

Guidelines for Granting Exemptions for System Leakage Management Plans

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Prepared by:

Office of the Water Supply Regulator

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1 Introduction

These guidelines are provided to assist water service providers that wish to apply for an exemption from the requirement of the *Water Supply (Safety and Reliability) Act 2008** (the Act) to prepare a system leakage management plan (SLMP) and submit it to the regulator for approval.

Under the Act, the requirement for preparing and submitting a SLMP does not apply to a water service provider who supplies only drainage services (s. 78).

Furthermore, by virtue of the definition of a water service provider, a service provider who is **only** registered to provide a sewerage service is not required to have a SLMP.

Chapter 2 of the Act (infrastructure and service) requires that service providers have a SLMP in place to minimise the water leakage from their water supply distribution systems.

A distributor-retailer under the *South-East Queensland (Distribution and Retail Restructuring) Act 2009* is not required to prepare a SLMP if they have a water netserv plan in place. Existing approved SLMPs for participating local governments are taken to be the distributor-retailer's approved SLMP until the day the distributor-retailer has a water netserv plan.

The regulator may exempt service providers from preparing a SLMP (s. 83). The process for obtaining an exemption from preparing a SLMP is detailed in these guidelines.

The regulator is the Director-General of the Department of Environment and Resource Management (DERM).

* This Act was enacted on 1 July 2008, and has replaced certain provisions of the *Water Act 2000*. The Act can be accessed on the Queensland legislation website <www.legislation.qld.gov.au>.

1.1 Guideline—aims

These guidelines set out the minimum requirements for applying for an exemption from preparing a SLMP. Service providers may choose, at their own discretion, to go beyond these requirements.

The guidelines specify the criteria, as set down in section 84 of the Act, on which an application for exemption may be based, together with the decision-making criteria that the regulator will apply in deciding exemption applications.

These guidelines outline how a service provider can apply for an exemption and the information that a service provider should supply in support of any exemption application.

2 Service provider obligations

Unless exempted, each service provider, registered under the Act as providing a water service, is required to have a SLMP and to report annually on the SLMP.

A service provider is the legal owner of the infrastructure providing the service, not the operator of the infrastructure. It is therefore the owner of the infrastructure who is responsible for preparing a SLMP and submitting it for approval. This does not preclude collaboration between an owner and an operator in the preparation of the SLMP.

The service provider obligations are summarised as follows:

<p>Prepare a SLMP for the registered water service provided.</p>	<p>The SLMP:</p> <ul style="list-style-type: none"> • documents the water lost due to leakage from a water supply distribution system as well as a system leakage management program to reduce the leakage • must be prepared in accordance with both the Act and guidelines issued by the regulator (Guidelines for Preparation of a System Leakage Management Plan)¹ • must be approved by the regulator <p>Service providers must:</p> <ul style="list-style-type: none"> • comply with an approved SLMP • regularly review and audit the SLMP in accordance with intervals set by the regulator.
<p>Report annually to the regulator.</p>	<p>Reporting should:</p> <ul style="list-style-type: none"> • be done with respect to achievement against the service provider’s SLMP • include the actions taken to implement the SLMP • include the outcome of any review of the SLMP • summarise the findings of and any recommendations stated in an audit report.

¹ These guidelines are available on the DERM website: <www.derm.qld.gov.au>.

3 Who can apply for an exemption?

All service providers, regardless of size, can apply for an exemption. Under the Act, a SLMP is a single document which addresses the different elements of a water service and the schemes provided by the service provider. Therefore there is no power to grant an exemption for any discrete element of a service or scheme within a service provider's registered service.

4 When can a service provider apply for an exemption?

Service providers are eligible to apply for an exemption at any time up until the deadlines for compliance with the provisions of the Act relating to submission of a SLMP. However, service providers should be aware that some lead time is necessary for preparing a SLMP if an exemption application is unsuccessful. The lead time will vary depending on the individual circumstances of the service provider. For this reason, service providers are encouraged to consider their compliance responsibilities and apply for an exemption, if desired, at the earliest possible time.

It is the service provider's responsibility to ensure that the Act's requirements, from which an exemption is being sought, can still be complied with by the statutory deadline, if an exemption is not granted.

Unless the service provider gains an exemption, service providers must prepare and submit a SLMP for approval within two years of being registered as a service provider (s. 82) or as provided under legislation.

5 How does a service provider apply for an exemption?

An application for an exemption must be submitted in the approved form, SPE02—Service Provider System Leakage Management Plan Exemption Application Form, to the regulator (s. 83) and be supported by sufficient information to enable the regulator to make a decision on the application. The required information is detailed in section 8 of these guidelines.

The cost of supplying any information by the service provider is the service provider's responsibility.

The approved form can be obtained from:

Office of the Water Supply Regulator
Department of Environment and Resource Management
GPO Box 2454
Brisbane Qld 4001

or by downloading it from the DERM website <www.derm.qld.gov.au>.

There is no fee for lodging an exemption application.

6 How is a decision made on an exemption application?

Under s. 84 of the Act, the exemption must be granted if the regulator is satisfied that the application complies with s. 83 and at least one of the following applies:

- the water service provider's distribution system is considered relatively new under guidelines made by the regulator
- the water service distributes underground water from the Great Artesian Basin primarily for stock and domestic purposes
- the water service provider's distribution system is designed to operate as a groundwater recharge system
- current water leakage from the distribution system is considered low under the guidelines
- current water leakage from the distribution system is considered high under the guidelines but the water service provider does not have the financial capacity to undertake a cost–benefit analysis for the distribution system
- current water leakage from the distribution system is considered high under the guidelines but the cost of undertaking a cost–benefit analysis for the distribution system is more than the cost of the water that could be recovered
- a cost–benefit analysis for the distribution system shows that it is not cost–effective to implement any measures to reduce leakage.

If the regulator is not satisfied that the service provider's circumstances meet the above requirements, the regulator must refuse the application.

The regulator must have regard to these guidelines when deciding the application.

There is no prescribed time limit set out in the Act as to when the regulator must decide an application. However, it is recommended that a decision should be made within three months of receipt of the application.

Section 84(3) of the Act requires that the regulator must, within 10 business days after deciding an application, give the service provider an information notice advising of the outcome of the application. The Act requires that the information notice includes a copy of the relevant internal review provisions of the Act and states:

- the decision
- the reasons for the decision
- the name and address of any other person who was given the notice
- that the person given the notice may apply for an internal review of the decision, within 30 business days after the notice is given
- how to apply for the internal review.

In giving the reasons for the decision, the regulator must set out the regulator's findings on material questions of fact and refer to the evidence or other material on which those findings were based.

