



Aligning Definitions of Recycled Water in Queensland

Discussion Paper for the *qldwater* Sewerage and Water Environmental Advisory Panel (SWEAP)

Table of Contents

1	Executive Summary		
2	Purpo	se of Discussion Paper5	
3	Regula	atory Requirements5	
4	Defini	tions of recycled water	
	4.1 E	nvironmental Regulator	
	4.2 V	Vater Supply Regulator	
	4.3 P	Public Health Regulator	
	4.4 N	lational Definitions11	
5	Clarify	ring Definitions	
	5.1 C	Common Definition Elements	
	5.2 C	Confusing and Conflicting Definition Elements12	
	5.2.1	Intended Use12	
	5.2.2	Reuse and the Waste Hierarchy13	
	5.2.3	Use On Site14	
	5.2.4	Third Party Use14	
6	Alignir	ng Recycling Requirements for WSPs15	
7	Glossa	ary and Abbreviations16	
Арр	Appendix 1. Environmental Management Hierarchy for Surface or Groundwater		
Арр	endix 2	2. Decision Tree with Corresponding Reporting and Legislation	





1 Executive Summary

This discussion paper outlines regulation of **recycled water** in Queensland and recommends minor clarifications often overlapping regulatory requirements for Water and Sewerage Service Providers (**WSPs**). This alignment is needed both to improve management and reporting and to increase the likelihood of safe water recycling. It is also the first step towards seeking broader agreement on risk-management practices (to be considered in a future paper). Highlighted terms in this paper are defined in the Glossary in Section 7.

Regulation of **recycled water** produced by **WSPs** is managed under three State Acts and five regulatory reporting frameworks under a raft of State and Commonwealth legislation. The regulatory instruments include multiple definitions of **recycled water** and the uses that it can be put to. The lack of consistency appears semantic rather than intentional, but still impedes management, use and particularly, accurate measurement and reporting of **recycled water**. A streamlined approach would facilitate greater safe recycling of urban water in Queensland.



The diverse existing definitions have several elements in common. This discussion paper proposes an overarching definition using a modified version of the Australian Guidelines for Water Recycling (AGWR) definition. It is proposed that all regulatory instruments relevant to WSPs can be encompassed if **recycled water** is defined as:

"water generated from sewage, greywater or stormwater systems and treated to a standard that is appropriate for its intended use **rather than discharge to land or water**."

The modification (in bold) explicitly aligns the definition with Queensland Acts and distinguishes 'discharge' from a beneficial **intended use**.





Other conflicting elements in current definitions also need to be clarified and it is recommended that:

- "intended use" be interpreted to include any use with a **beneficial**, including public good, outcomes, in contrast to **discharge** of surplus treated water,
- recycling and recovery (e.g. of water, energy and nutrients) including through beneficial irrigation, be explicitly agreed as the preferred goal for treated sewage (prior to considering discharge to land, and then lastly discharge to waters),
- on site use of treated water (either in the treatment process or for reasonable watering of STP grounds) be considered together as "onsite recycling", and
- 'third party' with respect to the use of recycled water be interpreted to any person not directly involved in its production, so that risk information is transferred to all potential users.

The inconsistencies in definitions relevant to Queensland **WSPs** can be overcome without legislative change through adherence to the above interpretations and agreement on a common classification for **intended uses** as proposed in the following schema. Following this agreement, the next step should be to provide further clarification on fit-for-purpose risk management and reporting of **recycled water** for different uses that is consistent with all current legislation and guidance.











2 Purpose of Discussion Paper

The Australian Guidelines for Water Recycling (**AGWR**) phase 1 document defines **recycled water** as *"water generated from sewage, greywater or stormwater systems and treated to a standard that is appropriate for its intended use"*, and presents a risk-management framework for use of the resource. In Queensland, water recycling by Water and Sewerage Service Providers (**WSPs**) is overseen by three State agencies under several legislative instruments. **WSPs** are also required to report annual volumes of recycled water produced under three State and four national reporting frameworks, each with their own definitions and requirements. Confusion is inevitable and impedes the beneficial use and management of recycled water while unnecessarily adding risk.

