



Regional Environment Improvement Plan

Western Water's Recycled Water Schemes



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Glossary and Abbreviations

TERM or ABBREVIATION	MEANING or DEFINITION
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australian and New Zealand
BOD	Biochemical Oxygen Demand (BOD ₅) – indicator of organic pollution measured as amount of oxygen used by biochemical oxidation of organic matter over a period of 5 days under controlled conditions in the lab.
BOM	Bureau of Meteorology, Government of Australia
CSC	Customer Supply Contract
CSMP	Customer Site Management Plan
CEC	Cation Exchange Capacity (measure of soil ability to capture cations)
DH	Department of Health
DPI	Department of Primary Industries (Victoria)
DSE	Department of Sustainability and Environment
EC	Electrical Conductivity
<i>E.Coli</i>	<i>Escherichia coli</i> , a bacteria which is an indicator pathogen for faecal contamination
EIP	Environment Improvement Plan
EMP	Environment Management Plan
EMS	Environmental Management System
EPA or EPA VIC	Environment Protection Authority (Victoria)
LCA	Land capability assessment
NATA	National Association of Testing Authorities
NTU	Nephelometric turbidity unit – water turbidity measurement unit
Recycled Water guidelines	<i>Environmental Guidelines for Use of Reclaimed Water</i> (EPA Publication No. 464.2, June 2003)
Recycled Water	Alternative description used in this REIP for “Reclaimed Water”, being water that has been derived from sewerage systems and treated to a standard that is satisfactory for its intended (“fit-for-purpose”) use(s).
Regional EIP or REIP	Regional Environmental Improvement Plan
RWP	Recycled Water Plant
SEPP	State Environment Protection Policy. Gazetted Victorian Government policies pursuant to the Environment Protection Act 1970.
SMP	Site Management Plan
TDS	Total Dissolved Salts or Solids (measure of salinity)
TSA	Temporary Supply Agreement
Workcover	Victorian Workcover Authority
WW	Western Water

Western Water – A Recycled Water Leader

Western Water (“WW”) is a recognised leader in water recycling. It has several Recycled Water Plants (RWPs) supplying recycled water schemes at Sunbury, Melton, Bacchus Marsh, Gisborne, Riddells Creek, Romsey and Woodend. Western Water has been proactively expanding the beneficial use of recycled water across its service area. As more recycled water becomes available, Western Water will continue to expand its onsite and offsite schemes with the progressive extension of recycled water networks and new customer connections.

Western Water has continued to build on its water recycling successes, with the award winning Sunbury-Melton Recycled Water Scheme, and most recently the Melton South Regional Class A Scheme. The Class A plant at Melton RWP commissioned in 2008, supplies the Eynesbury Township dual reticulation scheme and Harness Racing Victoria’s (HRV) new racing and entertainment complex at Melton South. Eynesbury will eventually have around 3000 houses. The Melton RWP is expected to ultimately supply non-potable water to a further 70,000 people as well as new commercial and industrial precincts in the Melton South Regional growth corridor.

In 2007, Western Water was recognised as the Australian Leader in water recycling in the National Performance Report for urban water utilities. It also received the United Nations Environmental Award for Excellence in Sustainable Water Management and was a finalist for the Premier’s Sustainability Award in recognition of the Eynesbury township Class A recycled water scheme.

At time of writing this REIP, Western Water had over 70 Class B and C recycled water customers 54 including more than 50 in the Sunbury Melton Scheme. Recycled water “fit-for purpose” uses include irrigation for agriculture, vineyards, golf courses, sporting grounds, parks and gardens, nurseries, etc. About 37 trucking permits were also issued in 2008-09 for offsite transport of recycled water for municipal watering, dust control, road construction and other purposes allowed by EPA’s guidelines.

In 2008-09, 5328 ML or 88% of all recycled water available from WW’s seven RWP’s was utilised across the various Class A, B and C recycled water schemes. WW’s ultimate business plan target is for 100% beneficial use of recycled water by the year 2013. WW has committed more than \$13 Million for future recycled water projects to increase recycled water availability to existing and new customers, in order to achieve its 100% recycling target.

A new Overarching Regional Environmental Improvement Plan

Western Water is pleased to release this Regional Environmental Improvement Plan (REIP) for all of the Class B and C Recycled Water Schemes within its service area. This new overarching REIP provides the environmental framework for all of Western Water’s Class B and Class C recycled water schemes, and replaces and integrates the previous suite of individual environmental management and improvement plans, including the 2002 Sunbury-Melton Recycled Water Scheme REIP.

This REIP is directly linked to Western Water’s business processes and monitoring, auditing and reporting systems contained in its Integrated Management Strategy and ISO14001 registered Environmental Management System. The business plan target of 100% use of recycled water by the year 2013 is a key commitment in Western Water’s Strategic Business and Corporate Plans, Water Supply Demand Strategy, Recycled Water Strategy 2008-2013 and Water Plan 2008-2013.

This REIP has been developed in accordance with EPA’s “*Guidelines for Environmental Management Use of Reclaimed Water*” (Publication No. 464.2, 2003). This REIP demonstrates WW’s commitment to its 100% recycling target, and the responsible management of the supply and beneficial use of recycled water to ensure compliance with EPA Guidelines.

REIP Action Plan

No.	Objectives	Key Actions / Management Controls	Responsibility (ü)		Section/Ref.	
			WW	Customer	REIP	CSMP *
1	Recycled Water Supply Reliability, Quality & Quantity					
1(a)	Compliance with Class B or C recycled water objectives of EPA guidelines as relevant to the individual RWP (listed in Table 5 2)	<ul style="list-style-type: none"> Operation and maintenance of all RWPs in accordance with WW's RWP & Depot manuals, procedures, contingency plans, etc; Monitoring in accordance with Western Water Corporate Licence monitoring requirements and this REIP; Communicate monitoring results to EPA & customers, & report annually to EPA on RWP performance for recycled water quality 	ü		5.2, 7 11	
1(b)	Minimise the effects of algae including Blue-Green algal blooms on customer activities	<ul style="list-style-type: none"> Proactively control algal growth and manage blue-green algal blooms in recycled water storages in accordance with WW procedures. Respond to any algal blooms in accordance with WW's ERP for Algal Management in Recycled Water Storages in conjunction with minor and major recycled water incident procedures 	ü	ü	7	7.2 11.2, 11.3
1(c)	Ensure reliable supply of recycled water to meet the customer demands as per CSMPs and plant water requirements	<ul style="list-style-type: none"> Design and construction of recycled water infrastructure in accordance with relevant Australian standards. Maintain in accordance with WW's Depot Operations Manuals and other maintenance procedures. 	ü		7	4, 8
1(d)	Minimise spills, leaks and flushing flows to the environment from recycled water assets	<ul style="list-style-type: none"> Inspect and maintain in accord with WW's Depot Operations Manuals and other maintenance procedures. Respond to significant recycled water asset spills, leaks or discharges in accordance with WW's ERP in conjunction with minor and major recycled water incident procedures 	ü		7	
1(e)	Ensure all recycled water workers have appropriate training	<ul style="list-style-type: none"> Provide induction training to relevant staff in risk awareness and safe working practices when working with recycled water. 	ü		7	
2	Customer Site Management					
2(a)	Ensure recycled water is supplied for allowable customer uses and suitable sites in accordance with CSC's, CSMPs, EPA's guidelines and the REIP	<ul style="list-style-type: none"> All new customers undertake WW's customer application and approval process. All customer applications assessed for sustainable recycled water use based on consideration of "fit for purpose" and site suitability (ie. soil & land capability). 	ü	ü	8	5, 6

No.	Objectives	Key Actions / Management Controls	Responsibility (ü)		Section/Ref.	
			WW	Customer	REIP	CSMP *
		<ul style="list-style-type: none"> Approved customers are issued with an individual CSC and develop a site specific CSMP for signing prior to receiving recycled water for the first time. Maintain individual CSMP's based on up-to-date templates (large, small, permanent or temporary as relevant) in compliance with EPA guidelines. 				
2(b)	Ensure all recycled water customers comply with their individual CSC & CSMP and EPA guidelines.	<ul style="list-style-type: none"> All Customers are responsible for compliance with the requirements of their individual CSC's and guidance provided in individual CSMPs, and submitting annual compliance statement to WW by 30 June each year. Annual internal audits conducted by WW for all customer sites for compliance with CSMP & CSC, including review of Customer Annual Compliance Statements and customer soil testing results (if undertaken) Address non-compliances at Customer sites identified by above activities 	ü	ü	8 11	All 12.3
2(c)	Ensure customers understand their obligations and the requirements of the CSC, CSMP and EPA guidelines	<ul style="list-style-type: none"> Induction training for new recycled water customers in health and environmental risk awareness, irrigation water efficiency, soil monitoring, and safe working practices. Provide refresher training to existing customers from time to time if required. Customer liaison program such as consultative committees, fact sheets, newsletters, advertising, field days, demonstrations, recycled water training (as above), water use efficiency advice, etc. 	ü	ü	8	8.8 10
3	Incident Management					
3(a)	Adequate staff training and equipment preparedness for any recycled water scheme incident, and effective management of response to ensure minimal health or environmental risk.	<ul style="list-style-type: none"> To proactively prepare for incidents and ensure that staff are routinely trained in the Emergency Response Manual and associated procedures. 	ü	ü	9	11
3(b)	Minor and Major incident response and reporting occurs in accordance with Western Water's Emergency Response Manual	<ul style="list-style-type: none"> Follow the Emergency Response Procedures, Incident Escalation Procedures and Incident reporting processes. Report all major incidents to EPA within a practicable timeline and provide details of responses and corrective actions in EPA annual reports. 	ü	ü	9	11

No.	Objectives	Key Actions / Management Controls	Responsibility (ü)		Section/Ref.	
			WW	Customer	REIP	CSMP *
4	Monitoring and Recording					
4(a)	Recycled water quantity and quality monitoring programs ensure transparent data to customers and EPA about the status of compliance with EPA guidelines	<ul style="list-style-type: none"> Monitoring of recycled water quality and quantity supplied from all RWPs in accordance with schedule in laboratory services contract. 	ü		10	
4(b)	Customer soil monitoring programs to enable ongoing assessment of impacts and suitability of recycled water irrigation in the WW region.	<ul style="list-style-type: none"> Baseline & annual soil monitoring. Reported annually to WW Audit soil monitoring every 3 years may be required by WW, arranged in conjunction with the customer. 	ü	ü	10	12.1
4(c)	Ensure WW's RWP groundwater monitoring programs enable ongoing assessment of impacts on groundwater and status of compliance with SEPP (Groundwaters of Victoria)	<ul style="list-style-type: none"> Annual Monitoring of bores at all RWPs. 	ü		10	12.2
5	Auditing and Reporting					
5(a)	Compliance by WW and its customers with the objectives and targets of REIP, EPA guidelines, SEPPs, Environment Protection Act etc.	<ul style="list-style-type: none"> Internal audits of recycled water customer sites on a rotational basis, in accordance with the WW internal audit schedule, with key focus on higher volume and higher risk customers; External audits of up to 4 recycled water customer sites every 3 years by a suitably qualified/accredited independent auditor; Internal audits of recycled water treatment systems and supply infrastructure as required in accordance with WW's auditing schedule. 	ü		11	
5(b)	Maintain EMS accreditation to AS/NZS 14001, as well as other IMS accreditations	<ul style="list-style-type: none"> External surveillance audits of EMS in accordance with WW's auditing schedule, to maintain AS/NZS 14001 and other IMS accreditations. 	ü		11	
5(d)	All customers provide Annual Compliance Statements to WW by due date	<ul style="list-style-type: none"> Receive, collate and review all Annual Compliance Statements and any soil test results as part of internal auditing processes and overall annual report preparation for EPA. 		ü	11	12.3
5(c)	Transparent Reporting by WW to EPA and Customers.	<ul style="list-style-type: none"> Annual report to EPA included as part of overall WW Environment Report providing summary of performance of all recycled water schemes against the objectives of this REIP and compliance with EPA guidelines 	ü		11	

* Note to REIP Action Table: - Based on current CSMP template for Sunbury Melton Recycled Water Scheme – see Appendix B.

