

APPROVED for public release 28 November 2013

REF: A, Adamu. 2012. Identification of Key Issues in Delivering Fit for Purpose Water Services to Remote Indigenous Communities: Evaluation of Performance of Water And Waste Water Management Service Providers for Remote Indigenous Communities in Queensland, Australia (unpublished report), Master of Integrated Water Management, The International WaterCentre, Australia.

Masters of Integrated Water Management

The University of Queensland

**IDENTIFICATION OF KEY ISSUES IN
DELIVERING FIT FOR PURPOSE WATER
SERVICES TO REMOTE INDIGENOUS
COMMUNITIES: EVALUATION OF
PERFORMANCE OF WATER AND WASTE
WATER MANAGEMENT SERVICE PROVIDERS
FOR REMOTE INDIGENOUS COMMUNITIES IN
QUEENSLAND, AUSTRALIA**

By

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2012

ACKNOWLEDGEMENT

My deep gratitude and thanks goes to my supervisors Dr. Greg Jackson of Queensland Health and Linda Dobe of Department of Energy and Water Supply for their enduring support and strategic advice. Your contributions to this exercise undoubtedly made it a success.

To the staff of the Water Supply Policy Unit and the Office of the Water Supply Regulator both of the former Department of Environment and Resources Management that participated directly or indirectly to the success of this study I say a big thank you for the opportunity to have a wonderful experience I will cherish for a life time.

My gratitude and appreciation goes to the entire staff of the International Water Centre, for organizing this wonderful masters programme and collating the most wonderful people that inspire and support the development of water leaders and enriching them with integrated knowledge for the management of the most precious resources in this earth.

To my colleagues and friends whom we studied together for the past 18 months, I express my sincere appreciation for the wonderful time we have shared. I believe the friendship established and the experiences we shared will be cherished and will be a never ending story. Most importantly I express my appreciation to my wife and my son for their unflinching love, support and endurance during my study and for their moral and emotional support I say a big thank you with a big hug and a kiss. Many thanks also goes to my family back in Nigeria, my dad, my mum, brothers and sisters for their care, love and support while I am away for this masters programme.

Finally, with gratitude to almighty Allah (SWA) for granting me the health and ability to participate in this programme and to undertake this study, I humbly dedicate this thesis to my daughter Fatima who is just few weeks older than the thesis.

ABSTRACT

This study was proposed by the former Department of Environment and Resources Management (DERM) now Department of Energy and Water Supply and the Office of the Water Supply Regulator (OWSR) with the view to check the anecdotal belief that many indigenous service providers are not providing adequate levels of service to their communities and have difficulties in meeting regulatory requirements and to recommend actions to improve service provision and to improve compliance with regulatory requirements. In addition to the above, other difficulties experienced by the service providers include those related to service delivery especially in terms of operation and maintenance because the communities they serve are generally remote, they do not recognize the value of treated water leading to excessive waste of water and also have other social challenges.

There are 17 indigenous councils that are registered as service providers for water supply and or waste water management in Queensland. OWSR under the former DERM now Department of Energy and Water Supply, is vested with the responsibility of registering and regulating the activities of all water and waste water operators within the State by the provisions of the Water Supply (Safety and Reliability) Act, 2008.

The main objective of the study is to Review the profiles of the 17 Indigenous Councils and identify issues that contribute to their performance as service providers in terms of compliance with regulation, community participation and health impact; to identify key issues and extract knowledge that can be replicated to improve delivery of water and waste water services and compliance with regulatory requirements.

A profile of each of the service providers was prepared containing information gathered from planning reports available at the office of the water supply regulator. The profile consist of details on the infrastructure they manage, operation details, staff and management issues, history of compliance with regulatory requirement, community participation and health impact. In order to assess benchmark performance, sets of indicators were proposed in line with the National Water Commission Framework using the information from the profiles.

Assessment of the indicators showed that information from the planning reports would not provide adequate information to assess performance; hence the anecdotal view of lack of performance of indigenous service providers was not substantiated. The study revealed very low community participation and engagement in water supply and wastewater management in the communities. It was observed that there is improvement in meeting regulatory requirement by the providers with recent engagement and capacity building of staff. It was also observed that there was no data to corroborate impact of water supply and waste water management to health.

**IDENTIFICATION OF KEY ISSUES IN DELIVERING FIT FOR
PURPOSE WATER SERVICES TO REMOTE INDIGENOUS
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AND WASTE WATER MANAGEMENT SERVICE PROVIDERS FOR
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ABBREVIATIONS

ADWG	Australian Drinking Water Guideline
ATSIC	Aboriginal and Torres Strait Islander Commission
AWWA	American Water Works Association
CHIP	Community Housing Infrastructure Program
DATSIP	Department of Aboriginal and Torres Strait Islander Policy
DERM	Department of Environment and Resources Management
DOGIT	Deed of grant in Trust
DWQMP	Drinking Water Quality Management Plan
DWQQR	Drinking Water Quality Quarterly Report
ESO	Essential Services Officer
GWP	Global Water Partnership
ISIP	Indigenous State Infrastructure Program
IWA	International Water Association
IWRM	Integrated Water Resources Management
JAIP	Joint Agency Infrastructure Program
MIP	Major Infrastructure Program
NAHS	National Aboriginal Health Strategy
NDRRA	National Disaster Relief and Recovery Arrangement
NHMRC	National Health and Medical Research Council
NPA	Northern Peninsula Area
NRMMC	Natural Resources Management Ministerial Council
NWC	National Water Commission
NWI	National Water Initiative
O&M	Operation and Maintenance
OWSR	Office of the Water Supply Regulator
QH	Queensland Health
SGFA	State Government Financial Aid
TSIRC	Torres Strait Island Regional Council

CHAPTER 1 INTRODUCTION

1.0 BACKGROUND

There are more than 517,000 resident indigenous people in Australia representing more than 2.5% of the total Australian population, and increasing at a rate almost double the rate of total Australian population (ABS 2012). These consist of individuals that registered themselves as either of Aboriginal or Torres Strait Islander origin or combination of both. The State of Queensland has the second largest indigenous population of 144,900, and is the fastest growing with an annual average growth rate of more than 2.8% (ABS 2012). It was projected that Queensland will have the highest indigenous population in Australia by the year 2016 (ABS 2012). The indigenous people of Queensland reside in both urban cities and remote settlements with the general public and also in some indigenous council areas. Contrary to general perception, most indigenous people reside in urban areas with the general public than in remote indigenous council lands (Dugdale 2008). An estimated 48.3% of the indigenous population in Queensland live in the 6 major cities of Brisbane, Cairns, Gold Coast, Rockhampton, Toowoomba and Townsville while only about 13.9% reside in the indigenous council areas (Dugdale 2008). Each of the indigenous local governments is responsible for the provision and management of all infrastructure and utilities within their area of operations.

There are 17 indigenous councils in the state of Queensland which were identified as part of the recommendations of the Independent Local Government Reform Commission of July 2007, and approved by the State government for the March 15, 2008 election (Local Government Reform Commission 2007). The councils are: Aurukun, Cherbourg, Doomadgee, Hope Vale, Kowanyama, Lockhart River, Mapoon, Mornington Island, Napranum, Northern Peninsula Area (NPA) Regional, Palm Island, Pormpuraaw, Torres Council, Torres Strait Island Regional (TSIRC), Woorabinda, Wujal Wujal and Yarrabah. While 15 of the councils were already in existence before the reform in accordance with the Local Government Act 1993, 2 regional councils (NPA and TSIRC) were newly formed in line with the provisions of Local Government Regulation 2005 S7 and S159 S (i) (b) (iii). All the councils were created with particular consideration to their influencing governance and unique features of land tenure differences, with most of them being Deed of Grant in Trust (DOGIT) land as provided under the Land Act 1994. In addition, the councils are challenged with more specific responsibilities with issues such as local jurisprudence in terms of alcohol control, heritage/cultural identity, management and maintenance of infrastructure. (Local Government Reform Commission 2007). Maps showing the locations of the indigenous Councils are presented in Appendix I

Sixteen out of the 17 of these indigenous councils (with the exception of NPA regional council) are responsible for the provision of water supply and waste water management services to their communities (Department of Local Government and Planning 2011), while Queensland government through the Department of Local Government is registered as the service provider for the management of the water supply of NPA regional council (Sunwater n.d.). The water supply services for Torres Strait Island Regional Council fall within the medium class managing between 1000 to 5000 connections, while the remaining 16 of these communities fall within the class of small service providers that manage less than 1000 connections (Queensland Government 2008).

The former Department of Environment and Resources Management (DERM) now Department of Energy and Water Supply is vested with responsibility for the regulation of water and wastewater service providers under the Water Supply (Safety and Reliability) Act 2008 as transferred from the provisions of the Water Act 2000 (Queensland Government 2008). The purpose of the Act is to ensure that quality drinking water is supplied by the

service providers to protect public health (DERM n.d). This function is administered by the Office of the Water Supply Regulator (OWSR) through mandatory monitoring and reporting of the quality of drinking water and development and implementation by drinking water service providers of drinking water quality management plans (Queensland Government 2008). Asset maintenance and drought management issues are also regulated through the development of Strategic Asset Management Plans, Drought Management Plans and System Leakage Management Plans. Customer Service Standards and annual reports are also required. In addition to the requirements of the Water Supply (Safety and Reliability) Act 2008, service providers are required to provide services that meet drinking water quality standards and other regulatory requirements related to public health risk, as specified in both the Public Health Act 2005 and the Public Health Regulation 2005.

1.1 RATIONALE OF STUDY

Water managers for indigenous communities are faced with challenges similar to those in other remote communities in the form of lack of qualified staff, lack of access to technical support due to remoteness, very low revenue generated and high operation & maintenance cost as a result of aged infrastructure or widely dispersed services. In addition to these general issues, greater difficulties are experienced in some of the indigenous communities more than others as they must deal with significant social issues such as poor health, lack of other essential services, unemployment etc. Evidence has also established low appreciation of the value of treated water with per capita consumption of indigenous communities put at an average of about 1400 litres per capita per day (Johnson 2011) compared with around 150 litres per capita per day in south east Queensland.

Even though there was no written evidence to establish the compliance level in performance of the indigenous communities' service providers, it was understood from the view of OWSR that some of them find it difficult to provide adequate levels of service to their communities and to meet their regulatory requirements. More so, most of the council generate very low income and depend solely on State and Federal funds and grants programs for both their capital and recurrent expenditures. Access to some of these funds usually requires some reporting and auditing responsibilities which are not easy for some of the local councils.

The purpose of this study is therefore to put a searchlight on the indigenous service providers and try to identify issues that contribute to their performance. Documents availed by the service providers to the regulator as part of the regulation requirement will be reviewed to either corroborate the anecdotal belief of poor performance or dispute it. Effort will be made to identify if there are trends that influence good performance and if these parameters can be extracted and replicated by the non performing providers. The study will also try to establish whether information provided in the reports supplied by the service providers as regulatory requirement will be adequate to provide the necessary information to evaluate performance.

1.2 PROJECT OBJECTIVES

Main Objective

Review the profiles of the 17 Indigenous Councils and identify issues that contribute to their performance as service providers for drinking and waste water services; in terms of compliance with regulation, community participation and health impact; to identify key issues and extract knowledge that can be replicated to improve:

1. Delivery of water and waste water services.
2. Timely preparation of relevant required documentation by Council to meet regulatory requirements.

