5.8. DSC WATER SUPPLY SECURITY, RELIABILITY AND RESILIENCE STRATEGY

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RECOMMENDATION

That Council resolves to approve and progressively implement the initiatives below, subject to available budget allowances:

- **Short term strategy initiatives for the Douglas Shire Council water supply systems as follows:**
  - **The project scheme for the provision of a 20ML reservoir at Craiglie be constructed without delay for target completion in January 2018.**
  - **Investigation work be continued to assess the suitability and viability of Proposed Site - Drumsara Quarry area on the Mossman River to be developed as the next potential source for the Mossman/Port Douglas system.**
  - **Assessment of proposals for the refurbishment/upgrade of the waste recovery system at the Mossman Treatment Plant be continued with a view to undertaking the work as soon as funds are available.**
  - **A project be established to investigate, locate and repair any significant water leaks in the Mossman/Port Douglas/Whyanbeel reticulation system.**
  - **Work be undertaken for the establishment of a whole of water system model and network analysis for the Mossman/Port Douglas system and this be followed by similar work for the remaining water supply network.**
  - **Concept planning be undertaken to assess the options and benefits for further upgrading the interconnection of the Mossman and Whyanbeel reticulation systems.**
  - **Douglas Shire Council continue to work with Department of Energy and Water Supply (DEWS) on a project partnership to achieve a shared understanding of existing water supply capability and risk, future population growth and water demand.**

- **Medium term strategy initiatives for the Douglas Shire Council water supply systems be approved as follows:**
  - **Further investigations be undertaken for the establishment of a suitable scheme for the reticulation of recycled water and a Business Case Report be developed to be ready for submission should grant funding become available.**
  - **Investigate supplementary supply options in the Daintree catchment via bore water options during wet season creek intake supply issues.**
  - **Concept planning commence for the introduction of a system of "smart meters" throughout the water service areas.**

EXECUTIVE SUMMARY

Water supply security, reliability and resilience is an important issue for Douglas Shire as there is no large dam storage available and the Shire suffers annually from water shortage and restriction events.

The construction of the new 20ML Craiglie reservoir is an important step in the journey to greater water reliability, however there are a number of key strategies proposed to increase Council's reliability and resilience of supply for our residential and commercial customers.

These key recommendations are contained in the report and have been discussed with the Water Regulation DEWS as well as our internal and external consultant team. The recommendations are costed and divided into short term and medium term strategies and will be put up to Council for further consideration in the 2017/18 budget determinations.

The risk of not understanding these strategies is that we will remain in our existing paradigm of ongoing annual water restrictions and run the risk of reputational damage if Council fails to provide reliable and good quality potable drinking water for the Shire.

BACKGROUND

Douglas Shire Council water supply operations are regulated through various items of State Legislation including the *Water Act 2000* and the *Water Supply (Safety and Reliability) Act 2008*. The Water Act determines the procedures and regulations for the use of a natural water source, e.g. Rex Creek. Conditions for the extraction of water for the water service areas of Douglas Shire are contained in water licences granted by the Department of Natural Resources and Mines. The Safety and Reliability Act imposes obligations upon the service provider to ensure the water supply system is operated efficiently, provides a safe and reliable supply of water and adheres to a documented set of customer service standards. To assist in the achievement of these obligations, the Council is empowered to set demand management targets and if necessary, alter the supply to premises.

The Council commissioned the preparation of a report "Mossman Water Security Planning Report – Reliability Assessment Report" from consulting engineers, GHD. The report will assist with consideration of options for the development of short and medium term strategies for achieving safe and reliable water supplies in the Douglas Shire.

COMMENT

This report reviews and discusses the current status of the Mossman/Port Douglas Water Supply System and identifies opportunities to enhance the reliability, security, resilience and financial wellbeing of the undertaking. A report "Mossman Water Security Planning Report – Reliability Assessment Report" prepared by GHD Consulting Engineers and dated December 2016 (GHD Report) has been used in part to inform the discussion and recommendations in this report. The GHD Report references and builds on earlier reports on this subject.

Technical options for the achievement of sustainability, reliability and resilience targets must be balanced with affordability and stakeholder support. The attached report outlines consideration of options and makes recommendations for the adoption of strategies under the headings of:

- Water source security
- New source option assessment
- System configuration and operation
- Recycled water opportunities
- System diversification opportunity
- Demand management
- It should be noted that another report will be submitted detailing options for demand management strategies and water pricing in May 2017.

