Consultation Post Implementation Review - Chapter 2A of Public Health Act 2005

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Queensland Government

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For more information contact:

Water Unit, Department of Health, Queensland Health, GPO Box 48, Brisbane QLD 4001, email waterquality@health.qld.gov.au, phone (07) 3328 9310.

An electronic version of this document is available at www.getinvolved.qld.gov.au

Glossary

BEMS	Building and Engineering Management Services
CEO	Chief Executive Officer
CHO	Chief Health Officer
DON	Director of Nursing
GM	General Manager
HPC	Heterotrophic plate count (a measure of overall microbial activity in water)
NATA	National Association of Testing Authorities, Australia
OBPR	Office of Best Practice Regulation
PIR	Post Implementation Review
RIS	Regulatory Impact Statement
The Act	*Public Health Act 2005*
The Regulation	Public Health Regulation 2018
TMV	Thermostatic mixing valve (used to reduce temperature of hot water)
VMO	Visiting Medical Officer
VSL	Value of a statistical life
WRMP	Water risk management plan

Summary

Background

The *Public Health Act 2005* (the Act) regulates many aspects of public health. Amendments to the Act in 2016 introduced new Chapter 2A provisions for water risk management in healthcare facilities, which commenced in February 2017.

The objective of the new Chapter was to improve the management and control of health risks associated with the supply and use of water in hospitals and residential aged care facilities, in particular the health risks associated with the *Legionella* bacteria.

The amendments required public hospitals, state aged care facilities and private health facilities to:

- prepare water risk management plans, including undertaking a risk assessment and develop risk mitigation controls and processes
- undertake water testing for *Legionella* and other identified hazards
- report to the department on the outcomes of testing

Queensland Health is undertaking a post-implementation review (PIR) of the provisions, in accordance with the Queensland Government Guide to Better Regulation, to consider the impacts of the new requirements.

The interim measures
Following a report by the Chief Health Officer in 2013, mandatory interim measures were applied in 2014 requiring facilities to develop a water risk management plan, focusing on the management and control of *Legionella* risks.

The legislative amendments
In 2016, the interim measures were replaced with amendments to the Act, which came into force in February 2017. The Act requires prescribed facilities to have a water risk management plan—a written plan to prevent or minimise the risks posed by all water-related hazards, hazard sources or hazardous events to individuals at the facility. The amendments extended the scope of the interim measures, requiring facilities to consider hazards other than *Legionella* and included notification and reporting obligations.

The amendments were based on international best practice in *Legionella* bacteria risk management in hospitals and residential aged care facilities and aligned closely with the new national Guidelines for *Legionella* control in the operation and maintenance of water distribution systems in health and aged care facilities, approved by the Australian Health Protection Principal Committee in 2015.

Objectives

The objectives of the legislative amendments were articulated in the Amendment Bill's Explanatory Notes and second reading speech. The objectives were to:

- improve the management and control of health risks associated with the supply and use of water in hospitals and residential aged care facilities, in particular the health risks associated with *Legionella* bacteria, and

- provide greater transparency of water testing activities being undertaken by these facilities.

It is against these objectives that the effectiveness of the legislative amendments has been assessed in this PIR, having regard to the costs of implementing the amendments.

Costs and benefits of the interim arrangements and legislative requirements

The total costs incurred by prescribed facilities since 2014 (over and above what they would have done anyway), is $23.8 million to meet the requirements of the interim arrangements and the legislative requirements. It is estimated that a cost of $10.1 million was incurred under the interim arrangements and around $13.7 million since the legislative requirements commenced in 2017.

Allowing for maintenance, repair and replacement of capital over time, and training new staff, the annualised ongoing cost of the legislative requirements continuing is estimated at around $4.9 million per year, or about $18,000 per facility on average (an average of $18,800 per annum for public sector hospitals and $16,900 for private sector heath care facilities).

The prescribed facilities have confirmed that, in nearly all facilities, risks are much better managed under the legislative changes than before. Staff now have a better awareness and understanding of the hazards and risks, and there is improved oversight of water quality within the facilities. A large majority of facilities (77 per cent) consider their plans are 'good' or better in identifying, assessing and controlling risks. The proportion of facilities that now actively control risk of *Legionella* has risen from 48 per cent to over 98 per cent, and there are now much higher proportions of facilities that actively control other risks such as loss of water supply, water temperature, residual disinfectants, *Pseudomonas aeruginosa*, and heavy metals.

Facilities also report that there is increased confidence in the safety of the facilities in regard to water-based hazards. Most facilities confirmed that the assurances of safe water are working, with the plans assisting in timely resolution of issues as they arise.

By way of illustration, the benefits outweigh the costs if each year the actions taken under the water management plans prevent at least:

- the loss of one statistical life (at a value of $3 million)
- and 38 non-fatal infections (each with an avoided cost of $50,000; a total of $1.9 million per year).

It is difficult to measure the direct benefits of the legislation. This is because reported detection of water hazards, and confirmed cases of infection due to detected hazards, are now more likely, with the greater awareness on identifying and managing risks leading to greater effort to match harms with causes. In other words, previously (and to a lesser extent now), some sicknesses and deaths were likely caused by water-based hazards within the facilities, but not verified if the cause of the infection was not correctly diagnosed and there was limited testing to confirm the source of the infection.

Nevertheless, it is likely that the measures put in place have contributed to a reduced risk of infection for vulnerable people in the facilities. It is certainly true that a large share of facilities have detected the presence of *Legionella* since the plans were put in place. The key point is that once facilities were aware of the risk from previously undetected *Legionella*, they then had

the procedures in place to take appropriate measures to reduce either the occurrence of *Legionella* or to eliminate the potential exposure of patients.

While prevention of water-hazard related deaths and illness is of course the ultimate objective, it can be difficult to see any clear evidence of the impact of the legislation on these outcomes over a short period of time, where such incidents are not usually frequent at a facility, and where evidence of source and cause of infection can remain unclear. The intention of the legislation is not to prevent every case of water hazard harm, but to reduce the overall risks over the medium to longer term of these hazards impacting on people. The more relevant short-term indicator is whether facilities have actually reduced the level of risk—being either the risk of the hazard itself existing, the risk of a person being harmed by the hazard, or the consequential impact of that harm occurring.

The benefit of reduced risk can therefore be seen by the evidence that:

- all prescribed facilities have a water risk management plans in place
- all facilities have invested in improved processes, infrastructure and staff training to reduce risks
- all facilities have undertaken additional testing for and reporting on the presence of *Legionella*
- there is now a higher awareness of water hazard risks in these facilities.

Feedback from the survey of health facilities highlighted the following general benefits resulting from the legislative changes (these comments are quoted verbatim):

- Better understanding of hazards and risks; Improved oversight in water quality within the facility.
- Good from a governance perspective; database is transparent and can be followed if specific personnel are on leave; assists with the coordination of testing and management of positive results; easily identifies problem areas where addition investigation/work may have to be carried out.
- Assurance that water supplies are safe and maintenance regimes are working; Reassurance to patients, visitor and staff that the facility has good water quality.
- The plan has been beneficial when patients have presented to the hospital with legionellosis and testing of the ward they are being cared in can be quickly undertaken and source identified as not from the hospital infrastructure—contribution to clinical risk.
- Having a formal plan has assisted with the swift and timely resolution of issues as they arise.
- The process also provides good general information on the status of the water reticulation system in general.
- Identification of lack of backflow prevention.
- Benefits in the form of plumbing infrastructure upgrades, as well as improved efficiency with maintenance schedules.

In addition, the regular testing and reporting of *Legionella* detection will also assist in investigation of suspected outbreaks. Where an outbreak is detected, there would usually be a high level of resources used to identify the source of the infection. This can involve tens of

thousands of dollars depending on the facility. A regular record of testing streamlines any investigation.

Options for change

The broad alternative options to continuing with the legislation are:

- Repealing Chapter 2A of the Act and reverting to the arrangements under the interim arrangements
- Repealing Chapter 2A of the Act and not reverting to the interim arrangements.

These options are essentially the base cases against which the impacts were assessed in Chapter 4 of this PIR, which showed that the benefits of the legislation are likely to outweigh the costs, and therefore the current legislation is the preferred option.

The review of the legislation, in particular feedback from stakeholders, did not identify any significant gaps in the regulatory framework that would warrant consideration of expanding the legislative scope or requirements. It is noted:

- Some of the existing powers in the Act are only now beginning to be used, such as the ability for Queensland Health to review individual plans and direct changes to be made. The use of these powers will increase in the future.
- The Act allows the requirements to be extended to private residential aged care facilities via amendment of the Public Health Regulation. This is intended to occur at some time in the future, and will be subject to a separate assessment of costs and benefits.

This review, drawing on feedback from regulated facilities, has identified a number of areas that could help in reducing the costs of compliance. However, these actions all exist outside of the legislation and can be considered by Queensland Health as part of their ongoing administration of the legislation.

Next steps

This is a Consultation PIR. It sets out Queensland Health's conclusions based on the available evidence. The release of the Consultation PIR is an opportunity for any interested parties to provide a written submission to Queensland Health on the findings and conclusions of this report. All submissions will be reviewed, before finalising a Decision PIR, which updates this PIR in response to feedback provided. The Decision PIR is then provided to Minister to make a decision on the future of the legislation.

Lodging a submission

Closing date for Submissions: **29 November 2019**

You are invited to have your say about the impact of the Chapter 2A Water risk management provisions of the *Public Health Act 2005*.

Written comments should be provided by *4pm Friday 29 November 2019*. The government will consider all submissions received by the due date.

Submissions should be sent either by email or post:

Email: Waterquality@health.qld.gov.au with the subject line: Water risk management – Consultation PIR – [your name]

Post: Water Unit, Health Protection Branch, PO Box 2368, FORTITUDE VALLEY BC QLD 4006

Submissions may be published unless provided in confidence. Material provided in confidence should be clearly marked “IN CONFIDENCE”.

Any questions about this consultation process can be submitted via the email info@regulatoryimpactsolutions.com.au or by contacting Regulatory Impact Solutions on 0408 111 142.

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1 Background

1.1 Public Health Act 2005

The object of the *Public Health Act 2005* (the Act) is to protect and promote the health of the Queensland public. This object is achieved, in part, by provisions in the Act for preventing, controlling and reducing risks to public health; inquiring into serious public health matters; responding to public health emergencies; and providing for compliance with the Act to be monitored and enforced.

1.2 Legislative changes were made in 2016

There are over 50 species of *Legionella* bacteria, some of which can cause disease in humans. *Legionella bacteria* are widely distributed in the environment in natural water sources such as lakes, rivers and streams, and other habitats such as soils and mud. *Legionella* bacteria from natural water sources can enter and colonise manufactured water systems. These systems are commonly found in commercial, industrial, health care, aged care, child care and education facilities and include:

- air handling systems incorporating water cooling towers and evaporative condensers (collectively known as cooling water systems)
- piped water supplies and cold, warm and hot water pipework
- spa pools, spa baths and hydrotherapy pools
- ice machines and chilled water dispensers
- air-houses (industrial humidifiers used in paint, electroplating and finishing shops)
- humidifiers and nebulisers
- decorative fountains.

The *Public Health (Water Risk Management) Amendment Act 2016* introduced a new Chapter 2A into the Act. The objective of the new Chapter was to implement measures to improve the management and control of health risks associated with the supply and use of water in hospitals and residential aged care facilities, in particular the health risks associated with *Legionella* bacteria.

Following an outbreak of Legionnaires' disease in two patients at the Wesley Hospital in late May and early June 2013, the Chief Health Officer (CHO) conducted a review to investigate measures to improve the control and management of risks from *Legionella* bacteria in hospitals and residential aged care facilities. In September 2013, the CHO published a report Review of the prevention of *Legionella* pneumophila in Queensland and made six recommendations. The CHO recommended the introduction of interim measures requiring public hospitals, public residential aged care facilities and licensed private health facilities to develop and implement water quality risk management plans, focusing on the management and control of *Legionella* bacteria risks. These interim measures were put in place in mid-2014 (via a Physical Environment Standard issued for private health facilities and a Health Service Directive for public health facilities). The CHO also recommended amendments to the Act to provide a

permanent regime to better manage the risks, as a legislative scheme can provide better enforcement.

International consensus is that the proportion of acute infections caused by bacteria that are fatal tends to be much higher for healthcare acquired infections. This may be attributable to the fact that those at highest risk are likely to spend increased time as hospital inpatients or as residents of aged-care facilities and that the complexity of the plumbing in these premises may encourage the multiplication of *Legionella* bacteria.