Introduction

1.1 About Western Water

Western Region Water Corporation (“Western Water” or “WW”) provides water, sewage and recycled water services to a service region north west of Melbourne, covering an area of about 3000 km² and extending from Melton and Eynesbury in the south, Sunbury and Bulla in the east, Lancefield and Woodend to the north, and Bacchus Marsh and Myrniong to the west. The region incorporates parts of municipalities of Melton, Moorabool and Macedon Ranges Shires, City of Hume as well as small area of the City of Wyndham south of Eynesbury. A map of the Western Water's service area is shown in Figure 1-1.

Western Water's service area contains both urban and rural living, with considerable population and urban growth forecasts particularly at Melton and Sunbury. The service area has a population of about 135,000 people (2.6% growth in 2007-08), and includes over 53,000 business and residential customers. Around 93% of Western Water's customers are residential.

The service area is mostly rural and devoted to agricultural enterprises, mostly grazing and cropping. There are other important agribusiness activities and tourism precincts across the region including highly regarded vineyards and wine producers, established racing horse and equestrian service industry (training, breeding, etc), golf courses, open space and other recreational activities.

The Bacchus Marsh Irrigation District (BMID) is also an important horticultural area covering about 1358 Ha. BMID has about 45 irrigated farms receiving supply via Southern Rural Water's weir on the Werribee River and the open channel and pipeline system, under diversion licences issued by SRW.

1.2 Western Water's Recycled Water Program

Western Water (“WW”) is a recognised industry leader in water recycling having successfully established several recycled water schemes across its service region. Each recycled water scheme is supplied by a local Recycled Water Plant (RWP). RWPs are located at Sunbury, Melton, Bacchus Marsh, Gisborne, Riddells Creek, Romsey and Woodend as illustrated in Figure 1-1 (also refer to Figure 1-2 and recycled water network plans in Appendix A).

WW's best known recycled water schemes are the Sunbury-Melton Class B Recycled Water Scheme (established in 2001), and the Melton South Regional Class A Scheme (established in 2008).

At time of issue of this REIP, WW had more than 70 Class B and C customers across its service region including 54 in the Sunbury Melton scheme using recycled water for a range of “fit-for-purpose” uses mainly for irrigation for agriculture, vineyards, golf courses, sports grounds, parks and gardens. WW has also issued more than 35 trucking permit customers for offsite transport of recycled water for municipal watering, construction and other purposes allowed by EPA's guidelines.

The economic viability of many irrigated agricultural properties, vineyards and golf courses within the Sunbury Melton Recycled Water Scheme as well as other areas in WW's region, may not have been possible without availability of recycled water.

The location of recycled water schemes across the Western Water service area is also illustrated in Figure 1-2.

1 Introduction

Figure 1-1 Western Water Service Area



1 Introduction

Figure 1-2 Western Water Recycled Water Schemes



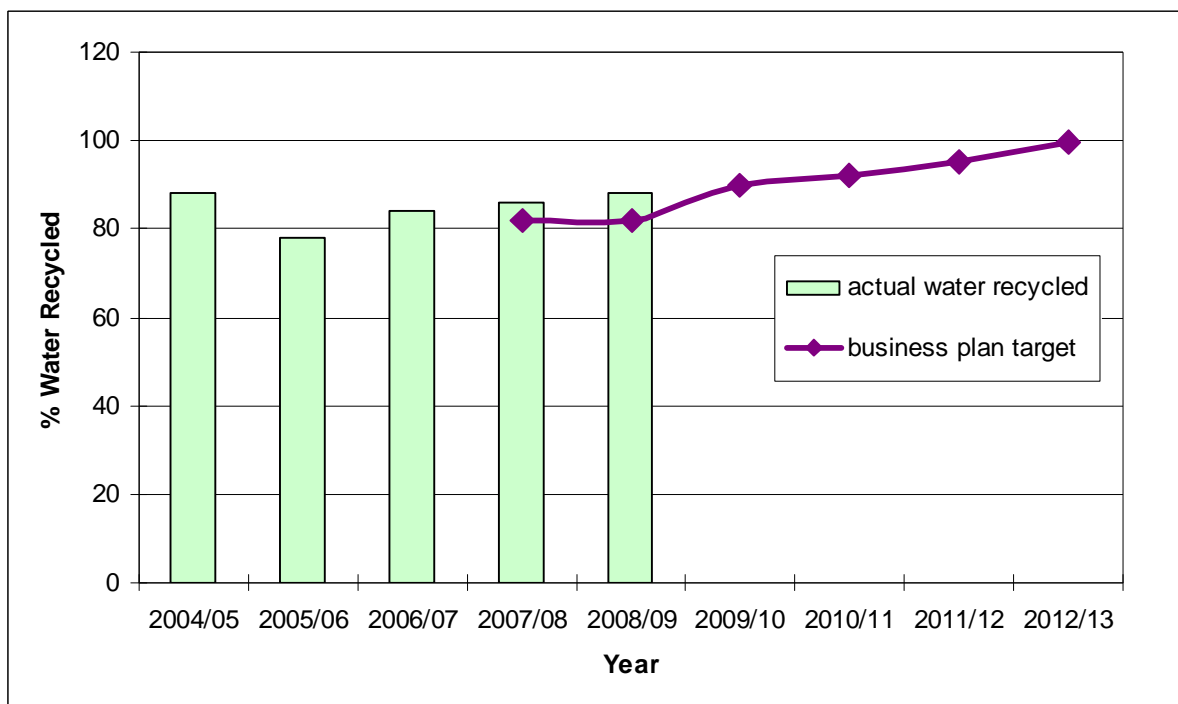
1 Introduction

1.3 Recycled Water Use Targets

For the purposes of this REIP, 100% recycling is defined as beneficial use of total volumes of recycled water produced from all RWPs in all years up to the one-in-ten (90% percentile) wet year except for Woodend and Gisborne where the 100% recycling target is based on an average rainfall year.

The Corporate Business Plan has an aspirational target to achieve 100% recycling by the year 2013. Western Water has set interim annual targets for beneficial use of recycled water from all its RWPs as shown in Figure 1-3.

Figure 1-3 Corporate Business Plan Targets & Annual Water Recycled



In the 2008-09 financial year, WW and its customers utilised 88% (or 5328 ML) of the total recycled water produced across its seven RWP's. This result was above business plan targets.

The above percentages of actual water recycled and future targets is the total of all Class A, B and C schemes across the WW region as shown in Figure 1-2 including pipeline, standpipe and trucking permit customers, as well as recycled water utilised onsite at RWPs for treatment process purposes.

WW is well on track to achieve the 100% recycling target, and has committed more than \$13 Million for future recycled water treatment plant upgrades and expanded supply projects to increase recycled water availability to existing and new customers across its service area.

The future water recycling targets in Figure 1-3 are adopted by this REIP, and will be reviewed annually as part of annual environmental performance assessment and reporting to EPA.

1 Introduction

1.4 A New Overarching REIP for all Recycled Water Schemes

This REIP describes the overarching environmental planning and management framework for Western Water's Class B and Class C recycled water schemes, and replaces and integrates the previous suite of separate EIPs and EMPs for the WW's recycled water schemes, including the 2002 Sunbury-Melton Recycled Water Scheme REIP.

The key purpose of this REIP is to demonstrate WW's commitment to responsible management and the safe and sustainable supply and use of recycled water in the Western Water region, and to comply with EPA's "*Guidelines for Environmental Management Use of Reclaimed Water*".

This REIP describes the key environmental risks and how they are responsibly managed by WW and its customers according to respective roles and responsibilities. The REIP outlines controls for recycled water quality and supply system reliability, contingency plans, customer site management plans (CSMP), training, monitoring, auditing and reporting programs. This REIP is directly linked to WW's management systems including monitoring, auditing and reporting procedures as described in its Integrated Management System (IMS) incorporating the EMS (ISO14001 registered), QMS, OH&S, individual RWP operational and maintenance plans and WW's EPA Corporate licence.

This REIP is also linked to existing Customer Supply Contracts, Customer Site Management Plans, and for trucking purposes Temporary Supply agreements and Recycled Water Carter Permits, the requirements for which remain unchanged.

Scope and Objectives

2.1 REIP Objectives

This REIP describes Western Water's environmental framework for the safe and sustainable supply and use of Class B and C recycled water in the Western Water service area, and demonstrates WW's commitment to increased beneficial use and responsible management of its recycled water schemes. The overall aim of this REIP is to ensure compliance with EPA Victoria's *Environmental Guidelines for the Use of Reclaimed Water* (Publication 464.2, June 2003).

To meet the above overall aim, WW has adopted specific performance objectives according to recycled water management themes and corresponding management actions. These performance objectives are described at the beginning of the various "activity based" chapters of this REIP (Chapters 7 to 11), and are summarised in the REIP Action Plan. The key performance objectives to be considered to the success of this REIP are:

- Recycled water quality supplied to customers is "fit-for-purpose" and complies with EPA's Class B or C recycled water objectives as relevant to the individual RWP and recycled water scheme;
- WW's recycled water distribution systems are reliable and meet customer's water demands;
- Assistance to customers through training/liason programs and promotion of appropriate irrigation and environmental site practices is effective in helping them understand their CSMP obligations;
- Ensure Customers are complying with their CSMPs or equivalent site management plan, through customer site checks, soil monitoring and audit programs
- Demonstrate that recycled water does not cause adverse impacts on soils, crops or plants through recycled water quality and customer soil monitoring programs
- Facilitate increased beneficial usage of recycled water for purposes allowed by EPA guidelines
- Increased availability of recycled water to existing and new customers towards achieving the target of 100% recycling from all RWPs by 2013
- Demonstrated compliance with the EPA Corporate Licence, EPA Guidelines and SEPP environmental objectives through monitoring, auditing and environmental improvement programs
- Adherence to transparent Auditing and Reporting to EPA and WW Recycled Water Customers.

These performance objectives are considered by WW during annual performance assessment of the results and outcomes of REIP monitoring, auditing and reporting programs. If performance objectives are not met, WW will undertake appropriate responses including identification and implementation of improvement opportunities where appropriate and possible review of objectives.

