Oakley Greenwood

Revised Calculation of Reasonably Efficient Competitor Costs Report

prepared for:
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1. Introduction

The Independent Pricing and Regulatory Tribunal (IPART) is currently conducting a review of the prices that Sydney Water and Hunter Water can charge to wholesale customers. These wholesale customers are a relatively new category of service provider and generally purchase wholesale water and/or sewerage services from an incumbent (e.g. Sydney Water or Hunter Water) and on-supply these services to end-use customers.

As part of this review, IPART engaged Oakley Greenwood to:

- Develop numbers that it could use directly or indirectly in the building block calculation of reticulation and retail costs for a new entrant reasonably efficient competitor (REC); and
- Inform its consideration of the extent to which it is feasible to have system-wide retail minus prices.

IPART used the estimates provided by Oakley Greenwood to determine the draft system-wide REC cost minuses included in IPART's Draft Report and Draft Determinations which were released on 1 November 2016.

Oakley Greenwood's report and accompanying spreadsheet were published on IPART's website in November 2016 entitled "Calculation of reasonably efficient competitor costs" (the October 2016 Final Report) as the same time as IPART's Draft Report and Draft Determinations.

IPART sought comment from stakeholders on its Draft Report and Determinations. Stakeholder submissions included comments on Oakley Greenwood's estimates of REC costs.

IPART engaged Oakley Greenwood to:

- Provide advice on relevant comments, information and issues raised in stakeholder submissions regarding the estimates of reasonably efficient competitor costs included in Oakley Greenwood's October 2016 report; and
- Provide revised estimates of reasonably efficient competitor costs for providing retail and reticulation services.

This report should be read in conjunction with the associated spreadsheet – "Revised Calculation of REC Costs".

1.1. Scope of the response

As advised by IPART, this report responds to the issues raised in submissions that directly relate to the cost estimates provided by and outlined in the October 2016 Final Report and accompanying spreadsheet. These included submissions from:

- Sydney Water;
- Hunter Water; and
- Lendlease Living Utilities.

The detail of the issues raised and our responses are contained in section 3.

1.2. Structure of this report

The remainder of this report is structured as follows:

- Section 2 provides a summary of the October 2016 Final Report on calculating the REC costs;

- Section 3 presents our responses to issues raised in submissions to our report; and
- Section 4 provides a revised calculation of REC costs.

1.3. Summary of revised REC cost estimates

In response to submissions, we have revised our estimated REC costs from the October 2016 Final Report. The following provides a summary of the changes to our benchmark cost estimates:

Retail costs

- Change to meter supply and installation costs;

  The estimated supply and installation costs for meters has been revised to reflect different types of meters (telemetry and non-telemetry) and further cost information regarding supply and installation from *Rawlinson's Australian Construction Handbook.*

- Incorporated meter reading costs for retail services;

  We have incorporated meter reading costs to account for the reading of non-telemetry meters. The estimated cost was based on a quoted price for a water business and information from the electricity industry.

- Incorporated management costs;

  An allowance has been provided for management costs to reflect the resourcing that would be required to manage the retail operations (outsourcing of the service delivery will also require management of contracts and outputs). The estimate was based on our experience in utilities and regulation and an average salary from the Australian Bureau of Statistics.

- Change to call centre costs;

  We have revised our estimate based on additional information provided by a call centre service provider that has previously provided services to the electricity industry. We have also adjusted the assumption about the delivery of the services in the example schemes we estimated REC costs for – Examples 1 and 2 are based on the services being delivered by the management resources and therefore no additional ongoing costs are required, whereas Example 3 is based on delivered by an outsourced call centre service provider.

Reticulation costs

- Changes to the annual operating expenditure for reticulation infrastructure;

  We have revised the annual operating expenditure for reticulation infrastructure to reflect specific lifecycle profiles for different asset types – gravity sewer main, sewer pressure main and water pressure main. We acknowledge that the actual lifecycle cost profile will depend on various factors (such as exposure to traffic, condition of soils, etc.), however in order to provide a more accurate lifecycle profile we have sought to allocate the total operating expenditure over pre-defined stages of the asset's serviceable life.

- Incorporated the cost of PVC pipes;

  We have revised the selection of pipe materials to include PVC pipes up to DN375. In estimating the costs of the example schemes, we have assumed that all pipes up to DN375 will be constructed of PVC. PVC pipe has a lower capital cost when compared with DICL pipe and therefore the estimate has been reduced for this piece of infrastructure.

- Incorporated renewal cost estimates; and

  The previous cost estimates did not incorporate renewal costs, however, in order to provide the costs over the longest time horizon option considered by IPART in its November 2016 Draft Report, we have included renewal costs in our revised cost estimates.

- Changes to the estimates based on construction sequencing.

  We have assumed that the mains are located outside the boundary of the wholesale scheme, typically within the road verge (nature strip). Given this, the estimated capital expenditure for greenfield mains (sewer and water) has been reduced by $12/metre to exclude restoration cost in these scenarios.

Section 3 contains further details on these revisions while section 4 highlights the impact of these revisions on the REC cost estimates.

2. Summary of October 2016 Final Report

In addressing the objectives set out by IPART, the report outlined the results of two key tasks that Oakley Greenwood undertook:

- **Task 1: Benchmarking unit rates for retail and reticulation assets**

  Establish benchmark unit rates for each of the assets that would be required for the different retail and reticulation services to be provided.

- **Task 2: Calculation of costs for example schemes**

  Using the benchmark unit rates from Task 1, the report estimated costs for a REC for each of the following examples:

  - 2,000 20mm equivalent brownfield development;
  - 2,000 20mm equivalent greenfield development; and
  - 10,000 20mm equivalent greenfield development.

2.1. Task 1: Benchmarking unit rates for retail and reticulation functions

The following provides a summary of our approach to estimating the benchmarked unit rates from the October 2016 Final Report.

2.1.1. Meter infrastructure retail services

Regarding metering infrastructure, we assumed that all residential and non-residential facilities will have individual metering, consistent with the requirements of new multi-level strata buildings in Sydney Water's *Multi-Level Individual Metering Guide*. We also assumed that each individual meter that is installed will be 20mm on the basis that all residential customers are required to be provided with a 20mm meter and that the non-residential connections of the REC service provider will be small non-residential customers. In determining the installation cost of these meters, we relied on engineering experience and industry knowledge.

The density (number of meters per km^2) and the overall number of meters in the development, given the sizes being considered in the examples specified by IPART, are unlikely to have a material impact on the unit cost of meters and meter installation.

2.1.2. Non-meter infrastructure retail services

The non-meter infrastructure retail services relate to services such as billing, call centre and back-office services. For these retail services, it is assumed that the REC would have economies of scope by being able to provide these retail services to customers receiving two services (i.e. water and sewerage) for the same cost as receiving one service (i.e. water-only or sewerage only).

Rather than build-up the costs associated with developing the required infrastructure in-house, we assumed that a reasonably efficient new entrant service provider would seek to outsource the delivery of these services. This assumption was driven by both:

- A desire to avoid the likely significant up-front costs associated with establishing billing systems and call centres for retail activities; and
- The fact that there is a nascent market for the outsourcing of these services in the water industry given:

- The experience in the electricity industry has shown that the introduction of competition gives impetus to these service providers (which in-turn enhances competitive entry); and
- It would be expected that providers of these services in electricity can readily develop service offerings for the water industry.

Given the assumption regarding outsourcing, we approached a company that offers these managed retail services to utilities to get a better understanding of the likely services and potential costs involved:

- **Billing services:** A variety of billing services could be provided (depending on level of integration with the utility), a standard billing service would generally be between $2 and $4 per customer per month. The lower end of the range ($2) would represent a larger customer base, while the upper end of the range ($4) would represent a smaller customer base.
- **Call centre services:** Call centre costs for a water and wastewater service provider would generally be less than for an electricity retailer given the fewer customer interactions generated by water and wastewater service providers compared to electricity. For the same reason, these costs would be even less than for a wastewater-only service provider than for a potable-only or a combined water and wastewater service provider. Unlike the billing services, the call centre costs are unlikely to attract a similar discount for higher customer base. We have estimated $4 per customer per month based on a new entrant providing both water and wastewater services.
- **Customer communications:** This relates to material such as leaflets, newsletters and brochures that are distributed to customers to notify them of changes to their service or other general information regarding their water and sewerage services. These costs would generally equate to approximately $1 per customer per month for a small retailer and $0.50 per customer per month for a larger retailer.
- **Other:** There are a number of other services which may be required of a new entrant retailer, such as:
  - Credit and collections;
  - Hosting and maintenance; and
  - Knowledge management and compliance.

  It was expected that these other costs would be relatively small compared to the other services, estimated to be between $0.50 and $1 per customer per month.

Table 1 highlights these estimated costs based on the customer numbers for the examples used in Task 2. These costs per customer relate to either water-only, water and sewerage, or sewerage-only services – that is, the costs do not change if an additional service is being offered.

Table 1: Estimated retail cost to serve in Oakley Greenwood's October 2016 report

Cost item	2,000 customers	10,000 customers
Billing services	$4	$2
Call centre	$4	$4
Outbound customer communications	$1	$0.50

Other	$1	$0.50
$/customer/month	*$10*	*$7*
$/customer/year	*$120*	*$84*

2.1.3. Water reticulation services

In determining benchmark unit rate estimates for water reticulation costs for new entrant water and sewerage service providers, we relied on the "*NSW Reference Rates Manual – Valuation of water supply, sewerage and stormwater assets*" (NSW Reference Rates Manual) published by the Department of Primary Industries – Office of Water in 2014.

Some of the key assumptions and other sources of information include:

- Escalation of historical information has been based on information from the Australian Bureau of Statistics;[1]
- Estimated asset lives are based on the *Water Supply Code of Australia*;
- Reticulation pipes are assumed to be installed at a minimum depth as per the *Water Supply Code of Australia* (typical 600-750mm, laid in roadway);
- Average annual operating expenditure has been assumed based on the estimated lifecycle costs for the assets;
- For brownfield installation costs a moderate construction difficulty level has been assumed, the additional cost of which is based on information from the *NSW Reference Rates Manual*; and
- Operating expenditure estimates are based on median figures provided in the *2014/15 NSW Water Supply and Sewerage Performance Monitoring Report* from the Department of Primary Industries.

2.1.4. Wastewater reticulation

The benchmark unit rates for wastewater reticulation were separated into gravity-based infrastructure and pressure-based infrastructure.

The approach that we used in estimating these benchmark unit rates was largely the same as that outlined above in section 2.1.3 for water reticulation infrastructure. The following highlights the key exceptions in our approach:

- Estimated asset lives for sewage pump stations are based on the *Sewage Pumping Station Code of Australia*;
- Pressurised wastewater reticulation pipes are assumed to be installed as per the *Sewerage Code of Australia* (typical 600-750mm, laid in roadway); and
- Gravity-based wastewater reticulation pipes are assumed to be installed as per the *Sewerage Code of Australia* (typical 1.5m to 3.0m, laid in roadway).

1 *Australian Bureau of Statistics, Publication 6401.0 - Consumer Price Index*, Australia Table 1 - Sydney

2.1.5. Variations within the benchmark unit rates

The report provided an overview of potential variations in the benchmark unit rates.

- **Economies of scale**

  There is likely to be economies of scale issues arising between brownfield and greenfield schemes. This is because brownfield schemes generally have a higher density and easier access to the main network, whereas greenfield schemes generally have a lower density and are further away from the main network. This is likely to impact on the infrastructure required for the different schemes and is an issue that will need to be considered in light of estimating a system-wide price.

  Higher density development may reduce the costs per installation for metering infrastructure, but there are several other variables that also impact these costs, and this makes it difficult to be definitive about the full and final effect of increased scale on unit costs across developments of different sizes. For example, higher density development may reduce the length of reticulation pipe required, but it may also require a larger pipe size which has a higher unit cost. This makes it difficult to quantify any impact of higher density development on reticulation benchmark unit rates.

  Conversely, pumping station costs (when required) are unlikely to be impacted as the sizing of the pump station will be independent of the density.

  Per-customer non-meter retail costs such as billing services, outbound customer communications and other general services, by contrast, are likely to reduce with increased scale. This is because there is a degree of fixed cost involved in these services which is reduced on a per-customer basis as it can be recovered from a larger total number of customers.

- **Economies of scope**

  We were advised by the managed service provider that the costs for providing billing services for either water-only, wastewater-only or a combined water and wastewater service would be the same (assuming the same number of customers). Thereby demonstrating economies of scope by being able to purchase billing services for two industries for the price of one. Similarly, there are economies of scope in call centre costs for providing wastewater services in addition to water services as the additional call centre costs for wastewater services would be expected to be lower.

  There may also be economies of scope for reticulation infrastructure where a single civil contractor can install multiple service assets (such as water, wastewater, stormwater, etc.). However, as noted above, there are many other factors that would also influence this cost.

- **Topography differences**

  Topography is unlikely to have an impact on the benchmark unit cost for water reticulation or pressure-based wastewater infrastructure. On the assumption that any pumping stations or reservoirs are above-ground structures, variations in topography are unlikely to have an impact on the benchmark unit costs however, it may have a minor impact on the quantity and the equipment selection for pumping stations and reservoirs depending on the development layout and design (e.g. if pump station is located on low-ground, the pump may require a slightly bigger unit to discharge to the main, but we would expect the overall impact of this to be minor).

