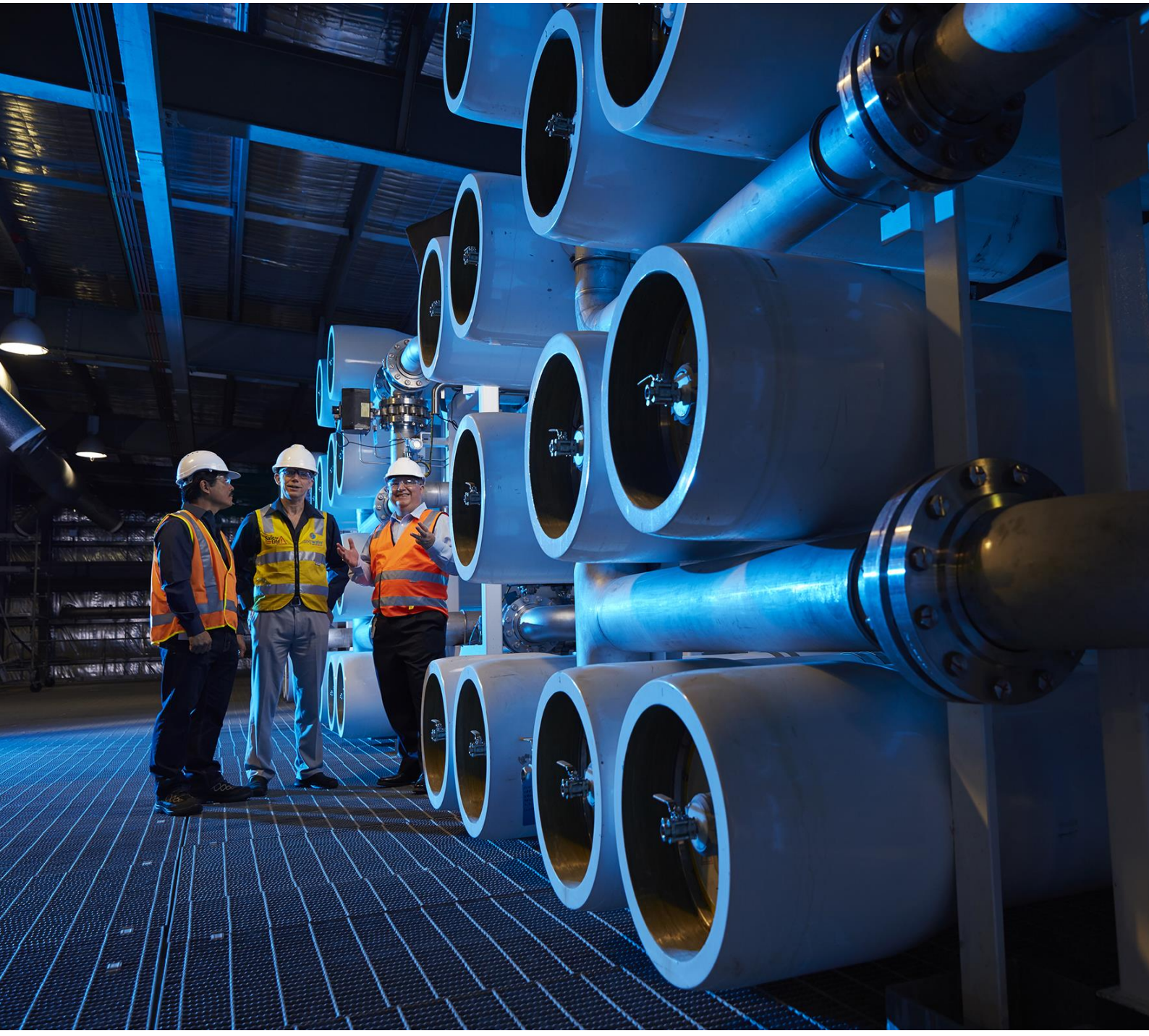
Technical Note

Maintenance Base Year Adjustments and Step Changes



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seqwater
WATER FOR LIFE

SOURCE STORE SUPPLY

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Executive Summary

In the QCA's draft determination report on Seqwater's bulk water price review, QCA advised that insufficient justification had been provided to justify growth in maintenance spending in the QCA base year. This document provides this justification in the form of base year adjustments and step changes.

