil works required on water network assets and respond to client requests.
Senior Network Engineer	Plans and coordinates the programmed and reactive maintenance on water network assets and oversees the monitoring of the water network pump stations performance.
Transfer Systems Team	Monitor and attend water network pump stations to ensure optimal and efficient performance.

In addition to the governance roles and responsibilities there are supporting departments within MRC which participate in delivering the asset management outcomes for the water network. The supporting departments and their roles and responsibilities are summarised in Table 6.

Table 6 Roles and Responsibilities of Supporting Departments to the Water Network

Role	Responsibility
Plant and Procurement	Provide assistance with contracts, orders and purchasing of goods and ensure purchasing is undertaken in compliance with MRC policy and legislative requirements. Manage the allocation, maintenance and replacement of vehicles in the MRC fleet.
Information Services	Provide information technology support in maintaining software and hardware. Ensure systems are updated and backed up.
Property Services	Manage the maintenance of buildings and workshops utilised by MRC employees. Control the number, authorisation and distribution of keys and passes to access MRC sites, buildings and infrastructure.
Financial Services	Process payments for creditors and payroll and reconcile purchasing cards.
Governance & Assets	Oversee the insurance premiums for MRC and insurance claims; and manage the financial delegation of employees.
Client Services	Receive client queries and complaints, record them and direct them to MWS to be addressed.
Human Resources	In accordance with MRC policy and legislative requirements; provide guidance and administrative support in the recruitment, retention and discipline of employees and administer the employee training matrix and remuneration packages.
Enterprise Risk and Strategic Review	Work Place Health and Safety (WHS) resides under Enterprise Risk and Strategic Review and the representatives ensure that water network operations are performed in a safe manner and undertaken according to MRC policy and legislative requirements.

3. SERVICE RESERVOIRS

3.1 Asset Class Drivers

Service reservoirs provide storage for potable water in the water network. Storage of potable water enables MWS to provide a continuity of supply to clients in the event the water treatment facility is non-operational or a peak in demand arises which exceeds the available output from the treatment facility. Storage of potable water in service reservoirs, in most cases, also allows MWS to meet pressure requirements and fire fighting flows dictated in the Client Service Standards[3].

Service reservoirs as an asset in the water network need to be managed in order to meet the storage requirements for continuity of supply and pressure and fire flow. Service reservoirs further need to be managed to ensure that the water quality of the potable water is maintained and safe drinking water is supplied from the reservoir.

3.1.1 Key Risk Drivers

Detailed risk assessments have been completed in relation to service reservoirs and are provided in Appendix 6 and Appendix 8. The key risks which have been identified as driving factors for the management of service reservoirs include:

- Increased pathogen risk from:
  - Water ingress
  - Contamination from external sources such a vermin
  - Long detention time in reservoir leading to reduced chlorine residual
- Unsafe work conditions from:
  - Poor access to reservoir roofs
  - Poor condition of reservoir, including its roof, due to age and lack of upkeep
  - Little to no safety measures such as walkway railings or caged ladders to prevent injury from a fall from height
- Security deficits allowing access to site or reservoir contents which enables vandalism and/or deliberate malicious contamination

3.2 Condition Assessment

In recent years a number of projects have been undertaken to inspect and assess the condition of service reservoirs. These projects have led to the initiation of capital works for the maintenance of service reservoirs.

A capital works project is currently in progress to undertake inspections and cleaning of all service reservoirs in the water network. The works are scheduled to be completed by the end of the 2013/2014 financial year. There are two components to the works being undertaken;

- a visual external assessment of the service reservoirs and their site from concrete condition to fencing integrity, and
- an internal assessment and clean of the reservoirs by divers.

From initial findings, reservoirs are generally structurally sound. There are leaks through floor joints and some through roof but are currently uneconomical to repair. On completion of the inspection and cleaning project the condition assessment reports will be reviewed and recommended works planned and undertaken as required.

3.2.1 Asset Capacity

Current demand requirements are being met by the existing service reservoirs.

The details of the current service reservoirs are provided in Table 7.

Table 7 Infrastructure Details for Service Reservoirs

Reservoir	Capacity (ML)	Elevation	Roof Structure
Mackay Water Supply Scheme			
Mt Pleasant no.1	17.7	Ground level	Concrete
Mt Pleasant no.2	17.7	Ground level	Concrete
Mt Pleasant no.3	17.6	Ground level	Concrete
Mt Oscar no.1	6.7	Ground level	Concrete
Mt Oscar no.2	6.7	Ground level	Concrete
Rural View	9.9	Ground level	Concrete
Blacks Beach no.1	2.11	Ground level	Concrete
Blacks Beach no.2	4.3	Ground level	Concrete
Green St	0.85	Ground level	Framed and Trussed Colourbond sheeting
Berry St	1.0	Ground level	Concrete
Mt Basset (Harbour)	5.24	Ground level	Concrete
Shoal Point	0.43	Ground level	Concrete
Silingarges Rd Reservoir	2.27	Ground Level	Concrete
Walkerston Tower	0.2	Elevated	Concrete
Farleigh	4.7	Ground level	Concrete
Seaforth	1.9	Ground level	Concrete
Bronson's Scrub no.1	0.03	Ground level	Complete tank – no separate roof
Bronson's Scrub no.2	0.03	Ground level	Complete tank – no separate roof
Ball Bay/Halliday Bay	1.6	Ground level	Concrete
Seaforth Mount Vista	0.29	Ground level	Concrete
	Currently not in service – ensure to include in maintenance schedule		
The Leap Break Tank	0.7	Ground level	Concrete
Slade Point Water Tower	0.45	Elevated	Concrete
Pollock St Pressure Vessel	0.02	Elevated	Concrete
Eton Water Supply Scheme			
Eton Hill St	0.22	Ground Level	Custom orb sheeting with recessed parapet wall
Marian Water Supply Scheme			
Marian DMA			
Marian Ground Level	1.5	Ground Level	Concrete