Topography is likely to have an impact, however, on the unit cost of gravity-based wastewater reticulation as cost of installation increases with the depth of installation. The sewer gravity main would need to have a deeper average depth in flatter terrain compared to undulating terrain. Depending on the installation depth of the sewer gravity main, the unit cost could be 2 to 3 times higher for a depth of up to 4.5m.

- **Geotechnical differences**

  In terms of reticulation infrastructure, ground conditions such as rock excavation, contaminated soil, water-charged ground and bearing capacity are likely to have an impact on the unit cost. Encountering rock in trench installation can increase the cost by 20 per cent to 5 times, depending on the hardness and level of the rock in the pipe trench.

  On the basis that the sewer pump station is a wet well (typically 5m to 10m deep), ground conditions such as rock excavation, contaminated soil, water-charged ground and bearing capacity are also likely to have an impact on the unit cost.

- **Regional differences**

  For non-meter retail estimates, we do not consider there would be any material difference in providing the services in either Sydney or Hunter regions. This is because we have adopted an approach that assumes these services are provided by an external service provider and the services do not require this external service provider to be located in any particular region.

  In terms of the reticulation and meter-based benchmark unit rates, we consider that the public data that has been relied on to provide the estimates is not accurate enough, or sensitive enough, to distinguish between the Sydney and Hunter regions (i.e. the margin for error in the estimates is greater than the difference between the two regions).

2.2. Task 2: Calculation of costs for example schemes

The report also applied the benchmark unit rates identified in Task 1 to a set of example wholesale customer schemes. For the purposes of this exercise we used three examples that were provided by IPART:

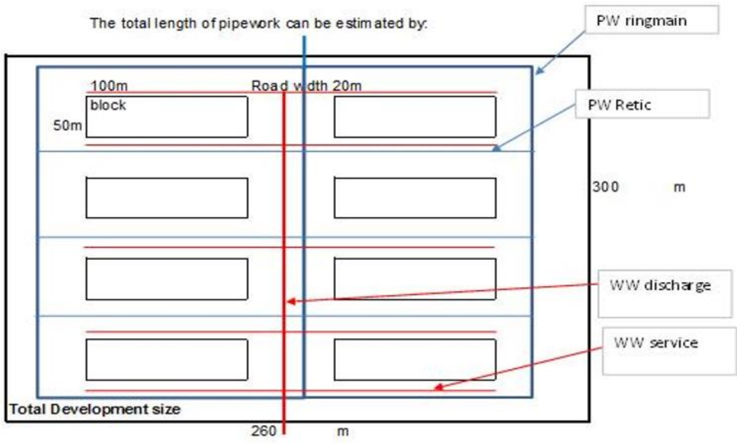
- **Example 1:** 2,000 20mm equivalent brownfield development;
- **Example 2:** 2,000 20mm equivalent greenfield development; and
- **Example 3:** 10,000 20mm equivalent greenfield development.

The following provides a summary of the analysis and findings of these three examples. A further breakdown of the calculations is contained in Appendix B.

2.2.1. Example 1

In considering a brownfield development, we assumed a lesser land size and a medium to high density zoning to accommodate the proposed development. Figure 1 provides the layout that we assumed for Example 1.

Figure 1: Assumed layout for Example 1



Requires one of the above typical layout for 2,000 Brownfield properties

The October 2016 Final Report set out detailed assumptions regarding the quantity of pipework and infrastructure required based on the size of the development, block sizes, road reserves and the portions of built-up area per lot. It was assumed that a single pipe from the incumbent main would be required, however a water booster pump station would not be required. A single sewer discharge from the development site to the incumbent network was assumed with one service connection per apartment block. Further details on these assumptions can be found in section 4.2.

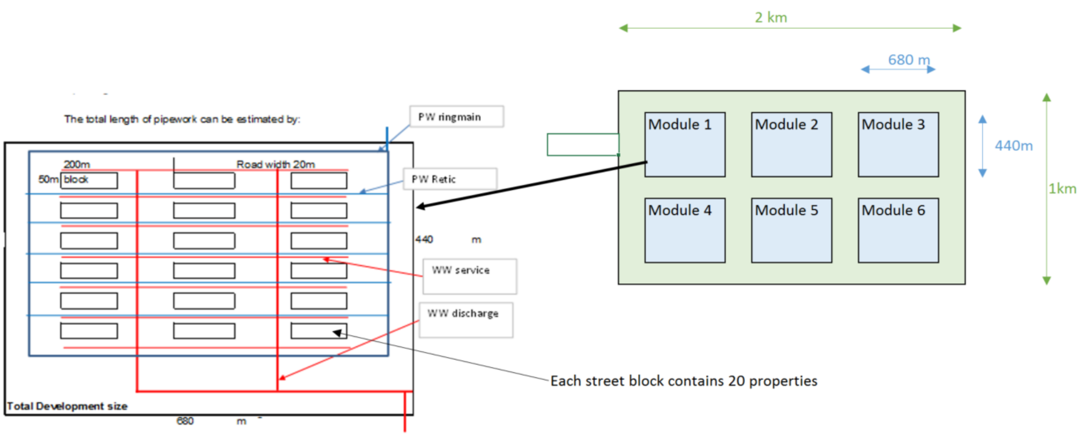
Based on these assumptions, we estimated the costs of a REC to service Example 1 to be:

- **Total Capital Expenditure: $2,813,341**
- **Annual Operating Expenditure: $252,080**

2.2.2. Example 2

Example 2 was based on the same volume of connections as Example 1, however it is a greenfield development and therefore we assumed larger land size and low density zoning. Figure 2 provides the layout that we assumed for Example 2.

Figure 2: Assumed layout for Example 2



Typical module size shown above.
For total 2,000 greenfield properties, a total of 6 modules required

The October 2016 Final Report set out detailed assumptions regarding the quantity of pipework and infrastructure required based on the size of the development, block sizes, road reserves, and the split between residential and commercial properties. It was assumed that a single pipe from the incumbent main would be required, however a water booster pump station would not be required. A single sewer discharge from the development site to the incumbent network was assumed with one service connection per property. Further details on these assumptions can be found in section 0.

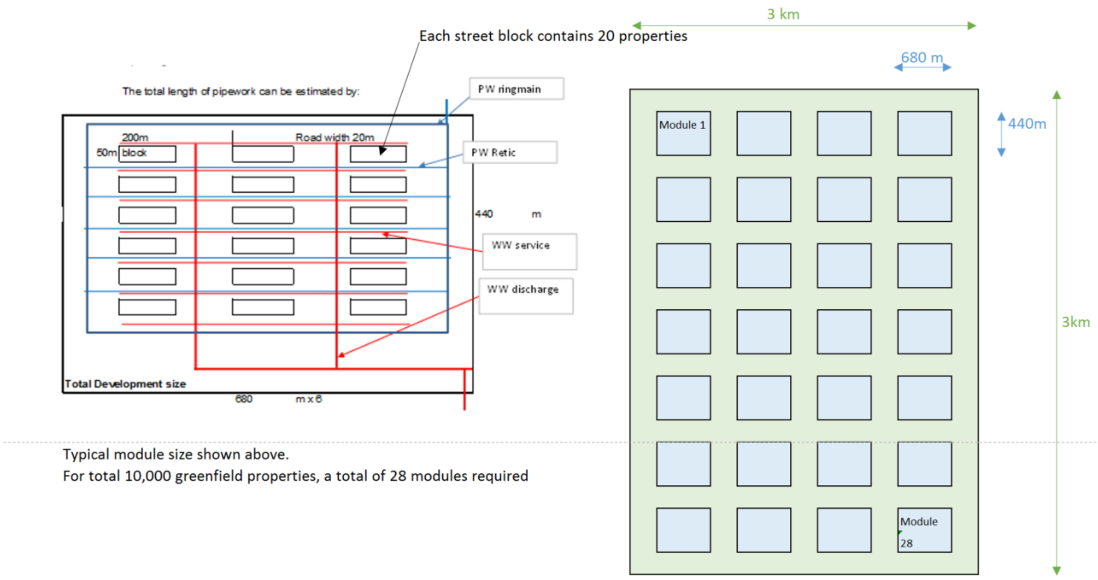
Based on these assumptions, we estimated the costs of a REC to service Example 2 to be:

- **Total Capital Expenditure: $31,816,214**
- **Annual Operating Expenditure: $581,880**

2.2.3. Example 3

Example 3 was a larger greenfield development within which we assumed larger land size and low density zoning. Figure 3 provides the layout that we assumed for Example 3.

Figure 3: Assumed layout for Example 3



The October 2016 Final Report set out detailed assumptions regarding the quantity of pipework and infrastructure required based on the size of the development, block sizes, road reserves, and the split between residential and commercial properties. It was assumed that a single pipe from the incumbent main would be required, with two water pumping stations and a water reservoir required to supply the whole development. Two sewer discharges from the development site to the incumbent network was assumed with one service connection per property. Further details on these assumptions can be found in section 0.

Based on these assumptions, we estimated the costs of a REC to service Example 3 to be:

- **Total Capital Expenditure: $135,176,670**
- **Annual Operating Expenditure: $2,621,970**

3. Response to submissions

3.1. Definition of services covered and infrastructure included

In reviewing the submissions and discussions with IPART staff, we have sought to further define the services and/or infrastructure that are captured in our estimate of the REC costs. The following considers the services and/or infrastructure covered by both retail and reticulation services and whether the associated costs can be estimated and included in our recommended REC costs of retail and reticulation functions.

3.1.1. Retail services

Our definition of retail services includes two categories of services:

- Meter retail services and
- Non-meter retail services

Defining meter retail services

No submissions were received regarding the definition of meter retail services; therefore, our definition has not changed from the October 2016 Final Report - the provision and installation of meters.

Defining non-meter retail services

In the October 2016 Final Report, we outlined that the estimated costs for non-meter retail services was based on information provided by a service provider for the following services:

- Billing services;
- Call centre services;
- Customer communications;
- Other services:
  - Credit and collections;
  - Hosting and maintenance; and
  - Knowledge management and compliance.

Stakeholder submissions identified some additional services that could be considered part of a REC providing a retail service:

- Meter reading;
- Customer account management; and
- Bad debts.

We have considered meter reading and bad debts further in section 3.3.3, whereas we consider customer account management to be captured within the 'other services' category outlined in the October 2016 Final Report.

3.1.2. Reticulation services

We defined water reticulation services as the pipework downstream of a distribution reservoir. The mains are generally sized between DN100 and DN375 and transfer water from a reservoir to property service connections.

Sewer reticulation services are defined as the pipework conveying waste from property service connections (at the source) to a trunk sewer main and then on to a point of treatment (or connection to the town sewer main). These services are generally sized between DN100 to DN300.

In estimating the costs for the example schemes, we adopted a holistic approach to the scenario – to identify the physical infrastructure that would be required to provide the water and sewerage services to customers in the example scheme. We have therefore sought to identify where certain infrastructure may not be required of the REC in providing the services, such as:

- Infrastructure that may be an upstream requirement of the REC (and therefore provided by the wholesale service provider – Sydney Water or Hunter Water); and
- Infrastructure that is dependent on scheme configuration and location.

Our approach in estimating the physical infrastructure requirements for each of the scenarios is based on the following:

- Greenfield development has been assumed to be low density residential zoning. As such the required development land size would be substantially larger than brownfield development (assumed to be medium dense).
- Based on the assumed layout of example schemes 2 and 3 as set out in section 2.2 and the assumptions outlined in section 4, a sewer pumping station was included to minimise the installation depth of the sewer gravity main. If the sewer pumping station was to be excluded, the installation of the sewer gravity could have a maximum depth of up to 8-10m (approx.) at the downstream end, and would increase the difficulty in identifying tie-in point(s) to the downstream sewer mains (the wholesale service provider's network).
- For greenfield developments (examples 2 and 3), a water pumping station and reservoir have been included in the cost estimate due the scale of the development, based on:[2]
  - The existing bulk supply network (town main) would likely not have sufficient capacity to supply the proposed development. Water reservoirs are generally required within the water reticulation network to enable balancing of water supply during peak demand as well as for maintenance purposes such as partial shutdown of the water network for repairs and inspections.
  - Water pumping stations are generally required to pump the bulk water to the water reservoir for re-distribution. Due to the nature (greenfield) and scale of the development, it is unlikely that the existing bulk water supply network will have sufficient pressure to supply the water to the reservoir.

3.2. System-wide estimate v. granularity

3.2.1. Issues raised in submissions

The Lendlease Living Utilities' submission considered that the proposed mechanism could be improved through specifying a range of 'minus factors' so that the wholesale prices are able to take account of a wider range of cost conditions rather than specifying a single, system-wide minus factor.

2 As outlined above, and discussed further in section 4.5, we have adopted a holistic approach to considering the likely requirements for servicing the example schemes provided by IPART. In some cases, this is likely to result in potential upstream costs to the wholesale service provider. These costs have not been included in the estimated cost to the REC of providing retail and reticulation services but have been identified for completeness.