Seqwater's base year adjustments have primarily been driven by either internal factors, such as a deteriorating asset base, or external factors, such as water demand growth, requiring amendments to Seqwater's asset base through the capital program. When these assets are replaced, Seqwater makes decisions underpinned by water security modelling in order to ensure assets are able to meet demand for a further 30 years. In addition, these assets are required to be replaced with their modern engineering equivalent, which includes regulatory changes. This at times further grows the maintainable asset count.

Seqwater's step change adjustments are underpinned by changes to our asset base condition, regulatory changes or certification changes, all of which are outside Seqwater's control. However, Seqwater has also identified efficiencies in the way it conducts its maintenance in order to mitigate the increase in cost from these external changes as far as reasonably possible.

Seqwater provides the following summary of the base year adjustments and step changes:

Table 1: Summary Base Year Adjustment and Step Changes

Change Type	Change Sub-type	Description	Driver	Net Change (FY17/18 to FY20/21)
Base Year Adjustment	Asset Condition	Deteriorating Asset Condition	Seqwater have a deteriorating asset base that has shown steady signs of degradation over the past five years. Seqwater have balanced these costs by growing the maintenance backlog, however expects this trend to continue to escalate over the next five years.	$0
	Asset Growth	Aspley Network Site	Major Upgrade completed in FY19/20 in order to meet regulatory water quality requirements. This upgrade addressed chlorine residual in the water grid, as well as enabling additional water produced by the central region to be transported to the north via the NPI needed for resilience and water security. It has driven a large increase in maintainable assets for the site, as well as a significant increase in chemical usage.	$178,875

Change Type	Change Sub-type	Description	Driver	Net Change (FY17/18 to FY20/21)
		Beaudesert WTP	There were two upgrades of note at Beaudesert completed in FY18/19: • Two new storage reservoirs constructed and brought online to support the SRWP Western Pipeline project. These tanks and ancillary equipment represent a growth in maintainable assets with no reduction. • Degradation of water quality in the Logan River (ammonia pollution) resulted in the need for Granulated Activated Carbon (GAC) to be installed at the water treatment plant. This results in an increase in maintainable assets and chemical usage. This additional treatment process was required to ensure that water quality requirements could be met in these conditions.	$140,034
		Esk WTP	Due to the increasing water demand, Esk WTP underwent a substantial upgrade in FY18/19. An existing filter was decommissioned, and a new larger filter was installed to meet growing demand in the area. This represents a growth in maintainable assets and an increase in chemical usage.	$22,704
		Image Flat WTP	Due an aging asset and a growth in water demand, new clarifiers and an upgraded lime system were installed which included allowance for future expected water demand growth. Both of these systems result in the need for an increased maintenance regime and increased chemical dosing, and were commissioned in FY18/19.	$44,823
		Kilcoy WTP	Kilcoy WTP UV system was upgraded in FY19/20 to allow for sufficient redundancy required to meet increasing water demand requirements. While increasing operational availability, this UV system represents a significant increase in maintainable assets.	$121,970

Change Type	Change Sub-type	Description	Driver	Net Change (FY17/18 to FY20/21)
		Linville WTP	Commissioned in FY19/20, Linville WTP was replaced and water treatment processes upgraded to meet water quality and resilience requirements. The WTP sustained damage from the 2013 flood event and had not been operating.	$36,843
		Lowood WTP	Lowood WTP is approaching end of life, however is an off grid WTP. While the long term replacement is progressing through the Gateway process, Lowood WTP has undergone upgrades to extend its operational life, improve resilience and meet Water Quality requirements. The deteriorating assets have also contributed to the increase in maintenance required to keep Lowood operational.	$81,390
		Molendinar WTP	In FY19/20, two items were addressed at Molendinar WTP that represent a large increase to the maintainable assets at this WTP: • A water quality issue was found relating to backwash velocity which affected water quality certification. A major electrical upgrade was under taken, including new supply transformers, switchboards, pumps and generators. • A significant emerging electrical risk was identified (arc flash) which could have resulted in fatalities. Additional maintainable assets were installed to address this risk.	$209,258
		North Stradbroke Island WTP	An environmental regulatory change in FY17/18 saw the need for additional residual waste costs related to the installation of new waste tanks to address this non-compliance inherent in the design of the original facility.	$120,000