Specific Objectives

Completion of the following tasks:

- a. Prepare a profile of the indigenous water service providers in Queensland consisting:
 - i. The institutional arrangements and summary of the regulatory requirements these providers have with water and sewerage service provision
 - ii. Type and level of services provided.
 - iii. Sources of fund and income generation.
- b. Review the performance of each provider including history of compliance, infrastructure status, community needs etc, and identify which are working well and what is transferable.
- c. Summary of state and federal agencies assisting the councils to provide water and sewerage services to the communities; who assists, in what capacity and how are they assisted?
- d. Propose recommendations how to improve water and sewerage service provision in indigenous communities

1.3 APPROACH OF THE RESEARCH

Generally the information to be used for this study is contained in public documents, files, and survey reports conducted by public offices. Other sources of data are contained in text books, academic journals and other authentic documented sources. In addition, unstructured interviews were conducted with public officers from the DERM, Queensland Health, and the former Department of Local Government and Planning to obtain further information and corroborate the findings from reports and studies.

The profile of the providers extracted from available resources was used to propose descriptive indicators for assessment. The findings from the analysis were used to determine positive and negative trends and patterns (where possible) that could be linked to the performance of the service providers. Qualitative data analysis methodologies were applied to drive conclusions and make recommendations.

The uniqueness of these communities was recognised, hence an effort was made to analyse the performance of the service providers on an individual basis, prior to being grouped. Figure 1 is a graphical representation of the research approach:

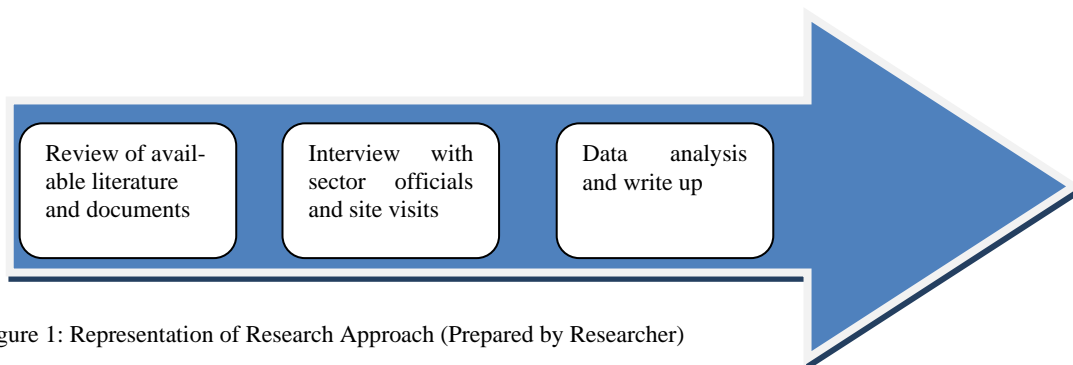


Figure 1: Representation of Research Approach (Prepared by Researcher)

CHAPTER 2 METHODOLOGY

2.0 INTRODUCTION

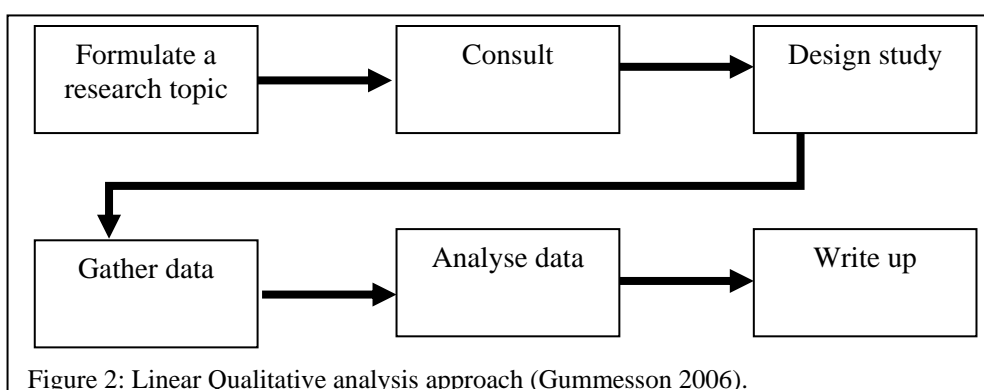
In order to meet the set objectives of this study, it is imperative to select and apply the appropriate methodology to give the desired outcome. The research proposes to use indicators to benchmark the performance of indigenous water supply and waste water providers that will be useful to the regulators of the service providers in identifying issues that impact on their ability to meet regulatory requirements and the efficiency of their operations and maintenance. Discussions with the regulator revealed that it does not conduct performance based assessment of the service providers and relied mainly on plan reports provided as regulatory or policy requirements. In addition, there are a lot of complexities that are not readily apparent and which needed to be revealed and assessed. Some of these issues are associated with community governance, such as issues to do with autonomy and ownership, as well as funding and revenue generation. The choice of the best approach that best suit the research situation will be determined by the research approach, techniques and phases employed.

2.1 RESEARCH APPROACH

The research approach involved review of regulatory documents, which include both guidelines for regulation of the providers and compliance documents supplied by the providers, records of visits and interviews. The purpose of the study is to assess the performance of the service providers within a specified context, which can only be meaningful if a set of criteria is prepared to work with. A set of assessment indicators were proposed based on the nature and condition of services being provided taking into account the limitations of application, access and context of the working environment. Unstructured interviews were conducted with people that operate and contribute in the sector to corroborate findings from reports and documents. It is therefore imperative to emphasise the choice of analysis tool that recognises complexity and is also applicable within the working context.

2.2 CHOICE OF QUALITATIVE ANALYSIS

A qualitative methodology is desirable to improve the outcomes from complex and contextual research approaches (Gummesson 2006). A qualitative approach will still rely on data collection but this is supplemented by '*searches for general statements about relationships and underlying themes*' (Gummesson 2006 p.4). A linear conceptual approach was chosen and applied as shown in figure 2. The use of qualitative analysis has been tested as a social science assessment tool to replace questionnaires and other statistical information surveys as the sole source of data, especially in the water sector (Sijbesma & Postma 2008). Sijbesma & Postma, 2008 showed that it was in recognition of the benefits of qualitative data that led to the evolution of participatory techniques which have become widely used for estimating, valuing, ranking, scoring and comparing, and as instruments for measuring core factors for better management at all levels (Sijbesma & Postma 2008).



Unstructured interviews were conducted as part of the data gathering process. This was done to emphasise the interviewees' thoughts and views on issues and other related subjects without limitations. The aim of this is to use the system as a discovery tool rather than for checking (Descombe 2010).

2.3 DATA ANALYSIS AND REPORTING

The approach adopted for data analysis combined three modes of qualitative analysis, namely; iterative, inductive and researcher-centred analysis (Descombe 2010). The analysis was iterative because while data is being generated, in some cases it was still being analysed, which encouraged further indicators being proposed. An inductive analysis approach came into play where the individual data generated was used to provide general theme statements especially while generating conclusions and making recommendations. The experience of the researcher as a student of integrated water management and his background of working in policy and monitoring of providers in the water industry also contributed and influenced the research analysis.

The report is structured to provide background information about the study, the research rationale and objectives of the study as part of Chapter 1. Chapter 2 discusses the methodology applied for the research and for writing the project. Chapter 3 reviews relevant literature focusing on extracting justifications for the indicators to be used in comparison to international standards bearing in mind the context of the research environment. It also provides some insight into the purpose and benefits of using indicators as a means of comparison for the level of service and benchmarking. Attempts were also made to explain the rationale behind the selection of the proposed indicators and why real performance indicators that are being applied in the water and wastewater management sector could not be applied here. Chapter 4 presents and discusses the data generated, primarily focusing on the relationship between the indicators and discussing the applicability of the indicators in assessing the performance of the service providers. Conclusions and recommendations are drawn from the analysis in relation to the research rationale and the objectives of the study. The final chapter concludes the presentation and provided general recommendations for further research areas.

2.4 CONSTRAINTS & LIMITATIONS

Limited time to conduct the research was the prominent constraint for the project. The study was planned to be conducted and reported within 4 months (February - May). Table 1 below explains some of the limitations presented during the project exercise and the mitigation procedures adopted where possible.

Table 1: Limitations and Constraints (Prepared by Researcher)

Limitations	Explanation
Time Constraint	Due to wide scope of the research and lack of background knowledge of the study area by the researcher, a substantial amount of time was consumed to articulate the research objectives and for the researcher to be familiar with the study area.
Availability of relevant documents	Most of the documents available to the researcher to extract basic information about the operations of the service providers are a number of years old and do not contain up to date information. It is also important to note that the OWSR was given responsibility for regulating the water industry only after the enactment of the Water Supply (Safety & Reliability) Act 2008. Prior to the Water Supply (Safety & Reliability) Act 2008, the safety of drinking water was regulated only by Queensland Health (QH) under the public health risk

	provisions of the Public Health Act 2005. Before then DERM was only responsible for regulation of asset management, drought planning etc under the provisions of Water Act 2000.
Limited access to stakeholders	Because of limited time, remoteness and the geographical spread of the communities covered by this study plus the sensitivity of engaging with indigenous councils who are both the service providers and members of the indigenous communities, it was decided that they are not directly involved in the study.
Research and Study area	There are 17 indigenous councils in Queensland that are also the providers for water and waste water services to their communities. These councils are independently registered as service providers and should not be lumped together as “indigenous councils” to avoid the risk of looking at them together and making general statements without due consideration to their peculiarities. In order to avoid the problem of generalisation, effort was made to look at each of them independently prior to arriving at general conclusions. This approach increased the complexity of the research
Inadequate source of information and baseline information	One of the best ways of deriving indicators is by reviewing changes over a specified period of time. That is why indicators are required to be time and location specific. Baseline information is needed in order to compare and evaluate the changes for each indicator. For this study, there is no adequate baseline data. There was also no record of any attempt to review the operational performance of the service providers. This means there is no previous knowledge to build upon.

CHAPTER 3 REVIEW OF RELEVANT LITERATURE

3.0 INTRODUCTION

The main objective of any water utility manager is “*the achievement of the highest level of consumer satisfaction and service quality in line with the prevailing regulatory framework, whilst making best use of available resources*” (Cardoso et al 2004 p. 55). In order to provide adequate service in terms of quality and quantity the provider shall at least have the capacity, possess certain qualities, and meets the minimum prerequisites necessary for sustainable water management. Some of the necessary prerequisites for sustainable water management include; availability of water resources, sound financial base, ability to attract necessary professionals and sound consumer oriented management planning (Seppala et al 2004). This objective should be equally shared with the remote and indigenous water and waste water service providers in Queensland. However how effectively they strive to fulfil or achieve the set objective needs to be critically reviewed. The service providers are expected by their customers and the regulator to provide the highest level of service which is beyond the basic and intermediate levels of service. At this level of service, they are expected to provide chemicals and consumables, provide full time staff to cover all required shifts, establish expert support programs, conduct periodic/routine checks such as water quality and equipment monitoring and also initiate programs for optimisation of system performance (Farmerie 2004). Cardoso et al, 2004 identified 3 areas that service providers can improve their performance, they include:

1. Implementation of quality assurance systems,
2. Use of effective management tools, and
3. The best use of existing technologies.