The importance of water recycling is well-established as are the parallel needs to manage risks to protect public health and the environment but also to maintain public and institutional confidence in the advantages of safe recycling. These advantages include reducing demand for other water sources, reducing inappropriate discharge to the environment and increasingly, recovery of nutrients and energy embedded in sewage. Risks associated with recycling include pathogens, nutrients, salts and potential contaminants which are commonly concentrated in **sewage** as well as the economic and reputational risks from building and maintaining recycling infrastructure.

This discussion paper was prepared by the *qldwater* Sewerage and Water Environmental Advisory Panel (SWEAP), for WSPs, in order to outline overlapping regulation of **recycled water** and recommend clarifications as the first step in increasing safe recycling of water from sewers.

3 Regulatory Requirements

There are nearly 300 individual sites across Queensland where **urban sewage** is managed. They range in size and complexity and vary in the way that treated water is licenced for 'release'. In the 2019-20 Reporting Year 378,000 ML of wastewater was collected across Queensland, of which:

- 83% was released to waters (10% fresh and 73% tidal),
- 6.3% irrigated to land (for 'disposal' or 'recycling'),
- 9.1% was 'recycled' in an unspecified manner, and
- the remainder was released to groundwater or included in general 'losses' (e.g. through evaporation).

Sewage treatment is an essential service and differs from other waste management in several ways. The most significant difference is the large volume (and weight) of waste processed because sewage consists to a large degree of (previously) potable water. For example, the Queensland Recycling





Waste Report for 2018/19 recorded 11.04 million tonnes of 'headline wastes' collected of which 48.7% (5.372 tonnes) was "diverted for recovery". All recycling of cardboard, glass, plastic, steel and aluminium by local governments totalled only 0.3 million tonnes and even the greatest mass of waste (concrete) totalled only 2 million tonnes. In contrast, in the same year approximately 44.7 million tonnes of **sewage** (not a headline waste) was recycled. Energy used for treatment processes and pumping water involved in sewage treatment is one of the largest expenses for utilities reflecting the large mass to be managed.

Despite being more than 100 time larger than other council waste streams, the volume of water recycled represented only 12% of the total volume of sewage processed by local government owned WSPs in Queensland in 2018/19. Unfortunately, this figure is an imprecise estimate, largely because of inconsistency in definitions of 'recycling' across the three State and four Commonwealth Acts that regulate different reporting requirements (Figure 1). An agreed interpretation covering all the legislative instruments would improve both the accuracy of this estimate and encourage increased focus on safe recycling.



Figure 1: Urban treated water is regulated under five (discharge) and seven (recycling) legislative frameworks by several different agencies with varying definitions and interpretations.

Under the *Environmental Protection Act 1994* (Qld), the Queensland environmental regulator oversees more than 300 authorised sites for public sewage treatment (see Box 1). However, there is no mechanism to record the volumes for any single activity or the general types of recycling.





Box 1 : There are over 300 public sewage treatment sites with Environmental Authorities to release water to		
the environment. Conditions can authorise three different categories of release.		
• land (53.9%)	 irrigation to a specified area (by flood, drip, spray)*, use onsite for (treatment plant) landscaping, irrigating golf courses, grounds, fields, and parks, third party reuse (e.g. industry), and watering cemeteries, air strips, and 'other'. 	
• water (57.5%) and	 freshwater or tidal (i.e. marine and estuarine sites) 	
• groundwater (8.1%)		

* no distinction is made between irrigation to dispose if surplus water (herein termed 'discharge') and the other types that may have benefits and be considered as 'recycling'.

Under the *Water Supply (Safety and Reliability) Act 2008* (Qld), the water supply regulator oversees high exposure recycled water schemes (specifically, augmenting drinking water supplies, irrigating minimally processed food crops, and reticulation for flushing toilets, washing machines or outdoor use at residential premises). The regulator requires Recycled Water Management Plans for these uses and maintains a register of 'recycled water providers' (schemes) but monitor only aggregated annual volumes produced (i.e. not specific volumes reused nor their **intended use**).