While *Legionella* bacteria detections in hospital water supplies are not unusual, there have been relatively few fatal cases of hospital acquired legionellosis in Queensland hospitals.

The amendments responded to a community expectation that hospitals and residential aged care facilities should proactively manage and control potential risks to the health of their patients and residents. The amendments included measures that will give effect to the Government's commitment to greater public transparency regarding water testing being undertaken by facilities to detect *Legionella* bacteria.

The new requirements are the most stringent in Australia when it comes to water risk management in hospitals and residential aged-care facilities and they build on current international best practice in *Legionella* risk management in these spaces.

There are currently around 271 entities regulated under Chapter 2A—153 public sector facilities including 140 hospitals (with 51 aged care facilities co-located on site with the hospital and 13 separate State aged care facilities not co-located with a hospital) and 118 private healthcare facilities.

Table 1: Number of prescribed facilities

Facility Type	Over 100 beds	51 to 100 beds	1 to 50 beds	No overnight beds/unspecified	Total
Public sector hospitals and state aged care facilities	13	8	90	42	153*
Private facility licensed under *Private Health Facilities Act 1999*	25	14	19	60	118
Total	38	22	109	102	**271**

*State aged care facilities are generally located within public hospitals, and therefore not counted as additional facilities

The following table illustrates the requirements for facilities to manage water related hazards over time.

Table 2: Water risk management requirements over time

Mandatory Requirements	Prior to May 2014	Interim Arrangements May 2014 – 31 Jan 2017	Chapter 2 A requirements 1 Feb 2017
Water management plan that considers life cycle of infrastructure	✗	✓	✓
Scope of WMP limited to *Legionella* management	✗	✓	✗
Scope of plan includes all water related hazards	✗	✗	✓
Undertake risk assessment	✗	✓	✓
Describe the water distribution system	✗	✗	✓
Document procedures for controlling hazards	✗	✗	✓
Scheduled testing of water for presence of *Legionella*	✗	✓	✓
Scheduled testing of water for other hazards	✗	✗	✓
Procedures for responding to presence of hazards	✗	✓	✓
Reporting to the Department of positive detections of *Legionella* in water samples	✗	✗	✓
Requirements to review the plan	✗	✗	✓
Comply with Preliminary Guidelines for Managing Microbial Water Quality in Health Facilities 2013	✗	✓	✗

Water risk management plans are recognised internationally as the most effective method of managing health risks associated with water related hazards. They are reflected in the World Health Organization's water safety framework approach for ensuring drinking water safety as outlined in its *Guidelines for Drinking-water Quality* (WHO 2017) and in their guideline document *Water Safety in Buildings* (WHO 2011). They are also intrinsic to the risk-based approach adopted in the national guidelines for *Legionella* control in health and aged-care facilities that were approved by the Australian Health Protection Principal Committee in late 2015 (enHealth 2015).

The new requirements for water risk management plans

Chapter 2A requires the 'responsible person' for a prescribed facility to ensure there is a *water risk management plan*. Water risk management plans are written plans to prevent or minimise the risks posed by hazards, hazard sources or hazardous events to individuals at the facility.

The prescribed facilities that need to prepare a water risk management plan are:
(a) public sector hospitals that provide treatment or care to inpatients
(b) private health facilities licensed under the *Private Health Facilities Act 1999*
(c) State aged care facilities
(d) residential aged care facilities, other than a State aged care facility, prescribed by regulation.[1]

Water risk management plans must comply with the content requirements set out in section 61D of the Act. Copies must be provided to the Queensland Health chief executive, if requested. The Act provides for the Queensland Health chief executive to require amendments to a plan.[2]

The responsible person for a prescribed facility must ensure the facility operates in a way that complies with the facility's water risk management plan. The responsible person must also take all reasonable steps to ensure that each person who has an obligation to comply with the plan, complies with the plan.

A plan must include:

- a schedule that must be complied with for testing water for *Legionella* and other identified hazards at a frequency informed by the risks, measures and procedures
- stated procedures for responding to the results of testing that indicate the presence of a hazard in water within the prescribed facility's water distribution system.

If the result of a test confirms the presence of *Legionella* in water, a 'person in charge' of the facility must give the Queensland Health chief executive a notice about the result of the test within 1 business day after the person in charge is notified of the result of the test. This notification must provide the required information as specified by the notification form.

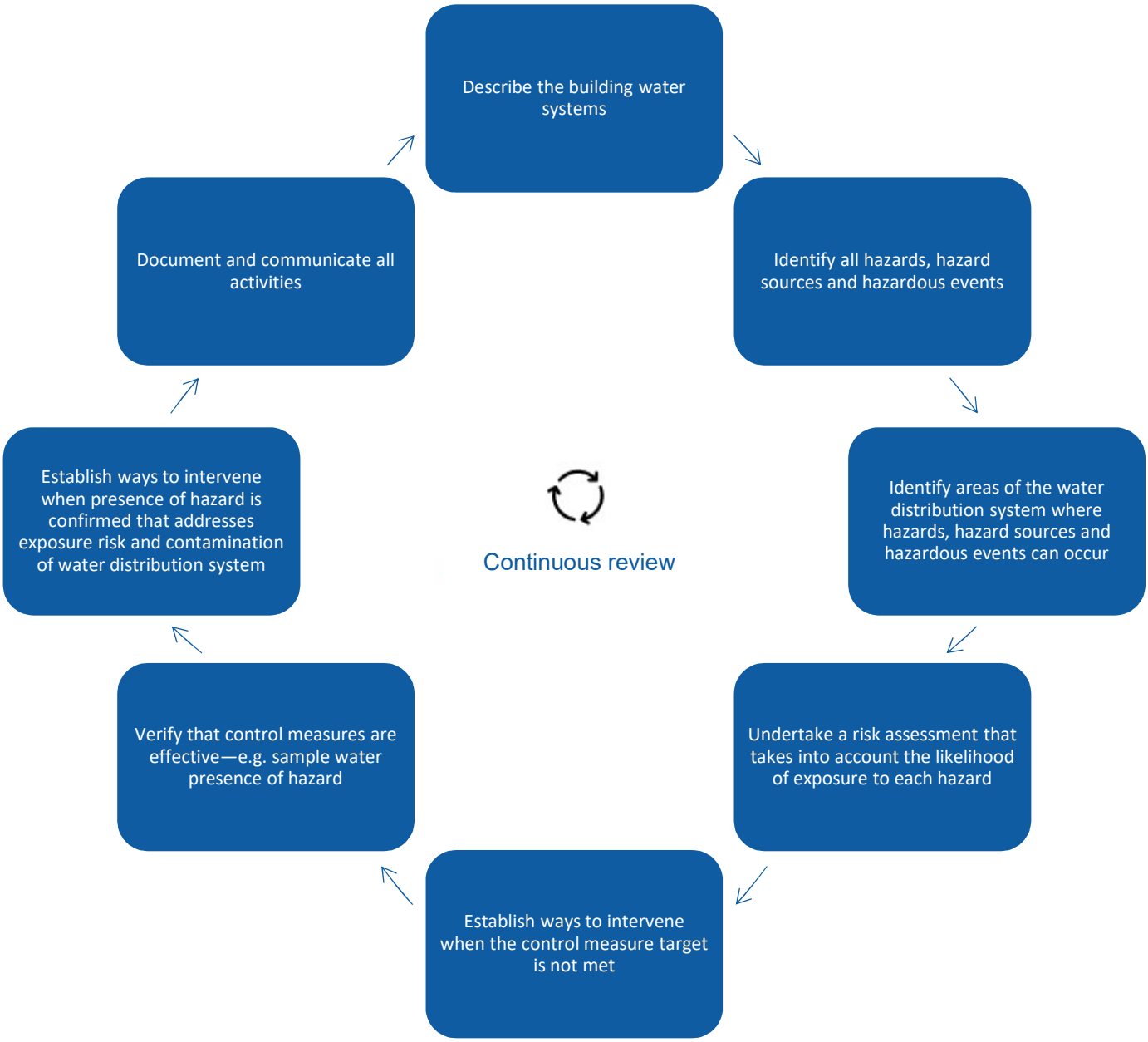
The person in charge must also provide a quarterly report about the results of prescribed tests carried out under the water risk management plan for the prescribed facility.

[1] The legislation sought to provide flexibility to accommodate the Government's intention to implement the legislation in private sector residential aged care facilities using a phased approach. To date, no other facilities have been prescribed in regulations. It is intended that the scheme will be rolled out to the more than 400 private residential aged care facilities in the future.

[2] To date, the chief executive has not formally reviewed any plans or directed amendments—this process is intended to commence in the future.

Developing and maintaining a water risk management program is a multi-step, continuous process. The main steps are outlined in Figure 1 below.

Figure 1: Steps to developing a water risk management plan



There must also be certain framework elements to support the implementation of a plan including:

- Employee training
- Research and development
- Documentation and reporting
- Internal audits for continuous improvement.

1.3 The purpose of this Review

A regulatory impact assessment—a formal evaluation of the likely costs and benefits of the amendments—was not done at the time of making the amendments to the Act. The Queensland Government Guide to Better Regulation provides for an assessment to be done following the implementation of the amendments—a Post Implementation Review (PIR)—when an exemption from a RIS has been undertaken.[3]

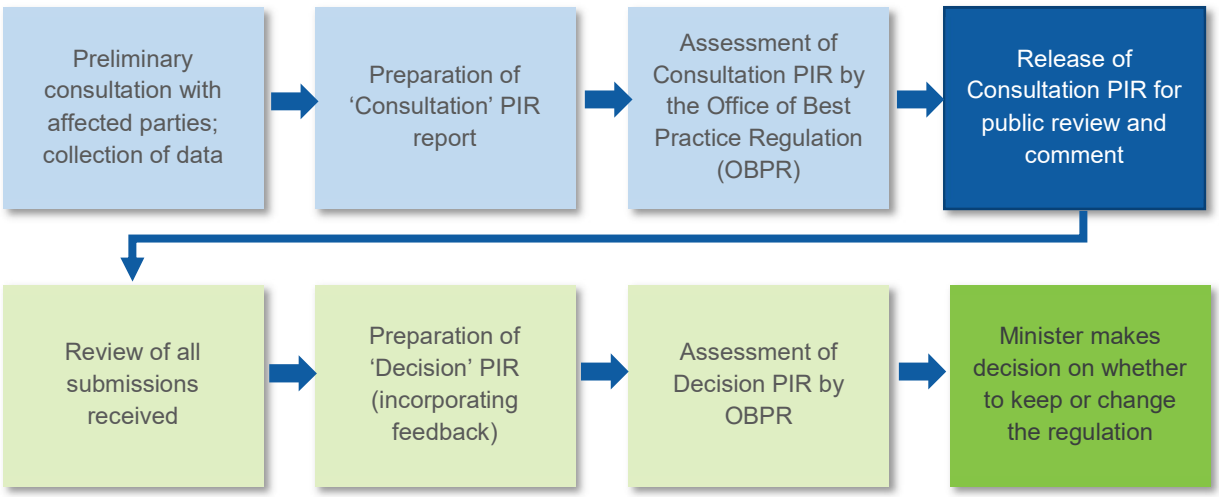
The purpose of a PIR is to assess the impacts, effectiveness and continued relevance of regulations that have been made and are in force. A PIR must address:

- whether the problem requiring regulation still exists (that is would exist without the regulation)—what was the problem that the regulation intended to solve? What were the objectives of government action? Why was the policy (that became the regulation) preferred over other options?
- the actual (rather than expected) impacts of a proposal—what are the observed impacts (costs and benefits) of the regulation since implementation?
- effectiveness of the regulation—is the regulation working as intended? Has the regulation solved (or made progress towards solving) the problem? Is it meeting the original policy objectives?
- whether there were any unintended consequences from the regulation's implementation
- whether the regulation should continue, including whether any amendments should be made—Is there a genuine need for continued regulation? If yes, is the current regulation the best option? What impacts would arise if the regulation expired / was repealed?
- list any proposed improvements to the regulation (especially if the problem is not being adequately addressed) and discuss potential impacts.

[3] Cabinet may require an agency to complete a PIR when a regulatory proposal has been exempted from the requirement to complete a RIS. Where a PIR is required, it must be commenced within two years (and completed within three years) of the implementation date of the legislation—unless Cabinet prescribes a different timeline or approach. The amendments to the Act commenced on 1 February 2017.

There are a number of steps involved in completing the PIR.

Figure 2: Process for completing a Post Implementation Review



This document is the Consultation PIR released for public feedback. Following consultation, a Decision PIR is prepared which updates and builds on the Consultation PIR and includes:

- a summary of the submissions received and the key views of stakeholders
- a discussion of whether any of the information or analysis contained in the Consultation PIR has changed based on information received during consultation
- a final assessment of the regulation's effectiveness and any recommended amendments.

