

## 8. Recycled water quantity

Factors that influence the quantity of recycled water that can be supplied to a customer may include:

- total scheme output, including output from the wastewater treatment facility plus storage;
- seasonal variation in the output from the water recycling facility; and
- the quantity of recycled water that has been committed to other existing and future customers.

The quantity of recycled water that customers wish to take may also be subject to seasonal variation. For example, the volume of recycled water used for irrigation would reduce during high rainfall periods.

Both parties may have obligations in relation to recycled water quantity. For the supplier this may include providing a certain quantity of recycled water at a pressure or flow rate appropriate to the customer's particular use and application method. The customer may be required to take a minimum amount of recycled water so that the overall scheme recycling targets are met, or to restrict the daily volume taken or usage rate so that an acceptable level of service can be maintained for all customers during peak demand periods.

Service availability and volumes of use for each customer may be governed by a roster system or irrigation schedule. Roster systems rely on a high degree of cooperation between customers, which may need to be formalised by including them in the agreement. In the *Model recycled water agreement*, details of recycled water quantity, flow rate or pressure and restrictions on service availability are included in the Levels of Service item in the Particulars section.

### 8.1. Specifying the quantity to be supplied

The quantity of recycled water to be supplied may be specified by:

- **Fixed amount:** A common approach is to specify a fixed amount of recycled water, usually an 'annual amount' that is to be supplied over a particular period.
- **Agreed application rate:** For irrigation uses, the quantity of supply can also be expressed in terms of an application rate over a specified area, typically megalitres per hectare per year (ML/ha/year). The size of the irrigation area is specified in the agreement, the recycled water use management plan or equivalent plan.
- **Variable amount:** In other schemes, suppliers agree to provide a variable amount of recycled water calculated according to a formula that takes into account the irrigation schedule, seasonal conditions, land use, crop type, irrigation area and site conditions.

- **Fixed proportion:** Variability in the production of recycled water from STPs and other recycling facilities can make it difficult for a supplier to commit to providing a fixed amount on a daily or seasonal basis. Instead, the quantity available to each customer can be expressed as a fixed proportion or a share of the total water available in the scheme over the year, or as a proportion of the average dry weather flow from the treatment plant.
- **Unrestricted amount:** Where there is a surplus of recycled water supply relative to demand, the quantity may be specified as 'unrestricted' or available 'as required'.

The customer should satisfy themselves that the levels of service proposed by the supplier will provide a sufficient amount of recycled water at the times it is needed and that the flow rate or pressure is adequate for their particular application method. For example, a minimum pressure may be required to operate a spray irrigator and/or a certain flow rate sustained over several hours may be required to complete an irrigation event. If levels of service are critical to the effective use of the recycled water, minimum pressure and flow rate on a daily or hourly basis or the equivalent application rate (for example L/ha/day) can be specified in the agreement.

Suppliers must be confident that they can provide any fixed amount or flow rate before these are included in the agreement. This should be based on an assessment of peak demand across the system from existing and potential customers and the hydraulic capacity of the delivery system. If such an assessment has not been done, the supplier may seek a qualification that the quantity of recycled water available to the customer will be subject to fluctuations in the number of customers drawing from the system and their level of use. However, this level of service may be unacceptable to the customer.

The supplier will not be in control of all factors governing the production, delivery and demand for recycled water and should avoid an absolute obligation regarding quantity of supply. In most cases the supplier undertakes to use 'best endeavours' or 'reasonable endeavours' to provide the quantity and levels of service specified in the agreement.

### 8.2. Specifying the quantity to be used

Where year-round use of a high proportion of the available recycled water is very important to the supplier, agreements also commonly require customers to use their 'best endeavours' to take all of the recycled water allocated under the contract. This could be necessary to

enable a council to meet nutrient load targets in a Development Approval for the wastewater discharge from an STP to a waterway.

Minimum use provisions were included in agreements for several schemes in rural Victoria where the water authority had no other option for disposing of treated wastewater other than irrigation by customers and there was no storage capacity. Minimum recycled water use requirements can also result in a more consistent drawdown from the delivery system, which in turn can help prevent stagnation, water quality and odour problems.

The customer may be excused from an obligation to take a specified amount or portion of their allocated volume under certain circumstances, such as:

- where exceptionally high rainfall or cool conditions significantly reduce (irrigation) demand;
- where taking and/or using the recycled water could have adverse environmental or health impacts or could contravene the customer's recycled water use management plan; or
- an event beyond the customer's control prevents them taking the water.

Clause 10.3 (Minimum usage) of the *Model recycled water agreement* is an example of a clause providing for minimum use. This clause requires the customer to use 'best endeavours' to take the quantity of recycled water specified in the Levels of Service. Clause 17 (Force majeure) is an example of a clause dealing with events beyond the control of the customer or supplier (for example a natural catastrophe) that prevents either party from meeting an obligation under the agreement.

Another option is to include a requirement for the customer to notify the supplier as soon as possible if they anticipate they will not be able to use their allocated volume of recycled water.

### 8.3. Suspending or interrupting supply

Any agreement should include rights in favour of the supplier to suspend or cease the supply of recycled water as a result of circumstances beyond their control. These circumstances may include:

- a significant reduction in inflows to the wastewater treatment plant;
- a decline in water quality below the agreed specification;
- the imposition of a new environmental or health constraint, regulation or law that makes it unlawful to continue to supply or use recycled water for the particular purpose;

- the loss of the relevant permits or consents needed for the supplier or customer to operate;
- a natural catastrophe (for example storm, flood or fire), civil commotion, accident, strike or other incident beyond the control of the supplier; and
- power outages, damage to or breakdown in the treatment plant or delivery system.

Clause 9.1 (Reduction, interruption or discontinuance) of the *Model recycled water agreement* provides that in the above circumstances, the supplier is excused from their obligation to provide recycled water according to the Levels of Service, provided that the failure to supply did not occur because of a wilful or negligent act on the supplier's part.

The supplier should be able to temporarily suspend or disrupt supply to undertake essential repairs or maintenance on the treatment plant or delivery system.