Reservoir	Capacity (ML)	Elevation	Roof Structure
Marian Tower	Not in service – consider whether to demolish reservoir or not and, if not, include in maintenance schedule and ensure complete disconnection from water network		
Mirani DMA			
Mirani Ground Level	1.5	Ground Level	Concrete
Mirani Tower	0.243	Elevated	Concrete with steel access door
	Not in service – consider whether to demolish reservoir or not and, if not, include in maintenance schedule and ensure complete disconnection from water network		
Finch Hatton Water Supply Scheme			
Finch Hatton	0.5	Ground Level	Concrete
Gargett Water Supply Scheme			
Owens Hill Rd	0.5	Ground Level	Concrete
Sarina Water Supply Scheme			
Mt Griffith Reservoir	2.38	Ground level	Steel
Mt Hayden Reservoir	1.60	Ground level	Concrete
Alligator Creek Balance Tank	0.17	Ground level	Steel
Sarina Reservoir 1	3.80	Ground level	Iron
Sarina Reservoir 2	2.25	Ground level	Iron
Armstrong Beach Balance Tank	0.15	Ground level	Concrete
Koumala Water Supply Scheme			
Koumala Balance Tank	0.637	Elevated	AC sheeting
Calen Water Supply Scheme			
Calen	1	Ground Level	Concrete
Bloomsbury Water Supply Scheme			
No reservoir in water network as clear water tanks at treatment facility meet storage needs.			
Midge Point Water Supply Scheme			
Midge Point	9.45	Ground Level	Concrete

3.2.2 Asset Capability / Performance

The service reservoirs capabilities currently meet the water network needs however factors have been identified which diminish the capability of some service reservoirs.

The capability of service reservoirs is dependent on the water supply scheme and water network in which they are part and the current demand. Factors identified as affecting the capability of service reservoirs in the water supply schemes are captured in Table 8.

Table 8 Factors Affecting the Capability of Service Reservoirs

Water Supply Scheme	Service Reservoir	Factor
Mackay	Ball Bay / Halliday Bay	The reservoir was constructed with a common inlet/outlet structure. The commonality of the inflow and outflow impacts on the asset performance in filling and discharging and therefore also on the water quality.
	Rural View	The reservoir was constructed with a common inlet/outlet structure. Black Beach Pump Station was constructed to correct the problems resulting from the commonality. It is noted however, if the pump station were to fail the reservoir would no longer meet its capability.
Marian	Marian Ground Level Reservoir	To meet the pressure requirements of Client Service Standards[3] a pump station has been installed to pressurize the mains network because the service reservoir being at ground level is unable to perform this function.
	Mirani Ground Level Reservoir	To meet the pressure requirements of Client Service Standards[3] a pump station has been installed to pressurize the mains network because the service reservoir being at ground level is unable to perform this function.
Midge Point	Midge Point Reservoir	The service reservoir was constructed to meet the potential high demands associated with Laguna Quays Resort, however, since the resort closed the service reservoir is oversized for the current demands. This leads to many operational issues, in particular, water quality concerns.

3.2.3 Key Gaps

Key gaps identified for reservoirs are:

- Assign accountabilities to the water network team to enable the coordination and completion of operational and maintenance tasks.
- Asset data and condition information be uploaded to Assetic.
- Scheduled maintenance of external access ladders.
- Access/ security procedures and protocols for third-party access to reservoir sites e.g. telecommunications.
- Flow meters installed on the inlet and/or outlet of service reservoirs have not been regularly read and flow balances in the water network not routinely assessed and interpreted. Investigations are planned to look into the installation of automatic water meter reading devices on the flow meters which would link into the MiWater database for easy access to flow data.
- Reservoirs to be assigned a criticality rating.

3.3 Overview of Key Strategies

3.3.1 Planning Strategy

Strategic planning reports have been developed for Mackay (Appendix 11) and Marian and Mirani (Appendix 10). The Mackay strategic planning report is scheduled to be reviewed as per the RMIP. A strategic planning report is in draft format for Sarina while the small rural schemes

including; Koumala, Eton, Finch Hatton, Gargett, Calen, Bloomsbury and Midge Point, have no strategic planning reports due to system size. The Eton water model is being developed in FY2014/15 and will be able to be used for infrastructure planning purposes going forwards.

A summary the key strategic planning projects for service reservoirs is provided in Table 9.

Table 9 Key Strategic Planning Projects for Service Reservoirs

Water Supply Scheme	Project
Mackay	Design of new service reservoir at Shoal Point to meet the expected growth. The reservoir is scheduled for 2021 however timing will be determined based on realisation of growth in the Shoal Point area.
	Anticipated growth throughout the Mackay scheme will require a service reservoir augmentation south of the Pioneer River. A site has been identified and procured in Walkerston for future service reservoir requirements.
	An investigation is being undertaken to assess the need for the Slade Point Reservoir and whether it can be taken offline and decommissioned.
All	Internal and external reservoir condition assessment work (FY13/14 and FY14/15)

3.3.2 Operational Strategy

The operational strategy for service reservoirs aims to ensure:

- the service reservoirs maintain the minimum level of water to meet demand and, where required, provide pressure to the system to meet Client Service Standards[3]
- the water in the service reservoirs is turned over regularly to prevent long detention times and degradation of water quality
- the service reservoirs are not compromised and there is no contamination of the drinking water
- where possible, to implement power savings measures, the service reservoirs are filled in low tariff periods.

Some of the service reservoir sites are a key part of the regions communications network with telecommunication companies renting space on the sites. The service reservoir sites generate a revenue through renting out part of the site, however this also poses a risk MWS as unknown contractors have access to the service reservoirs through the requirement to gain access to the telecommunication infrastructure.

3.3.3 Maintenance Strategy

The programmed maintenance strategy for all service reservoirs is detailed in the Asset Maintenance Schedule (Appendix 16) and involves:

- Monthly site visits and inspections by water network operations teams to identify any issues and rectify them in place or initiate a maintenance request in order to have the issues rectified.
- Two yearly external and structural inspections any anomalies are to be rectified in place or a maintenance request submitted if required
- Internal inspections and cleaning every five years (frequency to be adjusted based on results)

Any critical spares required for reservoirs will be captured in the Critical Spares Register (Appendix 17) and stocks will be maintained in stores at the Paget Depot.