This study will attempt to review the performance of the indigenous service providers taking into recognition their purpose and overall objective, and also review how they attempt to provide the required level of service within their circumstances.

3.1 WATER AND WASTE WATER SERVICE PROVISION IN REMOTE AREAS

O'Rourke, 2011 and ABS, 2009 reported that some remote settlements across regional Queensland suffer poor water quality and water shortages. Even though the reported settlements are smaller than the 17 we are looking at, the situation may not be dissimilar. The major challenges of water service provision in remote indigenous communities in Queensland is not far from being similar to global challenges of service delivery to remote and rural areas around the world. A discussion paper on rural water sector development of The World Bank summarized the challenges and lessons from both developed and developing countries (Triple S 2011). Some of the challenges identified that are applicable to indigenous providers in Queensland include the following:

- a) Focus is usually maintained on urban areas (especially when the process of privatisation is involved due to lucrative returns in urban areas) and weak local governments are usually left with the burden of either managing rural and remote water utilities and in some cases the responsibility of ensuring regulations.
- b) Service providers are expected to give sustainable service while primary focus is usually on capital investment driven by coverage targets with less investment in strengthening the institutions that manage the infrastructure (Triple S 2011).

Against observed global trend there is a very strong regulatory framework in Queensland with strong demand by regulatory agencies for all service providers, remote ones inclusive, to meet regulatory requirement.

3.2 CONCEPT OF INTEGRATED WATER MANAGEMENT IN PROVISION OF WATER AND WASTE WATER SERVICES

The Global Water Partnership (GWP) defined Integrated Water Resources Management (IWRM) as:

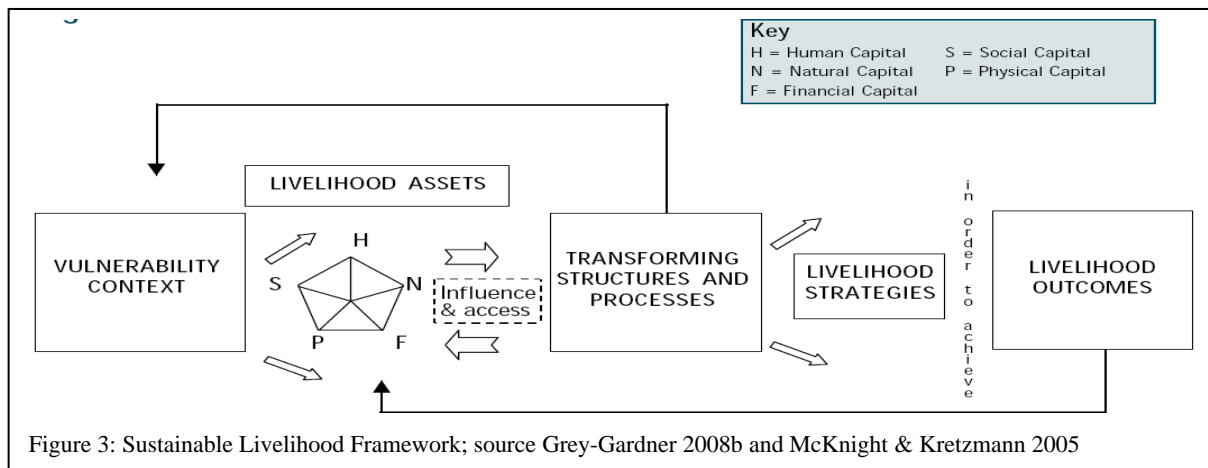
“a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (GWP 2010). From interpretation, the applicability of this definition raised questions, but records of achievements in countries that adopted the concept of IWRM establishes the ability for IWRM to manage complex water management issues in comparison to past experiences of single sector approach (Anderson et al 2008). The strategies of IWRM generated from the Dublin Principles presented at the Rio de Janeiro World Water Summit of 1992 stated that;

1. *“Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.*
2. *Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.*
3. *Women play a central part in the provision, management and safeguarding of water.*
4. *Water has an economic value in all its competing uses and should be recognized as an economic good.*
5. *Integrated water resources management is based on the equitable and efficient management and sustainable use of water”.* (GWP 2010)

For the purpose of this study, emphasis will be on principles nos. 1, 2 and 4 which reflect the major concern areas for water supply and waste water service provision in Indigenous communities of Queensland.

For sustainable water resources management, it is necessary that it is given economic value and the beneficiaries of services are involved at all levels of decision making. It is essential to conduct cost benefit analysis and economic valuations to determine who benefits and who bears the cost without necessarily charging or setting tariff, and to encourage community participation and private partnership because it improves value for water, increases capacity and efficiency (UNESCO 2006).

There is no specific blue print for IWRM and that individual development priorities are usually the drivers for IWRM which are context specific for different societies (community to country level). Effective strategy and good practice in infrastructure investment, creating a strong enabling environment, robust institutions and effective utilisation of technical and management instruments are necessary for its success (Lenton & Muller 2009). For instance, the use of ‘sustainable livelihood framework’ which is one of the tools for encouraging community participation has proven to yield positive results in building capacity and water management in smaller remote areas in Queensland (Grey-Gardner 2008b). The framework (as shown in Figure 3) is a very rewarding participatory approach, which is not only accurate but true and can be achieved easily by combining the capacities and assets and by encouraging the community to invest in itself and its resources using its own effort to develop structures of opportunity and income (McKnight & Kretzmann 2005)



Health is a factor of life sustenance for humans and is directly and indirectly affected by water supply covering all aspects of sanitation and hygiene and spread of diseases. Improvements in aspects of water supply present opportunities to enhance public health (Hunter et al 2010). In addition to the standard classifications of water diseases (water borne, water washed, water based and water related) there are other important health issues which include:

- Chemical-mediated diseases such as arsenic contamination and high fluoride in water.
- Impact of muscular skeletal health, proven by carrying water by women and children over long distances.
- Unpleasant taste or odours of safe sources may deter their use and lead to exposure and use of unsafe sources (e.g. chlorine taste may deter use as drinking source) (Hunter et al 2010)

Connection between water supply and the health of indigenous people in Australia has proven to be difficult due to lack of related data that could be correlated to suggest hypotheses to be tested. However, ABS 2009 reported significant improvements in public health as a result of improvements in drinking water quality and sanitation between 2000 and 2006. It was gathered from interviews and reports that some of the indirect connections that could be attributed to health in indigenous settlements include high naturally occurring minerals (e.g. Fluoride in Kowanyama) and rejection of chlorine in water due to taste (e.g. Mapoon) which exposes users to higher health risks (see Appendix II). The Alma Ata conference in 1978 accepted the concept of Primary health as a key to attainment of health for all, and considered adequate supply of safe water and basic sanitation amongst its focus areas (Briscoe 1984).

3.3 WATER AND INDIGENOUS PEOPLE IN QUEENSLAND, AUSTRALIA

Although there is no specific definition of who really are indigenous people in Australia, it was until the 1971 census when identification of 'race' was removed that indigenous self identification was introduced (Hughes 2008). Due to increasing conflicts on indigenous entitlements, in 1981 the department of Aboriginal affairs attempted to define indigenous person 'as a person of Aboriginal or Torres Strait descent who identifies and was accepted as such by the settlement he lives' (Hughes 2008). Out of the 144,900 recorded indigenous people in Queensland, only about 13.9% live in indigenous council areas (Dugdale 2008). Indigenous people have a strong relationship with their environment. Traditionally, their livelihood has been inextricably linked, culturally, spiritually, economically and socially to water, land and the environment in general (McFarlane 2004). The indigenous people's view to water is; 'Water is elemental of life, it does not only support physical life; it is sacred source of life, identity, rights, and responsibilities under indigenous law' (McFarlane 2004; p.3). Regardless of the intimate connection of the indigenous people to water, its resources and the environment, yet their interest and values are poorly understood by decision makers who decide how these resources are utilised (McKaige & Considine 2009). This probably as

observed is because most residents of indigenous councils rely on the Commonwealth and State governments welfare for their income.

The National Water Initiative (NWI) signed through intergovernmental agreement on June 25, 2004 has an objective of '*achieving a nationally compatible market with regulatory and planning based system of managing both ground and surface water resources for rural and urban use that optimises economic, social and environmental outcomes and is able to adapt to the future changes in the demand and supply of water*' (McFarlane 2004 p. 11). The objective is achievable through statutory recognition of environmental and other public benefit outcomes using improved environmental management practices, integrated water management strategies, scientific knowledge, capacity building and community partnership and adjustment (McFarlane 2004). Paragraphs 52-54 of the NWI recognises indigenous needs in access and management and recommended the involvement of indigenous people in water planning processes, and that water plans and strategies will incorporate indigenous, social, spiritual and customary objectives (McFarlane 2004, Willis et al 2008, Bark et al 2011 and Finn & Jackson 2011). Intentions and objectives of indigenous recognition are clearly presented in the initiative but the implementation process through which indigenous rights and interest are to be managed are yet to be resolved (Willis et al 2008 and Bark et al 2011). The recognition of indigenous values and connections to water resources and their involvement in water planning is concurred to in the Queensland government Water Act 2000, but native title rights to water were denied (O'Rourke 2011).

There are general concerns about the ability of indigenous people to decisively participate in water resources management decisions because there is a gap between their perceptions and reality of outcomes, and until this gap is closed indigenous participation will be difficult (McFarlane 2004 and Willis et al 2008). McFarlane 2004 presented some of the barriers identified that hinder indigenous participation which include; poor understanding of indigenous perspectives, lack of respect for indigenous social structure and their authorities, lack of flexibility in government operation towards indigenous affairs and indigenous economic and social context as inhibiting reason for non participation.

Records have shown that some remote settlements across regional Queensland have suffered poor water quality and water shortages (O'Rourke 2011 and ABS 2009). Service providers and the community share the responsibility of ensuring efficient water service delivery as described in part of clause 64 of the NWI. Clause 66(v) of the NWI also stated that full cost recovery for all water systems shall be achieved, the application of which shall be on case-by-case basis, but most residents of the indigenous communities in Queensland do not pay for water (Willis et al 2008). This is an issue that requires serious attention and needs to be resolved because it exacerbates the gap mentioned above that constrained community involvement and participation in water management decisions and eventually the efficiency of service delivery.

3.4 POLICY AND REGULATORY FRAMEWORK

A number of state agencies (including Department of Environment and Resource Management, Queensland Health, Department of Local Government and Planning) support indigenous providers to provide water and wastewater services. The key regulatory tool is the Water Supply (Safety and Reliability) Act 2008 administered by DERM. While the preparation of water supply management plans is being regulated by the provisions of the Water Supply (Safety and Reliability) Act 2008, preparation of water resources plan which covers catchment planning taking into consideration all aspects of environmental, cultural, social and economic interests within the plan area is covered by the provisions of the Water Act 2000 (O'Rourke 2011). The Australian Drinking Water Guidelines (ADWG) developed by the National Health and Medical Research Council (NHMRC) and the Natural Resource Management Ministerial Council is also key to water system management as it incorporates

the *Framework for Management of Drinking Water Quality* (NHMRC & NRMMC 2011). The framework provides guidance to the water supply industry, health management authorities and the general public on what constitutes good quality drinking water. It uses quality principles and well researched and an internationally acclaimed risk assessment management methodology so that water suppliers can ensure high standards in safety at the point of use (O'Rourke 2011 and Grey-Gardner 2008b). However, issues such as low technical capacity have been identified as a limitation in application of the framework by small scale service providers and local councils (O'Rourke 2011 and Grey-Gardner 2008b). The complexity of the ADWG was acknowledged by its developers; hence they developed the *Community Water Planner* tool using generic risk-based water management planning that can be used as a simple guide by service providers especially small scale providers and local councils to prepare their water quality management plans (Grey-Gardner 2008b). Table 2 provides a brief description of legislative arrangements and responsibilities of relevant organisation for provision of water and waste water services to indigenous communities in Queensland.