Agreements often require that suppliers attempt to minimise the inconvenience of interruptions to customers. The agreement may require suppliers to consult with customers over the timing of planned service interruptions (for example for maintenance purposes) and to provide immediate notification of unplanned interruptions (see clause 9.2 (Notice) and 9.3 (Timing) of the *Model recycled water agreement*). Agreements may even specify arrangements for the supplier to provide an alternative water source such as a potable water service, if the problem is going to take a long time to fix.

Customers paying a price that is competitive with ground or surface water supplies or a potable water service, or who have made a significant capital investment in the recycled water scheme, may seek a service with comparable reliability to alternative sources. These customers may only agree to a clause permitting suspension or interruption of supply in more limited circumstances.

### 8.4. Delivery point

The delivery point is the point where the supplier's delivery system joins the customer's infrastructure. The delivery point is generally taken as the point where ownership of the recycled water and responsibility for any risks associated with its subsequent management or use transfer to the customer. Ownership is generally transferred at the delivery point regardless of whether the recycled water has been paid for or who actually owns the infrastructure or underlying land.

Agreements generally specify that recycled water is to be supplied to a delivery point. In many cases the delivery point will be the customer's property boundary. However, depending on the arrangement of delivery pipelines and storage facilities, the delivery point could also be somewhere else within the customer's site or on land owned by the supplier or a neighbour. Typically, a flowmeter is installed at or very close to the delivery point, to measure the customer's use of recycled water. This meter needs calibrating regularly as per the manufacturer's instructions and in accordance with *Australian Standards (AS 2001)* to achieve acceptable reliability and accuracy.

It is important to clearly specify the location of the delivery point. Generally, the supplier's obligations in relation to recycled water quantity, water quality and levels of service apply at this point, but no further downstream. A map or diagram of the scheme infrastructure that shows the delivery point is useful (annexure A in the *Model recycled water agreement*). The customer is usually responsible for the construction, operation and maintenance of infrastructure used to transfer, store, treat and apply the recycled water below the delivery point.



## 9. Recycled water quality

Recycled water quality is a key issue in negotiating recycled water agreements. The quality of the recycled water supplied to the customer has a significant bearing on the health and environmental risks involved in the scheme and management of these risks.

The quality of recycled water influences whether use for the customer's purpose at their particular site will be sustainable. For example:

- the quantities of salts or nutrients in recycled water used to irrigate a crop can affect soil structure and fertility in the long term;
- certain characteristics of recycled water affect infrastructure such as irrigation lines and pumps, or valves and storage vessels in industrial premises; and
- other characteristics may lead to deterioration of the recycled water if it is stored in outdoor lagoons or sits in transport pipelines for long periods.

Water quality characteristics may also influence the price that the supplier seeks to obtain for the recycled water or that the customer is willing to pay.

Suppliers have obligations under consumer protection and workplace health and safety legislation as well as common law that relate to the quality of the recycled water provided to customers. Suppliers who breach these laws may be subject to claims for damages or loss caused by the supply or use of the water.

The following sections outline key elements of the legislation relevant to recycled water quality and actions that suppliers can take to ensure compliance with these laws.

This section provides an overview of the consumer protection parts of trade practices law as it could relate to the supply of recycled water, in particular recycled water quality. It does not address all the elements of the various sections of the *Trade Practices Act 1974* (Cwlth) or the *Fair Trading Act 1989* (Qld). This is a complex area of law and the application of these Acts will vary depending on the entities involved and the nature of the particular transactions. For example, certain parts of the *Trade Practices Act 1974* may not apply to government entities, while the mirror provisions of the *Fair Trading Act 1989* may apply. The following is intended as background information only and should not be used as a substitute for legal advice.

Further information can be found in the following publications:

- *Summary of the Trade Practices Act 1974* (ACCC 2003a);
- *Consumer protection: conditions, warranties and refunds* (ACCC 2003b); and
- *Authorising and notifying collective bargaining and collective boycott issues* (ACCC 2004).

### 9.1. Trade practices laws

The *Trade Practices Act 1974* and *Fair Trading Act 1989* contain laws designed to protect consumers and promote fair trading of goods and services. The main areas that may be relevant to recycled water agreements include:

- misleading or deceptive conduct and false or misleading representations;
- implied conditions and warranties in contracts of sale; and
- product liability.

#### 9.1.1. Misleading and deceptive conduct and false or misleading representations

The *Trade Practices Act 1974* and *Fair Trading Act 1989* prohibit conduct by business that is misleading or deceptive or is likely to mislead or deceive. Broadly speaking, conduct could be considered misleading if it is likely to mislead the target audience. Misleading conduct could include silence, for example failing to tell customers about something they would reasonably expect to be told.

False and misleading representations are also prohibited. They occur when a person makes statements that are wrong, untruthful or misleading about things such as:

- the standard, quality or value of goods or services, for example the quality of the recycled water;
- the price of goods or services;
- the sponsorship, approval or performance characteristics of goods or services supplied;
- the customer's need for any goods or services; and
- the existence, exclusion or effect of any condition, warranty, guarantee, right or remedy available to consumers.

Breach of the laws on misleading and deceptive conduct and false representations may result in investigation and legal action by the ACCC or the Office of Fair Trading, or private action from an aggrieved third party.

#### 9.1.2. Implied conditions and warranties

The *Trade Practices Act 1974* implies various conditions and warranties into contracts for the sale of goods and services to consumers. A seller cannot exclude, restrict or modify these statutory rights. Therefore, only conditions that are consistent with the Act should be included in contracts where the implied conditions and warranties apply. Generally, a person, whether an individual or a company, acquires goods or services as a consumer if:

- the goods or services are of a type normally bought for personal or household use; or

- the goods or services cost \$40,000 or less, provided the goods are not acquired for commercial use to produce, repair or treat other goods.

While it is arguable, that councils and other local government bodies are not bound by the provisions of the *Trade Practices Act 1974* and that the provisions may not apply to certain transactions, it is best to ensure compliance. The *Sale of Goods Act 1896* also contains similar laws on implied conditions and warranties.

The relevant conditions that are implied into a contract for the supply of 'goods' (in this case recycled water) are that they should:

- be of **merchantable quality**: meet a basic level of quality and performance that would be reasonable to expect, having regard to their price and the manner in which they are described;
- be **fit for their purpose**: the goods are suitable for any particular purpose that the customer made known to the supplier when negotiating to buy them, or a purpose that is obvious from the circumstances in which the sale took place; and
- **meet their description**: where goods are supplied by description, they must correspond with the description provided.

