Guidelines for Non-drinking Water in South Australia

Part 1: Infrastructure

SOUTH AUSTRALIA

Government of South Australia

Guidelines for Non-drinking Water in South Australia

Part 1: Infrastructure

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Introduction

Purpose

The aim of these Guidelines is to provide advice and assistance to the plumbing and water industry for the correct installation and ongoing operation of non-drinking water systems that are acceptable to the Technical Regulator and deemed to comply with the *Water Industry Act 2012 (*Act), *Water Industry Regulations 2012* (Regulations), and technical standards, i.e. *National Construction Code* (NCC), Volume Three.

The intention is to improve awareness, understanding of the installation requirements for non-drinking water systems and the associated regulatory responsibilities within the plumbing and water industries.

Scope

These Guidelines present the current requirements for the technically safe and reliable installation and operation of non-drinking water systems in South Australian.

These Guidelines do not introduce any additional legislative requirements to current prerequisites.

These Guidelines apply to new installations as well as alternations, additions and repairs to existing installations.

Beneficiaries

These Guidelines have been developed for water industry entities' personnel, plumbing contractors, irrigation contractors, engineers, planners, consultants, developers, local government and State government agencies. Specific sections of the Guidelines are also relevant to individual landowners and community groups.

Normative References

These Guidelines contain both legislative (normative) and informative information for use.

The normative references include:

- *Water Industry Act 2012.*
- *Water Industry Regulations 2012.*
- *Plumbing, Gasfitters and Electricians Act 1995.*
- *Plumbing, Gasfitters and Electricians Regulations 2010.*
- National Construction Code Volume Three (Plumbing Code of Australia).
- AS/NZS 3500.1 – Water Services.

In all cases, non-drinking water should not be used for purposes other than those specified in relevant legislation or an applicable approval.

Licensing Requirement

The Plumbers, Gasfitters and Electricians Act 1995 and Plumbers, and Gasfitters and Electricians Regulations 2010 determine who can carry out work on non-drinking water systems. There is specific work that Plumbing and Irrigation Contractors and Workers can carry out. For the purposes of the guidelines the wording "appropriately licensed persons" will be used.

For clarification on the specific licensing conditions contact Consumer Business Services on www.cbs.sa.gov.au.

These Guidelines include licensing requirements for the installation of non-drinking systems and who can undertake work associated with non-drinking water installations.

The wording within the Guidelines will be “the appropriate licensed person/s”.

Structure

These Guidelines are structured in a manner consistent with similar documents in the plumbing and water industries. The focus is placed on safe and reliable installations and ongoing operation for people and plant to ensure a safe and reliable service to customers.

The Guidelines are presented in Parts as follows:

- **Part 0 – Glossary of Terms, Abbreviations and References** provides assistance in interpreting terminology and abbreviations used in the parts of these Guidelines.
- **Part 1 – Infrastructure** overviews non-drinking water as an alternative water supply, and the requirements associated with non-drinking water infrastructure. Information included in this Part includes legislative requirements, planning and design, implementation, monitoring, management, reporting and auditing for non-drinking water infrastructure.
- **Part 2 – On-site Plumbing** provides detailed information related to on-site non-drinking water installations.

1. Overview of Non-drinking Water

1.1 Non-drinking Water Definition

Non-drinking water can be defined as any water that is not intended for human consumption or for purposes connected with human consumption, such as washing, processing, preparation or cooking of food.

The Water Supply Code of Australia defines non-drinking water as “any water other than drinking water including wastewater, stormwater, bore water, groundwater, lake or river water, which has been treated to meet a Standard (as defined by the Regulator), and which is satisfactory for its intended use(s)”.

1.2 Alternative Terminology for Non-drinking Water

The National Construction Code Volume Three (Plumbing Code of Australia) defines non-drinking water as “any water that is not drinking water”. As such, non-drinking water is commonly referred to by a number of different names, including but not limited to recycled water, reclaimed water, non-potable water, and reuse water.

1.3 Non-drinking Water Sources

These Guidelines deal with non-drinking water which has been sourced from treated wastewater, greywater, stormwater, natural sources and mixed source water (i.e. combination of wastewater and stormwater).

These Guidelines do not specifically deal with non-drinking water from on-site wastewater treatment plant, such as an Aerobic Wastewater Treatment System (AWTS), industrial and commercial wastewater due to the highly variable characteristics including quality, variability and quantity. However, these Guidelines provide a general approach which may be adapted in order to apply to industrial and commercial applications.

1.4 Non-drinking Water Quality and Treatment

The quality of non-drinking water is highly dependent on its source and subsequent treatment process, if any. Some non-drinking water sources contain potential hazards including microbial, chemical, physical and radiological agents that may be harmful to human or environmental health, and require removal via a specific treatment process prior to use by the end user, as presented in the Table 1-1.

Table 1-1 Sources and potential hazards to human and environmental health

Source	Potential Hazards
Stormwater	Pathogens, pharmaceuticals, nutrients, ammonia, phosphorus, nitrates, nitrites, turbidity, pesticides, heavy metals, organic chemicals, micro-organisms
Wastewater	Pathogens, pharmaceuticals, hormones, domestic chemicals, radiological agents, detergents, nutrients, ammonia, phosphorus, nitrates, nitrites, turbidity, pesticides, heavy metals, organic chemicals, micro-organisms, salinity, water disinfection by-products
Greywater	Detergents, pharmaceuticals, personal care products, sunscreen, domestic chemicals, oils, nutrients, cleaning products, pathogens, salts
Natural sources (i.e. Bore water (groundwater)	Pathogens, pharmaceuticals, nutrients, fertilizer contaminants, ammonia, phosphorus, nitrates, nitrites, turbidity, pesticides, heavy metals, organic chemicals, micro-organisms, salinity, salts

Source: Table adapted from Australian Guidelines for Water Recycling – Managing Health and Environmental Risks (Table 2.3; pg.36)
Note: The above table is not intended to be extensive.

The level of treatment (if any) and associated monitoring requirements are determined by the relevant authority and dependent on the physical and chemical characteristics of the source, end use and associated risk (i.e. exposure potential).

1.5 Possible uses for non-drinking water

Non-drinking water is a valuable resource and can be a suitable alternative to drinking water in some cases. As such, there are a number of possible uses for non-drinking water including: agricultural; fire control; municipal uses; residential and commercial property uses; industrial and commercial uses and environmental uses.

In some cases, non-drinking water has been treated to a level determined by the relevant authorities as being suitable with or without site controls for its end use, e.g. temporary diversion of greywater.

1.6 Non-drinking water uses in practice

The necessary approvals and advice from relevant authorities (as set out in Section 2) must be sought prior to designing, installing and using non-drinking water systems in South Australia.

In all cases, non-drinking water should not be used for purposes other than those specified in relevant legislation or applicable approval, and may require on-site exposure controls (refer to Section 5.6).

For example, all non-drinking water uses where the water has been sourced (either completely or partially) from treated wastewater or greywater require approval from the Department for Health and Ageing (DHA). However in other cases, non-drinking water is determined suitable for use without any treatment.

The following uses of non-drinking water are currently in practice within South Australia:

Agricultural uses

Agriculture is the largest consumer of water in Australia and internationally, therefore agricultural uses provide the largest opportunity for non-drinking water use. Additional benefits of agricultural uses may include the reduced likelihood for direct ingestion and potential health risks, and increased nutrient uptake by crops minimising environment risks.

Examples of agricultural uses include, but are not limited to:

- Horticulture, i.e. vegetable/ salad crops.
- Trees / wood lots.
- Pasture / fodder.
- Turf farms.
- Stock water.
- Viticulture.
- Wash down for stockyards and non-food contact areas of dairies.

Typically, risks associated with agricultural uses can be minimised through treatment and the use of site controls. Of particular note, some agricultural uses associated with grazing animals may require the control of helminths as a high priority through appropriate treatment and withholding periods.

Municipal/Community uses

Municipal/community uses is a broad category that refers to any use of non-drinking water within the community, including but not limited to:

- Irrigation of public parks and gardens, sports fields, school ovals, road verges and median strips.
- Irrigation of golf courses including those incorporated within housing developments.
- Ornamental landscapes including decorative ponds.

Health risks associated with municipal/community uses (as a result of body contact, exposure or ingestion of aerosols from spray irrigation) are typically managed through a combination of treatment and site controls. Whereas, environmental risks associated with municipal uses can be controlled through appropriate agronomic management techniques and practices.

Residential and commercial property uses

Residential and commercial property uses are becoming more common in South Australia with water restrictions and general water scarcity concerns. Residential and commercial property uses typically involve the provision of water supply for internal non-drinking purposes, often by a dual-reticulation or third pipe system.

Residential and commercial property uses may include:

- Garden watering.
- Toilet flushing.
- Car washing.
- Path / wall washing.
- Clothes washing.
- Water features and systems, e.g. ponds, fountains, cascades.
- Air conditioning / cooling towers (Note: Legionella risks must be considered).

Fire control uses

With water now a scarce resource, the use of non-drinking water for fire-fighting purposes is considered a suitable alternative to the use of drinking water for such purposes. Non-drinking water may be used by fire-fighters, volunteer fire-fighting and state emergency services for the following uses:

- Controlling fires.
- Testing and maintaining fire control systems.
- Training facilities for fire-fighting.

Depending on the source of non-drinking water, health and safety considerations should be managed appropriately to minimise incidental exposure through splashing, aerosol inhalation or ingestion.

Industrial and commercial uses

There are numerous possible applications for non-drinking water within industry and commercial businesses, in particular for processes where water of drinking water quality is not required, such as:

- Process water, i.e. Cooling system make-up water, boiler feed water etc.
- Wash down water.
- Dust control.
- On-site fire protection/control.

Environmental uses

Non-drinking water can be used for environmental purposes to improve existing environmental conditions, such as:

- Bioremediation of contaminated soils.

- Recharge of wetlands and recharge of surface water bodies (non-recycled water only).
- Replacing/enhancing environmental flows (non-recycled water only).

2. Legislative Requirements

2.1 Legislation, Guidelines and Relevant Documentation

There are a number of key legislation, policy, codes of practice and guidelines applicable to non-drinking water installations, operations and management, as summarised in Table 2-1.

Table 2-1 Legislation, policy and guidelines related to non-drinking water

Environment Protection Act 1993	General and specific obligations under this legislation apply to the operation of non-drinking water systems.
Environment Protection (Water Quality) Policy 2015	General and specific obligations apply to non-drinking water systems relating to the discharge of water and waste to ensure that no environmental harm occurs.
Livestock Act 1997	Specific obligations under this legislation prohibit the use of contaminated water (with faecal matter) unless to an appropriate quality.
Livestock Regulations 2013	Specific obligations under this legislation prohibit livestock being fed with contaminated stock food (with faecal matter).
Local Government Act 1999	General and specific obligations under this legislation apply to the operation of non-drinking water systems in that the Council's need to provide appropriate services and facilities to meet the present and future needs of the associated local community. In addition, a provision is made in Schedule 1A for the implementation of Stormwater Management Agreement.
Natural Resources Management Act 2004	General and specific obligations under this legislation apply to the management of water, soils, pest animals and plant control. This legislation is applicable to the operation of non-drinking water systems to ensure management in a sustainable and integrated manner, and where the system incorporates or impacts on prescribed watercourses, surface water or groundwater resources.
Plumbers, Gas Fitters and Electricians Act 1995	General and specific obligations under this legislation stipulate who can perform plumbing work. The legislation also includes requirements associated with licensing of contractors and registration of workers.
Plumbers, Gas Fitters and Electricians Regulations 2010	Specific obligations under this legislation include licensing of contractors and registration of workers, including work which is exempt.
South Australian Public Health Act 2011	General and specific obligations under this legislation apply to protecting individuals or communities from risks to public health, including those related to non-drinking water.
South Australian Public Health (Wastewater) Regulations 2013	General and specific obligation under this legislation apply to the operation of recycled water systems; including installation or alteration of collection, treatment of reuse of its recycled water.
Water Industry Act 2012	General and specific obligations under this legislation apply to the installation and operation of non-drinking water systems, including: water demand and supply planning; licensing; price regulation; customer service standards; and technical standards for infrastructure and plumbing installations, including the National Construction Code Volume Three (Plumbing Code of Australia).
Water Industry Regulations 2012	General and specific obligations under this legislation apply to the installation and operation of non-drinking water systems.
Wastewater Overflow Management Code of Practice	The Code of Practice is administered by the Environment Protection Authority, and provides directives and advice on the management of wastewater systems, including non-drinking water systems.
Code of Practice for Aquifer Storage and Recovery	The Code of Practice is administered by the Environment Protection Authority, and provides guidance on the management of managed aquifer recharge schemes including planning, installation and operation.
Code of Practice for Milking Shed Effluent	The Code of Practice is administered by the Environment Protection Authority, and provides advice on the management of wastewater, including non-drinking water, derived from milking activities.
Recycled Water Connections Procedure	This procedure outlines the minimum requirements that must be met in order to allow recycled water connections for irrigation purposes at Department for Education and Child Development (DECD) schools and preschools in South Australia. It identifies key requirements and responsible parties, and sets forth the process that must be followed for schools and preschools to connect to recycled water.