3.3.4 Renewals Strategy

The renewal strategy for service reservoirs is taken to include the planning items detailed in section 3.3.1 and is based on the internal and external asset condition assessment outcomes for the reservoirs.

3.4 Asset Risk Management & Improvement Program

The asset risk management and improvement program (RMIP) compiled for all MWS assets including the service reservoirs in the water network has been provided in Appendix 12. In addition to the asset RMIP the DWQMP RMIP (Appendix 6) contains applicable actions for this asset category.

4. PUMP STATIONS

4.1 Asset Class Drivers

Water pump stations (WPSs) assist MWS to meet pressure and fire fighting flow requirements detailed in the Client Service Standards[3] and enable continuity of supply to clients by moving the drinking water through the water network.

Pump stations as an asset in the water network need to be managed in order reduce costs from electricity charges and meet the requirements for continuity of supply and pressure and fire flow. Pump stations further need to be managed to ensure that the water quality of the potable water is maintained and safe drinking water is supplied.

4.1.1 Key Principles, Risk and Drivers

Detailed risk assessments have been completed in relation to pump stations and are provided in Appendix 6 and Appendix 8. The key risks which have been identified as driving factors for the management of pump stations are associated include:

- Unsafe work conditions from:
    - Poor to nil access in inclement weather
    - Lifting equipment in poor condition, inoperable and/ not rated correctly for the weight of the pump
    - Water escaping under high pressure
    - Water escaping and coming into contact with electrical infrastructure such as switchboards
- Increased pathogen risk from use of contaminated tools during maintenance and repairs
- Poor quality of design and construction of donated assets resulting in reduced asset life and increased risk of failure
- Security deficits allowing access to site which enables vandalism and/or deliberate malicious damage

4.2 Condition Assessment

Water pump stations are functional. There is an unidentified risk on electrical assets including obsolete controllers. Greater than 50% of the mechanical and electrical assets are beyond their design service life and increased maintenance is required. There is a current capital project in the financial year 2014/15 to upgrade a selection of switchboards. The preliminary scope of the capital works are:

- Green Street HL Pumps. Replace Switchboard, Controller and install VSDs.
- Harbour Marina Pumps. Investigation and Implementation of Multiple Drives, control system and switchgear.
- Bronson's Scrub PS. Custom job to replace Delta M6 controller, new VSD and switchgear.
- Investigate control system to replace Hydro 2000 as these controllers as spares are no longer available.

4.2.1 Asset Capacity

Current demand requirements are being met by the existing pump stations. The details of the pump stations are provided in Table 10.

Table 10 Infrastructure Details for Pump Stations

Pump Station	No. Pumps	Capacity
Mackay Water Supply Scheme		
Dolphin Heads	2	VSD – 80 m dynamic head
Harbour Village	5	VSD Each pump 12.5 L/s Total 60 L/s
Slade Point	2	VSD Robuschi B.P.O. to 80 L/s at 46 m
Creese St	3	4.5 L/s at 69 m total dynamic head
Shuttlewood	3	VSD on each motor – setpoint 700 kPa
		2.5 L/s at 32.5 m to 6.6 L/s at 14.3 m
McEwen's Beach	3	VSD 4.4 L/s at 46 m total dynamic head
Ashburtons Rd	2	68.5 L/s at 72 m total dynamic head
Janes Creek (High Level)	2	69 L/s at 138 m total dynamic head
Golf Links	2	180 L/s
Green St (High Level)	3	8.3 L/s at 70 m total dynamic head
Cape Hillsborough	2	2.64 L/s at 65 m total dynamic head
Sunset Dr	2	VSD 1.7 L/s at 60 m total dynamic head
Mid Level	2	13.5 L/s at 25 m total dynamic head
Mount Vista Seaforth	2	2.5 L/s at 98 m total dynamic head Not currently in service – ensure to include in maintenance schedule
Bonson Scrub	3	4.5 L/s at 140 m total dynamic head
Leap View	2	1.6 L/s at 29 m total dynamic head
Illalangi	3	VSD 2.2 L/s at 65 m total dynamic head
Vines Creek	2	120 L/s at 25 m total dynamic head - Not in service
Andergrove Booster	2	40 L/s at 83 m total dynamic head - Not in service
Walkerston	2	40 L/s at 48 m total dynamic head (Duty/Stand-by)
Bold Street	2	27.5 L/s at 38 m head
Blacks Beach Booster	2	90 L/s at 29.5 m head
Eulbertie Ave Booster	2	32 L/s at 22 m head
	2	18.2 L/s at 39 m head (fire flow pumps only)
Willetts Road	2	Not in service
Florence St	2	2.3 L/s at 30 m
Eton Water Supply Scheme		
Stoney Creek	2	5.5 L/s at 64 m total dynamic head
Marian Water Supply Scheme		
Marian DMA		
Booster	5	VSD 17.7 L/s at 50 m head
Jockey	1	VSD
Transfer	2	VSD 17 L/s at 45 m head
Mirani DMA		
Booster	5	VSD 20 L/s 33 m head

Pump Station	No. Pumps	Capacity
Jockey	1	VSD
Finch Hatton Water Supply Scheme		
No pump station in water network as town is gravity fed from service reservoir.		
Gargett Water Supply Scheme		
No pump station in water network as town is gravity fed from service reservoir or fed by bore pumps.		
Sarina Water Supply Scheme		
Southside Sarina Booster	4	6.25 L/s each @ 26 m head
Hill St Booster	4	5.8 L/s each @ 58 m head
Leslie St Booster	2	0.8 L/s each @ 53 m head
Marwood	2	36 L/s each @ 24.8 m head
Alligator Creek	4	Pumps 1 & 2: 28 L/s each @ 80 m head Pumps 3 & 4: 45 L/s each @ 58 m head
Eversleigh Hills Booster	1	1.7 L/s @ 46.8 m head
Sarina Beach Booster	3	1.5 L/s each @ 45 m head (fire flow pumps)
Armstrong Beach	2	15 L/s at 50 m head
Koumala Water Supply Scheme		
No pump station in water network as town is gravity fed from service reservoir.		
Calen Water Supply Scheme		
No pump station in water network as town is gravity fed from service reservoir or fed by booster pumps at treatment facility.		
Bloomsbury Water Supply Scheme		
No pump station in water network as town is fed by booster pumps at treatment facility.		
Midge Point Water Supply Scheme		
No pump station in water network as town is gravity fed from service reservoir or fed by high lift pumps at treatment facility.		