Under the *Public Health Act 2005* (Qld), the Health Regulator has responsibility for **recycled water** that presents an exposure risk (which in essence means all uses). They act as co-regulator for highexposure uses and also provide specific <u>guidance</u> for common low-exposure uses as well as a <u>model</u> <u>user agreement</u> (previously referred to as "**third-party-**agreements"). Low exposure uses include irrigation of public open spaces (such as playing fields and parks), pasture and fodder crops, heavily processed food crops such as sugar cane, non-food crops such as cotton and dust suppression on construction sites).

Queensland WSPs also have mandatory reporting requirements under frameworks managed by the Australian Bureau of Statistics (**ABS**), Bureau of Meteorology (**BOM**), National Performance Reporting Framework (**NPR**) and National Pollutant inventory under the National Environment Protection Measure (NPI). Data is required annually and most **WSPs** provide this information using Queensland's State-wide Water Information Management system (**SWIM**).





4 Definitions of recycled water

4.1 Environmental Regulator

Environmental legislation in Queensland deals primarily with controlling risk of ecological impacts and covers recycled water under three pieces of legislation subordinate to the *Environmental Protection Act 1994* (**EPAct**). There is no definition of 'recycling' in the EPAct itself or in the subordinate *Environmental Protection Regulation 2019*.

Instrument	Term	Definition
EPP (Water & Wetland	recycling, of	(a) re-using the waste water in the process that
Biodiversity) 2019	waste water	generated it; or (b) reprocessing the waste water to develop a new
		product; or
		(c) using the waste water, whether on or off the site where it is generated.
Irrigation Guidelines	Reclaimed water	Wastewater that has been recovered for further use after appropriate treatment
Model STP conditions	water recycled [is]	used for purposes other than direct discharge at the approved discharge location(s)

Additionally, disposal to land is distinguished from recycled (or reclaimed) water is :

Instrument	Term	Definition
Irrigation Guidelines	Land disposal	effluent disposal onto land, most commonly in Queensland via irrigation

4.2 Water Supply Regulator

The Water Supply Regulator is part of the Department of Regional Development, Manufacturing and Water (RDMW) and focusses on 'high-exposure risk recycling' defined as indirect potable reuse, dual reticulation and irrigating minimally processed food crops. The *Water Supply (Safety and Reliability) Act 2008* (**WSSRA**) overtly excludes water that is "discharged into, or disposed of in, the environment" in order to distinguish aspects of recycling ostensibly covered under environmental legislation.





Instrument	Term	Definition
Water Supply (Safety and Reliability) Act 2008 (WSSRA 2008)	recycled water	 any of the following that are intended to be reused— (a) sewage or effluent sourced from a service provider's sewerage; (b) greywater sourced from a large greywater treatment plant within the meaning of the Plumbing and Drainage Act 2002; (c) wastewater, other than water mentioned in paragraph (a) or (b)."
WSSRA 2008	reused	includes being treated to improve the water's quality, but does not include merely being discharged into, or disposed of in, the environment.
Water quality guidelines for recycled water schemes, November 2008	recycled water	See WSSRA 2008
Recycled water management plan and validation guidelines	recycled water	See WSSRA 2008
Manual for recycled water agreements in Qld 2005 (superseded by <u>model user</u> <u>agreement</u> doc).	water recycling	Use of appropriately treated wastewater and urban stormwater for further beneficial purposes
RDMW KPI Definitions Guideline	recycled water	water sourced from sewage or effluent, or urban stormwater, or wastewater from industrial, commercial or manufacturing activities, including animal husbandry activities that has been treated for specific re-use purposes and supplements water supply





A decision tree is provided by the regulator to assist in identifying when recyled water falls under

their jurisdiction (Figure 2).



Figure 2: Decision tree for determination whether a Recycled Water Management Plan is required (Source: RDMW).

4.3 Public Health Regulator

This Public Health Act 2005 (**PHealthAct**) is primarily concerned with managing risks to public health and adopts the definition used by the Water Supply Regulator (see **WSSRA** above). Specific guidelines have been developed to deal with deemed 'low-exposure' recycling along with a <u>model</u> <u>user agreement</u> to complement environmental and water legislation.

Instrument	Term	Definition
Public Health Act 2005	recycled water	See WSSRA 2008
Queensland Health	recycled water	sewage or effluent, sourced from a service
Guidelines for low-		provider's infrastructure, that is intended to be
exposure water		reused
schemes		





4.4 National Definitions

Recycled water is also considered under national legislation that sets mandatory requirements for reporting of **recycled water** among other activities undertaken by water utilities.