If any one of the conditions is not satisfied, the customer has the right to cancel the contract, get a refund and seek compensation from the supplier for any loss or damage suffered.

The *Trade Practices Act 1974* implies warranties into contracts for the supply of services to consumers. These may apply to suppliers providing recycled water services. In essence, services must be carried out with due care and skill and any materials supplied in connection with those services must be reasonably fit for the purpose for which they were supplied. A breach of this warranty entitles the customer to sue for damages.

#### Tips for suppliers negotiating a recycled water management agreement

- Use plain language when communicating with customers.
- Highlight important information for customers.
- Before signing an agreement, provide customers with all relevant information about the source and quality of the recycled water, the treatment and delivery systems used to supply the recycled water and its water quality characteristics. This will assist the customer to make an informed decision about

the suitability of the recycled water for their intended purpose and whether the potential risks associated with its proposed use are acceptable.

- If you are aware of any defects or contaminants in the recycled water, point them out to the customer before entering into the contract. There is an ongoing obligation for the supplier to disclose any relevant information about defects that come to light during the term of the agreement.
- Provide the customer with a recycled water quality specification based on water quality characteristics relevant to their particular end use (see section 9.4). Ensure that this specification is based on adequate quality-assured monitoring data.
- Explain to customers that the quality of recycled water sometimes varies in nutrient levels and/or other contaminants. Before entering into a recycled water agreement, fully disclose information about any contaminants in recycled water that could be expected to occur and that may impact on the environment, health or recycled water infrastructure. Provide information on the nature of the impact (for example chronic or acute effects) and any actual or indicative monitoring data on the levels of contaminants in recycled water. Explain that while you have given information about contaminants that are typically in recycled water, there may be other contaminants you are not aware of.
- If you think that a customer misunderstands the information or terms of the agreement, clarify their understanding. For example, if a customer thinks the water would be suitable for a particular use and you know that this is not the case, correct the misunderstanding.
- If the customer insists on using recycled water for a purpose for which you know it is not suited, the supplier should make it clear to the customer that the water is not suitable for this purpose. Make written notes of your discussions and send a letter to the customer confirming your position. Require the customer's formal agreement to only use the recycled water for the specific use that you have discussed and agreed upon as being a suitable use for the recycled water. While service providers cannot be held responsible if the result is unsatisfactory because the customer insisted on having the service carried out in a particular way or with particular materials, it is wise to seek legal advice prior to entering into a contract with such a customer.
- When discussing pricing of recycled water, make sure the customer has enough information to assess the full cost.

- Provide relevant information to your customers as it becomes available (for example pass on new information about water quality and risks, provide regular reports or summaries of water quality and environmental monitoring).
- Be open and honest. Put yourself in your customer's position – if you would want to know about something in relation to the quality of the recycled water, tell them about it.
- If an existing customer asks permission to use the recycled water for a purpose other than the use permitted under the agreement, make sure you establish whether the water is suitable for this new use and that any further risks are disclosed. The supplier may elect to approve this alternative use in writing (see clause 10.1 (Use) of the *Model recycled water agreement*). The agreement, and where appropriate the recycled water use management plan (see section 11), should be amended to reflect the alternative use.
- Do not make statements such as: 'no responsibility for loss or damage'. Seek legal advice regarding the application of the implied conditions and warranties to recycled water agreements and the extent to which liability can be limited.

### 9.1.3. Product liability (defective goods)

Under Part VA of the *Trade Practices Act 1974*, a person who is injured, or whose property is damaged, by a defective product may have a right to compensation by the manufacturer of the product. Goods are considered defective if their safety is 'not what persons are entitled to expect'. Factors that can be taken into account in determining whether goods are defective include the manner in which they are marketed, instructions or warnings that accompany the goods and the time that has elapsed since the supply of the goods. The provisions relating to manufacturers' liability for defective goods cannot be restricted, excluded or modified by contract.

As with implied warranties (previous section), it may be argued that councils and other local government bodies are not bound by these provisions of the *Trade Practices Act 1974*. Similarly, it is possible that recycled water would not be considered a 'manufactured' good under the Act. Notwithstanding this, it is best to ensure compliance and seek legal advice.

Manufacturers incur liability when a customer or another individual suffers injuries as a result of the supply of defective goods. If an individual is injured or dies, manufacturers may also be liable to compensate any other person who has suffered loss as a result of the

injuries or death of the individual. The manufacturer's liability extends to domestic or household-type goods, land and buildings or fixtures that are destroyed or damaged as a result of the use of the defective goods (provided these were for private use). Under the *Trade Practices Act 1974*, affected parties may make claims for damages or compensation for death or personal injury due to defective goods, subject to certain limitations.

Tips for suppliers outlined in the previous boxes are suggestions that may assist suppliers to minimise their risk of liability under the defective goods provisions of the *Trade Practices Act 1974*. Independent legal advice should be sought by suppliers of recycled water on these issues.

## 9.2. Ensuring recycled water is 'fit for purpose'

Ensuring that recycled water is fit for the purpose for which the customer intends to use it is an important supplier responsibility, with implications for treatment, storage and distribution. The appropriate quality of recycled water will depend on the customer's particular end use, site characteristics and risk factors.

The supplier of recycled water and potential customers should, at an early stage in the development of the water recycling scheme, discuss the proposed use/s of the recycled water and agree on what the actual use will be. It is a joint decision as to whether the recycled water is suitable for the customer's desired purpose, and this decision should be based on the best available information.

The *Queensland Water Recycling Guidelines* describe five classes of recycled water. Classes of recycled water are largely based on microbiological characteristics and provide an indication of the level of the treatment processes used and the human health risks associated with its use. Table 1 describes the five classes of recycled water.

Both suppliers and customers should become familiar with the information in the *Queensland Water Recycling Guidelines* on the classification system for recycled water and about water quality characteristics of recycled water from different sources and treatment processes. Relevant industry codes of practice and other documents that identify water quality requirements for particular end uses, for example the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000), should also be consulted.