3.2.2. Response to issues

When estimating benchmark or average/typical costs such as this, there is always a trade-off required between accuracy, time and data availability. This results in two broad approaches:

- **System-wide estimates:** An aggregated approach to estimating, generally based on average costs for the entire region. This is the quicker and simpler approach; however, it is not able to take account of differences that may arise between different situations.
- **Granular estimates:** A granular approach that results in multiple cost estimates based on different variables that impact the cost to serve. This approach has more extensive data requirements and generally requires more time to undertake.

Our scope for the engagement was to provide costs that could be used in calculating system-wide retail-minus REC prices. Based on this, we have developed average benchmark costs based on a system-wide approach.

Based on our experience in developing the system-wide estimates, we think it is unlikely that there will be robust information available regarding each of the different variables that would be required to develop more granular estimates that account for differences such as location, topography, geology, etc. Developing more granular cost estimates would therefore require a considerable number of assumptions and would therefore introduce additional subjectivity in the process.

We acknowledge that the cost estimates provided will not be appropriate for all situations, however, we do not think it is feasible to establish pre-determined estimates (or ranges) that would cover all likely scenarios. Given this, we have not developed more disaggregated system-wide REC costs of retail and reticulation functions.

3.3. Retail operating costs

This section provides further details behind our approach to estimating the retail operating costs, additional information regarding some of the cost categories that were estimated in the October 2016 Final Report and additional cost categories that were not considered previously.

3.3.1. Context for estimating the REC costs

To provide further context to our approach to estimating the REC costs in providing retail services, we have assumed that the REC will be a completely new entrant that is not servicing any other region or providing any other services that may be related to water and sewerage services. By servicing other regions or providing other services, a new entrant may have varying degrees of efficiencies that it could achieve. The level of these efficiencies is highly variable and completely dependent on the individual circumstances of the new entrant and therefore does not lend itself to a system-wide approach to pricing. As outlined in section 2.1.2, the REC cost estimates are based on the provision of retail services for water-only, water and sewerage, or sewerage-only service as these costs do not change due to the number of services that retail functions are being provided for.

3.3.2. October 2016 Final Report estimated retail operating costs

In its submission to IPART's Draft Report, Hunter Water stated that its internal cost estimates for retail activities (customer contact, billing and collections) are around $30 per customer per annum for water, sewerage and stormwater services. The October 2016 Final Report's benchmark operating cost estimates for retail activities are $84 per customer per annum[3] – nearly three times higher than Hunter Water's actual retail costs.[4]

Sydney Water stated that the estimated retail operating costs are 3.8 times higher than Sydney Water's estimated average cost of approximately $22 per customer. Sydney Water provided a breakdown of its estimated average cost (shown in Table 2).

Table 2: Comparison of cost estimates ($/customer/year)

Cost item	Reasonably Efficient Competitor	Sydney Water	Difference
Billing services	24	3.4	20.6
Call centre	48	4.7	43.3
Outbound customer communications	6		6.0
Meter reading		4.3	-4.3
Payments and debt recovery		7.3	-7.3
Customer account management		2.1	-2.1
Other	6		6.0
$/customer/year	*84*	*21.8*	*62.2*

In considering these issues, we have separated the call centre services from the other back-office services. This separation is based on the higher number of call centre service providers than back-office service providers, thereby allowing for a potential separation of the service provision. We have also considered more general issues, such as economies of scale and the size of the outsourcing market, that may impact on the differences between the October 2016 Final Report estimate and the estimates provided by Sydney Water and Hunter Water.

Economies of scale in providing retail services

One of the key reasons that the retail cost to serve for small new entrant REC would be higher than that of the incumbent service providers is the economies of scale benefits that would likely arise through higher customer numbers. No publicly available studies have been undertaken into the differences in retail cost to serve from the size of service providers in the water industry. We have therefore considered the electricity industry where studies have been undertaken into the retail operating costs to serve. This has been driven by the fact that this industry is a more mature industry in relation to retail competition.

3 The October 2016 Final Report estimated non-meter retail costs of $84 to $120 per customer per annum and IPART adopted the $84 in its Draft Report.

4 Hunter Water, *Response to IPART: Draft Determination and Draft Report on Prices for Wholesale Water and Sewerage Services*, 7 December 2016, p.7.

We reviewed two recent studies for the electricity industry:

- Australian Energy Market Commission (AEMC): 2016 Retail Competition Review; [5] and
- Queensland Competition Authority (QCA): Regulated Retail Electricity Prices for 2016-17. [6]

Further details on these reviews is contained in Appendix A. The key points arising from these studies is that electricity and gas retailers view economies of scale as important, however there does not appear to be a material difference in the overall retail costs (including margins) based on the size of a retailer once they have reached at least 150,000 customers.

Given this we consider that economies of scale are important to retailers, however the size of the benefits from economies of scale will depend on the overall size of the REC. The larger the REC, the smaller the impact of economies of scale; whereas the smaller the REC, the greater the impact of economies of scale. Thereby having a customer base of only 10,000 is likely to result in higher average cost to serve than those with a much larger customer base as it is quite a small number of customers overall.

Size of the market for outsourced retail services

As outlined in the October 2016 Final Report, the costs of establishing retail operations in-house for a new entrant REC are likely to be significant. Therefore, we considered that the more appropriate approach for any REC of the size nominated by IPART was to outsource the provision of these services and therefore avoid potentially significant capital expenditure.

The size of the market for providing outsourced retail services will likely have an impact on the prices that would be charged to any new entrant:

- A smaller market will have limited competition and therefore less downward pressure on prices; while
- A larger market will likely have competitive forces that place downward pressure on prices.

It is therefore important to consider the market in which a new entrant will likely be entering when determining the potential costs a REC would incur in delivering retail services via an outsourcing approach.

Based on discussions with industry and other research, we believe there is only one service provider offering comprehensive customer contact, billing and back-office retail services for the water industry in Australia (with some additional service providers located overseas, but none are currently providing services within Australia). This means that if a new entrant was seeking to obtain a 'packaged' deal from an outsourced service provider, it would be exposed to a small market which may impact on the price that can be negotiated.

Any service offering would be required to be equal to, or less than either:

- The required capital and operating expenditure to develop in-house capabilities;
  - IT capabilities;
  - Training;
  - Resourcing; and
  - Licence fees for required software.

5 Australian Energy Market Commission, *2016 Retail Competition Review*, Final Report, 30 June 2016, Sydney.

6 Queensland Competition Authority, *Regulated Retail Electricity Prices for 2016-17 - Final Determination*, May 2016.

- A competitor's offer.

Given that there is only one active outsourced service provider for the water industry, there is no direct offer that they are competing with.[7] Therefore the key consideration for any price offering from an outsourced service provider is to ensure that the offering is below the costs that a REC would incur in developing the capabilities in-house. It is for this reason that sought further information from the services market and considered separating the service offering between:

- Call centre services; and
- Back-office services.

Call centre services

The October 2016 Final Report provided an estimated cost of call centre services of $4 per customer per month (equating to $48 per customer per annum). This was based on information provided by an outsourcing service provider.

The estimated cost used in the October 2016 Final Report was based on a cost per customer that was broken down into monthly components, rather than reflecting the costs per call to the call centre. This cost would be incurred regardless of the number of calls made to the call centre.

The most significant variation in the costs in the October 2016 Final Report and those provided in Sydney Water's submission was the estimated call centre costs. Based on further consideration, we decided to separate the approach to providing call centre services based on the size of the example schemes:

- Example 3: Outsourced due to number of calls likely to be received; and
- Examples 1 and 2: Undertaken internally due to small number of calls likely to be received.

Example 3

Given the significant variations in estimates and the fact that a market for outsourced call-centres is well established we sought additional information from call-centre only service providers. In response to a number of queries, we obtained a quote from a call centre service provider that had provided call centre services to the electricity industry. In order to ensure it was a meaningful quote, we were required to make a number of assumptions, such as:

- Number of calls to be received through the call centre
  - we have used the proportion of calls to number of customers for Sydney Water in 2015-16 – 39.5%.[8] This would appear to be a reasonable estimate for converting customers to calls received. This equated to 3,950 calls per annum for Example 3.
- Calls would need to be answered 24 hours a day, 7 days a week. The proportion of calls to be received during and after working hours
  - 80 per cent of calls during standard working hours (9am to 5pm); and
  - 20 per cent of calls after standard working hours (including weekends).

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7 This is not to say that there may not be competition from separating services or potential new entrants.

8 Sydney Water received 752,000 calls from its 1,900,000 customers in 2015-16 (Sydney Water, *2015-16 Annual Report*, p. 53).

- Call centre staff would need to be able to access customer billing records, confirm or correct customer information, answer simple queries, refer more difficult questions back to the company for a resolution and log the nature and outcome of each call in a format that can be associated with the customer's billing records; and
- An expectation that calls would generally average 2-3 minutes each

The service provider offered the following ongoing pricing options given the proposed assumptions and requirements:

- Full service (allowing for full coverage – 1 agent available at all times): $58.08 per customer per annum; and
- IVR service (use of Interactive Voice Response to direct calls after hours): $15.45 per customer per annum.

Based on feedback from the service provider and the likely number of calls after hours, we consider that the IVR service option would be the preferred option for an REC. The price for the IVR option was based on:

- 1 contact centre agent available during working hours (Monday to Friday, 9am to 5pm);
- Team leader for 2 hours per day;
- Telephony licensing costs; and
- Account management costs.

In addition to the ongoing costs, there would be initial costs involved in setting up the service. The quoted price for this was $11,914 for both options. These costs were based on:

- Recruitment costs;
- Agent and team leader training;
- Account management and program set-up; and
- Telephony set-up and integration.

This information resulted in an estimated cost for the initial year of $166,441, with an ongoing annual cost of $154,527. In calculating revised estimates, we have relied on this new information as it is more granular and specific to the actual call centre costs that a REC is likely to incur.

Examples 1 and 2

Using the same assumptions regarding the proportion of call centre calls to the number of connections, Examples 1 and 2 would result in only 15 calls per week (790 calls per annum). Given this low number of interactions, we consider it appropriate that the resources within the management allowance (see further below) would be able to respond to these customer enquiries. We have therefore not provided a separate allowance for call centre costs for Examples 1 and 2.

We do however consider that the set-up of an Interactive Voice Response process would be appropriate as it will be able to screen calls after hours, with only important calls then answered by the management resources. Based on information provided by the call centre service provider we have estimated the initial set-up of this process to be $1,900 for both Examples 1 and 2.

Back-office retail services

The October 2016 Final Report estimated that the cost of providing the additional retail services (which we have termed, back-office retail services) would be $36 per customer per annum. As outlined above, we separated the call-centre service from the back-office services in order to obtain, and consider, further information from the separate markets. We have therefore sought information from an outsourcing service provider that offers similar back-office services to the electricity industry.

While the retail services of the electricity and water industries do have differences, there is a degree of overlap whereby the information from the electricity industry can be used at least as a guide to sense-check the estimates from the October 2016 Final Report. We obtained a quote from a service provider offering these services to small electricity retailers. The quote provided an aggregated price based on the following services (note that this does not include call centre services):

- Back-office fees:
  - Customer management;
  - Credit checking;
  - Billing and payment management;
  - Product and contract management;
  - Standing data and metering data management;
  - Service order management;
  - Settlements management;
  - Reporting management;
  - Task management;
  - Collections management; and
  - GSL payments management.

We note that there are some functions that would not be required by the water industry (such as settlements management) and we would also expect that the requirements for an electricity retailer would be greater than a water retailer. Based on this we would expect the price for water retail services to be less than the price for electricity retail services.

Table 3 provides the prices for this service offering based on the number of customers held by the retailer. The quote was from late-2015, therefore while not current, we would not expect the prices to change significantly. It can be seen from the table that the quote incorporates economies of scale for customer numbers, however any benefits in pricing are not material until the business has 50,000 customers.

Table 3: Variations in price based on customer numbers

Customer Numbers	Base cost per annum	Additional cost per month	Cost per annum*
0 to 25,000	$21	$1.75/month	$42
25,001 to 50,000	$20	$1.67/month	$40
50,001 plus	$18	$1.50/month	$36

* - This assumes that the customer is for 12 months

Given that the example schemes considered through this engagement have 10,000 customers or less, this equates to the first category of pricing - $42 per annum per customer. The comparable estimate from the October 2016 Final Report is $36 per customer per annum (this is $84 less $48 for call centre services).

It is not known how much of the estimated price should be attributed to factors that are not relevant to the water industry, however given the estimate is approximately 15 per cent below the electricity price, we do not consider the estimated cost for these services in the October 2016 Final Report to be unreasonable.

3.3.3. Additional retail operating costs

In addition to the retail operating costs identified in the October 2016 Final Report, we have also considered further cost categories that may impact on a REC. The following provides our view on additional cost categories: meter reading, bad debts and management costs.

Meter reading services

As identified in the submission from Sydney Water, meter reading costs were excluded from the estimate in the October 2016 Final Report. This was an oversight in estimating the retail operating costs for a REC.

As discussed further below in section 3.4.2, we have assumed that the type of meter installed will depend on the type of development being considered. For greenfield developments, we have assumed telemetry meters will be installed and therefore no meter reading costs have been added to the retail operating costs (it is assumed that the meter data information will be stored with the outsourced service provider). Whereas for brownfield developments, we have assumed that non-telemetry meters will be installed, and therefore manual meter reading costs will need to be incorporated.