7 Exemption conditions

The Act imposes conditions on some exemptions that are granted (s. 85).

Where an exemption has been granted, it only applies for the period of time, if any, nominated by the regulator (s. 85(1)).

An exemption will usually be granted for a period of five years, unless the regulator considers that the circumstances under which the exemption was granted are likely to change within that period.

Section 85(2), prescribes the conditions that apply to the exemptions granted under s. 84. The conditions are based on the exemption criteria listed below:

- the current water leakage from the distribution system is considered low under the guidelines
- the current water leakage from the distribution system is considered high under the guidelines but the water service provider does not have the financial capacity to undertake a cost–benefit analysis for the distribution system
- the current water leakage from the distribution system is considered high under the guidelines but the cost of undertaking a cost–benefit analysis for the distribution system is more than the cost of the water that could be recovered
- a cost–benefit analysis for the distribution system shows that it is not cost-effective to implement any measures to reduce leakage.

The conditions applicable in these circumstances include:

- the water service provider must have in place a leakage control system of a standard approved under guidelines made by the regulator, and
- the water service provider must, for each two year period the exemption is in force, give the regulator a report on the leakage levels.

For details of what is required for an approved leakage control system, refer to appendix 5.

An exemption granted to a service provider only applies while the service provider abides by the prescribed conditions (s. 85(3)).

8 The exemption criteria, the required information and the decision making criteria

8.1 Exemption criteria

An exemption from preparing, reviewing, auditing and implementing a SLMP will be granted if the regulator is satisfied that an application for exemption satisfies one of the seven (7) criteria stated in s. 84 of the Act.

The information that should be submitted in support of an exemption application, and the decision-making criteria that the regulator will apply for each of these categories, is outlined in sections 8.4 to 8.10 respectively. The seven potential exemption categories are as follows:

- the water service provider's distribution system is considered relatively new (s. 84(1)(b)(i))
- the water service distributes underground water from the Great Artesian Basin primarily for stock and domestic purposes (s. 84(1)(b)(ii))
- the water service provider's distribution system is designed to operate as a groundwater recharge system (s. 84(1)(b)(iii))
- current water leakage from the distribution system is considered low (s. 84(1)(b)(iv))
- current water leakage from the distribution system is considered high under the guidelines but the water service provider does not have the financial capacity to undertake a cost–benefit analysis for the distribution system (s. 84(1)(b)(v))
- current water leakage from the distribution system is considered high under the guidelines but the cost of undertaking a cost–benefit analysis for the distribution system is more than the cost of the water that could be recovered (s. 84(1)(b)(vi))
- a cost–benefit analysis for the distribution system shows that it is not cost–effective to implement any measures to reduce leakage (s. 84(1)(b)(vii)).

Where a cost–benefit analysis is required to justify an exemption application, the timeframe used for such a cost–benefit analysis should be five years.

8.2 Certifications

The application to the regulator requires an accompanying certification by either the chief executive officer (CEO), however named, of the water service provider or a Registered Professional Engineer of Queensland (RPEQ). The Act prescribes who must certify the application in each case (s. 83(5)).

This determination is based on whether or not the preparation of the report is founded on necessary engineering expertise or relies primarily on an assessment of the service provider's financial capabilities. The only exception to this is in the case of infrastructure age whereby the CEO is empowered to certify the average infrastructure age. This provision exists to allow a CEO to certify the age of infrastructure installed within the specified age range.

8.3 Exclusions/exemptions—drainage and/or sewerage services

The requirement to prepare and submit a SLMP does not apply to a water service provider supplying only drainage services (s. 78).

Furthermore, by virtue of the definition of a water service provider, a service provider who is registered to only provide a sewerage service is not required to have a SLMP.

8.4 Average age of the distribution system

Section 84(1)(b)(i)—The water service provider's distribution system is considered relatively new under guidelines made by the regulator.

'Relatively new' infrastructure is infrastructure that is less than 15 years old.

Service providers may apply for an exemption from the requirement to prepare a SLMP if the average age of their distribution system is less than 15 years.

Service providers applying for an exemption under this category must, as a minimum, supply a report to the regulator that documents the following:

Registered service	Identify the registered service to which the SLMP exemption application applies.
Nature of the service/s	<p>Describe, in general terms:</p> <ul style="list-style-type: none"> • all of the separate schemes that make up the registered water service • all elements of the registered water service being provided to the separate schemes i.e. bulk water; retail water; irrigation; primarily stock and domestic • the nature of the service. Relevant considerations include whether the service is potable or non-potable, pressurised on-demand, a constant flow scheme; a dual reticulation scheme; a channel system, etc. • the extent of the service. This includes an estimate of the number of connections² and the total length of mains and/or channels for the service as a whole and by each scheme and element of water service, where relevant.
Infrastructure details	<p>Describe, the distribution infrastructure used to deliver the elements of the service that collectively make up the service provider’s registered service.</p> <p>This includes identifying the major infrastructure facilities and components, their purpose and capacity (capacity information is not required for pipelines). Major infrastructure facilities and components include:</p> <ul style="list-style-type: none"> • treatment plants • pump stations • reservoirs • channels • pipelines³. <p>This information should include a schematic layout clearly showing the linkages between each of the major infrastructure components.</p>
Infrastructure age	<p>Determine the average age of the distribution system.</p> <p>The average age of the distribution system may be determined by the following methodology:</p> <ol style="list-style-type: none"> 1. determine the total length of the distribution system (regardless of type, material or size – exclude water treatment or recycling plants). 2. determine the age length of various parts of the distribution system (regardless of type, material or size) i.e. length in metres multiplied by the average age (from installation) in years of that part of the system. Installation periods for infrastructure should be no longer than five years—the average age of the system should be based on the mid year of the period of installation. 3. determine the total age length for the distribution system (by totalling calculations for the various parts). 4. calculate the average age of the distribution system i.e. by dividing total age length by the total length of the distribution system.

The chief executive officer, however named, of the water service provider, must:

- certify the contents of the report as being accurate for the provider’s infrastructure and registered service
- provide his or her name and position details.

The condition referred to in s. 85(1) of the Act will apply to an exemption granted under this category.

The exemption will only be granted for the period of time up to and including the time at which the average age of the infrastructure reaches fifteen (15) years. The provisions of ss. 79, 81 and 82 of the Act will apply once the average age of the infrastructure is equal to or greater than 15 years.

² Note, where the term connections is used in the Act, a different meaning applies (see schedule 3 of the Act).

³ For large complex systems, identification of pipelines may be limited to trunk delivery mains only rather than documenting extensive networks of reticulation pipe work or distribution mains.

