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Cost Drivers for Queensland Local Government Water and Sewerage Service Providers

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Executive Summary

Financial indicators have been reported by Queensland water and sewerage service providers (Service Providers) in the past but in 2015 reporting was integrated into a mandatory, state-wide reporting and benchmarking framework. Benchmarking water utilities is common internationally with a key aim being to assess relative efficiencies and encourage improvement through yardstick competition. To be successful, such benchmarking must direct focus towards key cost drivers for Service Providers taking into account the variability of extrinsic factors.

To date, there has been little effort directed to identifying cost drivers for Queensland Service Providers and this report focuses on identifying cost drivers to inform and direct future performance reporting and public benchmarking. The first section of the report provides a review of financial indicators identified as most relevant for assessing small water and sewerage utilities. This Section includes a review of recent studies of efficiency of utilities and develops a short-list of key performance indicators. The second and third sections explore existing data for each of these indicators to determine their relevance and availability for Queensland Service Providers.

The final section of the report provides a list of the cost drivers identified by the Queensland water industry itself and aligns each with the identified performance indicators. This analysis builds on current understanding of the critical drivers of costs and also identifies gaps and aspects that are not currently covered under the standard performance reporting framework. As well as shedding light on gaps in the understanding of appropriate indicators for benchmarking performance of Queensland Service Providers the report highlights some comparisons that will be immediately useful in designing the future benchmarking reports for the State regardless of the institutional arrangements present in each region.

Background

The Local Government Association of Queensland (LGAQ) and ***qldwater,*** along with elected representatives and staff from numerous Councils, have been cooperating in developing regional collaboration in the Local Government water sector for several years. In Queensland, urban water and sewerage services are predominantly provided by 68 councils and three council-owned entities maintaining around 370 public supplies, 88% of which are deemed potable. In 2011, the Queensland Water Regional Alliances Program (QWRAP) was developed as a council-led initiative to investigate regional institutional models for urban water services in regional Queensland. The program received seed funding from the State Government and this report is part of a series of deliverables to the Department of Energy and Water Supply providing background information informing decisions on optimal models for regional reform.

This report examines current KPI reporting methodologies focussing on selecting readily-available financial indicators that describe business cost drivers for service providers in regional Queensland. The aim is to review trends in current data and its quality and suggest ways to move towards greater state-wide consistency and the development of metrics on business cost drivers. While the QWRAP seeks to improve economies of scale through regional approaches, many cost-drivers for small isolated towns may remain the same regardless of regional aggregation so better methods are needed for comparing these factors across and within utilities. The report is presented in four sections:

Section 1: reviews commonly used financial indicators in Australia and internationally to identify appropriate data and indices.
Section 2: investigates applicability of Queensland data (including capital replacement costs) for the key indicators identified in Section 1.
Section 3: Reviews the availability and accuracy of data reported using these indicators in Queensland.
Section 4: Describes the cost-drivers for the Queensland water industry and maps existing indicators to highlight alignment and gaps.

1 Commonly used financial indicators

Water and sewerage services (WSS) usually exist as a natural monopoly meaning that non-market mechanisms are important to ensure appropriate levels of service are matched with reasonable pricing. Transparent reporting of performance linked with regulatory incentives and penalties is commonly used in many countries aiming to prevent over-charging or long-term under-investment, ensure transparency for customers and encourage competition by comparison to improve efficiency (see e.g. Walter *et al*., 2009; Rouse, 2009; Haider *et al*., 2014a; Vilanova *et al.*, 2015). This approach is generally underpinned by benchmarking selected performance indicators and is common internationally (Figure 1).

Figure 1: Countries applying benchmarking approaches in the governance of water and sewerage services. Source: Walter *et al.*, 2009.

Performance reporting and benchmarking have been effectively used in the management of the urban water industry in Chile, Denmark, England, Wales, the Netherlands, Canada and the USA (see Lonborg, 2005; Rouse, 2009; PWC 2011; Haider *et al.,* 2014a) and have been in place for some years in in NSW (e.g. NOW, 2011), Tasmania (e.g. OTTER, 2011) and for large utilities nationally (see NWC and WSAA, 2014). Although public reporting of performance indicators for the majority of service providers in Queensland became mandatory only in 2015, a significant historical resource has been developed through voluntary reporting through the State-wide Water Information Management system (SWIM). Internationally, "benchmarking has elements of both competition and collaboration, but different approaches emphasise either competition or collaborative learning as the main mechanism for improvement […and.…] price regulation based on efficiency benchmarking is a strong example of the competitive approach. It is also described as 'managed competition' or 'yardstick competition'" (Sørensen, 2010, p. 25).

Data is commonly collected in the form of basic measures of some aspect of a Service Provider's business or as indicators that combine data into ratios or percentages in a way that normalise the metrics based on some common factor (commonly 'head of population', 'customers' or 'length of network'). Selection of appropriate indicators can be difficult and is often complicated because "performance measurement has several main objectives: to support decision making; to change behaviour and increase motivation; to monitor performance trends; to state priority and actions; to verify the effectiveness of optimization measures already implemented; to aid dissemination of organizational results via marketing; and to aid benchmarking" (Vilanova *et al.*, 2015). This is true of Queensland too, where annual performance data has been requested in the past by several different state and national bodies for a range of different uses.

Extensive overseas experience in benchmarking water and sewerage services can provide insights and reflect availability of appropriate indicators. The International Benchmarking Network for Water and Sanitation Utilities (IBNET, 2015) summarises the strengths and weaknesses of four broad approaches to performance benchmarking, namely:

- Partial Indicators,
- Total Factor Productivity,
- Data Envelopment Analysis (DEA), and
- Statistical/Econometric Methods (e.g. Stochastic Frontier Analysis).

This list places the different methods in approximate order of complexity.

In terms of use internationally, partial indicators are most commonly used while only one example of Total Factor Productivity was provided by IBNET (2015), namely performance monitoring of water and sanitation services following privatisation in England and Wales. The remaining two methods have typically been used to compare efficiency of different institutional forms based on a range of inputs and outputs which are derived from existing partial indicators (see e.g. Abbot and Cohen, 2009; Vilanova *et al.*, 2015). These approaches recently have been adopted enthusiastically both internationally and in Australia (see e.g. reviews by Coeli and Walding, 2006; Walter *et al*., 2009; Abbott and Cohen, 2009; Worthington, 2014; and Vilanova *et al.* 2015). In a recent Australian study, Worthington (2011) reviewed 27 analyses across seven countries and found that DEA was most common in recent analyses. Both methods allow a range of input variables such as type of water source, location, and utility size (although the DEA approach requires a multi-step process to achieve this comparison which is not undertaken by all authors). Unfortunately, many studies use the volume of water produced as the primary output which may skew analyses due to the focus on a product rather than service. Moreover, many studies also consider only operational costs as an input. However, recent papers have incorporated other outputs (e.g. customer complaints, water losses, environmental outcomes) using surrogate indicators where data is not available. For example, Worthington and Higgs (2014) also included surrogates for capital expenditure but acknowledged this did not reflect future growth and projected investment because of a lack of data.

'Partial performance indicators', particularly those measuring economic outcomes commonly used for benchmarking, have been criticised in some of these studies because they can obscure estimation of overall efficiency (e.g. Byrnes, 2013; Woodbury and Dollery, 2004), and ignore extrinsic, uncontrollable factors such as "physical environmental circumstances, as well as constraints arising from organisational, managerial and regulatory policy" (Worthington, 2011, p 8 and see Faust and Baranzini, 2014; Vilanova *et al.*, 2015). Crucially though, these methods use exactly the same data used to generate partial indicators although they integrate them in complex and often obscure models to develop comparisons. In contrast, the oft-cited advantage of partial indicators is that they "provide the simplest way to perform comparisons: performance indicators are easy to calculate and they seem easy to interpret" (IBNET, 2015).

Collectively, all four approaches share the problem of poor data availability. For example, Woodbury and Dollery (2004, p.631) investigated the relative efficiency of WSS in regional NSW, but acknowledged that the indicators chosen were not comprehensive and "factors other than the seven variables used in the regression analysis must primarily account for the variations in efficiencies calculated by the DEA". The authors concluded that data limitations inhibited benchmarking of the NSW water utilities. Similarly, an analysis of the 18 largest utilities in the Australian water industry concluded that data limitations and the wide variability among utilities nationally make benchmarking difficult (Coeli and Walding, 2006). In another study, the available data was found to "not adequately reflect the operating environment or other exogenous influences" (Byrnes *et al*., 2010, p. 453). Ironically, these often are the very issues that the modelling techniques are employed to address. In most studies, data gaps drive indicator selection and are likely responsible for the "somewhat startling variability" found across different studies (Worthington, 2010, p. 11).

In Australia, the majority of studies have used benchmarking data collected by the NSW government or the indicators collected annually for the National Performance Report from large (>10,000 customers) utilities across the country. There have been no studies considering any but the largest Queensland service providers and small utilities are seldom included. Indeed, for small service providers, environmental factors may dominate drivers of efficiency and performance and may not be well captured through standard benchmarking approaches. It is widely recognised that "benchmarking as quasi competition also entails some challenges, including how to handle heterogeneity and how to take account of other performance aspects than efficiency" (Sørensen, 2010, p. 25). This is particularly difficult for small WSS which lack economies of scale and density but are still accountable for meeting basic quality, health and customer standards while striving for efficiency.

In the next section the different mechanisms for benchmarking water and sewerage service providers internationally are examined to identify indicators commonly used to gauge efficiency as surrogates for cost drivers with an emphasis on 'small' service providers.

1.1 Identification of appropriate indicators

The selection of appropriate 'partial indicators' has been investigated in many jurisdictions as part of the formation of local benchmarking frameworks. Recently, Haider *et al*. (2014a) reviewed performance reporting frameworks globally, (including the Australian National Performance Reporting framework) and despite the variation among the frameworks, numerous indicators were found to be common. These were collated and further analysed in a subsequent paper by the same authors ranking the indicators by their relevance to smaller service providers based on 'Applicability', 'Understandability', 'Measurability' and 'Comparability' (Haider *et al*., 2014b). This analysis provides a particularly useful starting point for Queensland where two thirds of potable schemes service towns with fewer than 1000 residents and 50% service fewer than 500 people. Small communities may be separated by many kilometres and low density diminishes opportunities to realise economies of scale and can impact cost-to-serve.

Indicators relevant to cost drivers were included in the economic/financial category defined by Haider *et al*. (2014a,b) and ranked as follows:

1. Water rate for a typical size residential connection using 250 kL/year.
2. O&M Cost ('000s)/ km Length ($/km).
3. Revenue per unit volume of supplied water ($/m).
4. O&M cost of water treatment ($/ 1000 kL of treated water).
5. Operating cost coverage ratio
6. Debt service ratio (%)
7. NRW (non-revenue water) by volume

A description of each of these indicators is provided in Table 1.

Table 1: Financial indicators ranked as most relevant to small and medium service providers. Sources: Haider *et al*. (2014a,b).

Rank	Indicator	Calculation	Raw Data Required
1	Water rate for a typical size residential connection using 250 kL/year.	Residential water bill based on rate charged for 250 kL consumption in one year.	• Information on tariff structure.
2	O&M Cost ('000s)/ km Length	Annual operating costs per length of mains.	• Total operating costs • Length of mains
3	Revenue per unit volume of supplied water	Operating revenues – capitalised costs of the constructed assets)/ authorized consumption during the year.	• Operating revenue during the year • Authorized consumption during the year
4	O&M cost of water treatment	Operating costs of water treatment per 1000 kL.	• Operating cost of water treatment • Volume of water treated.
5	Operating cost coverage	Total annual operational revenues/total annual operating costs.	• Total operational revenue from total water sold • Total operating costs
6	Debt service ratio (%)	Cash income/financial debt service × 100.	• Total annual net income • Financial debt service contains the cost of interest expenses, the cost of loans and the principle repayment debt instruments
7	Non-revenue water	Cost of the systems input volume − billed authorised consumption	• System input volume • Data on billed consumption • Unit cost of water

Another way to identify indicators relevant to cost drivers is to examine the literature comparing Australian utility efficiency using data envelopment analysis and econometric techniques. These studies universally include a process for identifying an optimal suite of metrics to be used as inputs and outputs in models and view "the choice of inputs and outputs as critical" Ananda (2014, p. 3). Commonly used input variables include labour costs, employee numbers, total operating expenditure, energy costs, and network length (Table 2). Output variables always include the volume of water supplied but some studies have also included number of customers, number of connections, number of complaints, indices of water quality, and volume of water losses. A measure of capital expenditure is sometimes incorporated in these studies but causes significant problems because of the lack of reliable data, often requiring a surrogate such as mains length to be used. Table 2 summarises the indicators used in the efficiency literature highlighting those that are also present in Table 1.

Table 2: Inputs and Outputs selected for analysis in Australian studies of efficiency of water and sewerage service providers (with those also reflected in Table 1 highlighted in bold).

Study	Inputs	Outputs
Woodbury and Dollery (2004)	• **Management costs.** • **Maintenance and operation costs.** • **Energy and chemical costs.** • Capital replacement costs.	• **Number of connections.** • **Annual water consumption.** • Water Quality Index: o chemical and physical requirements, o microbiological requirements. • Water Service Index: o water quality complaints, o service complaints, o average customer outage.
Coeli and Walding (2005)	• **Operating expenditure.** • Capital (TOTEX – OPEX).	• **Number of properties connected.** • **Volume of water delivered.**
Byrnes *et al*. (2009) – Sewage	• **Total operating cost.**	• **Total Wastewater Treated.** • Complaints per 1,000 connections.
Worthington (2011)	• **Operating Costs.** • **Number of properties per km .** • **Total urban water supplied.** • Percentage of water sourced from bulk suppliers. • Percentage of water sourced from groundwater. • Percentage of water sourced from recycling. • Percentage of water sourced from surface water.	• Percentage of zones where chemical compliance was achieved • Percentage of zones where microbiological compliance was achieved, • **Inverse of real losses** • Inverse of water quality and service complaints per 1000 properties, and • Inverse of water main breaks (per 100 km of water main).
Ananda (2014)	• **Operating Expenditure.** • Length of water mains.	• **Total water supplied.** • Water quality complaints.

It is clear that although the studies of efficiency use more complicated analyses, the indicators driving their models incorporate all of the 'partial indicators' that were highly ranked by Haider *et al*. (2014 a, b). The additional indicators used in the efficiency literature all represent attempts to incorporate measures of the level of service provided by utilities. This issue deserves further attention (because levels of service provided are a key cost driver), but is not discussed further in this report because of the selected focus on financial indicators. The combined set of financial indicators common to both types of study are listed in Table 3 along with the equivalents currently collected by Queensland service providers.

Table 3: Summary of collated financial indicators from previous studies (see Tables 1 and 2) with an indication of their availability in Queensland SWIM data. The analysis column provides links to further discussion in this report for each indicator.