PROPOSAL

The proposed recommendations contained in this report addresses short term and medium term strategy initiatives to further improve the reliability and resilience of water supply in Douglas Shire. The recommendations have also been discussed in detail with DEWS to ensure the regulators views are assessed in order to come to a recommendation to Council. Each strategy has been subjected to cost estimates so the staying and financial implications can be identified and assessed by Council.

FINANCIAL/RESOURCE IMPLICATIONS

The financial implications associated with each strategy has been set out in the attached report. The resources and capital costs associated with each strategy will be presented to Council separately for budget consideration in 2017/18 budget and ongoing years.

RISK MANAGEMENT IMPLICATIONS

Council as a registered water service provider has a statutory obligation to ensure it is able to provide clean, reliable water services to our customers. Council's reputation would suffer if it is unable to maintain service levels at the prescribed standards and reliability of supplies. The Water Supply Security, Reliability and Resilience Strategy provides key recommendations to de-risk water reliability, manage demand and prevent harsh water restrictions on residential and commercial customers. Failure to undertake these measures may result in unreliable and poor service outcomes relating to water supply delivery to the Shire.

SUSTAINABILITY IMPLICATIONS

Economic: It is essential to adequately maintain water infrastructure in order to provide satisfactory services in support of economic development in the Shire.

Environmental: Failing to provide adequate and compliant water services can lead to environmental harm and breaching of licence conditions. Water treatment staff are aware of the actions that they may take at the water treatment plant intakes, and into the World Heritage Catchment, and are also aware that discharges can impact on the Great Barrier Reef.

Social: The Community expects fully operational and compliant water services.

CORPORATE/OPERATIONAL PLAN, POLICY REFERENCE

This report has been prepared in accordance with the following:

Corporate Plan 2014-2019 Initiatives:

Theme 3 - Improve Environmental Performance
3.2.2 - Investigate opportunities for efficiencies in water use including the use of recycled water.
3.2.3 - Investigate process improvements at Council's wastewater treatment plants to improve wastewater quality, save energy and identify markets for end products.

Operational Plan 2015-2016 Actions:

3.2.1 - Develop and Implement a Water Security Strategy for Port Douglas and Mossman.

COUNCIL'S ROLE

Council can play a number of different roles in certain circumstances and it is important to be clear about which role is appropriate for a specific purpose or circumstance. The implementation of actions will be a collective effort and Council's involvement will vary from information only through to full responsibility for delivery.

The following areas outline where Council has a clear responsibility to act:

Asset-Owner	Meeting the responsibilities associated with owning or being the custodian of assets such as infrastructure.
Regulator	Meeting the responsibilities associated with regulating activities through legislation or local law.

CONSULTATION

Internal: Extensive internal consultation occurred during the formation of the new DWQMP. All water operational and management staff were actively involved in the internal audit, risk identification process and development of procedures.

External: DEWS, Consultant GHD.

COMMUNITY ENGAGEMENT

Further community consultation will occur.

ATTACHMENTS

1. Water Supply Security Reliability and Resilience Strategy Report **[5.8.1]**

DOUGLAS SHIRE COUNCIL

DOUGLAS SHIRE COUNCIL WATER SUPPLY SECURITY, RELIABILITY AND RESILIENCE STRATEGY

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Douglas Shire Council Water Supply Security, Reliability and Resilience Strategy

Introduction

This report reviews and discusses the current status of the Mossman/Port Douglas Water Supply System and identifies opportunities to enhance the reliability, security, resilience and financial wellbeing of the undertaking. A report "Mossman Water Security Planning Report – Reliability Assessment Report" prepared by GHD Consulting Engineers and dated December 2016 (GHD Report) has been used in part to inform the discussion and recommendations in this report. The GHD Report references and builds on earlier reports on this subject.

Water Source Security

The "run of river" flows from Rex Creek are used as the water source for the Mossman/Port Douglas area raw water supplies and extraction is only available when the creek flows are above a minimum volume. Allowable rates of extraction vary with the volumes flowing in the creek. The natural configuration of the extraction site is such that no holding pond storage is available. Flow regimes to ensure continuance of environmental flows and use of the site as a water source is regulated under a Department of Natural Resources and Mines (DNRM) licence: *Rex Creek Water Licence 408436.*

The GHD Report discusses the reliability of the supply in the context of licenced flow availability and various scenarios of population predictions and consumer demand. The engineers conclude that the calculated reliability is not appropriate for Mossman/Port Douglas system with a run of river supply where no significant storage is available to buffer peak demands.

Reliability and resilience can be enhanced by introducing diversification of sources into the system and the GHD Report considers a range of intake sites for option evaluation.