4.2.2 Asset Capability / Performance

The capability of pump stations is dependent on the role they play in the water network i.e. whether they transfer water from one area to another or whether they are used to boost pressure or a combination of both. The following points highlight key capability requirements for pump stations.

- With variations in demand booster pump stations will require to be able to ramp up or down to supply the differing flows needed and maintain a specified pressure set point.
- Booster pump stations must be sized correctly to be able to supply both the peak and low demand flows as well as not damage downstream mains due to high pressure caused by peak flows or creating pressure transients which exceed the hydraulic capabilities of the mains.
- Transfer pump stations must be sized correctly to be able to supply 20 hours MDMM flow as well as not damage downstream mains due potential pressure transients which exceed the hydraulic capabilities of the mains.
- Pump stations need to be able to pump efficiently and smoothly.
- Critical pump stations need the capacity to be able to pump when mains electricity supply is unavailable i.e. to be able to have a generator connected to the switchboard.

4.2.3 Key Gaps

The key gaps identified for pump stations are

- Asset data and condition information is unavailable for civil, mechanical, electrical assets to inform and provide confidence to the water pump station renewals program.
- Asset data and condition information be uploaded to Assetic.
- Pump stations to be assigned a criticality rating and uploaded to Assetic.
- Identification of critical spares for pump stations.

4.3 Overview of Key Strategies

4.3.1 Planning Strategy

Strategic planning reports have been developed or are under development as described in section 3.3.1.

A summary the key strategic planning projects for pump stations is provided in Table 11.

Table 11 Key Strategic Planning Projects for Pump Stations

Scheme	Project
All Schemes	AMW1 – Condition Assessment and Asset Data Capture of 46 Water Pump Stations to be completed in FY2014/15

4.3.2 Operational Strategy

The operational strategy for pump stations aims to:

- pressurize the system to meet Client Service Standards[3]
- ensure sufficient volume is pumped to maintain continuity of supply
- prevent contamination of drinking water
- operate so as to minimise the number of starts
- operate mostly in low tariff periods under AD demands

4.3.3 Maintenance Strategy

The programmed maintenance strategy for critical pump stations is detailed in the Asset Maintenance Schedule (Appendix 16) and involves:

- Weekly site visits and inspections by the Transfer System Team to identify any issues and rectify them in place or initiate a maintenance request in order to have the issues rectified.
- Annual Pump Maintenance for critical pumps and pumps greater than 15kW as per the manufacturers recommendations
- Non critical pumps less than 15kW will be run to failure

Reactive maintenance will be performed on non-critical pump stations as required and works undertaken will be assessed as needed at the time.

Any critical spares required for the pump stations will be captured in the Critical Spares Register (Appendix 17) and stocks will be maintained in stores at the Paget Depot.

4.3.4 Renewals Strategy

The renewal strategy for pump stations is developed from items detailed in section 4.3.1 and section 4.3.3.

4.3.5 Asset Risk Management & Improvement Program

The asset RMIP compiled for all MWS assets including the pump stations in the water network has been provided in Appendix 12. In addition to the asset RMIP the DWQMP RMIP (Appendix 6) contains applicable actions for this asset category.

5. MAINS NETWORK

5.1 Asset Class Drivers

The mains network performs the function of the water carrier from the treatment facility to the clients in water network, via service reservoirs and pump stations, and is the major element of the water network. The mains network is composed of many different pipeline types and sizes dependant on the volumes required to be moved, the pressure the water is moving under and the environment in which the pipeline is situated.

The mains network is managed to ensure continuity of supply and safe drinking water is supplied to clients.

5.1.1 Key Principles, Risk and Drivers

Detailed risk assessments have been completed in relation to the mains network and are provided in Appendix 6 and Appendix 8. The key risks which have been identified as driving factors for the management of the mains network include:

- Unsafe work conditions from:
    - Close proximity to other services such as electrical and gas lines
    - Depth of some pipelines requires working in a trench
    - Assets are located under roads and work is required to be undertaken in the road
    - Pipelines are constructed using asbestos
    - Assets are inaccessible due to being built over or covered e.g. by a road surface
- Increased pathogen risk from:
    - Ingress due a break in a pipeline
    - Failure of backflow prevention device
- Loss of supply to critical commercial and residential clients such as hospitals and dialysis patients
- Poor quality of design and construction of donated assets resulting in reduced asset life and increased risk of failure
- Loss of supply due to critical main failure or incorrect valve isolation on critical main

5.2 Condition Assessment

Minimal asset condition work has been completed on water mains. There has been a 5 year renewals program for water mains developed on performance information and attributes. Mackay benchmark low in water main breaks compared with the industry. Before commencement of replacements, condition assessments of a sample of mains are required. Main issues anticipated will be with:

- Cast Iron mains installed prior to 1950s not cement lined
- Asbestos Cement mains installed prior to 1980s with natural rubber joint failures
- Small diameter poly lines suffering multiple bursts in the one area where compromising installation techniques were allowed

Condition assessment has begun for valves this 2014/15 financial year. A greater sample of valves will provide a clearer indication into the condition of the fleet.

Condition assessment has begun for hydrants this 2014/15 financial year. Based on flow and pressure tests, there are some concerns around fire hydrant condition within Sarina and older areas of Mackay City impacting performance. A greater sample of hydrants will give provide a clearer indication into the condition of the fleet.