We sought information from multiple sources regarding the costs of reading meters. We received a 2015 quote for a water retailer for quarterly meter reads that indicated these costs were $0.61 per read (equal to $2.45 per annum per meter).

In addition to this we also sought information on meter reading costs for electricity meters. These estimates are for Type 6 (accumulation) meters, which are likely to require similar reading activities as would be encountered for water meters in brownfield areas. However, per read costs for a water business would more than likely be higher than those for an electricity business because a higher proportion of water meters require the reader to gain access to the property in order to read the meter.

Table 4: Type 6 meter reading costs per year[9]

Energy business	Meter reading costs
Ausgrid	$3.18
Endeavour Energy	$2.00
Essential Energy	$0.70[10]

Based on this analysis we would expect a REC would incur meter reading costs of between $2 and $3 per meter per annum. For the purposes of estimating the costs for the example schemes, we have used the mid-point of $2.50 per meter per annum which generally equates to the quote previously received by the water retailer. This is less than the estimate provided by Sydney Water in its submission, however Sydney Water's cost estimate (of $4.30 per customer per annum) may also include other meter data costs, such as data management, which we have assumed to be part of 'other services'.

An REC that is already undertaking meter reading activities (or purchasing meter reading services) may be able to achieve a cheaper cost per customer due to economies of scale (or scope if reading other types of meters). However, given the already low level of the cost it is unlikely to have a material impact on the overall cost to serve.

Incorporation of bad debts

The October 2016 Final Report did not provide any explicit allowance for the cost of bad debts for a REC. The Lendlease Living Utilities' submission put forward that there should be an explicit allowance and referred to a recent report undertaken by Ofwat on the costs and benefits of introducing competition to residential customers in England.[11] The report notes that bad debt costs for water utilities in England currently stand at 44 per cent of the total retail costs, equivalent to 22 per cent of total revenue. In comparison, the Ofwat report states that the equivalent number for the electricity industry is 4 per cent.

This information, does not provide any meaningful information to estimate the likely size of bad debts for a new entrant REC in the New South Wales water industry. There is a wide variety of reasons to why the estimate from England will not be relevant to this review, including:

- Billing practices;
- Payment plans that are offered;
- Relative size of the water and sewerage bills;
- Disincentives for non-payment; and
- Cultural views in relation to payment of water bills.

9 Ausgrid, *Type 5 & 6 metering services proposal - Attachment 8.15*, May 2014, p. 27.

10 Based on the report, it would appear that Essential Energy may have different cost allocation processes which result in a considerably low estimate compared to other providers, it is not clear why this is the case, it may be driven by factors such as 'self-reads'. Given Essential Energy's service territory - predominantly rural and low density - it would be expected to have a higher meter reading cost than other energy businesses in NSW. We have therefore excluded this number when considering an appropriate meter reading cost for a REC.

11 Ofwat, *Costs and benefits of introducing competition to residential customers in England*, 2016, pp. 20-21.

Based on the above factors, we do not believe that the information from the water industry in England in relation to bad debts can automatically be applied to the NSW context.

Water and sewerage service providers should be funded for an efficient level of bad debts when providing the service. The IPART regulatory framework does not appear to provide an explicit allowance for bad debt in the revenue requirement, however there are two elements of the framework to consider:

- Non-revenue water; and
- Equity Beta.

As noted in IPART's Final Report on Sydney Water's retail prices, non-revenue water includes (among other items), water associated with real system losses (i.e. leakage), unauthorised consumption, and unbilled unmetered consumption (e.g. for firefighting). The costs associated with both billed metered demand and non-revenue water are recovered through the water prices paid by billed metered customers.[12]

This unauthorised consumption would reflect theft of water and water that had not been paid for (bad debts essentially) and is identified as a cost to the service provider as it was required to purchase the water from the bulk service provider and has not received payment from the customer. The greater the loss of water (either through unauthorised consumption or leakage), the higher the retail water price for customers. This means that the cost of water being consumed but not paid for is already incorporated into the retail price.

In addition to this, we also consider that the equity beta used to calculate the rate of return (the weighted average cost of capital) implicitly captures the risks that the network businesses are exposed to regarding non-payment. The equity beta assumed for the regulatory benchmark WACC applied in the recent retail price reviews for both Sydney Water and Hunter Water (0.7) implies that they face the same level of systematic risk as a typical water agency. It could be assumed that this level of systematic risk includes the exposure to bad debts for the water industry and therefore has already been factored into the retail prices.

If the same assumptions are used in calculating the retail-minus wholesale price (losses and cost of capital), then we would expect that an implicit allowance for bad debt is incorporated within the calculation and therefore no additional adjustment for the wholesale customer regarding bad debts is appropriate.

Management costs

In considering the requirements for the provision of retail services, it would be reasonable to assume that there would need to be resources to manage the delivery of the services – even if a number of the operations had been outsourced. This was not factored into the estimates for the October 2016 Final Report, however we think it appropriate to include in the revised estimates.

12 Independent Pricing and Regulatory Tribunal, *Review of prices for Sydney Water Corporation from 1 July 2016 to 30 June 2020 - Final Report*, June 2016, p.137.

We have estimated that a small REC, such as those considered in the example schemes, would require two staff under the smaller schemes (Examples 1 and 2), however an additional resource would be required for the larger scheme (Example 3) based on increased requirements and outputs. While there is an increase in resourcing requirement, we would expect that there would be economies of scale in the management costs as the REC serves higher numbers of customers. The average annual salary for a utilities worker in Australia in 2016 was $90,184.[13] The salaries of management personnel for an REC may be above the average salary, however for the size of the example schemes being considered we consider that the average salary is appropriate.

In addition to the cost of labour, it would be expected that there would be corporate on-costs required. Based on our experience in reviewing expenditure proposals for regulated utilities, we have assumed a corporate on-cost of 15%. We consider this to be a reasonable amount that would allow for the REC to cover corporate costs associated with the labour resources.

This results in an estimated cost of:

- $207,423 for Example 1 and Example 2; and
- $311,135 for Example 3.

As outlined earlier, we have assumed that the REC will be a completely new entrant, however if the REC was already servicing another region, or providing other services, this would likely have an impact on the required management resources. A pre-established entity will have access to resources and be able to apportion resources between services and potentially have lower management costs.

Conclusion

Based on our review of retail cost to serve, we consider it entirely appropriate that a completely new REC providing retail and reticulation services to small numbers of customers will have a higher retail cost to serve than the average costs for Sydney Water and Hunter Water providing retail services. The submissions raised a number of issues which we have considered in further detail, the following provides a summary of those issues and any changes to our previous findings:

- **Call-centre costs:** We have revised our estimate based on additional information provided by a call centre service provider that has previously provided services to the electricity industry. We have also adjusted the delivery of the services – Examples 1 and 2 will be delivered by the management resources and therefore no additional ongoing costs are required, whereas Example 3 will be delivered by an outsourced call centre service provider.
- **Back-office costs:** We have not revised our estimate for back-office costs as we consider these to be reasonable when compared to information from another service provider from the market;
- **Meter reading costs:** We have incorporated meter reading costs to account for the reading of non-telemetry meters. The estimated cost was based on a quoted price for a water business and information from the electricity industry.
- **Bad debt costs:** We have not revised our estimate to explicitly allow for bad debts as we consider that the framework already implicitly provides an allowance for bad debts; and

13 Australian Bureau of Statistics, *6302.0 Average Weekly Earnings, Australia*, Series A84977843V.

- **Management costs:** We have incorporated management costs to reflect the resourcing that would be required to manage the retail operations (outsourcing of the service delivery will also require management of contracts and outputs).

In terms of the example scenarios, these changes have resulted in the following revised estimates:

- **Example 1:** The revised retail operating cost estimate for a REC servicing 2,000 customers in a brownfield development is $358,323 in the initial year and $356,423 per annum ongoing. This is compared to $240,000 from the October 2016 Final Report.
- **Example 2:** The revised retail operating cost estimate for a REC servicing 2,000 customers in a greenfield development is $353,323 in the initial year and $351,423 per annum ongoing. This is compared to $240,000 from the October 2016 Final Report.
- **Example 3:** The revised retail operating cost estimate for a REC servicing 10,000 customers in a greenfield development is $837,549 in the initial year and $825,635 per annum ongoing. This is compared to $840,000 from the October 2016 Final Report.

3.4. Retail metering costs

3.4.1. Issues raised in submissions

The October 2016 Final Report estimated metering costs at $500 per meter for the supply and installation of meters. Hunter Water submitted that IPART's 2016 retail determination set its 2016-17 miscellaneous charge for water service connection is $128 (up to and including 25mm water meters) and it therefore considers that halving the $500 benchmark estimate would give a more realistic assessment of reasonably efficient costs.

Sydney Water was of the view that the unit rate assumed for the water meter capital cost ($500 per 20mm meter per customer) seems very high. Sydney Water's cost is approximately one-fifth the unit rate assumed (less than $100).

3.4.2. Response to issues

Having reviewed the relevant section of Hunter Water's pricing proposal for IPART's 2016 review of Hunter Water's retail prices (appendix M), the $126 service connection charge from Hunter Water appears to be based on the administrative costs and does not reflect the actual installation cost (i.e. supply of meter, pipework and connection). The description of the fee states that a separate charge is payable to Hunter Water if Hunter Water is to perform the physical connection.

The time required to install the pipework (in preparation for the meter to be installed) may vary depending on the pipe set up/access requirements and number of meters to be installed at a time. The installation of multiple meters in one work package may also provide additional savings.

Our estimate for the costs of supplying and installing a remote water meter is based on the *Rawlinson's Australian Construction Handbook.* This reference provides estimates for these costs for different regions, however it should be noted that some estimates are not reflective of the costs that we are seeking to estimate. The estimate for Sydney is based on administration costs only and does not reflect the supply and installation costs, therefore we considered the Melbourne region as an appropriate proxy. The Melbourne region estimate was based on supply and installation costs and was estimated to be approximately $450 per meter.

To test this estimate we have also taken a bottom-up approach to develop an alternative estimate:

- **Supply:** We have assumed that a telemetry meter will cost $200 per unit for a 20mm meter (based on Sydney Water's rate); and[14]
- **Installation:** Based on the *Rawlinson's Australian Construction Handbook,* the average plumber's hourly charge rate in Sydney is $95-$110. Assuming an average call-out charge of $70 and an installation time of two hours, this equates to $240-$290.[15]

Our bottom-up approach to estimating the supply and installation costs results in a range of $440-$490 depending on whether a call-out charge is required. Given that the installation of these meters is likely to be undertaken in groups, it would be appropriate to assume that it would be at the lower end of the range (as the call-out charge may not always be applicable). Based on this, we consider that the estimate for the Melbourne region from the *Rawlinson's Australian Construction Handbook* is appropriate.

In estimating the cost of the meter, we have assumed that a telemetry 20mm meter will be installed for greenfield locations and a non-telemetry 20mm meter will be installed for brownfield. This is because the benefits of telemetry are more likely to be realised in a greenfield development than a brownfield development. As outlined above, we have assumed that a telemetry meter will cost $200 per unit for a 20mm meter (based on Sydney Water's rate).[16] A non-telemetry meter is assumed to cost $70 per unit for a 20mm meter.

The total estimated cost is therefore $450 ($200 supply and $250 installation) for greenfield developments and $320 ($70 supply and $250 installation) for brownfield developments.

3.5. Local Reticulation costs

3.5.1. Inclusion of lead-in mains

Issues raised in submissions

Hunter Water submitted that the proposed network configuration for greenfield projects includes DN450 and DN250 lead-in mains to the new development site. This assumes that the services provided by the REC would include those services required upstream from the wholesale connection to the physical connection of individual customers.

Hunter Water was of the view that the proposed network configuration does not align with its funding practices. Hunter Water maintains and operates lead-in infrastructure within its current wholesale supply agreements. Hunter Water does not see any reason why a wholesale customer would seek to own or operate this type of infrastructure in any future wholesale supply agreement, and therefore these assets should be excluded from estimates of the REC costs.

14 https://www.sydneywater.com.au/SW/accounts-billing/reading-your-meter/meter-readings/remotely-read-meters/index.htm

15 We note that there does not appear to be any publicly available information regarding installation time for water meters in Australia. Based on our experience we would expect that an average allowance of two hours is reasonable, however there are likely to be situations where the required time for installation will be lower.

e Ibid.

Response to issues

This response from Hunter Water appears to reference the "single DN250 feed pipe from the incumbent main to the development site" identified as an assumption for each of the example schemes in the October 2016 Final Report.[17] This assumption was made to provide a holistic view of the scheme and how it would be structured; the feed pipe was not used in developing the REC cost estimates for the example schemes as it was assumed that the connection point would be in close proximity to the development site.

For both greenfield scenarios under consideration, a reticulation ring main around the perimeter of the development site has been included to provide redundancy and security of water supply in an event of partial shut down for maintenance. Based on the anticipated scale and the estimated flow rate of the proposed development, DN250 and DN450 pipework will be required for Example 2 and Example 3 respectively.