8.5 Water service distributes water from the Great Artesian Basin

Section 84(1)(b)(ii)—The water service distributes underground water from the Great Artesian Basin primarily for stock and domestic purposes.

Service providers may apply for an exemption from the requirement to prepare a SLMP if the entire registered service is distributing underground water from the Great Artesian Basin (GAB) primarily for stock and domestic purposes. Underground water from the GAB is water from a direct connection to a defined and identified artesian aquifer, accessed by either artesian or sub-artesian bore.

This exemption is based on the premise that the GAB Rehabilitation Program is already addressing reducing leakage from bore drains. Furthermore, service providers who have replaced bore drains with pipes have already achieved significant water leakage reductions.

Service providers applying for an exemption under this category must submit to the regulator a report describing the nature of the service and statements that:

- the water for the service is being drawn from the GAB, and
- the service provider’s customers use the water primarily for stock and domestic purposes.

The chief executive officer, however named, of the water service provider, must:

- certify the contents of the report as being accurate for the provider’s infrastructure and registered service
- provide their name and position details.

The conditions referred to in s. 85(2) of the Act will not apply to an exemption granted under this category.

It should be noted that if at some time in the future the source is changed to one not drawing from the GAB, then s. 86 of the Act and the provisions of section 9 of these guidelines would apply.

8.6 Distribution system operates as a groundwater recharge system

Section 84(1)(b)(iii) —The water service provider’s distribution system is designed to operate as a groundwater recharge system.

Service providers may apply for an exemption from the requirement to prepare a SLMP if the distribution system is designed to operate as a groundwater recharge system.

Service providers applying for an exemption under this category must submit to the regulator a report describing the nature of the service and a statement that it operates as a groundwater recharge system.

The chief executive officer, however named, of the water service provider, must:

- certify the contents of the report as being accurate for the provider’s infrastructure and registered service
- provide their name and position details.

The condition referred to in s. 85(2) of the Act will not apply to an exemption granted under this category.

It should be noted that if at some time in the future the purpose of the infrastructure changes from that of operating as a groundwater recharge system, then s. 86 of the Act and the provisions of section 9 of these guidelines will apply.

8.7 Current water leakage is low

Section 84(1)(b)(iv)—The current water leakage from the distribution system is considered low under the guidelines.

The regulator has decided that service providers may apply for an exemption from the requirement to prepare a SLMP if:

- the current water leakage from the distribution system is less than:
 - 80 litres/connection/day for a small water service provider
 - 70 litres/connection/day for a medium water service provider
 - 60 litres/connection/day for a large water service provider
- for water transmitted by bulk water service providers in large pipelines the percentage lost is less than five per cent of the total volume transmitted

$$\text{Percentage leakage} = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

- for irrigation schemes consisting of channels and pipelines, the percentage leakage from the scheme is less than 25 per cent on an annual basis

$$\text{Percentage leakage} = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

A situation that requires clarification is that of a service provider having a natural watercourse forming either all or the majority of their distribution system. Leakage losses from a natural watercourse are not to be considered in the determination of overall leakage from the distribution system, therefore it might reasonably be expected that the leakage determination could effectively result in a zero current leakage figure. This would assume, however, that the leakage from any other minor elements of the distribution system were zero, or close to zero, as well. Such a system might be that of a dam with an outlet valve and pipework discharging into a river or the like, along the length of which landowners extract their allocated volume of water for agricultural purposes.

Service providers applying for an exemption under this category must, as a minimum, supply a report to the regulator that documents the following:

Registered service	Identify the registered service to which the SLMP exemption application applies.
Nature of the service/s	Describe, in general terms: <ul style="list-style-type: none"> • all of the separate schemes that make up the registered water service • all elements of the registered water service being provided to the separate schemes i.e. bulk water; retail water; irrigation; primarily stock and domestic • the nature of the service. Relevant considerations include whether the service is potable or non-potable, pressurised on-demand, a constant flow scheme, a dual reticulation scheme, a channel system, etc. • the extent of the service. This includes an estimate of the number of connections⁴ and the total length of mains and/or channels for the service as a whole and by each scheme and element of water service, where relevant.
Infrastructure details	Describe, the distribution infrastructure used to deliver the elements of the service that collectively make up the service provider’s registered service. This includes identifying the major infrastructure facilities and components, their purpose and capacity (capacity information is not required for pipelines). Major infrastructure facilities and components include: <ul style="list-style-type: none"> • treatment plants • pump stations • reservoirs • channels • pipelines⁵. <p>This information should include a schematic layout clearly showing the linkages between each of the major infrastructure components.</p>
System leakage	For piped systems, determine and document the volume of water leaking from a pressurised system, up to the point of customer connection. Water leakage ⁶ includes: <ul style="list-style-type: none"> • leakage and bursts from transmission mains • leakage and bursts from the distribution system—from the service provider’s mains, service connections, and fittings • leakage from reservoirs • overflows from reservoirs.

⁴ Note, where the term connections is used in the Act, a different meaning applies (see schedule 3 of the Act).

⁵ For large complex systems, identification of pipelines may be limited to trunk delivery mains only rather than documenting extensive networks of reticulation pipe work or distribution mains.

⁶ This definition of water leakage from a piped system is consistent with the standard definitions developed by the International Water Association (IWA) as components of annual water audit process for water supply and distribution systems. This system is recommended for use by Australian water utilities by the Water Services Association of Australia (WSAA). Appendix 2 briefly summarises the IWA system. (Note: Water leakage defined in these guidelines is equivalent to real losses as defined in the IWA system.)

Water leakage must be reported in terms of litres/connection/day. Service providers must document the methodology used for determining system water leakage.

For a bulk water service consisting of an individual large diameter pipeline, determine and document the volume of water leaking from the system, up to the point of customer connection. Water leakage⁶ includes:

- leakage and bursts from transmission mains
- leakage and bursts from the distribution system—from the service provider’s mains, service connections, and fittings
- leakage from reservoirs or balancing storages
- overflows from reservoirs or balancing storages.

Water leakage must be reported in percentage terms.

$$\text{Percentage leakage}^7 = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

Service providers must document the methodology used for determining system leakage.

For irrigation schemes consisting of channels and pipelines the leakage must be determined as a percentage for the overall scheme.

$$\text{Percentage leakage}^7 = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

Service providers must document the methodology used for determining system leakage.

Water leakage does not include:

- apparent losses caused by inaccuracies associated with production and customer metering
- unauthorised consumption, such as theft or illegal use
- evaporation from channels, balancing storages and tanks
- losses attributable to maintenance activities, such as scouring, cleaning, etc
- leakage losses from natural (as opposed to constructed) water courses
- unmetered water use of various types, such as fire fighting and training, parks and gardens, etc.