2.1 Development of the REIP

Western Water has reviewed the various environmental management and improvement plans (EIP, EMP, etc) that described the individual Class B and Class C recycled water schemes across WW's service area including the 2001 Sunbury-Melton Recycled Water Scheme REIP. These previous EIP, EMP and other documents detailed the operation and environmental management framework of the individual recycled water schemes at that time to demonstrate compliance with EPA's recycled water guidelines, and were approved by EPA.

However, these individual EIPs and EMPs contained detailed information and compliance requirements which were largely common across the various recycled water schemes. Some of the EIPs and EMPs had also become dated given the progressive expansion of WW recycled water schemes over recent years supplying additional offsite customers for the Sunbury, Melton, Gisborne, Riddells Creek, Romsey and Woodend recycled water schemes.

2 Scope and Objectives

From this review, Western Water identified a streamlining opportunity to develop an overarching REIP to cover all of its Class B and C recycled water schemes. This is consistent with the amalgamation of the seven previous EPA waste discharge licences for each of WW's RWPs into one EPA Corporate Licence (issued to WW in May 2008).

This new overarching REIP was developed to replace and integrate the Sunbury-Melton Recycled Water Scheme REIP and other various EIPs and EMPs for individual recycled water schemes. Individual site CSMP's and trucking permits remain unchanged.

2.2 Scope of REIP

This REIP only covers the Class B and Class C recycled water schemes established by WW, supplying both onsite and offsite customers from its seven RWPs at: Melton, Bacchus Marsh, Sunbury, Gisborne, Riddells Creek, Romsey and Woodend (see Figure 1-2). An overview of these schemes is provided in Chapter 5 of this REIP.

The REIP has been developed in accordance with the EIP checklist and other guidance described in EPA's "*Guidelines for Environmental Management Use of Reclaimed Water*". The REIP addresses the key risk management issues and controls for protection of the environment and human health associated with supply and use of Class B and C recycled water. The scope of the REIP includes:

- Key roles and responsibilities of WW and its customers;
- Recycled water quantity and quality assurance and monitoring from each of the 7 RWPs;
- Recycled water supply system reliability for quantity and quality delivered to customers;
- Allowable ("fit-for-purpose") uses of Class B and C recycled water;
- Regional land capability, general suitability and productivity for recycled water use;
- New customer site selection, risk assessment and approvals processes;
- Development of individual CSMPs describing site specific practices and controls such as:
 - irrigation scheduling (water budgeting) to meet plant water and nutrient demands,
 - recycled water storage, runoff, spray drift, humans/livestock site access and produce controls,
 - accounting for nutrients in recycled water and soils for fertiliser planning purposes
 - annual performance checks and general compliance reporting,
- Customer liaison and training programs to promote good site practices and CSMP compliance;
- Customer site checks by WW to assess CSMP compliance, and rectify non-conformances;
- Monitoring at RWPs and customer sites for recycled water use, soils and (if relevant) groundwater;
- General inspection and maintenance programs and relevant linkages to WW business systems;
- Contingency plans, minor and major incident response and reporting;
- Auditing programs for WW recycled water supply system assets, and customer sites;
- Annual reporting programs to EPA; and
- Annual REIP review process.
- Links to WW's IMS and EMS policies, procedures, manuals, CSMPs, and other key documents.

The Melton South Regional Class A Scheme is not covered by this REIP. It has separate Health and Environmental Management Plans (HEMP) and associated Recycled Water Quality Management Plans (RWQMP) developed in 2008 for the production and supply of Class A recycled water to the Eynesbury township dual reticulation scheme and Harness Racing Victoria's (HRV) racing complex.

2 Scope and Objectives

2.3 Timeframe for REIP

This REIP has a 5 year timeframe until the end of the 2013-2014 reporting period. After completion of the 2013-2014 auditing and reporting cycle, this REIP will be subject to extensive review and update, proposed to commence in early 2014.

Western Water Policies, Strategies and Procedures

Western Water's Strategic and Corporate Plans incorporate a range of strategies, policies and business management systems that underpin the environmental management framework for its water, treatment and recycled water services. Key elements relating to this REIP include:

- Water Plan 2008 - 2013 and Water Supply Demand Strategy 2006 - 2055 (WSDS),
- Environmental Policy and Recycled Water Policy
- Integrated Management System (IMS) including the Environmental Management System (EMS)
- EPA Corporate Licence.

Recycled water is being utilised in WW's service area as an alternative to potable water use. WW has recorded potable substitution volumes of 607 ML in 2005-06 increasing to 2000ML in 2008-09.

WW's recycled water strategy including the aspirational target of 100% beneficial use by the year 2013 is adopted across the Corporation.

3.1 Environmental Management System (EMS)

Western Water's EMS is incorporated as part of its IMS, which also incorporates WW's Quality and OH&S Management Systems. The IMS has the following International Standards accreditations:

- EMS accreditation to AS/NZS 14001;
- Quality Management System (QMS) accreditation to AS/NZS 9001; and
- Occupational Health and Safety (OH&S) Management System accreditation to AS/NZS 4801.

WW's EMS guides its daily activities and provides the framework for identifying opportunities for continuous environmental improvement. WW's Environment Committee oversees the administration of the EMS, and monitors and reports on performance and compliance. The EMS is subject to internal and external audit programs to ensure international standard accreditations are maintained. Audit outcomes are reported through internal reporting procedures to all levels of the organisation. Any non-conformances whether major, minor or improvement opportunities are recorded and reported during the audit process and issues rectified in consultation with WW staff and relevant contractors.

3.2 Environmental Policy and Recycled Water Policy

Western Water has developed an Environmental Policy and Recycled Water Policy under its EMS (refer to reference list in Appendix B). These policies include commitments by WW to work with its customers and the community to increase environmental awareness, promote water savings, and maximise beneficial use of recycled water to preserve drinking water and achieve the 100% water recycling target.

3.3 EPA Corporate Licence

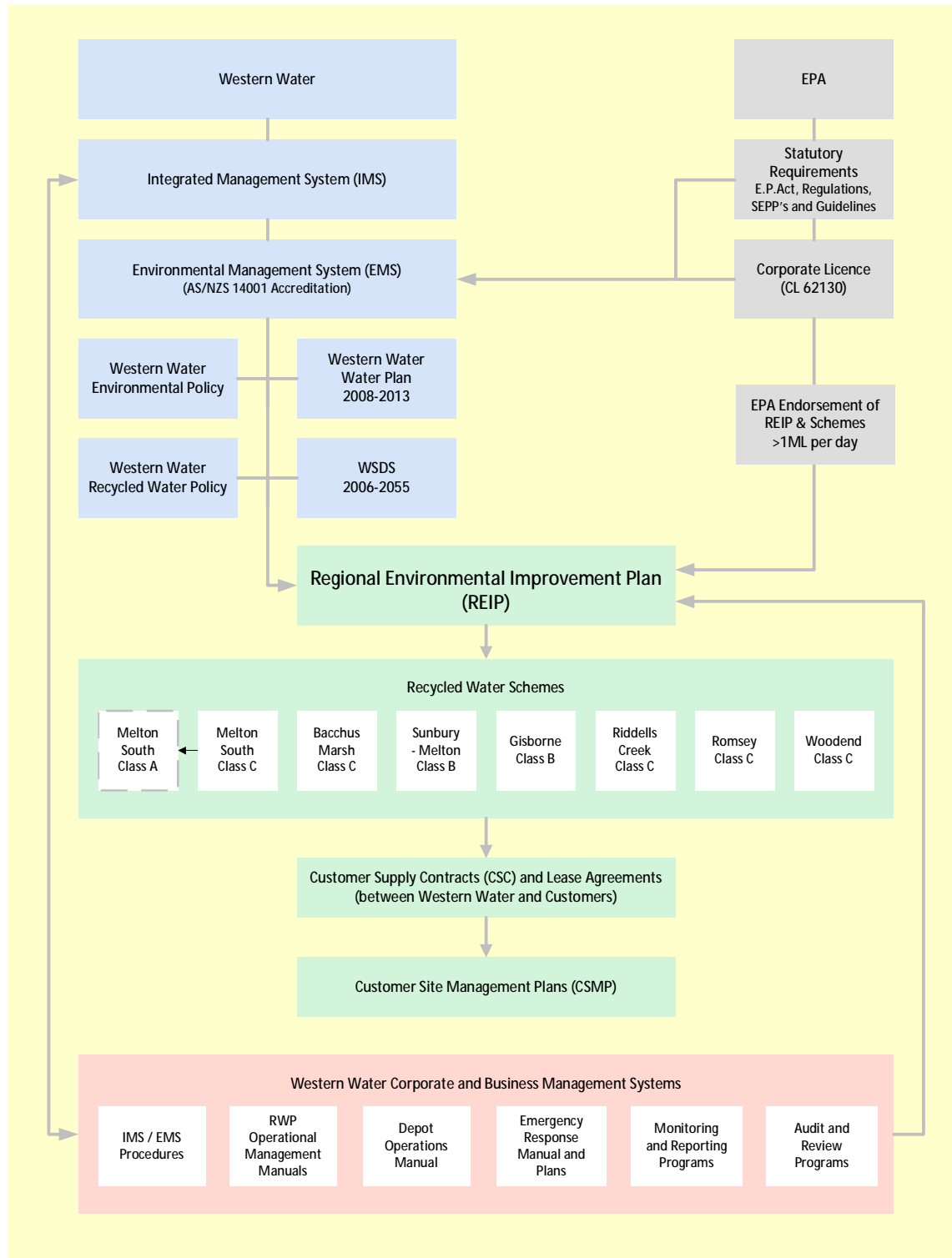
In 2008, Western Water received an EPA Corporate Licence, amalgamating the seven previous separate waste discharge licences held by WW for its RWPs. The licence includes both sustainability commitments to help WW meet its long term business goals, as well as compliance requirements for environmental performance, monitoring and reporting for protection of the environment and human health. Under the licence, WW is committed to identifying "fit-for-purpose" opportunities for beneficial use as a safe and alternative to drinking water, again with the target for 100% beneficial use.

3 Western Water Policies, Strategies and Procedures

3.4 Environmental Management Framework

The environmental management framework for this REIP and how it integrates with the above mentioned WW business and environmental management systems is illustrated in Figure 3-1.

Figure 3-1 Western Water Recycled Water Schemes Environmental Management Framework



3 Western Water Policies, Strategies and Procedures

3.5 Risk Management and Assessment Framework

Risk Management

A key area of responsibility for WW is its risk management framework, which is designed to evaluate risks, assess impacts and plan appropriate actions to eliminate, minimise or control identified risks.

Western Water understands the risks and liabilities affecting the organisation and exercise care, skill and diligence in addressing them. WW aims to see that all unacceptable risks are brought under control by a WW Board-approved risk management scheme suited to WW's size and risk profile.

The risk management framework is integrated into Western Water's management systems and involves all aspects of WW's operations from asset management to product quality and customer service. Significant environmental risks are logged in WW's corporate risk register, which is a compilation of all currently identified business risks. Risk treatment plans and mitigation actions are implemented with the objective to prevent significant environmental impacts.