Table 2: Legislative Arrangement for indigenous Local Water Supplies; (Adapted from National Indigenous Infrastructure Guide n.d)

Organisation Responsible	Key responsibilities	Key legislation and policy documents	Relevant drinking water guidelines
Indigenous Local Councils	Water and waste water service provision, S. 20 Water Supply (Safety and Reliability) Act 2008. Preparation of reports (Quarterly, Incident) and water management plans (drinking water quality, strategic asset, drought and system leakage Management Plans)	Water Supply (Safety and Reliability) Act 2008, Public Health Act 2005, Water Act 2000	Australian Drinking Water Guidelines (2011), Public Health Regulation 2005.
Qld Department of Environment and Resource Management (Office of the Water Supply Regulator)	Regulate water safety and reliability activities. Review and approve the reports relevant water management plans	Water Act 2000, Water Supply (Safety and Reliability) Act 2008 & Australian Drinking Water Guidelines (2011)	Encourages suppliers to meet Australian Drinking Water Guidelines (2011)
Queensland Health	Administration of the Public Health act 2005	Public Health Act 2005, Public Health Regulations 2005	Australian Drinking Water Guidelines (2011)

3.5 BENCHMARKING & ASSESSMENT OF PERFORMANCE IN WATER MANAGEMENT

Benchmarking is defined as '*setting goals by using objective, external standards and learning from others – learning how much and, perhaps more important, learning how, which is further described as never ending discovery and learning experience*' (Blokland 2010 p. 244). Benchmarking can be achieved by studying the behaviours of other practitioners and by subsequently adopting and adapting part of the behaviours as required. Therefore, benchmarking constitutes both performance assessment and performance improvement (Blokland 2010). Benchmarking started in the manufacturing industry in the 1970's and

became matured in the water industry in the 1990's and has since gained momentum and became widely practiced internationally (Blokland 2010 and Crotty 2004). Two categories of benchmarking are metric and process benchmarking. While metric benchmarking compares operational and financial indicators of utilities to track individual utility's performance with time, process benchmarking compares business processes in order to identify best practices that could be extracted and applied across the sector (Gritsinin 2008). The major drivers of benchmarking in the water industry include;

1. Benchmarking serves as opportunity for utilities to evaluate the extent to which their processes worked and to learn from the success of those that excel in the sector.
2. Due to overarching pressure from consumers, regulators and other stakeholders to utilities to know about progress and how utilities address issues of concern such as public health, safety measures etc, and
3. It serves as mechanism to streamline legal and regulatory frameworks in the water sector (Crotty 2004 and Gritsinin 2008).

Table 3 below provide a holistic view of the classification of benchmarking

Table 3: Classifications of Benchmarking (Source: Blokland 2010)

Classification	Type	Meaning
Nature of referent other	Internal	Comparing within one organization about the performance of similar business units or processes
	Competitor	Comparing with direct competitors, catch up or even surpass their overall performance
	Industry	Comparing with company in the same industry including non-competitors
	Generic	Comparing with an organization which extends beyond industry boundaries
	Global	Comparing with an organization where its geographical location extends beyond country boundaries
Content of benchmarking	Process	Pertaining to discrete work processes and operating systems
	Functional	Application of the process benchmarking that compares particular business functions at two or more organizations
	Performance	Concerning outcome characteristics, quantifiable in terms of price, speed, reliability, etc.
	Strategic	Involving assessment of strategic rather than operational matters
Purpose for the relationship	Competitive	Comparison for gaining superiority over others
	Collaborative	Comparison for developing a learning atmosphere and sharing of knowledge

Gradually benchmarking has expanded and the tool is now being used globally and is yielding positive results, with some large organisations that are interested in tracking performance of the water industry making large investments to generate and sustain enormous data banks for the application of generated indicators that are used for the benchmarking process (Blokland 2010). Prior to benchmarking, performance measurement systems need to be established focusing on topics that require action with a target of providing the right information to the right decision level at the right time (Crotty 2004). A set of indicators useful for comparison and analysis are required for effective performance measurement and successful benchmarking in the water sector.

Performance indicators are defined as *'tools providing means of measurement of fulfilment of any projects' objectives, success and prediction of obstacles that may hinder operation, and facilitate the indication of problems and their possible solutions'* (Hassanein & Khalifa 2007

p. 480). Performance indicators can also be viewed as *providing key information needed to define the efficiency and effectiveness of the delivery of services by an undertaking*' (Matos et al 2003 p. 1). Adequate knowledge of the context of operation and characteristics of the system and the environment of operation are necessary for interpretation of indicators, which is usually presented as the profile of the undertaking (Matos et al 2003 and Crotty 2004). Analysis of the indicators can either be using business or performance models like the QualServe Business Model (Crotty 2004) or sometimes using statistical techniques like the Ordered Weighed Average operators (Sadiq et al 2010). There are many standard performance indicators proposed in standard manuals by renowned organisation like the International Water Association (IWA), American Water Works Association (AWWA), Australian 2010 – 2011 National Performance Framework, etc that are accepted and in use by many water utility managers all over the world. For this study, we plan to propose simple indicators for Process/Functional/Collaborative benchmarking of the 17 indigenous water and waste water service providers on compliance with regulations, community participation (including community needs) and impact of their services on primary health. The purpose of the exercise is to attempt the use of information from planning reports for benchmarking and to extract best practices that could be used to improve the sector and to provide information to the regulatory agents on the efficiency and effectiveness of service delivery of the providers, with the hope that the indicators that are selected and the system approach will provide the right outcome at the right time.

3.6 IDENTIFICATION AND SELECTION OF ASSESSMENT INDICATORS

Performance indicators are usually expressed as ratios between variables either as commensurate (e.g. %) or non-commensurate (e.g. \$/L) and are required to possess certain qualities to be able to assess performance in a true and unbiased manner (Matos et al 2003). Some of the requirements for selection of performance indicators are presented by Matos 2003 and are as follows:

- They should be clearly definable, with concise meaning and unique interpretation for each indicator.
- They should be mutually exclusive without overlap.
- The data needed for each performance indicator should require a measuring tool which shall be affordable.
- They should be auditable, especially if they are to be used by regulatory agencies.
- They should refer to a well defined period of time.
- Should refer to well-defined geographical or spatial areas.
- As few as possible indicators shall be used, including only those necessary for performance evaluation.

To support formulation of such indicators, a profile shall be supplied by the utility containing the required data for the issues that are to be benchmarked (Crotty 2004). The source of the profile data is usually the performance report based on agreed report content or as required by policy regulations. For instance the National Water Commission benchmarked and reported on the performance of urban utilities in Australia using a set of indicators that the utilities are required to supply information on (NWC 2011).

Looking at the above requirements for establishment of performance indicators in relation to the limitations of this study, it is apparent that it will be difficult to derive performance indicators within the scope of this study. Some of the reasons being:

1. The OWSR do not receive performance reports from the providers that will give the required information to propose effective indicators. Information generated is from the required planning reports which do not provide detailed up to date information on

- their operations. The lack of performance reporting contravenes the recommendations of the NWI on review and benchmarking the performance of all service providers (Glindemann n.d).
2. With the exception of Woorabinda and Torres Shire Council all the other providers do not charge for water and all of the 15 that provide a sewerage service do not charge for the service. This means none of the indicators that have to do with pricing and finance can be proposed. This is also contrary to the recommendations of the NWI that full cost recovery for all water systems shall be achieved (Glindemann n.d).
 3. All the units responsible for the execution of the services are not autonomous. Lack of tariff structure is one of the major reasons that hinders operational autonomy. There is no entity in the form of a unit or a body with sufficient autonomy to take responsibility for providing the service on behalf of the councils. A pretty good example of autonomous and successful arrangement is the NPA water supply being managed by Sunwater as private operator engaged by the Queensland government through the Department of Local Governments.
 4. The reports available for review are not within the same time frame. Due to lack of performance reporting requirement, the planning reports including those that contain assets and financial planning are short term plans. They are required to be updated or renewed after a period of 2 – 4 years, and are sometimes subject to delays in submission by the providers.

In order to check the viability of using information from the available planning reports, an attempt will be made to use the definitions of some of the indicators used by the NWC for urban water utilities to benchmark the performance of the 17 indigenous service providers on compliance with regulations, community participation and impact on health. A profile of the providers was generated from the Strategic Asset management Plan Reports of each provider and the database of the OWSR. The NWC Urban Performance Reporting and Definitions Handbook proposed indicators under 44 subheads within 7 categories of water resources, asset data, customers, environment, public health, finance and pricing (NWC 2011).

CHAPTER 4 DATA ANALYSIS AND DISCUSSION

4.0 INTRODUCTION

A profile of the 17 indigenous service providers was prepared from the information available to the OWSR in some of the planning reports, largely from the Strategic Asset Management Plans and the data bank of the OWSR known as the Water Industry Compliance Database (WICD). Service providers are required to submit annual reports, but some indigenous providers have not been complying with that requirement. The profile is prepared in 8 categories as follows:

1. Water supply infrastructure: Water resources, age/last upgrade, treatment process, treatment capacity, water demand and number of connections
2. Waste water infrastructure: age/last upgrade, treatment process, capacity, number of connections and major operation challenges
3. Operation and maintenance (O&M): system and record of O&M, backfilling arrangement, emergency response plans, water demand programs
4. Personnel Management: Number of staff, qualifications & experience, staff turnover, motivation and incentives
5. Compliance with regulatory requirement: submission of quarterly reports, E. coli monitoring and water quality management plan
6. Funding and revenue: billing & tariff and sources of revenue
7. Customer relations: complaint resolution and community involvement
8. Health indices: E. coli incident reports and other drinking water incidents

The data from the profile will be tested to establish the possibility of using information from planning reports to benchmark the performance of the 17 indigenous service providers using the NWC performance indicators framework as guide. Twenty two performance indicators relating to compliance with regulatory requirements, community participation (consumer needs) and health were selected to be tested. The other 67 indicators of the NWC framework that are within the category of finance and pricing were not tested because with the exception of Woorabinda and Torres Shire Council that reported charging households a flat rate tariff, the service providers do not charge customers for services. Where it is not possible to apply the selected indicators, a brief explanation has been given on the inadequacy of the indicator. Other issues of interest that are not covered by the indicators were discussed separately. The detailed profile of the 17 indigenous service providers from the planning reports is presented as appendix II.