Legislation listed above is available at http://www.legislation.sa.gov.au/index.aspx.

2.2 Roles and Responsibilities

The roles and regulatory responsibilities of state agencies and entities involved in the regulation of non-drinking water are provided in Table 2-2.

Table 2-2 State agencies' and entities' responsibility for non-drinking water

State Agency / Entity	Overview of role and responsibility regarding non-drinking water	Relevant Legislation (including relevant documentation)
Office of the Technical Regulator (OTR)	• Monitoring and regulating safety and technical standards associated with the water industry, including the related infrastructure and installations extending to associated equipment, products and materials, and plumbing and equipment. • Approval of the water industry entities' safety, reliability, maintenance and technical management plans (SRMTMPs). • Approval of all non-drinking water on-site systems by the Plumbing Section prior to installation. • Developing and publishing technical standards in connection with the water and plumbing industries.	• *Water Industry Act 2012* • *Water Industry Regulations 2012*
Department for Health and Ageing (DHA)	• Monitoring and regulating public and environmental health by preserving, protecting and promoting good health and preventing illness and injury. • Assessment and approval of the design and installation of all recycled (treated wastewater/greywater) water infrastructure (i.e. collection, treatment, and recycled water reuse systems). • Provision of advice to water industry, local councils, government agencies, and community on health implications of recycled water use. • Provision of advice to water industry, local councils, government agencies, and community on health implications of stormwater reuse, natural waters and rainwater use.	• *South Australian Public Health Act 2011* • *South Australia Public Health (Wastewater) Regulations 2013* and their Prescribed Codes
Environment Protection Authority (EPA)	• Monitoring and regulating all relevant environmental matters, including the water quality, and pollution and waste control. • Licensing of non-drinking water treatment and Managed Aquifer Recharge (MAR) systems (exceeding nominated thresholds as described in legislation). • Approval of Wastewater Irrigation Management Plans (also known as Environment Management Plans).	• *Environment Protection Act 1993* • *Environment Protection (Water Quality) Policy 2015*
Department of Environment, Water and Natural Resources (DEWNR)	• Provision of permits and licensing of any non-drinking water that is drained or discharged into a natural water source (including prescribed aquifers). • Provision of advice to water industry entities. • Developing new water and wastewater legislation in the form under the *Water Industry Act 2012*.	• *Natural Resources Management Act 2004* • *Water Industry Act 2012* • *Water Industry Regulations 2012*
Essential Services Commission of South Australia (ESCOSA)	• Monitoring and regulating water industry entities, including retail pricing, service standards, consumer protection and performance monitoring. • Licensing of water industry entities providing a retail non-drinking water supply/service.	• *Essential Services Commission Act 2002* • *Water Industry Act 2012* • *Water Industry Regulations 2012*
Department of Planning, Transport and Infrastructure (DPTI)	• Approval of developments that incorporate non-drinking water systems where Council is not the local planning authority (i.e. Development Assessment Commission (DAC)).	• *Planning, Development and Infrastructure Act 2016*

Department for Education and Child Development (DECD)	• Provision of mandatory requirements and identification of responsible parties for the approval of a recycled water connection for irrigation purposes at DECD schools and preschools in South Australia.	• *Water Supply Procedure, Energy and Water Management in Schools and Preschools (Guideline)*
Primary Industries & Regions SA (PIRSA)	• Approval of recycled water being used for irrigation of crops for stock feed (based on adequate helminth control) by Chief Veterinarian Officer. • Approval of recycled water being used for drinking water for livestock by Chief Veterinarian Officer.	• *Livestock Act 1997* • *Livestock Regulations 2013*

3. Planning and Design

3.1 Planning of Non-drinking Water Systems

When planning a non-drinking water system, it is essential that service needs are identified for the short, medium and long terms in order to deliver a solution that achieves the required social, environmental, and financial outcomes.

The planning of a non-drinking water system can be broken into three stages: Strategic Planning; Concept / Feasibility Planning; and Detailed Planning. Table 3-1 provides the key activities associated with the three planning stages.

Table 3-1 Planning stages for non-drinking water systems

Planning Stage	Key Activities
Strategic Planning	• Identify the service needs. • Identify service requirements and standards. • Identify key stakeholders and associated requirements. • Determine short, medium and long term strategies for the infrastructure and non-asset solutions. • Evaluate social, environmental and financial impacts. • Identify alignment with overarching strategies, i.e. State development plans, water plans etc. • Identify future implications and requirements. • Identify benefits and risks.
Concept / Feasibility Planning	• Confirm the service needs. • Confirm service requirements and standards. • Understand identified key stakeholders' requirements. • Identify possible options for system. • Determine systems' technical and financial feasibility. • Estimate the financial and non-financial impacts (including future implications). • Quantify the social, environmental and financial impacts. • Risk assessment of options.
Detailed Planning	• Identify approvals and licences for non-drinking water system (See Section 2). • Finalise key components of non-drinking water system. • Finalise risk assessment of non-drinking water system. • Finalise short, medium and long term strategies for the system (infrastructure and non-asset solutions). • Prepare detailed capital and operational cost estimates. • Develop implementation plan. • Develop communication plan.

As with any project, a non-drinking water system requires extensive planning to ensure that outcomes are achieved, risks minimised and costs reduced.

3.2 Service Need

The service need of a non-drinking water system can be identified through:

- Environmental conditions, i.e. drought.
- Requests or proposals from developers.
- Maintain community assets, i.e. greening public open space.
- Community requests for alternative water supplies.

- Responses to regulatory change.
- Response to government policy.
- Service improvement and efficiency opportunities.

In line with identifying the service need, it is also important to define the importance of the service, objectives of the service (operational, social, environmental, financial, WHS), critical success factors, alignment with corporate strategies, and potential alternative solutions that will address the need.

3.3 Key components of non-drinking water systems

There are key components and characteristics associated with non-drinking water systems that need to be explored during the planning stage, including but not limited to:

- Non-drinking water sources (catchment and collection systems).
- Source water characteristics, including estimated flows.
- Environmental conditions (including climate, seasonal characteristics, natural events etc.).
- Treatment systems to provide necessary water quality requirements.
- Storages (including lagoons and wetlands).
- Distribution systems.
- Non-drinking water application type (irrigation method).
- Site selection (including proximity to customers/end users and land use conflicts).
- Receiving environment.
- Use of non-drinking water.
- Users of non-drinking water.

In considering key components of a non-drinking water system, it is important to consider any short, medium and long term strategies of the non-drinking water service in terms of infrastructure and non-asset solutions required to achieve the associated service need.

Additional information related to the key components of a non-drinking water system utilising treated wastewater can be found in Australian Guidelines for Water Recycling (AGWR).

3.4 Communication planning

Communication planning is an essential exercise in the planning stage of a non-drinking water system and ensures effective consultation and communication with stakeholders.

Communication planning typically involves:

- Stakeholder management, including –
  - Identification of stakeholders.
  - Analysis of stakeholders' requirements.
  - Approach for meeting stakeholders' needs or requirements.
- Information management, including –
  - Identification of the information, who needs the information, when they need the information, in what format, by what means.
  - Receiving and processing of incoming information from stakeholders (including feedback).

- Distribution of information to all stakeholders.

3.4.1 Stakeholder Identification

Communication planning involves interaction with all identified key stakeholders throughout the life of the non-drinking water system.

A stakeholder is a person or group who can define, constrain, influence or decide on the viability of the non-drinking water system. Typical key stakeholders group for non-drinking water systems include:

- Government and regulatory agencies (including federal, state and local).
- Drinking water service provider (or other alternative water service providers).
- Water Industry.
- Plumbing Industry.
- Industry Representative Groups.
- Community (including businesses (commercial/industrial) and residential customers/users).
- General public.

Following the identification of all stakeholders, it is important to define the protocols for internal and external communications and engagement. These protocols define the relationship with the stakeholder, and the level of communication or interactions, which is dependent on how they may impact or be impacted by the non-drinking water system.

3.4.2 Community Consultation

It is well known that public acceptance is the key to success of any community based project and as such, community consultation is important to ensure that non-drinking water is seen as a beneficial addition to the community.

In terms of non-drinking water systems, community consultation provides opportunities for:

- Better understanding of both positive and negative factors that affect community acceptance.
- Identification of factors that may create barriers to acceptance.
- Improved creditability of the water industry entity or water supplier providing the service.
- Minimising the perception of risk associated with the system.
- Increasing community trust and confidence.
- Improving the overall level of acceptance.

There are many different approaches to community consultation, including: surveys, stakeholder forums, focus groups, private discussions, stakeholder juries, hotlines, ballots/polling, and public consultation issue papers/draft plans.

The South Australian Government has created a vision for community engagement through their "Better Together" Engagement Framework, which provides a principles-based foundation for community and stakeholder engagement for the South Australian public service. This approach provides a guide to best practice engagement and acknowledges the different contexts individual engagement processes, and provides empowerment of community through www.yoursay.sa.gov.au.

3.5 Financial planning

The long-term viability and sustainability of a non-drinking water system is essential for the continued safe and reliable service from a non-drinking water system.

As a minimum, a financial assessment is required to confirm that the service is able to be maintained, and may include but is not limited to:

- Capital cost estimates.
- Operation, maintenance and administrative cost estimates (including components).
- Estimated revenue (including tariffs – historic, current and proposed).
- Unit rates.

In 2004, the National Water Initiative (NWI) facilitated support for best practice water pricing principles, to:

- promote economically efficient and sustainable use of water resources, infrastructure assets, and where appropriate government resources for the management of water.
- ensure sufficient revenue streams allow for the efficient delivery of the required services.
- facilitate the efficient functioning of water markets.
- give effect to the principle of user-pays and achieve pricing transparency in respect of water storage and delivery in irrigation systems and cost recovery for water planning and management.
- avoid perverse or unintended pricing outcomes.

The NWI Pricing Principles also noted two main approaches to providing capital investment for water and sewerage schemes including non-drinking water systems:

1) **Annuity approach** – forecasts asset replacement and growth costs over a fixed period and converts to an annualised charge.

2) **Regulated Asset Base (RAB) or building blocks approach** – an allowance for a return of capital (depreciation) and a return on capital.

For water industry entities licensed by ESCOSA for the retail supply of non-drinking water through a reticulated system, the following pricing principles apply:

- Flexible regulation (NWI Pricing Principle for recycled water and stormwater (RWS) No.1).
- Cost allocation (NWI RWS Pricing Principle No.2).
- Water usage charge (NWI RWS Pricing Principle No.3).
- Substitutes (NWI RWS Pricing Principle No.4).
- Differential pricing (NWI RWS Pricing Principle No.5).
- Integrated water resource planning (NWI RWS Pricing Principle No.6).
- Cost recovery (NWI RWS Pricing Principle No.7).
- Transparency (NWI RWS Pricing Principle No.8).

For more information on the economic regulation of water and sewerage services in South Australia, and price determinations of water retailers, see www.escosa.sa.gov.au.

3.6 Implementation planning

Implementation planning provides a clear direction for the design and early construction activities associated with a non-drinking system. Implementation planning determines the project's criticalities, such as costs, benefits, risks, preferred delivery options, and implementation program.