A RPEQ⁸ must:

- certify the report. The engineer may be:
 - an employee of the service provider
 - an engineer employed to operate the service provider’s infrastructure
 - an engineer independent of the service provider
- provide a written certification to accompany the report stating:
 - the report is accurate for the water service provider’s infrastructure and registered service
 - their name and registration details.

An exemption will generally be granted if:

- the current water leakage from the distribution system is less than:
 - 80 litres/connection/day for a small water service provider
 - 70 litres/connection/day for a medium water service provider
 - 60 litres/connection/day for a large water service provider
- for water transmitted by large service providers in large pipelines the percentage lost is less than five per cent of the total volume transmitted

⁷ No allowance is to be made in the percentage formulas for meter inaccuracies, unauthorised consumption, evaporation, maintenance activities, losses from natural watercourses and/or unmetered use.

⁸ The Registered Professional Engineer must be a registered professional engineer as defined by the *Professional Engineers Act 2002*

- for irrigation schemes consisting of channels and pipelines the percentage lost from the scheme is less than 25 per cent on an annual basis

An exemption granted under this category will be subject to the following conditions:

- the water service provider must have in place a leakage control system of a standard approved under guidelines issued by the regulator, and
- the water service provider must, for each two year period the exemption is in force, give the regulator a report on the leakage levels.

8.8 Current water leakage is high—no financial capacity to undertake a cost–benefit analysis

Section 84(1)(b)(v)—Current water leakage from the distribution system is considered high under the guidelines but the water service provider does not have the financial capacity to undertake a cost–benefit analysis for the distribution system.

Service providers may apply for an exemption from the requirement to prepare a SLMP if the current water leakage is considered high but they can demonstrate they do not have the financial capacity to undertake a cost–benefit analysis. Leakage would be considered high if:

- the current water leakage from the distribution system is more than:
 - 80 litres/connection/day for a small water service provider
 - 70 litres/connection/day for a medium water service provider
 - 60 litres/connection/day for a large water service provider
- for water transmitted by bulk water service providers in large pipelines, the percentage lost is more than five per cent of the total volume transmitted

$$\text{Percentage leakage} = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

- for irrigation schemes consisting of channels and pipelines the percentage leakage from the scheme is more than 25 per cent on an annual basis

$$\text{Percentage leakage} = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

Service providers applying for an exemption under this category must, as a minimum, supply a report to the regulator that documents the following:

Registered service	Identify the registered service to which the SLMP exemption application applies.
Nature of the service/s	Describe, in general terms: <ul style="list-style-type: none"> • all of the separate schemes that make up the registered water service • all elements of the registered water service being provided to the separate schemes i.e. bulk water; retail water; irrigation; primarily stock and domestic • the nature of the service. Relevant considerations include whether the service is potable or non-potable, pressurised on-demand, a constant flow scheme, a dual reticulation scheme, a channel system, etc. • the extent of the service. This includes an estimate of the number of connections⁹ and the total length of mains and/or channels for the service as a whole and by each scheme and element of water service, where relevant.

⁹ Note, where the term connections is used in the Act, a different meaning applies (see schedule 3 of the Act).

Infrastructure details	<p>Describe, the distribution infrastructure used to deliver the elements of the service that collectively make up the service provider’s registered service.</p> <p>This includes identifying the major infrastructure facilities and components, their purpose and capacity (capacity information is not required for pipelines). Major infrastructure facilities and components include:</p> <ul style="list-style-type: none"> • treatment plants • pump stations • reservoirs • channels • pipelines¹⁰. <p>This information should include a schematic layout clearly showing the linkages between each of the major infrastructure components.</p>
System leakage	<p>For piped systems, determine and document the volume of water lost from a pressurised system, up to the point of customer connection. Water leakage¹¹ includes:</p> <ul style="list-style-type: none"> • leakage and bursts from transmission mains • leakage and bursts from the distribution system—from the service provider’s mains, service connections, and fittings • leakage from reservoirs • overflows from reservoirs. <p>Water leakage must be reported in terms of litres/connection/day. Service providers must document the methodology used for determining system water leakage.</p> <p>For a bulk water service comprising of an individual large diameter pipeline, determine and document the volume of water leaking from the system, up to the point of customer connection. Water leakage includes:</p> <ul style="list-style-type: none"> • leakage and bursts from transmission mains • leakage and bursts from the distribution system—from the service provider’s mains, service connections, and fittings • leakage from reservoirs or balancing storages • overflows from reservoirs or balancing storages. <p>Water leakage must be reported in percentage terms.</p> <p>Percentage leakage¹² = $\frac{\text{total input volume} - \text{volume delivered}}{\text{total input volume}} \times 100$</p> <p>Service providers must document the methodology used for determining system leakage.</p> <p>For irrigation schemes consisting of channels and pipelines the leakage must be determined as a percentage for the overall scheme.</p> <p>Percentage leakage¹² = $\frac{\text{total input volume} - \text{volume delivered}}{\text{total input volume}} \times 100$</p> <p>Service providers must document the methodology used for determining system leakage.</p>

¹⁰ For large complex systems, identification of pipelines may be limited to trunk delivery mains only rather than documenting extensive networks of reticulation pipe work or distribution mains.

¹¹ This definition of water leakage from a piped system is consistent with the standard definitions developed by the International Water Association (IWA) as components of annual water audit process for water supply and distribution systems. This system is recommended for use by Australian water utilities by the Water Services Association of Australia (WSAA). Appendix 2 briefly summarises the IWA system. (Note: Water leakage defined in these guidelines is equivalent to real losses as defined in the IWA system.)

¹² No allowance is to be made in the percentage formulas for meter inaccuracies, unauthorised consumption, evaporation, maintenance activities, losses from natural watercourses and/or unmetred use.

	<p>Water leakage does not include:</p> <ul style="list-style-type: none"> • apparent losses caused by inaccuracies associated with production and customer metering • unauthorised consumption (theft or illegal use) • evaporation from channels, balancing storages and tanks • losses attributable to maintenance activities, such as scouring, cleaning, etc • leakage losses from natural (as opposed to constructed) water courses • unmetered water use of various types, such as fire fighting and training, parks and gardens, etc.
Cost–benefit analysis cost	<p>Determine the cost of undertaking a cost–benefit analysis to determine measures that would be cost–effective for the service provider to implement</p> <p>Note:</p> <p>Service providers may choose to determine the cost of undertaking a cost–benefit analysis by one of the three following methods:</p> <ol style="list-style-type: none"> 1. adopt the default values for the cost of undertaking a cost–benefit analysis that have been developed by DERM. See appendix 4. 2. determine its own value for the cost of undertaking a cost–benefit analysis by using the table in appendix 3 and inserting their own cost for each component. If all components are not applicable, service provider’s adopting this method must document why those components do not apply. Additional components may be included if the water service provider considers it appropriate for its circumstances. The service provider must document why any additional component is included. 3. determine its own components and values for the cost of undertaking a cost–benefit analysis. Service provider’s adopting this method must document the methodology and details used in determining the cost of undertaking a cost–benefit analysis.
Financial capability statement	<p>Document why the service provider does not have the financial capability to undertake a cost–benefit analysis taking into consideration the following:</p> <ul style="list-style-type: none"> • the cost of undertaking a cost–benefit analysis • the total annual cost of providing the water service • the total annual revenue earned by the water service.