The Decision PIR is used to support any proposed amendments to the regulation, or to confirm that the regulation is working as intended.

PIRs must be prepared in accordance with the Queensland Government Guide to Better Regulation, which sets out the requirements for Regulatory Impact Statements (RIS). The key difference is that a PIR is prepared after a regulation is implemented while a RIS is prepared before a regulation is made (and looks at expected impacts across various options). The PIR examines the actual observed impacts of the regulation being reviewed. Some other differences from a RIS include the range of alternative options considered, and an implementation and evaluation strategy is not necessary (unless changes are proposed).[4]

The Office of Best Practice Regulation (OBPR) assesses both the Consultation PIR and Decision PIR for adequacy against the Queensland Government Guide to Better Regulation.

For further information on PIRs see:

- The Queensland Government Guide to Better Regulation – available at https://www.treasury.qld.gov.au/resource/queensland-government-guide-better-regulation/
- GUIDANCE NOTE Post implementation review – available at https://www.qpc.qld.gov.au/regulatory-reviews/

[4] The PIR represents an evaluation of the impacts of the amendments. It is best practice that any proposed changes to regulation undertake an analysis and consultation prior to changes being made.

1.4 Consultation to date

Queensland Health consulted widely on the development of the legislative amendments and their implementation.

In developing the legislation, Queensland Health consulted with:

- Hospital and Health Services (including Executives, public health physicians and senior Building, Engineering and Maintenance staff)
- Queensland private hospitals
- the Australian Aged Care Quality Agency
- the Commonwealth Department of Social Services
- Queensland Government agencies (Queensland Health, Department of Justice and Attorney-General, Department of Housing and Public Works and the Queensland Building and Construction Commission)
- representatives of three of Queensland's largest private residential aged care providers.

The general consensus from this consultation was that the focus of the legislative amendments should be on the implementation of water risk management plans.

Prior to the Bill being passed by parliament, the parliamentary Transportation and Utilities Committee examined the Bill, inviting submissions and holding public hearings. This PIR has taken note of the views of the Committee's report, and the views expressed by stakeholders as part of that examination:

- Central Queensland Hospital and Health Service
- Metro South Hospital and Health Service
- Master Plumbers' Association of Queensland
- Plumbers Union Queensland.

While the primary purpose of the release of the Consultation PIR is to facilitate consultation with affected stakeholders, consultation with regulated entities has been necessary in the preparation of the Consultation PIR. This is because the analysis focuses on the actual impacts of the legislative changes, which requires the PIR to specifically consider the experienced regulatory burden on the regulated entities. In the preparation of this Consultation PIR, Queensland Health sought the input from the facilities affected by the legislative amendments. An invitation was provided to all prescribed facilities to participate in an online survey to provide information on the costs and benefits of the amendments, and also to express views about the implementation. Responses to the survey are discussed later in this PIR—responses were received from 89 facilities.

This Consultation PIR has now been publicly released, and any interested person or organisation is able to provide a written submission. All submissions are reviewed, and the PIR is updated to incorporate this feedback, particularly where the submissions provide new evidence.

2 The problem addressed by the legislation

The problem that the legislative amendment sought to address was articulated in the Amendment Bill's Explanatory Notes and second reading speech. These drew on findings from the CHO's Review of the prevention of *Legionella pneumophila* in Queensland.

Legionnaires' disease[5] is a potentially fatal respiratory disease caused by bacteria belonging to the genus *Legionella*.

Key points about the nature and extent of the problem – water contamination insights

- *Legionella* is a diverse and opportunistic pathogen.
- There are multiple contamination hazards in drinking water supplies, in addition to *Legionella*, including cryptosporidium and giardia. Different pathogens and contaminants can interact chemically and biologically.
- Controls relating to *Legionella* are also relevant to many other biological contaminants.
- There are significant data gaps nationally on the track record of contamination incidents at different scales and in different types of facility, but some major incidents are well documented, and these serve as useful case studies.
- While the number of contamination cases historically is low, the individual health effects can be very severe, especially for people who are elderly, have compromised immunity or are otherwise unwell or at risk.
- Water contamination may be undetected or misattributed as a cause of some personal and public health impacts, even where those impacts are severe.
- Water contamination incidents can have large impacts on public confidence, as demonstrated by the 1998 Sydney water supply incidents.
- Preventing and addressing the dangers associated with water supply contamination requires coordinated and multi-faceted risk management.

Legionella is an opportunistic pathogen of public health concern.[6] There are over 50 species of *Legionella* bacteria, some of which can cause disease in humans. *Legionella* bacteria are widely distributed in the environment in natural water sources such as lakes, rivers and streams, and other habitats such as soils and mud. *Legionella* bacteria from natural water sources can enter

[5] In this PIR, the terms "legionellosis" and "Legionnaires' disease" are used in the same context and are interchangeable. Both terms refer to an acute infection caused by any bacteria belonging to the genus *Legionella*.

[6] Whiley et al, "Uncertainties associated with assessing the public health risk from *Legionella*", *Frontiers in Microbiology*, published September 2014.

and colonise manufactured water systems. These systems are commonly found in commercial, industrial, health care, aged care, child care and education facilities and include:

- air handling systems incorporating water cooling towers and evaporative condensers (collectively known as cooling water systems)
- piped water supplies, and cold, warm and hot water pipework
- spa pools, spa baths and hydrotherapy pools
- ice machines and chilled water dispensers
- air-houses (industrial humidifiers used in paint, electroplating and finishing shops)
- humidifiers and nebulisers
- decorative fountains.

The presence of other water-based organisms, such as amoebae, algae and other bacteria within these environments can provide greater nutrient levels, and protective habitat within the pipe biofilm, further enhancing growth of *Legionella*.

Legionnaires' disease is a bacterial infection which typically causes pneumonia but may also involve other organ systems. The disease is usually transmitted by airborne droplets from contaminated water sources, such as cooling towers, air conditioners, whirlpools, and showers. Cases have also been associated with use of contaminated potting mix. Legionnaires' disease is not transmitted from person-to-person.

It particularly affects the elderly, the very young and the immunocompromised. Risk of infection is a combination of two factors – the amount of *Legionella* bacteria to which the body is exposed and the resistance of the individual to the bacteria. Thus, it is only possible to make general statements about risk. However, risk is increased for those whose immune system is already under stress for any reason, including illness or medical treatment, such as radiation therapy. Diabetics, those suffering chronic lung, heart or kidney disease, aged persons, smokers and heavy drinkers also have some increased risk.

Sufferers generally require hospitalisation for lengthy periods, typically in intensive care. For a minority of sufferers, the disease proves fatal, while a small proportion suffer permanent disablement as a result of the disease. Fatality rates for those contracting Legionnaires' disease range from 5 per cent to as high as 50 per cent for some known outbreaks.

Water contamination case study 1: Melbourne 2000

During two weeks in April 2000, an outbreak of Legionnaires' disease occurred among visitors to the Melbourne Aquarium, causing 76 cases, including two deaths. The outbreak was traced to contamination of the aquarium's cooling towers, which were subsequently disinfected. In April 2002, a cluster of a further five cases were reported from Melbourne, evidently arising from a contaminated cooling tower in an inner city building. In December 2012, a small outbreak was reported from the Melbourne suburb of Bundoora. These incidents led to much public concern and a major public health response.

International consensus is that the proportion of acute infections caused by *Legionella* bacteria that are fatal tends to be much higher for healthcare acquired infections. This may be attributable to the fact that those at highest risk are likely to spend increased time as hospital inpatients or as residents of aged-care facilities and that the complexity of the plumbing in these premises may encourage the multiplication of *Legionella* bacteria.

While *Legionella* bacteria detections in hospital water supplies are not unusual, there have been relatively few fatal cases of hospital acquired legionellosis in Queensland hospitals. However, without adequate identification, assessment, control and monitoring of risks, preventable cases of harm are more likely to occur. Facility managers may lack awareness or have competing priorities relating to water delivery systems (cause), resulting in *Legionella* growth within the poorly maintained water delivery systems (event), which leads to case(s) of legionellosis (harm).

Recent cases of hospital acquired Legionnaires Disease
Ten cases of *Legionella pneumophila* infection were notified between 2013 and 2016 with hospitalisation during their exposure period.

Hospitalisation may not necessarily be the source of infection with *Legionella pneumophila*, particularly if a case spent less than their entire exposure period in hospital. Public health follow-up, and application of the surveillance case definition, resulted in five cases with hospitalisation unable to be excluded as a source of infection.

Cases of legionellosis associated with hospitalisation reported in the public domain include:
2013 : Two hospital cases (one deceased)
2015 : One case (deceased)
2015 : One case.

The overall risk to the community of having no regulation in place is medium, because while there are very low numbers of cases of legionellosis associated with these types of facilities, there are severe consequences for older and immune-compromised people from contracting legionellosis. It remains of public health importance because of a potential high mortality rate, particularly in untreated, immunocompromised patients; potential for outbreaks in community settings; and the potential for nosocomial transmission to immunocompromised patients in rare circumstances.

Prior to the incidents at the Wesley Hospital, facilities were not required to specifically manage and monitor for microbial water related hazards such as *Legionella*. Any testing of the water was typically undertaken as part of a disease investigation response following confirmation of a disease. If *Legionella* was found then actions such as flushing, pasteurisation or chlorination would be undertaken but only until a negative laboratory test was received. There was no ongoing management of hazards within the water distribution system.

The legislative amendments responded to a community expectation that hospitals and residential aged care facilities should proactively manage and control potential risks to the health of their patients and residents.

At the time the interim arrangements were put in place, it was accepted by government that an ultimate legislative scheme was the most appropriate response. The CHO report discussed the approach to *Legionella* control in other jurisdictions, noting a variety of approaches, but ultimately concluded with the specific recommendations in relation to mandatory WRMPs to which the legislative amendments gave effect.[7]

The amendments included measures that will give effect to the Government's commitment to greater public transparency regarding water testing being undertaken by facilities to detect *Legionella* bacteria. The 2015 case noted above attracted significant media interest, due in part to inconsistencies in the hospital's public statements regarding the number of positive tests since 2013. Media reporting highlighted that the state government was prevented by legislation from disclosing information about the hospital's water test results because the hospital is a private institution, whose data was protected under the *Private Health Facilities Act 1999*.

These risks are still in place, as the fundamental pathology has not changed. However, it is acknowledged that with the increased public attention on *Legionella* outbreaks in recent years, some facilities would (and have) taken a number of actions to mitigate risks that they would not have done without the legislation. For example, some facilities had already commenced enhanced water quality monitoring in response to their heightened risk perceptions after the 2013 Wesley incident.

While the focus of the community interest and the CHO's report was on *Legionella* outbreaks, it is recognised that attention to water risks would in practice also involve processes that would identify and manage risks of other water-based hazards. These water-based hazards, hazard sources and hazardous events evets include *Pseudomonas aeruginosa*, heavy metals (e.g., lead or copper), low disinfectant residues (e.g., chlorine), as well as risks associated with loss of water supply, elevated turbidity and high water temperature. These have the potential to cause significant harm to people. These other water related hazards were not included in the interim arrangements (which focused solely on *Legionella*), however since the commencement of the legislative arrangements in 2017, facility's water risk management plans need to identify all risks related to water.

2.1 The base case

The impacts of any regulation are assessed against a 'base case' of the scenario where the regulation does not exist. In the case of the legislative amendments that commenced in 2017, the base case is the interim arrangements put in place in 2014. However, the interim arrangements pre-empted much of the requirements that were ultimately reflected in the legislation, so it is useful to consider in this PIR the incremental costs to facilities of complying with the interim arrangements, and then any additional costs incurred once the legislation commenced.

[7] The CHO also made other recommendations that have been progressed as part of a broad response to *Legionella* risks. For example, the enHealth *Legionella* guidelines for hospitals and residential aged care facilities.

3 Objectives of the legislation

The objectives of the legislative amendments were articulated in the Amendment Bill's Explanatory Notes and second reading speech.

The objectives were to:

- improve the management and control of health risks associated with the supply and use of water in hospitals and residential aged care facilities, in particular the health risks associated with *Legionella* bacteria, and
- provide greater transparency of water testing activities being undertaken by these facilities.

It is against these objectives that the effectiveness of the legislative amendments has been assessed in this PIR, having regard to the costs of implementing the amendments.

4 The impacts of the legislation

4.1 Overview of the impacts of the legislation

This section examines the impacts of the legislative amendments. The types of impacts discussed are shown in the following table.