Typical implementation plans include (as a minimum):

- Project staging.
- Implementation requirements and targets – Internal/external (i.e. approval timeframes).
- Funding information (including financial model, funding cycles etc.).
- Project risks and constraints (i.e. land acquisition, stakeholder consultation etc.).
- Project delivery methodology (i.e. Design Build Operate (DBO), Build Own Operate (BOO), Build Own Operate Transfer (BOOT), Early Contractor Involvement (ECI) etc.).
- Internal and external resourcing requirements (i.e. availability of contractors).
- Procurement information (i.e. availability of materials, lead times etc.).
- Interaction with other projects.
- Seasonal factors (potential construction delays).
- Implementation program.

3.7 Design Standards

3.7.1 General

The key objective when designing non-drinking water systems is to ensure that the equipment and infrastructure can provide continuing safety and reliability.

The design of a non-drinking water system should:

- Optimise asset life to meet the services requirements over the whole life cycle.
- Achieve a sustainable use of all water resources managed by the water industry entity.
- Balance the system's reliability and capacity to the minimum service standards.
- Ensure a safe and reliable service by demonstrating well established industry practice.
- Comply with relevant standards and codes as detailed in this section.
- Reference these guidelines.

3.7.2 Water Services Association of Australia

The Water Services Association of Australia (WSAA) codes have been endorsed as acceptable technical standards for South Australia. The WSAA codes complement standards, codes and guidelines in current legislation – a hard copy of each code is available for viewing at the OTR.

The Water Supply Code of Australia Version 3.1 – WSA 03-2011 (Code) addresses the planning, design, construction, testing and commissioning of drinking water and non-drinking water supplies.

The Code sets out the requirements for non-drinking water supply infrastructure across three parts:

- Part 0: Glossary of terms, Abbreviations and References (including Introduction).
- Part 1: Planning and Design.
- Part 2: Construction.

The current edition of the Code was updated to include specific requirements for non-drinking water including infrastructure protection guidance and connectivity inspection of dual water supply systems.

The Code, together with the relevant Water Authorities supplement/s and any other requirements of the relevant authority, provides the minimum technical requirements for the design and construction of water supply and reticulation networks, and supply of associated products and materials.

The Code presents both performance based terms and deem-to-comply solutions, thereby allowing for alternative and innovative solutions to be developed and accepted provided it can be demonstrated that they meet the performance requirements.

3.7.3 Australian Standards

AS/NZS 3500 Part 1 provides deemed to satisfy provisions to meet the performance requirements of the National Construction Code Volume Three (PCA) to install non-drinking water services including the requirements for installing backflow prevention for containment and interconnection of water services.

There are also other Standards relevant to non-drinking water, including but not limited to:

- AS/NZS 1547 2012 for on-site recycled water reuse.
- AS/NZS 1546.3 for AWTS incorporating treatment systems for recycled water reuse.
- AS/NZS 1546.4 for greywater reuse systems (draft).
- AS 2700 for colour coding of pipework.

3.7.4 Department for Health and Ageing

The Department for Health and Ageing administers prescribed codes under the *South Australian Public Health (Wastewater) Regulations 2013* for non-drinking water systems which utilise wastewater and greywater, including but not limited to:

- SA Health On-site Wastewater Systems Code April 2013.
- SA Health Community Wastewater Management Systems Code April 2013.

The South Australian Recycled Water Guidelines have also been adopted by DHA.

3.7.5 Australian Guidelines for Water Recycling: Managing Health and Environmental Risks

The Australian Guidelines for Water Recycling (AGWR) is an authoritative reference for the supply, use and regulation of recycled water schemes from various sources, including wastewater, stormwater, and greywater. The AGWR was developed in two phases to ensure the safe use of recycled water throughout Australia, and consist of four parts which focus on: wastewater and greywater; stormwater; MAR; and augmentation to drinking water supplies.

The AGWR provide a risk management framework that can be applied to the design, operation and management of all recycled water systems. This risk management framework comprises 12 elements within four categories: commitment to responsible use and management of recycled water; system analysis and management; supporting requirements; and review.

Further information regarding the 12 elements is available in the AGWR.

This approach is documented in a recycled water Risk Management Plan (RMP) for the non-drinking water system. A RMP is a stand-alone document that captures the operation, maintenance and management of a recycled water system, including monitoring, evaluation, reporting and improvement requirements (and may include a Monitoring, Evaluation, Reporting and Improvement (MERI) plan).

RMPs are now a requirement for schemes that require DHA approval (refer to DHA for specific requirements).

3.8 Infrastructure Planning and Design

As a minimum, it is essential that the non-drinking water system is suitable for its intended use and meet the requirements of the water industry entity and regulatory authorities.

Planning and design requirements for non-drinking water treatment infrastructure is dependent on the source of the non-drinking water, the required water quality and its intended use as determined by the relevant authority.

Planning and design requirements for non-drinking water supply infrastructure are detailed in WSA 03-2011 – Part 1: Planning and Design.

The planning and design processes for non-drinking water systems include the non-drinking water supply sources, reservoirs and storages, treatment systems, transfer, distribution and reticulation mains, pumping stations, and control systems, as well as the drinking water supply systems for dual supply systems.

It is noted that some water industry entities have particular infrastructure requirements and as such, WSA 03-2011 should be read in conjunction with these relevant supplementary documentation.

3.9 Design Life

The service life of all non-drinking water infrastructure and assets should align with the nominated design standards and codes while recognising the operating parameters which may affect integrity and maintenance processes that may mitigate deterioration effects.

Operating conditions to be considered in design include but are not limited to:

- Pressure.
- Fluid velocity.
- Temperature.
- Service factors.

Typical design lives for water supply distribution assets which are also applicable to non-drinking water infrastructure are provided in WSAA-03 and included in Table 3-3.

Table 3-2 Typical design lives for water supply distribution assets

Water Supply Distribution Asset Type	Typical Asset Design Life (years)
Water Mains	100
Reservoirs	50
Pumps	20
Valves	30
Supervisory control and data acquisition (SCADA)	15

3.10 Safety in Design Requirements

Safety in design (SID) is a principle that is adopted by a designer to identify, eliminate or control all risks associated with infrastructure throughout its life using the Hierarchy of Control methodology (Figure 3-1).

As such, it is necessary that a water industry entity or water supplier providing non-drinking water takes all available opportunities to ensure the safe design of assets to achieve best practice. This applies to any design element, whether the design is carried out in-house or externally by design contractors. The water industry entity or water supplier should have in place processes and procedures to ensure that all hazards and risks have been adequately identified and provide appropriate mitigation measures for those hazards and risks in design through the Hierarchy of Control.

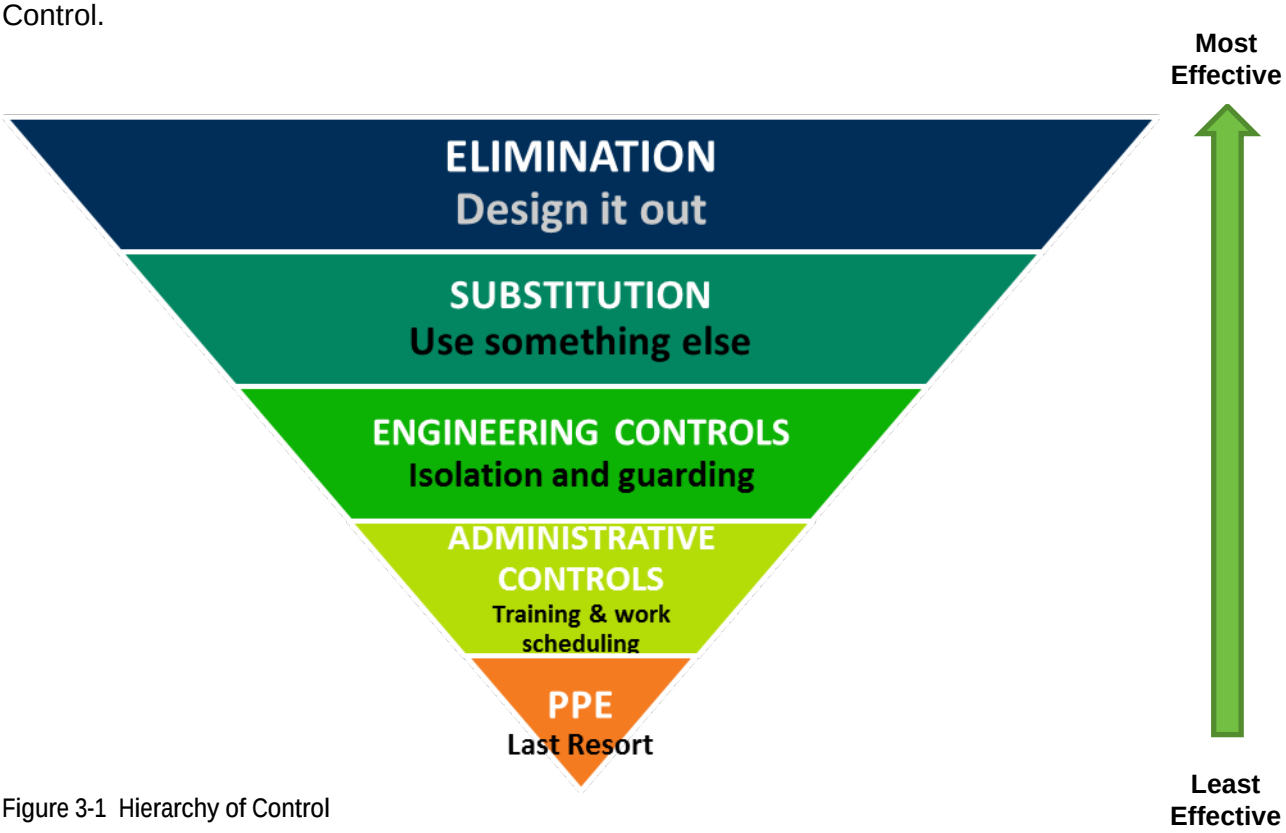

Figure 3-1 Hierarchy of Control

SID is to be considered from planning stages through to detailed design, and includes the consideration of the infrastructure's design and intended purpose; materials to be used; possible methods of construction, maintenance, operation, demolition or dismantling and disposal; and legislation, codes and standards required to comply with.

3.11 Risk Assessment and Management

3.11.1 General

AS/NZS ISO 31000 Risk Management – Principles and Guidelines (previously AS 4360) describes the principles and processes of risk assessment, and these should be applied within water industry entities or water suppliers to assess the identified risks and hazards. AS/NZS ISO 31000 defined Risk assessment as the overall process of risk identification, risk analysis and risk evaluation.

South Australia has adopted the approach nominated by the AGWR from a risk management perspective and supports the application of preventative measures and requirements for water quality which is consistent with the source of non-drinking water and intended use.

Figure 3-2 provides an indication of the relative risks associated with non-drinking water use.

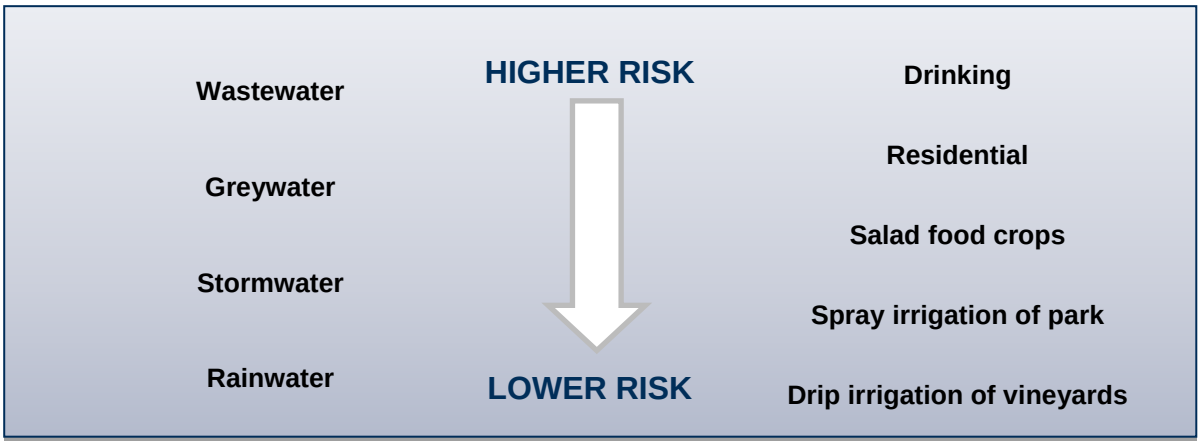

Figure 3-2 Relative risk associated with non-drinking water (Adapted from Department for Health and Ageing (2012), *South Australian Recycled Water Guidelines*)

3.11.2 Hazard Identification and Risk Assessment

Identification of hazards and hazardous events and the assessment of the level of risk that the hazards or hazardous events present to human and environmental health are essential for effective risk management.