An exemption will generally be granted if the service provider can demonstrate that it does not have the financial capacity to undertake the necessary cost–benefit analysis. The regulator considers that a service provider generally will not have the financial capacity to undertake a cost–benefit analysis in the case where the ‘Default costs for a cost–benefit analysis’ for the respective size of service provider (as stated in Appendix 4), exceeds 10 per cent of the total annual revenue from the service provider’s water service.

The chief executive officer, however named, of the water service provider, must:

- certify the contents of the report as being accurate for the provider’s infrastructure and registered service
- provide their name and position details.

An exemption granted under this category will be subject to the following conditions:

- the water service provider must have in place a leakage control system of a standard approved under guidelines made by the regulator, and
- the water service provider must, for each two year period the exemption is in force, give the regulator a report on the leakage levels.

8.9 Current water leakage is high—the cost of potential water savings is less than the cost of undertaking a cost–benefit analysis

Section 84(1)(b)(vi)—Current water leakage from the distribution system is considered high under the guidelines but the cost of undertaking a cost–benefit analysis for the distribution system is more than the cost of the water that could be recovered.

Service providers may apply for an exemption from the requirement to prepare a SLMP if the cost of the water that could be saved is less than the cost of undertaking a cost–benefit analysis to determine those measures that might be implemented to reduce water leakage. Leakage would be considered high if:

- the current water leakage from the distribution system is more than:
 - 80 litres/connection/day for a small water service provider
 - 70 litres/connection/day for a medium water service provider
 - 60 litres/connection/day for a large water service provider
- for water transmitted by bulk water service providers in large pipelines, the percentage leakage is more than five per cent of the total volume transmitted

$$\text{Percentage leakage} = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

- for irrigation schemes consisting of channels and pipelines the percentage leakage from the scheme is more than 25 per cent on an annual basis

$$\text{Percentage leakage} = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

Service providers applying for an exemption under this category must, as a minimum, supply a report to the regulator that documents the following:

Registered service	Identify the registered service to which the SLMP exemption application applies.
Nature of the service/s	Describe, in general terms: <ul style="list-style-type: none"> • all of the separate schemes that make up the registered water service • all elements of the registered water service being provided to the separate schemes i.e. bulk water; retail water; irrigation; primarily stock and domestic • the nature of the service. Relevant considerations include whether the service is potable or non-potable, pressurised on-demand, a constant flow scheme, a dual reticulation scheme, a channel system, etc. • the extent of the service. This includes an estimate of the number of connections¹³ and the total length of mains and/or channels for the service as a whole and by each scheme and element of water service, where relevant.
Infrastructure details	Describe, the distribution infrastructure used to deliver the elements of the service that collectively make up the service provider’s registered service. This includes identifying the major infrastructure facilities and components, their purpose and capacity (capacity information is not required for pipelines). Major infrastructure facilities and components include: <ul style="list-style-type: none"> • treatment plants • pump stations • reservoirs • channels • pipelines¹⁴. This information should include a schematic layout clearly showing the linkages between each of the major infrastructure components.

¹³ Note, where the term connections is used in the Act, a different meaning applies (see schedule 3 of the Act).

¹⁴ For large complex systems, identification of pipelines may be limited to trunk delivery mains only rather than documenting extensive networks of reticulation pipe work or distribution mains.

System leakage	<p>For piped systems, determine and document the volume of water leaking from a pressurised system, up to the point of customer connection. Water leakage¹⁵ includes:</p> <ul style="list-style-type: none"> • leakage and bursts from transmission mains • leakage and bursts from the distribution system—from the service provider’s mains, service connections, and fittings • leakage from reservoirs • overflows from reservoirs. <p>Estimate the lowest technically achievable level of water leakage from the service providers’ registered system and determine the water that can be saved by reducing leakage.</p> <p>Determine the cost of water (calculated at retail price) currently lost from the system due to leakage that can be recovered. Where step tariffs apply or excess water charges apply, the retail price shall be the highest price applicable to the step tariff or the excess water charge.</p> <p>Water leakage must be reported in terms of litres/connection/day. Service providers must document the methodology used for determining system water leakage.</p> <p>For a bulk water service comprising of an individual large diameter pipeline, determine and document the volume of water leaking from the system, up to the point of customer connection. Water leakage¹⁵ includes:</p> <ul style="list-style-type: none"> • leakage and bursts from transmission mains • leakage and bursts from the distribution system—from the service provider’s mains, service connections, and fittings • leakage from reservoirs or balancing storages • overflows from reservoirs or balancing storages. <p>Water leakage must be reported in percentage terms.</p> <p>Percentage leakage¹⁶ = $\frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$</p> <p>Service providers must document the methodology used for determining system leakage.</p> <p>For irrigation schemes consisting of channels and pipelines the leakage must be determined as a percentage for the overall scheme.</p> <p>Percentage leakage¹⁶ = $\frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$</p> <p>Service providers must document the methodology used for determining system leakage.</p> <p>For a bulk water service and/or irrigation scheme estimate the lowest technically achievable level of water leakage from the service providers’ registered system and determine the water that can be saved by reducing leakage.</p> <p>Determine the cost of water (calculated at retail price) currently lost from the system due to leakage that can be recovered. Where step tariffs apply or excess water charges apply, the retail price shall be the highest price applicable to the step tariff or the excess water charge.</p> <p>Water leakage does not include:</p> <ul style="list-style-type: none"> • apparent losses caused by inaccuracies associated with production and customer metering • unauthorised consumption (theft or illegal use) • evaporation from channels, balancing storages and tanks • losses attributable to maintenance activities, such as scouring, cleaning, etc. • leakage losses from natural (as opposed to constructed) water courses • unmetered water use of various types, such as fire fighting/training, parks and gardens, etc.
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¹⁵ This definition of water leakage from a piped system is consistent with the standard definitions developed by the International Water Association (IWA) as components of annual water audit process for water supply and distribution systems. This system is recommended for use by Australian water utilities by the Water Services Association of Australia (WSAA). Appendix 2 briefly summarises the IWA system. (Note: Water leakage defined in these guidelines is equivalent to real losses as defined in the IWA system.)