Table 3: Overview of impacts of the legislative amendments

Impact	Description
Costs incurred because of the legislation	Costs were incurred by the prescribed facilities in complying with the legislative requirements
Benefits of the legislation	The primary benefits examined are the reduced health risks, as well as greater transparency
Distributional impacts	Whether the impacts differ according to facility size or type, or geographic location
Other impacts	Whether there were any outcomes (good or bad) that were not expected

4.2 Cost of the legislative requirements

The costs to the prescribed facilities of meeting the legislative requirements were estimated based on a survey of facilities that reported actual costs.

The Department of Health sought information about the impact of the legislative amendments on each facility. This survey sought information on each organisation's actual experiences in implementing the changes in relation to facilities covered by the amendments. In particular, it requested costs to each facility of preparing and implementing the water risk management plans.

Facilities were asked about the specific tasks they undertook to meet the requirements and their costs associated, for both the interim arrangements and the subsequent legislative requirements. The types of burden imposed by the legislative requirements include:

- the need to prepare the water risk management plan itself—done by staff and/or external advisers
- costs of implementing the plans—which may involve tasks such as regular monitoring and testing of samples, replacement of equipment that reduces the risk of water hazards, or changes to processes such as servicing of equipment or flushing of water, and staff training
- additional administrative costs associated with monitoring compliance with the plan, and mandatory reviews of plans
- testing and reporting costs (specifically for *Legionella*).

The particular tasks undertaken by individual facilities are outlined in Appendix C (survey results).

Respondents to the survey gave estimates of the additional costs incurred that are attributable to the interim arrangements and the legislative requirements in the categories shown in Table 4 below. The table shows the estimates on a per facility basis, as well as a calculated total for all prescribed facilities.

Table 4: Costs of complying with the interim arrangements and the legislative requirements[8]

	Cost of interim arrangements		Cost of legislation		Interim arrangements	Legislation
	Cost per public sector facility	Cost per private facility	Cost per public sector facility	Cost per private facility	Total for all facilities[9]	Total for all facilities
Cost of developing plans	$8,706	$7,915	$4,137	$2,703	$2,266,000	$952,000
Cost of communicating plan and responsibilities to staff	$1,569	$1,130	$1,637	$1,108	$373,300	$381,300
Costs of additional staff training	$923	$996	$950	$1,029	$258,700	$266,800
Costs of monitoring and reporting against plan	$5,477 (per annum x 3 years)	$4,212 (per annum x 3 years)	$5,477 (per annum x 2 years)	$4,212 (per annum x 2 years)	$4,005,000	$2,670,000
Capital expenditure required by the plan	$5,490	$4,890	$11,961	$9,610	$1,417,000	$2,964,000
Cost of testing	No data	No data	$5,582 (per annum x 2 years)	$6,415 (per annum x 2 years)	No data	$3,222,000
Other costs of implementing new processes and controls	$2,026 (per annum x 3 years)	$2,483 (per annum x 3 years)	$6,536 (per annum x 2 years)	$5,314 (per annum x 2 years)	$1,809,000	$3,254,000
					$10,129,000	**$13,710,100**

See Appendix D for further detail on the estimation of costs on a per facility basis.

This means the total costs incurred by prescribed facilities since 2014 (over and above what they would have done anyway), is $23.8 million to meet the requirements of the interim arrangements

[8] Unless indicated, costs per facility were a once-off cost associated with meeting the requirements. For recurring expenses, the table shows (for the per facility costs) annual costs for the period 2014-2017 (for the interim arrangements) and 2017-2019 (for the period where the legislation has been in place). Costs per facility (for each facility type) are an average across all surveyed facilities of that type, based on separate estimates for different sized facilities (see Appendix D), and therefore reflect a proportion of facilities that may have incurred no costs for particular items (e.g., the costs of capital expenditure averaged across all facilities includes around 50 per cent of facilities not incurring any additional capital expenditure costs).

[9] The total for all facilities is based on 153 public sector hospitals/state aged care facilities and 118 private sector health care facilities.

and the legislative requirements. It is estimated that a cost of $10.1 million was incurred under the interim arrangements[10] and around $13.7 million since the legislative requirements commenced in 2017.

Allowing for maintenance, repair and replacement of capital over time, and training new staff, the annualised ongoing cost of the legislative requirements continuing is estimated at around $4.9 million per year, or about $18,000 per facility on average (an average of $18,800 per annum for public sector hospitals and $16,900 for private sector heath care facilities).

4.3 Benefits of the legislation

It is difficult to measure the direct benefits of the legislation. This is because reported detection of water hazards, and confirmed cases of infection due to detected hazards, are now more likely, with the greater awareness on identifying and managing risks leading to greater effort to match harms with causes. In other words, previously (and to a lesser extent now), some sicknesses and deaths were likely caused by water-based hazards within the facilities, but not verified if the cause of the infection was not correctly diagnosed and there was limited testing to confirm the source of the infection.

Nevertheless, it is likely that the measures put in place have contributed to a reduced risk of infection for vulnerable people in the facilities. It is certainly true that a large share of facilities have detected the presence of *Legionella* since the plans were put in place. The key point is that once facilities were aware of the risk from previously undetected *Legionella*, they then had the procedures in place to take appropriate measures to reduce either the occurrence of *Legionella* or to eliminate the potential exposure of patients.

Based on academic research on the value of a statistical life (see box below), if the measures contained in the legislation prevent just over 1.6 deaths from infection per year (on average) going forward,[11] and therefore the benefits will outweigh the costs.

[10] The $10.1 million is a conservative estimate as facilities did undertake some sampling during the interim arrangements but were not able to provide estimates of those costs in the consultation.

[11] This is based on the projected future ongoing costs to health facilities of $4.9 million per year. A forward-looking approach is used for this break-even analysis, as only looking at costs to date does not take account of the fact that most of the actions taken since 2014 (e.g., putting a plan in place, investment in changed infrastructure) are step-changes that have ongoing benefit. The $4.9 million per annum ongoing cost makes allowance for repair, maintenance and replacement of capital, as well as periodic review and updates to plans. Also, focusing on whether future benefits are likely to exceed future costs assists in the decision about whether to keep the legislative arrangements in place.

The theoretical value of an avoided death

The benefits of the legislative requirements are essentially 'avoided costs', i.e., preventing death and serious illness. There is no way to place a monetary value on the loss of life. However, for public policy purposes the value of a 'statistical life' (not a real person) can serve a useful purpose to help assess government policies.

The value of a statistical life (VSL) refers to the benefits derived from reducing risk of an individual death that is experienced in a population. The term 'statistical' is used to describe an ex-ante (i.e. before the event), anonymous individual, and the concept does not imply that an individual life is a market good.

Valuing a statistical life is a way of formalising and understanding implicit trade-offs. In a policy context, scarce resources must be allocated across a wide variety of issues, and a value for a statistical life is a useful tool for comparing different types of benefits and costs in order to produce better outcomes for society. Trade-offs may include a choice between two initiatives with varying safety implications; a project that saves a life versus a project that produces environmental benefits; or a regulation that saves lives versus improving travel times.

The Commonwealth Office of Best Practice Regulation has published guidance on the value of a statistical life.[12] The guidance is based on work done by Abelson in 2007.[13] To the extent that providing a default value of a statistical life promotes use of a consistent value across different regulatory proposals, it allows:

- regulatory proposals to be dealt with consistently across a range of issues
- the total costs and benefits of different proposals to be compared
- more time to be devoted to the analysis of the expected *number of lives saved*, rather than the value of a life.

The estimated value of a statistical life year is $199,892—based on Abelson's work, indexed to 2019 dollars. For a typical life, that would on average continue for another 40 years, this gives a net present value of $4.6 million per statistical life.

Given the focus of the legislative changes was to protect elderly and persons more vulnerable to infection and harm, use of a 'typical' life valuation is unlikely to be appropriate. In this PIR, an adjusted valuation has been used based on a shortening of expected life by 20 years. This gives the statistical valuation of about $3 million per statistical life.

It is stressed that this estimate is a statistical tool only and does not reflect many other impacts associated with loss of life, particularly for the individuals most directly affected. The literature acknowledges that avoiding particularly painful or traumatic deaths would be expected to have a higher value. The estimate gives no weight to how a death may affect the emotional wellbeing of others—the death of a person is likely to be devastating for the family and also impact on emergency and medical workers involved.

[12] https://www.dpmc.gov.au/deregulation/obpr/docs/ValuingStatisticalLife.pdf

[13] https://www.dpmc.gov.au/sites/default/files/publications/Working_paper_2_Peter_Abelson.pdf

Of course, avoided deaths are not the only potential benefit—most people who become infected do not die, but may experience prolonged illness, and there are associated additional health care costs.

There is limited data on the hospital and treatment costs of people who become infected. A United States study (in 2010) found that the hospital costs per case averaged more than US$34,000 for Legionnaires' disease.[14] An earlier US study found that each hospitalisation represented US$45,840 in Medicare charges and US$14,920 in other payments.[15] A UK study from 2013 noted treatment costs of around £18,000 per case,[16] while a different (but earlier) UK study measured the actual costs of treatment for a specific outbreak to be £2184 to £201 648 per patient, with a mean cost of £27 971 (all in 2005 values).[17]

Based on these studies, and adjusting for exchange rates and inflation, a reasonable yet conservative estimate of avoided costs related to a non-fatal *Legionella* infection in Australia would be around $50,000 per patient. This suggests, if only relying on avoided treatment costs of non-fatal infections, that the reduced risks associated with the legislation would need to prevent around 97 cases of infection each year in order for the benefits to outweigh the costs.

In practice, the benefits are likely to involve a combination of avoided deaths and prevented non-fatal infections. For example, the benefits outweigh the costs if each year the actions taken under the water management plans prevent at least:

- the loss of one statistical life (at a value of $3 million)
- and 38 non-fatal infections (each with an avoided cost of $50,000; so a total of $1.9 million per year).

While prevention of water-hazard related deaths and illness is of course the ultimate objective, it can be difficult to see any clear evidence of the impact of the legislation on these outcomes over a short period of time, where such incidents are not usually frequent at a facility, and where evidence of source and cause of infection can remain unclear. The intention of the legislation is not to prevent every case of water hazard harm, but to reduce the overall risks over the medium to longer term of these hazards impacting on people. The more relevant short-term indicator is whether facilities have actually reduced the level of risk—being either the risk of the hazard itself existing, the risk of a person being harmed by the hazard, or the consequential impact of that harm occurring.

The benefit of reduced risk can therefore be seen by the evidence that:

- all prescribed facilities have a water risk management plans in place
- all facilities have invested in improved processes, infrastructure and staff training to reduce risks

[14] https://www.reuters.com/article/us-legionnaires-costs-usa/three-waterborne-diseases-cost-u-s-539-mln-a-year-idUSTRE66D4RW20100714

[15] Science News, *Healthcare costs for infections linked to bacteria in water supply systems are rising,* Tufts University Health Sciences Campus, September 2016.

[16] Cossali et al, "The cost of Legionellosis and technical ways forward" presented to CIBSE Technical Symposium. Liverpool John Moores University, Liverpool, UK, April 2013.

[17] Lock et al, "Public health and economic costs of investigating a suspected outbreak of Legionnaires' disease" Epidemiol Infect. 2008 Oct; 136(10): 1306–1314.

- all facilities have undertaken additional testing for and reporting on the presence of *Legionella*
- there is now a higher awareness of water hazard risks in these facilities.

Feedback from the survey of health facilities highlighted the following general benefits resulting from the legislative changes (comments are quoted verbatim):

- Better understanding of hazards and risks; improved oversight in water quality within the facility.
- Good from a governance perspective; database is transparent and can be followed if specific personnel are on leave; assists with the coordination of testing and management of positive results; easily identifies problem areas where addition investigation/work may have to be carried out.
- Assurance that water supplies are safe and maintenance regimes are working; Reassurance to patients, visitor and staff that the facility has good water quality.
- The plan has been beneficial when patients have presented to the hospital with legionellosis and testing of the ward they are being cared in can be quickly undertaken and source identified as not from the hospital infrastructure - contribution to clinical risk.
- Having a formal plan has assisted with the swift and timely resolution of issues as they arise.
- The process also provides good general information on the status of the water reticulation system in general.
- Identification of lack of backflow prevention.
- Benefits in the form of plumbing infrastructure upgrades, as well as improved efficiency with maintenance schedules.

A complete list of benefits highlighted by heath facilities in set out in Appendix C.