A hazard is any agent (biological, chemical, physical or radiological) with the potential to cause harm to human health or the environment, and a hazardous event is an incident or situation which may introduce one or more hazards. Risk is the combination of the likelihood of a hazardous event and the severity of the consequences if the hazard occurs.

Risk assessment identifies the sources of risks, events which may result in risk, and the causes and resultant consequences of these risks. A risk assessment should be undertaken to ensure significant risks are minimised and managed through the application of mitigation measures, such as treatment requirements and site control.

A risk matrix is used to measure the consequence and likelihood of a risk.

3.11.3 Human Health Risk Assessment

A human health risk assessment for non-drinking water system should be undertaken in accordance with *Element 2 – Assessment of the Non-drinking Water (Recycled Water) System* of the AGWR framework, and/or the requirements of the DHA as the relevant authority for treated wastewater and greywater.

A human health risk assessment involves:

- Identifying intended uses and source of non-drinking water.
- Review of non-drinking water system.
- Assessment of water quality data.
- Hazard identification and risk assessment.

The human health hazard identification and risk assessment may include, but is not limited to:

- **Microbial hazards**, such as pathogenic bacteria, viruses, protozoa, and helminths.
- **Chemical hazards**, such as chemical composition, including industrial, pharmaceutical, hazardous chemicals.

Advice can be sought from DHA for further details on human health risk assessment of the recycled water systems in accordance with *Element 2* of the framework, when seeking approval for wastewater and greywater schemes.

The above risk assessment can also be applied to non-drinking water systems that utilise natural sources, with the appropriate modifications, i.e. identification of physical hazards.

3.11.4 Environmental Risk Assessment

Environmental risk assessment assists in the identification of key environmental hazards. In order to identify these hazards, it is important to consider the potential effect on the receiving environment in relation to:

- Concentration – both background concentration and non-drinking water concentration.
- Contamination – existing, potential and residual impacts.
- Eutrophication – existing, potential and residual impacts.
- Biodiversity – existing, impacts on and potential diversity.
- Productivity – including impacts on nutrient imbalance, salinity, sodicity, toxicity, waterlogging etc.
- Vector potential – including pests and disease.

In many cases, a source pathway receptor model is adopted during an environmental risk assessment to identify the source, pathway, receptor and consequence of the non-drinking water application. Alternatively, a water and nutrient balance is required to confirm the probability of environmental impacts on the receiving environment and suitability of the application.

Operational factors are also considered during an environmental risk assessment include:

- Non-drinking water quality, including microbial and chemical composition.
- Application including type/method, rates, timing, existing control measures (buffers, slope, benching etc.).
- Water sources assessment, including types, proximity to, existing water quality, biodiversity etc.
- Uptake pathways for undesirable compounds, such as heavy metals.
- Site assessment, including history, land use, impacts from adjoining properties, existing buffers.

3.11.5 Preventative Measures to Manage Risk

Depending on the source of non-drinking water, there are a number of preventative measures that can be employed to manage risks, including but not limited to:

- **Water source protection**, including:
  - Trade waste programs.
  - Restriction of human and livestock presence in source water catchment area.
  - Flow control.
  - Flow redirection.
  - Wastewater network maintenance (reduction of leaking pipes).
- **Treatment** (mainly applicable to treated wastewater and greywater), including:

- Primary treatment – physical (with or without chemical assistance) removal of suspended solids (including organic and inorganic matter).
- Secondary treatment – biological treatment and sedimentation processes (including Biological Nutrient Reduction (BNR) and chemical treatment processes).
- Tertiary treatment – membrane filtration; reverse osmosis; coagulation, flocculation and sedimentation (or flotation); advanced physiochemical processes; activated carbon adsorption; advanced oxidation processes; prolonged detention in lagoons or wetlands.
- In-line filtration – coarse, fine, micro and ultra.
- Disinfection – ultraviolet light, chlorination and oxidation.

- **Natural filtration**, including:
  - Injection of non-drinking water into an aquifer, unsaturated zone and soil.
  - Wetlands.
  - Vegetated lagoons.
- **Education programs**, including:
  - Information packs.
  - Educational flyers.
  - Advertisements.
- **On-site/end-use control measures**, including:
  - Access restrictions, i.e. fenced with locked gate or withholding periods or contact exposure (primary or secondary).
  - Buffer zones and setbacks (to reduce impacts on surrounding environment, including soil, surface water, groundwater, neighbouring properties etc.).
  - Subsurface or drip irrigation systems.
  - Engineered spray irrigation system (to achieve reduced spray drift or mists and runoff potential).
  - Low-occupancy irrigation times, i.e. night time irrigation scheduling.
  - Engineered site (i.e. Slope <10%, permeable and well-drained soils, appropriate soil chemistry etc.).

4. Implementation

4.1 Roles and responsibilities

4.1.1 Designer

The designer of a non-drinking water system requires extensive knowledge of the regulatory framework (Federal, State and Local Government), standards, guidelines and codes relating to non-drinking water.

Typically, the responsibilities of designers are dictated by the water industry entity or water supplier within their contract documentation and development agreements.

4.1.2 Water Industry Entity

The legislative responsibilities of a water industry entity are included in Section 68 of the *Water Industry Act 2012.*

As a minimum, a water industry entity must ensure:

- All infrastructure, equipment, products or materials used by the entity comply with and are used in accordance with, technical and safety requirements specified by relevant standards.
- Only appropriately licensed persons can install on-site non-drinking water plumbing and conduct cross connection testing/audits.
- On-site non-drinking water connections are appropriately activated, including conducting the cross connection test, and record and retain all relevant documentation.
- A Safety, Reliability, Maintenance and Technical Management Plan is prepared for all retail water supply services (including non-drinking services).

Water industry entities are responsible for managing any risks associated with the drinking water supply through appropriate measures, such as ensuring no cross connections exist by undertaking 5-yearly audits and/or an audit on the sale of properties that are serviced with non-drinking water.

4.1.3 Customer

The legislative responsibilities of a customer supplied with a retail non-drinking water service are included in Section 69 of the *Water Industry Act 2012.*

A customer should have basic knowledge of non-drinking water uses and risks associated with its use, and as a minimum must ensure:

- Only appropriately licensed persons can install and maintain non-drinking water services.
- All equipment located on their property complies with any technical and safety requirements.
- All equipment located on their property is identifiable and operates in a technically safe and reliable manner.
- Certificates of compliance are received for all installations or maintenance performed.
- Non-drinking water is used for its intended uses.

4.2 Approvals and Licensing Requirements

4.2.1 General

Non-drinking water systems require approvals and licences from a number of relevant regulatory authorities prior to installation. Table 4-1 provides a list of the relevant authorities requiring approval or licences for non-drinking water systems/supply.

Table 4-1 Non-drinking water systems/supply approval and licence requirements

Type of non-drinking water system	Relevant authority requiring approval or licence
Recycled water system (treated wastewater only and mixed source incl. treated wastewater)	DHA** ESCOSA (only for retail service by a reticulated system) EPA (only for systems <100 EP (in water protection area) or >1000EP elsewhere) PIRSA (only where end use involves stock watering/pasture irrigation) OTR* (commercial/industrial/residential irrigation installations) DECD***
Non-drinking water supply (carted)	DHA (for treated wastewater / greywater only) OTR* (commercial/industrial/residential irrigation installations)
Non-drinking water system (groundwater)	ESCOSA (only for retail service by a reticulated system) DEWNR (only for take of groundwater from wells within a prescribed wells area or prescribed water resources area) OTR* (commercial/industrial/residential irrigation installations) EPA (only for take of groundwater from certain aquifer systems identified within a SA EPA Groundwater Prohibition Area)
Non-drinking water system (surface water)	ESCOSA (only for retail service by a reticulated system) DEWNR (only for surface water take from a prescribed watercourse or from prescribed resources within a prescribed water resources area; and may be required for systems that import surface water as per NRM Act 2004 imported water permit requirements) OTR* (commercial/industrial/residential irrigation installations)
Non-drinking water supply (bulk water)	ESCOSA (only for retail service by a reticulated system) DEWNR (may be required for systems that import water as per NRM Act 2004 imported water permit requirements) PIRSA (only where end use involves stock watering/pasture irrigation) OTR* (commercial/industrial/residential irrigation installations)
Greywater system	DHA** DEWNR (may be required for systems that import water as per NRM Act 2004 imported water permit requirements) OTR* (commercial/industrial/residential irrigation installations)
Stormwater system	ESCOSA (only for retail service by a reticulated system) DEWNR (may be required for systems that import water as per NRM Act 2004 imported water permit requirements) OTR* (commercial/industrial/residential irrigation installations) DECD*** DHA (no formal approval required. However, proponents encouraged to contact)
MAR system	ESCOSA (only for retail service by a reticulated system) EPA Licence to inject as per EP Act requirements DEWNR permit to drain or discharge as per NRM Act requirements OTR* (commercial/industrial/residential irrigation installations) DECD***

See notes over page

Notes:

* - All non-drinking water systems require OTR Plumbing Section review prior to installation.

** - All approved product on-site non-drinking water systems (up to 40EP) require Local Government approval prior to installation.

*** - All recycled water connections servicing a DECD school or preschool in South Australia must meet mandatory requirements.

4.2.2 DHA Approval

All non-drinking water collection, treatment, reticulation and reuse systems using treated wastewater (recycled water) and greywater require approval from the DHA pursuant to the *South Australian Public Health (Wastewater) Regulations 2013* to ensure that public health risks are mitigated. Where two or more separate entities supply and reuse the treated wastewater, separate approvals are required.

Applications involving treatment and reuse systems for DHA approval are to include a design report and recycled water Risk Management Plan (RMP) as a minimum. For further information regarding the approval application process, refer to DHA South Australian Recycled Water Guidelines – October 2012 and DHA Community Wastewater Management Systems (CWMS) Code April 2013.

DHA also approves the carting of non-drinking water (recycled water/treated wastewater only) for purposes such as agricultural and municipal irrigation. The approval is granted by DHA pursuant to the *South Australian Public Health (Wastewater) Regulations 2013*. Further information is available in the DHA Water Quality Guideline – Guidelines for the carting of recycled water.

Further information relating to DHA responsibilities and requirements is available at the DHA Website.

4.2.3 EPA Licence

The EPA license activities of environmental significance as defined in Schedule 1 of the *Environment Protection Act 1993*. Schedule 1 of the *Environment Protection Act 1993* defines wastewater treatment plants and community wastewater management systems as an activity of environmental significance.

In some instances, a licence may not be required for a non-drinking water system. However, in many of these cases a wastewater irrigation management plan or RMP may be developed to minimise their impact on the environment and to comply with the general environmental duty (Section 25) of the *Environment Protection Act 1993* and the provisions of the *Environment Protection (Water Quality) Policy 2015*.

Further information is available on the EPA website.

4.2.4 DEWNR Licensing and Permitting

DEWNR is responsible for supporting the sustainable management of water in South Australia, and as such, issues licences and water allocations, measures water use through metering, manages water in high demand areas and secures environmental flows.

An activity that depends or impacts on a water resource (underground, watercourse or surface water), such as take of this water source for the purpose of irrigation or post managed aquifer recharge, where the water resource or well is prescribed, requires a licence to extract from DEWNR. In addition to a licence, a water affecting activities permit may be required if the non-drinking water system is impacting on a water resource (which supports an ecosystem or not). This includes activities such as: drilling, plugging, backfilling or sealing of a well; repairing, replacing or altering the casing, lining or screening of a well; draining or discharging water directly or indirectly into a well (i.e. MAR where the EPA is not the relevant authority for the discharge to the aquifer); using importing water in the course of carrying on a business; and using non-drinking water (in particular recycled water) in the course of carrying on a business or where a non-drinking water system involves the transport or use of non-drinking water in another Natural Resources Management (NRM) region. Furthermore, where a non-drinking water system involves the transport or use of non-drinking water in another Natural Resource

Management (NRM) region, a Water Affecting Activities Permit (WAAP) may be required. WAAP conditions related to non-drinking water use can also vary between NRM regions.

Further information is available on the DEWNR website.