Change Type	Change Sub-type	Description	Driver	Net Change (FY17/18 to FY20/21)
		Noosa Network Site	A sustained increase in demand from Noosa WTP from FY19/20 onwards has driven an increase in use of the network dosing site closer to capacity. This has driven increased operational and maintenance costs, and is an essential asset in ensuring continuity of water supply to the region.	$91,644
		Petrie Offtake	A new offtake pump station was constructed in partnership with Unitywater. This represents an increase in maintainable assets.	$23,833
		Canungra WTP	The new Canungra WTP was commissioned in late 2018 with an increased production output from 0.4ML a day to 1.8ML a day to meet emerging demand.	$99,368
Step Change	Audit Requirements and Aging Assets	Power Poles and Switchboards	Seqwater undertook an audit of electrical assets, including power poles, to understand condition of these assets. This audit identified significant issues with asset condition. All assets that represented an imminent risk to the community were immediately rectified. This step change represents the cost associated with ongoing preventative maintenance to mitigate the risk of this deteriorating asset class. With the emergence of arc flash risks from our electrical assets and a responsibility under the *Electrical Safety Regulation 2013,* Seqwater undertook condition assessments on all electrical switchboards to understand this risk. Additional maintenance is required to ensure the condition of these assets do not deteriorate further. This step change does not include the maintenance required to meet the *Work Health and Safety Act 2011,* the *Electrical Safety Regulation 2013* and the *Electrical Safety Code of Practice 2021 – Managing Electrical Risks in the Workplace* as noted in 3.2 below.	$ 900,000

Change Type	Change Sub-type	Description	Driver	Net Change (FY17/18 to FY20/21)
		Reservoirs	Seqwater's reservoirs are a deteriorating asset, and represent key infrastructure for water security. This step change represents the growth maintenance required to maintain structural integrity of these reservoirs and extend asset life.	$600,000
	Regulatory Change	Electrical Safety – Low Voltage	Seqwater has become aware of an emerging risk in our electrical infrastructure due to the age of these assets. In alignment with the *Work Health and Safety Act 2011*, the *Electrical Safety Regulation 2013* and the *Electrical Safety Code of Practice 2021 – Managing Electrical Risks in the Workplace*, Seqwater has a responsibility to amend work practices, including maintenance regimes to address the risk to electricians and other relevant persons. The cost presented is entirely to bring Seqwater's maintenance practice into compliance with Australian Standards and industry standard practice. The costs associated with the increased maintenance regime include additional inspections and preventative maintenance as required by Australian Standards. As this equipment will eventually be replaced in the Capex program, the costs provided are only preventative maintenance, and those that will be ongoing regardless of the age of the asset.	$431,134
		Electrical Safety – High Voltage		$38,998
		Electrical Safety – General Electrical		$304,251
		Electrical Safety – Electric Motors		$151,224
	Certification Change	Reservoirs	An external recertification audit identified non-conformance with *ISO 22000 - Food Safety Management* with respect to sanitary integrity of treated water reservoirs. In order to rectify this non-conformance, additional preventative maintenance is required on the treated water reservoirs across Seqwater's asset base. This includes annual and three yearly UAV and RAV inspections throughout the asset base.	$548,686

Change Type	Change Sub-type	Description	Driver	Net Change (FY17/18 to FY20/21)
		Water Quality Online Instrumentation	An external recertification audit identified non-conformance with *ISO 22000 - Food Safety Management* with respect to Water Quality Online Instrumentation. Growth in preventative maintenance is required to ensure higher availability and increased accuracy of this equipment in order to rectify this non-conformance.	$518,000
	Efficiencies	Maintenance Efficiencies	Seqwater's Maintenance Improvement Strategy (MIS) has created net savings to Seqwater after an initial investment (i.e. spend to save).	-$391,084
Total				$4,271,955

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1.0 Purpose

In the QCA's draft determination report on Seqwater's bulk water price review, QCA advised that insufficient justification had been provided to justify growth in maintenance spending in the QCA base year. The purpose of this document is to provide this justification in the form of base year adjustments and step changes.

2.0 Base Year Adjustments

When considering a FY18/19 base year, there are a number of adjustments required when considering efficient opex spend. Seqwater have characterised this into base year adjustments due to asset condition or asset growth.