Indicator	Units	Raw data required	SWIM code	Analysis
Water bill for 200 kL consumption.	$	• Bill for 200 kL (water/sewerage) • Typical residential bill (water/sewerage)	PR43 / PR45 PR44/PR46	Section 2.1
Total operating cost/ length of mains	$000's/km	• Operating costs water/sewerage • Length of mains (water/sewer)	FN32/FN33 AS2/AS5	Section 2.2
Revenue per unit volume of water supplied/ sewage collected	$000's/kL	• Total revenue (water/sewer) • Volume supplied/collected	FN1/FN2 WA11/WA18	Section 2.3
Operating cost coverage (Revenue/OPEX)	ratio	• OPEX water/sewerage • Revenue Water/Sewerage	As above (FN32/FN33 FN1/FN2)	Section 2.4
Debt service ratio (total income/ cost of debts x 100)	%	• Interest cover (earnings before interest and tax/net interest expenses).	FN 23	Section 2.5
Non-revenue water cost	$	• Cost of systems input volume • Billed authorised consumption	No equivalent	Section 2.6
Real losses	kL	• Real losses per service connection/d • Real losses per km of main/day	AS10 AS11 AS32	
Capital Costs (e.g. TOTEX-OPEX, length of mains, annual CAPEX)	$	• Current and projected capital costs.	No equivalent	Section 2.7
Operating cost of water treatment.	$	• OPEX for water treatment	No equivalent	N/A

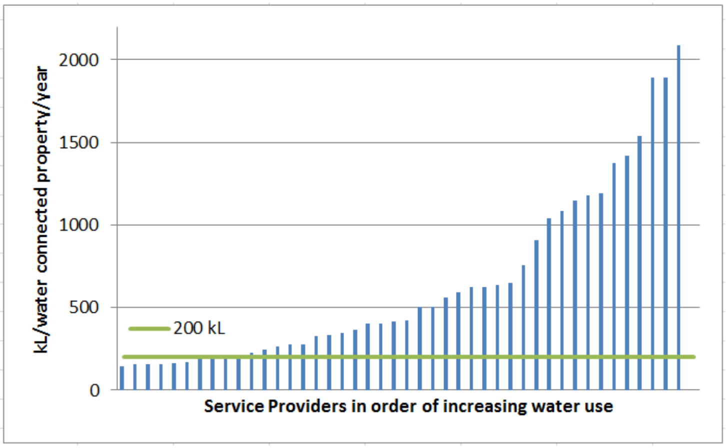
2 Analyses of available data for the identified indicators

This section analyses available data (which reflect many of the indicators that form the new Queensland KPI framework) with respect to each of the indicators listed in Table 3. The aim is to review trends, limitations and strengths of each indicator for Queensland WSS. This may provide insight when developing benchmarking reports for the new KPI data.

2.1 Bill for 200 kL and typical residential bills in Queensland

Comparison of annual bills reflects the total revenue and provides a window into what each community pays for water and sewerage services. The annual water bill for 200 kL of residential supply is often reported in Australia in conjunction with the typical annual bill paid by a residence (e.g. NWC & WSAA, 2014). Only the former was recommended by Haider *et al.* (2014b)[1]. The typical bill better reflects the amount paid by customers when water use is significantly greater or less than the arbitrary volume of 200 kL (as is the commonly the case in Queensland - see Figure 2.1A). The annual water bill for 200 kL provides a standard comparison for the charge levied by service providers for water and is thus useful for comparing relative costs of water and pricing policies across communities.

Figure 2.1A Average annual residential water use of Queensland service providers in 2013-14.

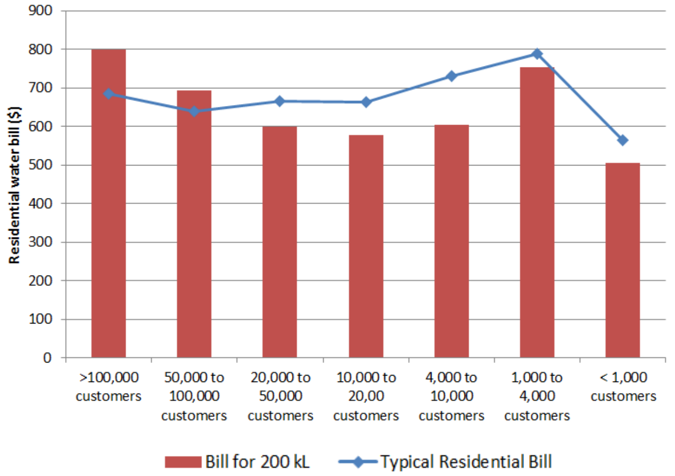


Typical residential water bills in Queensland are often higher than the bills for 200 kL of water particularly in smaller communities (see Figure 2.1B). This indicates many customers are using volumes greater than 200 kL and paying more per year because of the volumetric component of the water bill. This trend is likely to be greater than shown in the available data because many small communities report the same value for both indicators. This occurs because some small service providers do not have a volumetric charge as part of their water tariff and some have a free allowance that exceeds 200 kL. In these cases the fixed charge is equal to the typical bill and thus is also the bill for 200 kL. Sixteen service providers in the available data fall into this category. In addition, five service providers had annual residential water use close to 200 kL/year and hence their typical bills were also close to their bills for 200 kL. Despite this, it is clear that many customers pay typical bills higher than the annual bill for 200 kL because of high volumetric consumption.

[1] Haider *et al.* (2014b) recommended a value of 250 kl as the basis for the generic indicator, whereas Australia, despite being one of the most prolific urban water consumers in the world, has traditionally used a figure of 200 kL in most reporting frameworks (e.g. NWC and WSAA, 2014).

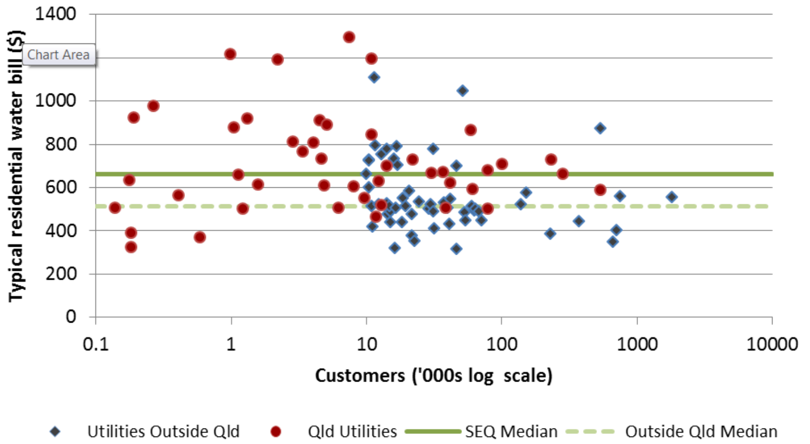
Indeed, a comparison of typical bills in Queensland with other Australian utilities shows typical bills are often higher in Queensland (Figure 2.1C). The median typical bill for SEQ is higher than the national data and across the State 69% of typical water bills were higher than the national median. This means more than two thirds of Queensland communities pay more for water than the Australian median.[2] Median typical bills were around 22% higher in Queensland.

Figure 2.1B: Comparison of typical bill and bill for 200 kL of water across seven size classes of Queensland service providers in 2012-13.



The main exception to this trend was a group of very small communities in Queensland which have bills below the national median (Figure 2.1C). This category comprised 10 small councils which have fewer than 1000 connections and service Queensland's smallest and most remote communities[3]. Even though some of the smallest councils operate with lean budgets and low overheads, they lack access to scale efficiencies and almost all service two or more communities and lack economies of density because of distance within and between each scheme. The communities served by these 10 councils are up to 160 km apart and all are remote from major urban centres. Many are in the most arid regions of the State with low rainfall and high evaporation increasing demand and inhibiting water efficiency. Some input efficiencies are possible for around half of these small service providers which source water from the Great Artesian Basin (GAB) and thus have no (or low) pumping costs (because they are under natural pressure) nor treatment costs (because GAB water is effectively sterile and thus supplied untreated). Unfortunately, these economies are usually insufficient to explain the lower bills and some of these smallest communities do not fully recover costs (see Section 2.4).

Figure 2.1C. Typical residential bill of Queensland utilities and those outside Queensland in 2012-13. **Source:** SWIM, 2014. NWC&WSAA 2014.



[2] However, the national (NPR) data does not include small local government utilities in NSW. Analysis of data from Queensland service providers with like-sized council utilities in NSW is needed.

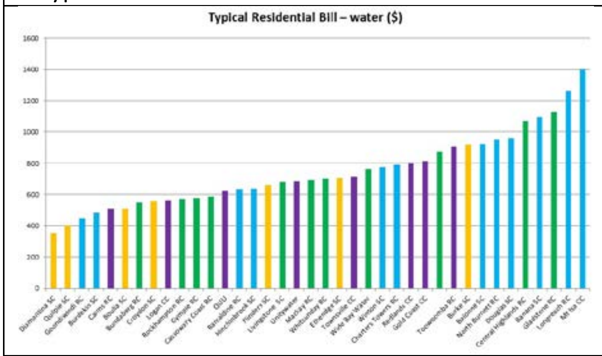
[3] Only two indigenous councils reported this data in the recent financial year. Most indigenous councils do not charge full rates so comparison of water bills is not possible.

2.1.1 Bill for 200 kL and typical bill for sewerage services

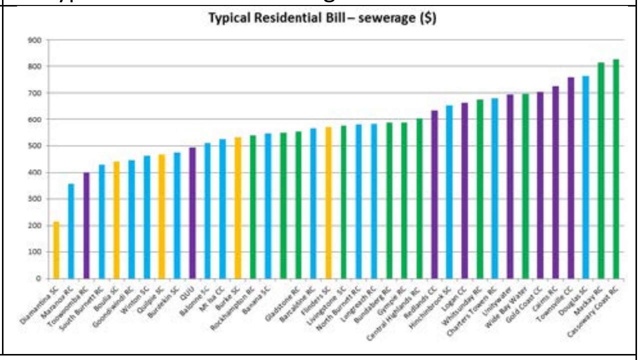
Although Haider *et al.* (2014b) considered only water supply indicators, both annual bill for 200 kL of sewage collected and the typical bill per residence for sewerage services are commonly reported by utilities in Australia. Typical bills have been reported in Queensland for the past three years in the SWIM annual benchmarking report (reproduced in Figure 2.1D). This shows that typical bills for sewerage are generally more consistent than corresponding water bills.

Figure 2.1D: Typical water (i) and sewerage (ii) bills in 2013-14 for Queensland service providers. Source: Scheltinga (2015).

i. Typical residential water bills



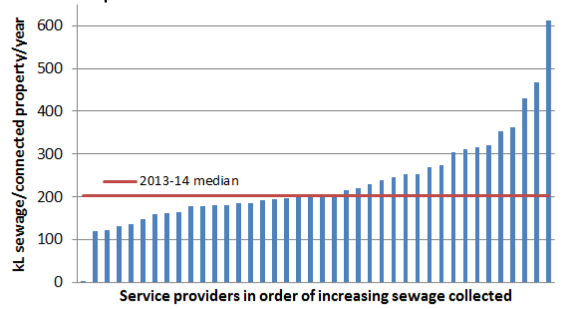
ii. Typical residential sewerage bills



Note: Bars represents service providers and are coloured based on number of customers: less than 1,000 customers (**orange**), between 1,000 and 9,999 customers (**blue**), between 10,000 and 50,000 customers (**green**), and more than 50,000 connections (**purple**). The 2013/14 Statewide median value for the typical water bill was $699, while the median value for typical sewerage bill was $573.

This likely reflects the more consistent volume of sewage collected which does not (with some exceptions) vary as widely as the volumes of water supplied across service providers (see Figure 2.1E, cf Figure 2.1A). For this reason, and because individual properties are not metered for the volume of sewage collected, the typical sewerage bill is the same as the bill for 200 kL in the majority of cases. There is little correlation between volume collected and the size of the service provider (although nine of the 10 largest volumes collected were by service providers with fewer than 10,000 customers). High water use is usually correlated with outdoor water use (irrigation), rather than internal use (which would be reflected in sewerage flows). This would be expected to be true of the many small regional communities that are typically in arid areas. Further analysis is necessary to determine the cause of the highest sewage volumes and their relationship with water use, rainfall, inflow and infiltration.

Figure 2.1E: Average annual volume of sewage collected per residence in 2013-14.



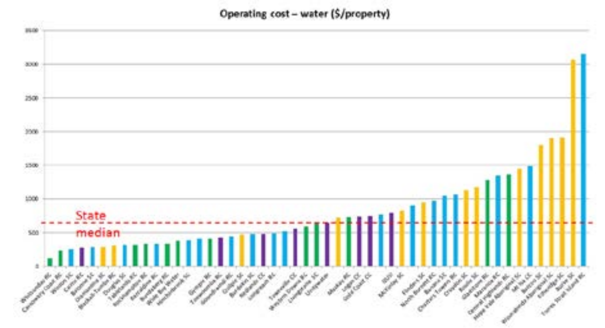
2.2 Operating cost per km

In the past, Queensland service providers and utilities nationally have reported 'operating cost per connection' which describes one aspect of the cost to serve per customer (see

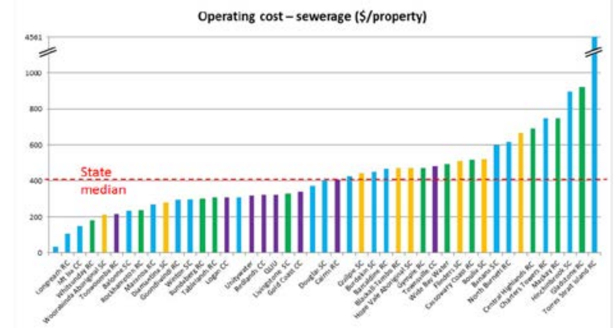
Figure 2.2A). Data from 2013/14 shows that the smallest utilities generally have high operational expenditure (OPEX)[4] per customer for water but tend to be close to the median for sewerage. In contrast, large utilities cluster around the median for water but are lower than the state median for sewerage. Intermediate sized service providers appear to be widely spread for both water and sewerage.

Figure 2.2A. Operating costs per property for water (i) and sewerage in 2013/14 in Queensland. Source: Reproduced from Scheltinga (2015).

i.



ii.