Once the parties have agreed to the customer's intended use for the recycled water, this use should be clearly stated in the recycled water agreement. In the *Model recycled water agreement*, this is referred to as the 'Permitted Use'. The *Model recycled water agreement* also suggests that the customer may not use the recycled

**Table 1: Description of the five classes of recycled water**

Class of Recycled Water	Description
Class A+	No pathogens should be detectable. Safe for many uses other than those involving human consumption.
Class A	Very low levels of microbiological indicators. Safe for most end uses, including those that could involve occasional human contact.
Class B and Class C	Only to be used with appropriate control measures in place.
Class D recycled water	Has the lowest microbiological quality with very limited number of recommended uses.

water for any purpose other than the agreed use without the supplier's written consent (clause 10.1 (Use)). Fresh consultation with the supplier is necessary to determine if the recycled water is suitable for any alternative use. For example, a customer using recycled water to irrigate sugar cane (Class C water is the minimum recommended quality) may wish to convert to tropical fruit production. The supplier's treatment facility may not produce the higher quality recycled water (Class A+) typically required for irrigating non-processed edible food crops.

Under clause 8.1 (Acknowledgement) of the *Model recycled water agreement*, the customer acknowledges that the recycled water is not fit for potable purposes, and is only suitable for the 'Permitted Use' under the conditions set out in the agreement. Other unsuitable uses for the recycled water could also be specified depending on the class of recycled water provided.

### 9.3. Disclosing relevant information

Recycled water suppliers should provide all relevant information to enable the customer to understand the quality of the recycled water and make an informed decision about whether it is suitable for their intended purpose and that the potential risks associated with its use are acceptable.

The information provided by suppliers should aim to show that the recycled water is 'fit for purpose' and is of 'merchantable quality' and satisfies the requirements for 'relevant information' under the *Workplace Health and Safety Act 1995* (see section 10.2). This could include details about:

- the source of recycled water (for example an STP or other wastewater treatment facility, stormwater or rainwater);
- the treatment processes used to produce the recycled water and the contaminants removed by these treatment processes;
- the reliability of the treatment processes and the type of defects in the recycled water that would result if the treatment process failed;
- long-term monitoring data to demonstrate that the treatment processes reliably produce recycled water of a given quality;

- the proportion and type of trade waste or other inputs to the treatment facility, which could affect levels of particular contaminants in the recycled water;
- any tests to determine the presence or levels of trace contaminants in the recycled water;
- health hazards associated with any contaminants in the recycled water;
- potential adverse environmental impacts of using recycled water and contaminants of environmental concern;
- potential adverse impacts of recycled water use on infrastructure or assets; and
- precautions for the safe use of recycled water in the workplace or to protect the general public (for example general precautions outlined in the *Queensland Water Recycling Guidelines*).

Suppliers cannot reasonably be expected to know the concentrations of all contaminants in the recycled water that could possibly have adverse health or environmental impacts at the customer's site. Knowledge about trace contaminants constantly evolves. The supplier should be open and honest in disclosing all relevant information they have when the agreement is being negotiated and should pass on new information about recycled water quality and risks as it becomes available. They should also keep abreast of current research and knowledge relating to the safe use of recycled water.

### 9.4. Recycled water quality specification

Including an accurate and detailed water quality specification in the recycled water agreement can benefit the supplier and customer by ensuring that the expectations of both parties are appropriate. Descriptions such as 'secondary undisinfectated effluent' or 'disinfectated treated effluent' do not provide sufficient indication of fitness for purpose or potential health or environmental risks of the recycled water.

#### 9.4.1. Developing the specification

The water quality characteristics included in the specification should be selected jointly by the parties to ensure that they

are relevant to the customer's intended use. This could include water quality characteristics that could affect:

- potential human or animal health risks;
- potential environmental impacts on or off-site;
- the long-term sustainability of use at the customer's site; and
- the life or effectiveness of the customer's recycled water infrastructure.

The starting point for a recycled water specification should be the microbiological class specified in the *Queensland Water Recycling Guidelines*. Table 2 provides a list of other water quality characteristics that can be important in determining the suitability for particular end uses of recycled water. This list is intended to provide a starting point for discussions between suppliers and

customers concerning the recycled water quality and, where necessary, be a guide for further testing of the recycled water.

A common practice in current water recycling agreements is to adopt the discharge water quality characteristics and concentration limits set in the Development Approval from the STP, or other wastewater treatment facility, as the recycled water quality specification. However, it needs to be recognised that such licence limits reflect wastewater quality characteristics relevant to the health of aquatic ecosystems (for example nutrients, suspended solids or organic content as represented by biochemical oxygen demand), which are not necessarily the same parameters that determine the safety and sustainability of recycled water for a particular end use.

**Table 2: Characteristics of recycled water from sewage treatment plants relevant to sustainable use of recycled water.**

Recycled water use or system configuration	Recycled water quality characteristics	Potential environmental, operational or productivity impacts
Irrigation of crops/grasses (all types)	Total Dissolved Solids (TDS) <sup>1</sup> or Electrical Conductivity (EC) Sodium Adsorption Ratio (SAR) <sup>2</sup> Boron Chloride pH, water hardness Nutrients  Nitrate (No <sub>3</sub> <sup>-</sup> )	Soil structure and soil fertility Salinisation of soil and groundwater Damage to plant growth Damage to foliage Corrosion/fouling of pipes & fittings Bioclogging of irrigation equipment Eutrophication from nutrient enriched runoff to waterways Leaching through soils and contamination of groundwater
Long distribution system and/or retention times	Biochemical oxygen demand (BOD) or suspended solids/turbidity	Odour problems, biofilm (slime) growth in pipes and storage tanks
Recycled water stored in lagoons	Nutrients	Algal blooms in storages
Significant trade waste inputs	Heavy metals Pesticides and stable organic compounds	Acute toxicity to some plants Accumulation of toxicants in the food chain
Pasture irrigation, cattle shed washdown	Helminths	Tapeworm infection in livestock
Environmental purposes (for example wetlands) <sup>3</sup>	Nutrients BOD  Temperature, Chlorine, Ammonia	Algal growth Oxygen depletion in receiving waters, leading to death of aquatic organisms Harmful to fish and other organisms
Recreational purposes – ornamental water bodies and passive recreation (no swimming or boating)	Aesthetics Nutrients	Clarity, colour, oil and grease, debris Algal growth & blooms affecting aesthetic qualities and biological health

<sup>1</sup> TDS is a measure of the inorganic and dissolved solids such as sodium, calcium, magnesium, iron, chloride, sulphates, bicarbonate, nitrates and phosphates.