The risk register is reviewed quarterly and annually and WW Board members and staff are kept informed of business performance and risks via the "RAG" (Red, Amber, Green) and "Balanced Scorecard" (BSC) reporting systems. The fortnightly RAG report captures items for attention of the Management Team and is made available to all staff on the intranet. Red items are urgent issues, amber items are issues currently being managed and green identifies issues that have been managed to a satisfactory solution. The report also covers any good new stories for the business.

Tied to these Risk Management efforts is Western Water's Incident Management Systems, incorporating various procedures under the EMS, QMS and OH&S.

Risk Assessment

The risk assessment process developed under WW's IMS and EMS includes procedures for evaluating and rating risks based on the following considerations (consistent with Australian Standard AS/NZS 4360:2004 Risk management):

- Aspect
- Likelihood
- Consequence
- Sensitivity
- Score (Likelihood x Consequence x Sensitivity)
- Cause
- Key Impacts
- Effect
- Controls in Place – ie. REIP, CSMP, other management plans, standard procedures, etc.

A general summary of key risk issues related to WW's recycled water schemes and how they are managed are provided included in Appendix D. The risk management plans, control and mitigating measures implemented by WW are discussed in chapters 7 to 11 of this REIP.

Roles and Responsibilities

4.1 Western Water

Western Water (WW), as the supplier of recycled water to schemes in its service region, will implement the following to demonstrate compliance with this REIP and EPA guidelines:

1. Maintain EPA endorsement of the REIP, and for any changes to the recycled water treatment and supply systems, and any subsequent updates to the REIP;
2. Ensure recycled water from each RWP complies with relevant recycled water quality objectives of EPA guidelines (Class B or C as relevant) so that it is fit for its intended purpose;
3. Ensure reliability of the recycled water supply/transfer system to minimise leaks and spills and ensure quality and quantity delivered to customers via metered outlets and standpipes;
4. Undertake risk and regional land capability assessments for any expansions to recycled water schemes to ensure general suitability and productivity when using recycled water;
5. Undertake risk and site selection assessments for new customer sites as part of new customer application and WW approvals processes (including any expansions on existing customer sites);
6. Maintain up-to-date registers of active recycled water customer sites and trucking permit sites;
7. Ensure all customers have signed up-to-date CSMPs and Customer Supply Contracts (CSC);
8. Provide induction training and ongoing liaison programs to ensure customers understand their CSMP and CSC compliance obligations, and to promote good environmental practices;
9. Implement internal customer site audit programs for assessment of CSMP compliance, identification and rectification of any non-conformances;
10. Implement contingency plans for recycled water supply and customer sites including incident response and reporting programs and procedures;
11. Carry out inspection and maintenance programs for WW recycled water supply assets and systems in accordance with WW business systems;
12. Provide adequate inductions and refresher training to all WW staff working with recycled water;
13. Carry out monitoring and recording programs for recycled water quality and quantity from RWPs;
14. Monitor soils and groundwater on WW land at RWPs that is irrigated with recycled water by WW and/or farm lease customers;
15. Carry out annual auditing programs for WW recycled water quality and supply systems;
16. Report annually to EPA including status and performance of all recycled water schemes and outcomes of RWP and customer site auditing programs; and
17. Carry out an internal annual REIP review process, and seek EPA approval for any REIP updates.
18. Liaison and customer communication through customer group meetings.

WW's roles and responsibilities are described further throughout the REIP for the various management elements of the recycled water schemes. The REIP Action Plan contains a summary of key roles and responsibilities including relevant cross references to chapters and sections of the REIP, CSMP and other WW standard procedures and management plans under its EMS.

4 Roles and Responsibilities

4.2 WW Recycled Water Management Teams

The management responsibilities for WW's recycled water schemes are spread across different management teams within the organisation. Key roles and responsibilities for WW's Class B and C recycled water schemes are generally as summarised in Table 4-1 (excludes Class A schemes).

Table 4-1 Western Water Recycled Water Management Teams – Class B and C Schemes

Managing Director & Board			
General Manager <u>Customer & Community Relations</u>	General Manager <u>Sustainability</u>	General Manager <u>Commercial Services</u>	Manager <u>Human Resources</u> <u>Manager Organisational Development and Risk</u>
<u>Communications</u> <ul style="list-style-type: none"> Coordination of all recycled water communications and media including: fact sheets, newsletters, advertising, etc 	<u>Capital Investments</u> <ul style="list-style-type: none"> Delivery of new infrastructure relating to recycled water 	<u>Finance</u> <ul style="list-style-type: none"> Allocation of operating and capital budgets Forecast revenue. 	<u>Human Resources</u> <ul style="list-style-type: none"> Occupational Health and Safety Induction process Ongoing staff training Audit schedule & register Risk register
<u>Customer and Information Services</u> <ul style="list-style-type: none"> Maintenance of customer database. Billing recycled water use. Management of new residential Class A connections. Handling prospective and current customer queries. Meter reading for billing purposes. 	<u>Assets</u> Maintenance and repair of recycled water infrastructure including: <ul style="list-style-type: none"> Bursts & leaks, Flushing, Meter installations Customer interface connections, etc. Maintaining GIS and assets register and replacements 	<u>Regulation</u> Management of: <ul style="list-style-type: none"> Corporate auditing Compliance procedures Reporting 	
	<u>Water Systems</u> <ul style="list-style-type: none"> Maintenance and upgrades at RWPs. Monitoring of recycled water supplied Recycled water quality monitoring. Water quality database maintenance. Respond to dirty water complaints relating to recycled water supply. 	<u>Renewable Resources</u> Work with customers to ensure appropriate recycled water use including: <ul style="list-style-type: none"> Development of Regional EIP's & CSMP's. Customer education and training. Assessing health and environmental risks. Reporting and auditing of recycled water systems and schemes. Planning and development of recycled water schemes. Identifying funding pathways and developing a business case. Meter reading for non billing purposes. EPA Corporate license compliance for recycled water quality. 	

4 Roles and Responsibilities

4.3 Recycled Water Customers

Recycled water customers are responsible for ensuring recycled water use and site practices on their land comply with EPA guidelines and individual CSMPs (and CSCs) or trucking permits as relevant, and to demonstrate:

1. Recycled water is used and managed for the purpose allowed (for Class B or C quality as relevant) by EPA guidelines and approved under the CSMP;
2. Onsite recycled water storages and irrigation water distribution systems are operated and maintained to minimise seepage, leaks, overflows, spills, etc;
3. WW or its appointed representatives are allowed site access for the purposes of customer interface maintenance, meter reading, site checks and audits, soil sampling, incident response, etc;
4. Participation and co-operation in site audits by WW staff and/or external auditors as relevant, and implementation of corrective actions or improvements as required;
5. Participation from time to time in WW's customer recycled water inductions and refresher training sessions when offered;
6. Approval is gained from WW prior to any changes to recycled water purpose and/or site application area not otherwise allowed by the CSMP
7. Recycled water use, soil and groundwater monitoring (as relevant) is carried out in accordance with the CSMP;
8. WW is promptly notified of any non-conformances with CSMPs or CSCs, and any incidents on the customer's property and co-operates with WW as required;
9. Adequate records are maintained including details of staff training and inductions, incidents, maintenance, recycled water use (eg. irrigation rates), storage and monitoring;
10. Annual reporting to WW on recycled water use and self-checks on performance against the CSMP.

Customer roles and responsibilities are described further in Chapter 8 of this REIP, and also in the REIP Action Plan as mentioned earlier.

4.4 EPA Victoria

EPA's role is to provide sign-off on the REIP and to provide formal endorsement that the scheme complies with EPA guidelines and is exempt from works approval and licensing.

EPA will review WW's annual environment reports to satisfy itself that EPA guidelines are being effectively implemented by WW and its recycled water customers, through the monitoring and reporting provisions of the REIP and individual CSMPs. Any EPA feedback on annual reports will be addressed in WW's annual REIP review process.

WW will also seek EPA approval for any updates or changes to the REIP as a result of REIP annual reviews, or expansions or management changes to WW's recycled water schemes.

Western Water's Recycled Water Schemes

5.1 Overview

Western Water has seven recycled water plants (RWP) at: Melton, Bacchus Marsh, Sunbury, Gisborne, Riddells Creek, Romsey and Woodend located as shown in Figure 1-2. The quality or "Class" of recycled water produced from each RWP and method of supply to customers is indicated in Table 5-1. Note that Melton RWP produces both Class A and Class C recycled water.

Table 5-1 Western Water Recycled Water Schemes

Recycled Water Plant (RWP)	Class	Scheme	Customer Supply Method		
			Onsite	Offsite via pipeline	Offsite via standpipe
Melton (Surbiton Park)	A & C	Melton South ¹	ü ²	ü	ü
Bacchus Marsh (Parwan South)	C	Bacchus Marsh	ü ²		
Sunbury (Springvale Farm)	B	Sunbury-Melton	ü ²	ü	ü
Gisborne	B	Gisborne		ü	ü
Riddells Creek	C	Riddells Creek		ü	
Romsey	C	Romsey	ü ²	ü	ü ⁴
Woodend	C	Woodend	ü ³	ü	

Table Notes:

1. Includes *Melton South Regional Class A Scheme* - offsite supply to Eynesbury Township, HRV, etc.
2. Recycled water irrigation occurs on WW land at Melton, Bacchus Marsh, Sunbury and Romsey RWPs under farm lease agreements with private (3rd) party customers.
3. At Woodend RWP onsite recycled water irrigation occurs directly under WW control (no farm leases at time of writing of this REIP).
4. The Romsey standpipe is located at Macedon Ranges Shire Council depot and is for council use only.

5.2 RWP Treatment Processes and Recycled Water Quality

Recycled water quality (Class, nutrients and salinity) differs marginally between each of the RWPs due to a combination of factors including:

- Raw sewage inflow quality, which is largely dictated by the unique sewerage catchment size and conditions for each township including:
 - Population and proportion of domestic, commercial and industrial sources,
 - extent of stormwater inflows and groundwater infiltration, and
 - impact of water restrictions;
- Treatment process design and operating conditions at each RWP; and
- Size of lagoon systems and recycled water storage facilities and evaporative losses at each RWP.

Treatment processes at each RWP are designed and operated to ensure recycled water quality complies with both the return to stream water quality limits of the EPA corporate licence and the recycled water quality objectives of EPA Victoria's *Environmental Guidelines for the Use of Reclaimed Water*. This ensures that the Class A, B or C recycled water produced from each RWP is suitable or "fit for purpose" for the wide range of intended uses by existing and future customers. RWP treatment processes and recycled water quality characteristics are summarised in Table 5-2.