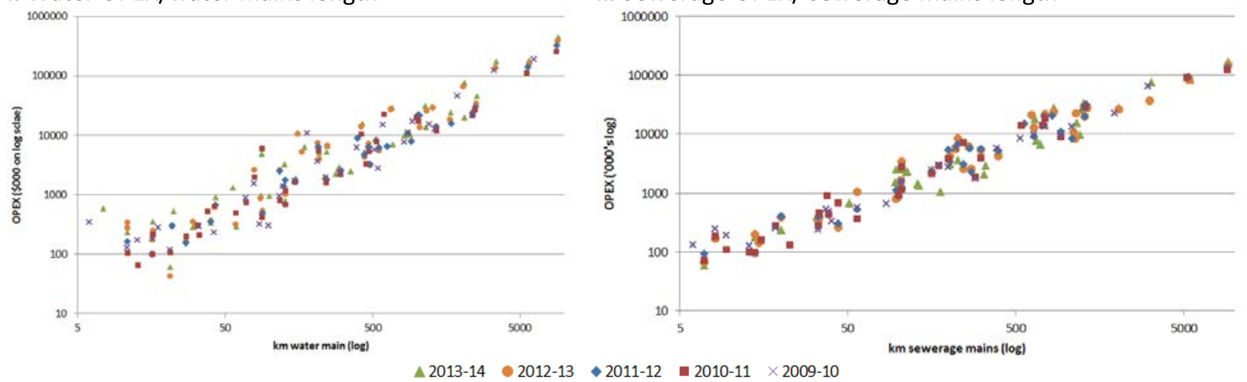


Note: Bars represents service providers and are coloured based on number of customers: less than 1,000 (**orange**), between 1,000 and 9,999 (**blue**), between 10,000 and 50,000 (**green**), and more than 50,000 (**purple**). The 2013/14 Statewide median value for water was $635 per property and for sewerage was $403 per property.

In contrast to normalising OPEX using the number of customers served, Haider *et al.* (2014b) recommended using the length of mains, with OPEX/km ranked second among financial indicators for small utilities. Mains length is commonly used in economics models as a surrogate for capital and the size of the network that is to be maintained (see Worthington, 2012), and thus OPEX per length of mains should give an estimate of total operating costs per unit of capital managed (irrespective of the density of customers). Indeed, analysis of SWIM data from the past five years shows a strong correlation between OPEX and length of mains for both water and sewerage (Figure 2.2B).

Figure 2.2B: Water (i) and Sewerage (ii) OPEX/km over five years in Queensland. Source: SWIM.

i. Water OPEX/water mains length **ii.** Sewerage OPEX/ sewerage mains length

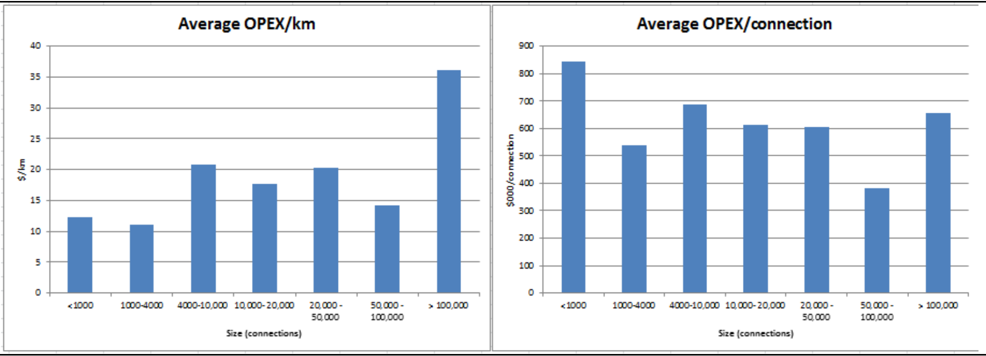


To determine how strongly each of these OPEX ratios are affected by the size, complexity and isolation of service providers, a comparative analysis of the relationship of both OPEX/km and OPEX/connection with number of connections, number of communities,

[4] OPEX is defined in this report to be the same as the Operating Maintenance and Administrative costs reported by utilities in SWIM and NPR reporting and excludes depreciation (see definition in Appendix 4).

average distance to a coastal centre and complexity of treatment was undertaken (see Appendix 1). Only weak relationships were identified, but there were often more extreme values for the largest and smallest utilities in any comparison. For example, neither ratio was strongly correlated with number of connections suggesting that they both normalise for the size of the service provider. Importantly though, the group of the largest service providers had high values for OPEX/km, while the reverse was true for OPEX/connection (Figure 2.2c). This is likely caused by density differences and the relatively larger residential blocks (and thus mains length per customer) in the smallest communities. These factors mean that costs per connection are high for small utilities while larger utilities will benefit from economies of density and also spread the costs over more customers. In contrast, very large utilities in Queensland had very high OPEX/km, and this may result from the high relative costs of water production driven by costs of 'drought-proofing' infrastructure developed during recent droughts. Further analysis of the relationship between OPEX and 'length of mains per connection' taking into account the costs of water treatment[5] is needed.

Figure 2.2C. Average OPEX/km and OPEX/connection versus size of utility as measured by number of connections in 2012/13.



Irrespective of the cause, the lack of strong correlations and the large differences for the smallest and largest utilities mean that both ratios tend to skew comparisons for both large and small service providers. This means that for larger utilities, OPEX/connection provides a good partial indicator, and indeed, it is widely used in Australia for large utilities in the National Performance Report (which all have greater than 10,000 connections). For smaller utilities (and low densities) however, OPEX/km provides a more consistent comparator and this may be why it was preferred by Haider *et al.*, (2014b) in examining indicators appropriate for small communities.

If different measures are appropriate for small and large communities, a threshold is needed to distinguish the two size classes. This may be provided by an analysis of the relationship between number of connections and length of mains (i.e. density). There is a strong non-linear relationship between number of connections and length of water mains (using all SWIM and NPR data between 2009 and 2014), but this relationship does not hold well for small utilities (Figure 2.2D). Below 15,000-20,000 connections, utilities in Queensland and elsewhere in Australia appear to follow a different, more linear relationship with density perhaps reflecting the size of residential blocks and the small number of multi-tenant premises and high-rises. This means that comparisons of utilities with fewer than

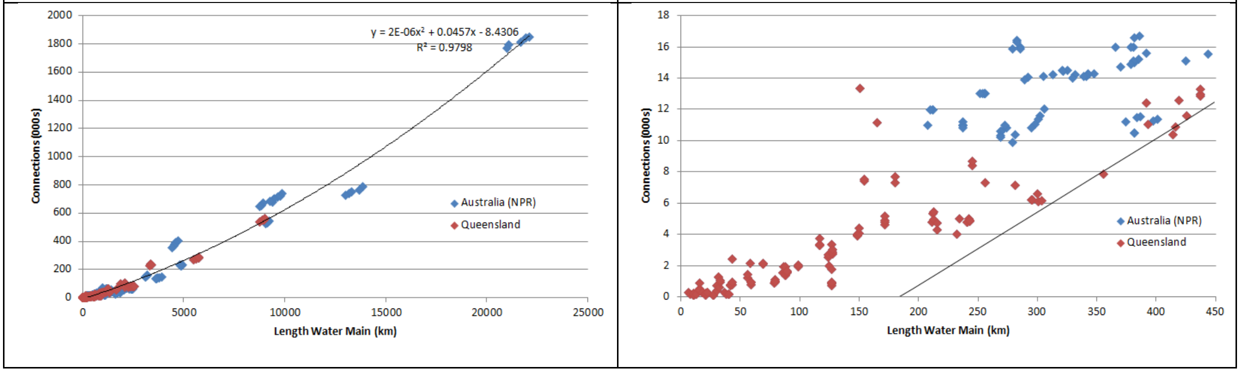
[5] Note that Haider *et al.* (2014b) recommended measuring the "operating cost of water treatment", but there is no equivalent indicator collected in Australia. In Queensland, the cost of sourcing water also varies depending on whether supplies come from Sunwater, Seqwater, council-owned supplies or ground water. A more useful measure may be the cost to provide potable water to the head of the distribution network.

20,000 connections might more appropriately use OPEX/km while larger utilities could be compared using OPEX/connection and assuming a curved relationship with density.

Figure 2.2D: Water mains length compared with the number of connections for Queensland and Australian utilities between 2009-2014. Source: SWIM and NWC&WSAA (2015).

i. All utilities (with quadratic trend line).

ii. Expansion of < 450 km section of (**i.**) showing the trend line's poor fit for smaller utilities.

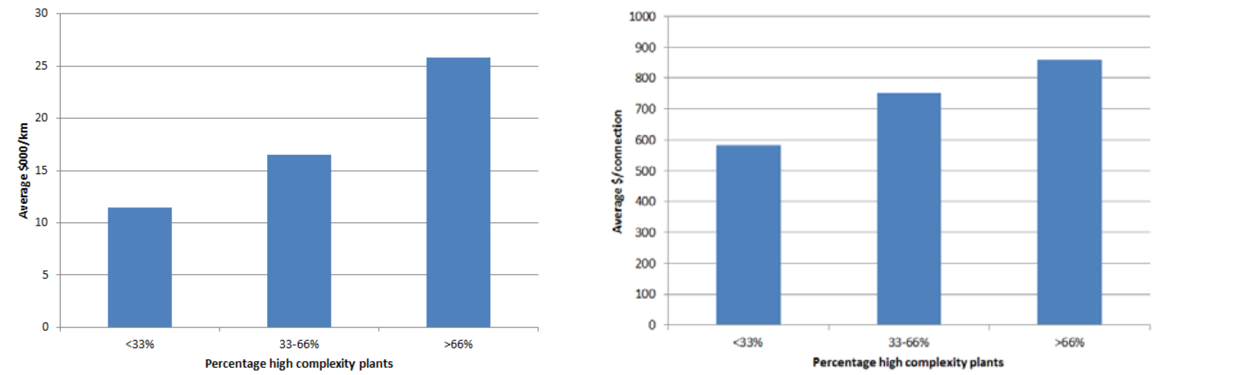


It might also be predicted that OPEX/km and OPEX/connection should be higher for service providers with higher levels of water treatment. This hypothesis was investigated by plotting the ratios against data from an independent survey ranking complexity of the water treatment plants in Queensland (Cameron, 2012). The highest OPEX/km and OPEX/connection tended to be in councils with a high proportion of complex treatment plants and there was little difference between the two ratios in this comparison (Figure 2.2F). To remove the confounding effect of the largest and smallest utilities, the analysis was repeated using only OPEX/km for utilities with fewer than 15,000 connections showing there is a tendency for average OPEX/km to increase with the proportion of high-complexity plants (Figure 2.2G).

Figure 2.2F: Average OPEX/km and OPEX/connection for providers in three categories of treatment complexity.

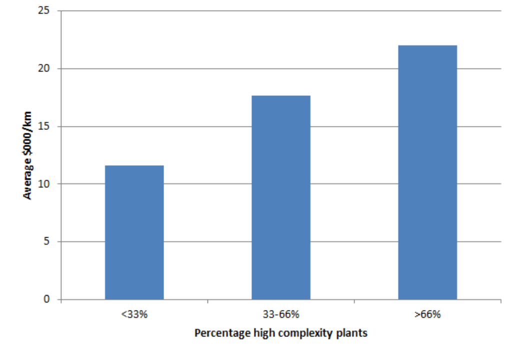
i. Average OPEX/km of water mains.

ii. Average OPEX/connection.



The results confirm that as expected, the costs of water treatment have an important impact on OPEX/km and OPEX/connection. While the OPEX data used excludes depreciation, it would be expected that taking into account the full fixed costs associated with treatment infrastructure would further reinforce the trend. This means that comparisons among utilities with different treatment complexities may be skewed unless this variable is controlled. Further analysis needs to identify both the cost of raw water, which varies dramatically around Queensland, but also the cost of water treatment.

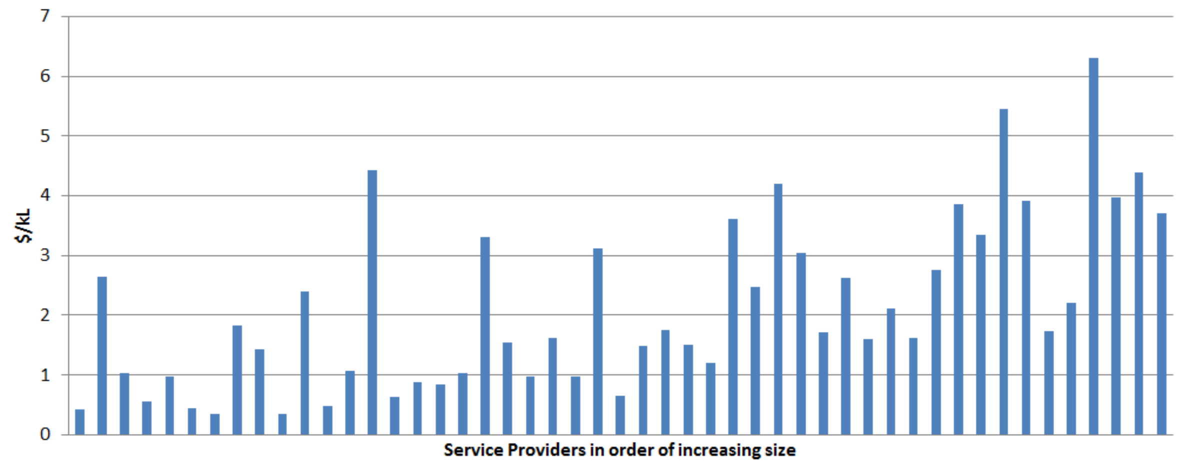
Figure 2.2G: Average OPEX/km for providers with < 15,000 connections across three categories of water treatment complexity.



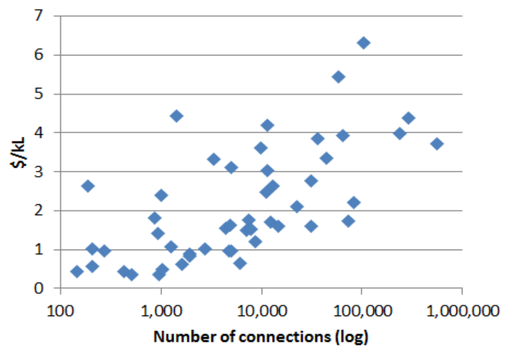
2.3 Revenue per volume delivered/collected

Indicators examining the revenue per volume of water or wastewater processed seek to derive the unit cost of water and sewerage services based on volume. Many of the more sophisticated efficiency analyses use volume as a basic output for their models presumably on the basis that water (or wastewater) is the product and thus output being managed by the industry.

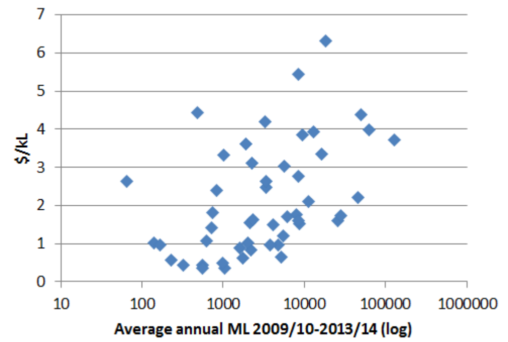
Figure 2.3A: Water - median of annual revenue/kL for water supplied between 2009/10-2013/14 by Queensland Service Providers reporting to SWIM.



(ii) Median revenue/kL vs log of connections.