3.5.2. Lifecycle operating costs

Issues raised in submissions

Hunter Water stated that the age profile of new assets has not been reflected in the minus allowance for local reticulation. This could overstate the costs and affect the minus by around $1,000 per km for water. It went on to state that the building block costs should include an expected profile of these average costs over the life of the asset. These costs would be lower when an asset is new, and higher as the asset approaches its design life.

Sydney Water's submission stated that the REC costs for reticulation operating expenditure is around 1.6 times higher than Sydney Water's costs for water, and 2.7 times higher for wastewater.

Based on past experience, Sydney Water contended that the operating expenditure for wastewater reticulation is significantly lower than operating expenditure for water reticulation. This is because operating expenditure costs for water and wastewater networks are largely related to costs to fix water main failures or sewer blockages. Clearing a sewer blockage generally involves sending a root cutter into the pipe, without the need for excavation. This means that the cost per job is typically much cheaper than fixing water main failures, which requires digging up of pipes.

Sydney Water states that its costs also generally reflect the assets' lifecycle operating costs, i.e. operating expenditure should match the age of the assets being operated. By adopting an average cost in the REC cost calculation, this has front-end loaded its assumed operating costs in the earlier years.

Sydney Water went on to state that the costs used are based on the *NSW Benchmarking Report 2013-14*. This report contains annual average operating costs from each organisation. This is likely to include aged infrastructure that would not appropriately reflect the advances in efficient infrastructure provision in recent years. This is likely to also reflect higher operating costs than those for a newly established water or sewer network.

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17 Example Scheme 3 assumed a DN450 feed pipe.

Response to issues

We initially adopted a linear average for the lifecycle operating costs due to the difficulties in predicting the lifecycle costs with great accuracy (this is due to the dependency on a significant number of factors, such as maintenance and monitoring regimes). We acknowledge that a linear average over the life of the assets is unlikely to truly reflect the operating costs incurred in practice. Given the feedback from submissions regarding this issue we have sought to develop a lifecycle profile for each asset type to provide a more accurate operating expenditure estimate over the life of the asset.

In terms of Sydney Water's specific comment that the operating expenditure is quite high and that it would expect sewer reticulation to have a lower operating expenditure than water reticulation, we note that we have revised the lifecycle operating costs for both water and sewer reticulation. As a result, the estimated operating cost is now lower than the original estimate (which was an annual average and did not take into consideration changes to operating expenditure over time). Based on Example 1, the gravity sewer reticulation operating expenditure is not lower than the water reticulation infrastructure. For Examples 2 and 3, the higher sewer reticulation operating expenditure is due to the assumption that pressurised sewer mains between the sewer pumping station(s) and the discharge point to the wholesale service provider's network.

It should be noted that the actual lifecycle cost profile may ultimately depend on various factors. These factors may include; the extent of an asset's exposure to high traffic loading, condition of soils, material / equipment selection, maintenance and monitoring regimes. Thus, we have estimated operating expenditure (expressed as a percentage of the total operating expenditure) for pre-defined stages of the asset's serviceable life (the lifecycle profile), based on the type of asset under consideration as detailed below. The detail of these costs is contained in the associated spreadsheet.

Gravity sewer main

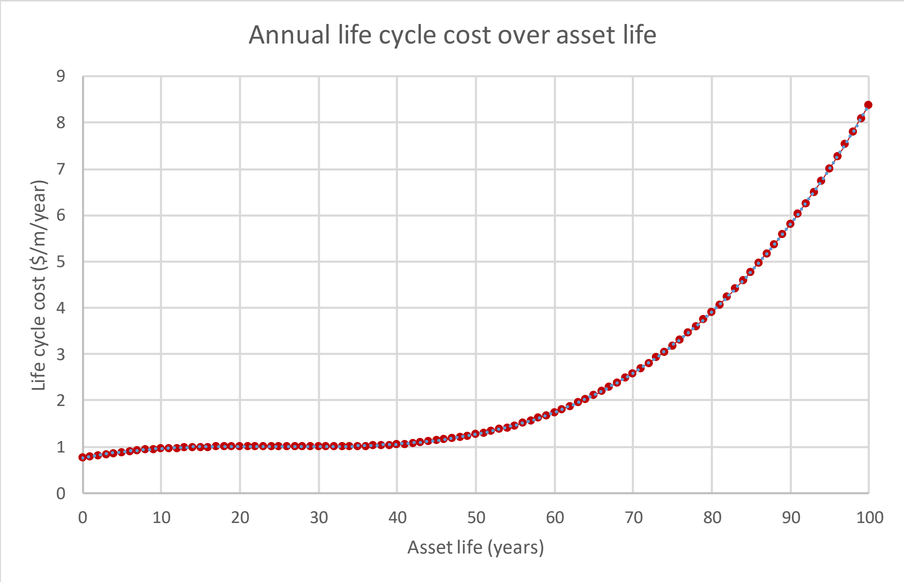
Gravity sewer mains constructed of more recent/newer materials (such as PVC) and utilising newer jointing methods (such as rubber ring joints) have been installed for only a relatively short time compared to those constructed of old technology (e.g., vitreous clay pipes). The whole life-cycle cost for new sewers is not known as the design life has not yet been reached. Hence predicting the future of the new sewers can only be based on the assumption that there will be some degradation of the sewers over time, with the level of this degradation increasing with age. When and where (in time) this would start cannot be determined at this stage and will only be known in the future. The below may represent a reasonable approach to the profile of cost over time.

The lifecycle profile is based on the following assumptions:

- New assets (in their first year of service) are expected to incur zero maintenance costs, therefore only operational costs will be considered for this period.
- For gravity sewers, 10% of the total lifecycle cost will be spent during the first 25 years of the asset's serviceable life. This accounts for general operation and maintenance (e.g., clearing blockages and tree roots).
- 40% of the total lifecycle cost will be spent between years 26 and 80 due to an increase in main repairs and maintenance, which are more likely to occur or be required as the asset ages (e.g. clearing blockages and tree roots).
- The remaining 50% of the total lifecycle cost will be spent in the last 20 years of the asset's serviceable life. This accounts for the fact that a large number of main repairs and maintenance are likely to be required.

Figure 4 shows the cost profile of the assumed lifecycle profile.

Figure 4: Lifecycle cost profile for gravity sewer mains



Sewer pressure main

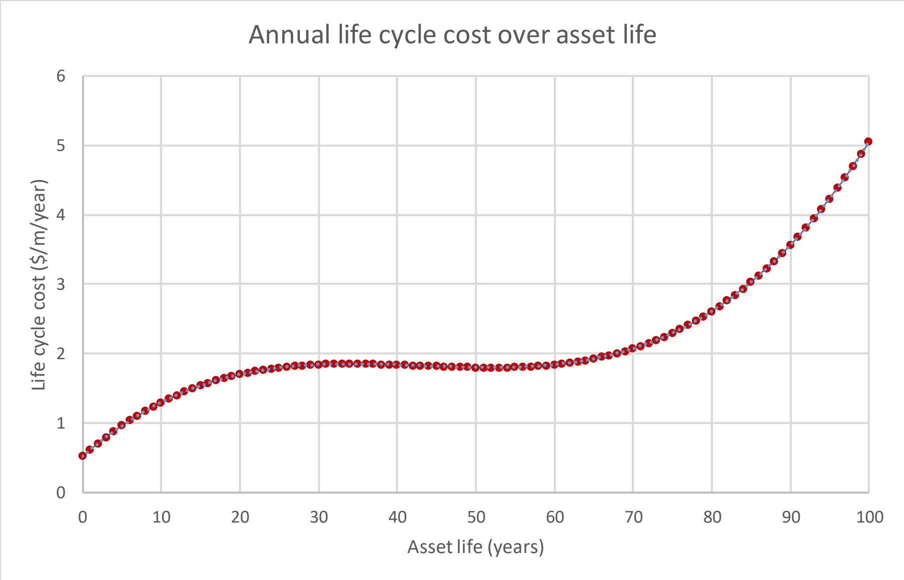
Sewer rising mains are more complicated to operate compared to clear water reticulation mains due to the solids in the sewage which can cause siltation and blockage of the main. More operator attendance is required to ensure the main operates reliably.

The lifecycle profile is based on the following assumptions:

- New assets (in their first year of service) are expected to incur zero maintenance costs, therefore only operational costs will be considered for this period.
- 20% of the total lifecycle cost will be spent in the first 30 years of serviceable life to account for general operation and maintenance.
- 60% of the total lifecycle cost will be spent between years 31 and 90 accounting for an increase in maintenance and monitoring of the asset (e.g. main repair and replacement and inspections), which is more likely to occur or be required as the asset ages.
- The remaining 20% of the total lifecycle cost will be spent in the last 10 years of the asset's serviceable life primarily for main repairs and replacements due to the ageing of the asset.

Figure 5 shows the cost profile of the assumed lifecycle profile.

Figure 5: Lifecycle cost profile for sewer pressure mains



Water pressure main

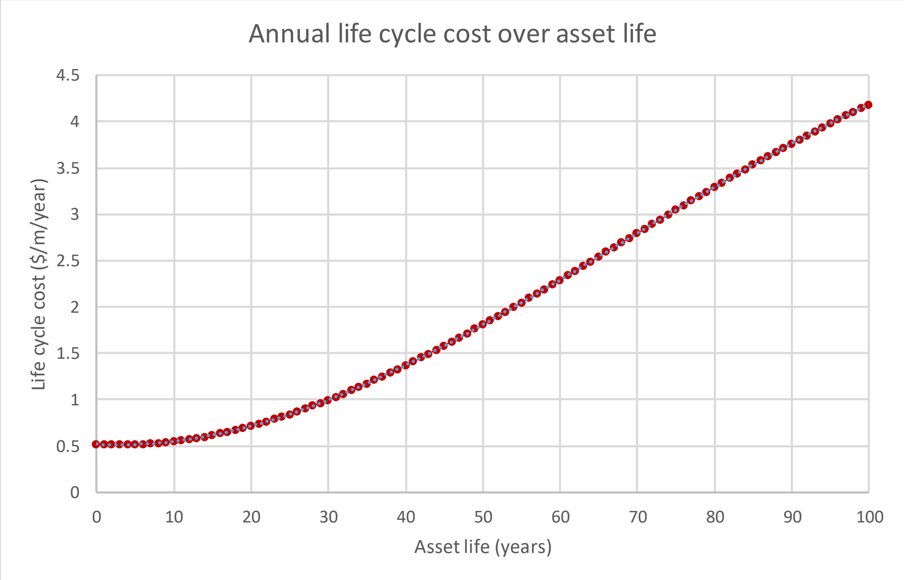
Water pressure mains are less complicated to operate compared to pressure sewer mains since the water is clear and free from solids thus there is a lower chance of siltation and blockage of the main.

The lifecycle profile is based on the following assumptions:

- New assets (in their first year of service) are expected to incur zero maintenance costs, therefore only operational costs will be considered for this period.
- 10% of the total life cycle cost will be spent during the first 30 years for general operation and maintenance (e.g. leak repairs and main breaks).
- 70% will be spent between years 31 and 90 representing the need for two sets of valve replacements (assuming a serviceable life of 30 years for the valves) and an increase of pipeline repairs and replacements, which are more likely to occur or be required as the asset ages.
- 20% of total lifecycle cost will be spent in the last 10 years of the asset's serviceable life due to an increase in pipeline repairs and replacements associated with the ageing of the asset.

Figure 6 shows the cost profile of the assumed lifecycle profile.

Figure 6: Lifecycle cost profile for water pressure mains



In terms of the other asset classes – valves and meters – we have not provided annual costs based on a lifecycle profile, for the following reasons:

- **Valves:** The lifecycle costs for valves are included in the pipe's lifecycle cost. For reticulation services, maintenance requirements and lifecycle costs for valves are relatively low. Valves are generally used for isolating section(s) of mains for maintenance and repairs; and
- **Meters:** These assets do not typically require maintenance during their serviceable life.

In relation to Sydney Water's comments regarding the estimated operating costs for reticulation infrastructure, as outlined above the operating costs have been revised to consider the effects of the lifecycle profile of the infrastructure asset. As a result, the estimated initial operating cost is now lower than the original estimate (which was an annual average and did not take into consideration changes in the operating cost over the life of the asset). Based on example scheme 1, the gravity sewer reticulation operating cost is now lower than the water reticulation assets. For example, schemes 2 and 3, the higher sewer reticulation costs is due to the inclusion of pressure sewer mains between the sewer pumping station(s) and the discharge point to the sewer main.

3.5.3. Pipe material

Issues raised in submissions

In its submission, Sydney Water noted that the costs assumed that all water pipes are made from DICL steel. However, based on its experience, around two thirds of water pipes are made from plastic (uPVC, oPVC, mPVC) and about one third from DICL.

Response to issues

Both DICL and PVC pipes are commonly used in the construction of water mains. However, PVC pipe generally has a lower structural strength when compared with DICL pipe (largely due to strength derating that considers the effects of temperature and fatigue on the material). As a result, DICL pipe is more commonly used in difficult and high loading area (such as under roadways).