5 Western Water's Recycled Water Schemes

Table 5-2 RWP Treatment Processes & Recycled Water Quality (2008-09)

RWP	Treatment Process Train [WW to verify]	Recycled Water Quality								
		Class	E.Coli (org/100mL)		pH ^(b)	Salinity / Sodicity ^(b)			Nutrients ^(b)	
			EPA Limits ^(a)	Actual ^(b)		TDS (mg/l)	EC (µS/cm)	SAR	N (mg/l)	P (mg/l)
Sunbury	Activated Sludge, biological de-nitrification (modified MLE) process, P-reduction by Ferric sulphate dosing, Tertiary Media Filtration (sand and filter coal), chlorination	B	<100	1	7.2	436	740	3.9	14 ^(c)	0.3 ^(c)
Bacchus Marsh	Aerated lagoons, Maturation Lagoons, Winter Storage	C	<1000	76	7.9	555	945	6.6	21	13
Melton:										
• Class C Plant	Activated Sludge, biological de-nitrification (modified MLE) process, Maturation Lagoons, Winter Storage	C	<1000	180	7.1	403	630	6.7	23	9
• Class A Plant	Micro-filtration, UV and Chlorination	A	<10	0	7.4	425	664			
Gisborne	Activated Sludge, Aerated lagoons, biological de-nitrification (modified MLE) process, P-reduction by Ferric sulphate dosing, Maturation Lagoons	B	<100	23	7.6	408	640	5	5	1
Riddells Creek	Facultative lagoons, Maturation Lagoons, Winter Storage	C	<1000	31	8.0	549	969	4.6	19	12
Romsey	Facultative lagoons, Maturation Lagoons, Winter Storage	C	<1000	61	8.2	554	890	6.2	10	5
Woodend	Activate sludge, IDAL Tanks, P-reduction by Ferric sulphate dosing, Maturation Lagoons, Winter Storage	C	<1000	230	7.9	564	936	6.4	8	10

Notes to above Table:

- (a) "Guidelines for Environmental Management Use of Reclaimed Water" (EPA Pub. No. 464.2, 2003) recycled water quality objective (annual median).
 (b) Water quality data source: Western Water 2008/09 Environmental Sustainability Report.
 (c) EPA Corporate Licence nutrient limits (annual medians) for Sunbury RWP discharge to Jacksons Ck – same water quality objective for recycled water supply.
 (d) Recycled water nutrient objectives for Gisborne RWP and post 2010 Woodend RWP upgrade (in commissioning during REIP development).

5 Western Water's Recycled Water Schemes

Water quality parameters that are most important in terms of irrigation and agronomic sustainability and productivity are salinity, cation balance (SAR), pH and nutrients (nitrogen and phosphorus). The levels of these parameters differ marginally between RWPs, but are all within manageable levels for ensuring productive agriculture under irrigation with recycled water.

The use of recycled water with higher salinity and nutrient levels (eg. at Riddells Ck RWP) and higher sodium adsorption ratio (SAR) is regarded as low risk according to land capability assessments commissioned by WW, and is closely monitored through monitoring of soil at customer sites. Recycled water nutrient levels are not limiting in terms of nutrient loads from irrigation due to relatively low to moderate water demand across the WW service region. Refer to chapter 6 for an overview of land capability, nutrient, salinity and sodicity management issues relating to suitability for irrigation and other uses of recycled water.

5.3 Recycled Water Quantity and Availability

Table 5-3 provides a breakdown for 2008-09 of RWP inflows and recycled water availability after process influences. Recycled water volumes available to WW's customers depend on RWP inflows and treatment process influences including process recirculation needs, biosolids management, recycled water storage and licensed discharges to waterways. Relative losses by evaporation and seepage are more significant for lagoon treatment and storage systems such as those at Melton, Bacchus Marsh, Riddells Creek and Romsey RWPs.

In 2008-09, total recycled water used by WW customers was about 5328 ML/Yr across all RWPs, compared with a total of about 6058 ML/Yr produced, representing about 88% recycling. The recycled water volumes supplied under contract to WW's recycled water schemes ranged from around 2874 ML/Yr from Melton RWP (including Class A recycled water) to 125 ML/Yr from Riddells Creek RWP.

Table 5-3 RWP Inflows, Recycled Water Availability and Use - 2008-09

RWP	Class	RWP Inflows (ML)	Process Influences ¹ (ML)	Volume Produced (ML)	Volume Used ² (ML)	% Water Recycled
Melton	A & C	3188	314	2874	2874 ³	100%
Bacchus Marsh	C	921	367	554	554	100%
Sunbury ⁴	B	1726	35	1691	1100	65%
Gisborne ⁴	B	479	24	455	331	73%
Riddells Creek	C	162	37	125	125	100%
Romsey	C	294	85	209	209	100%
Woodend ⁴	C	191	41	150	135	90%
Total		6961	903	6058	5328	88%

Table Notes:

1. Process Influences take into consideration process recirculation needs, rainfall inputs, and losses from evaporation, seepage and biosolids.
2. WW allows customers to take additional recycled water over and above their contracted amount, if additional recycled water is available and based on seasonal irrigation demands.
3. The recycled water volume used from Melton includes both Class A and Class C schemes.
4. At Sunbury, Gisborne and Woodend RWPs, a proportion of recycled water is discharged to local waterways in accordance with the EPA Corporate Licence. These discharges will progressively reduce as WW moves towards 100% recycling through its future projects to increase recycled water availability to customers.

5 Western Water's Recycled Water Schemes

5.4 Recycled Water Supply Methods

The recycled water supply method from each RWP to WW customers was indicated in Table 5-1. WW has established recycled water supply schemes to customers located both onsite (irrigation farm leases on WW land adjacent to RWPs) and offsite (on private customer properties) via pipelines and standpipes depending on RWP. General locations of RWPs and recycled water pipeline networks were shown in Figure 1-2.

5.5 Recycled Water Uses

The Class B and C recycled water produced from WW's RWPs is suitable for a wide range of irrigation and other beneficial uses, subject to appropriate site access restrictions and other controls for protection of the environment, human and worker health, livestock and produce from agriculture.

The quantity of recycled water utilised from each RWP depends on the number of recycled water customers and overall area under irrigation both onsite and offsite.

Onsite irrigation occurs at Melton, Bacchus Marsh, Romsey and Woodend RWPs. Recycled water is supplied offsite by pipeline systems from Melton, Sunbury, Gisborne, Riddells Creek, Romsey and Woodend RWPs for beneficial use by numerous private customers for a range of agricultural, horticultural, municipal and recreational turf irrigation uses.

Recycled water standpipes are also available at Melton, Sunbury, Gisborne and Romsey RWPs for numerous trucking customers for irrigation, parks and gardens watering, construction, agriculture and other uses including dust suppression of roads and quarries, etc. Note that Romsey standpipe is at Macedon Ranges Council depot and is for council use only.

The individual features of WW's Class B and C recycled water schemes are summarised in Table 5-4 including volume and quality available for recycling, numbers of customers (onsite and offsite as relevant), range of purposes/uses, etc.

An overall recycled water network plan showing location of all recycled water schemes across the WW service region is attached in Appendix A. Individual recycled water scheme maps are also provided in Appendix A.

5 Western Water's Recycled Water Schemes

Table 5-4 Characteristics of Western Water Class B & C Recycled Water Schemes (2008-09)

RWP	Location	Plant Est.	Class	Vol. Used	Irrigation Onsite			Standpipe	Offsite Customers	
				ML/Yr	No.	Development	Uses	Yes (ü)	No.	Uses
Melton	Butlers Rd, Melton (borders Werribee River)	1979	C	2874	1	338 Ha travelling irrigator, centre pivot & flood	Fodder crops	ü	2	Class C: nursery and equestrian centre Class A: Public open space, golf course, fire fighting and residential use Recreational turf.
Bacchus Marsh	Parwan South Rd, Parwan (~6km south east of Bacchus Marsh township)	1994	C	554	1	95 Ha centre pivot & flood	Fodder crops		-	-
Sunbury	Harker St Sunbury (borders Jackson's Creek)	1975	B	1100	1	2 Ha Drip irrigated vineyard		ü	54	agriculture, horticulture, golf courses, sports grounds, municipal parks & gardens, construction
Gisborne	Haywood Dr, Gisborne (borders Jackson's Creek, east of Gisborne township)	1981	B	331	0	None		ü	6	golf course, sports grounds, municipal parks & gardens, construction
Riddells Creek	Sutherlands Rd, Riddells Creek (eastern outskirts of Riddells Creek township)	1992	C	125	0	None			4	fodder crops & sports ground
Romsey	Portingales Ln, Romsey (borders Deep Creek, 5km east of Romsey township)	1990	C	209	1	80 Ha centre pivot & flood	Fodder crops (agriculture studies)	ü Council use only	2	Racecourse (horse training facility) & construction
Woodend	Montgomery Ln, Woodend (borders Five Mile Creek, north-west of township)	1985	C	135	0	15 Ha spray & flood	Fodder crops		3	golf course, sports grounds, municipal parks & gardens, & construction
Totals				5328		~ 530 Ha			69	

5 Western Water's Recycled Water Schemes

5.6 Future Recycled Water Projects

Western Water has made commitments and capital budget allocations in its Water Plan 2008-2013 for various RWP upgrades to cater for growth and ensure recycled water quality meets EPA guidelines.

Specific projects and programs for achieving the proposed recycled water targets shown in Figure 1-3 include the following:

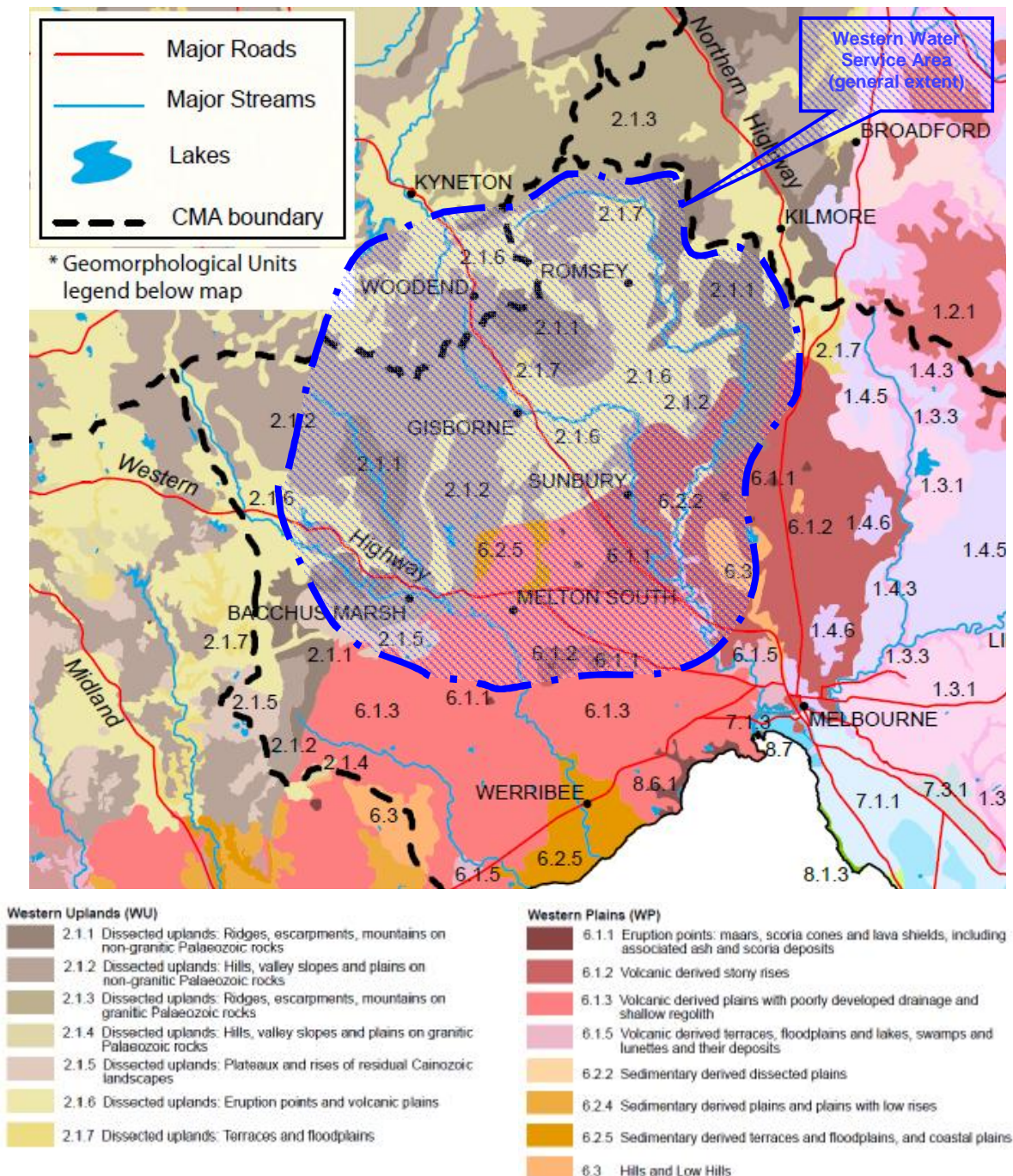
- Melton RWP flow capacity upgrade (2009-2010) and Storage Lagoon (2011-2012)
- Melton South Region Scheme progressive growth (2008-2013)
- Bacchus Marsh RWP progressive upgrades (2009–2012) and Travelling Irrigator (2010-11)
- Sunbury Melton Recycled Water Scheme progressive growth (2008-2013)
- Sunbury RWP Class A Feasibility Study (2010-2011)
- Gisborne Scheme Extension Stage 1 (2008-09) and Stage 2 (2011–2013)
- Riddells Creek Scheme Extension Stage 2 (2011-2013)
- Romsey Scheme Extension Stage 1 (deferred until additional recycled water is available)
- Woodend RWP Upgrade (2009-2010) and Scheme Extension Stage 2 (2010-2011)
- Network augmentation for various schemes (progressive 2009-2013).

Regional Land Capability

6.1 General Description of Region

Western Water's region covers an area of about 3000 km² (Figure 1-1) and is within Victoria's Western Plains and Uplands. The land systems across the region are dominated by the volcanic plains and dissected uplands generally in the east and south, and dissected tertiary land surfaces in the uplands to the west and north as illustrated in Figure 6-1 (the WW service area is generally as delineated within the blue hatched area).

Figure 6-1 Land Geomorphology to the north-west of Melbourne (source: VRO website 2009)



6 Regional Land Capability

6.2 Land and Soil Capability Assessments

Western Water has carried out numerous soil suitability and land capability assessments (“LCA”) across the WW region to evaluate sustainability of recycled water use. These assessments have been undertaken for a range of purposes including:

- Site selection and risk assessments as part of original RWP and onsite irrigation scheme works approvals and licence applications to EPA,
- Establishment and expansion of various offsite recycled water schemes as part of development and subsequent EPA sign-off of previous EIPs and EMPs;
- Ongoing soil and groundwater monitoring programs at RWPs and onsite irrigation schemes; and
- Ongoing monitoring and EPA guidelines compliance programs at customer sites.

WW customers irrigating with recycled may also from time to time carry out their own soil monitoring programs and farm productivity assessments.

A list of key reports from the last ten years containing important information about soil and land capability and its suitability for recycled water irrigation use is given in Appendix C.

The soil assessments and LCA reports, and other published geological studies, soil and land surveys listed in Appendix C have identified a wide range of land systems across the WW region. An overview of the different physical characteristics (topography, geology, soil types, etc), climatic conditions, and land uses (agricultural and other) as reported in these studies is provided in the following sections.

6.3 Climate

Rainfall and Evaporation

The WW region is within the general rain shadow of the Otway Ranges. The southern parts of the region experience a drier mild to temperate climate, with the districts around Sunbury, Melton and Bacchus Marsh having long term average rainfall of less than 500 mm/year. The northern uplands experience cooler temperatures and slightly higher average rainfall ranging from around 700mm/yr at Romsey, 750mm/yr Gisborne and over 800mm/yr at Woodend.

Since late 1996, annual rainfall has been consistently lower (typically 50-100mm/yr less) than long term averages. During 2006 and 2007, the region experienced some of the lowest rainfall on record, receiving only ½ half of normal annual rainfall. This has been a key reason for increased customer demand for recycled water across the WW region.

Annual average evaporation slightly varies across the region ranging from about 1350mm per year within the southern plains around Melton, Bacchus Marsh and Sunbury to approximately 1100 mm/yr in the higher areas of Woodend including at Woodend golf course.

Temperatures

Maximum temperatures typically reach 25-30°C between December and February in Gisborne and Sunbury (ie. roughly the centre of the WW region). Temperatures are normally than a few degrees higher than this in the southern plains and a few degrees lower in the more elevated areas around Woodend. Average maximum winter temperatures are generally 10-15°C cooler across the WW region than summer average maximums.

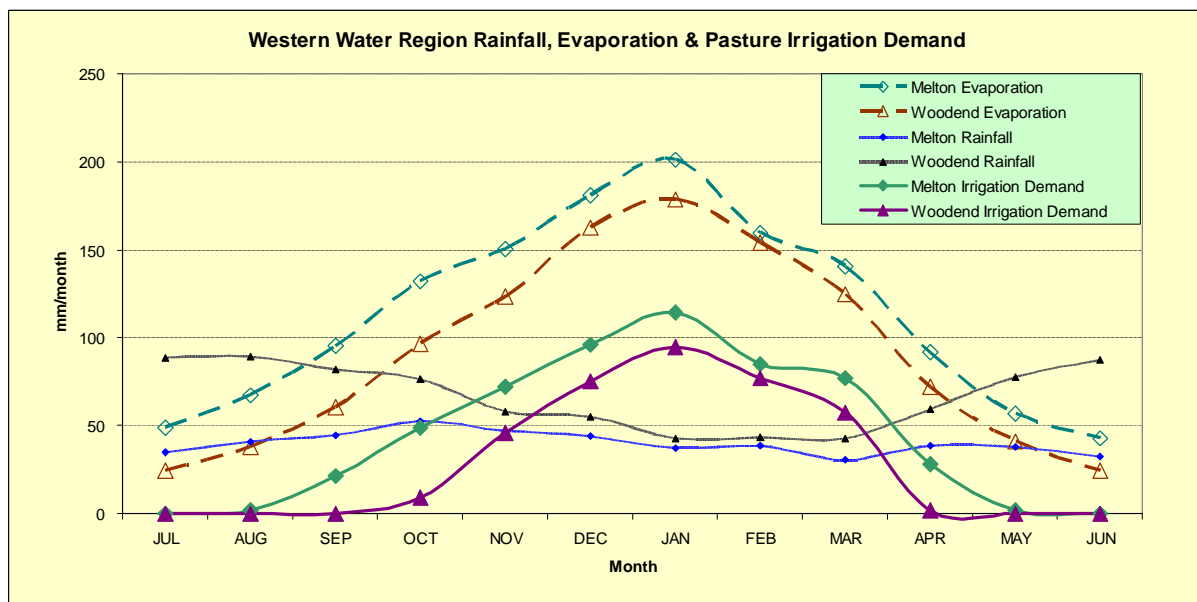
6 Regional Land Capability

Suitability for Irrigation

As a whole the region generally experiences higher winter and spring rainfall, lower summer rainfall, winter chilling and minimal spring frosts. These conditions are suited to a range of irrigated agricultural and horticultural enterprises including wine grapes, fruit, fodder crops, grazing pasture and forestry. These conditions are also suited to spring/summer/autumn irrigation of turf grasses on recreational reserves, sports ovals and golf courses.

Monthly rainfall and evaporation profiles for Melton and Woodend (representative of the range across the WW region), and typical irrigation demand for annual pasture are shown in Figure 6-2. The length of the irrigation season in an average year is typically around eight months from September to April. In recent very dry years the irrigation season has been longer (August through to May).

Figure 6-2 WW Region Rainfall, Evaporation and Pasture Irrigation Demand



6.4 Landscape/topography

The landscapes across the WW region where most recycled water customer properties are located can broadly be described as gently undulating, with some recycled water customer sites located on localised flatter land surfaces on volcanic derived terraces (eg. Surbiton Park) and alluvial floodplains (eg. sports reserves along Jacksons Creek floodplain in Gisborne, and along Five Mile Creek at Woodend). There are a small number of customer sites located on steeper landscapes in more elevated areas of the region such as Woodend Golf Course which is located on the south-west colluvial apron of the small lava cone (Newer Volcanics eruption point known as “Golf Course Hill”).

Elevation across the WW region ranges from less than 100m at Melton South (Surbiton Park) to over 550m at Woodend, and over 610m at Woodend Golf Course. In the undulating and steeper areas across the WW region all recycled water customers have spray, sprinkler or drip irrigation systems on their properties for efficient application of recycled water and to minimise runoff.

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On the flatter lands at Melton RWP, flood irrigation is undertaken on laser graded paddocks, with any runoff collected in drains and sumps for subsequent reuse onsite. On other irrigation areas on undulating land at Melton RWP, spray irrigation systems including pivot irrigators are employed.

6.5 Geology and Soils

The geology and soils across the WW region have been extensively surveyed and mapped and subsequently published for the Victorian Geological Survey as well as numerous soil and land studies and reports (see list in Appendix C). In addition, WW has commissioned various sub-regional or site specific land capability and soil suitability studies (also listed in Appendix C).

Volcanic Plains and Uplands

As reported in the various land and soil studies the WW region is mostly within the volcanic or basaltic plains and uplands (Newer Volcanics). As a result almost all of WW's recycled water customer sites (both onsite and offsite) are located on soils derived from Pleistocene basalt. The predominant soils on the volcanic plains are the sodic duplex or texture contrast soils, which generally comprise the following two main types (described by Rendell McGuckian in 2001 for the Sunbury-Melton area):

- Red-brown calcareous sodic duplex soils or "red-brown earths"; and
- Mottled yellow and grey sodic duplex soils.

The above soil types are the most widespread soils on the lower volcanic plains but are also generally applicable to the volcanic dissected uplands and plain in the higher regions of the WW service area.

These soils generally have shallow topsoils (generally <10cm) consisting of fine sandy to silty clay loam topsoils overlying subsoils with high clay fraction. There is usually shallow weathered basalt rock on the plains, and/or basalt stones and boulders ("floaters") at the surface on low hills and rises. In most long-established agricultural areas in the volcanic plains the basalt stones and boulders have been largely removed to improve the land arability.