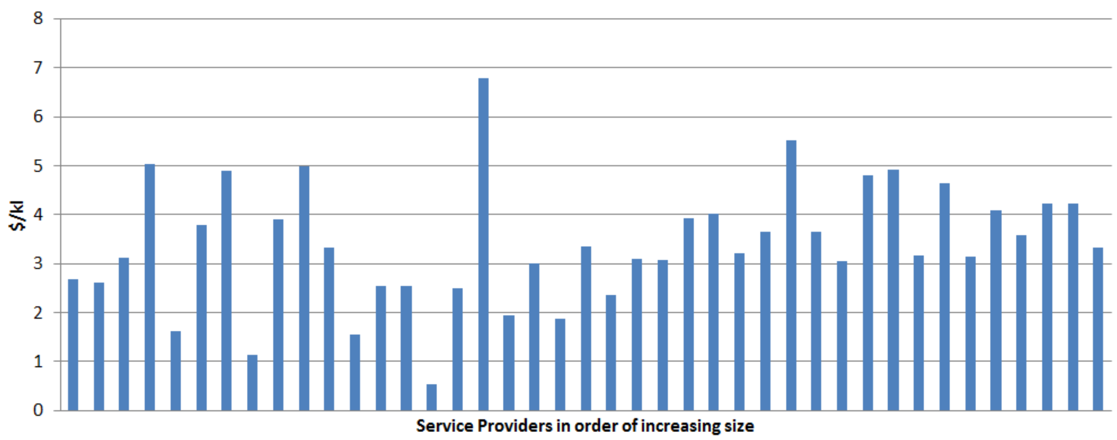
(iii) Median revenue/kL vs log of average annual flow.



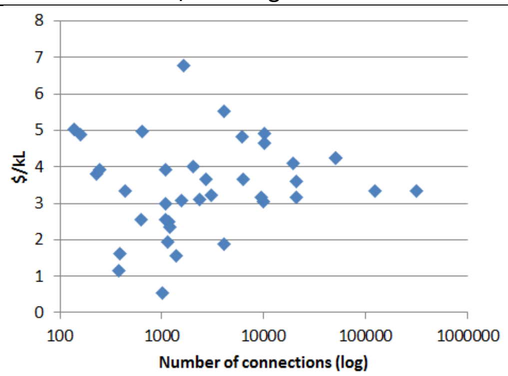
Analysis of annual data from Queensland service providers shows that there is a large degree of variation in revenue/kL for water supplied over the past five years (Figure 2.3A). There appears to be a degree of correlation between the revenue per kL and the size of a utility and also with the total volume delivered, suggesting that larger utilities derive greater income per unit sold. However this is not a clear correlation and the variation, particularly among smaller service providers, makes benchmarking difficult. This likely reflects the numerous extrinsic factors that can impact revenue/kL including level of water treatment, customer service standards, pricing policies, and various economies of scale and density.

A similar pattern is detected for revenue/kL of sewage treated although the correlation with size and total volume are even weaker than for water (Firgure2.3B). Although sewage prices are more consistent than those for water (see Section 2.1), the cost of treatment can vary greatly as can the total volume of flow attributed to inflow and infiltration. This indicator will only be useful for benchmarking if these external factors can be normalised in some way. A significant barrier is the lack of financial data for individual communities: summing all data across service providers that service two or more communities confuses the causal assumptions inherent in these indicators.

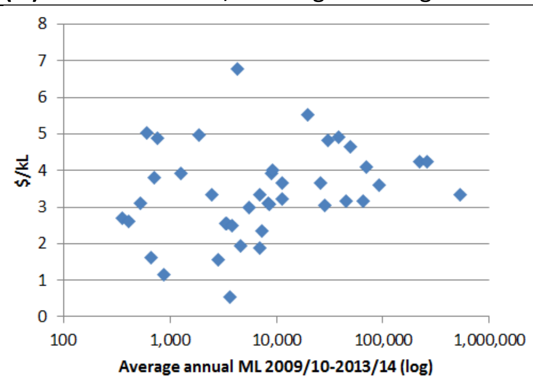
Figure 2.3B: Sewage - median of annual revenue/kL for sewage collected between 2009/10-2013/14 by Queensland Service Providers reporting to SWIM.



(ii) Median revenue/kL vs log of connections.



(iii) Median revenue/kL vs log of average annual flow.

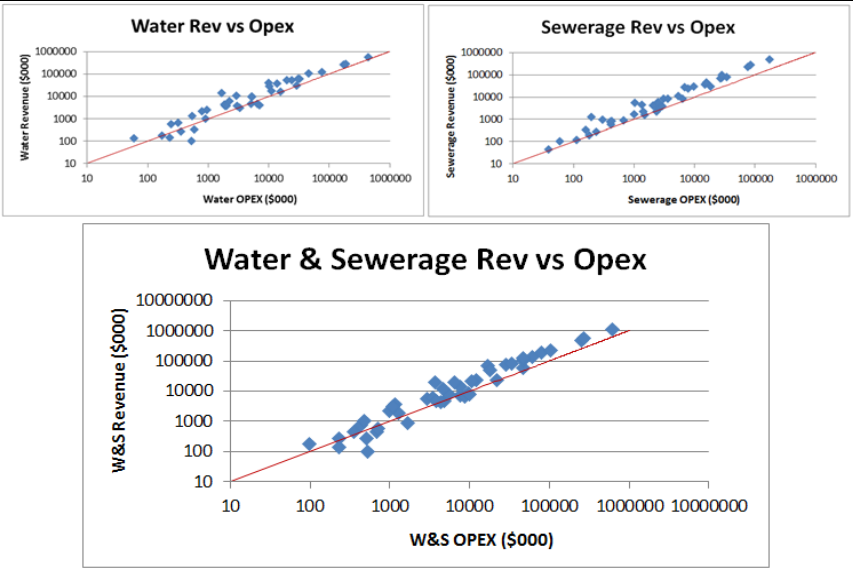


2.4 Operating cost coverage

The ratio of 'Operations and Maintenance Expenditure' (OPEX) to revenue describes how well basic costs are being recovered by an organisation and is commonly used in the literature being ranked 5th by Haider *et al*. (2014b). It should be noted that OPEX (as recorded in Queensland and for Australian NPR reporting) does not allow for capital expenditure (including renewals and replacements), depreciation or interest (see Appendix 3) and thus indicates only short-term cost recovery.

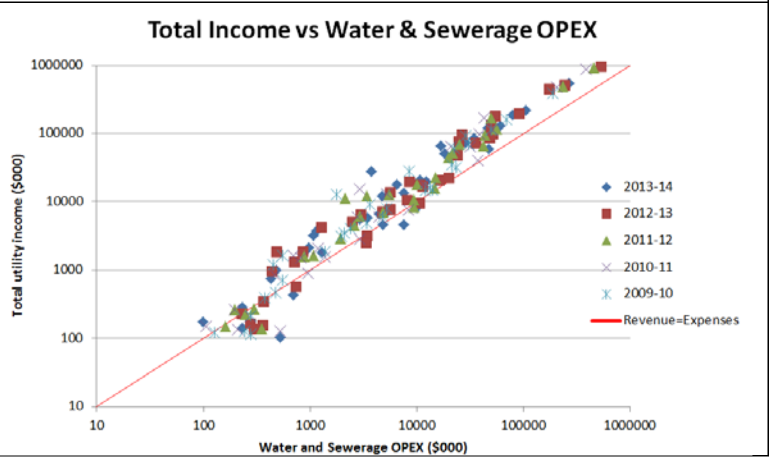
Figure 2.4A shows the ratio of revenue[6] for water, sewerage and water-and-sewerage for all Queensland entities reporting this data in 2013-14. It is clear that some service providers do not earn revenue sufficient to cover even basic operational expenses (i.e. fall below the red line which represents income = expenditure). The inability to recover even OPEX costs is not limited to the most recent financial year. Available data over the past five years is shown in Figure 2.4B showing that failure to recover operational costs has occurred commonly in smaller utilities.

Figure 2.4A: Revenue versus operating expenses for water and sewerage and the whole utility in 2013-14 for Queensland service providers (red line indicates Revenue = OPEX).



Initial analysis indicates that over the past five years, ten service providers consistently reported a ratio of Revenue to OPEX that was less than one. The average loss for each over the period was between $4,000 and $535,000 per annum with the total average loss exceeding $2,000,000 per year.

Figure 2.4B: Revenue versus operating expenses for water sewerage and the whole utility over five years Queensland service providers (red line indicates Revenue = OPEX).

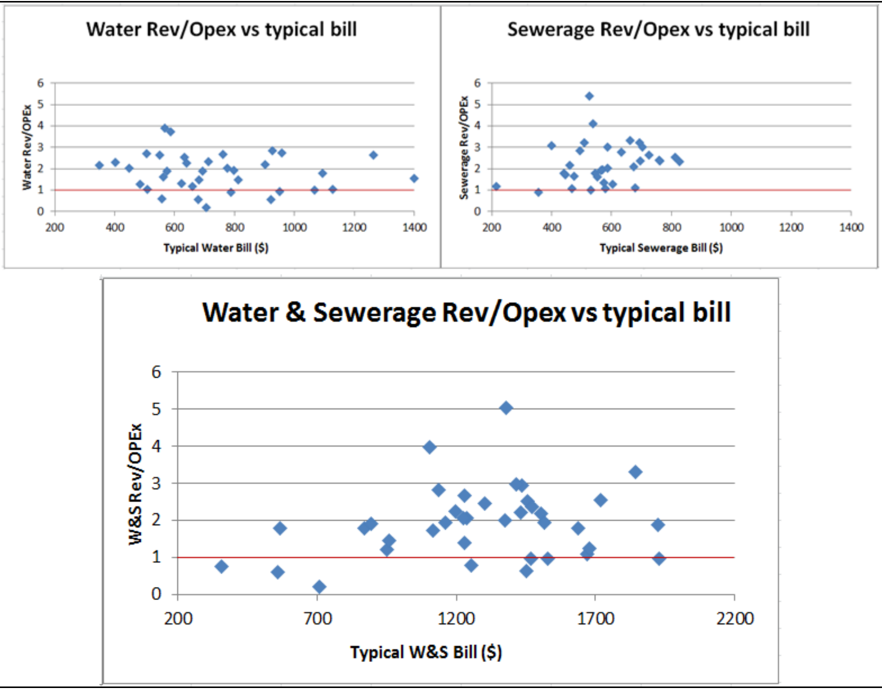


6 Revenue in this report is defined to align with the data submitted by service providers to SWIM and NPR reporting frameworks on Total Revenue for water and for sewerage (defined in Appendix 4).

2.4.1 Relationship between operating cost coverage and typical water bills.

A comparison of the average typical bills paid by customers and the ratio of revenue to OPEX shows that there is broad spread of bills even for those that do not fully recover OPEX (Figure 2.4C). In other words, some of the highest bills are paid by customers served by service providers that do not recover costs. This trend is also true when the costs and revenue from water and sewerage services are combined. This suggests that the additional cost to serve in at least some of these communities cannot easily be met by raising water charges. Further analysis on why costs are so high in these councils is needed.

Figure 2.4C: Revenue/operating expenses for water, sewerage and the whole utility in 2013-14 for Queensland service providers compared with typical residential bill (red line indicates Revenue = OPEX).



The figure also shows that at least some of the lowest combined water and sewerage bills were charged by service providers that did not recover costs in 2013-14. Further analysis is needed to determine whether these same service providers consistently under-recover and whether the low pricing is a determining factor.

2.4.2 Which councils do not recover operational costs?

A comparison of the ratio of revenue to OPEX with size of the service providers based on number of customers show that it is smaller utilities that do not always recover OPEX costs (Figure 2.4D). When both water and sewerage services are considered, all service providers that failed to recover costs in the 2013-14 reporting period had fewer than 12,000 connections.

Analysis of data for the past five years shows that in each year up to 10 service providers reported OPEX costs exceeding total revenue. It should be noted that during this period, some entities reported only once (e.g. de-amalgamated councils) making it difficult to assess the accuracy of all over time. Instead of focussing on individual service providers data from 2009-10 to 2013-14 was grouped according to utility size and the median percentage that OPEX comprises of total revenue was calculated for each size class for both Queensland and NPR reporting entities outside the state (see Figure 2.4E).

Figure 2.4D: Revenue/operating expenses for water, sewerage and the whole utility in 2013-14 for Queensland service providers compared with number of connections (red line indicates Revenue = OPEX).

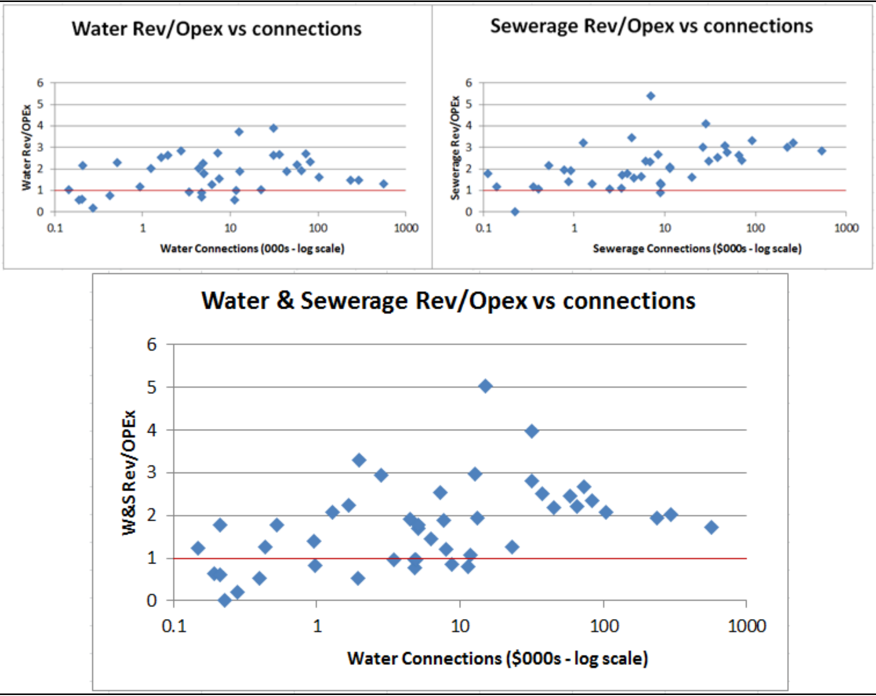
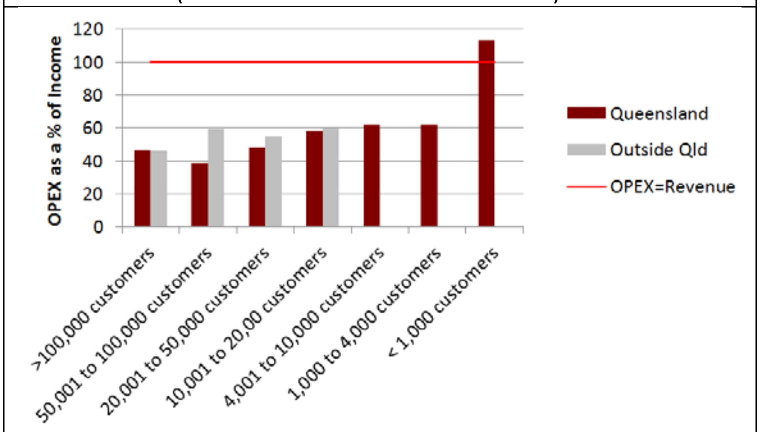


Figure 2.4E: Median operating expenses for water and sewerage as a percentage of total revenue for seven size classes of Queensland and national (NPR-reporting) utilities between 2009-10 to 2013-14 (red line indicates Revenue = OPEX).