¹⁶ No allowance is to be made in the percentage formulas for meter inaccuracies, unauthorised consumption, evaporation, maintenance activities, losses from natural watercourses and/or unmetered use.

<p>Cost–benefit analysis cost</p>	<p>Determine the cost of undertaking a cost–benefit analysis to determine measures that would be cost–effective for the service provider to implement. Service providers must document the methodology and details used for determining the cost of undertaking a cost–benefit analysis.</p> <p>Note:</p> <p>Service providers may choose to determine the cost of undertaking a cost–benefit analysis by one of the three following methods:</p> <ol style="list-style-type: none"> 1. adopt the default values for the cost of undertaking a cost–benefit analysis that have been developed by DERM. See appendix 4. 2. determine its own value for the cost of undertaking a cost–benefit analysis by using the table in appendix 3 and inserting their own cost for each component. If all components are not applicable, service provider’s adopting this method must document why those components do not apply. Additional components may be included if the water service provider considers it appropriate for its circumstances. The service provider must document why any additional component is included. 3. determine its own components and values for the cost of undertaking a cost–benefit analysis. Service provider’s using adopting this method must document the methodology and details used determining the cost of undertaking a cost–benefit analysis.
<p>Compare the costs for the cost–benefit analysis with the cost of water lost</p>	<p>Compare the costs that were determined for carrying out the required cost–benefit analysis with the cost of water lost through leakage from the distribution system based on a five year payback period.</p>

An exemption will generally be granted if the cost of undertaking a cost–benefit analysis exceeds the cost of water currently lost due to leakage that can be potentially saved.

The chief executive officer, however named, of the water service provider, must:

- certify the contents of the report as being accurate for the provider’s infrastructure and registered service
- provide their name and position details.

An exemption granted under this category will be subject to the following conditions:

- the water service provider must have in place a leakage control system of a standard approved under guidelines issued by the regulator, and
- the water service provider must, for each two year period the exemption is in force, give the regulator a report on the leakage levels.

8.10 Current water leakage is high—not cost–effective to implement leakage reduction measures

Section 84(1)(b)(vii)—A cost–benefit analysis for the distribution system shows that it is not cost–effective to implement any measures to reduce leakage.

Service providers may apply for an exemption from the requirement to prepare a SLMP if the current leakage from its distribution system is considered high, but a cost–benefit analysis shows that it is not cost–effective to implement any measures to reduce the leakage. Leakage would be considered high if:

- the current water leakage from the distribution system is more than:
 - 80 litres/connection/day for a small water service provider
 - 70 litres/connection/day for a medium water service provider
 - 60 litres/connection/day for a large water service provider

- for water transmitted by bulk water service providers in large pipelines, the percentage leakage is more than five per cent of the total volume transmitted

$$\text{Percentage leakage} = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

- for irrigation schemes consisting of channels and pipelines the percentage leakage from the scheme is more than 25 per cent on an annual basis

$$\text{Percentage leakage} = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

Service providers applying for an exemption under this category must, as a minimum, supply a report to the regulator that documents the following:

Registered service	Identify the registered service to which the SLMP exemption application applies.
Nature of the service/s	Describe, in general terms: <ul style="list-style-type: none"> all of the separate schemes that make up the registered water service all elements of the registered water service being provided to the separate schemes i.e. bulk water; retail water; irrigation; primarily stock and domestic; the nature of the service. Relevant considerations include whether the service is potable or non-potable, pressurised on-demand, a constant flow scheme, a dual reticulation scheme, a channel system, etc; the extent of the service. This includes an estimate of the number of connections¹⁷ and the total length of mains and/or channels for the service as a whole and by each scheme and element of water service, where relevant.
Infrastructure details	Describe, the distribution infrastructure used to deliver the elements of the service that collectively make up the service provider’s registered service. This includes identifying the major infrastructure facilities and components, their purpose and capacity (capacity information is not required for pipelines). Major infrastructure facilities and components include: <ul style="list-style-type: none"> treatment plants pump stations reservoirs channels pipelines¹⁸. <p>This information should include a schematic layout clearly showing the linkages between each of the major infrastructure components.</p>
System Leakage	For piped systems, determine and document the volume of water lost from a pressurised system, up to the point of customer connection. Water leakage ¹⁹ includes: <ul style="list-style-type: none"> leakage and bursts from transmission mains leakage and bursts from the distribution system—from the service provider’s mains, service connections, and fittings leakage from reservoirs overflows from reservoirs.

¹⁷ Note, where the term connections is used in the Act, a different meaning applies (see schedule 3 of the Act).

¹⁸ For large complex systems, identification of pipelines may be limited to trunk delivery mains only rather than documenting extensive networks of reticulation pipe work or distribution mains.

¹⁹ This definition of water leakage from a piped system is consistent with the standard definitions developed by the International Water Association (IWA) as components of annual water audit process for water supply and distribution systems. This system is recommended for use by Australian water utilities by the Water Services Association of Australia (WSAA). Appendix 2 briefly summarises the IWA system. (Note: Water leakage defined in these guidelines is equivalent to real losses as defined in the IWA system.)

Water leakage must be reported in terms of litres/connection/day. Service providers must document the methodology used for determining system water leakage.

For a bulk water service comprising of an individual large diameter pipeline, determine and document the volume of water leaking from the system, up to the point of customer connection. Water leakage¹⁹ includes:

- leakage and bursts from transmission mains
- leakage and bursts from the distribution system—from the service provider’s mains, service connections, and fittings
- leakage from reservoirs or balancing storages
- overflows from reservoirs or balancing storages.

Water leakage must be reported in percentage terms.

$$\text{Percentage leakage}^{20} = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

Service providers must document the methodology used for determining system leakage.

For irrigation schemes consisting of channels and pipelines the leakage must be determined as a percentage for the overall scheme.

$$\text{Percentage leakage}^{20} = \frac{(\text{total input volume} - \text{volume delivered}) \times 100}{\text{total input volume}}$$

Service providers must document the methodology used for determining system leakage.