4.2.5 ESCOSA Licence

ESCOSA independently regulates any person or entity that provides a water retail service including non-drinking water supply services through a reticulated system unless deemed to be exempt under the *Water Industry Act 2012*. The ESCOSA Licence application involves information pertaining to: corporate and legal information; regulatory information; technical and human resource information; and financial information. The information provides evidence to support the safe and reliable operation, and ensure the protection of the long-term interests of the South Australian consumers with respect to price, quality and reliability are maintained.

It is noted that ESCOSA does not require a person or entity to be licensed if they provide non-drinking water free of charge or via a non-reticulated system, such as a water standpipe or water carting truck.

Further information relating to licensing is available at the ESCOSA website.

4.2.6 OTR Approval

The OTR is not a licensing authority for non-drinking water systems; instead it promotes, audits and enforces the compliance of all installation with safety and technical standards. In particular, the OTR administers the certificate of compliance requirements to ensure that appropriately licensed persons comply with legislation requirements relating to the work that they have carried out.

Overall, the responsibilities of the OTR in non-drinking water plumbing installations are:

- To ensure all on-site non-drinking water services comply with the objective and performance requirements of the PCA.
- Audit in-wall and in-ground non-drinking water installations.
- Audit water industry entity/water supplier and appropriately licensed person (where applicable) for documentation but not limited to safety management plans, cross connection tests and site visits.
- Performance reporting.

From an infrastructure perspective, the OTR approve SRMTMPs prepared by licensed water industry entities. A SRMTMP documents the operations, maintenance and management of a non-drinking water system, and demonstrates how the water industry entity is operating in a technically safe and reliable manner whilst meeting any legislative requirements.

Further information relating to OTR responsibilities and requirements is available at the OTR Website.

4.2.7 Development Approval

Development approval is required for all major and some minor developments where there is a provision of non-drinking water. Development approvals are submitted to the appropriate referral body being either Development Assessment Commission within the Development Division of the Department for Planning, Transport and Infrastructure (DPTI) or local government (i.e. Council).

The referral body for a development application is dependent on the location, non-drinking water disposal system (if any), relevant local authority, developer, and potential impacts on surface or groundwater resources. Alternatively, a works approval can be obtained through the EPA.

Further information regarding development applications is available at the South Australian Government Website.

4.2.8 DECD Recycled Water Connections Procedure

The DECD Recycled Water Connection Procedure outlines the minimum requirements that must be met in order to allow recycled water connections for irrigation purposes at DECD schools and preschools in South Australia. It identifies key requirements and responsible parties, and sets forth the process that must be followed for schools and preschools to connect to recycled water.

Further information is available on the DECD website.

4.2.9 Primary Industries and Regions South Australia

The Department of Primary Industries and Regions South Australia (PIRSA) is a key economic development agency within the South Australian Government, who is responsible for the prosperity of the State's primary industries and regions. With regards to non-drinking water, PIRSA has dedicated programs focusing on water resources, viticultural and irrigated crops, and are supportive of the use of alternative water supplies.

The *Livestock Act 1997* and *Livestock Regulations 1998* are aimed at improving disease control and prohibit the use of faecal contaminated water in livestock production unless it has been treated in an acceptable manner. As such, controls have been put in place to manage the risks associated with non-drinking water being used for different types of livestock, irrigated pasture and fodder production, wash down stock yards and non-food contact areas of dairies.

Where aquaculture production can be used for the purpose of food for human consumption, such as bait, pet food or the aquarium trade, compliance with the requirements of the *Primary Produce (Food Safety Schemes) Act 2004* and other relevant Regulations and Standards is necessary. Aquaculture schemes proposing recycled water use will be assessed on a case-by-case basis.

It is recommended that advice is obtained from PIRSA and DHA with regards to the use of non-drinking water for agricultural (including hydroponics) and aquaculture purposes.

4.2.10 Water Industry Entity (including Local Government) and Non-drinking Water Supplier

Water industry entities (including local government), who are licensed by ESCOSA, are required to have supply agreements for all non-drinking water supplies. Typically the agreement includes any specific requirements necessary to allow for the supply and receipt of non-drinking water, as well as any equipment that is installed on the customer's property. In some cases, other non-drinking water suppliers may also have supply agreements or requirements for the provision of supply.

Typical non-drinking water supply service requirements may include, but are not limited to:

- Capital contribution (set fee or by negotiation).
- Installation of connection (which may include the meter).
- Fees and charges (fixed annual charge, cost per volume, additional meters costs).
- Internal pipework audits (fees or certification).

It is recommended that the customer contacts the supplier of non-drinking water to confirm the specific requirements for connection to the non-drinking water system and continued supply service. A list of retail suppliers of non-drinking water are provided in Appendix B.

4.3 Supply Infrastructure Installation Requirements

4.3.1 General

Installation requirements for non-drinking water supply infrastructure are detailed in WSA 03-2011 – Part 2: Construction. It is noted that some water industry entities have particular infrastructure installation requirements and WSA 03-2011 should be read in conjunction with relevant supplementary documentation.

4.3.2 Differentiation of Dual Water Supply Systems

The WSAA Code notes that a range of measures are to be adopted to allow for the differentiation of drinking and non-drinking water supply systems, such as:

- Pipe colour.
- Warning messages printed on non-drinking water mains or sleeving.
- Use of marking tape.
- Marking of surface fittings.
- Identification markers and marker posts.
- Service pressure differential.
- Different or defined pipe locations with minimum pipe separation.
- Different pipe materials for each system.
- Identification signage.

4.3.3 Infrastructure Separation Distances

For non-drinking water infrastructure installations, clearances from other service utility assets are provided in WSAA Code. The clearance is measured between the two closest parts of the non-drinking water service and the other underground service are to be not less than (and preferably exceed) the minimum vertical and horizontal clearances as show in Table 4-2.

Table 4-2 Horizontal and vertical clearances for non-drinking water infrastructure assets (adapted from WSA 03 - 2011)

Utility (Existing or proposed service)	Minimum Horizontal Clearance(mm) New main size		Minimum Vertical Clearance(mm)
	≤ DN 200	> DN 200	
Water mains >DN375	600	600	300
Water mains ≤ DN375	300	600	150
Gas Mains	300	600	150
Telecommunication conduits and cables	300	600	150
Electricity conduits and cables	500	1000	225
Stormwater drains	300	600	150
Sewer – gravity	1000 / 600	1000 / 600	500
Sewer – pressure and vacuum	600	600	300
Kerbs	150	600	150 (where possible)

The minimum clearances may be reduced in consultation and approval from the corresponding service utility, and may require additional pipe support or protection measures. For further information on minimum clearances and reductions to clearances, refer to WSA 03–2011.

4.3.4 Non-drinking Water Meters

Non-drinking water meters must be externally coloured purple in accordance with AS 2700.

Non-drinking water meters are supplied and installed by the water industry entity or water supplier.

For domestic and commercial premises, a connection size of 20mm and greater is provided. If a property is located within an area that has a dual water supply system, it may be a prerequisite by the water industry entity to have both a drinking water connection and non-drinking water connection, whether either supply is utilised or not.

Meters located on non-drinking water from natural sources, such as prescribed surface water, watercourses and groundwater, are not required to be coloured.

4.3.5 Non-drinking Water Meter Installation

Non-drinking water meters shall be coloured purple, fitted above or below ground in an accessible position. The meter inlet and outlet threads may be different to prevent interchange with the drinking water meter. Meter installation requirements may vary between water industry entities and water suppliers.

It is recommended that the non-drinking water meter is located 300mm to the left of the drinking water meter when facing the property from the street, and the meter is free of any obstructions, such as trees, stobie poles, letter box etc. Figure 2-1 and Figure 2-2 provides examples of a typical above-ground and below ground connection (Source – SA Water Metered Recycled Water Connection Fact Sheet).

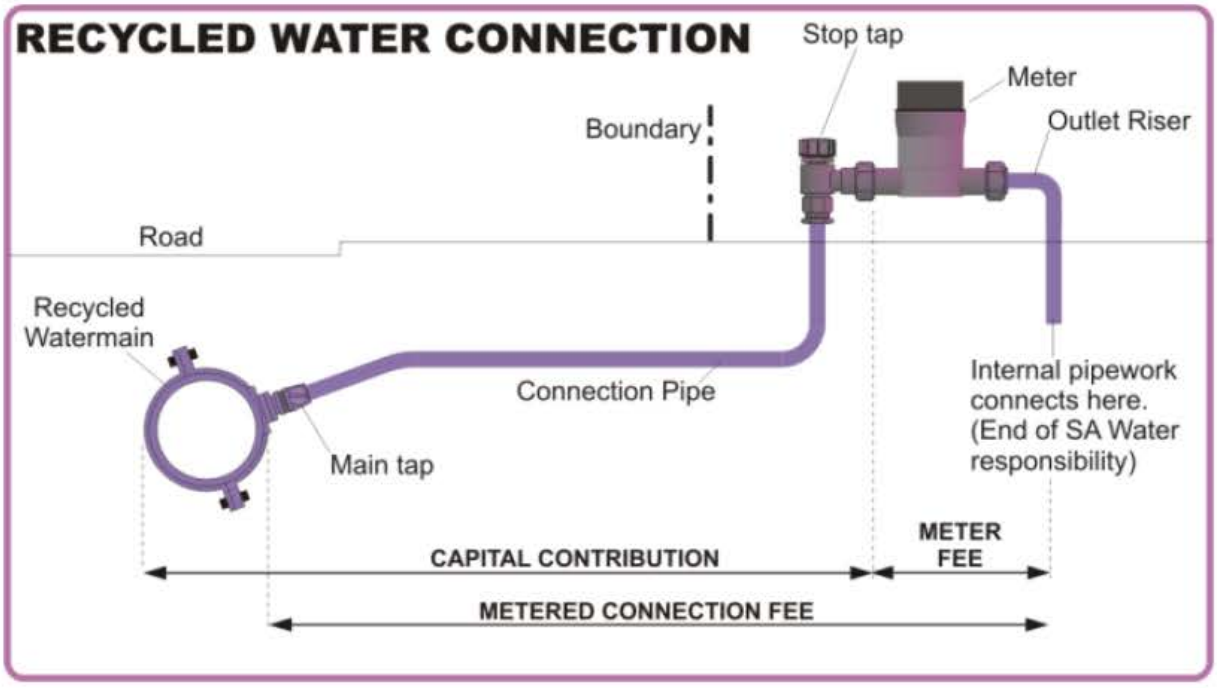

Figure 4-1 Typical non-drinking water meter above-ground installations (Source – SA Water Metered Recycled Water Connection Fact Sheet)

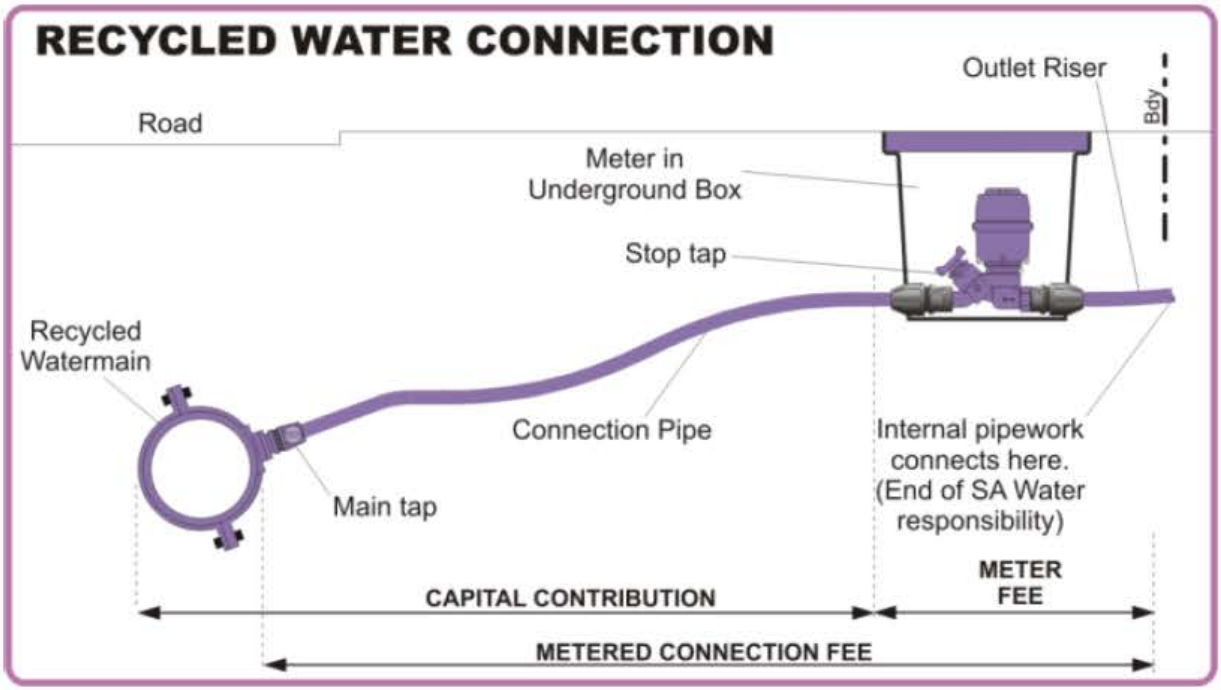

Figure 4-2 Typical non-drinking water meter below ground installations (Source – SA Water Metered Recycled Water Connection Fact Sheet)

4.4 Supply Infrastructure Testing and Commissioning Requirements

The testing and commissioning of non-drinking water supply infrastructure is detailed in WSA 03-2011–Part 3: Construction.