Queensland medians were reasonably close to those of national service providers except in the range of 50,000 to 100,000 customers where Qld providers appear to direct a lower proportion of revenue to expenditure other than national utilities. The median values for OPEX were near the range of 40% and 60% of total revenue regardless of size for all but the smallest size class. For the group of the smallest providers (14 of which reported verified figures), nine had annual expenditure greater than revenue resulting in a median figure exceeding 100%. In other words, service providers that do not recover OPEX consistently are among the smallest in the State.

Of the nine service providers with OPEX that exceeded revenue consistently over the past five years:

- two were Aboriginal councils (which do not charge full rates for services and may also be responsible for household plumbing),
- six serviced more than one community (i.e. managed two or more small schemes which increases costs while decreasing opportunities for economies of scale),
- two provided only water (i.e. no sewerage) services,
- all but one sourced water from non-artesian sources (thus having higher treatment and pumping costs than small GAB communities) and,
- all are among the most remote communities in Queensland being classified as "very remote" by the ABS and being between 300 and 1000 km from the nearest metropolitan centre and servicing schemes separated by between 30-160 km.

The small size of these service providers means that the total value of expenditure that is not recovered is relatively small compared with the rest of the sector. Service providers that consistently fail to recover OPEX are among the smallest and most remote councils in the state. It should also be noted that only two indigenous councils provided financial data in this period and both fell into the category. The majority of indigenous councils do not recover costs having low or zero rates on top of the challenges of small size and remoteness.

2.5 Debt servicing

This indicator is intended to measure the cost of interest expenses and repayment of loans. Haider *et al*. (2014b) suggested it was "relevant for private organisations, or WSS developed with loans". While this does not preclude the use of this indicator for local government service providers, the focus would presumably be on debt incurred to match state funding of capital expenditure.

Unfortunately, there is little data on the level of debt associated with water and sewerage services in Queensland. The nearest indicator requested through SWIM for reporting to the National Performance Reporting Framework (FN23) is "earnings before interest and tax (EBIT) divided by net interest expense for the whole water utility". However, only 19 councils reported this indicator over the past five years and many only once or twice during the period (see Table 3.1). There was also a high degree of variation in the data reported suggesting that the indicator has been interpreted differently among councils and over time. No further analysis of this data was undertaken and further work would need to investigate types and impacts of debt on service providers in light if broader local government debt and state and national subsidy arrangements.

2.6 Real losses and Non-revenue water

These indicators provide a measure of inefficiencies due to water loss during treatment and in the distribution network. Real losses consist of leakage and releases from transmission and distribution systems up to the point of customer metering or consumption. They include unbilled uses (e.g. backwashing and flushing). Non-revenue water includes all real losses but also losses due to theft and under-registration of metered supply (sometimes called apparent losses). Neither of the indicators measures losses on private property (i.e. beyond the water meter). Use of these indicators can vary markedly. IBNET (2015) noted:

> *The IWA distinguish between non-revenue water and unaccounted for water, with the latter not including legal usage that is not paid for. The indicators are usually measured in m^3/conn/day. The difference is usually small, and the IBNET Toolkit therefore only uses non-revenue water as an indicator.*

Accurate estimations of real losses and non-revenue water require reliable metering at all stages of the distribution network. The Queensland System Leakage Management Plan Guidelines used an international approach to describing losses for Queensland water service providers as summarised in Table 2.6A.

Table 2.6A: Relationship of different categories of loss from water supply systems. Source: modified from Queensland System Leakage Management Plan Guidelines (***qldwater***, 2007).

<table>
<tr><th colspan="3">Type of water use</th><th>Description</th></tr>
<tr><td rowspan="3">Authorised Consumption</td><td rowspan="2">Billed consumption</td><td>Metered Consumption (ML/yr)</td><td>Measured retail consumption from residential, commercial and municipal water meters.</td></tr>
<tr><td>Unmetered Consumption (ML/yr)</td><td>Water that is billed but not directly metered (e.g. some services estimate the volume consumed).</td></tr>
<tr><td rowspan="3">Non-revenue water</td><td>Unbilled Authorised (ML/yr)</td><td>Usually estimated as 0.5% of water supplied (e.g. backwashing filters, flushing mains).</td></tr>
<tr><td rowspan="2">‘Unaccounted for’</td><td>‘Apparent’ Losses (ML/yr)</td><td>Usually estimated as theft of 0.1% of water supplied[7], plus 2% meter under-registration.</td></tr>
<tr><td>‘Real’ or ‘Physical’ losses (ML/yr)</td><td>Water Supplied – (Metered Consumption + Billed, Unmetered Consumption + Unbilled Authorised + Apparent Losses)</td></tr>
</table>

There is also debate as to the most appropriate way of representing water loss. Reporting losses as a percentage of water produced “can make utilities with high levels of consumption, or compact networks, look to be better performing than those with low levels of consumption or extensive networks. To capture these different perspectives the reporting of three measures of non-revenue water has become the norm” (IBNET, 2015). These are:

- Non-revenue Water - Difference between water supplied and water sold (i.e. volume of water “lost”) expressed as a percentage of net water supplied
- Non-revenue Water per km per day - Volume of water “lost” per km of water distribution network per day
- Non-revenue Water per connection per day - Volume of water “lost” per water connection per day.

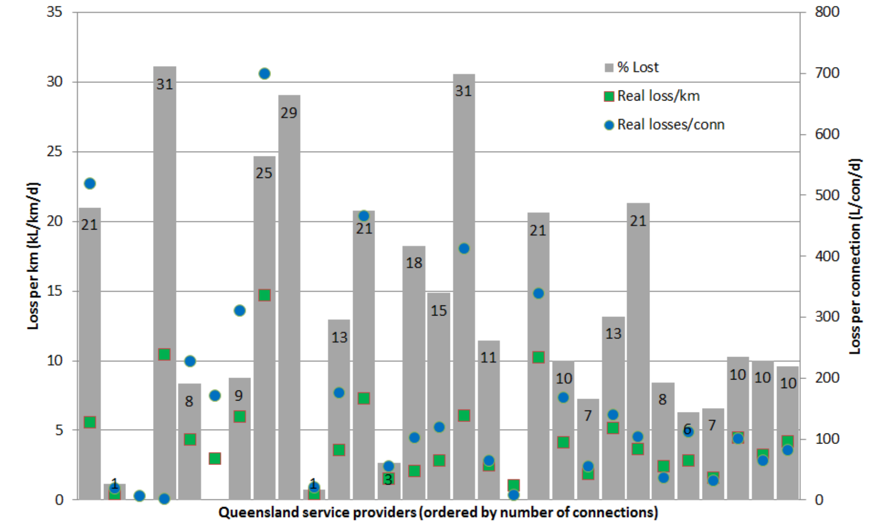
Similar indicators have been collected through SWIM for several years (namely AS10 – Real Water Losses per connection, AS11 – Real Water losses/day and AS32 Total Real Losses –

[7] This estimate is provided for Australian utilities. In third-world countries apparent losses can be as high as 40% driven chiefly by theft (World Bank, 2006).

see Appendix 3). However, there has been a patchy response to reporting of these figures from all but a few service providers in past years (see Table 3.1). Taking the average of each service provider's response over the past five years shows a range of leakage rates across Queensland, as might be expected owing to the varying age, size and pressure of networks (Figure 2.6A).

The variation in all three indicators is telling, particularly given some of the lowest values appear to exceed international best practice. Very low leakage is possible in new networks, but there is also a possibility that there is confusion around the definition of these indicators and the way that each service provider interprets their data. This is corroborated by the variation in results from some service providers within the period analysed. That is, some service providers reported significant variation in leakage which may be due to reporting inaccuracies rather than actual changes in water loss.

Figure 2.6A: Average **i**ndicators of water loss from Service Providers that reported via SWIM between 2009 and 2014. Source: SWIM.



Notwithstanding the quality of some of the data, the average results over the period provide useful information. The percentage of total water produced that was recorded as loss varied mostly within 5 to 30%. Additional analysis showed that there was no correlation between the percentage of water losses and the volume consumed indicating that this variation is due to other factors. It would be useful to analyse water losses against the age and average pressure of individual supply schemes. This data is not available through SWIM but was reported to the Department in previous years through System Leakage Management Plans (or the exemption applications for these mandatory Plans).

As predicted from international literature, the % water loss shows little correlation with either water loss per km or per connection. In contrast, these later two indicators appear to be highly correlated in the larger service providers. However, for small service providers, water losses per connection are highly variable (as would be expected from the skewing effect of the diverse range of population sizes). Standardising water losses based on the length of the distribution system may be a more useful for benchmarking smaller schemes and the point where the close relationship breaks down at least in the limited dataset available is between 6000 and 7000 connections.

2.7 Indicators of Capital Costs

Estimation of capital costs is notoriously difficult and often complicated by the need for consistent and accurate determination of remaining asset lives, asset values (through regular revaluation and/or re-estimation of future income) and appropriate depreciation methodologies. The majority of Queensland councils and their water service providers annually estimate the total replacement cost of assets (gross value) and their 'written down value' (or the value of the depreciated value of the assets). These figures have in the past been used to estimate the total value of assets of Queensland service providers and these are compared with the totals estimated in this report in Table 2.7A. For this report, gross asset values and written down values were determined from the most recent available annual reports from each Queensland council and those of the council owned entities QUU, Unitywater and Wide Bay Water (see Appendix 2).

Table 2.7A: Estimates of the total value of council and utility assets.

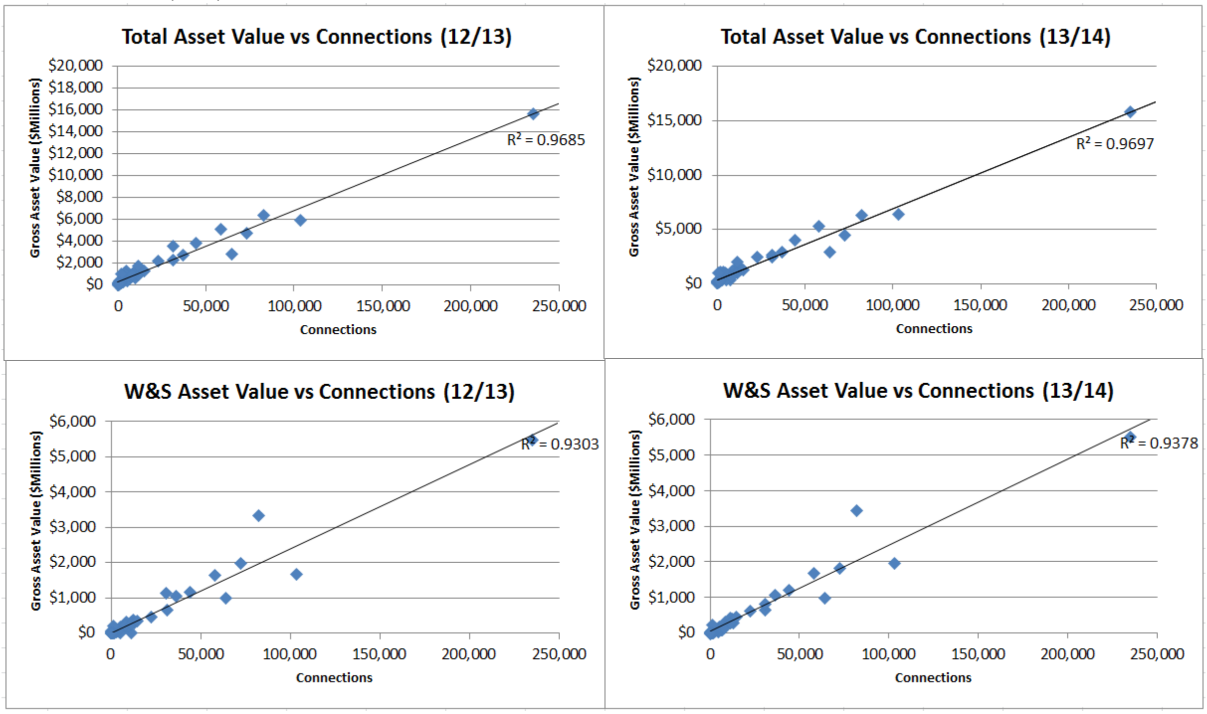
Date	Region Assessed	All Assets (bill)		Water & Sewerage (bill)		Source
		Replacement	WDV	Replacement	WDV	
2000	National water sector (including private ind)			$60.6		ABS, 2000
2011				$11.6	$7.7	DLG, 2011
2012	Qld regional LG + SEQ			$36.4		LGAQ, 2012
	77 Qld council's	$76.0		$25.7		LGAQ, 2012
	QUU and Unity			$11.4		LGAQ, 2012
2014	77 Qld councils (excludes QUU & Unity)		$89.1			ABS, 2014
	69 council's (excludes QUU & Unity)	$72.1		$15.6		QAO, 2014
	71 councils (excludes Unity & QUU)		$81.4		$12.0	DILGP, 2015
	74 councils (excludes Unity & QUU)	$120.5	$96.8	$25.6	$23.6	This report
	Unity and QUU		$8.1		$7.0	This report
	QWRAP councils	$24.2	$17.9	$7.1	$4.7	This report

All councils use fair value estimations of assets most years, but undertake valuations or revaluations periodically. The universally accepted framework for consistency in this reporting is AASB13 and AASB116 and all councils and DREs follow these Accounting Standards. This requires estimation of 'Fair Value' namely "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants". This first requires the asset valuations to be undertaken and the "three widely used valuation techniques are the market approach, the cost approach and the income approach." (AASB13 s. 62). The majority of Queensland service providers use the 'cost approach' which estimates the depreciated replacement cost (i.e. the cost to replace the current service capacity of the asset taking into account its condition and location). Annual, audited financial statements of these Service Providers include both the "gross value of assets" and the depreciated or "written down value". Both are usually stipulated to be part of the Fair Value basis of measurement.

The Written Down Value (WDV) has been reported in SWIM for some years and recent annual report figures align with current SWIM data. Thus, this indicator (WDRC/fair value/WDV) is well established. The Gross Value is not currently recorded in SWIM but is used by some councils as “current replacement cost” and is required under the new KPI framework. Technically, it could be argued that ‘Gross Value’ is not equivalent to ‘real replacement cost’, but this number provides the best available estimate based on standard, established and audited methodologies.