PVC pipe is readily available in sizes up to DN375 and has a lower capital cost when compared with DICL pipe. As a result, we have revised the benchmark estimates to include capital expenditure for PVC pipes for water reticulation main sizes up to DN375. In estimating the costs of the example schemes, we have assumed that all pipes up to DN375 will be constructed of PVC. The detail of these costs is contained in the associated spreadsheet.

3.5.4. Construction sequencing

Issues raised in submissions

Sydney Water submitted that an asset valuation approach should also generally give lower wastewater costs, primarily because of construction sequencing, particularly in greenfield situations. Wastewater mains are typically laid in the backyard of each lot prior to construction, not along the footpath. This means there are generally less restoration costs and a more limited length of connection per property, compared to water.

Response to issues

The location and/or alignment of sewer mains is typically dependent on the design and layout of the development.

For this costing exercise, it is assumed the mains are located outside the property boundary typically within the road verge (nature strip). Given this, the estimated capital expenditure for greenfield mains (sewer and water) will be reduced by $12/m (based on previous project experience) to exclude restoration cost in these scenarios. The detail of these costs is contained in the associated spreadsheet.

3.5.5. Excavation and backfill

Issues raised in submissions

Sydney Water's submission stated that the REC costs for wastewater reticulation assets also include excavation and backfill (often referred to as 'cavity hole') costs as part of renewal costs. This is not consistent with modern practice. Instead of excavating and replacing the pipe, it would be re-lined. By including this cost, the REC costs may be overstated. We note that this is assuming that the wastewater reticulation system is a gravity system (which is the case for around 99% of the wastewater network). For pressure systems, however, costs to the utility can vary greatly, depending on the utility's arrangement with the customer (i.e. whether the utility or the customer pays for ongoing maintenance of equipment).

The *NSW Reference Rates Manual* estimates that the costs for excavation and backfill (or cavity hole) are typically about 60% of the cost of reconstructing a shallow sewer, i.e. an existing sewer main would be valued at 40% of its replacement cost at the end of its useful life.

Response to issues

The previous costs estimates did not incorporate renewal costs, however, in order to provide the costs over the longest time horizon option considered by IPART in its November 2016 Draft Report, we have included renewal costs in our revised cost estimates.

For wastewater reticulation assets, the renewal method at the end of the asset's serviceable life depends on several factors such as: condition of the existing asset, location of the asset, traffic volume, and potential disruption to the public due to construction work. Generally, pipe relining is the preferred renewal method as it is the least disruptive when compared to other forms of renewal, such as exhume and relay. Minimal shutdown periods and construction footprints are two main advantages of this method.

Thus, for this costing exercise, it is assumed that gravity sewer mains are relined in situ at the end of their serviceable life (100 years). Based on past experience, the cost of relining a gravity sewer main is estimated at 50% of the cost to exhume and relay a pipeline of its size (per metre). The cost to exhume and relay is considered to comprise of three components:

- Removal of the old asset, assumed to be 60% of capital expenditure (noting that approximately 40% of the capital expenditure is related to the asset's value).
- Installation of the new asset (assumed to be as per the greenfield rate)
- On-site difficulties (assumed to comprise traffic control, site management etc.)

Costing will assume that gravity sewer mains (of size less than or equal to DN100), will be exhumed and re-laid. Pipe sizes equal to and greater than DN150 will be relined at the end of their serviceable life. The cost for this is estimated to be 50% of the exhumation and re-laid cost.

Pressure sewer and water are assumed to be exhumed and re-laid. The cost for this is comprised of the same three components as gravity mains: removal of the old asset, installation of the new asset and on-site difficulties.

3.5.6. Economies of scale

Issues raised in submissions

The Lendlease Living Utilities' submission states that for the reticulation and meter infrastructure, the October 2016 Final Report simply applied unit rates from the *NSW Reference Rates Manual*, which reflect water asset contract rates that have been obtained by the NSW water utilities and public authorities, including what is stated to be an appropriate mark up for survey, investigation, design and project management costs. It is unrealistic to assume that a reasonably efficient competitor could obtain construction at the same rates that are available to very large buyers like the NSW water utilities. Moreover, it would be expected that a reasonably efficient competitor would not have access to the same economies of scale in relation to survey, investigation, design and project management costs as a large water utility.

Response to issues

The estimates obtained from the *NSW Reference Rates Manual* included survey, investigation, design and project management (NSW Reference Rate, P5, Section 2.2) which is typical for the project size. As noted in Page 6, Section 2.3 of NSW Reference Rate, the rates are based on competitive contract prices and consider "data from substantial contracts (e.g. those with long lengths of pipe consisting several kilometres of mains)".

Based on the anticipated size and scale of the proposed development, we consider that the formulation of the rates outlined in the *NSW Reference Rates Manual* is comparable and appropriate for this exercise and have therefore not revised the rates based on economies of scale.

3.5.7. Asset life

Issues raised in submissions

The Lendlease Living Utilities' submission states that the spreadsheet associated with the October 2016 Final Report appears to have assumed a serviceable life of 100 years for water and sewerage mains even though the *NSW Reference Rates Manual* – the source for unit rates – specifies an indicative useful life of 70 years for the same assets.

Response to issues

The design and construction of water and wastewater infrastructure is generally required to be completed in compliance with the relevant codes and standards. This includes the *Water Supply Code of Australia*, S*ewerage Code of Australia* and *Sewage Pumping Station Code of Australia* (published by Water Services Association of Australia).

Thus, the asset life was based on the codes published by Water Services Association of Australia. These codes are applicable to both brownfield and greenfield scenarios, and the asset serviceable lives outlined in these codes supersede the indicative asset lives outlined in the *NSW Reference Rates Manual*.

The asset lives that have been used in the analysis are:

- Reticulation pipework: 100 years;
- Ancillary pipework: 30 years;
- Sewer pump stations: 25 years;
- Sewer pump station pipework: 50 years;
- Sewer pump station valves: 30 years;
- Sewer pump station structural assets: 100 years; and
- Sewer pump station EI&C: 20 years.

3.5.8. Valve asset values

The October 2016 Final Report, provided a range of values for valves in the reticulation network (that 5-20 per cent of pipework expenditure is related to valves). To provide further clarity, we have provided a point estimate of this valuation based on certain assumptions.

It is estimated that approximately 14 per cent, on average, of pipework expenditure is related to valve and associated equipment. This was based on the following:

- Typically, valves are required at an average of 200 metres to provide isolation for maintenance and operational purposes. Noting that, the locations and quantity of valve depends heavily on the design and layout of the development; and
- An average of two water hydrants per valve unit (one on each side of the valve). This is generally required in water reticulation networks for maintenance purposes, such as running temporary water supply in the event of partial shutdown of the water network for repairs.
- From past project experiences, a typical DN250 valve installation ranges from $6,000 to $11,000:
  - Using the unit rate for DN250 greenfield of $245.38/metre for a length of 200m, this equates to approximately $49,000.
  - Using the unit rate for DN250 brownfield of $362.91/metre for a length of 200m, this equates to approximately $72,000.
  - We have therefore used14 per cent of these costs as it is approximately equal to the typical cost for valves ($6,800 and $10,000).

4. Revised calculation of Reasonably Efficient Competitor costs

Benchmark unit rates for infrastructure likely to be required by a REC providing retail and reticulation services are contained in the spreadsheet “Revised Calculation of REC Costs”. For the purposes of providing example calculations based on these benchmark unit rates, we have used three examples that were provided by IPART:

- **Example 1:** 2,000 20mm equivalent brownfield development;
- **Example 2:** 2,000 20mm equivalent greenfield development; and
- **Example 3:** 10,000 20mm equivalent greenfield development.

The following sections set out the revisions to the estimates from our October 2016 Final Report, the configuration and assumptions of the example schemes and our revised estimates for each of the example schemes.

4.1. Revisions to calculations from October 2016 Final Report

In response to submissions, we have revised our estimated REC costs from the October 2016 Final Report. The following provides a summary of the changes to our benchmark cost estimates:

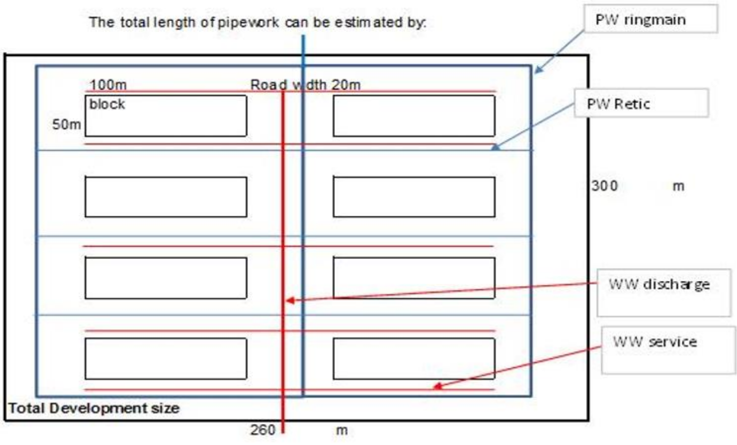
- Separated meter capital costs between remote and standard units;
- Changes to meter supply and installation costs;
- Incorporated meter reading costs for retail services;
- Incorporated management costs;
- Change to call centre costs;
- Changes to the annual operating expenditure for reticulation infrastructure;
- Incorporated the cost of PVC pipes;
- Incorporated renewal cost estimates; and
- Changes to the estimates based on construction sequencing.

Each of these changes and their reasons were considered in section 3. The following provides the details of our revised calculations for the example schemes.

4.2. Example 1

In considering a brownfield development, we assumed a lesser land size and a medium to high density zoning to accommodate the proposed development. Figure 7 provides the layout that we have assumed for Example 1.

Figure 7: Assumed layout for Example 1



Requires one of the above typical layout for 2,000 Brownfield properties

Within this layout, we have assumed:

- Quantity of pipework based on:
  - Total development size of 300m by 260m;
  - Total of 8 street blocks, each with 4 service connections;
  - Block sizes of 100m by 50m, with 10 levels of residential units and a ground level for commercial premises (total of 11 levels);
  - Road reserve width at 20m, total road length estimated to be 2,200m; and
  - 50 per cent build-up area per lot (i.e. half of the land area is building infrastructure).

In relation to the **required water infrastructure**, we have assumed:

- A single DN250 feed pipe from the incumbent main to the development site (this has not been included in the estimated REC costs);
- No allowance for water booster pump station (i.e. there is sufficient pressure in the incumbent main to supply the whole development);
- DN250 ring-main allowed around the perimeter of the development site to provide redundancy and security of supply in the event of shut-down for maintenance;
- Minimum DN150 for all water reticulation mains to allow for firewater connection(s) of potable water reticulation network;
- Based on one service connection point per apartment block (with 2x DN80 and 1x DN150 water service connections); and
- Valves, hydrants and associated fittings are accounted for within the unit rates of pipework.

In relation to the **required sewerage infrastructure**, we have assumed:

- Single sewer discharge from development site to incumbent network;
- Based on one service connection point per apartment block (with 1x DN150 sewer connection);
- Manholes and bends are accounted for within the unit rates of pipework; and
- The incumbent's receiving sewer has capacity for flows from development via gravity.

Table 5 and Table 6 provide our estimate of the retail and reticulation costs for a REC providing water and sewerage services for Example 1.

Table 5: Calculation of retail REC costs for Example 1

	Quantity	Unit Rate	Revised Cost	Previous Cost
Meter retail costs				
Metering capital expenditure	2,000	$320	$640,000	1,000,000
Meter reading costs (per annum)	2,000	$2.50	$5,000	NA
Non-meter retail costs (per annum)				
Billing services	2,000	$48	$96,000	$96,000
Call centre				$96,000
Customer communications	2,000	$12	$24,000	$24,000
Management costs	2	$103,712	$207,423	NA
Other retail activities	2,000	$12	$24,000	$24,000
Retail capital expenditure			**$640,000**	**$1,000,000**
Retail operating expenditure (per annum)			**$356,423**	**$240,000**

Table 6: Calculation of reticulation REC costs for Example 1

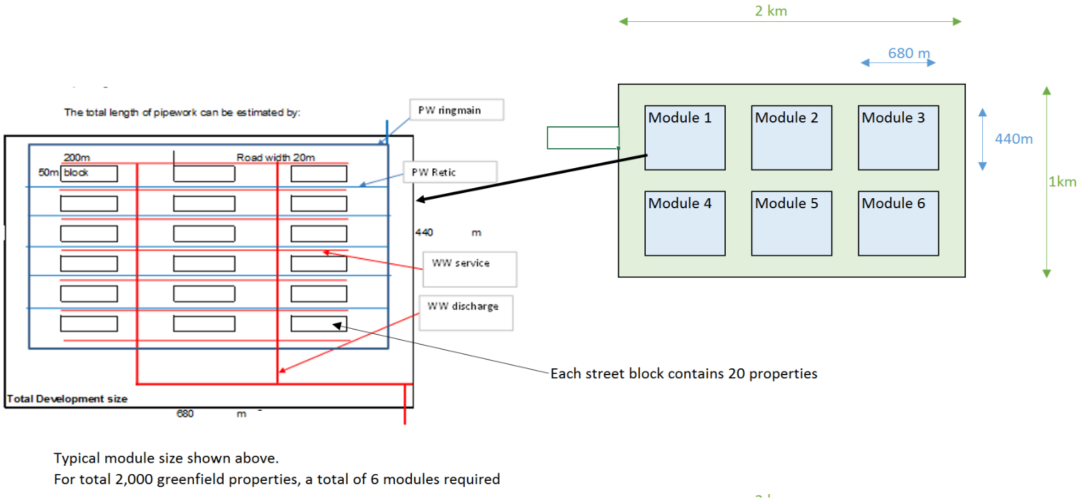
	Quantity	Unit Rate	Revised Cost	Previous Cost
Water reticulation				
DN80uPVC	640	$82.48	$52,787	$52,992
DN150 uPVC - Brownfield	1,100	$207.23	$227,954	$297,149+
DN250 uPVC - Brownfield	1,420	$362.91	$515,335	$576,122+
Sewerage reticulation				
DN150 - Brownfield	320	$323.73	$103,595	$103,997
DN225 - Brownfield	1,300	$429.93	$558,905	$561,074
DN375 - Brownfield	300	$737.17	$221,150	$222,008
Reticulation capital expenditure			**$1,679,726**	**$1,813,341**
Reticulation operating expenditure (new asset)			**$3,102**	**$12,080^**

+ - This was previously a DICL pipe. ^ - The previous approach was based on a linear average.