Red gradational clay-loam soils which are often stony with higher permeability are found in some isolated areas such as on crests and lava cones. There are also the grey cracking clays (uniform profile), commonly found in low lying areas including on lower slopes, swales and alluvial terraces of the basaltic plains. These poorly drained soils are often self mulching, have low permeability and can experience extended periods of waterlogging.

The red-brown earths are considered moderately suitable for low intensity irrigation subject to good management of soil structure and site drainage. The better drained soils tend to occur on the gently undulating and long gentle slopes of the landscape and outwash slopes of old lava cones.

Palaeozoic Sedimentary Rocks Hills and Landscapes

The Palaeozoic sedimentary hills and landscapes (mostly originating from Ordovician Slates and Sandstones) exist in the steeper hills and uplands to the north of Gisborne and Riddells Creek up towards Woodend. There are also isolated sedimentary landscapes in the gentle hills to the north west of Sunbury towards Toolern Vale. The sedimentary soils in the Sunbury land system tend to have shallow stony gradational profiles with shallow topsoils on the upper slopes, and mottled yellow-brown clayey duplexes on lower slopes. These soils tend to have poor structure and drainage and are prone to waterlogging in low lying areas and erosion in the steeper areas.

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However, there are some well drained sedimentary soils in the Gisborne, Riddells Ck and Woodend recycled water supply areas, which are considered suitable for recycled water irrigation. As a result there are a few customer sites at Woodend, Gisborne and Riddells Creek located (either fully or partly) using recycled water on the better soils (loams and sandy-loams) of these sedimentary land surfaces.

For further details of specific geology, soils and land capability across the region, refer to the specific reports as listed in Table 6-1 as well as published literature (Appendix C).

6.6 Groundwater

Watertable levels and quality of groundwater vary significantly across the WW region with topography and geology, with the salinity of the shallow aquifer generally increasing to the south.

In the north of the WW region the shallow aquifer of the Palaeozoic sedimentary rocks around Gisborne, Romsey and Woodend has good quality groundwater - typically ranging up to 3000 mg/L, mostly <1000mg/L in higher rainfall areas.

In the southern parts of the region, the shallow aquifer is contained within the fractured rock of the basalt, and is of generally poorer quality - mostly >2500mg/L, up to 6000 mg/L. The deep aquifer system (Werribee Formation) underlies the shallow basalt aquifer, and is best in the Bacchus Marsh area where it is has been used for irrigation.

WW carries out groundwater monitoring from bores at its seven RWPs to evaluate impact of treatment activities and (where relevant) onsite irrigation, and to assess trends and compliance with the water quality objectives of SEPP Groundwaters of Victoria. WW's groundwater monitoring program is to be discussed in chapter 10.

Based on the range of salinities detected by monitoring between 2004 and 2006, groundwater quality at each of the RWPs has been classified according to segments as indicated in Table 6-1.

Current and potential beneficial uses of groundwater across the WW region include irrigation, potable water supply, mineral water supply, stock watering, non-potable domestic uses, industrial uses, primary contact recreation and ecosystem support.

Table 6-1 Groundwater Salinity at RWPs (source: 2004-2006 Bore Monitoring Data, Hyder 2007)

RWP	SEPP Groundwaters of Victoria – Segment (TDS levels mg/l)			
	A2	B	C	D
	501-1000	1001-3500	3501-13000	>13000
Melton		ü	ü	ü
Bacchus Marsh	ü	ü		
Sunbury		ü	ü	
Gisborne	ü	ü		
Riddells Creek		ü	ü	
Romsey	ü	ü	ü	
Woodend	ü	ü	ü	

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6.7 Crop Water Usage - Irrigation Requirements

Potential irrigation rates for recycled water will vary across the Western Water region according to different rainfall levels and site specific limitations such as soil and crop type, slopes, irrigation method, drainage, etc. The climate and soils across the region are suited to moderate levels of irrigation, but a wide range of agricultural, municipal, industrial and commercial enterprises are possible such as:

- Fodder crops including annual and perennial pastures, lucerne, etc
- Cereal Crops, wheat, oats, etc
- Recreational turf, golf courses, park and gardens, turf farms
- Horticulture, vineyards, fruit trees, olives, flowers, lavender, nurseries, etc
- Woodlots, and
- Construction, road making, dust control, etc.

Estimated potential irrigation demands (plant use) across the WW region for a typical pasture (eg. rye/clover) mix or recreational turf grass mix, lucerne, vines, olives and mature native woodlots (aged greater than 4 years) is given in Table 6-2.

Table 6-2 Indicative Irrigation Demand from Recycled Water (average rainfall year)

Recycled Water Scheme	Annual Rainfall (mm/Yr)	Annual Evaporation (mm/Yr)	Indicative Irrigation Demand (ML/Ha/Yr)				
			Pasture	Lucerne	Vines (no cover crop)	Citrus/ Olives	Mature Native Woodlots
Sunbury	490	1370	5.4	8.3	3.6	4.0	10.2
Bacchus Marsh	470	1370	5.5	8.4	3.7	4.1	10.4
Melton	480	1370	5.5	8.3	3.7	4.1	10.3
Gisborne	740	1200	4.0	6.2	2.7	2.6	7.3
Riddells Ck	740	1200	4.0	6.2	2.7	2.6	7.3
Romsey	710	1200	4.2	6.5	2.9	2.9	7.6
Woodend	800	1100	3.6	5.7	2.6	2.4	6.5

The above rainfall, evaporation and irrigation demands are indicative only and are based on annual long-term averages, calculated using water budget calculation methods consistent with EPA's *Guidelines for Wastewater Irrigation*. Note that there has been higher irrigation demand since 1996-97 due to the extended period of drought.

6.8 Nutrient Loads and Crop Uptake

Estimated average annual nutrient loads from recycled water irrigation on pasture, lucerne, vines, citrus, olives, and mature native woodlots are given in Table 6-3 based on the irrigation demands and corresponding nutrient concentrations in recycled water produced from each RWP in 2008-09 (see Table 5-2). Nitrogen loads from irrigation with recycled water from all RWPs would be expected to be less than typical pasture requirements, suggesting that supplementary nitrogen fertilisers may be needed on all or most customer sites in the WW service area.

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Table 6-3 Indicative Nutrient Loads from Recycled Water Irrigation (average rainfall year)

Recycled Water Scheme	Indicative Crop Nitrogen and Phosphorus Loads (kg/Ha/Yr)									
	Pasture		Lucerne		Vines (no cover crop)		Citrus/Olives		Mature Native Woodlots	
	N	P	N	P	N	P	N	P	N	P
Sunbury	76	2	116	3	50	1	56	1	143	3
Bacchus Marsh	116	72	176	109	77	48	87	54	218	135
Melton	126	49	192	75	84	33	94	37	237	93
Gisborne	20	4	31	6	14	3	13	3	36	7
Riddells Ck	110	56	173	87	76	38	73	37	203	102
Romsey	42	31	65	47	29	21	29	21	76	55
Woodend	29	36	46	57	21	26	19	24	52	65

The phosphorus loads are also expected to be lower than plant needs for all recycled water schemes except for Bacchus Marsh and Riddells Creek, which could slightly exceed normal P-uptake rates for many common pasture/turf mixes, cereal and horticultural crops grown in the WW service area. To manage these nutrient loading issues, WW's customers are required as part of their CSMPs to carry out soil testing at their properties to account for the nutrient value in recycled water as part of nutrient budgets and fertiliser planning.

6.9 Salinity and Sodicity

Estimated average annual salt loads from recycled water irrigation is given in Table 6-4, based on the irrigation demands for a typical pasture or turf grass mix and specific salinity (TDS) levels of recycled water from each RWP as listed in Table 5-2. Estimated salt loads are expected to be highest from Bacchus Marsh, followed by Riddells Creek, Sunbury and Melton.

Table 6-4 Indicative Salt Loads from Recycled Water Irrigation of Pasture (average rainfall year)

Recycled Water Scheme	Salt (TDS) Load
	T/Ha/Yr
Sunbury	2.6
Bacchus Marsh	3.1
Melton	2.6
Gisborne	1.7
Riddells Ck	2.7
Romsey	2.3
Woodend	2.1

Recycled water sodicity is lowest at Sunbury (SAR = 3.5) and highest at Melton (up to 6.8). These SAR levels should be readily manageable on customer properties. Soils across the WW service area are naturally sodic (ESP greater than 6), which is common for many volcanic and sedimentary land systems in this region.

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Recycled water customers manage their soil salinity and sodicity (due to natural conditions and recycled water irrigation) through good agricultural, irrigation, soil and crop/plant management practices and measures such as:

- selection of crops/plant with appropriate salt tolerance for the individual recycled water salinity;
- appropriate leaching volumes using recycled water or other low salinity water sources such as catchment water or groundwater if available, and also taking into account winter/spring rainfall;
- regular soil testing to check salt and sodicity levels do not increase to levels of concern to plant growth and soil structure decline; and
- site improvements and soil treatments as required (usually based on soil testing) including application of calcium supplements such as gypsum or lime and application of organic matter (manure, compost, etc) to improve cation balance, soil structure, drainage, etc.

6.10 Acidity/Alkalinity

Recycled water available from all RWPs is neutral to slightly alkaline, often influenced by original town water supply source, sodicity levels and algal growth. These pH levels are within the range for productive plant growth in irrigated agriculture. Customers may apply soil supplements (eg. humic acids, sulphur and ammonium-based nitrogen fertilisers) from time to time that will help to reduce pH levels if they rise to levels of concern.

6.11 Summary

The overview of climate, soils and other land capability issues in this chapter provides the background for understanding long-term irrigation demands and potential impacts of recycled water use across the WW region. The various land capability assessments and soil suitability studies commissioned by WW (Appendix C) identified the key soil limitations for recycled water irrigation on the numerous landscapes across the region. These studies resulted in a range of recommended irrigation controls, site management measures and soil monitoring programs to ensure productive agriculture as well as other uses of recycled water can be sustained.

These land and soil capability studies form part of WW's risk assessment processes and the environmental management framework for this REIP and individual CSMPs.

To follow in this REIP are the "activity based" chapters describing the key performance objectives and actions associated with WW's Class B and C recycled water schemes including recycled water quality and customer site monitoring, reporting and auditing programs. Customer site and soil management issues, irrigation controls, monitoring of recycled water use, soil nutrients, salinity, etc are also to be covered in chapter 8.

Recycled Water Supply Reliability - Quality and Quantity

7.1 Objectives

- (a) Provide recycled water to Western Water sites and reuse customers that meet the Class B and C recycled water quality objectives of EPA guidelines corresponding to the individual RWP as listed in Table 5-2.
- (b) Minimise the effects of algae including Blue-Green algal blooms on customer activities.
- (c) Ensure reliable supply of recycled water to meet the demands of customers in accordance with CSMPs and plant water demands.
- (d) Minimise spills, leaks and flushing flows to the environment from recycled water assets
- (e) Ensure all WW staff that work with recycled water have appropriate training in health and environmental risk awareness and safe working practices and procedures.