<sup>2</sup> SAR is the ratio of sodium ions (Na<sup>+</sup>) relative to calcium (Ca<sup>2+</sup>) and magnesium ions (Mg<sup>2+</sup>) in the soil solution. SAR indicates the potential for sodium to accumulate in the soil.

<sup>3</sup> Recycled water characteristics important for environmental and recreational purposes are highly site specific depending on the receiving water quality (environmental values).

The concentration and range of contaminants in recycled water can vary. Examples include microbial pathogens and contaminants that come into the treatment plant in irregular trade waste discharges. This variability makes it difficult to set an absolute concentration limit for many water quality parameters. Accordingly, recycled water quality limits are usually expressed as the percentage of time or the percentage of samples taken that are below a certain concentration limit. For example, a 50-percentile limit is the concentration of the parameter that must be met at least 50 percent of the time. A 95-percentile limit is a more stringent standard: it is the concentration limit that has to be met 95 percent of the time. Averaging limits recognises the variability in the performance of treatment processes and quality of inflows to the treatment plant and give the supplier some leeway in meeting acceptable recycled water quality.

The supplier should be careful not to give an absolute guarantee or warranty for a particular recycled water quality specification. The terminology used in the *Model recycled water agreement* is that the supplier will use ‘best endeavours’ to meet the water quality specification. A qualification is often also included that compliance with Development Approval discharge limits takes precedence over the recycled water quality specification.

The supplier’s treatment process may have no capacity to remove certain water quality parameters of interest to the customer. For example, conventional treatment processes do not remove salts, which is an important parameter for most irrigation uses. A compliance limit will not usually be included in the recycled water specification for such parameters, although it may include, for information purposes only, an average concentration and/or a concentration range for the parameter derived from previous monitoring by the supplier. The supplier may be required to monitor levels of such parameters on an ongoing basis and to provide the results of this monitoring to the customer.

One possible format for a recycled water specification is included as annexure B (Water quality specification) in the *Model recycled water agreement*. It is important that suppliers ensure that any classifications and descriptions of recycled water in the recycled water agreement are accurate. That is, they are based on sufficient quality - assured monitoring data. Care should also be taken to ensure that the classifications and descriptions are consistent between the agreement and the recycled water management plan or equivalent plan. This may be relevant to trade practices laws relating to ‘sale by description’ and ‘misleading conduct’ (see section 9.1).

Another important provision in relation to recycled water quality specifications is that the supplier takes no responsibility or liability for any changes in recycled water

quality that occur below the delivery point. It is appropriate that the customer takes responsibility for managing recycled water quality, including storage, on their site.

#### 9.4.2. Notification limits

The recycled water quality specification can also include ‘notification limits’ for certain water quality parameters. This means that if any single sample exceeds this concentration limit, the customer is immediately notified of the result. If a notification limit is exceeded, the supplier may also be required to promptly investigate whether there is an underlying problem with the treatment processes and report back to the customer about any findings or actions taken. Clause 8.6 (Adverse results) of the *Model recycled water agreement* provides an example.

The aim of notification limits and procedures is to inform customers as soon as possible when monitoring indicates a significant departure from the desired recycled water quality. The notification limit for a particular parameter will generally be higher than the corresponding long-term or average concentration limit in the water quality specification.

Notification limits and related procedures may not be relevant for all water quality parameters and water recycling schemes. They are likely to be appropriate in situations where:

- a short-term increase in the concentration of a water quality parameter could have an immediate (acute) environmental or health impact at the customer’s site;
- water quality parameters are frequently monitored (for example on a daily basis or continuously such as for chlorine or turbidity); and
- the key treatment process is a biological system that could be temporarily affected by trade waste or other inputs that kill the micro-organisms that help treat the wastewater. In such systems, a general indicator of the activity or ‘health’ of the micro-organisms involved in breaking down the wastes can be a proxy for elevated levels of a range of potentially dangerous contaminants in the recycled water (for example from an illegal pesticide dumped into the sewer).

If the customer is aware that the recycled water they recently received, or are about to receive, may be of poor quality, they may be able to take precautionary action to minimise any adverse effects. For example, they could store the poor quality recycled water and dilute it with water from another source before use, or apply the recycled water more sparingly than usual.

Notification limits and procedures are less relevant for parameters that are infrequently monitored (for example on a monthly or longer basis) because it will be unclear

for how long levels of the parameter have been elevated and whether preventative measures by the customer will be effective. They are also less useful if the potential adverse impacts of a particular contaminant result from the overall load applied to the soil or otherwise used at the customer's site over a long period (that is the contaminant has a chronic impact). However, even for these parameters, the customer may be interested in the number of times an upper 'notification' or 'trigger' limit was exceeded over a longer period such as a year.

#### 9.4.3. Monitoring requirements

To demonstrate compliance with any agreed water quality specification and for quality assurance purposes, the supplier has an obligation to monitor recycled water quality. Developing the water quality specification will therefore typically involve agreeing on a set of water quality parameters, average concentration and/or notification limits and a monitoring program. The Water Quality Specification in the *Model recycled water agreement* (annexure B) includes monitoring frequencies and sampling locations for each of the parameters selected.

Locations and frequencies for all monitoring associated with the scheme, including final water quality, the status of treatment processes and environmental or health-based indicators, should also be set out in the recycled water management plan.

The minimum monitoring requirements of the supplier are outlined in the recycled water quality specification (see annexure B of the *Model recycled water agreement*). These monitoring requirements should form part of the recycled water agreement even if a recycled water management plan has not yet been prepared.