In addition, the regular testing and reporting of *Legionella* detection will also assist in investigation of suspected outbreaks. Where an outbreak is detected, there would usually be a high level of resources used to identify the source of the infection. This can involve tens of thousands of dollars depending on the facility.[18] A regular record of testing would streamline any investigation.

Feedback from health facilities and other areas of Queensland Health indicate that a significant additional benefit of the changes to legislation is the increased knowledge and expertise around water quality, particularly in respect to *Legionella*. Queensland Health now has a number of environmental health officers and engineering staff who have enhanced their expertise through the requirement for the requirement for legislative reporting which, in turn, has helped shape governance frameworks and risk management approaches. This has had a positive effect on preparations and oversight of major events such as the Commonwealth Games preparations in 2017. For the Commonwealth Games, these experts worked with the Gold Coast Hospital to ensure water quality was safe for both the public and athletes by setting improved standards around areas such as water dispenser equipment and water baths. Queensland Health has also

[18] An investigation of a suspected outbreak in he UK in 2005 was estimated to cost £64,264.

developed partnerships with universities thereby guiding the scope and context of research outcomes.

4.4 Distributional impacts

A small number of facilities indicated that they considered the burden of the legislative arrangements were disproportional on smaller facilities. This need not be the case, as the intention of the framework is for facilities to put in place control measures that are suitable for the individual facility, which would include facility size as a factor in assessing and managing risk levels.

The above estimates of the costs on facilities was based on survey responses for facilities of different sizes. These results indicated that costs were in general proportional to the size of the facility—see Appendix D.

Queensland Health notes that:

- The majority of facilities considered that the legislative requirements did allow facilities to determine actions that were proportionate to the facility size—82 per cent of facilities indicated that the costs of developing and implementing plans was reasonable given the size and nature of services provided and level of vulnerability of the users of the facility.
- The development of plans, and the development of appropriate risk management controls, remains relatively new for many facilities, and it is expected that over time the risk controls will be refined to better match individual facilities.
- There appear to be a number of facilities that have put in place control measures that provide more options to manage the risks identified. Going forward, Queensland Health can give more targeted advice to facilities, including providing guidance on best practice controls for different types of facilities and risks.
- Nevertheless, there may be limits on available supply of external experts and consultants to assist smaller facilities that do not have the internal expertise to update and implement a water management plan, particularly in regional or remote areas. This can be more costly for these facilities.

In terms of costs of implementation and compliance, there was no apparent disproportional impact of the legislation on regional areas. While the survey results did show a difference in costs across survey respondents based on geographic location, this was a consequence of the composition of facility sizes in different areas, and once adjusted for facility size, there was no discernible cost difference based on location. However, it is noted that for some areas the number of respondents was low—see Appendix C.

4.5 Other impacts

A number of facilities noted that there was a focus on *Legionella* at the expense of other more significant microbiological risks, with facilities focusing scarce resources they currently have on perhaps a sub-optimal whole-of-site disease/infection management approach. While there is some focus on the testing and reporting of *Legionella*, the legislation requires the WRMPs to identify and address all water hazard risks, and facilities should use that identification to prioritise

where controls will be most effective. This can be improved through further guidance in the future.

A small number of facilities noted an unforeseen impact—community perceptions about an apparent waste of water. Depending on the facility and their decisions about appropriate control measures, some risk controls involve flushing of water systems regularly. This can result in increased use of water by the facility. In some areas in the state, particularly regional and rural areas, water is very scarce, and some facilities reported some concern from local residents about the environmental impact of some of the preventative measures being not commensurate with the risk of *Legionella* in some facilities. This suggests an ongoing role for Queensland Health in providing guidance to facilities in adapting to changing environmental and regulatory challenges.

4.6 Assessment against the objectives

The objectives of the legislation were to:

- improve the management and control of health risks associated with the supply and use of water in hospitals and residential aged care facilities, in particular the health risks associated with *Legionella* bacteria, and
- provide greater transparency of water testing activities being undertaken by these facilities.

The prescribed facilities have confirmed that, in nearly all facilities, risks are much better managed now than prior to the interim arrangements, and that for a majority of facilities, the effectiveness of the facility's ability to manage and control *Legionella* risks has increased since the legislation commenced. Staff now have a better awareness and understanding of the hazards and risks, and there is improved oversight of water quality within the facilities. A large majority of facilities (77 per cent) consider their plans are 'good' or better in identifying, assessing and controlling risks. The proportion of facilities that now actively control risk of *Legionella* has risen from 48 per cent to over 98 per cent, and there are now much higher proportions of facilities that actively control other risks hazards or hazardous events such as loss of water supply, water temperature, residual disinfectants, *Pseudomonas aeruginosa*, and heavy metals.

Facilities also report that there is increased confidence in the safety of the facilities in regard to water-based hazards. Most facilities confirmed that the assurances of safe water are working, with the plans assisting in timely resolution of issues as they arise.

4.7 Consistency with other policies and legislation

Regulations must be consistent with clause 5 of the Competition Principles Agreement and the fundamental legislative principles as defined by section 4 of the *Legislative Standards Act 1992*. Consistency with these was confirmed at the time of the Bill—see the Bill's Explanatory Notes and the parliamentary committee report.

5 Are there better options available?

5.1 Should the legislation be repealed?

The broad alternative options to continuing with the legislation are:

- Repealing Chapter 2A of the Act and reverting to the interim arrangements
- Repealing Chapter 2A of the Act and not reverting to the interim arrangements.

These options are essentially the base cases against which the impacts were assessed in Chapter 4 of this PIR, which showed that the benefits of the legislation are likely to outweigh the costs, and therefore the current legislation is the preferred option.

If the legislation were repealed, with no other measures taken, it is likely that some of the controls put in place at health facilities would continue. However, over time these controls would be expected to become less effective as there would be no requirements to regularly review plans and controls, no requirement for health facilities to monitor compliance with plans, and no formal framework for testing and reporting on *Legionella*.

5.2 Should the legislation be expanded?

The review of the legislation, in particular feedback from stakeholders, did not identify any significant gaps in the regulatory framework that would warrant consideration of expanding the legislative scope or requirements. It is noted:

- Some of the existing powers in the Act are only beginning to be formally used, such as the ability for Queensland Health to review individual plans and direct changes to be made. This will increase in the future. This process may involve additional costs and benefits for health facilities, where the review identifies further controls measures that should be put in place. However, feedback to facility's on their plans can be expected to consider the costs and benefits on an individual basis to ensure the plans remain appropriate for the assessment of risks at the facility. Also, it is possible that a review of plans will identify where facilities could reduce actions taken (e.g., less frequent testing) that would reduce the costs to facilities without having a material impact on risk.
- The Act allows the requirements to be extended, by way of Regulation, to private residential aged care facilities. This is intended to occur at some time in the future, following comprehensive consultation with the aged care sector, and will be subject to the normal assessment requirements for making a Regulation before implementation.

5.3 Can the legislation be improved?

Despite the generally favourable feedback from regulated facilities, the survey identified a number of concerns with the implementation of the legislation.[19] Key comments from this feedback are presented below:

Table 5: Distillation of facility's key views on the legislation

'The workload and expense was higher than expected, particularly where supplementary chlorination and routine flushing were needed.'
'There is a need for increased water consumption through flushing regimes and response actions.'
'The environmental impact on a regional facility is hard to comprehend. Patients who visit our facility are often from a rural setting and to have water running down the drain for something that is low risk in the setting is almost criminal to drought stricken country people.'
'There is a risk of media concerns around public notifications and misconception of these in community affecting brand.'
'There is a need to find a reliable and trusted potable water testing agency for the hospital.'
'An ugly shed was put in front of the hospital to house the water treatment plant and the community feedback is pretty awful.'
'There is disproportionate emphasis on *Legionella* which based on any reasonable analysis is a relatively low risk in comparison to other water borne microbiological risks. This bias has the potential to be a risk as facilities focus their scarce resources and concentrate on *Legionella* at the expense of other microbiological risks.'
'Consider some flexibility with the reporting turnaround timeframe.'
'Ongoing costs associated with oversight of WRMPs, periodic testing and maintenance of capital infrastructure (dosing equipment etc.) are not proportionate to the risk of *Legionella* and other water-based hazards.'
'The legislative reporting timeframe (24 hours) is too short and does not allow for normal operational challenges i.e. unplanned staff leave. I would also like to see the reporting trigger level for a non-compliant response reviewed and the introduction of an alert limit (action required to mitigate) and a critical limit (reportable non-compliance).'
'I would like to see more workshops on water risk management plans and how the results affect you for those in roles that monitor this. The person who implemented the plan may have retired or moved on therefore the new person in the role needs more education to come up to speed with processes. Also with the ever changing regulations in health care it is useful to have a refresher course.'
'The template was difficult to use as our facility's computer program was not as up to date and many things were difficult to save. The detail required was time consuming to find and then to list all and maintain as current for small organisation with limited IT systems.'
'The plan could have been templated better so everyone works to the same thing.'
'Greater assistance from QLD Health organisation'

Most of these concerns or suggestions for change do not relate to the legislation itself.

The legislation does not prescribe a set frequency for testing the water for *Legionella* or other identified hazards. It requires a facility to decide on a frequency that is informed by the risks, measures and procedures. This approach was seen to be best practice as it enables the facility to make decisions based on their own particular circumstances and supports cost effectiveness

[19] The majority of responses indicated the system was working well and/or did not identify any improvements.

where samples are taken based on risk rather than by a specified quota per time period. The risk-based approach enables the facility to reassess its testing frequency based on the evidence it has obtained through their sampling schedules and make adjustments to the testing frequency or number of samples. For public sector facilities, this supports the objects of the *Hospital and Health Boards Act 2011* objectives, which include the need to strengthen local decision making and accountability. For private healthcare facilities, licensed under the *Private Health Facilities Act 1999*, it supports the object to protect the health and well-being of patients receiving health services at private health facilities.

Prior to the introduction of the provisions, the *Public Health Act 2005* did not contain any obligations for persons to notify the department if *Legionella* was detected in a hospital or residential aged care facility's water distribution system. The inclusion of notification and reporting obligations were introduced to support transparency about the actions of a facility. The person in charge of each prescribed facility is required to notify the chief executive when the presence of *Legionella* is confirmed in a sample of water used by the facility. This enables the department, where necessary, to ensure that facilities that have confirmed the presence of *Legionella* in their water distribution systems are putting in place timely and appropriate remedial responses. It is expected that identified risks are managed upon being identified.

Periodic reporting was introduced to implement Government's commitment to increased transparency regarding *Legionella* testing being undertaken by hospitals and residential aged care facilities. The person in charge of a prescribed facility is required to provide a report to the department about the results of tests for *Legionella* undertaken in accordance with the water risk management plan, within the prescribed period. A maximum of thirty business days is provided after the conclusion of the reporting period in which to submit the report. The information and the timing of the publication of data is at the discretion of the chief executive of Queensland Health. At present, publication of data occurs twice a year when two full data sets are published at the same time. Each report received by the department is reviewed for accuracy prior to publication.

It is noted that some concerns have been raised regarding potential unintended impacts of the legislation which relate to increased water consumption, due to greatly increased flushing of pipes, and the excessive emphasis on *Legionella* relative to other hazards.

- Increased water consumption: Flushing outlets is an accepted response to the detection of *Legionella* when disinfectant residuals cannot be maintained through to points of use. However, facilities do need to consider whether this response is always suitable to their circumstances. As internal facility knowledge and expertise of water risk management grows, there is likely to be a change in flushing regimes, with reductions when the evidence allows. Plans should be reviewed at least annually, and flushing time is an area that should be considered carefully. Communicating decisions about water usage to employees and patients can address those misconceptions.
- With respect to the issue of disproportionate effort being devoted to *Legionella* at the expense of other microbial risks, this might indicate that a facility has not yet embraced the full scope of its water risk management plan. A water risk management plan should place emphasis on managing all identified water related hazards, whether they be microbial, chemical or physical. It has been found that improved management of *Legionella* generally leads to reductions in risk from other microbial hazards, and improvements in maintenance of a wide range of plumbing related infrastructure, much of which should already be a part of routine maintenance practices. A water risk management plan assists the facility to identify, manage, monitor and respond to all water related risks.