2.1 Asset Condition

Following commentary provided by the QCA, Seqwater worked to establish the actual condition of our assets using our computerized maintenance management system (CMMS). Due to historical issues with this CMMS, this data is not readily available to analyse. Seqwater worked with an external CMMS consultant (Covaris) to provide insight into Seqwater's asset condition empirically. This report shows that Seqwater has deteriorating asset base that has increasingly shown signs of degradation in recent years. This has been confirmed through an analysis which has indicated that the growth in corrective and breakdown maintenance is a direct correlation to the condition of the assets.

However, Seqwater has been responsive to this situation to ensure prudent and efficient use of our resources. While the gateway process effectively addresses asset replacement, Seqwater also adjust our preventative maintenance schedules to address provide maintenance that best reflects asset condition. In this way, high cost and low efficiency events, such as breakdown maintenance, can be avoided by lower cost and higher efficiency planned interventions. This is depicted in Figure 1 below:

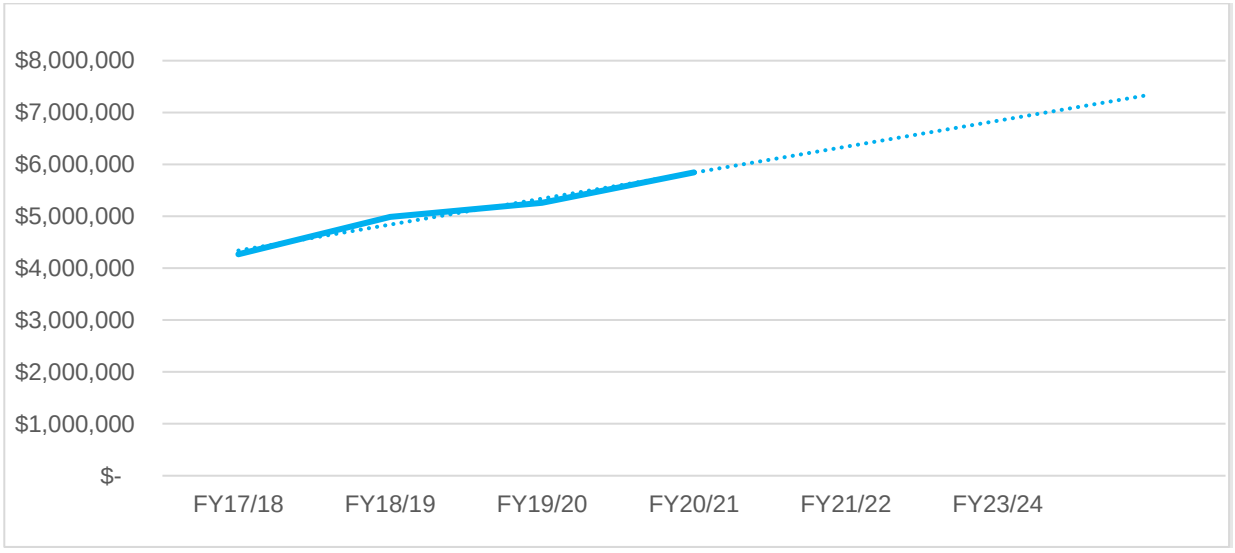

Figure 1: Preventative Maintenance Growth FY17/18 to FY20/21

The cost attributed to these deteriorating assets is escalating. When considering preventative maintenance only, there has been an average increase of $526,039 per annum. When considering all of maintenance delivery (i.e. preventative, corrective and breakdown maintenance, excluding administration costs), this growth is in the order

of $1,119,232 per annum. In order to complete this work, Seqwater has escalated the maintenance backlog in the order of $843,700 in FY20/21 alone. This has resulted in a reduction in redundancy and represents a significant operational risk escalation.

Seqwater have identified additional amendments required to maintain these assets moving forward, which is detailed in section 3.1 of this report.

2.2 Asset Growth

Due to the deteriorating asset condition detailed above, Seqwater have replaced or augmented assets that have reached end of life after 30+ years of service. When replacing these assets, Seqwater has be cognisant of the need to replace these assets within modern engineering standards to ensure a similar life span of these assets, and accounts for ongoing water security of the SEQ region for the next 30 years. It should be noted that the modern engineering standards are at times regulatory, further complicating any suggestion that like for like replacements of assets should be considered.