4.1 ASSUMPTIONS

It was assumed that the data in the profile was obtained from the same period of time for all the providers. This assumption allows the providers to be benchmarked on the same scale. The NWC framework presented issues on regulatory requirements and health under the two categories of environment and public health. The two categories in the NWC framework will be merged to be presented for benchmarking of both regulatory requirement and health issues in this study.

4.2 BENCHMARKING COMMUNITY PARTICIPATION AND CONSUMER NEEDS

The indicators for community participation and consumer needs are aimed to present how effectively the providers strive to satisfy the consumers. It also tests both the level of community awareness and confidence in the responsibilities of their service providers and their responsibilities and expectations in order to achieve the desired goal of effective and

efficient service. The following 15 indicators were selected from the NWC framework to benchmark this category

Total Water Sourced (PI:1)

Water is sourced from ground, surface or rain or combinations of two or all three by the 17 service providers as shown in table 4.

This indicator is expected to provide the volume of water taken from sources by the provider. The profile data available do not express the volume extracted rather the allowable volume allocated to the provider to be extracted. This information will not serve the purpose of the indicator which is to check the actual amount of water extracted, which can subsequently be compared to other parameters (for example comparison between amount extracted and amount supplied to identify losses). The deficiency of the data from the planning reports devalues this indicator and also devalues the use of the indicator with other indicators, because this indicator mainly serves as a normaliser for other indicators.

Table 4: Sources and allocation of water

Provider	Allocation (ML/year)	
	Surface	Borehole
Aurukun		250
Cherbourg	183	
Doomadgee	NA	
Hope Vale		143
Kowanyama		NA
Lockhart River		315
Mapoon		25
Mornington Is	NA	
Napranum		200
NPA	NA	
Palm Is	NA	
Pormpuraaw		200
Torres	NA	
Torres RC		
Woorabinda		NA
Wujal Wujal	NA	
Yarrabah	NA	NA

Seven of the providers use a surface water source, 8 used a ground water source, 1 uses a combination of surface and ground sources and 1 (TSIRC) uses combination of ground, surface, rain and desalination. The allocation data available is for only 7 out of the 17 providers.

Total Wastewater Collected (PI:2)

This is similar to PI:1. Table 5 shows the waste water collection capacity of the providers' plants. The data from the profile provides the capacities of the wastewater plants and not the amount of waste water collected. This indicator is also deficient.

Table 5: Capacities of sewage treatment plants

Provider	Capacity (ML/day)
Aurukun	0.31
Cherbourg	0.54
Doomadgee	NA
Hope Vale	0.32
Kowanyama	0.44
Lockhart River	0.2
Mornington Is	0.31
Napranum	2.6
NPA	NA
Palm Island	1.25
Torres	1.25
TSIRC	NA
Woorabinda	0.32
Wujal Wujal	0.2
Yarrabah	NA

2 out of the 17 providers (Mapoon and Pormpuraaw) do not have wastewater plants (they use in-ground septic tanks) and data is only available for 11 out of the 15. The capacities of the plants range between 2.6ML/day (Napranum) and 0.2 ML/day (Lockhart River and Wujal Wujal).

Properties Served per km of Water Main (PI:3)

This provides an indication of the density of properties served and indicates the ease or difficulty in delivering water. There are two indicators here, the first being the length of mains which shows the scale of the pipe network and then the ratio of connections to the length of the mains. Table 6 and Figure 4 show the length of mains pipeline and PI:3 respectively.

Table 6: Length of Mains – water

Provider	length (km)
Aurukun	8.76
Cherbourg	11.4
Doomadgee	7.2
Hope Vale	31.19
Kowanyama	16.15
Lockhart River	2.74
Mapoon	0
Mornington Is	6.2
Napranum	7.09
NPA	16.8
Palm Is	20
Pormpuraaw	4.84
Torres	0
Torres RC	0
Woorabinda	31
Wujal Wujal	4.1
Yarrabah	15

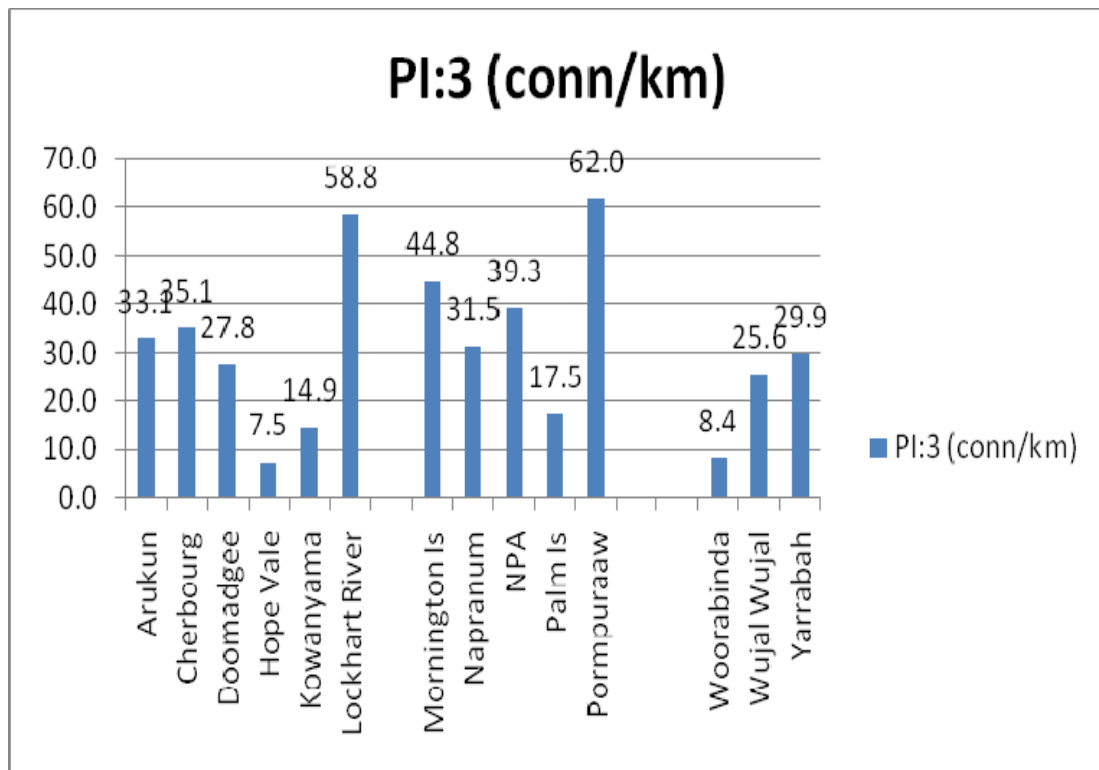


Figure 4: Properties served per km of water mains

Data on the water main pipeline is available for 14 communities. The length of the mains ranges between 31.19km (Hope Vale) and 2.74km (Lockhart River), and the total length of the mains for all the schemes is 182.47km. The connection density ranges between 62 (Pormpuraaw) and 7.5 (Hope vale) connections/km. This helps to explain more difficulties in Hope Vale and higher functionality of the mains in Pormpuraaw.

Properties Served per km of Sewer Main (PI:4)

This indicator is similar to PI:3 for wastewater. It reports on the scale of pipe network and density of connections as shown in table 7 and Figure 5 respectively

Table 7: Length of Mains – sewage

Provider	Length (km)
Aurukun	6.23
Cherbourg	6.7
Doomadgee	11.8
Hope Vale	10.14
Kowanyama	7.9
Lockhart River	2.48
Mornington Is	8.2
Napranum	5.73
NPA	NA
Palm Is	20
Torres	NA
Torres RC	NA
Woorabinda	9.9
Wujal Wujal	1
Yarrabah	7

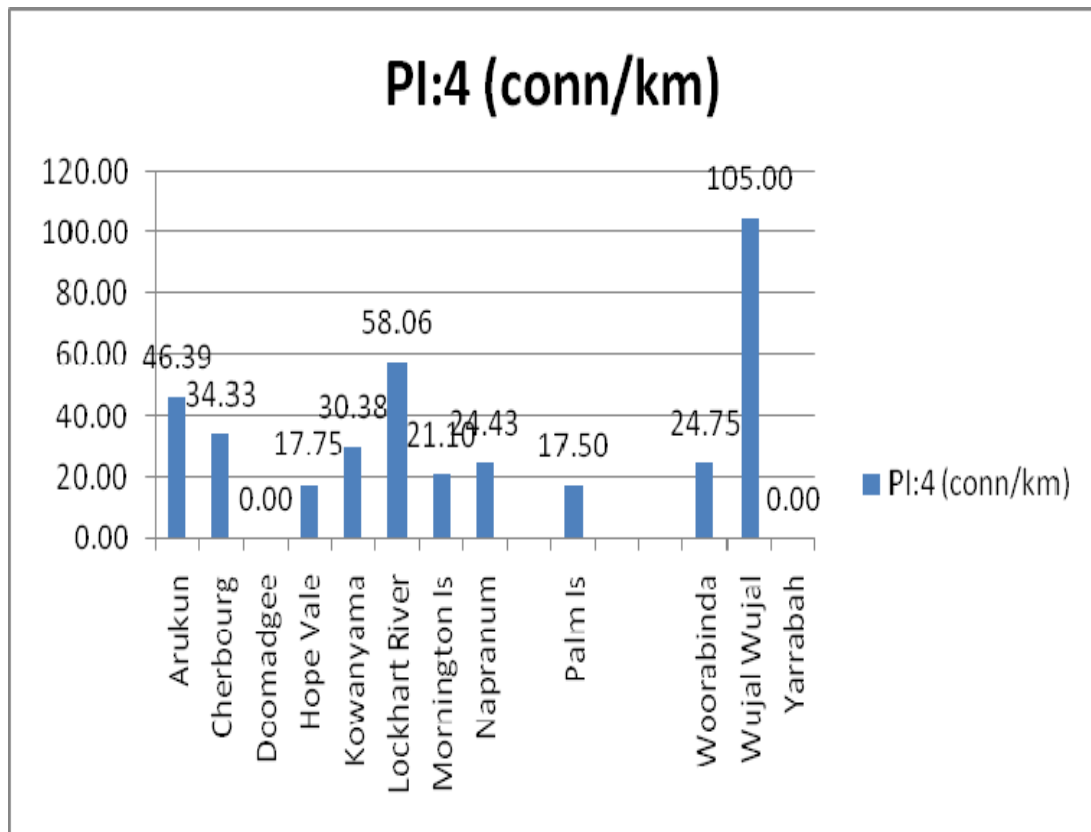


Figure 5: Properties served per km of sewer mains

Data on the sewer mains is available for 12 communities. The length of the wastewater mains ranges between 20km (Palm Island) and 1km (Wujal Wujal), and the total length of the mains for all the 12 schemes is 97.08km. The connection density was generated for 10 communities, as the number of connections in Doomadgee and Yarrabah are not available. The connection density ranges between 105 (Wujal Wujal) and 17.5 (Palm Island) connections/km. This showed the tendency of higher difficulty in pipeline maintenance in Palm Island and higher functionality of the mains in Wujal Wujal.

Water Main Breaks per km of Main (PI:5)

This is an indication of the condition of the water main pipeline and also partially reports on effectiveness of service to consumers. The profile data, being from planning reports, do not contain information on what actually happens to the pipeline network and no data is available on breakages. The providers are required to submit System Leakage Management reports to DERM but none has complied. What is mainly reported is the age of a component of a system that requires replacement or the period of latest upgrade of the system. Due to lack of adequate data, this indicator cannot be assessed.