Douglas Shire Council also recently entered into a RWSSA project partnership with the Department of Energy and Water Supply (DEWS). The aim of the project is to achieve a shared understanding of existing water supply capability and risk, future population growth and water demand.

The RWSSA examines the current and historical water use; models the water supply system capability; and develops an assessment of likelihood and magnitude of water supply shortfalls.

DEWS will be assisting Council by funding the modelling of data and statistics, and collaborating in the delivery of the final published report that will be co-badged with both parties.

New Source Option Assessments

Twelve new intake sites on both the North and South Mossman Rivers and Saltwater Creek have been evaluated as possible options for a new source for the Mossman/Port Douglas urban serviced

areas. Each site has been inspected for practical viability and technical aspects and balanced against a multi-criteria evaluation considering environmental, social, economic and regulatory impacts.

A preferred option for further concept development is described as Site No 3, at Drumsara Quarry, south side of Mossman River. The GHD Report advises that although the site requires detailed assessment to confirm available extraction volumes, the location has the advantage of being in the closest proximity to the Water Treatment Plant and would be a sub-surface extraction in the river bed flow differing from the existing surface stream flow extraction.

It is recommended that investigation work be continued to assess the suitability and viability of Proposed Site # 3 to be developed as the next source for the Mossman/Port Douglas system.

In recognition of the risk associated with failure of the Intake Creek supply to the Daintree area during the wet season, it is recommended to expand the consideration of the current GHD report focus to the Daintree area. More specifically investigate supplementary supply options, such as bore water supply, as an economical alternative to improving the reliability of the existing Intake Creek supply.

System Configuration and Operation

The GHD Report considers aspects of the treatment and delivery system and the impact on operational efficiency and reliability.

Water Treatment Plant

All treatment plants develop a waste stream from backwashing the filtration equipment, sludge wastage and cleaning. A necessary operational aim is to minimize the waste volume as any waste volume reduces the availability of flow from the source to service the reticulation requirements. The current losses from the treatment system are generally in the order of 9-10% of intake volume, or over one million litres per day flowing to a non-licenced and non-beneficial waste. The original treatment plant incorporated a waste recovery system which is not currently operational. A proposal for the refurbishment or upgrading of the recovery system is being evaluated. The proposed equipment options are expected to recover 85% to 90% of the current waste stream to be available for recycling through the treatment plant. The substantially reduced volume of waste can then be piped to a sewer for transport to the Mossman Wastewater Treatment Plant where it is expected to aid in the treatment process at that plant. This is also required as part of existing ‘closed system’ licence conditions by the DEHP.

It is recommended that assessment of proposals for the refurbishment / upgrade of the waste recovery system at the Mossman Treatment Plant be continued with a view to undertaking the work in future financial year budgets.

Reticulation System Storage

Reticulation system reservoirs are required to balance diurnal flow patterns and provide for operational efficiency. The provision of system storage allows the raw water source extraction and treatment system to operate at efficient flow rates rather than having to “flow pace” the consumer demand. The storage is also available to provide a buffer for maintenance or repair down time, thus

increasing the reliability of the system. Council is currently developing contract documents for the construction of a new 20 ML storage reservoir at Craiglie, with an intended completion date of end January 2018.

This project scheme for the provision of a 20ML reservoir at Craiglie is to be constructed without delay in accordance with Council's works program.

Reticulation System Leakage

System water losses are calculated by comparing known data from treatment plant output with metered consumer chargeable flows. The flows termed "Un-accounted for water", or non-chargeable water were estimated to be 1.5 million litres per day in 2014/15. This can be compared with average day chargeable flows at that time of 10 million litres per day. Thus significant reduction of the losses through leakage could offset the need for additional raw water source and reduce operational costs. Water losses on the consumer side of the meter are not known for the Mossman/Port Douglas system but published experiences from other local authorities shows the water volumes being wasted is usually significant. In common with the reticulation system losses, these leakage volumes can have a large impact on the need for source water and operational costs.

It is recommended that a project be established to investigate, locate and repair significant water leaks in the Mossman/Port Douglas reticulation system.

Reticulation System Demand Management

Variable water demand by consumers and the need for reliable predictions of current and future occupancy rates results is a significant uncertainty for water system planners both at the design and operational levels. Planning strategies for water supply systems have to be informed by reliable population predictions, urban development expectations, system configuration and reliable water usage data. Improved consumer data is being developed from Council property and rating records together with consumer's water meter records. Functionality of the data can be enhanced by a "whole of system mathematical model" enabling scenario modelling under varying conditions and demand patterns. The model can provide answers to "what if" problems to enable more effective planning strategies. While a system model is a planning and design tool, it provides an added benefit to assist in understanding system uncertainties and scenario modelling can provide enhanced confidence in outcomes during times such as anticipated reductions in source availability, changes in demand patterns and during planned shut downs for maintenance.