There have also been a number of suggested improvements, which do not require amendments to the Act:

- Reporting requirements—the timing for reporting is contained in the Public Health Regulation rather than the Act. This provides some flexibility for the future for reporting periods to be shortened or lengthened if warranted, without requiring changes to the Act. Reporting on actions each quarter provides some transparency about actions taken in the quarter as well as assisting with identification of issues with processes supporting the implementation of the plan enabling a more rapid response when processes fail.
- Guidance on developing plans appropriate to the facility—Queensland Health recognises the challenges associated with the development of a water risk management plan. Expansion of the information and guidance material it provides to facilities could be undertaken as examples of exemplar plans and good practices are identified. Queensland Health has advised that they are developing template and model plans to assist smaller, less well-resourced facilities to develop compliant water risk management plans.
- Costs of testing and other controls—the frequency of testing for the presence of *Legionella* at many facilities may be higher than needed for that facility. Matching the frequency of testing to the level of risk at the facility should improve over time as facilities become more familiar with undertaking surveillance of their control measures and reviewing the assessment of risk. Queensland Health can also consider providing additional guidance or examples on optimising the frequency of testing and routine control measures. At present Queensland Health takes every opportunity to remind regulated entities that large numbers of water tests are not required in order to understand and manage risks from *Legionella* and other water associated hazards.

6 Outcome of the review

Based on the results identified in the PIR, Queensland Health believes the legislative amendments should remain in place, and no changes to the legislative requirements are warranted at this time.

The objectives were to:

- improve the management and control of health risks associated with the supply and use of water in hospitals and residential aged care facilities, in particular the health risks associated with *Legionella* bacteria, and
- provide greater transparency of water testing activities being undertaken by these facilities.

While prevention of water-hazard related deaths and illness is of course the ultimate objective, it can be difficult to see any clear evidence of the impact of the legislation on these outcomes over a short period of time, given that these are rare events and evidence of source and cause of infection can remain unclear. The intention of the legislation is not to prevent every case of water hazard harm, but to reduce the overall risks over the medium to longer term of these hazards impacting on people. The more relevant short-term indicator is whether facilities have actually reduced the level of risk—being either the risk of the hazard itself existing, the risk of a person being harmed by the hazard, or the consequential impact of that harm occurring.

The benefit of reduced risk can therefore be seen by the evidence that:

- all prescribed facilities have a water risk management plans in place
- all facilities have invested in improved processes, infrastructure and staff training to reduce risks
- all facilities have undertaken additional testing for, and reporting on, the presence of *Legionella* in their water supply
- there is now a higher awareness of water hazard risks in these facilities.

Queensland Health considers that the estimated costs on health facilities to date and expected in the future are, overall, reasonable and in proportion to the size of the problem.

The PIR has identified a number of areas for improvement, including reduction in cost burden. These can be achieved through by a range of actions that do not require changes to the legislation.

6.1 Implementation

As no change is proposed to the legislation, no new implementation strategies are required. Queensland Health already has plans in place to:

- commence the process for formal reviews of the water risk management plans of facilities. This is expected to commence within the next 6-12 months, with a schedule to be developed to cover all facilities. Queensland Health will liaise with health facilities on individual timing.
- extend the legislative requirements to private residential aged care facilities. This will occur by way of amendments to the Public Health Regulation 2018 that will prescribe each additional facility to be captured. These amendments will be subject to the normal

assessment and consultation processes associated with the amendment of the Regulation. A specific implementation plan for this expansion will be developed following further consultation with the sector.

6.2 Evaluation Strategy

This PIR provides findings of the actual impacts of the legislative change on health facilities, and an assessment of the corresponding benefits that have been identified. As such, no further evaluation specific to the assessing the amendments to the Act is planned. However, Queensland Health will continue to monitor the incidence of water hazard harms and the management of risks across the state and will regulatory regularly review whether the suite of policies in place remain appropriate and fit for purpose.

6.3 Next steps

This is a Consultation PIR. It sets out Queensland Health's conclusions based on the available evidence. The release of the Consultation PIR is an opportunity for any interested parties to provide a written submission to Queensland Health on the findings and conclusions of this report. All submissions will be reviewed, before finalising a Decision PIR, which updates this PIR in response to feedback provided. The Decision PIR is then provided to Minister to make a decision on the future of the legislation.

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Queensland Health (2013) Chief Health Officer's report: *Review of the prevention and control of Legionella pneumophila infection in Queensland*

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Legislation cited

Aged Care Act 1997 (Cwlth)

Hospital and Health Boards Act 2011

Legislative Standards Act 1992

Private Health Facilities Act 1999

Public Health Act 2005

Public Health Regulation 2018

Work Health and Safety Act 2011

Appendices

Appendix A – Chapter 2A of the *Public Health Act 2005* (*excerpt*)

Chapter 2A **Water risk management plans**

Part 1 **Preliminary**

61A Definitions for chapter

In this chapter—

approved provider means an entity for which an approval is in force under the *Aged Care Act 1997* (Cwlth).

cooling tower see the *Work Health and Safety Act 2011*, schedule 1, part 1, section 1(6).

hazard means—

(a) *Legionella*; or

(b) microorganisms, substances or physical properties of water that are reasonably expected to cause injury or illness to an individual; or

(c) microorganisms or substances prescribed by regulation.

hazardous event, for a prescribed facility, means—

(a) an event, or series of events, that causes or has the potential to cause the presence of a hazard in water within a prescribed facility's water distribution system; or

(b) an interruption of the supply of water to the prescribed facility.

hazard source means a location or condition that establishes or increases the presence of a hazard.

Legionella means bacteria belonging to the genus *Legionella*.

prescribed facility means—

(a) a public sector hospital that provides treatment or care to inpatients; or

(b) a private health facility licensed under the *Private Health Facilities Act 1999*; or

(c) a State aged care facility; or

(d) a residential aged care facility, other than a State aged care facility, prescribed by regulation.

prescribed test means a test for *Legionella* prescribed by regulation for this chapter.

residential aged care facility means a facility at which an approved provider provides residential care under the *Aged Care Act 1997* (Cwlth).

residential care has the meaning given by the *Aged Care Act 1997* (Cwlth), section 41–3.

responsible person, for a prescribed facility, means—

(a) for a prescribed facility that is a public sector hospital—the health service chief executive for the public sector hospital; or

(b) for a prescribed facility that is a private health facility licensed under the *Private Health Facilities Act 1999*—the licensee for the private health facility under that Act; or

(c) for a prescribed facility that is a State aged care facility—the health service chief executive for the State aged care facility; or

(d) for a prescribed facility that is a residential aged care facility, other than a State aged care facility—the approved provider that provides residential care at the residential aged care facility.

State aged care facility means a residential aged care facility at which the State provides residential care.

water distribution system, of a prescribed facility—

(a) means the infrastructure within the prescribed facility from every point where water enters the facility through the infrastructure to every point where the water is used; but

(b) does not include a cooling tower.

water risk management plan, for a prescribed facility, means a written plan to prevent or minimise the risks posed by hazards, hazard sources or hazardous events to individuals at the prescribed facility.

61B Operation of chs 2 and 2A

Nothing in this chapter is intended to affect the operation of chapter 2.

Part 2 **Requirement and content of plans**

61C Requirement for water risk management plans

The responsible person for a prescribed facility must ensure there is a water risk management plan for the prescribed facility that complies with section 61D, unless the person has a reasonable excuse.

Maximum penalty—500 penalty units.

61D Content of water risk management plans

The water risk management plan for a prescribed facility must—

(a) describe the prescribed facility's water distribution system; and

(b) identify hazards, hazard sources and hazardous events relevant to water within the prescribed facility's water distribution system; and

(c) assess the risks associated with hazards, hazard sources and hazardous events identified under paragraph (b); and

(d) state the following—

(i) measures to be taken to control the risks assessed under paragraph (c);

(ii) the procedures that must be implemented for monitoring the effectiveness of the measures;

(iii) a schedule that must be complied with for testing water for *Legionella* and other identified hazards at a frequency informed by the risks, measures and procedures;

(iv) the way records of results obtained under subparagraphs (ii) and (iii) will be kept; and

(e) state procedures for responding to—

(i) the results of monitoring that indicate the failure of measures taken to control risks assessed under paragraph (c); or

(ii) the results of testing that indicate the presence of a hazard in water within the prescribed facility's water distribution system; and

(f) include a requirement for the water risk management plan to be reviewed and when that review is to be carried out; and

(g) include any other requirement prescribed by regulation.

61E Amending water risk management plans

(1) This section applies if the chief executive is satisfied a water risk management plan for a prescribed facility requires amendment to comply with section 61D.

(2) The chief executive may give the responsible person for the prescribed facility a notice requiring the responsible person to amend the water risk management plan.

(3) The notice must state the following—

(a) that the responsible person must amend the water risk management plan;

(b) the way the water risk management plan must be amended;

(c) the day by which the water risk management plan must be amended;

(d) the day by which the responsible person must give the chief executive a copy of the amended water risk management plan.

(4) The responsible person must comply with the notice, unless the responsible person has a reasonable excuse.

Maximum penalty—500 penalty units.

Part 3 **Compliance**

61F Obligation to give chief executive copy of water risk management plans

(1) The chief executive may, by notice, ask the responsible person for a prescribed facility to give the chief executive a copy of the water risk management plan for the prescribed facility by the day stated in the notice.

(2) The responsible person must comply with the notice, unless the person has a reasonable excuse.

Maximum penalty—200 penalty units.

61G Complying with water risk management plans

(1) The responsible person for a prescribed facility must ensure the facility operates in a way that complies with the facility's water risk management plan, unless the responsible person has a reasonable excuse.

Maximum penalty—500 penalty units.

(2) The responsible person for a prescribed facility must take all reasonable steps to ensure each person who has an obligation to comply with the plan, while the facility is operating, complies with the plan, unless the responsible person has a reasonable excuse.

Maximum penalty—200 penalty units.

61H Obligation to notify chief executive of *Legionella*

(1) This section applies if the result of a prescribed test confirms the presence of *Legionella* in water used by a prescribed facility.

(2) A person in charge of the prescribed facility must, under subsection (3), give the chief executive a notice about the result of the test, unless the person has a reasonable excuse.

Maximum penalty—

(a) if the offence is committed intentionally—1,000 penalty units; or

(b) otherwise—200 penalty units.

(3) The notice must—

(a) be in the approved form; and

(b) be given to the chief executive within 1 business day after the person in charge is notified of the result of the test; and

(c) comply with any other requirements prescribed by regulation.

61I Obligation to give chief executive reports

(1) A person in charge of a prescribed facility must, under subsection (2), give the chief executive a report for each reporting period about the results of prescribed tests carried out under the water risk management plan for the prescribed facility, unless the person has a reasonable excuse.

Maximum penalty—200 penalty units.

(2) The report must—

(a) be in the approved form; and

(b) be given to the chief executive within 30 business days after the end of the reporting period; and

(c) comply with any other requirements prescribed by regulation.

(3) In this section—

reporting period means a period prescribed by regulation.

61J False or misleading reports

(1) A person must not give the chief executive a report under section 61I containing information the person knows is false or misleading in a material particular.

Maximum penalty—1,000 penalty units.

(2) Subsection (1) does not apply to a person if the person, when giving the report—

(a) tells the chief executive, to the best of the person's ability, how it is false or misleading; and

(b) if the person has, or can reasonably obtain, the correct information—gives the correct information.

61K Chief executive may publish reports

(1) The chief executive may publish in a report—

(a) notices about the presence of *Legionella* given to the chief executive under section 61H; or

(b) reports about prescribed tests given to the chief executive under section 61I.

(2) The report may also include any other information the chief executive considers relevant to the notices or reports.

(3) However, information may not be included in the report under subsection (2) if the information is adverse to a person unless—

(a) before the report is prepared, the chief executive gives the person an opportunity to make submissions about the information; and

(b) any submissions made by the person are fairly stated in the report.

Appendix B – Public Health Regulation 2018 (*excerpt*)

Part 3 **Water risk management plans**

28 Prescribed test for *Legionella*

(1) For section 61A of the Act, definition *prescribed test*, a test for *Legionella* is prescribed if the test—

(a) quantifies the number of *Legionella* colony forming units in a sample tested; and

(b) is carried out by a laboratory that is accredited to carry out the test.

(2) In this section—

accredited, for a laboratory to carry out a test for *Legionella*, means a laboratory accredited as complying with ISO/IEC 17025 to carry out the test by—

(a) the National Association of Testing Authorities Australia ACN 004 379 748; or

(b) another entity the chief executive is satisfied is appropriately qualified to accredit a laboratory as complying with ISO/IEC 17025.

ISO/IEC 17025 means the standard in relation to the competence of testing and calibration laboratories published jointly by the International Organization for Standardization and the International Electrotechnical Commission as in force from time to time under that designation (regardless of the edition or year of publication of the standard).

29 Prescribed requirement for water risk management plans—Act, s 61D

For section 61D(g) of the Act, a water risk management plan for a prescribed facility must identify the person, by position title, who is responsible for complying with sections 61H and 61I of the Act for the facility.