In addition to WSA, an approval or licence from a relevant authority may also include testing and commissioning requirements of a non-drinking water system, such as:

- Completion advice prior to the commissioning of the system.
- Commissioning advice prior to the date of commissioning of the system.
- Structural soundness testing of the system.
- Water tightness testing of the system.
- Material testing of certain components of the system.
- Engineering certification of compliance in accordance with all relevant standards, codes and guidelines.
- Treatment validation testing.

4.5 Treatment and Storage Infrastructure Testing and Commissioning Requirements

The testing and commissioning of non-drinking water treatment and storage infrastructure is determined by the relevant authority/approving agency/ies, water industry entity and where applicable, the manufacturer and/or supplier of the infrastructure.

5. Operation

5.1 Introduction

In relation to system operation, Water Industry Entities, water suppliers and the supporting industry should ensure:

- Current knowledge of all safety matters.
- Risks associated with carrying out the operation of non-drinking water systems and various associated asset types are understood.
- Appropriate resources and processes are available to manage risk.
- Appropriate information and advice is received to respond to incidents and risks.
- Management has and implements processes for complying with legislation.
- Verification of all requirements is satisfied.

5.2 Risk response, mitigation and control

Due diligence is typically achieved through hazard identification and rating, and determining levels of responsibilities associated with controlling and monitoring hazard control measures.

Risk response and mitigation strategies / activities should be applied to identify and assess risks using the hierarchy of control, which states preference to eliminating the risk rather than controlling it.

The hierarchy of controls is as follows:

- **Elimination** – removes the cause of danger completely.
- **Substitution** – controls the hazard by replacing it with a less risky way to achieve the same outcome.
- **Isolation** – separates the hazard from the people at risk by isolating it.
- **Engineering** – using engineering controls, i.e. making physical changes to lessen any remaining risk.
- **Administration** – use administrative controls to lessen the risk.
- **Personal Protective Equipment (PPE)** – application of PPE in carrying out defied tasks.

The selected hazard controls and mitigations that are applied are assessed for effectiveness. Applying controls that are not effective negates the control measure.

5.3 Workplace Health and Safety

All businesses have a legal obligation to abide by the South Australian Work Health and Safety laws which are governed by a national harmonised framework consisting of legislation, codes of practice and supporting guidance documentation, such as standards.

The *Workplace Health and Safety Act 2012* (WHS Act) specifies specific duties and responsibilities on a range of parties to ensure health and safety in the workplace including a broad framework which allows a “person conducting a business or undertaking” (PCBU) flexibility in their approach to achieving standards set out in legislation.

All companies are considered to be a PCBU and have the primary duty under the WHS Act to ensure, so far as is reasonably practicable, that workers and other persons are not exposed to health and safety risks arising from the business or undertaking.

As a PCBU under the WHS Act, in order to ensure health and safety while taking into account and weighing up all relevant matters, it is necessary to consider:

- Likelihood of the hazard or risk occurring.
- Degree of harm as a result of the hazard or risk.
- Knowledge of the person's understanding of the hazard or risk and approaches for elimination.
- Availability and suitability of the hazard or risk elimination or minimisation.
- Costs associated with hazard or risk elimination or minimisation.

Correct operation of non-drinking water systems requires commitment to health and safety of personnel, contractors, other stakeholders and the public due to hazards and the risk of exposure. Occupational exposure to non-drinking water is managed through organisational policies, protocols and procedures.

Depending on the sources and quality of non-drinking water, typical measures for managing and minimising exposure include:

- Wear appropriate protective clothing (i.e. long sleeve shirts and full leg pants).
- Wash hands well with soap before eating, drinking or smoking, and prior to leaving site.
- Do not consume food or drink, and do not smoke while working with non-drinking water.
- Cover any broken skin (including wounds, cuts, abrasions etc.).
- Undertake maintenance during non-operational times.
- Avoid any un-necessary contact (including ingestion and exposure to aerosols and sprays of non-drinking water).
- Use appropriate safety equipment.

5.4 Training

All personnel working with non-drinking water require fundamental knowledge of the operation, maintenance and management of the system, and the associated risks and controls required to ensure the safe and reliable supply of non-drinking water.

Further information relating to training and competency is included in Section 7.

5.5 Non-drinking Water Identification

All non-drinking water infrastructure and plumbing installations requires appropriate warning signage indicating that the non-drinking water is not suitable (fit) for human consumption.

In addition to the appropriate signage, all pipework, included in infrastructure and plumbing installations should be distinctively marked and colour coded to ensure that any system cannot be mistaken as conveying drinking water.

In cases where an existing installation was supplied with drinking water and is now being connected to a non-drinking water supply, i.e. MAR water, the pipework should be identified in accordance with the above requirements.

5.6 On-site Controls

Areas where non-drinking water is used or present, such as irrigation areas or ornamental water feature, may be subject to on-site controls according to approval or licence conditions and relevant legislation. The level of on-site control is dependent on the exposure risk.

Examples of on-site controls are included in Section 3.11.5.

5.7 Odours and Vectors

All potential odours should be controlled during the operation of the non-drinking water system to reduce potential for nuisance or offensive conditions.

As such, non-drinking water infrastructure is typically designed and maintained to ensure that pests are not supported, such as mosquitoes and midge flies.

5.8 Algae

Some non-drinking water systems have the potential to support algal growth due to increased nutrients. Appropriate control measures (including mechanical and chemical) are often required to ensure that distribution networks remain clean and free of build-up to ensure that water quality requirements are maintained.

5.9 Additional controls

Additional operational controls for the use of non-drinking water may be included in an applicable approval or licence issued by the relevant authority.

6. Monitoring

6.1 General

Monitoring of non-drinking water systems is essential to manage risk, ensure public and environment health, and meet statutory requirements under the licence or approval from the regulatory authority.

The AGWR notes that a good monitoring program includes:

- Well defined monitoring objectives within the RMP.
- Objectives that will be met.
- Clear data requirements, collection techniques and outcome purposes.
- Reliable and sensitive sampling and analytical techniques.
- Analysis and reporting of data for optimised operation.
- Auditing requirements to meet statutory obligations.

Monitoring is determined by the relevant authority and is dependent on the non-drinking water source, water quality and intended use.

6.2 Type of monitoring

There are four key monitoring requirements for non-drinking water systems; including:

- Baseline monitoring (See Section 6.3).
- Validation monitoring (See Section 6.4).
- Operational monitoring (See Section 6.5).
- Verification monitoring (See Section 6.6).

In addition to the key monitoring requirements, there are additional monitoring requirements which can be implemented for a non-drinking water system, such as monitoring for aesthetic quality (i.e. colour, taste etc.).

Detailed information and guidance on monitoring programs are available in *Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC and ARMCANZ 2000b)*.

For non-drinking water (recycled water and greywater) systems, please seek advice from DHA for specific monitoring requirements.

6.3 Baseline monitoring

Baseline monitoring provides an assessment of the receiving environment and the non-drinking water source for assessing the risks and hazards associated with the use of non-drinking water. The information obtained from baseline monitoring is used for the risk assessment, and can include details, such as seasonal and operating conditions.

Baseline monitoring provides:

- Information that will reinforce the risk assessment process.
- A basis for assessing potential impacts of non-drinking water use.
- A picture of the current situation without the use of non-drinking water.

Baseline monitoring is undertaken prior to the design, implementation, installation, commissioning and operation of the non-drinking water system, and is a key action during the planning stage of any system.

Baseline monitoring may be necessary for the development of the RMP including the validation, operational and verification monitoring. Baseline monitoring is part of *Element 2 – Assessment of Recycled Water System* of the AGWR, further information is provided in 5.2.2.

6.4 Validation monitoring

Validation monitoring confirms that the non-drinking water system's RMP will achieve the performance requirements in accordance with the 12 elements of the AGWR.

Validation monitoring is considered the proving period of a non-drinking water system and is:

- Intensive.
- Sometimes focussed on microbial indicators to demonstrate performance against log reduction design.
- Sometimes used for assessing health indicators.

Validation monitoring is typically completed during pre-commissioning, commissioning and operation, and provides confirmation that the preventative measures employed will achieve the health and environmental target criteria. Validation monitoring (where existing validation protocols and indicators are not in place) should be undertaken by an independent person that is appropriately qualified, at the same time as operational monitoring.

Typically full validation monitoring is completed during the commissioning of a non-drinking water system and only undertaken once. This monitoring is extensive and includes the infrastructure used as well as the performance of the system, whereas operational validation monitoring is undertaken throughout the life and operation of the non-drinking water system.

Validation monitoring is part of *Element 9 – Validation, Research and Development* of the AGWR. Further information is provided in 5.2.3 of the AGWR.

6.5 Operational monitoring

Operational monitoring is considered routine monitoring that involves visual assessments and measuring of control parameters to confirm that the non-drinking water system is operating as designed to achieve the required water quality requirements.

For some systems, operational monitoring may involve continuous online measurements and observations including, but are not limited to:

- Dissolved oxygen (DO).
- pH.
- Turbidity.
- Chlorine residual.
- UV dose.
- Warning signs.
- Fault alarms.
- Cross-connection hydraulic controls.
- End-user controls.

Operational monitoring is often used to determine performance against critical control points (CCPs). Increased operational monitoring provides increased information about the operation of the system and can be used to predict any non-conformances.

Online measurement allows for the early identification and timely intervention to allow for the necessary corrective action and ultimately avoid operational problems and non-conformances. However, it is noted that the operational monitoring is highly dependent on the correct use and operation of equipment and data collection/interpretation processes.

Operational monitoring is part of *Element 4 – Operational Procedures and Process Controls* of the AGWR. Further information is provided in Section 5.2.4 of the AGWR.

6.6 Verification monitoring

Verification monitoring applies methods, procedures, tests and other evaluations, in addition to those used in operational monitoring, to determine compliance with the RMP and identify any necessary modifications.

Verification monitoring determines the performance of the non-drinking water system, non-drinking water quality being supplied and the quality of the receiving environment.

Verification monitoring auditing provides assurance to customers and relevant authorities that the non-drinking water system is operating in a safe and reliable manner.

Examples of verification monitoring are included in Table 6-1.

Table 6-1 Examples of verification monitoring (adapted from AGWR)

Process Step	Verification Monitoring
Non-drinking water treatment system	• Confirm calibration schedule comply with monitoring equipment requirements (used for operational monitoring) (if required as part of RMP). • Confirm compliance with preventative maintenance schedule.
Point of supply	• Monitoring microbial indicator concentrations including *E.coli*.
Point of use	• Confirm response times to non-conformances and resultant corrective actions and reporting requirements (Operational monitoring).

Verification monitoring is part of *Element 5 – Verification of Recycled Water Quality and Environmental Performance* of the AGWR. Further information is provided in Section 5.2.5 of the AGWR.

7. Management

7.1 Operational procedures

Operational procedures are necessary for every element of the non-drinking water system to ensure that the system is operating in a safe and reliable manner. Operating procedures cover the correct operation of the non-drinking water system assets to ensure that the assets are operated in accordance with the Licence and other legislative requirements. This is generally achieved by following relevant Australian and International codes and standards, industry codes and guidelines, and the water industry entity or non-drinking water suppliers own policies and procedures.