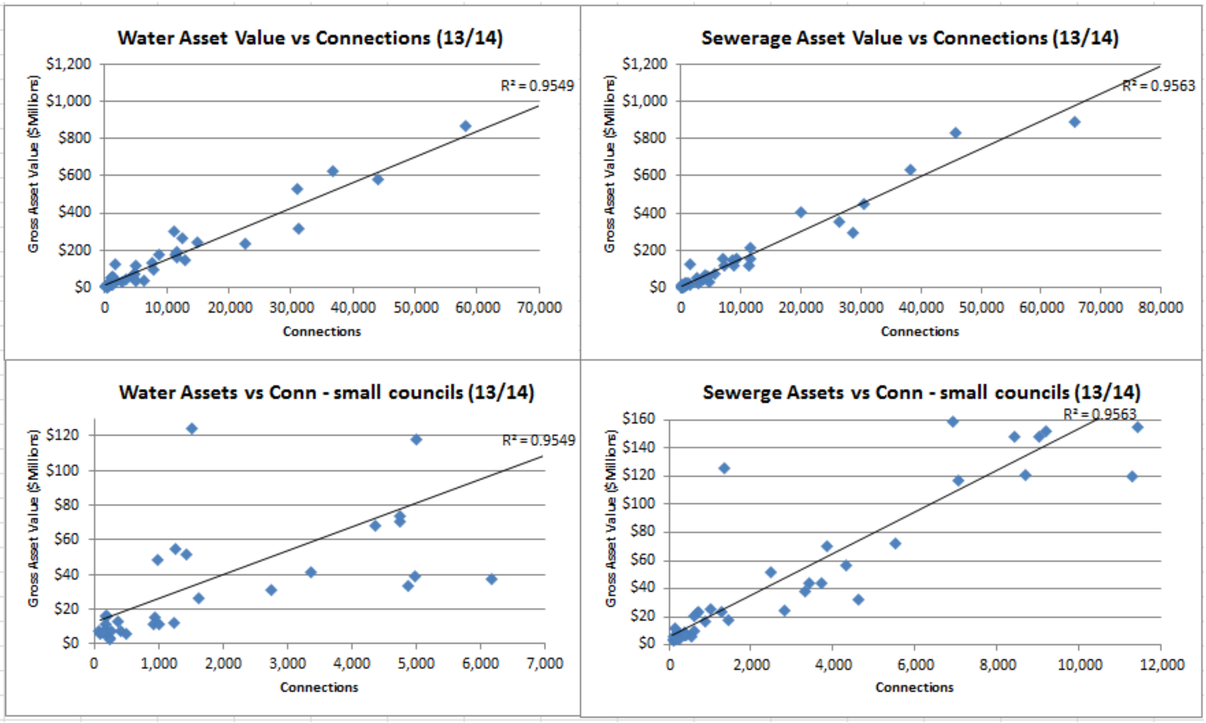
‘Closing gross value’, consistent with the audited financial statement should thus be interpreted as current replacement cost and the depreciated asset value (or WDV/book value etc.) consistent with the audited financial statement should be reported as written down replacement cost. However for those entities using ‘Income Approach’ (currently QUU and Unitywater) “Fair Value” consistent with the audited financial statement is equivalent to WDRC and there is no regular, audited estimate of replacement cost.

Figure 2.7A: The value of all council assets and water and sewerage assets is strongly correlated with number of connections (size).



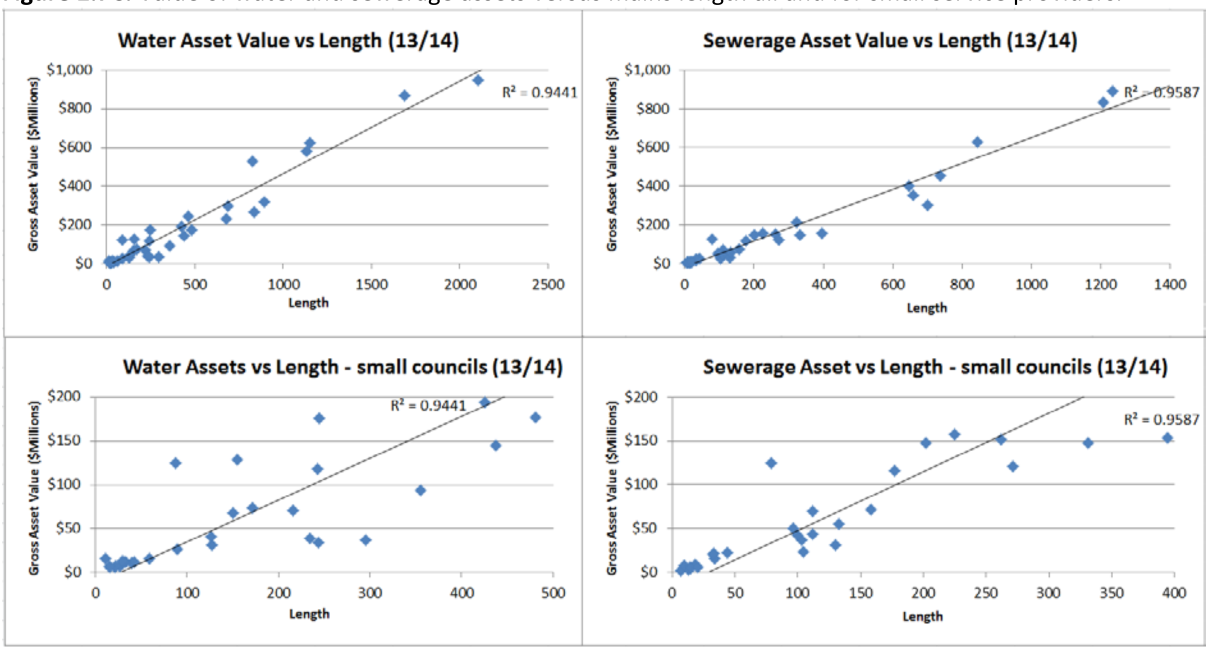
The relationship of the value of all council assets and total water and sewerage assets with the size of a service provider (measured by the number of water customers) was also analysed. The indicators were highly correlated as would be expected (Figure 2.7A). The value of water and sewerage assets were also individually strongly correlated with number of water and sewerage customers respectively although this relationship broke down to some extent for small service providers, particularly for water (Figure 2.7B). Further analysis is needed to determine why some councils have unusually high or low replacement values as this may indicate under or over investment (or may simply reflect particularly complex or simple systems).

Figure 2.7B: Value of water and sewerage assets versus number of customers for all and for small service providers.



As discussed in Section 1, mains length is a commonly used surrogate for total capital value and Figure 2.7C shows there is indeed a strong correlation between gross value and mains length for both water and sewerage when all Queensland service providers are considered. However, there is a once again a deterioration in this relationship for small service providers, particularly for water. It is possible that this pattern reflects the high relative cost of water treatment (compared with network assets) in some small communities, but further analysis is needed to test this. Regardless, this variation means that caution must be taken when comparing asset values of the smallest water and sewerage service providers.

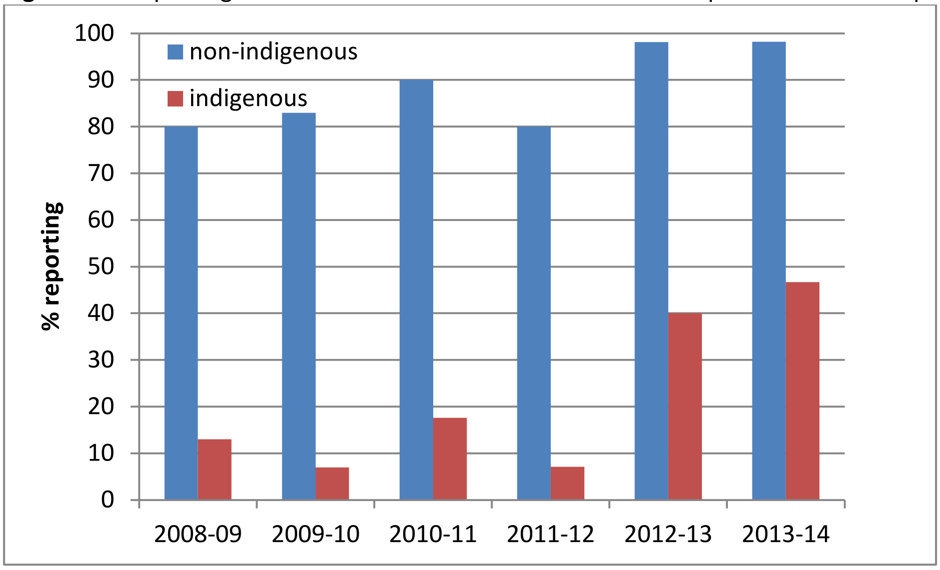
Figure 2.7C: Value of water and sewerage assets versus mains length all and for small service providers.



3 Availability of Data

Reporting of performance indicators for various purposes has occurred in Queensland for over a decade but coordinated reporting of a consistent set of KPIs has been undertaken only since the creation of the Statewide Water Information Management (SWIM) system in 2006. This voluntary system integrated reporting requirements from several State and Commonwealth organisations and provided tools to assist council service providers to record, check and submit data as well as simple benchmarking tools for comparing their performance with other Queensland service providers. Reporting via SWIM increased each year after the 2006 pilot and has continued to increase since council amalgamations in 2008 (Figure 3.1).

Figure 3.1: Reporting via SWIM of all Queensland council service providers over the past five years.



The amount of data reported by each service provider has varied but generally increased over time. Patchy reporting in the past means that long-term trends may be more difficult to assess for some indicators than others. Further, some indicators have been reported rarely by any service provider (see Table 3.1). This analysis of reporting over time shows that some small service providers, and particularly many indigenous councils have reported little data in the past but this is expected to change in 2015 with the introduction of mandatory reporting and support from DEWS for indigenous councils.

Table 3.1: Number of years of data for each indicator for councils that reported to SWIM between 2009 and 2014. Source: SWIM

Colour codes show number of years of data reported: 5 yr | 4 yr | 3 yr | 2 yr | 1 yr

Service Provider	Indicators (units) & SWIM identification code																			
	Water Connections (000s)	Sewerage Connections (000s)	Water bill ($ for 200kL/y)	Sewerage Bill ($ for 200kL/y)	Typical water bill ($)	Typical sewerage bill ($)	Water OPEX ($000)	Sewerage OPEX	Length water mains (km)	Length sewerage (km)	Water OPEX ($/con)	Sewerage OPEX ($/con)	Water Revenue ($000)	Sewerage Revenue ($000)	Volume water supplied (ML)	Volume sewage collected (ML)	Interest cover ratio	Real water losses (kl/con/d)	Real water losses (kl/km/d)	Total real losses (ML)
	CS4	CS8	PR43	PR45	PR44	PR46	FN32	FN33	AS2	AS5	FN11	FN12	FN1	FN2	WA11	WA18	FN23	AS10	AS11	AS32
Balonne Shire Council	4 yr	4 yr	5 yr	3 yr	4 yr	3 yr	5 yr	5 yr	5 yr	5 yr	4 yr	4 yr	4 yr	4 yr	4 yr	2 yr				
Banana Shire Council	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	4 yr	5 yr	1 yr			
Barcaldine Regional Council	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr		4 yr	4 yr	5 yr
Barcoo Shire Council	5 yr	5 yr	3 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	4 yr	5 yr	4 yr	5 yr				
Blackall-Tambo Regional Council	4 yr	4 yr	1 yr	1 yr	1 yr	1 yr	3 yr	3 yr	5 yr	5 yr	3 yr	3 yr	3 yr	3 yr	3 yr	4 yr		1 yr	2 yr	4 yr
Boulia Shire Council	4 yr	4 yr	4 yr	4 yr	4 yr	4 yr	4 yr	4 yr	5 yr	5 yr	4 yr	4 yr	4 yr	4 yr	3 yr	4 yr				
Bulloo Shire Council	4 yr	3 yr	1 yr	1 yr	2 yr	2 yr	3 yr	3 yr	5 yr	5 yr	3 yr	2 yr	1 yr	1 yr		1 yr				
Bundaberg Regional Council	5 yr	5 yr	5 yr	4 yr	5 yr	4 yr	4 yr	4 yr	5 yr	5 yr	4 yr	4 yr	4 yr	4 yr	5 yr	5 yr	4 yr			
Burdekin Shire Council	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	1 yr	3 yr	4 yr	5 yr
Burke Shire Council	2 yr		2 yr	2 yr	2 yr	2 yr	1 yr	1 yr	1 yr	1 yr	1 yr		1 yr	1 yr	1 yr					
Cairns Regional Council	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	4 yr
Carpentaria Shire Council	5 yr	5 yr					3 yr	2 yr	5 yr	5 yr	3 yr	2 yr	2 yr	2 yr	3 yr	3 yr		1 yr	1 yr	1 yr
Cassowary Coast Regional	5 yr	5 yr	5 yr	5 yr	5 yr	5 yr	4 yr	4 yr	5 yr	5 yr	4 yr	4 yr	4 yr	4 yr	5 yr	5 yr	1 yr	5 yr	5 yr	5 yr
Central Highlands Regional	4 yr	4 yr	4 yr	3 yr	3 yr	4 yr	4 yr	4 yr	5 yr	5 yr	4 yr	4 yr	5 yr	5 yr	2 yr	4 yr				
Charters Towers Regional	2 yr	2 yr	2 yr	2 yr	2 yr	2 yr	2 yr	2 yr	2 yr	2 yr	2 yr	2 yr	2 yr	2 yr	2 yr	2 yr		2 yr	2 yr	2 yr

Cherbourg Aboriginal Council																				
City of Gold Coast																				
Cloncurry Shire Council																				
Cook Shire Council																				
Croydon Shire Council																				
Diamantina Shire Council																				
Douglas Shire Council																				
Etheridge Shire Council																				
Flinders Shire Council																				
Gladstone Regional Council																				
Goondiwindi Regional Council																				
Gympie Regional Council																				
Hinchinbrook Shire Council																				
Hope Vale Aboriginal Council																				
Isaac Regional Council																				
Kowanyama Aboriginal Council																				
Livingstone Shire Council																				
Logan City Council																				
Longreach Regional Council																				
Mackay Regional Council																				
Mapoon Aboriginal Council																				
Maranoa Regional Council																				
Mareeba Shire Council																				
McKinlay Shire Council																				
Mornington Shire Council																				
Mt Isa City Council																				
Murweh Shire Council																				
North Burnett Regional Council																				
Palm Island Aboriginal Council																				

Paroo Shire Council																				
Quilpie Shire Council																				
QUU																				
Redlands City Council																				
Richmond Shire Council																				
Rockhampton Regional Council																				
South Burnett Regional Council																				
Southern Downs Regional																				
Tablelands Regional Council																				
Toowoomba Regional Council																				
Torres Strait Island Regional																				
Townsville City Council																				
Unitywater																				
Western Downs Regional																				
Whitsunday Regional Council																				
Wide Bay Water																				
Winton Shire Council																				
Woorabinda Aboriginal Council																				
Yarrabah Aboriginal Council																				

4 Cost drivers and urban water industry data

The first three sections of this report seek to isolate indicators that may drive costs for small utilities based on best industry practice internationally and then assess the nature of these indicators based on available data from Queensland. This final section approaches the issue of measuring key cost drivers from the perspective of industry intelligence on business factors that most affect costs.