It is recommended that work be undertaken for the establishment of a whole of water system model and network analysis for the Mossman/Port Douglas system in the 2017/18 financial year subject to funds availability and this be followed by similar work for the remaining water supply network.

Consumer Water Demand and Behaviours

Part of the understanding of consumer water demand is informed by water meter data. Accurate and reliable meter data has a twofold benefit: firstly, for the Council in managing the revenue from consumers; and for the consumers to better understand their water usage behaviours and the impact of water charges. Current technology in so called "smart meters" allows continuous recording of water use rather than only over long intervals dictated by manual reading, and includes electronic transmission of the readings for remote recording. Thus the patterns of usage in selected

locations over periods of the day, weeks etc. or over specific periods such as climatic or tourist seasons are readily available. Importantly, the regular data availability can assist in understanding impacts of tariff scale development, revenue collection and planning for demand management strategies. A further report will be prepared for the analysis of tariff scales in relation to demand management and financial sustainability of the water treatment and reticulation in Douglas Shire.

It is recommended that:

- Concept planning commence for the introduction of a system of “smart meters” to be sequentially rolled out throughout the water service areas subject to funding.
- That a further report is to be submitted to Council in May detailing options for demand management strategies and water pricing.

Recycled Water Opportunities

Observations suggest that significant volumes of potable water are used for landscape irrigation both within and outside private properties, particularly in areas of multiunit tourist accommodation. An opportunity to provide recycled water for this use is available from the wastewater treatment plants. Equipment and technologies for the treatment of the current effluent to provide a product suitable for open space public use is readily available. Further studies to establish financial viability are recommended. An extract from the GHD Report discussing this subject is included as Appendix A. The extract indicates that a recycled water system for the Port Douglas area is not likely to be currently financially viable at existing rates, however the option should not be discounted as that area has the potential for the greatest beneficial reuse in offsetting potable water use and reducing effluent flows to environmentally sensitive areas.

It is recommended that further investigations be undertaken for the establishment of a suitable scheme for the reticulation of recycled water and a Business Case Report be developed to be ready for submission should grant funding become available in future financial years.

System Diversification Opportunities

The Mossman and Whyanbeel systems currently have a low volume interconnection which can assist in providing operational flexibility in either of the two networks. The discussion in the GHD Report suggests an upgrade of the interconnection could warrant further investigation for establishing operational and long term financial benefits.

It is recommended that concept planning be undertaken to assess the options and benefits for further upgrading the interconnection of the Mossman and Whyanbeel reticulation systems in 2017/18 financial year with an initial connection in the 2016/17 financial year budget.

Summary of Enhancements/Initiatives

Project	Preliminary Estimate of Cost
Short term	
Further investigate and prepare business case for establishment of new source at Proposed site - Drumsara Quarry Mossman River (Douglas Shire Council Staff time at this stage)	$100,000
Treatment Plant waste recycle and disposal system – approx. saving of source water = 1 ML/d	$730,000
Investigate and repair system leaks – approx. saving of product water = 0.75 ML/d	$100,000
Develop whole of system mathematical model and network model	$100,000
Investigate Mossman/ Whyanbeel system interconnection upgrade including short term connection	$200,000
Review water tariffs and demand management policies	$50,000
DEWS – RWSSA project	TBC
Medium term	
Develop business plan for recycled water reticulation	$100,000
Daintree supplementary supply investigation and implementation	$200,000
Install new system of 'smart meters' (Year by year program to be developed)	$1,800,000 (Cost to be confirmed)

Recommendations

Summary of recommendations from this report.

It is recommended that:

- The project for the provision of a 20ML reservoir at Craiglie be constructed for target completion January 2018.
- Investigation work be continued to assess the suitability and viability of Proposed Site - Drumsara Quarry area Mossman River to be developed as the next source for the Mossman/Port Douglas system.
- Assessment of proposals for the refurbishment / upgrade of the waste recovery system at the Mossman Treatment Plant be continued with a view to undertaking the work as soon as funds are available.