Losses per Length of the Mains or per Number of Connections (PI:6)

This indicator reports on both apparent losses that are unavoidable and real losses that are regarded as waste of resources, increases operational cost and reduces the efficiency of the system. Aurukun and NPA reported the maximum expected losses in their systems as 20% in the whole system and 220L/connection/day respectively. These figures are assumed from experience of operation and do not necessarily show actual occurrence, but rather show the high losses expected to be incurred in the systems. Due to the same reasons of inadequate data as in PI:5, this indicator cannot be assessed.

Other similar indicators that check losses, due to breakages, leakages, etc also cannot be assessed due to the same reason.

Sewer Break/Choke per Length of the Sewer Mains or per Number of Connections (PI:7)

This indicator is similar to PI:5 for wastewater. It assesses the condition of the sewer pipeline and channels and also reports on effectiveness of customer service. Similar to PI:5 this indicator cannot be checked.

Population Receiving Water Supply and Number of Properties Served (PI:8)

These indicators report on the composition and scale of the whole system. They are similar to PI:1, as they serve as normalisers for other indicators and are shown in Table 8.

Table 8: Population and number of properties served with water supply

Provider	Connected Population	No. of Connections
Aurukun	1,500	290
Cherbourg	2,000	400
Doomadgee	1,240	200
Hope Vale	1,250	235
Kowanyama	1,150	240
Lockhart River	800	161
Mapoon	300	46
Mornington Is	1,200	278
Napranum	943	223
NPA	2,555	661
Palm Is	2,500	350
Pormpuraaw	700	300
Torres	0	714
Torres RC	0	0
Woorabinda	960	259
Wujal Wujal	480	105
Yarrabah	4,000	448

The population and the number of connections show the diversity in size of the indigenous communities being served. However it can be seen that population size is not commensurate to number of connections as there are communities that have lower population than others but have higher number of connections. This can be interpreted as those communities have smaller family sizes or there are fewer number of people per household.

Population Receiving Wastewater Service and Number of Properties Served (PI:9)

There is no data on the population being served by the wastewater services. The number of properties served with wastewater treatment services are shown in Table 9.

Table 9: No. of properties receiving wastewater services

Provider	No. of Connections
Aurukun	289
Cherbourg	230
Doomadgee	NA
Hope Vale	180
Kowanyama	240
Lockhart River	144
Mornington Is	173
Napranum	140
NPA	NA

Palm Is	350
Torres	580
TSIRC	NA
Woorabinda	245
Wujal Wujal	105
Yarrabah	NA

Even though there was no data to assess the number of properties served, NBS 2009 reported that in 2006 30%, 37.7% and 28.3% of indigenous communities in Australia use town systems, water borne systems and septic tanks respectively as means of sewage disposal, which represent about 55% increase compared to 2001.

Water Quality Complaints (PI:10)

This indicates the satisfaction of customers with the quality of services received. It is also a partial indicator for suitability and appreciation of treatment processes. Records of complaints do not feature in the planning reports, in fact it is only in Doomadgee and Lockhart River that they have a formal register for complaints at the council office. The remaining providers do not have a formal procedure for registering complaints. Due to lack of information, this indicator cannot be assessed.

Water Service Complaints (PI:11)

Similar to PI:10, this indicator checks on the satisfaction of consumers on supply services. It is also a partial indicator for reliability of service. As earlier mentioned, there was no record available on the complaints of consumers and that 15 of the providers do not have a formal complaint procedure.

Lack of complaint data made it impossible to assess the performance of the providers on satisfaction of service to consumers, reliability of the service and acceptability or suitability of treatment process using PI:10 – PI:12. Other indicators such as billing complaints, total complaints, complaints answered within certain period of time and resolved complaints cannot be assessed due to the same reason of lack of complaint data. Lack of formal complaint procedure is an indication of lack of cohesion between the providers and their consumers.

Wastewater Service Complaint (PI:12)

This indicator reports on customer satisfaction, service quality and service reliability. Similar to PI:10 and PI:11, there is no data to assess this indicator.

Average Duration or frequency of Unplanned interruption – Water (PI:13)

This indicates how effective the operation of the system is. It is a partial indicator for customer service and also assesses the condition of the water pipeline network. There is no record of the number of interruptions of supply from any of the providers possibly because data was generated from planning reports. Additionally 9 of the providers reported not having formal records of their operations. This means it is possible that the information may not be available when required and that it may not be possible to assess the effectiveness of their operations.

Average Sewer interruptions (PI:14)

This indicator is similar to PI:13 for wastewater. For the same reasons it is not possible to assess the indicator.

Number of Restrictions or Legal Actions for Non-payment of Bill (PI:15)

This indicates effective management procedures in the part of the provider and expresses the confidence of the provider in service delivery. Only Torres Shire Council and Woorabinda charge customers flat rate for water services and there is no record of any penalty imposed for non-payment. Consequently this indicator as other indicators that are related to finance and billing cannot be assessed.

Other Community Participation and Consumer Needs Issues

The set of indicators from the NWC framework are for urban utilities where consumer needs are usually assessed using operational, financial and billing indices. Less emphasis is on community participation especially in contribution to management affairs. Considering the population and number of connections in these indigenous communities, they are closer to remote areas where there is an emphasis on and encouragement of community participation compared to urban areas. The set of indicators available here do not give enough coverage on community integration which as shown in the previous chapter have a tremendous impact on improving level of service especially for small scale providers. Another area that was not covered is water demand management, water efficiency and conservation practices that are lacking in indigenous communities because of records of high water consumption. Records from the profile showed the concern of the service providers on lack of encouragement for water conservation measures and on high water use. The NWC framework does not check on the age of the infrastructure as a factor of performance. This is possibly because it is designed for large schemes that are complex in size and management and have large asset base. For smaller schemes like the ones managed by these providers, age is an influential factor of operation and often an indicator of degradation. Most of the service providers do not generate revenue from water and waste water services, it is therefore important to assess how they get funds for both operation & maintenance and for major capital investments.

Community Participation Measures

O'Rourke, 2011 reported that studies across Queensland indigenous settlements show demand for greater community participation in the management of water supply, and recommended integrating community involvement with council management where local government is the service provider. Grey-Gardner, 2008a described the water management system for remote indigenous settlements as 'technology driven' where decision making and responsibility reside outside the settlements. It can be argued that members of the management crew may be from the locality but lack of involvement of residents in managing the risks and hazards associated with their water supply made the decision making process to be considered foreign. Lack of clear decision process by supporting and funding agencies and lack of community supported risk based water management plans were also identified as issues that corroborate difficulty in remote water management (Grey-Gardner 2008b). A study on smaller communities with less than 100 connections showed how the use of a livelihood assessment tool increased the likelihood of sustainability and enhanced the applicability of the risk management approach proposed by the ADWG. Similar participatory approaches will undoubtedly improve capacity, sustainability and establish appropriate level of responsibility in the management of the indigenous water supply and waste water management systems and ensure better water quality management plans as required by the Water Supply (Safety & Reliability) Act 2008. There are many experiences of engaging communities in water management especially in the developing countries. An example of such experiences that the researcher is familiar with is the Nigeria small towns water supply and sanitation programme, which is a demand driven project and remote communities where engaged and organised to take ownership and management of water and sanitation facilities (The World bank 2006).

Demand Management and Water Conservation Measures

All 17 service providers expressed concern at the level of water wastage in the communities even though there are no adequate records to establish actual losses. Johnson, 2011 reported

as high as 1400L per person per day consumption in indigenous settlements. Issues such as leaving taps continuously running to waste, condition of pipelines, using water for cooling and many other reasons are linked to excessive water use. For urban areas, price and resources availability are the major drivers for water demand management (Pigram 1986). During the era of drought, it was gathered that various levels of water restriction were implemented by the indigenous providers but there is no record to assess the impact. For non urban settlements improved community awareness on water demand management and water efficiency mechanisms are the best ways to manage water consumption especially in remote areas where services are not charged (Gray-Gardner 2008b). O'Rourke, 2011 reported on a case study of the Dajarra community in North West Queensland and suggests that an appropriate approach that uses existing physical, cultural or social settings and is designed to accommodate culturally specific behaviours determine success for interaction with outsiders and implementation of new initiatives. It was observed that DERM has water wise programs that promote efficiency and demand management. The school environmental management program targeted school children, incorporating water wise ideas in curriculums and linking with councils for implementation. Use of models, local champions and collaboration with other agencies that have established contacts and current programs in these communities can be a good means of entry and presenting new programs. For instance Queensland Health is running a community hygiene awareness program in some of these communities in collaboration with the Northern Pride rugby league team. The Take Pride program is popular with indigenous Queenslanders, as many indigenous players are recognised as role models.

Sources of Funding

The councils who are the service providers depended on funding from external agencies and the small revenue they generate internally to cover the cost of operations since they do not charge for services. The State Government Financial Aid (SGFA) program is the main source of funds for the indigenous councils. This funding program started as far back as 1984 when indigenous councils were established (DIP 2010). The program provides financial contributions (in lieu of rates) for costs incurred by the council on essential services including water and wastewater services (DIP 2010). The funding is paid on a quarterly basis and requires fulfilment of certain requirements in terms of reporting and certification (DIP 2010). A total of AU\$ 32,675,000 and AU\$33,704,000 was recommended for SGFA payment to councils for 2010-11 and 2011-12 respectively (DLG 2011). It was understood that the Department of Local Government implements the Indigenous State Infrastructure Program (ISIP) which is another Queensland government program that prioritises environmental infrastructure upgrades of which the sum of AU\$67 million was made available for the 2011 financial year. Other sources of funding available to the indigenous councils include the Commonwealth financial assistance grants, which is a federal government grant under the Local Government Financial Assistance Act 1986, and is available for any developmental project chosen by the council (DIP n.d.). The sum of AU\$377 million was made available to Queensland local governments in 2009-10 (DIP n.d.). The Joint Agency Infrastructure Program (JAIP) whereby the Federal and State agreed to contribute 50% each is another funding arrangement for essential service development including water and wastewater infrastructure for the indigenous councils (DIP n.d.). Under the current agreement the sum of AU\$61.5 million is made available for the indigenous councils (DIP n.d.). In addition to SGFA, ISIF and JAIP, other sources of funding for indigenous councils that can assist in water and wastewater delivery being managed by the Department of Local Government include the Major Infrastructure Program (MIP), which is another federal and state joint program of AU\$28 million between 2009-11 for the Torres Strait communities, the Natural Disaster Relief and Recovery Arrangement (NDRRA) is also a federal state joint program to the tune of AU\$170 million in 2009-10 for recovery of infrastructure impacted by natural disasters (DIP n.d.). There are also some smaller funds available like the AU\$8.5 million for improvement of water services in Wujal Wujal, Woorabinda, Doomadgee, Mornington Island and Hope vale provided under the federal government's Water for the Future Initiative

(Indigenous People Issues and Resources, 2010), and the Australian Government's Water Sustainability Strategy that provided AU\$3.35 million for capacity building of indigenous council staff (DLGP n.d.).