30 Prescribed reporting period—Act, s 61I

(1) For section 61I(3) of the Act, definition *reporting period*, the period is the shorter of the following—

(a) a quarter;

(b) the period stated in a notice given to the prescribed facility by the chief executive.

(2) In this section—

quarter means a 3-month period ending on 31 March, 30 June, 30 September or 31 December.

Appendix C – Survey results

Prescribed facilities were invited to complete an online survey. The survey was open from 30 April to 23 May 2019.

Responses

Responses were received from 89 prescribed facilities—a response rate of 33 per cent of all facilities to which the requirements apply. The names of individual facilities that have responded to the survey are not disclosed.

The composition of respondents was as follows:

Table 6: Characteristics of survey respondents

Facility type	Over 100 beds	51 to 100 beds	1 to 50 beds	No overnight beds	*Total*
Public sector hospital and state aged care facilities	9	4	21	0	*39*
Private facility licensed under *Private Health Facilities Act*	14	6	7	23	*50*
Total	*24*	*11*	*31*	*23*	*89*

The following table shows the number of survey respondents for each category as a percentage of total survey responses. The number in parenthesis is the number of total facilities of that category as a percentage of total facilities.

Table 7: Proportion of responses by facility category compared to proportion of population by category

Facility type	Over 100 beds	51 to 100 beds	1 to 50 beds	No beds	*Total*
Public sector hospital and state aged care facilities	11% (5%)	6% (3%)	27% (33%)	0% (15%)	*44% (56%)*
Private facility licensed under *Private Health Facilities Act*	16% (9%)	7% (5%)	8% (7%)	26% (22%)	*56% (44%)*
Total	*27% (14%)*	*12% (8%)*	*33% (40%)*	*26% (38%)*	*100% (100%)*

The following table shows the survey response rate for each facility category.

Table 8: Survey response rate by facility category

Facility type	Over 100 beds	51 to 100 beds	1 to 50 beds	No beds	*Total*
Public sector hospital and state aged care facilities	77%	63%	27%	0%	*25%*
Private facility licensed under *Private Health Facilities Act*	56%	43%	37%	38%	*42%*
Total	*63%*	*50%*	*28%*	*23%*	*33%*

The location of facilities that respondent to the survey is show below.

Table 9: Responses from geographic locations

Area	Responses	%
Cairns and Hinterland	6	6.74%
Central Queensland	1	1.12%
Central West	2	2.25%
Children's Health Queensland	0	0.00%
Darling Downs	12	13.48%
Gold Coast	5	5.62%
Mackay	4	4.49%
Metro North	13	14.61%
Metro South	12	13.48%
North West	0	0.00%
South West	6	6.74%
Sunshine Coast	10	11.24%
Torres and Cape	0	0.00%
Townsville	5	5.62%
West Moreton	1	1.12%
Wide Bay	12	13.48%

These responses suggest the survey results are reasonably representative of all prescribed facilities.

Results

Arrangements in place prior to 2014 (prior to interim arrangements)

53% of facilities had no specific arrangements in place to manage water risks prior to the introduction of the interim measures in 2014. For those that did have some arrangements in place, the following arrangements were noted:

Table 10: Examples of arrangements to manage water risks prior to the 2014 interim arrangements (verbatim responses)

An annual flushing regime and cleaning of aerators in high risk clinical areas
Monitoring of water quality via incoming mains and cooling tower testing as per legislative requirements
Periodic Testing of warm water systems for *Legionella* and HPC
Water sent to Symbio Lab for analysis yearly
Flushing of taps, checking of TMVs
Cooling tower risk management plan covering maintenance & water management within the cooling tower system. Maintenance of Air handling systems.
Following a report by CHO - this facility drafted and implemented measures to comply with the required Water Risk Management Plan

An annual flushing regime and cleaning of aerators in high risk clinical areas
Cooling tower testing and water treatment only
Schedule preventative maintenance on the hydraulic system including flushing and routine sampling
There were tempering valves and Thermo mixing valves on all patient care taps which were tested, replaced when needed and maintained. Backflow prevention devices on lines with risk of backflow to incoming water supply which were tested, replaced when needed and maintained. Water quality testing to comply with AS/NZS 4187.
10 x Random water samples taken every 6 months from showers
Every month 3 water samples are taken from patient's rooms and analysed by a laboratory. Water samples are taken from water condenser and tested by a NATA Registered Laboratory.
Regular monthly microbiological analysis of water samples from hot shower outlets. Heated water systems management plan in place. Risk management plan for *Legionella* Control
Risk assessment engaged further consultant to assist as required
Routine water testing
We commenced a new facility and adapted a water plan as per day surgery in the same building
Water management plan implementation through consultation; Frequently monitored and reported water bacterium; Appropriate filtering systems to apply to affected areas; Bottled water options for patients and staff as required;
Disaster management plans for water quality, building design to minimise risks etc
Water testing reporting new procedures to prevent *Legionella*
Testing of all final rinse taps in clinical areas and policies and procedures for same
Annual water & TMV testing, annual infection control standards, AS4187 & National Standards, audit by independent consultants.
Random sampling for *Legionella* of XXX campus and YYY campus monthly and water sampling of cooling towers monthly
Annual TMV maintenance annual water testing for *Legionella*
Our facility was already conducting quarterly *Legionella* testing of our water. We had a simple water management policy in place at the time.
We had water testing in place but not to the extent that we have now under the water quality management plan
We already had basic water management plans in place after the implementation these were tweaked to reflect the new requirements
Risk Management Plans existed for our Cooling Towers where *Legionella* testing was regularly undertaken as per these RMPs.
Environmental health came to the facility to do water testing for *Legionella* specifically.
Periodic Testing of warm water systems for *Legionella* and HPC.

An annual flushing regime and cleaning of aerators in high risk clinical areas
XXX Hospital had a robust program of testing already in-place focussing on high risk clinical areas which aligned to the 2014 requirements so minimal impact from this sites perspective. Good engagement with QUU was already in place and potable water chlorination at a reasonable level coming in to the respective buildings. A program for chiller testing was also in place.
Reporting from Local council. Policy procedure MS 4.50 management water systems
We had a water management plan and it was similar to what we do now.
Quarterly water testing
Purging of all water outlets monthly
Prior to the guidelines being circulated the hospital was not undertaking routine potable water sampling. The process was ad hoc.

Actions taken to comply with the interim arrangements

Most facilities took additional actions to comply with the requirements of the interim arrangements to put in place water risk management plans. Some of these actions are listed below:

Table 11: Actions taken to meet interim arrangements

When the new arrangements were implemented we ceased the use of ice making machines and subsequent testing.
The facility implemented the requirements via water flushing and sampling based on risk assessment of the clinical areas
Altered testing methodology and frequency and developed procedures for testing to ensure compliance.
Developed a plan based on QH Guideline for *Legionella*, Australian Drinking Water Guidelines and the then SEQ Water Grid Manager water quality management plan, commenced a testing and sampling regime, implemented a flushing program.
Regular testing as per plan of TMVs. Heat sanitation of taps. Tested the water temperature as per plan weekly flushing of low use taps quarterly water testing
Formed management committee to review interim requirements & produce action plan to implement & monitor requirements. 1. Formed management committee 2. Performed hydraulic site inspection to identify risk areas & formulate action plan 3. Commenced routine random water sampling & monitoring of system 4. Following sampling of incoming water supply implemented supplementary water treatment to maintain active residual chlorine at distal points
Risk assessments where conducted on the facilities water supply, copy of the external testing of the facilities incoming water supply was obtained, from this risk assessment was conducted on the incoming water supply and the water management plan developed and implemented.
Quality improvement project launched to bridge the gap with requirements. Water management plan developed and initiated. Thorough initial baseline testing undertaken. The plan outlined how routine testing would be scheduled and undertaken, how TMV maintenance/cleaning would be done, cooling tower testing and maintenance would be done, how chlorination of tanks would be done and how reporting works.
Reviewed the draft of the Hospital Water Risk Management Plan initially and then rolled it out to the Nurse Unit Managers and to the nursing team. In addition, with input from Tropical Health Services and the Operational Services Manager, supporting BEMs and Infection Control to contain and adverse events from a hazard and form a response via an Incident Response Plan and isolate any potential water exposure from the Hazard

Introduced the routine testing in patient areas and routing flushing of high risk outlets. Policies and procedure were developed, documented and published to all staff and VMOs. A reporting procedure was included in this process
Reviewed the facilities available to the day hospital. Formulated a water quality risk management plan with input from relevant parties. Commenced testing and reporting.
Increase water testing regime including quarterly *Legionella* sampling and pasteurisation
Completed the *Legionella* Plan template with the detail requested. Developed a *Legionella* policy and procedure. Instructed Maintenance staff on the flushing and water testing requirements. Organised water testing with outside laboratory as none onsite
Change to 10 x random water samples every 3 months
Commenced regular water testing
Frequently monitored and reported water bacterium; Appropriate filtering systems to apply to affected areas; Bottled water options for patients and staff as required; Contacted appropriate water service suppliers to apply heat pasteurisation to the facility water lines
Commenced flushing of outlets and quarterly *Legionella* water sampling
Established facility wide steering committee, allocated project manager, researched requirements, prepared draft plans, implemented testing regime for *Legionella*
Testing and reporting
Engaged a consultant to commence testing for *Legionella* in our facility
Commenced quarterly water testing, continued with maintenance schedule.
Increased the scope of our water testing program and in consultation with other hospitals within our company and our external Infection Control consulting company, we developed our water management plan.
Held meetings with population health staff, building engineering and maintenance, undertook an audit of the entire facility plumbing infrastructure, developed an inventory of components, labelling and identification of infrastructure, identifying hazards, future monitoring and verification of sample site selection
Commenced weekly water testing while working closely with the Public Health department
Engaged specialist hydraulic engineering firms to develop and implement our risk management plans Weekly water testing is conducted on site.
Mapped water supply piping, conducted hazard risk analysis, prepared risk management plan (generic plan from QH), commenced water sampling & testing regime.
Altered testing methodology and frequency and developed procedures for testing to ensure compliance Ceased the use of ice-making machines and the subsequent testing.
Reviewed and revised the Water Management Plan that was in place to include a database and also added Chorine testing
Twice weekly flushing of water system. Heat treatment at beginning of implementation. Quarterly water testing
Purging of all water outlets weekly with sign sheet to ensure compliance Education of Staff about the issues that can & may arise.
Testing for *Legionella* was undertaken on an ad hoc basis and reported to Private Health Unit The hospital implemented an extensive review and gap analysis, engaging expertise in the field of water management. The Hospital has since commissioned a purpose-built facility to treat and dose potable water to meet these guidelines.
Interim arrangements were 10 min tap flushing weekly of all taps in the facility

A few facilities noted that they already had processes in place prior to the interim arrangements, but even in these cases, the interim arrangements involved a review of their processes and documenting plans.

Most facilities considered the plans developed under the interim arrangements were successful.