Seqwater's water security modelling indicates that in addition to the expected population growth, the adverse effects of climate change and the 2032 Olympics requires significant forward planning. With many uncertainties to deal with over the next 30 years, Seqwater has taken an adaptive approach to planning so that Seqwater can change depending on circumstances.

It is therefore both a prudent and efficient use of resources to ensure that assets that are being replaced through the capital program will meet a changing demand throughout their 30 year life span. This often results in the need to install assets of different size and configuration to the previous installation. This typically results in an increase in maintainable assets.

Figure 2 below depicts the net change to maintainable assets from FY17/18 onwards, with an average growth rate of over 600 assets per year.

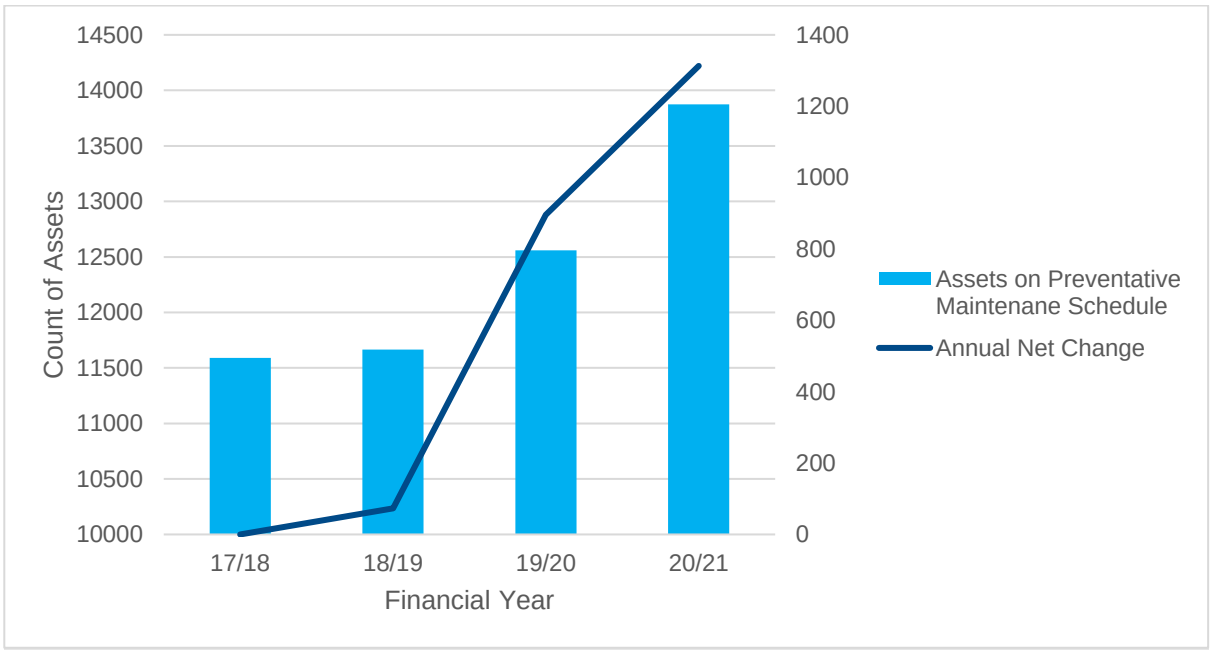

Figure 2: Net Change to Assets on Preventative Maintenance Schedule

Seqwater is not requesting an increase in funding for all of these maintainable assets. While Figure 1 depicts the net change in assets, installing additional assets can at times drive efficiencies through a decrease in corrective and breakdown maintenance. Seqwater is requesting funding where the driver for change has been a growth in water demand or regulatory changes that do not aid in efficiency (e.g. regulatory changes made due to safety or water quality requirements). This is detailed in Table 2 below:

Table 2: Base Year Adjustments

No.	Description	Driver	Net Change (FY18/19 to FY20/21)
1	Aspley Network Site	Major Upgrade completed in FY19/20 in order to meet regulatory water quality requirements. This upgrade addressed chlorine residual in the water grid, as well as enabling additional water produced by the central region to be transported to the north via the NPI needed for resilience and water security. It has driven a large increase in maintainable assets for the site, as well as a significant increase in chemical usage.	$178,875
2	Beaudesert WTP	There were two upgrades of note at Beaudesert completed in FY18/19: • Two new storage reservoirs constructed and brought online to support the SRWP Western Pipeline project. These tanks and ancillary equipment represent a growth in maintainable assets with no reduction. • Degradation of water quality in the Logan River (ammonia pollution) resulted in the need for Granulated Activated Carbon (GAC) to be installed at the water treatment plant. This results in an increase in maintainable assets and chemical usage. This additional treatment process was required to ensure that water quality requirements could be met in these conditions.	$140,034
3	Esk WTP	Due to the increasing water demand, Esk WTP underwent a substantial upgrade in FY18/19. An existing filter was decommissioned, and a new larger filter was installed to meet growing demand in the area. This represents a growth in maintainable assets and an increase in chemical usage.	$22,708
4	Image Flat WTP	Due an aging asset and a growth in water demand, new clarifiers and an upgraded lime system were installed which included allowance for future expected water demand growth. Both of these systems result in the need for an increased maintenance regime and increased chemical dosing and were commissioned in FY18/19.	$44,823
5	Kilcoy WTP	Kilcoy WTP UV system was upgraded in FY19/20 to allow for sufficient redundancy required to meet increasing water demand requirements. While increasing operational availability, this UV system represents a significant increase in maintainable assets.	$121,970
6	Linville WTP	Commissioned in FY19/20, Linville WTP was replaced and water treatment processes upgraded to meet water quality and resilience requirements. The WTP sustained damage from the 2013 flood event and had not been operating.	$36,843

No.	Description	Driver	Net Change (FY18/19 to FY20/21)
7	Lowood WTP	Lowood WTP is approaching end of life, however is an off grid WTP. While the long term replacement is progressing through the Gateway process, Lowood WTP has undergone upgrades to extend its operational life, improve resilience and meet Water Quality requirements. The deteriorating assets have also contributed to the increase in maintenance required to keep Lowood operational.	$81,390
8	Molendinar WTP	In FY19/20, two items were addressed at Molendinar WTP that represent a large increase to the maintainable assets at this WTP: • A water quality issue was found relating to backwash velocity which affected water quality certification. A major electrical upgrade was under taken, including new supply transformers, switchboards, pumps and generators. • A significant emerging electrical risk was identified (arc flash) which could have resulted in fatalities. Additional maintainable assets were installed to address this risk.	$209,258
9	North Stradbroke Island WTP	An environmental regulatory change in FY17/18 saw the need for additional residual waste costs related to the installation of new waste tanks to address this non-compliance inherent in the design of the original facility.	$120,000
10	Noosa Network Site	A sustained increase in demand from Noosa WTP from FY19/20 onwards has driven an increase in use of the network dosing site closer to capacity. This has driven increased operational and maintenance costs, and is an essential asset in ensuring continuity of water supply to the region.	$91,644
11	Petrie Offtake	A new offtake pump station was constructed in partnership with Unitywater. This represents an increase in maintainable assets.	$23,833
12	Canungra WTP	The new Canungra WTP was commissioned in late 2018 with an increased production output from 0.4ML a day to 1.8ML a day to meet emerging demand.	$99,368

2.2.1 Calculation Methodology

In order to establish the list provided in Table 2, Seqwater's operational spend was interrogated by location in order to understand trends between the FY17/18 and FY20/21 financial years. This produced an initial list of variances by site. This list was then interrogated to understand the causality of these changes, and if they were driven by an internal or external change. All sites driven by an internal change only were rejected where both increases or savings were definitively linked to an external driver. This final list was then investigated thoroughly to understand the nature of the change in order to produce Table 1.

It should be noted that the variable cost associated with chemical usage has not been included within the figures given in Table 2.

3.0 Step Changes

There are a number of external regulatory, certification and safety factors that are required to be addressed within the period from 1 July 2022 to 30 June 2028. Seqwater provides the below step changes, with further details in the following document sections.