5.2.1 Asset Capacity

Current demand requirements are being met by the existing mains network. The details of the mains networks are provided in Table 13.

Table 12 Infrastructure Details for Mains Network

Type	Diameter (mm)	Approx. Mean Age (Years)	Age Range (Years)	Length (km)
Mackay Water Supply Scheme				
AC	100 - 675	37	31 – 79	273.17[2]
CI	32[2] - 450	57	61 – 85	24.1
CICL	75 - 600	59	151 – 85	33.78
DI & DICL	100 - 750	17	3 –	86.79

Type	Diameter (mm)	Approx. Mean Age (Years)	Age Range (Years)	Length (km)
			501	
GRP	600	25	25	5.24
GWI	50	35	35	0.08
HDPE	60 - 200	16	15 - 22	0.16
HOBAS	300	26		0.68
MDPE	32 - 100	8	1 - 40	8.33
PE/PE80/PE100	63 - 600	3	1 - 541	1.028
PP	40 - 63	10	3 -	2.17

Type	Diameter (mm)	Approx. Mean Age (Years)	Age Range (Years)	Length (km)
			15	
PVC[3]	32 - 600	25	1 - 721	379.21
RCP[4]	500	56		8
SSSW	300	46		0.07
ST & MSCL	50 - 825	35	2 - 54	12.52
Eton Water Supply Scheme				
AC	100 - 150	50	152 - 52	7.36[2]

Type	Diameter (mm)	Approx. Mean Age (Years)	Age Range (Years)	Length (km)
PVC[3]	100 - 150	15	14 to 15	1.67[2]
unknown	100 - 150	45	43 to 52	0.88
Marian Water Supply Scheme				
Marian DMA				
AC	100 - 200	35	30 to 37	9.93
PVC[1]	63[2] to 200	10+	1 to 18	26.89

Type	Diameter (mm)	Approx. Mean Age (Years)	Age Range (Years)	Length (km)
DICL	150 - 250	2	2	0.1
MPDE	63	5	3 - 8	0.22
Mirani DMA				
AC	100 - 150	36	36	7.14
PVC[1]	150 - 250	10	1 to 21	15.08
DICL	150 - 250	6	1 to 12	0.4
MPDE	200	12	12	0.08
Finch Hatton Water Supply Scheme				
AC	100 - 150	34	34	4.32

Type	Diameter (mm)	Approx. Mean Age (Years)	Age Range (Years)	Length (km)
MPVC/UPVC	100 - 250	4	4 to 5	1.04
PP	32 - 50	5	5	0.08
Gargett Water Supply Scheme				
MDPE	150 – 200	5	5	0.115
UPVC	100 - 150	5	2 to 5	3.56
PP[2]	50 - 63	5	5	2.2[2]
Sarina Water Supply Scheme				
AC	100, 150, 200, 250 300	48	30 – 53	53.13
DI & DICL	100, 150, 200, 250 300		3 to 53[1]	27.87

Type	Diameter (mm)	Approx. Mean Age (Years)	Age Range (Years)	Length (km)
GS	32, 150	53[2]		0.10
HDPE & PE100	32, 40, 50, 250	10	3 to 22	4.32
PP	32, 40, 50, 63		19 to 531	0.60
PVC	50, 100, 150, 200, 250		1 to 511	67.47
Unknown	100 - 250		4 to 53	3.20
Koumala Water Supply Scheme				

Type	Diameter (mm)	Approx. Mean Age (Years)	Age Range (Years)	Length (km)
	100 - 150			
Calen Water Supply Scheme				
PVC	100 - 150	10	10	6.71
AC	100 - 150			
DICL	200	10	10	0.22
Bloomsbury Water Supply Scheme				
DICL	150 - 375	10	3-12	2.37
Polyethylene[2]	32 - 63	7	7	1.3
ST	375	12	12	0.19
UPVC	32[2] - 250	10	7-12	5.65[2]
Seaforth District Metered Zone * note these statistics are also included within the Mackay Scheme details above.				
DICL	100 - 250	20	10-21	3.79
Polyethylene	63	8	8	.07

Type	Diameter (mm)	Approx. Mean Age (Years)	Age Range (Years)	Length (km)
PVC	63 - 250	12	2 - 31	10.66
UPVC	63 - 200	8	10 - 18	1.37
Midge Point Water Supply Scheme				
DICL	300 - 375	22	22	18.35
PVC[3]	100 - 200	20	3 to 22	7.87
MDPE	63	3		0.06
Unknown	375	22		19.37

Notes

1. Age does not correspond with known product manufacture dates
2. Data requires validation
3. PVC includes PVC, UPVC, OPVC and MPVC
4. Raw water pipeline to Nebo Rd WTP

Details on valves, hydrants and flow meters are currently not available; refer to section 5.2.3.

5.2.2 Asset Capability / Performance

The capability of the mains network is linked to the ability to provide continuous supply of safe drinking water without significant costs and water loss. The following points highlight the key capability requirements for the mains network.

- The pipelines in the mains network must be able to carry drinking water without compromising on water quality.
- The pipelines in the mains network must be able to carry drinking water without significant loss of structural integrity leading to pipeline deterioration and failures resulting in water loss and costly maintenance.
- The mains network should be able to provide a drinking water supply that meets the Client Service Standards.

The current fire flow and pressure performance of the mains network in Mackay, Marian, Mirani and Sarina is presented in Appendix 20 through to Appendix 27.

5.2.3 Key Gaps

The key gaps identified regarding the mains network include:

- Valve and hydrant condition assessment.
- Condition assessment of water mains.
- Condition assessment information to be uploaded to Assetic.
- Water mains, valves and hydrants to be assigned a criticality rating and uploaded to Assetic.
- Identification of critical spares for water mains.
- Backflow device / valve checking program.
- Details and lines of communication with critical customers.
- Formal lines of communication with Queensland Fire and Emergency Services in regards to critical fire hydrants.

5.2.4 Planning Strategy

Strategic planning reports have been developed or are under development as described in section 3.3.1.