When designing and describing the monitoring regime the following factors should be addressed:

- accurate description of the monitoring location for each parameter. Parameters that are important in determining the safety of final use of the recycled water (such as microbiological indicators and chlorine residual) ideally should be monitored at or as close as possible to the customer's delivery point. This is rarely practical due to the large distances between individual customer delivery points and the treatment facility. Recycled water is often monitored at the outlet from the treatment facility or the outlet from a final wastewater storage lagoon into the distribution system.
- variability of recycled water quality between the monitoring point indicated in the water quality specification and the customer's delivery point. For example, storing recycled water in an uncovered dam downstream of the monitoring point could lead to a degradation in water quality as a result of

eutrophication or contamination by bird or animal - derived faecal matter. If the recycled water has a long residence time in the distribution system, this could lead to stagnation, bacterial regrowth and odour problems. As noted in section 9.1, to avoid implications under the misleading conduct provisions of trade practices law, any potential defects in the recycled water should be disclosed to the customer prior to entering into the agreement. Factors that could cause recycled water quality to deteriorate between the monitoring point and customer's delivery point should also be disclosed to the customer, although it may not be necessary to include these factors in the agreement.

- monitoring locations must be appropriate to the particular parameter and not produce misleading data. For example, it is not generally appropriate to monitor microbiological indicators such as E. coli levels at the outlet of storage lagoons because levels can be affected by contamination with animal and bird sourced faecal matter (for example from ducks) in the lagoon. The reliability of E. coli as an indicator of disinfection efficiency is thereby reduced.
- regular reporting of monitoring data to the customer. This is best done as a formal report provided on a regular basis. The supplier should also provide results of any specific water quality testing to the customer at any time upon request. Under clause 12.1 (Annual report) of the *Model recycled water agreement*, the supplier must provide the customer with an annual report that includes the results of water quality monitoring undertaken to determine compliance with the water quality specification.
- where the customer requires very high quality recycled water (for example Class A+ water for irrigation of non-processed edible crops or water of a very specific chemical composition for an industrial use), a requirement could be included for an independent audit to be carried out at specified intervals to determine or verify the supplier's performance in meeting the water quality specification. For the customer, such a provision will ensure a higher level of quality assurance and transparency of monitoring data.

## 10. Compliance with legislation

Suppliers and customers must use recycled water safely and comply with laws relating to trade practices, environmental protection and public and occupational health. Those laws include:

### Queensland legislation

- *Water Act 2000*;
- *Health Act 1937*;
- *Workplace Health and Safety Act 1995*;
- *Environmental Protection Act 1994*;
- *Integrated Planning Act 1997*;
- *Fair Trading Act 1989*;
- *Food Act 1981*; and
- *Sale of Goods Act 1896*.

### Australian Government legislation

- *Trade Practices Act 1974*.

Relevant obligations under these Acts are outlined in chapter 2 of the *Queensland Water Recycling Guidelines*. Trade practices law is discussed in detail in section 9.1 of this Manual. This section gives an overview of key provisions in the legislation relevant to managing environmental and health risks in recycled water schemes.

Clause 11 (Compliance with laws) of the *Model recycled water agreement* requires parties to comply with all laws, including section 319 (General environmental duty) and section 320 (Duty to notify environmental harm) of the *Environmental Protection Act 1994*. It also recommends compliance with the *Queensland Water Recycling Guidelines* as 'best practice', although this is not a legal requirement and could be included if both parties agree it is a useful provision.

*The Reclaimed Water Agreement Manual* (Di Carlo & Sherman 2004) provides a detailed discussion of common law obligations in relation to the safe use of recycled water, particularly in the areas of negligence, nuisance and trespass.

### 10.1. General environmental duty and duty to notify

The *Environmental Protection Act 1994* states that we all have a general environmental duty. This means that we are all responsible for the actions that we take that affect the environment. To decide what meets your general environmental duty, you need to consider:

- the nature of the harm or potential harm;
- the sensitivity of the receiving environment;
- the current state of technical knowledge for the activity;

- the likelihood of successful application of the different measures that might be taken; and
- the financial implications of the different measures as they would relate to the type of activity.

If you become aware of serious or material environmental harm being caused by an activity you are involved in, you have a duty to report that harm, unless the harm is authorised (such as under an environmental protection policy, an environmental management program, an environmental protection order, or an authorisation or direction from an authorised person in an emergency). This is the duty to notify environmental harm. If you fail to fulfil this duty it is an offence and you can be prosecuted (refer to EPA Prosecution Guidelines).

To determine how you can meet your obligations to fulfil the general environmental duty (s319), duty to notify (s320) and other relevant provisions, refer to the *Environmental Protection Act 1994*.

### 10.2. Workplace Health and Safety Act 1995

Under the *Workplace Health and Safety Act 1995*, recycled water is considered to be a 'substance', and as such, a person in control of a workplace has an obligation to ensure that the substance is 'used properly' (section 15). A substance is not used properly when it is used without regard to available appropriate information or advice about its use.

Employers also have a general obligation to ensure the health and safety of their employees, themselves and other persons who may be exposed to risks arising out of the conduct of their business. This obligation may include one or more of the following:

- conducting a hazard identification and risk assessment;
- providing and maintaining a safe and healthy work environment;
- ensuring safe use, handling, storage and transport of substances;
- ensuring safe systems of work; and
- providing information, training and supervision to ensure health and safety.

The employer obligations under the *Workplace Health and Safety Act 1995* apply to all workplaces, including those where recycled water is used or produced.

Under section 34 of the *Workplace Health and Safety Act 1995*, a manufacturer or supplier of a substance for use at a workplace has an obligation to ensure that the substance:

- is safe and without risk to health when used properly;
- is tested and examined to ensure it is safe and without risk to health when used properly; and
- is accompanied by relevant information, when supplied to another person.

‘Relevant information’ means information that clearly identifies the substance, and specifies:

- (a) any precautions that must be taken for the safe use of the substance;
- (b) any health hazards associated with the substance; and
- (c) the results of any tests carried out for the substance that are relevant to its safe use.

Suppliers of recycled water should provide their customers with all relevant information about possible contaminants in recycled water that could cause harm to human health as a result of the use of the recycled water. This should include appropriate advice on how the recycled water can be safely used. In any event, water suppliers should disclose this information to meet their trade practices obligations (see section 9.1).

### 10.3. Legal liability

Compared to traditional methods of wastewater treatment and discharge to waterways, new and less familiar risks can be associated with water recycling schemes. The main adverse impacts or risks that could potentially arise from the supply and use of recycled water include:

- environmental damage;
- impacts on the health of the general public, employees and neighbours; and
- harm to animals or food safety.