Many factors determine the costs of providing water and sewerage services with some being under the control of water authorities and others being extrinsic. The key drivers are related to assets and the impact capital and operational costs and depend on demographic, available water source, geographic, management/political and compliance factors (Table 4.1). Each has a different effect on cost and efficiency and may vary in impact from place to place. Note that some of these factors may also impact pricing of water and sewerage services but pricing is not considered in this report.

Table 4.1 summarises the external and internal factors that can increase or decrease the costs of providing water and sewerage services. This list was developed with engagement with the Queensland industry through workshops and informal discussion. Further work is being undertaken to prioritise and quantify the key cost drivers. Understanding the key cost drivers and the magnitude of their impacts will reveal the optimal indicators for assessing efficiency of specific service providers. Most cost drivers are not measured directly so must be calculated using surrogate indicators (or be inferred from efficiency benchmarking as described in Section 1). Table 4.1 also lists existing indicators that are relevant to each of the cost drivers. There are numerous gaps and many current indicators are too coarse to derive useful information on the drivers themselves. Prioritisation of the cost drivers, particularly those that are under the direct or indirect control of service providers and government agencies will allow greater definition of appropriate indicators in the future.

Table 4.1: List of cost drivers of water and sewerage services in Queensland with an indication of how costs are affected by each driver. Indicators relevant to each driver are also listed. Red cells indicate extrinsic drivers, while green cells are drivers controlled through management/governance and yellow cells show drivers that may be partially influenced depending on external factors

Type	Cost Driver	Description	Impact on costs and efficiency of asset use	Relevant Indicators
Demographic	Population size	Number of customers determines the scale of infrastructure and large populations achieve economies of scale and reduced unit costs of service provision.	Larger population increases costs but raises scale efficiencies within a scheme.	Population No of customers No of customers/km Volume of water used Number of communities/schemes Length of Mains
	Population growth rate	High growth drives investment but new infrastructure typically triggers new standards increasing compliance costs (see below). Water and sewerage assets are typically lead infrastructure requiring early upfront investment. Developer infrastructure contributions do not cover the cost of new infrastructure therefore a portion of the cost is carried by the existing customer base.	Investment increases spare capacity lowering asset use efficiency. Population decline results in spare capacity decreasing efficiency.	
	Population density	Number of connections (customers) per km and number of residents per connection impact the cost of network infrastructure.	Higher density increases efficiency.	
	No. communities served	Distinct water and sewerage services and their distance from each other impacts economies of scale.	Disaggregated services decrease efficiency.	
	Cultural drivers of demand	Demand for water and variation in primary water uses (e.g. internal/external water use) varies among similar communities based on cultural and historical factors.	Demand below the design capacity infrastructure results in spare capacity and thus lower efficiency. Demand exceeding design capacity results in additional investment (see above).	Wateruse per connection/capita Litres per person per day Water delivered/sewage collected
	Customer Expectations	Customer expectations change over time and typically increase service standards. Influence and are influenced by political drivers and compliance costs.	Increasing expectations increase costs.	
	Socio-economic	Income, living costs and capacity to pay influence expectations, service standards, risk profile and capital planning.	Higher expectations and standards increase costs	SEIFA index (ABS)
	No. & nature of comercial customers	Number and type of industrial customers influence typical demand as well as volume, timing and types of trade waste collected.	Variable impacts on costs and efficiency.	Industrial/Commercial water use vs residential water use
	Age/history of assets	Established communities may have older infrastructure meaning replacement and maintenance costs are higher than in new developments.	Aged infrastructure may have higher maintenance costs but lower compliance standards.	Average age of network.
Water Source	Source infrastructure	Cost to build and operate/maintain dams, weirs, bores (e.g. depth) and bulk pipe assets depends on available sources and geography/geology but can also affected by capital planning decisions and selection of alternative sources.	Variable impacts depending on headworks.	CAPEX OPEX*
	Number and reliability of sources	Unreliable or limited water sources require greater investment in alternative sources and drought contingency.	Limited or unreliable supplies increase costs and require less efficient back-ups.	OPEX*
	Raw Water costs	Variable costs of bulk water providers driven by legacy arrangements, including contracts, allocations, licences and competing water uses (i.e. mining, agriculture).	Variable impacts depending on context.	OPEX* CAPEX
	Raw Water quality	Cost to build and operate/maintain water treatment facilities (depends on source water quality and prevailing standards).	Lower source quality increases costs.	OPEX*

Type	Cost Driver	Description	Impact on costs and efficiency of asset use	Relevant Indicators
Asset Constraints	Legacy Infrastructure Decisions	Past decisions with an arbitrary or political component (e.g. number and location of treatment plants, type of treatment process selected, size and depth of network mains,	Past decisions continue to impact OPEX and replacement costs.	Replacement cost and written down value of assets. Number/type of plants
	Unit cost and scale of treatment infrastructure	Treatment plants which cannot be easily scaled to meet the current or emerging population size or demand can create inefficiencies particularly if demand never reaches the optimal size for the asset.	Increase costs if oversized or needed irregularly (e.g. desalination and advanced recycling plants).	Treatment complexity Population size.
Geographic	Topography	Distance to waterways and landscape relief influences costs to build and operate networks (particularly reliance on gravity flow for water and sewers vs pumping) and their susceptibility to impacts from flooding.	High relief increases pumping costs. Distance from waterways increases costs but decreases flood risk and mitigation/recovery costs.	OPEX* CAPEX Pumping stations per km. Length of Mains
	Location and isolation	Location and distance to nearest regional centre impacts access to consumables, parts and skills and the cost of energy supply. Distance is also a surrogate indicator of impact on some workforce measures.	Greater distance increases costs and decreases opportunities for scale efficiencies.	GIS Distance calculations
	Climate	Influences domestic demand and peak infrastructure needs. Ratio of peak to average water demand (seasonal peak demand compared to wet weather water demand) influences bulk water assets and the sizing of distribution infrastructure.	Large seasonal peaks require larger assets, increasing costs and creating (seasonal) spare capacity reducing efficiency.	Rainfall Temperature Evapotranspiration
	Catchment characteristics	Unimpacted catchments may provide better raw water quality (see Water Source above), but increase environmental values and sensitivity to discharges, overflows and thus increase environmental compliance costs.	Higher environmental values increase costs and can require spare capacity for peak flows.	Mean and peak flow rates
Governance/Management	Management/ political	Structure of the service provider, political context and internal policies directly affect decision processes, risk tolerance, and standard practices (e.g. impacting staffing levels, OHS, reactive vs proactive maintenance, pricing/income).	Variable impacts.	Size of workforce Training of workforce Total revenue Proportion of revenue spent on HR
	Management Capacity	Capacity/capability of management, also impacted by capacity to collaborate, presence of a guiding coalition or individual champions to achieve economies of scale.	Increasing capacity can increase efficiency but also increases costs.	
	Scope of operations	Combining services (e.g. vertically across the water cycle, horizontally within other utilities or inside local government) provides economies of scope and scale creating critical mass (but must be balanced against the risk of reducing focus on key issues).	Increased economies of scope and scale can reduce costs but can dilute water-specific management capacity.	Scope of service provider
	Capital Planning	Decisions on infrastructure investment and procurement drive CAPEX costs and have significant flow-on to fixed OPEX costs. Strongly driven by understanding and risk tolerance of decision makers and communities.	Optimised capital planning greatly reduces long-term costs and the efficiency of asset use.	CAPEX Projected (10 year) expenditure
	Financial structures	Accepted levels of debt, adopted asset valuation, depreciation and accepted forward projections strongly influence current and future costs.	Variable impacts.	Replacement and WD Value of assets
	Levels of service	Accepted levels of service vary depending on customer expectations (see above) but also management decisions. Management of consistency, security and resilience to adversity is particularly costly.	Higher performance standards increase costs and need for spare capacity and redundancy.	CSS

Type	Cost Driver	Description	Impact on costs and efficiency of asset use	Relevant Indicators
Compliance costs	Statutory planning / management	Cost to meet regulatory requirements including mandatory plans, reporting and auditing. Requirements that are closely matched to the business needs of the industry can drive improvements in standards and efficiency across an industry.	Regulatory overheads increase costs but can be used to improve efficiencies.	CAPEX OPEX* Licence Conditions Compliance with licence Number/ severity of incidents OPEX/Revenue Asset Consumption ratio
	Environmental standards	Cost of meeting infrastructure and discharge standards set by regulators to reflect external environmental benefits. External decisions influence the treatment technology installed and thus cost.	Environmental compliance costs increase cost to serve.	
	Health Standards	Cost of meeting health standards for drinking water and for any discharges or water reuse. Standards are necessary but must be well-designed to be efficient.	Compliances costs increase cost to serve.	
	Economic regulation	Costs of meeting management, reporting, and auditing requirements of an economic regulator (e.g. in SEQ). Policy around capping of infrastructure charges, pricing control and subsidy schemes impact debt, RAB and depreciation and impact future investment. Appropriate regulation can be a net benefit across an industry.	Economic regulation increases compliance costs but can be used to improve efficiencies.	
	Design Standards	Influenced by scale and scope of standards and risk tolerance of designers and how standards are interpreted locally. Standards tend to increase over time potentially increasing costs of newer infrastructure.	Stricter standards typically increase costs and constrain range of efficiency of assets.	Standards used

*Principal OPEX costs are staff, electricity, consumables and market and political forces also impact the cost of these inputs.

5 Conclusions

Widely accepted indicators of financial performance and efficiency have been collected in Queensland for at least five years and show that there is wide variation in the water and sewerage sector at present. The quality and coverage of data collected over the past five years has improved over time but there are still numerous gaps which will hopefully be filled under the new State KPI reporting framework.

Detailed examination of estimated capital costs completed for the first time in this report show that the relationship of asset values to utility size (measured by number of connections or length of mains) breaks down somewhat for smaller service providers. This finding reflects a trend identified for other indicators and broadly acknowledged within the industry, namely that small utilities cannot easily be benchmarked with larger ones likely because of the wide variation and extreme impact of extrinsic factors on smaller providers.

Identification of key cost drivers for the sector highlighted the importance of assets not only in terms of how they are managed, but also in their design, selection and history of development. Infrastructure planning and investment have a greater impact on the ongoing efficiency of utilities than is sometimes recognised. This highlights the importance of optimising design standards and capital investment in the context of different sized utilities. The list of cost drivers also mapped poorly to existing indicators in many cases suggesting that current KPIs and efficiency analyses may not be capturing all of the information required. Prioritisation and quantification of the key cost drivers may allow greater focus on KPIs that better measure a utility's performance.

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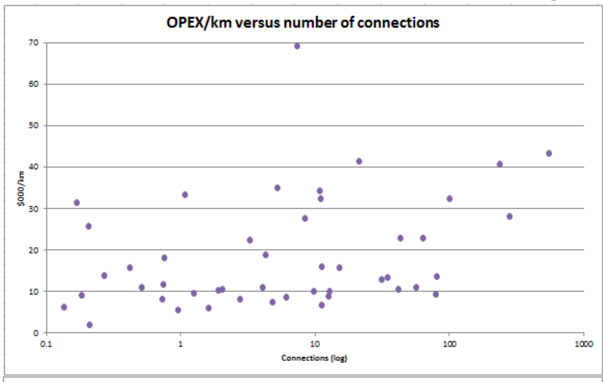
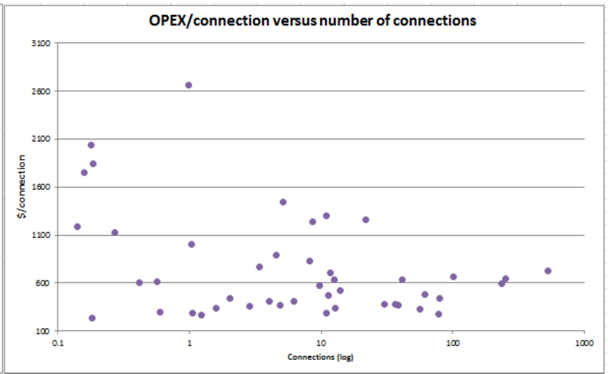
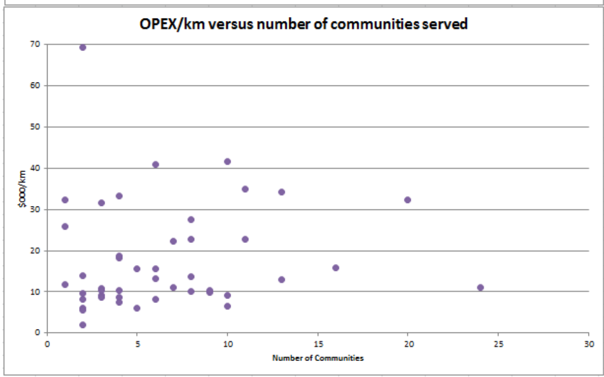
Appendices

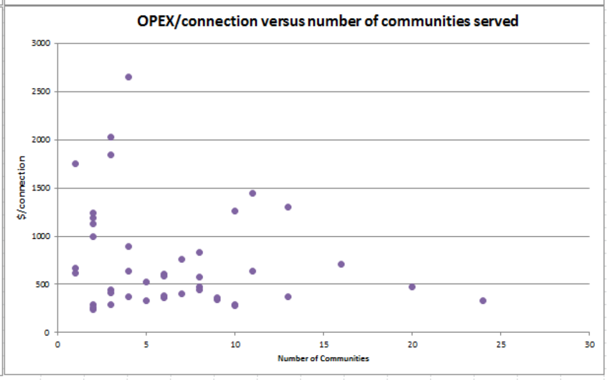
Appendix 1: OPEX/km and OPEX/connection – correlation with other factors.

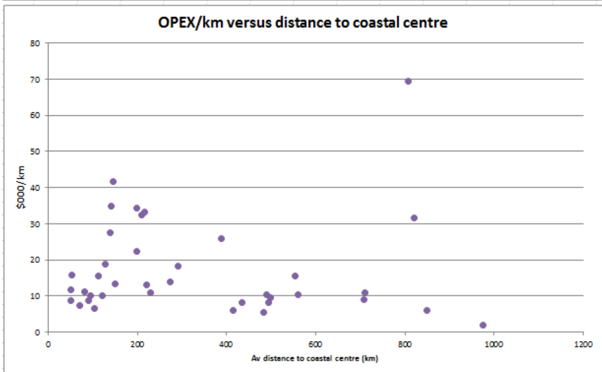
OPEX/km and OPEX/connection were plotted against number of connections, number of communities served, distance to nearest coastal centre and treatment complexity to determine the extent of correlation among these factors.