During the course of this study it was gathered that there were other funding programs that invested in the water sector of the indigenous council, such as the National Aboriginal Health Strategy (NAHS) which was initiated by the federal government in 1990 for capital projects, the Community Housing Infrastructure Program (CHIP), and other programs by the Department of Aboriginal and Torres Strait Islander Policy (DATSIP) and the Aboriginal and Torres Strait Islander Commission (ATSIC), which was abolished in 2005.

From the above it can be seen that the indigenous councils have many sources of funding, some of which are not permanent and may not be sustained. These funds usually come with series of criteria that need to be fulfilled which may likely require huge investment especially in personnel time and effort.

Staff Management and Capacity Building

The indigenous providers like other remote service providers have challenges accessing adequate and experienced staff especially in the area of treatment plant operations (this was discussed during the Capacity Building, Water and Wastewater Workshop – Far North Region of 22nd March 2012). It was gathered that the situation was exacerbated by the present day mining boom that provides lucrative returns and the previous government's Indigenous Employment Policy for Queensland Government Building and Civil Construction Projects (IEP 20% Policy), which provides opportunities for ambitious young indigenous persons with so many options for adventures. Other factors that contribute to high turnover of staff and low interest to work for the indigenous water providers include issues such as alcohol control in some communities, lack of comparative salary and lack of incentives and motivation as expressed by the staff in response to a questionnaire administered by OWSR (No 19 Appendix II). Nine out of the 17 councils have managers overseeing service provision but their responsibilities go beyond water and waste water, they usually oversee all infrastructures under the council. The operators are usually essential service officers (ESO) that hold certificate 2 and 3 in water treatment plant operations. There are usually few of them and they complained of working extra hours and lack of back filling arrangements especially in providing technical support when experiencing difficulties. Only Woorabinda and Wujal Wujal have arrangements for technical support for water and sewage respectively. Several efforts are being implemented to assist the situation, for instance the Department of Local Government is running a capacity building programs for the providers and Queensland Health support indigenous councils with funds to engage environmental health workers. It may be suggested that some level of autonomy and independence in the management of the water and wastewater facilities will boost the morale of the staff and improve their sense of responsibility towards their duties.

4.3 BENCHMARKING COMPLIANCE TO REGULATORY REQUIREMENTS AND PUBLIC HEALTH

Institutional Arrangement for Water Supply Regulation

The Water Supply (Safety & Reliability) Act 2008 is the major tool for the regulation of drinking water services in Queensland and is being administered by the chief executive of the former DERM, now Department of Energy and Water Supply, who in turn delegates certain powers to the staff of the OWSR (DERM n.d.). The aim of the Act is to protect public health and provisions of the Act require that upon registration as a service provider with OWSR, providers are to:

- monitor and report on drinking water quality

- develop and implement an approved Drinking Water Quality Management Plan (DWQMP) (DERM n.d.)

Pursuant to Clause 630 of the Act, notice was issued to all providers to provide water quality monitoring reports until they have an approved plan in place (DERM 2010). Sixteen of the Indigenous providers fall within the category of small providers and are expected to have their DWQMP in place and approved by July 1st 2013 (DERM 2010).

Schedule 3 of the Water Supply (Safety & Reliability) Act 2008 requires that drinking water quality standards shall be as prescribed under the Public Health Act 2005, administered by Queensland Health (DERM 2010). The Public Health Act 2005 and Public Health Regulation 2005 set specific standards for drinking water quality and also empower Queensland Health to intercede and take action either by issuing and enforcing improvement notices or public health orders when water supplied by a provider is suspected to present a risk to public health, or some action needs to be taken to protect public health. Some of the parameters to be monitored and reported on include *Escherichia coli* – (E. coli) in reticulation, and the fluoride concentration in treated water when fluoride is added to a water supply. DERM water quality criteria also includes all other pathogens and chemicals contained in the ADWG (DERM n.d.). The providers are required to submit to the OWSR routine monitoring reports such as quarterly reports and incident reports immediately or as early as possible (DERM n.d.).

Percent of Sewage Volume Treated that was Compliant (PI:16)

This indicator checks compliance with discharge licence and assesses a provider's commitment to protecting the environment. All sewage plants operated by the providers are licensed with the exception of Cherbourg whereby at the time of reporting the licence has expired and there were concerns on the effect of effluent on the downstream of discharge points; and Palm Island where it is reported that effluent does not meet licence requirements. The reports reviewed do not provide any information on compliance of discharges in relation to licensing.

Public Disclosure of Sewage Treatment Performance (PI:17)

This indicator demonstrates transparency and accountability to the community and regulators. As mentioned earlier, treatment plants are operated on licence but there is no evidence to establish compliance and operation details are not disclosed.

Compliance with Regulator - Sewerage (PI:18)

This indicator checks if the requirements of the regulator are met in the operation of the entire system. The providers are operating under licence and there was no report expressing dissatisfaction in their operation or expression of failure to meet requirements from the regulator (except the 2 mentioned above who reported non compliance). As such it can be inferred that they complied with the regulator's requirement.

Sewer Overflows Reported to Regulator (PI:19)

This indicator assesses how effectively the sewerage network is managed. It is also a partial indicator for the condition of the network and can also be used to assess consumer service standard. Details of operational issues are not provided such as number of overflows, number of blockages, etc, but the providers gave an overview of the challenges with the operations of the sewage plants including ground water infiltration, blockages and overflows, blue-green algae and high volume of wastewater due to high water consumption.

Drinking Water Quality Guidelines (PI:20)

The Water Supply (Safety & Reliability) Act 2008, Public Health Act 2005, Public Health Regulation 2005 and ADWG provide the guidelines for drinking water quality to the providers. Presently they are expected to provide quarterly monitoring reports pending the submission and approval of their DWQMP known as Drinking Water Quality Quarterly

Report (DWQQR). It will be difficult to answer yes or no on whether the providers have met the requirement of submitting the quarterly reports because a provider may submit some and not submit for some quarters, they may submit very late, or they may submit a report which does not contain what is required. Details on the providers' compliance with quarterly reporting requirement are also given in the profile in Appendix II. For this indicator, compliance with quarterly reporting for the year 2011 was assessed. Table 10 shows the number of DWQQR submitted by the providers for the year 2011.

Table 10: Compliance with quarterly reporting for the year 2011

Provider	No of Quarterly reports (2011)
Aurukun	4
Cherbourg	3
Doomadgee	4
Hope Vale	NA
Kowanyama	3
Lockhart River	3
Mapoon	4
Mornington Is	4
Napranum	0
NPA	4
Palm Is	3
Pormpuraaw	4
Torres	2
TSI RC	4
Woorabinda	4
Wujal Wujal	3
Yarrabah	4

Nine out of the 17 have submitted all 4 DWQQRs, 5 have submitted 3 reports each, 1 submitted 2 reports and 1 didn't submit any. This is an improvement in comparison to previous years. The providers attributed their failure to submit reports as required to issues such as lack of funds and availability of staff. It was also understood that initially from inception of the new Water Supply (Safety and Reliability) Act in 2008, the regulator did not recognise the limited capacity of the remote providers and take time to build their capacity on the new responsibilities and introduce them to the appropriate staff in DERM. Recent efforts by engaging an indigenous consultant to liaise with the providers has improved the relationship with the regulator and reflects on the providers' commitment to meeting reporting requirements and improved communication with the regulator. The consultant encouraged the providers to prepare their DWQMP and for the first time they are working with the staff of the regulator and preparing their plans without engaging external consultants.

Achievement of Microbiological Compliance (PI:21)

The Water Supply (Safety & Reliability) Act 2008 requires that the providers shall achieve compliance with the water quality standards in the Public Health Regulation. This means that 98% of drinking water samples over a period of 12 months must show no microbiological contamination using the E. coli test. The presence of E. coli does not necessarily means sickness to consumers. E. coli can occur in the natural environment not necessarily from faecal source, but its presence in treated water indicates inadequate treatment (NHMRC & NRMCC 2011). Table 11 shows the E. coli compliance over a period of 12 months for all the 17 providers.

Table 11: 98% no E. coli presence over 12 months in 2010

Provider	98% E. coli compliance
Aurukun	Yes
Cherbourg	No
Doomadgee	Yes
Hope Vale	Yes
Kowanyama	Yes
Lockhart River	Yes
Mapoon	Yes
Mornington Is	Yes
Napranum	Yes
NPA	Yes
Palm Is	Yes
Pormpuraaw	Yes
Torres	No
Torres RC	No
Woorabinda	Yes
Wujal Wujal	Yes
Yarrabah	Yes

Data available for 2010 showed that 14 of providers met the 98% no E. coli requirement while Cherbourg, Torres Shire Council and TSIRC failed to meet this standard. This analysis showed the effort of the providers to provide safe drinking water to their consumers. While there was no explanation on the failure to meet the requirement, it was reported that the responsible officer in Cherbourg had difficulties understanding and completing DWQQR.

Risk Based Drinking Water Management Plan Approved? (PI:22)

Risk based water management plans demonstrate commitment to a systematic and focused approach to management of drinking water. The Water Supply (Safety & Reliability) Act 2008 requires the indigenous service providers who are mainly categorised as small providers to have their DWQMP ready and approved by July 1st, 2013. As at present only Kowanyama had submitted their DWQMP to OWSR, while Hope Vale and Torres Shire Council have prepared drafts for review and all are expected to have their plans completed by the end of 2012.

Health Records for Monitoring

Good water supply and sanitation contribute to improvement of public health. Evidence shows that improved water supply and its related components radically reduce population illness and investment in the water supply sector is a driver for economic growth, with the benefits far outweighing the investment cost while also contributing to increased productivity of the society (Anonymous 2005). There are concerns about the health status of indigenous population in Australia being low compared to the non indigenous population (Australian Indigenous Health Infonet 2010 and ABS 2009) and it would have been worthwhile to check the impact of the investments in water supply and wastewater services on health of the societies. Effort to obtain health records to assess health impact in relation to water supply failed due to lack of data. However ABS, 2009 reported that there was improvement in public health due to improved water and sanitation infrastructure from the early 20th century and tremendous improvement between 2001 and 2006.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

The purpose of the study was to benchmark the performance of the indigenous service providers and to extract trends that can be replicated for improvement, especially in the areas of community participation, regulatory compliance and health improvement. In order to benchmark utilities, information is needed in the form of a profile or as required by the benchmarking agency. The use of information from planning reports has proven to be inadequate to assess performance of the providers because their contents were not structured to yield information required for performance assessment. For instance, it was observed that while information on the volume of water supplied (PI:1) and volume of sewage received (PI:2) are needed, the planning reports provided only the volume allocated for extraction or permitted to be discharged. In addition, the planning reports do not report on what transpired during operation of facilities, and because there is no emphasis on the need for the information, records are not usually maintained so that when the information is required, it can be obtained. For instance, number of breakages (PI:5) of water supply pipelines, number of chokes in sewers (PI:7), losses in water supply (PI:6), and interruptions ((PI:13 & PI:14) cannot be assessed due to lack of adequate data. Other issues such as complaints (PI:10, PI:11, PI:12) and operational compliance (PI:16, PI:18 and PI:19), were also not assessed and couldn't have been because the providers do not usually maintain appropriate records. It is recommended that in order to be able to assess the performance of the providers, performance reporting and record keeping, especially for operations and finance (where applicable), should be encouraged.