The following key strategic planning projects for the mains network are provided:

- In 13/14 financial year a survey of the valves and hydrants in Mackay, Marian, Mirani, Sarina, Midge Point and Calen water supply schemes was undertaken. Valves and hydrants missed through the survey will be located by MWS networks staff and in the 14/15 financial year the details will be uploaded to Assetic and MADI. The valve and hydrant survey will assist in re-aligning water mains to the correct spatial alignment.
- In the 14/15 financial year survey of the valves and hydrants in the Koumala, Finch Hatton, Gargett and Eton water supply schemes. The details will be uploaded to Assetic and MADI.
- 5 Year water mains renewal program (FY14/15).
- Pipe internal asset condition assessment.

Additionally to assist in planning projects the policy regarding the requirements for clearance to assets (Appendix 15) has been developed.

5.2.5 Operational Strategy

The operational strategy for the mains network aims to:

- minimise water loss, loss of supply and contamination through quick response to leaks and breaks.
- prevent contamination of drinking water through the implementation of approved standard operating procedures (SOPs).

5.2.6 Maintenance Strategy

The programmed maintenance strategy for the mains network is detailed in the Asset Maintenance Schedule (Appendix 16) and involves:

- mains identified as critical having scheduled works undertaken with specific maintenance plans determined for each critical main
- mains that are identified as non-critical will be reactive maintenance only
- scheduled annual inspections for generic network assets with maintenance works assessed and undertaken at the time or a maintenance request generated to be scheduled at a later date

Any critical spares required for the pump stations will be captured in the Critical Spares Register (Appendix 17) and stocks will be maintained in stores at the Paget Depot.

5.2.7 Renewals Strategy

The renewal strategy for the mains network is taken to include the planning strategy items detailed in section 5.2.4 and is based on the 5 year water main renewals program.

5.3 Asset Risk Management & Improvement Program

The asset RMIP compiled for all MWS assets including the mains in the water network has been provided in Appendix 12. In addition to the asset RMIP the DWQMP RMIP (Appendix 6) contains applicable actions for this asset category.

6. RE-CHLORINATION SYSTEMS

6.1 Asset Class Drivers

Re-chlorination systems are implemented within the water network to ensure that disinfection of drinking water is maintained and safe drinking water is supplied to clients. Re-chlorination systems are set up at locations within the water network where water quality data has provided evidence of low to nil free chlorine residual in the drinking water. The presence of free chlorine residual in drinking water indicates that the water has been fully disinfected. Lack of or low free chlorine residual increases the risk to consumers if contamination does occur as the water does not have the capacity to disinfect additional contamination.

Re-chlorination systems are operated to ensure the free chlorine residual in the drinking water is maintained at level which confirms full disinfection to the extremities of the water network.

6.1.1 Key Principles, Risk and Drivers

Detailed risk assessments have been completed in relation to the re-chlorination systems and are provided in Appendix 6 and Appendix 8. The key risks which have been identified as driving factors for the management of the re-chlorination systems include:

- Working with the hazardous chemical chlorine gas
- Inadequate disinfection through under dosing or no dose of chlorine
- Client complaints due to an overdose of chlorine

6.2 Condition Assessment

There has been a comprehensive condition assessment of all sites including rural schemes. A rectification program has been undertaken and nearing completion.

6.2.1 Asset Capacity

Current demand requirements are not being met by the existing re-chlorination systems. This is due to the requirement for manual dosing of chlorine tablets at service reservoirs to boost the free chlorine residual levels in the drinking water to ensure effective disinfection. The details of the re-chlorination systems are provided in Table 14.

Table 13 Infrastructure Details for Re-chlorination Systems

Facility	Set up	Chlorinators	Alarms	Auto Shut-off arrangement	Dose Rate (mg/L)
Mackay Water Supply Scheme					
Golf Links WPS	Chlorine Gas. Fixed arrangement with two 70 kg cylinders (duty/standby) and vacuum delivery system on scales	Chlorinator 2 x 0.5 kg/L Booster Pump	Yes	Yes	1.5
Janes Creek	Chlorine Gas.	Chlorinator 2	Yes	Yes	1.5

Facility	Set up	Chlorinators	Alarms	Auto Shut-off arrangement	Dose Rate (mg/L)
WPS	Fixed arrangement with two 70 kg cylinders (duty/standby) and vacuum delivery system on scales	x 0.5 kg/L Booster Pump			
Walkerston WPS	Chlorine Gas. Fixed arrangement with one 70 kg cylinder and vacuum delivery system on manual scale	Chlorinator 1 x 0.5 kg/L Booster Pump	Yes	Yes	0.4
Mt Bassett Reservoir	Chlorine Gas. 2x70kg gas cylinders.	2x0.5 L/s rated pumps	Yes	Yes	0.8
Shoal Point Reservoir	Chlorine Gas. 2x70kg gas cylinders.	2x0.5 L/s rated pumps	Yes	Yes	1.3
The Leap	Chlorine Gas. Fixed arrangement with two 70 kg cylinders (duty/standby) and vacuum delivery system on scales	NA	NA	NA	NA
Seaforth Reservoir	Chlorine Gas. Fixed arrangement with two 70 kg cylinders (duty/standby) and vacuum delivery system on scales	2*.189 Kg/H and flow paced pumps	Yes	Yes	1
Eton Water Supply Scheme					
N/A					
Marian Water Supply Scheme					

Facility	Set up	Chlorinators	Alarms	Auto Shut-off arrangement	Dose Rate (mg/L)
N/A					
Mirani Water Supply Scheme					
N/A					
Finch Hatton Water Supply Scheme					
N/A					
Gargett Water Supply Scheme					
N/A					
Sarina Water Supply Scheme					
Armstrong Beach	NA	NA	NA	NA	NA
Alligator Creek	NA	NA	NA	NA	NA
Koumala Water Supply Scheme					
N/A					
Calen Water Supply Scheme					
N/A					
Bloomsbury Water Supply Scheme					
N/A					
Midge Point Water Supply Scheme					
Midge Point Reservoir	Chlorine Gas. Fixed arrangement with two 70 kg cylinders (duty/standby) and vacuum delivery system on scales	2*.189 Kg/H and flow paced pumps	Yes	Yes	1

6.2.2 Asset Capability / Performance

The capability of the re-chlorination systems is linked to the ability of the system to apply a sufficient chlorine dose to the drinking water to maintain the free chlorine residual and therefore disinfection. The following points highlight the key capability requirements for the re-chlorination systems.