Table 12: Effectiveness of plans developed under interim arrangements

Response	Responses
It was very successful in highlighting and reducing risks of *Legionella* in the facility	66.67%
We put together a document to comply with the requirement, but implementation was slow or non-existent	16.67%
We did not develop a plan at the time	1.67%
Other (please specify)	15.00%

Actions taken to comply with the legislative amendments

Table 13: Actions taken to meet legislative requirements

Increased the number of test sites and frequency of testing. The facility assessed the needs of lower risk and determined actions to be taken, including removal of ice making machines. Governance was introduced throughout the Health Service including quarterly meetings, test reporting etc.
Comprehensive plan developed which identified a water management team, risk analysis, risk management, response to detection or cases and a requirement for regular review of the plan
Sampling methodology and frequency were modified.
Water tested through Symbio Lab
Reduced the sampling regime from 12 samples / qtr to 4 and focused only on high risk areas.
Conducted a full review of the interim water risk management plan against the legislative requirements to ensure compliance. Reviewed the previous risk assessments to identify gaps in hazard identification. Significant consultation with the Public Health Unit to provide input and oversight as water quality experts. Reformatted to simplify the plan and make it easy to understand and implement. Retained the clear risk-based philosophy of water quality risk versus patient safety risk. Aligned with the guideline template and discontinued using the SEQ Grid Manager water quality management plan template. Review the testing and sampling regime based on the data set collected from the commencement of the regime. Governance pathway via the Infection Prevention Committee with infectious diseases input to ensure a robust clinical/scientific/engineering integrated approach. Final approval by the Executive Leadership Committee of the organisation. Implemented supplementary dosing facilities at major facilities with a history of water quality issues and provision for other sites for the deployment of mobile dosing facilities.
Existing plan updated
Revised plan based on emerging practice or requirements. Addition of quarterly periodic reporting
Reviewed the schedule maintenance and policy
A significant increase in water quality surveillance. Regular water testing for *Legionella*, heavy metals, chlorine, E. Coli, water temperature and turbidity. There was a positive reading for *Legionella* detection in late 2016 at the facility and this was managed by the team via an incident response plan and identification and isolation of the positive *Legionella*.
We consulted a water compliance company to assess and assist us to make the appropriate changes and to develop an annual plan for testing

The plan was only change minimally and that was around the reporting of positive and high levels of growth after testing
We reviewed the plan and updated where necessary, identified further risks within the hydraulic infrastructure and addressed and or are in the process of addressing any identified risks (warn water loop)
The frequency of water testing adjusted to match the risk profile for the patients.
Identification of at-risk dead legs and weekly flushing. Weekly flushing of rooms not used. Weekly flushing of areas undergoing renovation. Water testing of renovated areas. 5 x water samples in low risk areas, 10 x water samples in high risk areas, completed every 3 months
Increase testing and reporting, action plan in place to address any high counts. This is reviewed 12 monthly.
The plan has been revised a few times but essentially continues to follow the original outlay of the water management plan
Developed a plan, clarifies roles and responsibilities and sought funding to enact plan.
Completed Water Risk Management Plan. Commenced regular routine flushing of all outlets. Commenced Chlorine sampling schedule. Removed unused outlets and deadlegs. Replaced filters in clinical sinks Replaced filters in ZIP taps to allow for chlorine penetration Replaced patient ZIP TAP with boiling only. Completed pasteurisation on outlets with high counts/positive detections
Updated to include signature of responsible person
Wrote a new plan
The initial draft we implemented was ratified and commissioned. This same document is reviewed each year and changes made accordingly.
The final plan brought together everything we were already doing and ensured a comprehensive plan was available for use by any and all staff tasked with implementation of our Water Management Plan. There was a greater review of all of our strategies and it highlighted any deficits in the interim plan - it was a thorough risk plan.
In consultation with the maintenance department and infection control a full plan was developed and implemented and numerous meetings were held before we finally accepted the plan was ready to go to the CEO for approval , this plan also went to the infection control meeting . minor changes were made from the interim plan
Updated to reflect changes. addition of schematic plan of facility water supply
The facility now tests residual chlorine levels; Heterotrophic Plate Counts; E. coli and Coliforms. Water temperatures at the outlets are tested monthly. With a plan to ensure that all outlets are tested annually. An external contractor was bought in to map our water pipes and remove as many dead legs as possible from the system. A robust water flushing process was put in place for outlets that aren't being used during quite periods such as Christmas.
Review of existing infrastructure has been completed, with dead legs etc completed. water testing points refined, the responding to detections flowchart has also been incorporated into the local facility disaster emergency plan
Taken basic water risk plan reviewed rewritten to include the new requirements.
Public Health conduct testing and our staff conduct weekly testing.
The Plan was updated to include Emergency Eye wash stations and the 3 monthly Routine cleaning & disinfecting of shower roses and hoses. Our hot water temperature was also increased to 70 degrees Celsius.
Original risk management plan was updated to include new actions - regular flushing of hot/cold water lines, testing of extra outlet locations.
Water Quality Risk Management plan was developed in 2017. Sampling methodology and frequency were modified.

Increased the test sites and number - *Legionella*. The facility then assessed lower clinical risk areas and determined whether action (such as the removal of ice-machines) was to be undertaken. Governance was put in place across the health service with quarterly meetings on water quality risk management. at a hospital level, water quality was aligned to NSQHS Standard 3 - Preventing Hospital Acquired Infections and is monitored by that multi-disciplinary committee monthly. Policies and procedures were formed and rolled out across the health service and each facility with in-patient beds either created or reshaped the water quality plans for their sites.
Plan reviewed annually, continued *Legionella* testing, discussions on warm water supply to building A
Reviewed and revised the Water Management Plan and added the following: 1. Database - included date of testing, location of testing, results of tests and action taken if applicable. 2. Added Chlorine testing.
Regular flushing of pipe system. Heat treatments.
Increased our testing and purging of water outlets. Educated all staff the issues that could arise - Learning package used.
The Plan was reviewed. Governance responsibilities was expanded along with tighter time frames to make testing times more consistent. Notification of results was covered more thoroughly with inclusion of tables to show when testing and reporting was to be undertaken and submitted.
The hospital developed and implemented a Water Risk Management Plan that meets the new requirements and had a more extensive focus on water flow throughout the hospital, identification of outlets, work instructions and flowcharts to assist in case of issues arising in our water system.
Weekly Tap flushing, increased chlorination of water, installation of water cycling valves at the far end of pipes, quarterly cleaning of tap aerators, shower heads. In some cases replacement of old taps and pipes. Capping of water pipes that weren't required.

A few facilities indicated that the plans put in place under the interim arrangements (or earlier) were not changed, but all facilities would have reviewed the plans for compliance against the legislative requirements and confirmed the relevant risk assessments.

Benefits of water risk management plans

Facilities were asked how they would rate the quality of their plan, in terms of how it has contributed to reducing risks at the facility.

Table 14: Effectiveness of plans

Types of risks	Facilities that managed risk before legislation	Facilities that manage risk since legislation
Legionella	48.33%	98.33%
Pseudomonas aeruginosa	8.33%	40.00%
Loss of water supply	36.67%	68.33%
Water temperature	61.67%	85.00%
Turbidity (i.e. cloudy water)	15.00%	48.33%
Heavy metals (e.g. lead or copper)	11.67%	40.00%
Boil water alerts affecting the use of the drinking water supply	10.00%	15.00%
Low disinfectant residual (e.g. chlorine)	21.67%	66.67%
None of the above – no hazards or hazardous events were managed by the facilities.	1.67%	0.00%

Table 15: Benefits reported by facilities

Better understanding of hazards and risks; Improved oversight in water quality within the facility.
The assurance that water supplies are safe and maintenance regimes are working. Plan has assisted with the swift and timely resolution of issues as they arise.
Reassurance to patients, visitor and staff that the facility has good water quality. Robust control measures and processes evident with respect to water management.
The real benefit would obviously come from identifying the presence of *Legionella* in the water reticulation system and in particular the pneumophila strain and being able to take action to prevent patient infection. However, we have fortunately not experienced this. The process also provides good general information on the status of the water reticulation system in general.
Early identification and proactive management of water quality issues.
Legionella has been detected and therefore the development of the action plan
Identification of poor reticulation areas & the need to have strict control over additions & removal of services from the existing facility.
Clear direction/pathway to be undertaken which is consistent with like facilities.
The monitoring of *Legionella* risk
Beyond providing water of a quality that minimises the risk of *Legionella* exposure, there is also benefits in the form of plumbing infrastructure upgrades. As well as improved efficiency with maintenance schedules etc.
The plan ensures the facility has a safe water supply, enhances patient, staff and visitor safety which is critical in a health facility.
Anticipated benefits of prevention of *Legionella*, and transparency
We understand more about our water system within the facility and are more conscious of the testing and results
Detection of issues and risk, better knowledge of the hydraulic infrastructure systems
Information gathered for Hospital, able to be used for Aged Care. The results of quarterly testing have been reassuring as no *Legionella* found.
Awareness of risk of water on site which could affect patient care.
Reduction in risk of patient and staff harm
Early detection and intervention
Aware on *Legionella*, identification of deadlegs, identification of lack of backflow prevention
Compliance with the risk management plan keeps our patients safe and knowing our facility is compliant makes me happy as the GM/DON.
The knowledge that the plan is in place should we need it and who would be contacted easily obtained from the plan should it be required is a benefit
Staff awareness
Have a process now to follow that is formalised, everyone knows roles and expectations
Providing clean water to our staff and residents
Assurance of safety and quality and legislative compliance. The plan has been beneficial when patients have presented to the hospital with legionellosis and testing of the ward they are being cared in can be quickly undertaken and source identified as not from the hospital infrastructure - contribution to clinical risk.

Good from a governance perspective; database is transparent and can be followed if specific personnel are on leave; assists with the coordination of testing and management of positive results; easily identifies problem areas where addition investigation/work may have to be carried out.
Knowledge that the facility is clear of *Legionella*
Yes all staff are now educated and aware of the issues that can occur, and are responsible for the water management, on a day by day basis.
I think it has helped us in delegating responsibilities and has provided those responsible with a guide to assist them in undertaking water testing and reporting.
Documented processes that are easy to follow. Systematic approach to water management lead by the Executive of the Hospital

Review of plans

Each water risk management plan is required to specify when it will be reviewed. Most facilities indicated that their plans are reviewed at least annually.

Table 16: Frequency of review of water risk management plans

Answer Choices	Responses
At least once year	78.33%
Every 2-3 years	18.33%
Every 4-5 years	1.67%
More than 5 years	1.67%

Appendix D – Estimates of costs per facility

The following table shows the modelled costs per activity for each facility type and size. These were based on the survey responses.

Table 17: Estimated costs per facility

	Interim arrangements					Legislative arrangements				
	Over 100 beds	51 to 100 beds	1 to 50 beds	No overnight beds	Average	Over 100 beds	51 to 100 beds	1 to 50 beds	No overnight beds	Average
Cost of developing plans										
Public sector hospitals and state aged care facilities	$10,000	$10,000	$8,500	$8,500	$8,706	$5,000	$5,000	$4,000	$4,000	$4,137
Private facility licensed under *Private Health Facilities Act*	$10,000	$8,000	$8,000	$7,000	$7,915	$4,000	$3,000	$3,000	$2,000	$2,703
Average	$10,000	$8,727	$8,413	$7,618	$8,362	$4,342	$3,727	$3,826	$2,824	$3,513
Cost of communicating plan and responsibilities to staff										
Public sector hospitals and state aged care facilities	$2,000	$2,000	$1,500	$1,500	$1,569	$2,500	$2,500	$1,500	$1,500	$1,637
Private facility licensed under *Private Health Facilities Act*	$1,500	$1,200	$1,000	$1,000	$1,130	$1,400	$1,200	$1,000	$1,000	$1,108
Average	$1,671	$1,491	$1,413	$1,206	$1,377	$1,776	$1,673	$1,413	$1,206	$1,407
Costs of additional staff training										
Public sector hospitals and state aged care facilities	$2,000	$1,200	$800	$800	$923	$2,200	$1,400	$800	$800	$950
Private facility licensed under *Private Health Facilities Act*	$2,000	$2,000	$500	$500	$996	$2,100	$2,100	$500	$500	$1,029
Average	$2,000	$1,709	$748	$624	$955	$2,134	$1,845	$748	$624	$985
Costs of monitoring and reporting (annual cost)										
Public sector hospitals and state aged care facilities	$10,000	$6,000	$5,000	$5,000	$5,477	$10,000	$6,000	$5,000	$5,000	$5,477
Private facility licensed under *Private Health Facilities Act*	$10,000	$5,000	$3,000	$2,000	$4,212	$10,000	$5,000	$3,000	$2,000	$4,212
Average	$10,000	$5,364	$4,651	$3,235	$4,926	$10,000	$5,364	$4,651	$3,235	$4,926
Capital expenditure required by the plan										
Public sector hospitals and state aged care facilities	$14,000	$8,000	$4,500	$4,500	$5,490	$30,000	$15,000	$10,000	$10,000	$11,961
Private facility licensed under *Private Health Facilities Act*	$10,000	$8,000	$5,000	$2,000	$4,890	$20,000	$13,000	$8,000	$5,000	$9,610
Average	$11,368	$8,000	$4,587	$3,029	$5,229	$23,421	$13,727	$9,651	$7,059	$10,937
Cost of testing (annual cost)										
Public sector hospitals and state aged care facilities	Not required					$10,000	$8,000	$5,000	$5,000	$5,582
Private facility licensed under *Private Health Facilities Act*						$10,000	$8,000	$5,000	$5,000	$6,415
Average						$10,000	$8,000	$5,000	$5,000	$5,945
Other costs of implementing new processes and controls										
Public sector hospitals and state aged care facilities	$10,000	$6,000	$1,000	$1,000	$2,026	$20,000	$10,000	$5,000	$5,000	$6,536
Private facility licensed under *Private Health Facilities Act*	$5,000	$5,000	$2,000	$1,000	$2,483	$10,000	$10,000	$3,000	$3,000	$5,314
Average	$6,711	$5,364	$1,174	$1,000	$2,225	$13,421	$10,000	$4,651	$3,824	$6,004