Instrument	Term	Definition
BOM Category 7 Reporting Handbook	recycled water	wastewater which, upon appropriate treatment, is suitable for an intended reuse application
ABS	Recycled (reuse) water	Drainage, wastewater (including sewage) or stormwater that has been used again without first being discharged to the environment. It may also be treated and supplied to another user. Excludes water reused on-site, for example on-farm water reuse, or water constantly recycled within a manufacturing plant. Recycled water is also known as reuse water or effluent reuse
NPR (note, no definition of recycled water)	Recycled water system	An urban recycled water system is a system used for the collection, transmission, treatment, storage and supply of recycled water collected by a utility
Australian guidelines for water recycling	recycled water	Water generated from sewage, greywater or stormwater systems and treated to a standard that is appropriate for its intended use

5 Clarifying Definitions

It is not possible to develop a universal definition for **recycled water** because of the multiple sources, uses, risks and stakeholders involved. The Australian Academy of Technological Sciences and Engineering review¹ noted "the terminology associated with the treatment and reuse of municipal wastewater has varied both nationally and internationally. In particular, the terms water reclamation, water reuse and water recycling have been used synonymously by some agencies. For

¹ Australian Academy of Technological Sciences and Engineering (ATSE) 2013 (Principal Author Stuart Khan)





example, the recent US EPA Guidelines for Water Reuse state that "water reuse" and "water recycling" have the same meaning, as do the terms "reclaimed water" and "recycled water". Such interchangeable use of terminology is widespread, and intended meanings are usually relatively easily understood in context."

This following discussion seeks to highlight common and conflicting elements of definitions **WSPs** are required to follow and clarify where differences could contribute to misunderstandings that increase risks or unnecessarily reduce recycling. This includes conflicting reporting requirements that may result in misreporting. The aim is to seek an agreed interpretation of recycling that meets all the legislative requirements for management and reporting purposes.

5.1 Common Definition Elements

The legislative definitions share many common elements: there is general agreement that recycled water is:

- sourced from supplies including **sewage**,
- contrasted with water discharged to land or water,
- subject to appropriate treatment, and
- produced for an **intended use**.

It is proposed that these common legislative elements can be encompassed by adoption of the **AGWR** definition with a small addition (indicated in bold), namely, **recycled water** is:

"water generated from sewage, greywater or stormwater systems and treated to a standard that is appropriate for its intended use **and not merely discharged to land or water**".

Adoption of this modified definition satisfies the state and national instruments if minor additional confusing elements can be clarified in an agreed approach.

5.2 Confusing and Conflicting Definition Elements

5.2.1 Intended Use

There is little guidance on what constitutes an '**intended use'** other than the water supply regulator's manual for recycled water agreements which specifies "beneficial purposes" and their KPI definitions which stipulate a use that "supplements water supply". All other definitions specify only an "intended use", presumably assuming that the intention for use conveys a benefit of some





kind. This distinction and the modification of the **AGWR** definition is important in Queensland for two reasons.

In use of irrigation to land, there is little demarcation of recycling versus **discharge** of surplus water (sometimes called land application or disposal). For example, the Qld Irrigation guidelines distinguish "reclaimed water" and "land disposal" but are not clear on when irrigation distinguishes either definition. This leads to confusion when recycled water is irrigated for agriculture or to enhance liveability (e.g. public spaces such as parks, gardens and golf courses). The solution proposed here is to consider any irrigation as recycling if it has **beneficial** outcomes such as supplementing potable supply, or generating financial, environmental and public good outcomes in contrast with merely **discharging** surplus water.

The second reason is that some stakeholders consider reuse of water from **STPs** as merely a mechanism to **discharge** surplus water unless there is direct and predetermined substitution for potable supplies. This means that public good or industrial reuse that arises due to the availability of a valuable urban resource is not considered **recycling.** In contrast, this paper proposes that the existence of the additional benefit of discharging surplus water does not preclude additional **beneficial** uses being an **intended use** and being considered **water recycling**. Indeed, there is no practical situation where sewage is specifically produced for the purpose of recycling to substitute potable supplies. All use of treated sewage arises from the existence of the resource regardless of whether it also achieves the essential public need of disposing of surplus treated water.