Performance indicators proposed by the NWC framework were used for the assessment. Some of the short comings for the choice of these indicators are; they are meant for large (urban) utilities that probably have a different focus for benchmarking compared with smaller utilities such as those managed by the indigenous providers. We have seen the emphasis on financial indicators and billing and less emphasis on issues such as community participation and impact of services on public health. In order to have a qualitative assessment, it is recommended that further studies should be undertaken to identify indicators that better suit the context of indigenous providers. Such indicators should be able to assess issues such as the different aspects of community participation, water demand and water conservation issues, provider personnel and staff issues, health impact of water and waste water services and also be able to assess financial management issues taking into consideration that most of the providers do not charge for services. The regulator should be able to require the providers to provide this information and report targeted and specific data.

The study aimed to identify trends that could be extracted and replicated. From the few indicators analysed there are no trends that could be extracted. For instance both Woorabinda and Pormpuraaw that have low and high properties served per km of water mains respectively complied with quarterly reporting and 98% compliance with microbiological standards. Wujal Wujal and Palm Island have high and low properties per km of sewer main respectively and both submitted 3 quarterly reports and complied with the microbiological requirement. Due to lack of adequate indicators the performance of the providers was not adequately assessed, and thus trends could not be extracted.

The anecdotal view that indigenous service providers are not performing was probably based on the failure of the providers to meet reporting requirements or from general observation of water supply services to remote areas (indigenous communities inclusive) that are usually much smaller and more remote than the 17 service areas covered by our study. That notwithstanding, it was found that compliance with reporting requirements was not very satisfactory. Other issues observed that impacted on the performance of the providers include staff management issues which is highlighted by high turnover of staff, lack of backfilling arrangements and lack of incentives and motivation. Operators of water and sewerage

services lack autonomy within Councils and this creates high dependency on council management which is vested with sole responsibility for funding and decision making. However, recent efforts by the regulator to engage directly with providers yielded positive results in the areas of communication and reporting requirements. As a result, 14 out of the 17 providers were able to meet the 98% no microbiological contamination in 2010. In order to promote autonomy and encourage higher levels of service provision, it is therefore recommended that indigenous councils be encouraged to consider private sector participation in the management of their utilities. Further studies are recommended in the area of public private partnership using the concept of integrated water management in water supply and wastewater utility management.

This study was neither able to assess the performance of the indigenous providers nor able to identify trends that could be extracted and be replicated to improve performance. But the study was able to identify areas where the providers could be better supported, especially by the regulator and other government agencies for improved delivery of quality service to their communities. It has been shown that for water services provided by indigenous councils, community organisation, participation and contribution is essential for effective service delivery. One of the advantages of community participation is in demand management and sustainable utilisation of resources, where community enlightenment, education and engagement are useful tools for success. It is recommended that further studies shall be conducted on ways of integrating the indigenous communities into the decision making of the Council service providers. Participatory approaches and many other integrated water management tools like the sustainable livelihood framework are available to be tested. Most importantly, an understanding of the social structure of these communities is crucial. While it is very sensitive it is also available to be utilised once it is understood and recognised. Existing structures, experiences and projects that recorded success should be recognised, copied and be built upon. The Take Pride project, run by Queensland Health is a good example. Experiences of community engagement and participation especially in developing countries are available and could also be tapped into. An example is the Nigeria Small Towns Water Supply and Sanitation Programme. Other areas that require support and intervention are on capacity building of staff to facilitate incentives and motivation for staff and improved backfilling arrangements to facilitate technical support in times of need. Due to remoteness some of the providers have difficulty in accessing technical support in times of distress. It is recommended that capacity building programmes should be developed and sustained. The recommendation also emphasises the need for improved collaboration between agencies to create synergy in identification and delivery of support programmes to consolidate support programmes and to avoid unnecessary duplication. Means of creating technical support and backfilling to the providers need also be researched and implemented.

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APPENDIXES

APPENDIX III: Inventory of Documents Reviewed

S/No.	Title	Pages	Year/Date	Author/Organisation	Description	Location
1	Water Supply & Sewerage Scheme Report for all Communities	6 (each)		OWSR	brief profile of the water and sewerage facilities in the communities	WICD\Indigenous Communities_Scheme Profiles\Drought
2	Aurukun SAMP	32	Sept. 04	Connell Wagner Pty Ltd	Strategic Asset Mngement Plan as requirement under Water Act 2000, content of which are specified in S 408 (4) (a) - (d)	OWSR
3	Cherbourg SAMP	39	Jan. 2004	Cardno MBK /Cherbourg Community Council	as above	OWSR
4	Hope Vale SAMP Review	14	Jan. 2008	Cardno (Qld) Pty Ltd/Hope Vale Aboriginal Shire Council	As requirement of Part 4 Division 1 Section 74(2) (a) of the Water Supply (Safety and Reliability) Act 2008	OWSR
5	Kowanyama SAMP Review	12	Nov. 2009	Cardno (Qld) Pty Ltd/Kowanyama Aboriginal Shire Council	as above	OWSR
6	Kowanyama SAMP	34	Sept. 04	Connell Wagner Pty Ltd	Strategic Asset Mngement Plan as requirement under Water Act 2000, content of which are specified in S 408 (4) (a) - (d)	OWSR
7	Lockhart River SAMP	30	Jul. 2004	Arup/ Lockhart River Aboriginal Council	as above	OWSR
8	Northern Peninsula Area SAMP	53	Apr. 2009	QLD Gov. Department of Infrastructure and Planning, Cairns	As requirement of Part 4 Division 1 Section 70 - 77 of the Water Supply (Safety and Reliability) Act 2008	OWSR

9	Pormpuraaw SAMP	24	Apr. 2007	Connell Wagner Pty Ltd/Pormpuraaw Aboriginal Council	Strategic Asset Mngement Plan as requirement under Water Act 2000, content of which are specified in S 408 (4) (a) - (d)	OWSR
10	Woorabinda SAMP	34	May. 2005	Cardno (Qld) Pty Ltd/Woorabinda Aboriginal Council	as above	OWSR
11	Wujal Wujal SAMP	15	Jun. 2009	Wujal Wujal Aboriginal Shire Council	As requirement of Part 4 Division 1 Section 70 - 77 of the Water Supply (Safety and Reliability) Act 2008	OWSR
12	Yarrabah SAMP	20	Oct. 2003	Arup/ Yarrabah Aboriginal Council	Strategic Asset Mngement Plan as requirement under Water Act 2000, content of which are specified in S 408 (4) (a) - (d)	OWSR
13	Doomadgee SAMP	33	Oct. 2004	Cardno (Qld) Pty Ltd/Doomadgee Aboriginal Council	as above	OWSR
14	Mapoon SAMP	21	Jun. 2004	Arup / Mapoon Shire Council	as above	OWSR
15	Mornington SAMP	20	Sept. 2004	Mornington Shire Council	as above	OWSR
16	Napranum SAMP	34	Sept. 2004	Arup/ Napranum Aboriginal Council	as above	OWSR
17	Palm Island SAMP	81	Feb. 2006	Cardno (Qld) Pty Ltd/palm Island Aboriginal Council	as above	OWSR
18	Torres TMP & SAMP (Part A & B)	43 & 145	Jan. 2008	Pdr Engineers/ Torres Shire Council	as above	OWSR
19	Aboriginal and Torres Strait Islander Support Visit Reports (All Communities)	NA	Aug. 2011 - Jan. 2012	OWSR	Report of support visit to service operators by Brice Stedman and other OWSR staff.	OWSR

20	Indigineous Councils Compliance History with Section 630 Notice of Water Supply (Safety & Reliability) Act 2008	38	2011	OWSR	Compliance History 2009- 2010 of Indigenous councils on reporting to OWSR in accordance to section 630 Notice of Water Supply)Safety & reliability) Act 2008	OWSR
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APPENDIX IV: Observations from Interviews

The following are what were observed and extracted from the unstructured interviews conducted with staff from DERM, former DLGP and Queensland Health. The identities of the interviewees are secured as such only relevant portions of the interviews are presented without expressing the source.

1. School Environment Management Programme under the Sustainable School Programme is a Queensland government initiative that collaborates with local councils and assist in developing curriculum for school children on water wise programmes. It also provides assistance in teacher training and link with other similar programmes.
2. A new proposed programme (Capacity Building in Remote and Indigenous Communities) is cooperating with DLG programmes (leakage detection programme and capacity building programmes) to introduce water demand management and water efficiency concept in indigenous communities.
3. A consultant was engaged to foster cooperation with the indigenous service providers. Since his engagement there was improvement in level of communication between the regulator and the provider and compliance with regulatory reporting requirement also received a boost. This success is attributed to the initiative of approaching and building the capacity of the providers on regulatory requirements and also because the consultant is an indigenous person who posses knowledge of the ways best to interact with the communities.
4. During a Capacity Building Workshop on water and wastewater organized by the DLG on March 22, 2012, officers from DERM used the opportunity to discuss water demand management issues with the attendees who are mainly from indigenous councils. Amongst its deliberations, the workshop identify staff turnover, lack of capacity and lack of technical support arrangement (backstopping) as some of the issues that hinder water and waste water operation. Some of the reasons for high turnover include lack of incentives, availability of options due to high demand of indigenous personnel because of the government policy on engagement of indigenous people, alcohol restrictions, etc.
5. Queensland Health assists indigenous councils to manage their own environmental health responsibilities and improve environmental health outcomes by supporting the engagement of Environmental health Workers, at least one for each of the councils since 2005. The support covered employment and cost of operations of the workers to the tune of about \$68,000 per annum. 4 workshops are held annually for the workers and there are 2 coordinators one for land councils and one for the islands.
6. A health statistics database known as the 'FERRET' was initiated around 2000 but its implementation couldn't be established.
7. The Department of Local Government serves as a bridge between the councils and the Queensland government to deliver funds, capacity building and infrastructure. The DLG do not support the councils on operation of water and wastewater facilities and do not assist with backstopping. They utilize local knowledge and expertise during construction and try to build local capacity.

8. Historically, anecdotal evidence has indicated many indigenous service providers have had difficulty in providing adequate levels of service to their communities, and have had difficulties in meeting regulatory requirements.
9. Dealing with indigenous people can be sensitive. They appreciate dealing personally with people they knew and appreciate sustained relationship. They want to put names to faces and want their social structures to be recognized and respected. Community participation in implementation of programmes will ensure sustainability but it will slow implementation which may not be well appreciated because most funding for project comes from treasury and is time bound.
10. Utilization of existing structures and collaboration between government agencies will improve the impact of deliverables to indigenous communities. Some of the flat forms that serve as collaboration avenues to agencies include the Remote indigenous land and Infrastructure Programme Office (RILIPO) and National Indigenous Environmental Health Forum.
11. The Take PRIDE project is an ongoing Health Education and hygiene promotion programme that targets school children using TV promotion, characters and costumes (Mr Germ and Mr Clean). Football league stars that are role models to the kids are used to promote the programme. The programme has become famous not only to school children but to other members of the community and there are plans for its expansion. This project and its structure can easily serve as a gate way to other projects that require community attention.
12. Lack of payment for services especially water supply encourages lack of recognition of the value of treated water leading to excessive waste. This attitude is to some extent connected to the high dependency on government welfare packages for the sustenance of most residents of indigenous communities.