There is a perception, particularly among suppliers, that water recycling schemes have opened up avenues of legal liability due to the potential for harm or loss from the supply and use of recycled water. The main potential sources of liability are:

- liability for statutory offences under environmental protection, workplace health and safety and human and stock health legislation. Suppliers and customers of recycled water could face prosecution from enforcement agencies such as the EPA;

- liability under the common law of nuisance and negligence. Suppliers and customers could be liable for damages to third parties such as adjoining landowners or consumers of products derived from recycled water use (*The Reclaimed Water Agreement Manual* (Di Carlo & Sherman 2004) provides a detailed discussion of negligence and nuisance);
- liability for damages for breach of express terms of the contract for the supply and use of the recycled water (discussed in section 14);
- liability of suppliers for breach of implied terms of contract, for example implied conditions that goods are ‘fit for purpose’, are of ‘merchantable quality’ and must ‘meet their description’ (discussed in section 9.1);
- liability of suppliers under the fair trading laws, including provisions relating to misleading and deceptive conduct and supply of defective products (see section 9.1); and
- liability for breach of statutory duties. Recycled water suppliers who are statutory authorities can be liable for damages if they fail to carry out a particular duty in relation to the supply of recycled water (for example, as under the *Water Act 2000*).

#### 10.3.1. Measures to limit liability

The key for both suppliers and customers of recycled water is to minimise risks and avoid harm or damage from occurring in the first place. This requires having an effective management system to identify and control risks, such as a recycled water management plan prepared in accordance with the *Queensland Water Recycling Guidelines*.

Measures for limiting legal liability in water recycling projects can be incorporated in the recycled water agreement. Each party should consider the liabilities and measures to limit those liabilities specific to their project and obtain their own legal advice.

The following measures for reducing risks and legal liability are discussed separately in this Manual:

- recycled water management plans (section 11);
- exclusion and indemnity clauses (section 12); and
- public liability insurance (section 13).

## 11. Recycled water management plans

The preparation of recycled water management plans as described in this Manual and in the Queensland Water Recycling Guidelines is currently **not** a mandatory or regulatory requirement for water recycling schemes in Queensland.

Recycled water management plans are suggested as a risk assessment and risk management tool to assist in the prevention of health and environmental impacts arising from business activities using recycled water.

The Plans should cover all stages of a recycled water scheme from the production to the use of recycled water and address both human health and environmental hazards. The Hazard Analysis and Critical Control Point (HACCP) process is the preferred method to develop the plans. HACCP is a systematic approach to hazard identification, risk assessment and control. Chapter 4 of the *Queensland Water Recycling Guidelines* outlines the main steps involved in the HACCP process and its application to preparing recycled water management plans.

The *Model recycled water agreement* refers to two management plans:

- the Recycled water *supply* management plan (annexure C). Typically this will encompass the STP or other wastewater treatment facility (for example at a meatworks, sugar mill or factory) and the wastewater inputs to this facility, central storage facilities for recycled water and distribution pipelines, pumping stations and associated infrastructure. The supplier's plan will demonstrate that they are capable of reliably providing recycled water that is fit for the intended purpose at the agreed levels of service.
- the Recycled water *use* management plan (annexure D). Typically this encompasses the infrastructure and activities associated with the final use of recycled water and may also include distribution pipelines and storage or re-treatment facilities on the customer's site. It addresses on and off-site environmental and health impacts. The customer's plan will demonstrate that they have identified foreseeable on and off-site environmental risks and impacts to community health and amenity from the use of the recycled water at the site and have put in place reasonable steps to control these risks.

The distinction between customer and supplier systems, for the purposes of developing management plans, is not always clear. For example, a supplier may build and operate a lagoon inside the property of one customer and this lagoon is used to store recycled water for several

scheme participants. Alternatively, a customer's off-take could be from a section of pipeline owned and maintained by another customer. A split should be made on the basis of who is primarily responsible for operating and maintaining the relevant infrastructure.

Management plans are living documents that should be reviewed on an ongoing basis in response to information obtained from the operation of the scheme and new knowledge about risks and control measures or changes to guidelines or regulations. For example, it may be appropriate for the supplier to reduce the frequency of monitoring *E. coli* in recycled water and instead introduce on-line turbidity monitoring if this proves to be a more useful indicator of disinfection efficiency. However, regulatory requirements for monitoring in EPA licences or other Development Approvals must be complied with.

Ideally the recycled water management plans should be incorporated in the recycled water agreement and each party should commit to comply with their respective plan. To achieve this, the plans would need to be developed in parallel with negotiation of the agreement and attached to the agreement before it is signed.

### 11.1. Supplier's management plan

Where water recycling facilities operate under an existing management system, such as an ISO 9000-style quality management system or an ISO 14001-style environmental management system, the operating procedures and monitoring regime developed through the HACCP process should be integrated into these existing systems, so as to minimise the number of operational plans that the supplier's employees and contractors are required to use.

Many existing recycled water agreements require the development of a management plan for the customer's site, but it has not been standard practice to include a complementary plan for the supplier's system. However, this is a way for the supplier to communicate and manage risks and improve transparency. It also recognises that managing risks in water recycling schemes is a joint responsibility of the supplier and customer.

Modification of the supplier's plan may be required if there is a significant change to the treatment or delivery system, for example if the quality of the recycled water is significantly improved through a treatment upgrade or a recycled water storage dam is constructed.

### 11.2. Customer's management plan

Customers may have existing risk management plans such as Site-Based Management Plans, Irrigation Management Plans, Environmental Management Plans, Environmental

Improvement Plans or Farm Management Plans. These types of plans have tended to focus on irrigation-based uses and management of environmental risks and natural resources (such as surface water and groundwater and soils).

A recycled water management plan is broader in scope than these traditional plans and includes risks to human health, workplace health and safety and all components of the customer's recycled water system (not just application of the water). With the addition of risk assessment and the inclusion of human health considerations, the more traditional plans could be adapted to function as a recycled water management plan.

In several schemes in Queensland, the supplier has taken the lead role in developing the customer's or recycled water 'use' management plan. This has taken the form of contributing expertise or advice, providing templates for irrigation management plans and in some cases preparing the plan on the customer's behalf with their final approval. In contrast, in some Victorian agricultural irrigation schemes, recycled water customers had primary responsibility for preparing management plans and carrying out regional and on-site environmental monitoring. Whichever approach is taken, it is important that the customer has a sense of ownership and a commitment to implement the plan.