4.3. Example 2

Example 2 is based on the same volume of connections as Example 1, however it is a greenfield development and therefore we have assumed larger land size and low density zoning. Figure 8 provides the layout that we have assumed for Example 2.

Figure 8: Assumed layout for Example 2



Within this layout, we have assumed:

- Quantity of pipework based on:
  - Total development size of 2km by 1km;
  - Total of 36 street blocks, each with 20 service connections;
  - Block sizes of 200m by 50m, with 500m^2 land lot per property;
  - Road reserve width at 20m, total length estimated to be 39km; and
  - Total of 1,800 residential and 200 commercial properties.
- Rates assumed no existing services within the development; and
- Both pipe size and length may vary depending on water consumption and sewage flow assumed and the layout of the development site.

In relation to the **required water infrastructure**, we have assumed:

- A single DN250 feed pipe from the incumbent main to the development site (this has not been included in the estimated REC costs);
- Total of 1x water pumping station and water reservoir allowed for water supply to the whole development (this has been separated from the estimated REC costs);
- DN250 ring-main allowed around the perimeter of the development site to provide redundancy and security of supply in the event of shut-down for maintenance;
- Minimum DN100 for all water reticulation mains to allow for firewater connection(s) of potable water reticulation network;
- Based on one service connection point per property (with 1x DN20 water service connection); and
- Valves, hydrants and associated fittings are accounted for within the unit rates of pipework.

In relation to the **required sewerage infrastructure**, we have assumed:

- Single sewer discharge from development site to incumbent network;
- Based on one service connection point per property (with 1x DN100 sewer connection);
- Manholes and bends are accounted for within the unit rates of pipework;
- Due to topography and development size, 1x sewerage pumping station allowed;[18]
- Assumed all property wastewater will be gravity drained to sewerage pumping station(s); and
- Total of 1x sewerage pumping stations allowed for sewerage discharge from the whole development to the incumbent's mains (assumed 2x sewerage discharge points).

Table 7 and

18 We have assumed the topography to be relatively flat. With this assumption, the sewerage discharge point to the town main is likely to be relatively shallow. In such cases, a sewerage pumping station would assist in discharging the sewage to the incumbent main at shallow depth. A different topography could mitigate the needs of a sewerage pumping station, provided that the development is located in higher ground and the incumbent main is located at a low point. This may allow the sewage to discharge to the incumbent main via gravity and mitigates the need for a pumping station.

Table 8 provide our estimate of the retail and reticulation costs for a REC providing water and sewerage services for Example 2.

Table 7: Calculation of retail REC costs for Example 2

	Quantity	Unit Rate	Revised Cost	Previous Cost
Meter retail costs				
Metering capital expenditure	2,000	$450	$900,000	$1,000,000
Non-meter retail costs				
Billing services ($/per annum)	2,000	$48	$96,000	$96,000
Call centre				$96,000
Customer communications	2,000	$12	$24,000	$24,000
Management costs	2	$103,712	$207,423	NA
Other retail activities	2,000	$12	$24,000	$24,000
Retail capital expenditure			**$900,000**	**$1,000,000**
Retail operating expenditure (per annum)			**$351,423**	**$240,000**

Table 8: Calculation of reticulation REC costs for Example 2

	Quantity	Unit Rate	Revised Cost	Previous Cost
Water reticulation				
DN20 - Service Connection	2,000	$63.92	$1,278,440	$1,283,400
DN100 uPVC - Greenfield	20,400	$85.57	$1,745,689	$3,378,240+
DN250 uPVC - Greenfield	13,440	$245.38	$3,297,880	$4,034,016+
Sewerage reticulation				
DN100 - Greenfield	2,000	$210.32	$4,206,480	$4,471,200
DN225 - Greenfield	28,560	$312.39	$8,921,944	$9,311,274
DN375 - Greenfield	8,040	$557.77	$4,484,479	$4,601,734
DN200 DICL - Sewer Pressure Pipe	1,000	$183,52	$183,518	$196,650
Sewerage pump station 80L/s*	1	$979,450	$979,450	$983,250
Reticulation capital expenditure			**$25,097,880**	**$28,259,764**
Reticulation operating expenditure (new asset)			**$71,533**	**$280,480^**

* It is assumed that one sewerage pump station will be required for this greenfield development to ensure suitable discharge of sewage from the reticulation network. This will not always be the case and will be dependent on individual circumstances for the development, however we think it is reasonable that pumping would be required for reticulation services in this greenfield development.

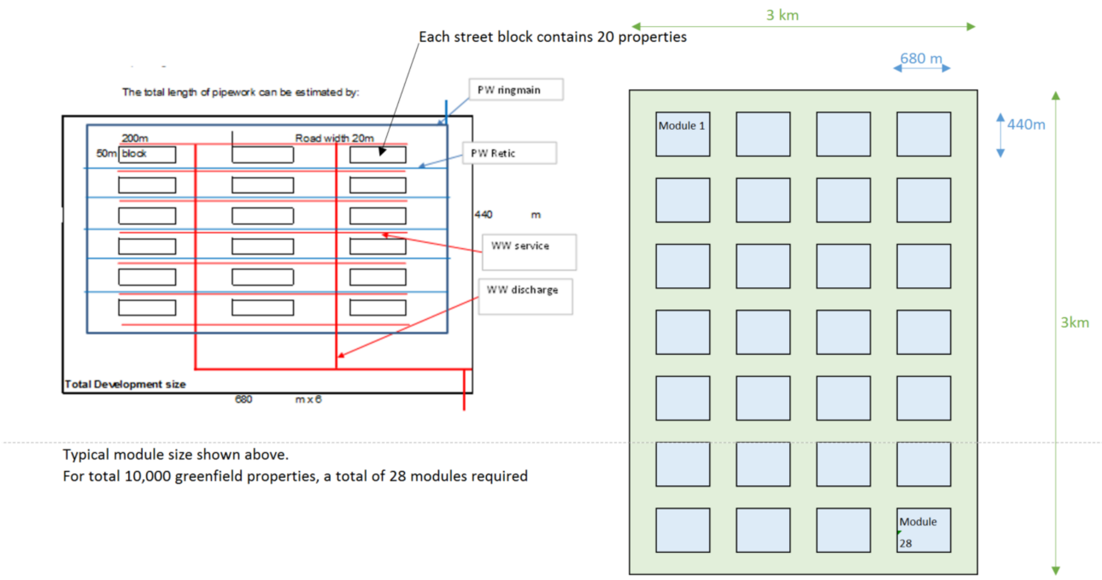
+ This was previously a DICL pipe.

^ The previous approach was based on a linear average.

4.4. Example 3

Example 3 is a larger greenfield development, within which we have assumed larger land size and low density zoning. Figure 9 provides the layout that we have assumed for Example 3.

Figure 9: Assumed layout for Example 3



Within this layout, we have assumed:

- Quantity of pipework based on:
  - Total development size of 3km by 3km;
  - Total of 180 street blocks, each with 20 service connections;
  - Block sizes of 200m by 50m, with 500m^2 land lot per property;
  - Road reserve width at 20m, total length estimated to be 180km; and
  - Total of 18,000 residential and 2,000 commercial properties.
- Rates assumed no existing services within the development; and
- Both pipe size and length may vary depending on water consumption and sewage flow assumed and the layout of the development site.

In relation to the **required water infrastructure**, we have assumed:

- A single DN450 feed pipe from the incumbent main to the development site (this has not been included in the estimated REC costs);
- Total of 2x water pumping station and water reservoir allowed for water supply to the whole development (this has been separated from the estimated REC costs);
- DN450 ring-main allowed around the perimeter of the development site to provide redundancy and security of supply in the event of shut-down for maintenance;
- Minimum DN100 for all water reticulation mains to allow for firewater connection(s) of potable water reticulation network;
- Based on one service connection point per property (with 1x DN20 water service connection); and

- Valves, hydrants and associated fittings are accounted for within the unit rates of pipework.

In relation to the **required sewerage infrastructure**, we have assumed:

- Two sewer discharge from development site to incumbent network;
- Based on one service connection point per property (with 1x DN100 sewer connection);
- Manholes and bends are accounted for within the unit rates of pipework;
- Due to topography and development size, 3x sewerage pumping station allowed; [19]
- Assumed all property wastewater will be gravity drained to sewerage pumping station(s); and
- Assumed wastewater to be gravity drained to 2 sewerage pumping stations prior to discharge to incumbent sewer main via sewer rising main.

Table 9 and Table 10 provide our estimate of the retail and reticulation costs for a REC providing water and sewerage services for Example 3.

Table 9: Calculation of retail REC costs for Example 3

	Quantity	Unit Rate	Revised Cost	Previous Cost
Meter retail costs				
Metering capital expenditure	10,000	$450	$4,500,000	$5,000,000
Non-meter retail costs				
Billing services ($/per annum)	10,000	$24	$240,000	$240,000
Call centre	10,000	$15.45	$154,500	$480,000
Customer communications	10,000	$6	$60,000	$60,000
Management costs	3	$103,712	$311,135	
Other retail activities	10,000	$6	$60,000	$60,000
Retail capital expenditure			**$4,500,000**	**$5,000,000**
Retail operating expenditure (per annum)			**$825,635**	**$840,000**

19 We have assumed the topography to be relatively flat. With this assumption, the sewerage discharge point to the town main is likely to be relatively shallow. In such cases, a sewerage pumping station would assist in discharging the sewage to the incumbent main at shallow depth. A different topography could mitigate the needs of a sewerage pumping station, provided that the development is located in higher ground and the incumbent main is located at a low point. This may allow the sewage to discharge to the incumbent main via gravity and mitigates the need for a pumping station.

Table 10: Calculation of reticulation REC costs for Example 3

	Quantity	Unit Rate	Revised Cost	Previous Cost
Water reticulation				
DN20 - Service Connection	10,000	$63.92	$6,392,200	$6,417,000
DN100 uPVC - Greenfield	95,200	$85.57	$8,146,550	$15,765,120+
DN450 DICL - Greenfield	8,960	$513.44	$4,600,404	$4,729,536
Sewerage reticulation				
DN100 - Greenfield	10,000	$210.32	$21,032,400	$22,356,000
DN225 - Greenfield	133,280	$312.39	$41,635,739	$43,452,612
DN375 - Greenfield	17,920	$557.77	$9,995,256	$10,256,602
DN600 - Greenfield	17,920	$1,018.63	$18,253,814	$18,547,200
DN200 DICL - Sewer Pressure Pipe	3,000	$183.52	$550,554	$589,950
Sewerage pump station 80L/s*	3	$979,450	$2,938,350	$2,949,750
Reticulation capital expenditure			**$113,545,267**	**$125,063,770**
Reticulation operating expenditure (new asset)			**$312,254**	**$1,224,680^**

* It is assumed that three sewerage pump stations will be required for this greenfield development to ensure suitable discharge of sewage from the reticulation network. This will not always be the case and will be dependent on individual circumstances for the development, however we think it is reasonable that pumping would be required for reticulation services in this greenfield development. + This was previously a DICL pipe. ^ The previous approach was based on a linear average.

4.5. Key differences between example scheme cost estimates

There are a number of reasons for differences in the cost estimates for the example schemes. This relates to different cost drivers and factors that impact on the cost estimates. The following is a summary of the key differences.

4.5.1. Retail cost estimates

The key differences for the retail estimates relate to whether the scheme is brownfield or greenfield and the overall size of the scheme:

- Meter reading costs are not required for the greenfield schemes (Examples 2 and 3);
- Standard meters being installed in brownfield schemes (Example 1) and telemetry meters being installed in greenfield schemes (Examples 2 and 3);
- Outsourced call centre costs not required for the smaller schemes (Examples 1 and 2);

- Different rate per customer for billing services, customer communication and other back-office retail activities based on the size of the scheme (i.e. larger scheme has greater economies of scale and therefore a lower unit rate); and
- Greater management requirements for a larger scheme (2 resources for Examples 1 and 2, and 3 resources for Example 3).