Operational procedures include site specific procedures, generic operational procedures, non-standard or non-routine activity procedures and administrative procedures, and are developed by risk analysis of each task or job hazard analysis to ensure that all tasks can be completed with minimal risk. Operational procedures are initially confirmed during an ESCOSA licence application and then monitored by the OTR as part of a water industry entity's SRMTMP.

7.2 Incidents and emergency procedures

SA Water has clear guidelines from the interagency protocol (*EPA/DHA Water/Wastewater Incident Notification and Communication Protocol*) with regards to non-drinking water system incident classification and their obligations associated with notification and reporting to the relevant authority/ies. All other water industry entities are required to adhere to the *OTR Water and Sewerage Infrastructure Incident Notifications and Communication Protocol* and any reporting requirements included in the relevant regulatory approvals for non-drinking water incidents.

The EPA has a *Code of practice for wastewater overflow management* that applies to all wastewater systems that collect, treat and dispose of wastewater from multiple, commercial and industrial sources, and for all schemes where reuse of such wastewater occurs. The code is available at the EPA Website.

In addition to the relevant authorities' incident notification and communication guidelines, a water industry entity or non-drinking water supplier may adopt internal incident classification, management, reporting and investigation processes, procedures or protocols. Internal processes, procedures or protocols may include requirements associated with:

- Reporting of environmental incidents.
- Reporting of breach of Licence events.
- Reporting of non-drinking water quality incidents.
- Public emergency incident notifications.

Internal processes, procedures or protocols often include additional stakeholder communication obligations, such as notification of SafeWork SA, DEWNR and Local Government (i.e. Council).

Emergency procedures for non-drinking water systems can be included in incident notification and communication processes, procedures or protocols or remain separate in an emergency response management plan or business continuity plan. Emergency response management plans outline actions to be taken by non-drinking water system operators and managers in response to a range of potential emergencies and incidents that may occur at the collection system, treatment plant or the distribution system, including but not limited to:

- System error.
- Communications failure.

- Operator error.
- Vandalism/terrorist interference.
- Electrical power failure.
- Treatment process failure.
- Equipment failure (e.g. aerators, pumps, disinfection etc.).
- Pipeline failure.
- Storage over flow.
- Chemical spills.
- On-site fires and bushfires.

The emergency response plans also include links to a contact list for corporate emergency employees, external stakeholders (i.e. landowners) and relevant authorities.

7.3 Asset management

Asset management involves coordinated activity to realise value from non-drinking water assets and requires the balancing of costs, opportunities and risks against the required performance of assets, to achieve organisational objectives.

Asset management enables the examination of the need for, and performance of, non-drinking water assets and asset systems at different levels. Additionally, it enables the application of analytical approach toward managing an asset over the different stages of its life cycle (which can start with the conception of the need for the asset, through to its disposal, and includes the managing of any potential post disposal liabilities).

A water industry entity or non-drinking water supplier is expected to have implemented an asset management system which, at high level, controls and guides activities to develop the optimum value from their non-drinking water assets. This will include but not be limited to assessing ongoing costs, opportunities and risks of owning, operating and maintaining the physical assets, and decisions regarding expanding, continuing to maintain, or replacement of the asset portfolio.

An asset management system demonstrates the safe and sustainable operation of all non-drinking water system assets, and includes:

- Decision making processes which consider the life cycle of the asset.
- Historic information for optimised operation of the asset.
- Risk regarding criticality, contingency and external pressures.
- Operational improvements opportunities.
- Response to changing risks and continual deterioration of existing assets.

7.4 Customer/public protocols and agreements

The installation and operation of non-drinking water infrastructure has the potential to affect not only customers but also the general community (public). Communicating with customers and the general public with regards to matters affecting them directly or indirectly is an important part of ensuring adequate information is supplied to everyone to ensure they manage their own safety or service provision.

Education procedures to provide customers with adequate information on non-drinking water specific use parameters as a means of reducing exposure to risk. Signage as a communication tool where

non-drinking water is being used is a critical control measure to reduce the risk of exposure to the public.

Communicating restrictions or interruptions to a non-drinking water service for any period and ensuring customers are aware of the details of the restriction are also important communications to consider so that they may make alternative arrangements for services where possible (e.g. purchase of water during outages, changing irrigation programming, etc.).

Appropriate supply agreement between water industry entities or non-drinking water suppliers are essential to ensure that the roles and responsibilities of all parties are clearly defined and the technical and health aspects of the non-drinking water supply and use are met. ESCOSA provides a standard customer contract for water industry entities, as well as a standard customer charter for water services. The customer charter includes information pertaining to:

- Water service, including:
  - Non-drinking water quality.
- Prices, including:
  - Price list.
  - Service availability charge.
  - Water concessions.
- Connections, including:
  - Existing connections – where the property is currently connected to infrastructure.
  - Connections – where the property is not connected to infrastructure.
- Billing and Payments, including:
  - Payment assistance and financial hardship.
  - Reviewing billing disputes.
- Overcharging.
- Undercharging.
  - Debt recovery.
- Customers with special needs.
- Entry to private property.
- Water flow restrictions.
- Disconnections.
- Reinstatement of water supply.
- Termination of contract for water services.
- Complaints and dispute resolution.

Additional information is available on the ESCOSA website.

7.5 Corrective actions and continuous improvement

Continuous improvement is a key area which is included in the RMP. Management level support, commitment and ongoing involvement are essential to the continuous improvement of a water industry entity or non-drinking water supplier's activities. Management should regularly review the approach to non-drinking water quality management, develop action plans and commit the resources necessary to improve operational processes and overall water quality.

In order to ensure continuous improvement, the highest levels of the water industry entity or non-drinking water supplier should review the effectiveness of the water quality management system and evaluate the need for change, by:

- Reviewing reports from audits, recycled water quality performance, environmental performance and previous management reviews.
- Considering concerns of users of water (both non-drinking and drinking water), regulators and other key stakeholders.
- Evaluating the suitability of the water quality policy, objectives and preventive strategies in relation to changing internal and external conditions such as:
- Changes to legislation, expectations and requirements.
- Changes in the water industry entity or non-drinking water supplier's activities.
- Advances in science and technology.
- Outcomes of water quality incidents and emergencies.
- Reporting and communication.

The review by senior managers should be documented.

Corrective actions resulting from audits or reviews should be considered in a holistic sense and as opportunities to make changes not only to rectify problems but also make improvements.

Specifically, a water industry entity or non-drinking water supplier should consider the value of preparing a water quality management improvement plan, which provides a description of how it manages improvements with regard to the water quality delivered to their customers.

Further information regarding continuous improvement is included in the AGWR *Review and Continuous Improvement – Element 12* (Chapter 2.12).

7.6 Competency and capacity of water industry entities

Water industry entities and non-drinking water suppliers need to demonstrate an appropriate level of competency and professional standard to ensure the safe and reliable operation of the non-drinking water system in accordance with the Licence and other regulatory requirements.

Human resources within the water industry entities or non-drinking water suppliers are to be managed according to policies and practices which ensure that employees, contractors and other persons satisfy personal, practical and professional requirements of the corresponding operations. Furthermore, regular reviews of these competencies and skill levels are to be undertaken to identify where deficiencies may exist, including those introduced by new technology. Where deficiencies are identified, training is to be provided and assessment of subsequent competencies and skills undertaken.

Management competency is also demonstrated through the implementation of a RMP which has been prepared in accordance with the risk management framework within the AGWR.

7.7 Contractor requirements

Water industry entities and non-drinking water suppliers should ensure that they are engaging contractors who are competent and have completed appropriate training to undertake the correct operation and maintenance of non-drinking water assets.

In addition to competency and training requirements, all contractors working on a specific non-drinking water system may need to undergo site specific inductions to be made aware of any risks associated with the non-drinking water system's assets and the location in which they will be working.

It is highly recommended that well established and experienced contractors are engaged on non-drinking water systems to ensure that they have appropriate management practices and knowledge of the risks associated with non-drinking water, in particular recycled water.

7.8 Training and awareness requirements

It is essential that non-drinking water system operators and end-users (including customers and the local community) have basic knowledge of the risks and hazards associated with non-drinking water systems and in particularly with regards to operators, the skills, motivation and commitment to ensure safe and reliable service is maintained.

As a minimum, operators and contractors should be aware of the following:

- Non-drinking water quality policy.
- All non-drinking water infrastructure and equipment, in terms of operation, maintenance and management.
- Emergency and incident procedures associated reporting requirements.
- Sampling and monitoring requirements.
- Risk management principles.
- Environmental and public health aspects.
- WHS issues associated with operating non-drinking water systems.
- Preventative and corrective actions in place throughout the non-drinking water system.
- Regulatory and legislative requirements.
- Roles and responsibilities of the water industry entity or non-drinking water supplier, their operators or contractors, and the end-users or customers.

Methods of ensuring competency and awareness includes formal training from a registered training operator, inductions, internal and external education programs, tool box, team and site meetings, print and electronic communication material, and guidelines.

In terms of end-users, customers and the general public, awareness of non-drinking water systems and the use of non-drinking water should be made available and include, as a minimum:

- Obligations of end-users, customers and general public.
- Contractual obligations and the role and responsibilities of the water industry entity or non-drinking water supplier.
- Restrictions on the use of non-drinking water.
- Appropriate use of non-drinking water to maintain sustainability.
- Any activities or practices involving non-drinking water that may impact on environmental and public health.

Training and awareness is part of *Element 7 – Operator, Contractor and End User Awareness and Training* of the AGWR. Further information is provided in Section 2.7 of the AGWR.

7.9 Customer and public consultation, communication and education

7.9.1 Community attitudes to non-drinking water

The type of non-drinking water can have a large impact on the community's attitude to non-drinking water systems. Effective communication of the beneficial uses of non-drinking water and increased

understanding of the potential hazards and risks and how to manage them is an important part of the management of any non-drinking water system.

Water industry entities and non-drinking water suppliers should have a clear communication strategy to build community support from the early planning stages of the system, as discussed in Section 7.9.2.

It has been documented that the main factors that influence community attitudes toward non-drinking water include but are not limited to:

- Perceptions of non-drinking water, including source.
- Perception of risks and hazards.
- Proposed uses and applications of non-drinking water.
- End-user and customer exposure to non-drinking water.
- Protection of public and environmental health.
- Roles and responsibilities of all parties.
- Relationship with or confidence in the water industry entity or non-drinking water supplier.
- Cost.
- Human responses to wastewater and human waste.

Information to better understand community attitudes towards non-drinking water is included in Section 6.1 of the AGWR.

7.9.2 Communication strategies

Communication strategies for non-drinking water systems need to address early communication activities as well as the ongoing approach to communication with key stakeholders in order to maintain ongoing support. Key steps involved in developing a communication strategy as demonstrated in Figure 7-1.

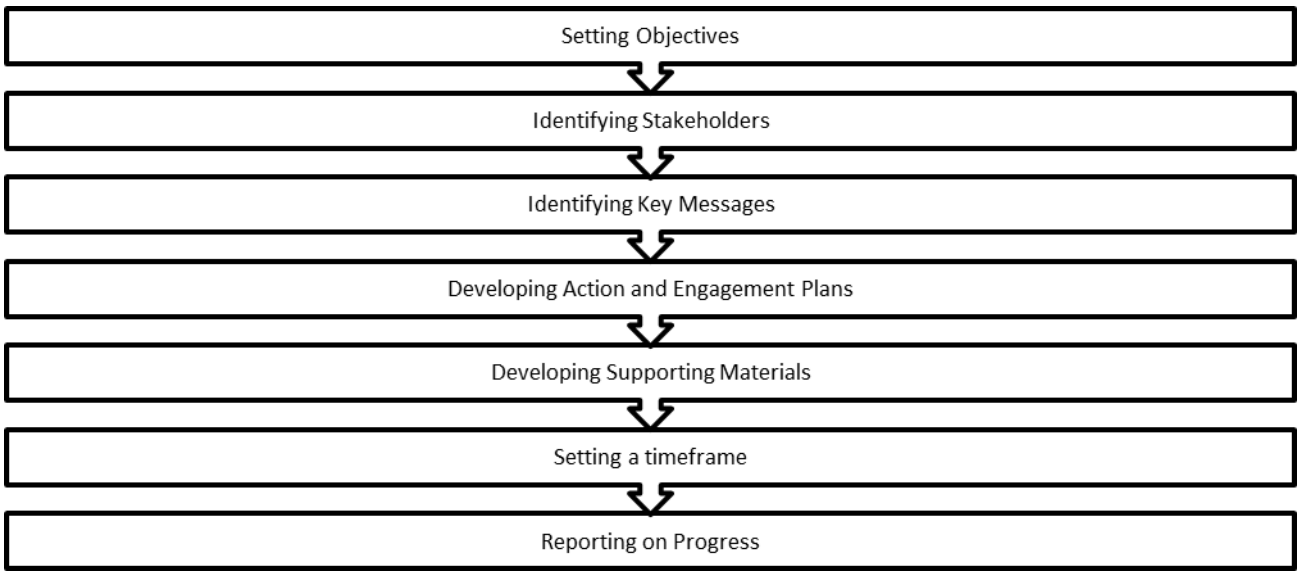

Figure 7-1 Steps involved in developing a communication Strategy

Communication strategies vary greatly depending on the type of non-drinking water system and the key stakeholders.