Water leakage does not include:

- apparent losses caused by inaccuracies associated with production and customer metering
- unauthorised consumption (theft or illegal use)
- evaporation from channels, balancing storages and tanks
- losses attributable to maintenance activities, such as scouring, cleaning, etc
- leakage losses from natural (as opposed to constructed) water courses
- unmetered water use of various types, such as fire fighting and training, parks and gardens, etc

Measures to reduce system water leakage

Document measures that will reduce water leakage from the system. For each measure:

- describe the nature of each measure
- state whether each measure is either a one-off or an on-going activity
- state the time-frame over which each measure would be implemented
- state the expected reduction in leakage for each measure
- estimate the lowest technically achievable level of water leakage from the service providers’ registered system.

Cost of measures to reduce leakage

Determine and document the cost to implement measures that are appropriate for the service provider’s infrastructure. When determining the cost of those measures, service providers must take the following into consideration:

- the cost of water (calculated at retail price) currently lost from the system due to leakage that can be recovered by the documented measures. Where step tariffs apply or excess water charges apply, the retail price shall be the highest price applicable to the step tariff or the excess water charge.
- the cost of developing and implementing a system leakage management program
- reduction in operation and maintenance costs e.g. energy for pumping water, chemicals for treating water, reduction in incidents of burst pipes, reduced costs for bulk water purchases
- deferral of (and possibly avoiding) the construction of new water infrastructure such as treatment plants and augmentation of water sources such as dams, weirs and bores.

²⁰ No allowance is to be made in the percentage formulas for meter inaccuracies, unauthorised consumption, evaporation, maintenance activities, losses from natural watercourses and/or unmetered use.

An exemption will generally be granted if a cost–benefit analysis shows that it is not cost–effective to implement any measures to reduce leakage. The cost–benefit analysis should be based on a five year pay back period.

A RPEQ must

- certify the report. The engineer may be:
 - an employee of the service provider
 - an engineer employed to operate the service provider’s infrastructure
 - an engineer independent of the service provider
- provide a written certification to accompany the report stating:
 - the report is accurate for the water service provider’s infrastructure and registered service
 - their name and registration details.

An exemption granted under this category will be subject to the following conditions:

- the water service provider must have in place a leakage control system of a standard approved under guidelines made by the regulator, and
- the water service provider must, for each two year period the exemption is in force, give the regulator a report on the leakage levels.

9 Exemption can be cancelled or amended

A service provider must immediately give the regulator notice if the circumstances under which an exemption was given, change. For example, the water leakage from a service provider's distribution system begins to exceed the nominated low values.

The regulator may also amend or cancel the exemption, without receiving notification from the service provider, if the regulator becomes aware of a change in the circumstances under which the exemption was given, such as the average age of distribution system infrastructure exceeding 15 years.

If an exemption is changed or cancelled, the regulator must give the service provider an information notice about the change or cancellation.

Section 86(3) of the Act requires that the regulator give the service provider an information notice advising of any decision to amend or cancel the exemption. The Act requires that the information notice includes a copy of the relevant internal review provisions of the Act and states:

- the decision
- the reasons for the decision
- the name and address of any other person who was given the notice
- that the person given the notice may apply for an internal review of the decision, within 30 business days after the notice is given
- how to apply for the internal review.

In giving the reasons for the decision, the regulator must set out the regulator's findings on material questions of fact and refer to the evidence or other material on which those findings were based.

10 Rights of appeal

Any decision made by the regulator in regard to a SLMP exemption may be the subject of appeal (chapter 7 of the Act)

In the first instance, the service provider must apply to the regulator for an internal review of a decision.

An application for internal review must be made within 30 business days after the day the service provider is given the information notice advising the outcome of the exemption application. However, the Act allows the reviewer to extend the time for applying for an internal review. The application for internal review must be:

- in the approved form WSR004 Internal review of decision application—a copy of which can be obtained from
 - Office of the Water Supply Regulator, Department of Environment and Resource Management, GPO Box 2454, Brisbane, Qld, 4001 or
 - by downloading it from the DERM website: <www.derm.qld.gov.au>.
- accompanied by a statement of the grounds on which the service provider seeks the review of the decision
- supported by enough information to enable the reviewer to decide the application.

The reviewer must, within 10 business days after making a review decision, give the service provider and any person who was given notice of the original decision, a notice of the review decision.

If the service provider is not satisfied with the review decision, arbitration can be sought from the Queensland Competition Authority (chapter 7, sections 524 – 529 of the Act).

The service provider may give the Queensland Competition Authority (QCA) a dispute notice applying for arbitration on the review decision. This notice must be given within 30 business days after the day that the service provider receives notice of the review decision. The dispute notice must state the name and address of the service provider, details of the review decision and the grounds on which arbitration is sought. The service provider is also required to give a copy of the dispute notice to the regulator.

The QCA must give the service provider and the regulator a notice acknowledging receipt of the dispute notice. The service provider may withdraw the dispute notice at any time before the QCA makes its determination.

The QCA must make a written determination on the dispute and must provide reasons for its determination. However, the QCA is not required to make a determination if it considers that the dispute notice was vexatious or the subject matter of the dispute is trivial, misconceived or lacking in substance.

Only the service provider who applied for the exemption can request a review and arbitration for the decision about the exemption. For example, a service provider's customer cannot undertake these actions.

Appendix 1—Definition of connections

For the purposes of these guidelines, the Water Services Association of Australia (WSAA) definition of connections has been adopted.

A water property, for the purposes of determining connections, is:

- connected to the service provider's water system
- subject to billing for water supply (fixed and/or consumption)
- a tenanted property, which is separately metered, and in respect of which the tenant is liable for water usage, counts as one property. The owner and tenant are not separately counted as water properties.

Connections are calculated by the addition of water properties that fit the above criteria as follows:

Single Residential connections + Multiple Residential connections (No. of dwellings/property*properties or No. of dwellings)
+ Industrial connections + commercial connections + other connections which don't fit into above categories.

This definition includes:

- a connected non-rateable property
- a connected but non-metered property.

It does not include:

- a body corporate
- a rated but unconnected property.

Appendix 2—Annual water audit

(Based on standard definitions developed by the International Water Association)

The International Water Association (IWA) has produced an international best practice standard approach for water balance calculations as shown in the table below, complete with definitions of all of the terms involved.

This water balance diagram and definitions have been adapted (with minor variations) by the Water Services Association of Australia (WSAA) for use by Australian water utilities and forms the basis of the BENCHLOSS software available from WSAA. WSAA has adopted this new water balance approach in its annual publication WSAA Facts and commends this methodology to other water service providers in Australia.

System input volume (including water imported)	Authorised consumption	Billed authorised consumption	Billed metered consumption (including water exported)	Revenue water	
			Billed unmetered consumption		
		Unbilled authorised consumption	Unbilled metered consumption		Non-revenue water
			Unbilled unmetered consumption		
	Water losses	Apparent losses	Unauthorised consumption		
			Metering inaccuracies		
		Real losses	Leakage on transmission and/or distribution mains		
			Leakage and overflows at storage tanks		
			Leakage on service connections up to metering point.		