- A project be established to locate and repair any significant water leaks in the Mossman/Port Douglas/Whyanbeel reticulation system.
- Work be undertaken for the establishment of a whole of water system and network model for the Mossman/Port Douglas system and this be followed by similar work for the remaining water supply network.
- Further investigations be undertaken for the establishment of a suitable scheme for the reticulation of recycled water and a Business Case Report be developed to be ready for submission should grant funding become available.
- Concept planning be undertaken to assess the options and benefits for further upgrading the interconnection of the Mossman and Whyanbeel reticulation systems including initial interconnection in 2016/17 financial year works.
- It be noted that another report will be submitted detailing options for demand management strategies including water pricing.
- Concept planning commence for the introduction of a system of “smart meters” throughout the water service areas to be rolled out in successive financial years.
- Investigate supplementary supply options, such as bore water supply, as an economical alternative to improving the reliability of the existing Intake Creek supply.
- Douglas Shire Council continue to work with the Department of Energy and Water Supply (DEWS) on a project partnership to achieve a shared understanding of existing water supply capability and risk, future population growth and water demand.

Appendix A

Extract from GHD Report Section 9.3

The following investigations have been undertaken into recycle water opportunities within the Mossman catchment;

- Mossman Wastewater Treatment Plant (WWTP) Upgrade – Supplementary Planning Report, Maunsell Australia, April 2009;
- Concept Report for Mossman Recycle Water Scheme – Distribution and Storage infrastructure, GHD, August 2011;
- Preliminary Design Report for Mossman Recycle Water Scheme – Distribution and Storage Infrastructure, GHD, February 2012;
- Mossman Recycle Scheme – Recycle Water Management Plan, GHD, March 2013.

This work culminated in the construction of a recycle water trunk distribution system in anticipation of an upgrade to the Mossman WWTP which would allow production of Class A recycle water. The upgrade of the Mossman WWTP did not eventuate and the proposed recycle water scheme was not implemented.

The key objectives of the recycle water scheme were reported as;

- Reduce the strain on the Rex Creek potable water intake by replacing potable water use, where appropriate with recycle water; and
- Reducing the quantum of effluent discharged to the Mossman River and the associated environmental impact.

The proposed scheme consisted of the following elements;

- Stage 1 implementation to initially transport Class C recycle water to selected users prior to upgrade of the Mossman WWTP;
- Stage 2 implementation to transport Class A recycle water to a wider range of users following upgrade of the Mossman WWTP;
- Recycle water network separated into two sub-schemes, namely the northern scheme to service areas north of Mossman River, and the southern scheme to service areas south of the Mossman River.

The expected capacity of the Mossman WWTP to supply recycle water was reported as a minimum of 0.5 ML/day (180 ML/a) during peak demand periods of the year, increasing to over 1 ML/day at the onset of the wet season. It was expected that the minimum effluent flows were expected to rise to 1.4 ML/day (511 ML/a) by the year 2041.

The identified areas for supply of recycle water was limited to the areas in the immediate vicinity of Mossman township and did not include the Port Douglas area. It is understood that Port Douglas was excluded in the scheme on the following basis;

- The expected cost of infrastructure to transport recycle water to Port Douglas was considered prohibitive; and Major existing users of recycle water in Port Douglas were unlikely to change their

existing agreements, notwithstanding the increase in water quality offered, and particularly if there was a cost associated with accessing the increased water quality.

Estimates of potential users of recycle users of recycle water indicated approximately 58 ML/a for existing users, with a potential future usage up to 475 ML/a. It is noted that the potential use of 475 ML/a included users that were not using potable water. For this reason, recycle water use would not necessarily result in a commensurate reduction in potable water use.

Capital cost estimates of the Mossman Recycle Water Scheme supply network was estimated at $5.17M. This estimate did not include the cost of the Mossman WWTP upgrade which would enable supply of Class A water. Indicative costs of the Mossman WWTP upgrade was estimated at approximately $5.5M (circa 2011/12).

The need for the Mossman WWTP upgrade was not singularly driven by the need to supply recycle water, but more so ensuring long term compliance of the WWTP effluent standards against the license conditions.

Recycle water can provide an opportunity to reduce potable water use particularly in external use such as irrigation. However, it is noted the costs associated with the establishment and continued operation of supplying recycle water is substantial. The ability to recover costs through recycle water pricing whilst still offering a price incentive to use recycle water can be challenging. In order to assess the true value of recycle water to DSC, it is necessary to consider the investment in combination with the potential savings in further investment in potable water supply infrastructure.

For these reasons it is recommended that DSC undertake an economic business case that considers recycle water investment in combination with the offset in cost associated with potable water supply investment. The outcomes of this business case can then be compared against the singular investment in potable water supply infrastructure.