5.2.2 Reuse and the Waste Hierarchy

Some definitions use the term 'reuse' to define recycling but others use these terms interchangeably (e.g. the ABS states that "recycled water is also known as reuse water or effluent reuse"). This circular definition highlights an issue with the legislative use of the environmental waste hierarchy for water discharges (see Appendix 1), a legislative recognition of the well-known 'waste hierarchy' (Figure 3).



Sometimes summarised as "reduce, reuse, recycle", parts of the hierarchy can be problematic when applied to sewage. For example, options for 'avoidance' and 'reduction' in the production of sewage are necessarily limited. Further, 'reuse' and 'recycling' are virtually synonymous and always involve "appropriate treatment" which for other waste types may not be considered until lower in the hierarchy. Finally, Queensland legislation states the preferred mechanisms for liquid wastes is



"appropriate treatment and release to a waste facility or sewer" (see Appendix 1) highlighting the difficulty in reconciling the standard hierarchy for **sewage**. Instead, the focus should be on maximising recycling (including recovery of water, energy, and nutrients) for **intended uses** and reducing discharge to land and in particular, waterways.

5.2.3 Use On Site

There are minor inconsistencies relating to the use of **recycled water** on the site where it is produced. Definitions in Queensland environmental legislation explicitly include "using the wastewater, whether on or off the site where it is generated". For sewage, use **on site use** could be interpreted as referring to domestic on site treatment systems or the use of treated sewage at an STP. Treated wastewater is often used in place of potable water as part of the treatment process and also for site maintenance (e.g. greening) at many locations. In contrast, the definition of **'on site use'** for mandatory ABS reporting "*excludes water reused on-site, for example on-farm water reuse, or water constantly recycled within a manufacturing plant*". This conflict causes confusion and likely double-counting in annual reporting. **On site use** of **recycled water** at **STPs** is clearly an **intended use** that substitutes for potable supplies and should be reported as **water recycling** to properly account for all water reused.

5.2.4 Third Party Use

An issue not reflected in the legislative definitions but referenced in many guidelines is "**third party**" use, that is when recycled water is transferred from the producer to another user for its **intended**





use. Such transfers are common and can occur within or between entities and increases risk if an end-user is not made aware of the possible hazards associated with specific quality of water transferred. The term "**third party**" is generally used to specify a separate legal entity but in this case should refer to any user where there is a duty of care that any risks associated with the recycled water are fully communicated to and understood by subsequent users. This will often include internal stakeholders, particularly in municipal recycled water use. Consequently, "**third party**" should be interpreted to mean any **recycled water** user not directly involved in is production (whether from a separate entity or not) and should be replaced wherever possible with the term 'subsequent user'. The term 'end user' is not recommended as it assumes that the resource won't be further traded or transferred within or between organisations.

6 Aligning Recycling Requirements for WSPs

The lack of cohesion across legislative definitions and reporting requirements is not significant but impedes water recycling and causes confusion in state and national reporting. Clarity can be achieved without significant change by adopting an agreed common definition and interpretation of **recycled water**. This would have a positive impact on consistent management of potential risks and reporting use of **recycled water**. Any common interpretation is important to allow WSPs to more clearly manage:

- risks of **recycled water** (to on-site workers, third parties, public health, the environment and to public and institutional confidence in safe recycling),
- different fates and water balance calculations for **recycled water** (e.g. to industry, golf courses, or municipal use), and
- both economic (e.g. industry, forestry and agriculture) and public good (e.g. community liveability, sports grounds, parks and gardens) outcomes from water recycling.

It is proposed that the first step towards these goals is agreement on a common definition that encompasses the requirements of current legislation such as:

"water generated from sewage, greywater or stormwater systems and treated to a standard that is appropriate for its intended use **and not merely discharged to land or water**".

Further, different uses of recycling should be agreed under this definition to provide common classification. A suggested schema is outlined in the following flow chart.







Figure 4: Decision tree for determining recycled water uses in Queensland (see Appendix 2 for corresponding legislation and reporting requirements).