Table 3: Step Changes to FY21/22

Document Section	Description	Driver	Net Change (FY20/21)
3.1	Audit Requirements and Aging Assets – Power Poles and Switchboards.	Seqwater undertook an audit of electrical assets, including power poles, to understand condition of these assets. This audit identified significant issues with asset condition. All assets that represented an imminent risk to the community were immediately rectified. This step change represents the cost associated with ongoing preventative maintenance to mitigate the risk of this deteriorating asset class. With the emergence of arc flash risks from our electrical assets and a responsibility under the *Electrical Safety Regulation 2013,* Seqwater undertook condition assessments on all electrical switchboards to understand this risk. Additional maintenance is required to ensure the condition of these assets do not deteriorate further. This step change does not include the maintenance required to meet the *Work Health and Safety Act 2011,* the *Electrical Safety Regulation 2013* and the *Electrical Safety Code of Practice 2021 – Managing Electrical Risks in the Workplace* as noted in 3.2 below.	$ 900,000
	Audit Requirements and Aging Assets – Reservoirs	Seqwater's reservoirs are an deteriorating asset, and represent key infrastructure for water security. This step change represents the growth maintenance required to maintain structural integrity of these reservoirs and extend asset life.	$600,000
3.2	Electrical Safety – Low Voltage	Seqwater has become aware of an emerging risk in our electrical infrastructure due to the age of these assets. In alignment with the *Work Health and Safety Act 2011*, the *Electrical Safety Regulation 2013* and the *Electrical Safety Code of Practice 2021 – Managing Electrical Risks in the Workplace*, Seqwater has a responsibility to amend work practices, including maintenance regimes to address the risk to electricians and other relevant persons. The cost presented is entirely to bring	$431,134
	Electrical Safety – High Voltage		$38,998
	Electrical Safety – General Electrical		$304,251

Document Section	Description	Driver	Net Change (FY20/21)
	Electrical Safety – Electric Motors	Seqwater's maintenance practice into compliance with Australian Standards and industry standard practice. The costs associated with the increased maintenance regime include additional inspections and preventative maintenance as required by Australian Standards. As this equipment will eventually be replaced in the Capex program, the costs provided are only preventative maintenance, and those that will be ongoing regardless of the age of the asset.	$151,224
3.3	Reservoirs	An external recertification audit identified non-conformance with *ISO 22000 - Food Safety Management* with respect to sanitary integrity of treated water reservoirs. In order to rectify this non-conformance, additional preventative maintenance is required on the treated water reservoirs across Seqwater's asset base. This includes annual and three yearly UAV and RAV inspections throughout the asset base.	$548,686
3.4	Water Quality Online Instrumentation	An external recertification audit identified non-conformance with *ISO 22000 - Food Safety Management* with respect to Water Quality Online Instrumentation. Growth in preventative maintenance is required to ensure higher availability and increased accuracy of this equipment in order to rectify this non-conformance.	$518,000
3.5	Maintenance Efficiencies	Seqwater's Maintenance Improvement Strategy (MIS) has created net savings to Seqwater after an initial investment (i.e. spend to save).	-$391,084

3.1 Calculation Methodology

In order to provide the data in Table 3, an in depth study was undertaken to calculate the incremental changes of the external factors. Seqwater utilise a zero based budgeting tool to undertake this study, which includes utilising 'what-if' scenarios to maximise efficiency of the proposed changes. Once the optimal maintenance regime has been found, the net difference to the existing regime is then compared. It is this net difference that is presented in Table 3.

3.2 Asset Condition

As detailed in section 2.1, Seqwater has an aging asset base. In recognition of this, a number of internal audits were conducted between 2019 and 2020 which identified weaknesses in the upcoming maintenance regime. To address these weaknesses, an action plan was developed to drive improvement throughout the entire maintenance cycle, including the tactical maintenance plans, 12-month preventative schedule and work order

classifications. A key element of this has been to achieve consistent maintenance strategies, condition assessment and data capture across the Seqwater asset portfolio where prudent and efficient to do so.

Implementation of this alignment will result in changes to the baseline maintenance schedules, and, for some asset types, will be a step change to align with industry standard maintenance practice. An effective preventative maintenance program is necessary to ensure that asset life and availability is optimised, and to reduce the need for larger, more costly interventions (which may involve a renewal or replacement).

3.3 Electrical Safety

In recent years there has been a higher safety awareness and legislative requirements whereby existing aging electrical infrastructure needs to be managed. There has been increased focus on arc flash hazards and to reduce its risk to electricians and other relevant persons in line with the *Work Health and Safety Act 2011*, the *Electrical Safety Regulation 2013* and the *Electrical Safety Code of Practice 2021 – Managing Electrical Risks in the Workplace.*

The asset class plan and subsequent tactical maintenance plan for electrical switchgear will bring the Seqwater planned maintenance practices in line with industry and Australian standards to ensure that electrical switchgear operate in the intended and reliable manner to protect equipment and provide for a safe environment to personnel. These new electrical requirements includes auxiliary power, HV and LV electrical works and the General Power (power poles and lines) assets.