Table: IWA Water Balance Diagram

Brief definitions of the various components of the water balance diagram follow. For more complete definitions and detailed discussions refer to the following references:

- Losses from water supply systems—International Water Association
- Benchmarking of water losses in Australia—WSAA BENCHLOSS software and user manual
- Managing and reducing losses from water distribution systems—Manuals 1 to 10, Environmental Protection Agency and Wide Bay Water.

Based on IWA definitions, the water losses from a system are calculated as follows:

$$\text{Water losses} = \text{system input volume} - \text{authorised consumption}$$

System input volume is the water input to a transmission system or a distribution system.

Authorised consumption is the annual volume of metered and/or unmetered water taken by registered customers, the service provider and others who are implicitly or explicitly authorised to do so by the service provider, for domestic, commercial or industrial purposes. It should be noted that authorised consumption includes items such as fire fighting and training, flushing of mains and sewers, street cleaning, watering of municipal gardens, public fountains, frost protection and water for construction. These may be billed or unbilled, metered or unmetered according to local practice.

The calculated water losses are defined by the IWA to consist of both real and apparent losses.

- Real losses are the physical water losses from the system up to the point of the customer metering. It is water that does not reach the customer and is not paid for by customers. If real losses are reduced, more water is available for distribution to customers. Real losses include background leakage in joints and fittings, reported and unreported bursts in pipes, and leakage and overflows from reservoirs.
- Apparent losses consist of water that is not physically lost from the system but that which is never measured or accounted for and, more importantly, not paid for. If apparent losses are reduced, more revenue will be generated by and for the service provider. Apparent losses include errors in source, production and customer meters, theft or illegal use, unmetered public use (council parks and gardens, cleaning), fire fighting and training, water used in processing (filter back-washing) and water used in infrastructure maintenance (pipe scouring and reservoir cleaning).

Important notes for service providers:

1. Water leakage as defined in these guidelines is equivalent to the real losses as defined above in the IWA system—refer section 3.6.
2. Water leakage as defined in these guidelines does NOT include apparent losses as defined above in the IWA system—refer section 3.6.
3. Service providers are not required to determine, report on or reduce apparent losses in their SLMPs.

Appendix 3—Components of a cost–benefit analysis

Breakdown of information, actions and costs associated with undertaking a cost–benefit analysis

Component	Information required and/or activities undertaken	Cost of obtaining information or undertaking action
Project establishment	Project establishment	
Data collection	<p>Collect and analyse relevant reports/ plans e.g. planning reports, demand management/ water loss reports).</p> <p>Collect and verify raw data including:</p> <ul style="list-style-type: none"> • reticulation system layout plans/ schematics • large water users (particularly night time) • asset capacity (e.g. yield, capacity) • asset attributes (e.g. main length, connections) • asset condition/ performance (e.g. burst mains/services) • flows/ consumptions • operational performance (e.g. responsiveness) • pressures • variable operational costs (included elsewhere) <p>Estimate accuracy of meter fleet.</p> <p>Current and future demands (10 to 20 years).</p>	
Undertake water audit	<p>Determine water loss and components.</p> <p>Determine current leakage level.</p>	
Determine possible water saving from the distribution system	<p>Compare leakage against benchmark figures.</p> <p>Determine target leakage levels (set a range of targets).</p> <p>Determine volume of water potentially saved by reducing leakage for various target levels.</p>	
Determine possible reduction in operation and maintenance costs for various target levels	<p>Cost of energy saved.</p> <p>Reduction in chemical costs.</p> <p>Reduction in cost for bulk water purchases.</p> <p>Reduction in maintenance costs due to reduced pipe bursts.</p>	
Determine possible cost savings for deferral or avoiding construction of new infrastructure based on target leakage levels	<p>Estimate new headworks (source/treatment and distribution) infrastructure requirements and costs.</p> <p>Revise future demand profile by including possible water savings due to reduction in leakage at various target levels.</p> <p>Revise estimate of new infrastructure requirements and costs taking possible water savings due to target leakage reduction into account.</p> <p>Calculate cost of deferring or avoiding new infrastructure.</p>	

Determine leakage reduction measures applicable to the distribution system	Evaluate applicability of various water leakage reduction options to achieve various target leakage levels.	
Determine cost-effective measures that could be implemented	Optimise leakage reduction measures and develop a leakage reduction program. Compare overall cost savings to cost to implement the leakage reduction program.	
Undertake cost-benefit analysis	Undertake analysis. Prepare report.	
Estimated cost to undertake a cost-benefit analysis		

Appendix 4—Default costs for a cost–benefit analysis

Service providers may choose to use the following default cost values for retaining a consulting engineer to undertake a study to determine the level of system leakage and to carry out a cost–benefit analysis of the proposed leakage reduction programs. The extent of the work is detailed in appendix 3:

- for small service providers \$20 000
- for medium service providers \$35 000
- for large service providers \$60 000.

Appendix 5—Leakage control system

Section 7 refers in general to the conditions that will apply to exemptions granted under specific criteria and, in particular, to a requirement to have a leakage control system of a standard approved under guidelines issued by the regulator. The following is intended to illustrate what elements could be considered in developing such a system

The purpose of any formalised leakage control system is to manage and control the volume of water lost from unreported leaks/bursts by limiting the time over which such losses occur.

The range of measures that may be considered as part of any leakage control program is extensive and the following should be considered for their appropriateness:

- ensuring that a full set of up-to-date working drawings is available that define the distribution system/s and therefore permit speedy decisions to be made in regard to isolating burst and/or leaks
- regular visual inspection of the distribution system pipework and/or pipework routes for signs of visible leakage
- regular inspection of reservoirs and their associated valves for signs of visible leakage/overflows
- regular reservoir drop tests to identify leakage from the reservoir
- the installation of permanent flow meters at bulk supply points into a system and/or the various designated zones within a system
- the establishment of zonal and/or district flow metering within the water supply system
- calibration of existing flow meters to ensure the accuracy of any results used for correlating readings between flow meters
- regular reading of flow meters and the correlation of readings with the aim of determining discrepancies that might represent leakage
- taking regular night-flow measurements to determine possible background leakage
- the use of temporary/permanent leakage noise detectors to find leaks
- the establishment of a pressure management regime
- the establishment of real-time monitoring of both pressure and flow within a system
- the correct selection of pipe materials best suited to local conditions
- ensuring the correct standards of installation for new works is maintained
- ensuring a speedy response to rectify reported leaks and that repair work is to a high standard.