7 Glossary and Abbreviations

ABS	Australian Bureau of Statistics
AGWR	Australian guidelines for water recycling
beneficial	Use of appropriately treated water for economic, social or environmental benefits other than mere discharge of surplus from sewage treatment. Beneficial uses can include use for agriculture, industry or mining (regardless of whether a charge is levied), public good use (including municipal use, parks and gardens, golf courses, dust suppression and other liveability enhancement).
BOM	Bureau of Meteorology
DES	Department of Environment and Science (which includes the environmental regulator)
Discharge	Release of treated water from a STP undertaken solely to dispose of surplus water with no other intended beneficial use. The term disposal may also be appropriate





	but can easily be confused with other requirements while 'discharge' is commonly used in DES EAs .
RDMW	Department of Regional Development, Manufacturing and Water (which includes the water supply regulator)
EA	Environmental Authority issued by DES that can authorise certain discharges of treated water.
EPAct	Environmental Protection Act 1994
EPRegs	Environmental Protection Regulation 2019
Health	Department of Health (which includes the public health regulator)
Intended use	Use of treated water with beneficial, including public good, outcomes in addition to disposal of surplus water
KPIs	Key Performance Indicators are simple metrics often required to be reported under legislation to assist with performance reporting and benchmarking public utilities.
NPI	National Pollution Inventory under the National Environmental Protection Measure (NEPM)
NPR	National Performance Reporting Framework
On site use	Use within the treatment train (i.e. 'process water') or for reasonable watering of treatment plant grounds (i.e. 'landscaping').
PDAct	Plumbing and Drainage Act 2018
PHealtAct	Public Health Act 2005
Recycled Water	Water generated from sewage , greywater or stormwater systems and treated to a standard that is appropriate for its intended use and not merely discharge d to land or water
Sewage	Grey/blackwater, wastewater and stormwater that is collected in sewers and managed by WSPs .
STP	Sewage Treatment Plant. The often synonymous "waste water treatment plant" is not used in this paper to avoid confusion with treatment of waste water that is not primarily conveyed via sewerage networks.
SWEAP	qldwater's Sewage and Water Environmental Advisory Panel
SWIM	Statewide Water Information Management System : an industry portal for aggregating all mandatory and voluntary reporting of KPIs in Queensland.
Third party	any recycled water user not directly involved in is production (whether from the same or a separate entity), so that risk information is transferred to potential users.
Urban	Cities, towns and community areas with public water and/or sewerage networks.





WHSAct	Work Health and Safety Act 2011
WSSRA	Water Supply (Safety and Reliability) Act 2008
WSP	Water and Sewerage Service Provider the general term for urban water utilities in Queensland which are predominantly owned by Local or State Governments.





Appendix 1. Environmental Management Hierarchy for Surface or Groundwater

Queensland Environmental Protection legislation commonly refers to a management hierarchy for different wastes. Section 14 of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 states the "management hierarchy" for any activity that may affect water. Under section 35 of the *Environmental Protection Regulation 2019*, this hierarchy must be considered by the Regulator in making environmental management decisions.

To the extent it is reasonable to do so, release of waste water or contaminants to waters must be dealt with in the following order of preference—

- (a) firstly—reduce the production of waste water or contaminants by reducing the use of water;
- (b) secondly—prevent waste and implement appropriate waste prevention measures*;
- (c) thirdly—evaluate treatment and recycling options and implement appropriate treatment and recycling;
- (d) fourthly—evaluate the following options for waste water or contaminants in the order in which they are listed—
 - (i) appropriate treatment and release to a waste facility or sewer;
 - (ii) appropriate treatment and release to land;
 - (iii) appropriate treatment and release to surface waters or groundwaters.
- * waste prevention means the adoption of practices or processes that avoid generating waste or reduce the quantity of waste requiring subsequent treatment, recycling or disposal.





Appendix 2. Decision Tree with Corresponding Reporting and Legislation.



Plumbing and Drainage Act 2018 and Work Health and Safety Act 2011.

Victorian Guidelines (Publication 1911.2 March 2021).

The scope and use of the term recycled water in this guideline includes water that has been derived from sewerage systems or industry processes and treated to a standard that is appropriate for its intended use. More broadly than within this guideline, the term also refers to water derived from stormwater or greywater.