4.5.2. Reticulation cost estimates

Similar to the retail cost estimates, the key drivers in the differences between the example schemes is whether it is brownfield or greenfield and the overall size of the scheme:

- Example 1 has less reticulation requirements due to the density of the scheme and the expected usage of customers within the scheme (thereby impacting on pipe sizing requirements);
- Example 1 does not require individual water service connections as it is assumed that it is based on apartment buildings;
- The greenfield schemes (Examples 2 and 3) are assumed to require sewer pumping stations and sewer pressure pipes to ensure sewage is able to be transported to the mains network
  - The assumptions regarding these requirements are further impacted by the size of the schemes (the smaller Example 2 requires 1 pumping station, while the larger Example 3 requires 3).

4.6. Water pumping and reservoir requirements

As outlined earlier in this report, we considered the example schemes from a holistic perspective. Given this, depending on the configuration and location of the scheme, there are likely to be potential upstream costs associated with some of the example schemes.

Greenfield development has been assumed to be low-density residential zoning. As such, the required development land size would be substantially larger than a brownfield development (assumed to be medium density). Given this, water pumping stations and reservoirs have been included in the cost estimates for Example 2 and Example 3 in the associated spreadsheet, on the basis of:

- The existing bulk supply network (town main) is unlikely to have sufficient capacity to supply the proposed development. Water reservoirs are generally required in water reticulation networks to enable the balancing of water supply during peak demand as well as for specific purposes such as partial shutdown of the water network for maintenance; and
- Water pumping stations are generally required to pump the bulk water to the water reservoir for redistribution. Due to the scale of the development it is unlikely that, the existing bulk water supply network will have sufficient pressure to supply the water to the reservoir.

We note that the requirement for water pump stations and reservoirs will be highly dependent on the location and configuration of the scheme and therefore may not be required in all circumstances. Our estimate of the costs that would be required to provide sufficient capacity and pressure through water pump stations and reservoirs is contained the associated spreadsheet.

Appendix A: Retail cost to serve studies

To further inform our understanding of the retail costs for a REC and the potential impact of economies of scale, we reviewed two recent studies for the electricity industry. The following provides a summary of those studies and their findings.

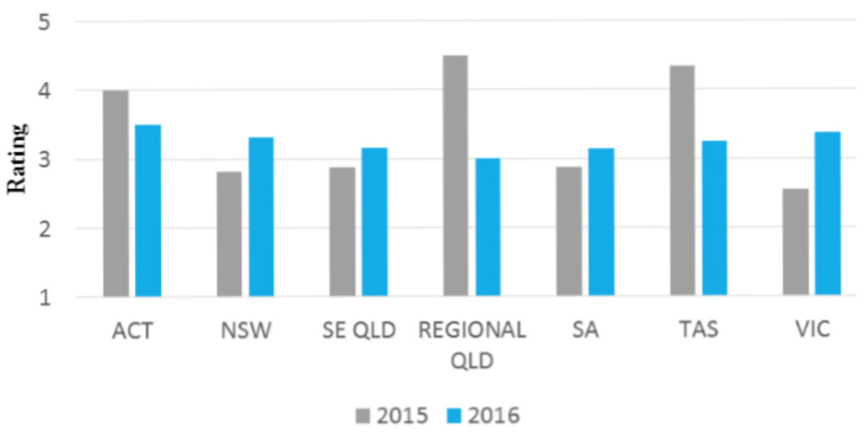
Australian Energy Market Commission (AEMC): 2016 Retail Competition Review[20]

The AEMC undertakes an annual review of competition in the electricity and gas retail markets across the jurisdictions within the National Electricity Market (NEM). The purpose of the reviews is to support the jurisdictions' commitment under the Australian Energy Market Agreement (AEMA) to remove price regulation in electricity and gas retail markets where effective competition can be demonstrated.

To explore retailers' views on the barriers to entry, expansion and exit in electricity markets, the AEMC undertook a retailer survey to, among other things, rate the importance of economies of scale for a retailers' ability to compete effectively in each of the jurisdictions where they operate.

In all jurisdictions, retailers' average rating of the importance of economies of scale fell between 'important' to 'very important' in 2016.21 In New South Wales, South-East Queensland, Victoria and South Australia (where retail competition is strongest), the average rating was higher than in 2015. In regional Queensland, the Australian Capital Territory and Tasmania, the average rating was lower, however the AEMC notes that this is likely due to the smaller sample sizes in 2015. The AEMC notes that the average ratings align with retailer comments on the importance in economies of scale in these jurisdictions. Figure 10 presents the outcomes of the retailer survey for economies of scale.

Figure 10: Importance of having economies of scale, average rating (electricity, by jurisdiction)



Source: Australian Energy Market Commission, *2016 Retail Competition Review*, Final Report, 30 June 2016, Sydney, p. 102

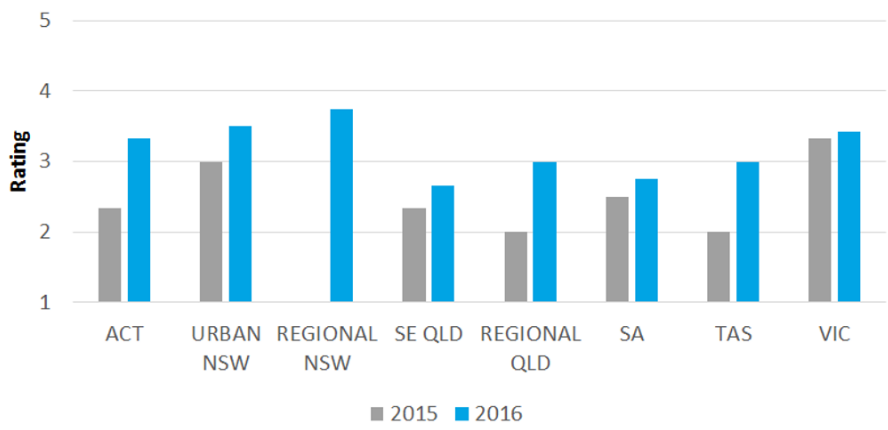
In comparison to the other factors that were considered in the survey (economies of scope and generation interests), economies of scale were, on average, considered the most important by respondents across all jurisdictions.

20 Australian Energy Market Commission, *2016 Retail Competition Review*, Final Report, 30 June 2016, Sydney.

21 The rating scale in the survey was 1 - Irrelevant; 2 - Slightly Important; 3 - Important; 4 - Very Important; 5 - Critical.

The same survey was conducted for gas retailers with similar results, with retailers generally agreeing that economies of scale were important in their ability to compete effectively. Figure 11 shows the survey findings for gas retailers.

Figure 11: Importance of having economies of scale, average rating (gas, by jurisdiction)



Source: Australian Energy Market Commission, *2016 Retail Competition Review*, Final Report, 30 June 2016, Sydney, p. 107

As with electricity, in comparison to the other factors that were considered in the survey (economies of scope and upstream gas interests), economies of scale were, on average, considered the most important by respondents across all jurisdictions.

Queensland Competition Authority (QCA): Regulated Retail Electricity Prices for 2016-17[22]

In 2016, the QCA made a determination of regulated retail electricity prices to apply in regional Queensland from 1 July 2016 to 30 June 2017. As part of this determination, the QCA was required to determine an allowance for retail costs (including a retail margin). The QCA engaged ACIL Allen Consulting (ACIL Allen) to estimate the efficient retailer costs for the region.23

ACIL Allen derived an implied level of retail costs incurred by retailers by analysing the competitive retail market offers available across several competitive jurisdictions. This estimation was based on the total average customer bill based on retailer market offers, before deducting network costs and estimated energy purchase costs. The residual amount reflected the total retail cost component. The report did not seek to breakdown the total retail cost component into operating costs and margin.

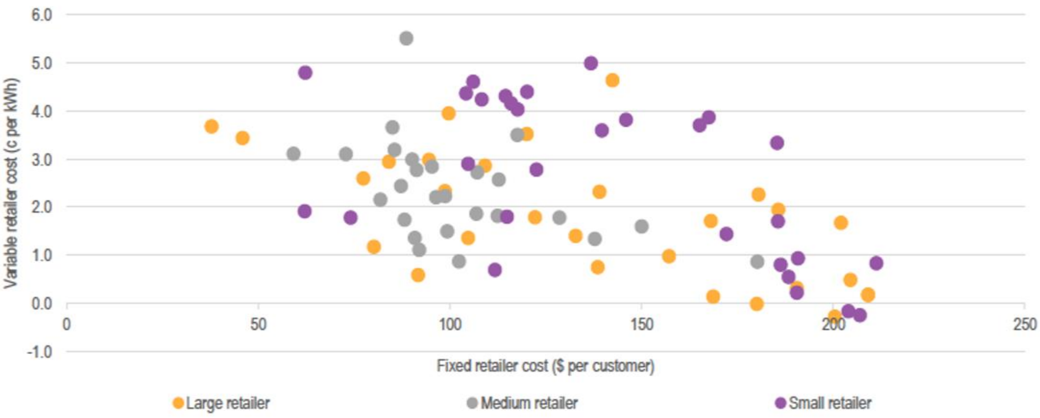
The ACIL Allen analysis did seek to separate the total retail cost component into different sized retailers (as shown in Figure 12), whereby they found that there was not a statistically significant difference between the retailer costs for different sized retailers. Without the underlying data it is difficult to determine the usefulness of this analysis for our recommendations regarding the REC costs of retail service, however there are some factors that we consider important:

22 Queensland Competition Authority, *Regulated Retail Electricity Prices for 2016-17 - Final Determination*, May 2016.

23 ACIL Allen Consulting, *Regulated Retail Prices for 2016-17 - Estimating the Efficient Retailer Costs*, May 2016.

- *Definition of small retailer:* The report provides a list of retailers that were used in the analysis. In reviewing this list, the smallest retailer would appear to be Click Energy which currently has approximately 150,000 customer accounts.[24] This is considerably larger than any retailer (wholesale customer) that is being considered for this analysis.
- *Total retail cost component:* This included both the retail operating costs and retail margins, without separating the two, it is not possible to determine the actual retail operating costs. The margins between large and small retailers may be quite different which would materially impact on any findings regarding the retail operating costs.

Figure 12: Analysis of total retailer cost component by size of retailer



ACIL Allen Consulting, Regulated Retail Prices for 2016-17 - Estimating the Efficient Retailer Costs, May 2016, p.39.

QCA's final decision was to provide a total retail cost allowance (retail operating cost and retail margin) of $232 per annum for residential customers and $604 per annum for non-residential customers.

24 Click Energy website, https://www.clickenergy.com.au/about-us/our-growth-our-team-our-owners-and-future/ (accessed on 20 January 2017)

Appendix B: Breakdown of October 2016 Final Report calculations for reticulation network

The following tables provide a breakdown of the estimated reticulation costs from the October 2016 Final Report.

Table 11: October 2016 Final Report calculations of reticulation REC costs for Example 1

	Quantity	Unit Rate	Cost
Water reticulation			
DN80uPVC	640	$82.80	$52,992
DN150 DICL - Brownfield	1,100	$270.14	$297,149⁺
DN250 DICL - Brownfield	1,420	$405.72	$576,122⁺
Sewerage reticulation			
DN150 - Brownfield	320	$324.99	$103,997
DN225 - Brownfield	1,300	$431.60	$561,074
DN375 - Brownfield	300	$740.03	$222,008
Reticulation capital expenditure			**$1,813,341**
Reticulation operating expenditure (annual average)			**$12,080^**

Table 12: October 2016 Final Report calculations of reticulation REC costs for Example 2

	Quantity	Unit Rate	Cost
Water reticulation			
DN20 - Service Connection	2,000	$64.17	$1,283,400
DN100 DICL - Greenfield	20,400	$165.60	$3,378,240⁺
DN250 DICL - Greenfield	13,440	$300.15	$4,034,016⁺
Sewerage reticulation			
DN100 - Greenfield	2,000	$223.56	$4,471,200
DN225 - Greenfield	28,560	$326.03	$9,311,274
DN375 - Greenfield	8,040	$572.36	$4,601,734
DN200 DICL - Sewer Pressure Pipe	1,000	$196.65	$196,650
Sewerage pump station	1	$983,250	$983,250

	Quantity	Unit Rate	Cost
80L/s*			
Reticulation capital expenditure			**$28,259,764**
Reticulation operating expenditure (annual average)			**$280,480^**

Table 13: October 2016 Final Report calculations of reticulation REC costs for Example 3

	Quantity	Unit Rate	Cost
Water reticulation			
DN20 - Service Connection	10,000	$64.17	$6,417,000
DN100 DICL - Greenfield	95,200	$165.60	$15,765,120⁺
DN450 DICL - Greenfield	8,960	$527.85	$4,729,536
Sewerage reticulation			
DN100 - Greenfield	10,000	$223.56	$22,356,000
DN225 - Greenfield	133,280	$326.03	$43,452,612
DN375 - Greenfield	17,920	$572.36	$10,256,602
DN600 - Greenfield	17,920	$1,035.00	$18,547,200
DN200 DICL - Sewer Pressure Pipe	3,000	$196.65	$589,950
Sewerage pump station 80L/s*	3	$983,250	$2,949,750
Reticulation capital expenditure			**$125,063,770**
Reticulation operating expenditure (annual average)			**$1,224,680^**