It is also important that the people involved in day-to-day operations at the customer's site are involved in preparing the plan, to ensure that control measures are practical and cost-effective. If the controls are too onerous or complex or it is difficult to verify that they have been implemented, the recycled water customer or their employees and contractors may be less inclined to observe them.

### 11.3. Modification of recycled water management plans

Either the supplier's or the customer's recycled water management plan may need to be modified in the following circumstances:

- if the quality of the recycled water is significantly improved, for example through an upgrade of the STP or a program that reduces trade waste contaminants in plant inflows;
- if the customer's intended use of the recycled water, including the crop grown (refer to clause 10.1 (Use) of the *Model recycled water agreement*), were to change;
- if there were a change in the extent or location of recycled water use at the customer's site;
- if the customer installs a facility to further treat recycled water at their site; and

- if there is a major change to the method of applying recycled water, for example conversion from high pressure spray irrigation to under-tree or trickle irrigation.

It is good practice to periodically review recycled water management plans every two to five years to ensure they accurately reflect current practices of recycled water treatment, delivery and use. This also provides an opportunity to address any new risks or control measures that may have come to light in the intervening period. Clause 12.2 (Review of usage of recycled water and management plans) of the *Model recycled water agreement* provides that the parties must review the management plans at least once every two years. If the management plans are part of the recycled water agreement, any amendments needed to the plans would have to be negotiated and agreed to by both parties.

### 11.4. Environmental monitoring

Some form of environmental monitoring is likely to be appropriate in many water recycling schemes, particularly for irrigation uses. The types and comprehensiveness of monitoring will depend on the nature and scale of the hazards identified in risk assessment and the sensitivity of the various environmental components.

For irrigation uses, this could involve monitoring impacts on groundwater and water quality, surface waters and wetlands, native flora and fauna, soil properties, community amenity (for example odours or spray drift) and contaminant levels in stock, produce or soils. Little, if any, environmental monitoring may be relevant for an industrial customer using recycled water in a closed system.

Monitoring is costly and it is important to design an environmental monitoring program that gives sound information at an affordable cost. Unless the program is rigorously designed, data is not likely to be of value in determining either the baseline condition or impacts over time. A good starting point for the design of monitoring programs is the *Australian Guidelines for Water Quality Monitoring and Reporting*, which is part of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC & ARMCANZ 2000). Sampling techniques are dealt with in the *Water Quality Sampling Manual* (EPA 1999) and *Australian Standards: Water Quality – Guidance* (AS/NZS1998).

The practical limitations of monitoring, such as preserving and transporting microbiological samples in remote areas, should also be recognised and alternatives considered.

The importance of having good baseline data cannot be overstated. For example, a comprehensive

characterisation of the recycled water, soil, surface waters and groundwater should be conducted prior to commencing irrigation with recycled water.

Proponents should be mindful that while some impacts can occur in the first year of a scheme, it may take many years for some important impacts to become apparent. For example, nitrate is very mobile and excess application to the soil can result in elevated levels in a groundwater source quite quickly. Phosphorus, on the other hand, is likely to be absorbed into the soil over many years before it leaches into the groundwater.

The recycled water agreement can specify how the responsibility for environmental monitoring, analysis and reporting is to be shared between a supplier and a customer. In multiple-customer irrigation schemes, it can be cost effective and provide more meaningful data if the supplier develops and carries out a whole-of-scheme environmental monitoring program. The Northern Shoalhaven Reclaimed Water Management Scheme (NSW) (Moore & Gould 2003) and the Eli Creek-Pulgul Scheme operated by Wide Bay Water Corporation (Heron & Lever 2000) are examples of this approach. Suppliers may consider environmental monitoring to be a due diligence/ duty of care action or alternatively may seek to recover monitoring costs through fees and charges for the recycled water. Monitoring of environmental aspects such as soil properties or structure and stock or produce condition should be part of the customer's routine land management responsibilities.

### 11.5. Audits and certification

Parties may consider including a requirement for periodic auditing of either the customer's or supplier's management plans or both. The agreement could provide that the supplier will audit the customer's plan and vice versa. Alternatively, an independent party could audit the plans. One way to ensure long-term compliance with a recycled water management plan is to achieve certification under an appropriate HACCP certification scheme, although this is likely to be relevant only to large, complex water recycling schemes. See chapter 4 of the *Queensland Water Recycling Guidelines* for further information.

### 11.6. Other approaches

A partnership approach to risk management is suggested in the *Queensland Water Recycling Guidelines* and in this Manual. This approach serves to identify the environmental and health risks and control measures that are most relevant to the specific water recycling situation. This then feeds into the recycled water management plan, which is attached to the recycled water agreement.

An alternative approach used in some schemes in Queensland and other states is for the supplier to include a set of standard controls relating to the safe use of recycled water in all their customer agreements or in agreements for customers with a similar end use. These standard clauses typically cover the design, construction, operation and maintenance of the customer's recycled water system, and may include prescriptive procedures relating to:

- prevention of cross-connections to a potable water system and contamination of potable water supplies with recycled water;
- prevention of contamination of groundwater and surface water;
- use of advisory signs at access points on recycled water pipelines and where recycled water is used or stored;
- provision of health and safety training to employees and contractors;
- prevention of infestations of mosquitoes and other pests; and
- operation and maintenance of recycled water infrastructure.

Suppliers may feel that including prescriptive health and environmental controls in the agreement provides greater certainty about the actions required by the customer and their likely compliance with these. However, the EPA does not encourage a prescriptive approach to risk management in water recycling projects as it is not considered to be consistent with best practice management. If site-based controls are not tailored to the particular recycling situation, key hazards can be overlooked and effort wasted on minimising minor hazards. Furthermore, some customers perceive these controls to be rigid and one-sided, and to be putting the supplier in a regulatory role in relation to their activities.

However, if the parties agree that prescriptive customer site-based controls are the best option, it is important that the control measures included in the agreement are:

- consistent with those recommended in the *Queensland Water Recycling Guidelines*;
- reviewed regularly to ensure they are consistent with any amendments or additions to the guidelines or other relevant standards; and
- fair and reasonable, so that the customer is more likely to comply.