Communication strategies may include approaches to:

- Stakeholder consultation, such as:
  - Workshops – open and closed.
  - Interviews.
  - Papers and draft documentation.
  - Surveys, forms and ballots – written form, electronic and telephone.
  - Focus groups.
  - Public forums and citizen juries.
- Public communication, such as:
  - Open presentations.
  - Written form, electronic and telephone communication.
  - Public forums and citizen juries.
- Education programs and resources, such as:
  - Flyers.
  - Information on bills.
  - Website.
  - Apps.
  - Educational resources.
- Frequently asked questions.

The AGWR provides a number of examples of Communication Case Studies in *Appendix 7*.

8. Reporting and Auditing

8.1 General

It is a well-established principle of an ISO 9001 compliant quality system that there are processes and procedures in place for monitoring performance of an organisation's systems and procedures to ensure that compliance to internal procedures and policies, and external legislative and code requirements along with meeting customer needs is maintained. These processes should include an audit program, development of key performance indicators (KPIs), and measurement of operations against those KPIs, as well as appropriate reporting mechanisms both internal and external.

Evaluation, Audit, Review and Continual Improvement are also covered by Elements 11 and 12 of the AGWR and are fundamental in the practices of operating non-drinking water services.

Audit programmes and the output of various audits will be required by regulators at different times and for different purposes as a means of demonstrating compliance with the water industry entity or non-drinking water supplier's own plan and those approvals and licences obtained from the relevant regulatory authorities.

There is an expectation that the water industry entity or non-drinking water supplier will have in place some form of audit program and performance monitoring of its operations to ensure safe and manageable processes for employees and safe delivery of services and products to its customers.

8.2 Documentation (Record keeping)

Documentation and reporting of water quality achieved by non-drinking water systems is included in the AGWR as Element 10 and considered to be a support mechanism. Documentation of the operation, maintenance and management of a non-drinking water system provides evidence that the system is operating in a technically safe and reliable manner and in accordance with the licence and approval conditions.

Documentation (record keeping) is necessary for auditing purposes, and should include, as a minimum:

- Operational processes, procedures and protocols.
- Maintenance processes, procedures and protocols.
- Monitoring processes, procedures and protocols.
- Incident processes, procedures and protocols.
- Preventative measures and corrective actions.
- Schedules and timelines.
- Data and records management requirements.
- Responsibilities and relevant regulatory authorities.
- Internal and external communication protocols.

For further information on Documentation can be obtained from Chapter 2.10 of the AGWR *Documentation and reporting (Element 10)*.

8.3 Annual reporting

Annual reporting on non-drinking water systems can include external and internal reporting measures. External reporting measures are determined by the relevant regulatory authority in accordance with the licence and approval conditions.

Annual reporting for non-drinking water systems is typically required from DHA, EPA, ESCOSA, OTR and DEWNR (depending on the type of system).

Annual reporting provides information related to:

- Operational information.
- Quantities (volumes of non-drinking water).
- Connection information.
- Assets and infrastructure performance and modifications.
- Reporting against Water Quality Monitoring Plan (WQMP) (including discussion and interpretation).
- Operational performance (including incidents).
- Operational management changes.
- Audit information.
- Verification of the information (Certification).

Internal reporting measures are established by the water industry entity or non-drinking water supplier as a means of monitoring the performance of the non-drinking water system and service provided to identify any areas for opportunity.

8.4 Incident reporting

8.4.1 Non-compliance reporting

Incident reporting is required to be completed in accordance with the requirements included in the *EPA/DHA Water/Wastewater Incident Notification and Communication Protocol* and *OTR Water and Sewerage Infrastructure Incident Notifications and Communication Protocol*.

Incident reporting is also included in the annual reporting to the relevant regulatory authority as nominated in the licence or approval.

8.4.2 Asset or service failure incident reporting

In addition to non-compliance reporting, a water industry entity is required to report any significant performance event that impact on service standards or regulator obligations to ESCOSA. A significant performance event is defined as:

- A significant number of customers are affected for a lengthy duration, or there is reason to believe that a significant number of customers may have been affected for a lengthy duration.
- The event is likely to seriously impact on the water industry entity's ability to meet one of more of its annual service standard(s).
- ESCOSA needs to undertake a review to be confident that the water industry entity has complied with its obligations under the relevant industry Code(s).
- There is strong stakeholder interest, or there is anticipated to be strong stakeholder interest.

Further information is available at the ESCOSA website.

8.5 Auditing requirements and reporting

Non-drinking water systems should be audited to confirm that the activities and water quality performance are in accordance with licences and approvals.

Auditing of non-drinking water systems gather facts about the performance of the system, in terms of operation, maintenance and management against the nominated processes, procedures, protocols and regulatory obligations (Licences and Approvals).

The main purposes of an audit are to:

- Confirm compliance with licences, approval requirements and any other regulatory requirements.
- Contribute to improvement opportunities.
- Identify areas where value can be added.

Audits may be completed by an internal party as well as an external party depending on the requirements of licences and approvals. Where an external party is required, it is necessary that the party is an accredited, independent and third party person or company.

The general principles of ISO 19011 are often adopted when undertaking audits of non-drinking water systems. ISO 19011 is an international standard that provides guidance on auditing management systems, including the principles of auditing, managing an audit programme and conducting management system audits.

Following the completion of an audit, a full report documenting the findings of the audit should be available for review and where appropriate, action by the relevant person/s.

For further information on auditing of non-drinking water system can be obtained from Chapter 2.11 of the AGWR *Evaluation and Audit (Element 11)*.

Appendix A Relevant Authority Contact Details

Name	Office Address	Postal Address	Phone Number	Email / Website
Office of the Technical Regulator (OTR)	Level 8, ANZ Building 11 Waymouth Street ADELAIDE SA 5000	GPO Box 320 ADELAIDE SA 5001	08 8226 5500 0400 881 271 (Plumbing enquiries) 0475 826 663 (Infrastructure enquiries)	otr.plumbenquiries@sa.gov.au dsd.otrwsinfrastructure@sa.gov.au
Department for Health and Ageing (DHA)	Level 4, Citi Centre, 11 Hindmarsh Square ADELAIDE SA 5000	PO Box 6 RUNDLE MALL ADELAIDE SA 5001	08 8226 7100	HealthWastewaterManagement@sa.gov.au waterquality@sa.gov.au
Department of Environment, Water and Natural Resources (DEWNR)	81 – 95 Waymouth Street ADELAIDE SA 5000	GPO Box 2834 ADELAIDE SA 5001	08 8204 1910	http://www.environment.sa.gov.au/
Environment Protection Authority (EPA)	250 Victoria Square ADELAIDE SA 5000	GPO Box 2607 ADELAIDE SA 5001	08 8204 2004	epainfo@sa.gov.au
Essential Services Commission of South Australia (ESCOSA)	Level 1, 151 Pirie Street ADELAIDE SA 5000	GPO Box 2605 ADELAIDE SA 5001	08 8463 4444	http://www.escosa.sa.gov.au/
Department of Planning, Transport and Infrastructure (DPTI)	77 Grenfell Street ADELAIDE SA 5000	GPO Box 1533 ADELAIDE SA 5001	1300 872 677	http://www.dpti.sa.gov.au/
Department for Education and Child Development (DECD)	31 Flinders Street Adelaide SA 5000	GPO Box 1152 ADELAIDE SA 5001	08 8226 0091 (Asset Policy & Environmental Resources (APER) team)	https://www.decd.sa.gov.au/ DECD.PolicyComms@sa.gov.au
Primary Industries and Regions SA (PIRSA)	Level 14, 25 Grenfell Street ADELAIDE SA 5000	GPO Box 1671 ADELAIDE SA 5001	08 8226 0995	http://www.pir.sa.gov.au/
Local Government Association	LGA House 148 Frome Street ADELAIDE SA 5000	GPO Box 2693 ADELAIDE SA 5001	08 8224 2000	lgasa@lga.sa.gov.au

Appendix B Water Industry Entities Contact Details (Retail Suppliers of Non-drinking Water)

Name (Trading Name)	Contact Person	Address (Office)	Address (Postal)	Phone Number	Email	Website
Adelaide Hills Council	John McArthur	26 Onkaparinga Valley Road, Woodside SA 5244	PO Box 44, Woodside, SA, 5244	08 8408 0400	mail@ahc.sa.gov.au	www.ahc.sa.gov.au
Alexandrina Council	Gary Lyons	11 Cadell Street, Goolwa SA 5214	PO Box 21, Goolwa, SA, 5214	08 8555 7000	alex@alexandrina.sa.gov.au	www.alexandrina.sa.gov.au
Berri Barmera Council	Myles Somers	19 Wilson Street, Berri, SA 5343	PO Box 229, Berri, SA 5343	08 8582 1922	msomers@bbc.sa.gov.au	www.bbc.sa.gov.au
City of Charles Sturt	[redacted]	72 Woodville Road, Woodville, SA 5011	PO Box 1, Woodville, SA 5011	08 8408 1111	council@charlessturt.sa.gov.au	www.charlessturt.sa.gov.au
City of Port Lincoln	Manager Community Infrastructure	Level One Civic Centre 60 Tasman Terrace Port Lincoln, SA 5606	PO Box 1787, Port Lincoln, SA, 5606	08 8621 2300	plcc@plcc.sa.gov.au	www.portlincoln.sa.gov.au
District Council of Ceduna	Grant Drummond	44 O'Loughlin Terrace, Ceduna, SA 5690	PO Box 175, Ceduna, SA 5690	08 8625 3407	council@ceduna.sa.gov.au	www.ceduna.sa.gov.au
District Council of Copper Coast	Matthew McRae	51 Taylor Street, Kadina, SA 5554	PO Box 396, Kadina, SA, 5554	08 8828 1200	info@coppercoast.sa.gov.au	www.coppercoast.sa.gov.au
District Council of Elliston	Tim Mills	21 Beach Terrace, Elliston, SA 5670	PO Box 46, Elliston, SA, 5670	08 8687 9177	[redacted]	www.elliston.sa.gov.au
District Council of Yankalilla	Kim Vivian	1 Charles Street Yankalilla, SA 5203	PO Box 9, Yankalilla, SA, 5203	08 8558 0200	council@yankalilla.sa.gov.au	www.yankalilla.sa.gov.au
ERA Water and Water Philosophy	Colin Pitman	8 Paech Brothers Rd, Hahndorf SA 5245	PO Box 390, Hahndorf, SA 5245	[redacted]	colin@waterphilosophy.com.au	[redacted]
Light Regional Council	Adam Broadbent	73 Main St Kapunda SA 5373	73 Main St, Kapunda, SA, 5373	08 8525 3200	abroadbent@light.sa.gov.au	www.light.sa.gov.au
Mid Murray Council	[redacted]	49 Adelaide Rd, Mannum SA 5238	PO Box 28, Mannum, SA 5238	08 8564 6020	postbox@mid-murray.sa.gov.au	www.mid-murray.sa.gov.au
SA Water	Technical Services	250 Victoria Square, Adelaide SA 5000	GPO Box 1751, Adelaide, SA, 5001	08 7424 1360	technicalservicesinvestigations@sawater.com.au	www.sawater.com.au

NB: The following table provides the names and details of water industry entities at the time of publication.