3.4 Reservoirs

Due to a body of work driven driven by external certification bodies, there is aneed to change maintenance activities required to sufficiently manage the sanitary integrity of our treated water reservoirs. An external recertification audit of Seqwater's drinking water quality management system conducted in 2018 identified a non-conformance with *ISO 22000 - Food Safety Management* with respect to sanitary integrity of treated water reservoirs. This identified the need to improve sanitary inspection and review of our treated water reservoirs.

As a result of this, a number of changes to the maintenance regimes were identified. These changes include yearly UAV external, 3-yearly RAV internal sanitary and structural integrity inspections. These inspections will improve data collection and identification of corrective maintenance before more costly interventions are required. In addition, these changes ensure that the planned maintenance practices maintain sanitary integrity, and the drinking water quality management system maintains compliance with ISO 22000.

3.5 Water Quality Online Instrumentation

An external recertification audit of Seqwater's drinking water quality management system against *ISO 22000 - Food Safety Management* highlighted changes required to online instrumentation maintenance and calibration. This was due to ongoing failures of these instruments which drove water quality exceedances.

In addition to the audits, analysis of the HACCP critical limit exceedances identified water quality instrument inaccuracy as the leading cause of these exceedances. This information suggests that changes to the calibration and maintenance of water quality instrumentation is also required to ensure the accurate measurement as well as a higher availability of equipment. In the event of an analyser failure, regular grab samples are required for verification which is more expensive due to the high labour required to implement.

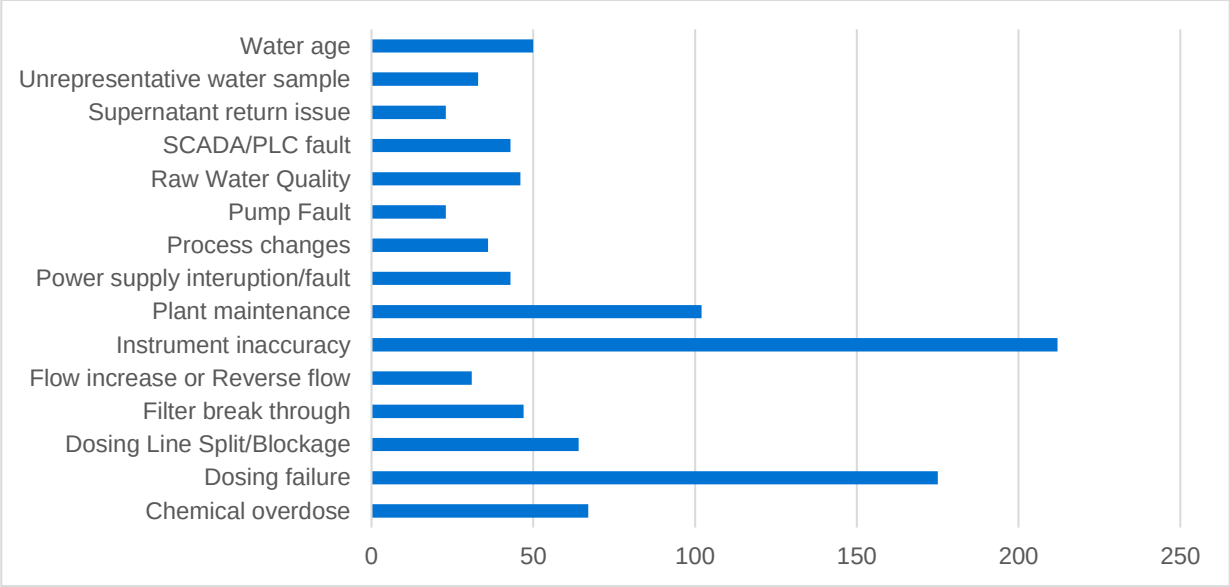

Figure 3: DWQ Critical Limit Exceedances

3.6 Maintenance Efficiencies

Seqwater commenced the Maintenance Improvement Strategy (MIS) in FY19/20, which after an initial investment has begun to deliver efficiencies to the maintenance budget. This is primarily completed through the transition to condition based maintenance and streamlining of work flows throughout the maintenance cycle.