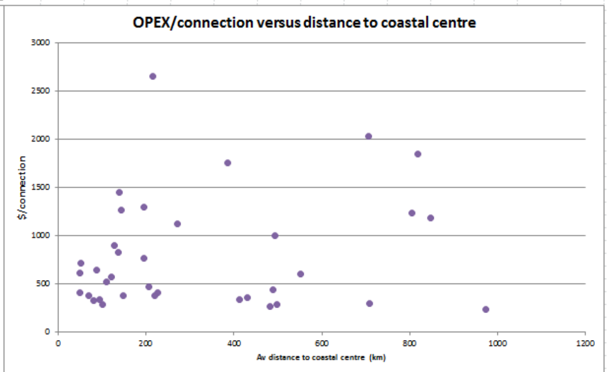


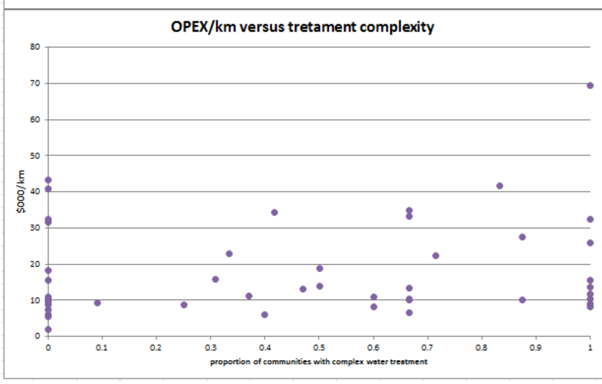


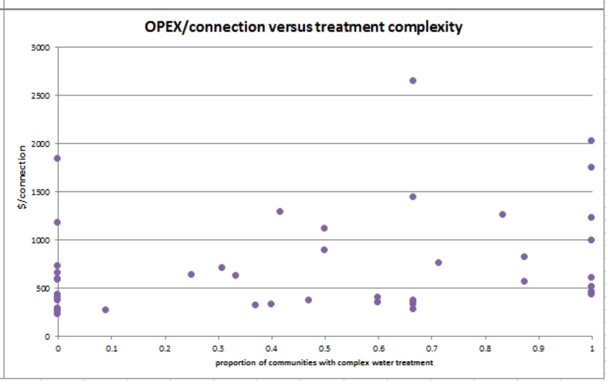












Appendix 2: Asset Values

Table A2: Gross Asset Values and Written Down Values for All Property Plant and Equipment and Water And Sewerage Assets in Queensland Councils.

2013-14	Property, Plant and Equipment	Tot -WDRV	Gross Value Water & Sew	WDV - Water & Sewerage	Notes
Aurukun	$104,165,925	$82,503,134	$10,952,679	$6,789,204	
Balonne	$347,498,000	$197,676,000	$53,850,000	$27,555,000	
Banana	$912,538,750	$701,444,886	$187,905,330	$92,768,343	
Barcaldine	$379,232,333	$316,869,266	$47,672,481	$31,856,608	
Barcoo	$204,990,429	$165,641,053	$11,263,555	$7,960,926	Note: no sewerage assets
Blackall-Tambo	$287,274,555	$229,509,696	$30,715,490	$18,881,068	
Boulia	$132,097,711	$102,957,743	$9,122,768	$6,225,188	
Bulloo	$277,010,219	$244,100,277	$10,834,859	$8,415,042	
Bundaberg	$2,426,240,525	$1,723,542,396	$671,246,037	$456,358,721	
Burdekin	$632,559,333	$461,629,061	$108,718,043	$54,047,783	
Burke	$131,106,957	$109,254,468	$19,896,965	$16,773,234	
Cairns	$4,489,632,289	$3,081,562,171	$1,838,856,851	$1,090,873,566	
Carpentaria	$383,513,466	$318,211,283	$70,747,621	$44,818,062	2013/14 value copied from 2012-13
Cassowary Coast	$1,565,945,250	$1,033,975,358	$422,309,299	$256,533,132	
Central Highlands	$1,523,611,752	$1,304,838,606	$345,833,531	$248,785,778	
Charters Towers	$611,486,909	$473,132,786	$108,037,466	$60,216,401	
Cherbourg	$126,725,892	$108,547,125	$21,805,391	$18,175,655	combined + drainage, and waste (overestimate)
Cloncurry	$373,901,879	$274,441,257	$68,565,573	$44,023,922	
Cook	$361,472,712	$254,064,759	$70,894,366	$47,499,778	
Croydon	$126,339,000	$102,515	$16,106,000	$13,928,000	Note: no sewerage assets
Diamantina	$168,926,750	$138,915,913	$8,969,131	$5,438,778	
Doomadgee					No data available
Douglas	$329,353,280	$310,936,001	$106,898,899	$95,739,980	
Etheridge	$193,302,675	$151,513,319	$7,277,993	$5,057,954	Note: no sewerage assets
Flinders	$221,797,000	$203,644,000	$31,559,000	$20,953,000	
Gladstone	$2,440,293,000	$1,992,282,000	$634,494,000	$442,411,000	
Gold Coast City	$15,839,954,000	$11,242,600,000	$5,530,209,000	$3,653,919,000	
Goondiwindi	$585,192,000	$412,175,000	$111,060,000	$57,303,000	
Gympie	$1,309,273,532	$1,054,076,772	$298,459,572	$198,253,570	
Hinchinbrook	$403,542,561	$239,148,663	$57,282,933	$30,389,813	
Hope Vale	$89,369,967	$63,780,806	$23,708,068	$16,496,799	
Isaac	$1,176,759,749	$981,339,904	$323,228,099	$237,358,936	
Kowanyama					No data available
Livingstone	$1,068,326,134	$805,070,444	$446,284,007	$301,046,917	
Lockhart River	$72,585,660	$52,118,091	$10,430,834	$6,576,450	
Logan City	$6,379,903,000	$4,368,725,000	$1,978,945,000	$1,382,150,000	

Longreach	$307,251,521	$195,005,005	$81,244,945	$47,024,352	
Mackay	$4,014,942,844	$3,338,942,043	$1,209,457,056	$880,112,126	
Mapoon	$84,953,842	$64,461,104	$7,390,601	$5,831,140	No sewerage assets
Maranoa	$1,038,449,576	$781,699,423	$117,273,990	$83,258,976	
Mareeba	$338,856,764	$334,755,605	$70,135,560	$69,191,839	
McKinlay	$218,569,540	$150,801,945	$14,794,026	$7,221,956	
Mornington					No data available
Mt Isa City	$750,583,705	$458,770,855	$244,949,535	$97,009,715	
Murweh Shire	$285,366,000	$172,609,000	$26,166,000	$11,089,000	
Napranum	$47,041,986	$45,468,933	$5,762,690	$5,762,690	
North Burnett	$1,111,706,624	$835,102,360	$91,469,046	$39,260,932	
Northern Peninsular	$260,401,358	$121,320,838	$28,604,010	$21,489,307	2013/14 value copied from 2012-13
Palm Island	$256,227,493	$165,994,158	$82,093,880	$59,852,800	2013/14 value copied from 2012-13
Paroo Shire	$270,258,000	$217,942,000	$19,986,000	$9,610,000	
Pormpuraaw	$147,700,941	$103,706,521	$18,168,320	$13,406,810	
Quilpie Shire	$179,335,682	$127,003,041	$11,226,980	$7,444,373	
Redland City	$2,921,408,000	$2,080,184,000	$1,006,363,000	$634,996,000	
Richmond Shire	$181,615,465	$120,481,857	$15,408,459	$9,546,478	2013/14 value copied from 2012-13
Rockhampton	$2,627,420,598	$1,832,457,658	$828,172,385	$503,602,054	
South Burnett	$711,880,473	$482,460,006	$208,577,621	$102,381,276	2013/14 value copied from 2012-13
Southern Downs	$973,617,000	$783,510	$297,235,000	$200,009,000	
Tablelands	$635,737,798	$440,377,742	$149,182,334	$95,556,714	
Toowoomba	$5,311,238,000	$3,986,050,000	$1,699,717,000	$1,138,698,000	
Torres Shire Council	$206,268,537	$150,197,818	$79,504,814	$59,972,693	
Torres Strait Is	$1,117,928,014	$691,922,986	$248,805,542	$129,129,126	
Townsville	$6,346,657,000	$4,324,190,000	$3,464,603,000	$2,115,940,000	combined (includes stormwater pipes, dams and weirs)
Western Downs	$1,980,146,826	$1,366,386,351	$283,673,925	$149,696,991	
Whitsunday	$1,310,711,841	$1,072,795,180	$454,617,416	$376,605,203	
Wide Bay Water	$2,938,270,245	$1,913,519,348	$1,073,990,706	$662,142,222	
Winton	$221,284,083	$164,027,781	$17,144,083	$8,554,703	
Woorabinda	$136,823,284	$72,178,752	$27,183,895	$20,238,312	12/13 and 13/14 copied from 2011/12
Wujal Wujal	$54,007,113	$39,117,529	$20,764,916	$17,283,953	
Yarrabah	$956,815,102	$92,546,364	$18,082,852	$9,644,549	
Sum Reg Qld	$83,619,398,449	$59,143,589,466	$25,615,890,428	$16,597,143,898	

QUU	not reported	$5,020,208,000	not reported	$4,155,609,000	QUU does not estimate replacement cost (likely > $10bill)
Brisbane council	$22,205,892,000	$17,830,337,000	N/A	N/A	
Ipswich council	$2,644,552,000	$2,186,729,000	N/A	N/A	
Somerset council	$375,984,000	$240,752,000	N/A	N/A	
Lockyer Valley	$606,123,000	$458,854,000	N/A	N/A	

council					
Scenic Rim council	$802,528,732	$677,310,397	N/A	N/A	
Unity	not reported	$3,093,508,000	not reported	$2,832,325,000	UnityWater does not estimate replacement cost
Sunshine Coast council	$3,930,928,000	$3,168,401,000	N/A	N/A	
Noosa council	$1,045,079,399	$873,447,519	N/A	N/A	
Moreton council	$5,257,298,000	$4,088,760,000	N/A	N/A	
Total	$36,868,385,131	$37,638,306,916		$6,987,934,000	

Appendix 3: Indicator Definitions

Water OPEX
SWIM code: FN32
Title: Operating cost - water (000s)
Units: $,000

Service Providers with cost reflective pricing and effective and efficient systems will have lower operating costs and thus provide better value for money to their customers. The components of operating cost (operation, maintenance and administration) are:

- Water resource access charge or resource rent tax.
- Purchases of raw, treated or recycled water
- Salaries and wages
- Overheads on salaries and wages
- Materials/chemicals/energy
- Contracts
- Accommodation
- All other operating costs that would normally be reported
- Items expensed from work in progress (capitalised expense items) and pensioner remission expenses
- Competitive neutrality adjustments, they may include but not be limited to, land tax, debits tax, stamp duties and council rates

Operating costs should EXCLUDE the following:

- All non-core business operating costs.
- Depreciation.
- Any write-downs of assets to recoverable amounts.
- Write-offs retired or scrapped assets.
- The written down value of assets sold.

Sewerage OPEX
SWIM code: FN33
Title: Operating cost - sewerage (000s)
Units: $,000

The components of operating cost (operation, maintenance and administration) are:

- Charges for bulk treatment/transfer of sewerage
- Salaries and wages
- Overheads on salaries and wages
- Materials/chemicals/energy
- Contracts
- Accommodation
- All other operating costs that would normally be reported
- Items expensed from work in progress (capitalised expense items) and pensioner remission expenses
- Competitive neutrality adjustments, they may include but not be limited to, land tax, debits tax, stamp duties and council rates

Water Income
SWIM code: FN1
Title: Total revenue - water
Units: $,000

Definition:
The water utility should report total revenue. Revenue will include, but may not be limited to, the following:

- Revenue from pay for use and base rate charges for provision of water (including recycled water) and sewerage services to residential and non-residential customers (AASB 118).
- Special levies.
- All contributed cash and assets (otherwise known as gifted assets, developer charges or headworks contributions).
- Receipts from governments for specific agreed services (e.g. CSOs).
- Other revenue from operations which would otherwise be included.
- Revenue from bulk water sales (for those businesses that supply bulk water).
- Sewerage (including trade waste).

Revenues, where possible or material (in assessing materiality, refer to Australian Accounting Standard AASB1031 - Materiality), should EXCLUDE the following:

- Funds received for specific capital works from governments or other parties.
- Equity contributions from governments.
- Investment activities.
- Noncore utility activities (e.g. consulting, agriculture, property leases).

Sewerage Income
SWIM code: FN2
Title: Total revenue - sewerage
Units: $,000

Definition:
The water utility should report total revenue. Revenue will include, but may not be limited to, the following:

- Revenue from pay for use and base rate charges for provision of water (including recycled water) and sewerage services to residential and non-residential customers (AASB 118).
- Special levies.
- All contributed cash and assets (otherwise known as gifted assets, developer charges or headworks contributions).
- Receipts from governments for specific agreed services (e.g. CSOs).
- Other revenue from operations which would otherwise be included.
- Revenue from bulk water sales (for those businesses that supply bulk water).
- Sewerage (including trade waste).

Revenues, where possible or material (in assessing materiality, refer to Australian Accounting Standard AASB1031 - Materiality), should EXCLUDE the following:

- Funds received for specific capital works from governments or other parties.
- Equity contributions from governments.
- Investment activities.
- Noncore utility activities (e.g. consulting, agriculture, property leases).

Water Losses per connection
SWIM Code: AS10
Title: Real water losses
Units: litres/service connection/day

Definition:

Real losses are leakage and overflows from mains, service reservoirs and service connections prior to customer meters. They represent a wasted resource, reduce the effective capacity of a water supply system, and may result in unnecessary operating costs. Real losses per service connection per day is an indicator of effective management that is influenced by pressure, condition or age of the infrastructure, or a combination of all of these factors.

The number of service connections is not the same as the number of metered accounts or connected properties. The number of service connections can be taken as being the number of metered accounts, minus the total of any sub-meters (after master meters e.g. to shops and flats), plus the estimated number of unmetered service connections (e.g. fire service connections). It is not acceptable to use the total connected properties value (C4) for calculating Real Losses Performance Indicators.

Real Losses
SWIM Code: AS11
Title: Real water losses
Units: kL/km water main /day

Definition:

Real losses represent a wasted resource, reduce the effective capacity of a water supply system, and may result in unnecessary operating costs. Real losses are leakage and overflows from mains, service reservoirs and service connections prior to customer meters. Note: 1 kL = 1 cubic metre (a unit often used for this indicator in other countries).

This indicator can be derived from others as follows:
Real water losses (kL/km water main/day) = volumetric losses ML per year [as32]*1000 / 365 days / length of water mains [AS2]