- The re-chlorination system must be able to apply variable doses of chlorine gas to drinking water maintain the target free chlorine residual set out in the Critical Control Point (CCP) procedure (Appendix 18).
- The re-chlorination system must be able to be operated safely due to the presence of the hazardous chemical chlorine gas.

6.2.3 Key Gaps

Key gaps are:

- Link into telemetry and therefore SCADA of the alarms associated with chlorine gas leaks and system isolations at the above mentioned facilities is required to be set up.
- Load re-chlorination assets into Assetic.
- Identification of critical spares for re-chlorination systems.

6.3 Overview of Key Strategies

6.3.1 Planning Strategy

Strategic planning reports have been developed or are under development as described in section 3.3.1. CDPB14-07 has been prepared to install chlorine gas leak detection units and automatic shut off systems at Janes Creek WPS, Golf Links WPS and Walkerston WPS re-chlorination facilities. These systems are being installed within the 2014-15 financial year.

6.3.2 Operational Strategy

The operational strategy for the re-chlorination systems aims to ensure that disinfection residual is maintained throughout the water network

6.3.3 Maintenance Strategy

The programmed maintenance strategy for the critical re-chlorination system components is detailed in the Asset Maintenance Schedule (Appendix 16) and involves

- weekly operational site visits and statutory testing
- annual servicing by external contractors

Reactive maintenance will be performed on the non-critical re-chlorination system components as required and works undertaken will be assessed as needed at the time.

Any critical spares required for the re-chlorination systems will be captured in the Critical Spares Register (Appendix 17) and stocks will be maintained in stores at the Paget Depot.

6.3.4 Renewals Strategy

There is no specific renewal strategy for the re-chlorination systems as the annual servicing undertaken under the Maintenance Strategy includes the replacement of components identified as in need of replacement.

6.4 Asset Risk Management & Improvement Program

The asset RMIP compiled for all MWS assets including the re-chlorination systems in the water network has been provided in Appendix 12. In addition to the asset RMIP the DWQMP RMIP (Appendix 6) contains applicable actions for this asset category.

7. WATER SERVICES, CUSTOMER METERS AND FLOW METERS

7.1 Asset Class Drivers

Water services and customer meters are the point of delivery of drinking water to clients. The outlet of a customer water meter is the point at which MRC's ownership of infrastructure ends and drinking water is supplied to clients.

Water services and customer meters are managed to ensure continuity of supply to clients and accuracy and reliability of the water flow readings.

Flow meters are installed in the water network to read flows and understand the network water balance so that non-revenue water and leakage can be accurately measured and locations of leaks can be identified for repair.

7.1.1 Key Principles, Risk and Drivers

A detailed risk assessment has been completed in relation to water services, customer meters and flow meters and is provided in Appendix 8. The key risks which have been identified as driving factors for the management of water services, customer meters and flow meters include:

- Loss of supply through damage to services and meters
- Overcharge of client or loss of income due to inaccurate meter reading
- Unsafe work conditions from the building electrical supply being connected to the pipes
- Maintenance and readings cannot be performed as meters are inaccessible due to dangerous dogs or clients or they are located behind fences and gates

7.2 Condition Assessment

Water services are performance assessed based on performance history and attribute information. This financial year a rolling program of water service replacements exists based on desktop assessment to replace water services. The domestic customer water meter fleet is in good condition. There is a low level of confidence on the condition of commercial customer meter fleet. In the 2014/15 financial year, 142 of the highest risk commercial meters are to be replaced including a sampling program to test performance.

All flow meters within the network have recently been audited. The audit found a large number of the water pump stations in the network appear to have to a flow meter installed on either the suction or discharge mains from the pump station. However, many of these are older mechanical models with little or no maintenance since installation. There is no record of calibration for any of the flow meters. There are a number of pump station flow meters not connected to SCADA. For many of them, a MWS Networks staff member documents the meter reading in a log book kept inside the pump station buildings. This is usually undertaken on a weekly or monthly basis.

There are currently four DMAs that have been installed and are metered through a total of five ABB AquaMaster electromagnetic flow meters. Currently, the data from these meters is fed back to a stand-alone computer. It is understood that this data is not currently utilised by MWS and has not been reviewed in any detail. Infrastructure Delivery is installing Taggle devices on these 4 DMA flow meters.

7.2.1 Asset Capacity

Current requirements are being met by the existing water services and customer meters. The details of the customer water meters and Automatic Water Meter Readers (AMR) are provided

in Table 15. The number of water services number approximately 21,010 based on the ratio of one water service for every 2 customer meters. The number of flow meters within the network numbers 85.

Table 14 Infrastructure Details for Customer Water Meters

Meter	Count at 2014-2 Billing Period	Number Tagged AMR Installed
Mackay Water Supply Scheme		
Residential	33,339	26,067
Non-Residential	2,689	
Eton Water Supply Scheme		
Residential	168	158
Non-Residential	10	
Marian Water Supply Scheme		
Marian DMA		
Residential	1,111	
Non-Residential	30	
Mirani DMA		
Residential	480	

Meter	Count at 2014-2 Billing Period	Number Tagged AMR Installed
Non-Residential	39	
Finch Hatton Water Supply Scheme		
Residential	108	1
Non-Residential	23	
Gargett Water Supply Scheme		
Residential	87	
Non-Residential	23	
Sarina Water Supply Scheme		
Residential	3,123	1,942
Non-Residential	180	
Koumala Water Supply Scheme		
Residential	61	72
Non-Residential	10	
Calen Water Supply Scheme		
Residential	117	
Non-Residential	29	
Bloomsbury Water Supply Scheme		
Residential	31	
Non-Residential	3	

Meter	Count at 2014-2 Billing Period	Number Tagged AMR Installed
Midge Point Water Supply Scheme		
Residential	341	
Non-Residential	18	

7.2.2 Asset Capability / Performance

The capability of the water services customer meters and flow meters are linked to the ability of the assets to provide continuous supply to clients and reliable and accurate flow readings. The following points highlight the key capability requirements for the water services and meters.

- Water services are required to ensure continuity of supply and negligible water loss
- Water meters are required to reliably and accurately measure and record total water flow

MWS are currently installing AMR devices on all water meters to enhance the ability to monitor and measure water flow. The goal of the project is to enable real time monitoring of water consumption at each property to allow for detection of water leaks and excessive water use as well as assist in the identification of opportunities for the implementation of demand management activities.

7.2.3 Key Gaps

Key gaps are:

- There is currently no water services asset data list.
- General condition of commercial customer water meter fleet is unknown.
- Flow meters require condition assessment and a calibration program to be developed.
- Water services, customer meters and flow meters specification data to be uploaded to Assetic.

- Existing flow meters require replacement (based on condition) or connection to SCADA and new flow meters require installation to determine network water balance.
- Criticality of water services, customer meters and flow meters to be identified an uploaded to Assetic.
- Identification of critical spares for water services, customer meters and flow meters.

7.3 Overview of Key Strategies

7.3.1 Planning Strategy

The planning strategy for water services and meters and AMR devices is the development of replacement programs, when required, as per the renewals strategy in section 7.3.4, and to utilise the AMR data collected to identify potential opportunities for implementation of demand management initiatives.

The planning strategy for the flow meters are detailed in Task Request 53 “Leak Detection and Demand Management” report.

7.3.2 Operational Strategy

The operational strategy for water services, customer meters, flow meters and AMR devices aims to ensure continuity of supply and reliable and accurate readings and records of flow.

The operational strategy further aims to utilise the AMR data collected to detect water leaks and to notify clients of potential leaks as per the procedure provided in Appendix 19. This will enable the clients to repair the leak and save on their water bill while reducing the demand on the water network.

7.3.3 Maintenance Strategy

Reactive maintenance will be performed on the water services, customer meters, flow meters and AMR devices as required and works undertaken will be assessed as needed at the time.

A bi-annual calibration program for flow meters will be undertaken completed by the manufacturer or specialist contractor.

Any critical spares required for the water services and meters are captured in the Critical Spares Register (Appendix 17) and stocks are maintained in stores at the Paget Depot.

7.3.4 Renewals Strategy

Water services are operated to failure and will only be replaced when required. Failure is defined as 3 breaks or more.

Domestic water meters are to be replaced when an approximate flow of 4.2 ML has passed through them. The current replacement program due to be completed by the end of 2014 is replacing meters based on the flow trigger of 4.2 ML or age of ten (10) years. The age trigger will be dropped for future renewals following experience gained through the Water Services Association of Australia (WSAA) Metering Group and the industry trend of basing renewals on capacity not age triggers.[4]

Commercial water meters are to be replaced with priority focused on highest revenue meters. 25-32 mm meters shall be replaced after 15 ML has passed through the meter. 40 mm meters will be replaced after 20 ML has passed through the meter. Meters 50 mm and greater will be

[4] Sourced from CAC No. 13 Service Standards Review

replaced on experience gained through the Water Services Association of Australia (WSAA) Metering Group and the industry trend.

AMR devices are to be replaced at the end of their useful life of 10 years and the renewals strategy will be aligned with the water meter replacement program.

7.4 Asset Risk Management & Improvement Program

The asset RMIP compiled for all MWS assets including the water services and meters in the water network has been provided in Appendix 12.

8. GLOSSARY

Term	Definition
Asset class	Grouping of assets of a similar nature and use in an entity's operations (AASB 166.37).
Asset condition assessment	The process of continuous or periodic inspection, assessment, measurement and interpretation of the resultant data to indicate the condition of a specific asset so as to determine the need for some preventative or remedial action.
Asset management	The combination of management, financial, economic, engineering and other practices applied to physical assets with the objective of providing the required level of service in the most cost effective manner.
Assets	Future economic benefits controlled by the entity as a result of past transactions or other past events (AAS27.12). Property, plant and equipment including infrastructure and other assets (such as furniture and fittings) with benefits expected to last more than 12 month.
Component	An individual part of an asset which contributes to the composition of the whole and can be separated from or attached to an asset or a system.
Infrastructure assets	Physical assets of the entity or of another entity that contribute to meeting the public's need for access to major economic and social facilities and services, eg. roads, drainage, footpaths and cycleways. These are typically large, interconnected networks or portfolios of composite assets The components of these assets may be separately maintained, renewed or replaced individually so that the required level and standard of service from the network of assets is continuously sustained. Generally the components and hence the assets have long lives. They are fixed in place and are often have no market value.

Term	Definition
Level of service	The defined service quality for a particular service against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental, acceptability and cost).
Planned Maintenance	Repair work that is identified and managed through a maintenance management system (MMS). MMS activities include inspection, assessing the condition against failure/breakdown criteria/experience, prioritising scheduling, actioning the work and reporting what was done to develop a maintenance history and improve maintenance and service delivery performance.
Reactive maintenance	Unplanned repair work that carried out in response to service requests and management/supervisory directions.
Risk management	The application of a formal process to the range of possible values relating to key factors associated with a risk in order to determine the resultant ranges of outcomes and their probability of occurrence.
Useful life	Either: (a) the period over which an asset is expected to be available for use by an entity, or (b) the number of production or similar units expected to be obtained from the asset by the entity. It is estimated or expected time between placing the asset into service and removing it from service, or the estimated period of time over which the future economic benefits embodied in a depreciable asset, are expected to be consumed by the council. It is the same as the economic life.

9. REFERENCES

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