7.2 Background

WW produces Class A, B and C recycled water from local RWPs within its service area. The scope of this REIP only relates to the Class B and C recycled water schemes as described in chapter 5. Western Water is committed to meeting the return to stream water quality requirements of its EPA corporate licence and the recycled water quality standards of EPA's *Environmental Guidelines for the Use of Reclaimed Water* (see Table 5-2 in Section 5.2).

Western Water also recognises that algal growth can occur in recycled water storages (e.g. particularly during summer and autumn). Algal blooms can cause elevated pH, suspended solids and/or BOD levels with potential to exceed Corporate Licence return to stream and recycled water quality limits and EPA guidelines recycled water standards, and also have potential to cause odour. Algal management procedures established by WW are part of routine day-to-day operations and are aimed at minimising algal growth in recycled water storages in the first instance.

WW's recycled water assets (both below and above ground) are designed and constructed in accordance with relevant Australian and WSAA standards. These assets are maintained in accordance with WW's Depot Operations Manuals and other procedures.

7.3 Key Actions

- Operation and maintenance of all RWPs in accordance with WW's established RWP and Depot manuals, procedures, contingency plans, etc;
- Monitoring in accordance with Western Water Corporate Licence monitoring requirements and this REIP (see Chapter 10);
- Communicate monitoring results to EPA and customers and produce an annual report to EPA on the performance of recycled water quality from all RWPs;
- Proactively control algal growth and manage blue-green algal blooms in recycled water storages in accordance with WW procedures including the following:
 - Design, operation and maintenance of recycled water storages and surrounds to encourage mixing of storage contents by natural wind and wave action;
 - Mechanical aeration/mixing of storage contents if necessary to control stratification;
 - Routine monitoring of storage when high pH readings occur;
 - Regular inspection programs for early detection of algal growth;
 - Controls on discharge or transfer of algal laden waters between storages, treatment facilities and supply to customers;

7 Recycled Water Supply Reliability - Quality and Quantity

- Respond to any algal blooms in accordance with Algal alert levels and response actions listed in WW's emergency response plans and procedures ("ERP") and in conjunction with the minor and major recycled water incident procedures
- Design and construct recycled water assets (Pipelines, Pump Stations, Storages) in accordance with relevant Australian and WSAA standards
- Maintain Western Water's Recycled Water Supply Assets and Systems to ensure reliability of recycled water supply and prevention of leaks and spills
- Ensure scheduled maintenance and inspections of recycled water infrastructure is conducted on a routine basis in accordance with WW's Depot Operations Manuals and other operational and maintenance procedures
- Water flushing and scouring retained on land or transferred back to nearest RWP for treatment and recycling
- Respond to significant recycled water asset spills, leaks or discharges in accordance with trigger alert levels and response actions listed in WW's emergency response plans and procedures ("ERP") and in conjunction with the minor and major recycled water incident procedures
- Provide induction training to relevant staff to provide awareness of potential health and environmental risks associated with recycled water and safe working practices when working with recycled water. Provide refresher training as needed.

7.4 References

- RWP Operation and Maintenance Manuals
- Depot Operations Manuals.
- ERP Algal Management in Recycled Water Storages
- Emergency Response Procedure WW ERP-002
- Incident Escalation procedure WW ERP-003.

Customer Site Management

8.1 Objective

- (a) Ensure all recycled water customers comply with individual Customer Supply Contracts (CSC) and Customer Site Management Plans (CSMP), Temporary Supply Agreements (TSA), Corporate Licence and EPA guidelines.
- (b) Ensure recycled water is only supplied for allowable (“fit for purpose”) uses in accordance with site restrictions and management requirements of CSC’s, CSMPs, TSA and EPA’s guidelines.
- (c) Ensure customers understand their obligations and requirements under the CSC, CSMP, TSA and EPA’s guidelines.

8.2 Background

In line with the Recycled Water Strategy 2008-2013 Western Water is aspiring to achieve 100% beneficial recycling, by identifying fit-for-purpose opportunities, developing new markets and progressively expanding its customer base for recycled water. WW has a transparent process based on triple bottom line risk principals to identify long term suitable and viable customer sites. This process comprises five main phases:

1. Identification of current and future recycled water availability (ie. volumes and quality) from RWP’s;
2. Identification of suitable supply districts for cost-effective pipeline transfer of recycled water – generally based on proximity, broad land capability, engineering feasibility and cost-benefit;
3. Advertising of an Expression of Interest (EOI) to potential customers in the proposed supply district to provide a list of possible new customers;
4. Short listing of potential customers based on site selection processes including more site specific assessments of technical and economic viability, soil suitability and land capability, health and environmental risk considerations;
5. Processing of applications from preferred short listed customers, approval by WW and sign up of the new customers through issue of CSCs and CSMPs.

An overview of WW’s “Principles of recycled water allocation” and customer site assessment and approvals processes are given below.

8.2.1 Western Water’s Principles of Recycled Water Allocation

Western Water is committed to maximising the beneficial use of recycled water to preserve drinking water supplies in response to climate change and the availability of water for future generations. Ensuring transparency when developing recycled water schemes and allocating recycled water contracts is a key part of this commitment.

Western Water’s key principles for allocation of recycled water are:

- Ensure that recycled water projects are Environmentally Sustainable and protect public health;
- Increase Public and Government Awareness of the role of recycled water in the water cycle;
- Balance supply and demand for water by our Developing Markets;
- Aim for Commercially Viable recycled water projects;
- Ensure Risks are understood managed and accepted by the most appropriate stakeholder;
- Offer a Transparent Process to ensure Equity.

8 Customer Site Management

Due to the high profile and sensitive nature of water supply contracts, all new recycled water contracts for 10ML or more are submitted for WW Board approval after an assessment of the suitability of the application has been undertaken. The following aims will be addressed during the assessment process:

- To achieve transparency, fairness and accountability in allocation.
- To achieve a balance in allocation between large, medium and small proposals.
- To ensure social, environmental and economic factors are considered in a balanced manner in the assessment.

The main principle for pipeline route selection is to maximise the volume of recycled water that can be used in a sustainable manner for pipeline capital expenditure. Additional considerations taken into account by WW when determining the pipeline route(s) for a new recycled water scheme are to:

- Reduce the demand on drinking or raw water supplies
- Attract sustainable agricultural enterprises to ensure long-term viability of the scheme
- Consider the land and soil capability
- Maximise winter storage potential
- Be consistent with local and state government planning schemes
- Maximise the economic and employment benefits to the Region.

In additional, when processing new recycled water applications and access to surplus recycled water on an existing scheme, applications are assessed on the following priorities:

1. Existing customers in order of receipt of application;
2. New potential customers on the pipeline route; and
3. New potential customers remote from the pipeline route.

8.2.2 Recycled Water Customer Application and Approvals Process

WW has a well-established “step-by-step” application process for prospective recycled water customers. New customers are required to satisfy specific criteria to confirm site suitability for recycled water use including the following:

- Appropriate intended use (fit-for purpose) use of recycled water
- Property size and proposed recycled water demand
- Property access controls for the public and livestock
- Availability of suitable storage facility for recycled water
- Land capability and soil suitability for long term recycled water use including consideration of:
 - Property slope
 - Soil type, physical and chemical properties (salinity, sodicity, structure, permeability, etc)
 - Presence of shallow groundwater or perched watertables that could restrict irrigation
 - Presence of shallow rock or other restrictive layer (clay hard pan)
 - Site drainage and flood potential and proximity to sensitive waterways, water supplies, etc
 - Potential for offsite spray drift and setbacks to sensitive land uses
 - Biodiversity issues – onsite flora and fauna issues (ie. any threatened species)
 - History of irrigation onsite
 - Proposed irrigation method and rate
 - Agricultural enterprise, crop management, recreational turf management, etc.

8 Customer Site Management

Usually as a minimum, new customers are required to submit the following to WW as part of the assessment process:

- site/farm layout plans showing proposed irrigation areas, site drainage, and surrounding land features and setbacks to sensitive land uses,
- baseline soil test results and interpretations in terms of suitability for recycled water use,
- site management practices for protection of the environment, and access controls and for the public and livestock (as relevant)
- worker occupational, health and safety procedures (safe working practices)
- procedures for responding to incidents (recycled water spills, algal growth in storages, etc)
- other information as requested by WW as part of the development of the CSMP.

WW will carry out a site inspection with the customer and verify the details of the customer's proposal as part of its assessment process. WW will refer any new customers proposing to use >1ML/day to EPA for its review and any subsequent endorsement. WW also refers any new or existing customer proposing to contract >10ML/Yr of recycled water to WW Board for its approval.

Upon approval by WW, customers are issued with a Customer Supply Contract (CSC) and Customer Site Management Plan (CSMP). The CSC and CSMP are to be signed by both the customer and WW prior to the receipt of any recycled water from WW customers. The contract period is usually for a period of up to 15 years.

8.2.3 Customer Supply Contract and Customer Site Management Plan

The CSC defines the legal and administrative terms of agreement for the supply of recycled water to the customer's property, and specifies the quality to be supplied by WW and quantity to be taken by the customer typically on a "take or pay" basis. This contract is supported by the CSMP, which Customers are obliged to fully comply with in conjunction with CSC requirements.

The CSMP describes how the customer uses recycled water. It defines management responsibilities for the customer, details recycled water quantity expected to be used by the customer and site specific controls to ensure compliance with EPA guidelines and protection of human health and the environment. The standard WW CSMP complies with the requirements for site specific EIP's as described in EPA's Guidelines. The typical CSMP for pipeline customers including larger sites (>1ML/d usage) contain the following sections (if relevant):

- Location of Customer Property and approved area for recycled water use
- Recycled water supply source and quality (ie. which RWP supplies the customer)
- Allowable and Prohibited uses of Recycled Water
- Recycled water storage details and controls including algal management
- Irrigation management including method, rates, scheduling, nutrient budgeting,
- Drainage/stormwater run on and run-off and spray drift controls,
- Site access controls for the public and livestock, fencing and signage, etc
- Crop harvest controls
- General Site Management, Inspection and Maintenance Programs
- Operator Competence, Training and Awareness records,
- Health and Safety
- Emergency plans
- Water use and soil monitoring

8 Customer Site Management

- Annual Reporting – standard Annual Compliance Statement
- Appendices containing Customer's Locality and Site Plans.

The Annual Compliance Statement requires recycled water customers to fill in details regarding their recycled water usage for the previous 12 month period. This includes information on crop type, irrigation area and volume of recycled water supplied to each area, and supplementary fertiliser use and any non-compliances that may have occurred during the reporting period.

WW has developed a standard CSMP template for larger sites (ie. typically those ≥ 1 ML/day recycled water use) - see list in Appendix B. CSMP template wording may be modified according to customer site specific conditions and recycled water use risks at individual properties.

8.2.4 Small Recycled Water Users and Trucking Permit Customers

WW has also developed less detailed Customer Site Management Plan template for low volume uses of recycled water (less than 1 ML/day) - see list in Appendix B. These small CSMPs are typically applicable for a one year period and include temporary (short-term or once-off) customers and "Trucking permit" customers who take water from WW or local council managed standpipes.

8.2.5 Allowable Uses of Class B and C Recycled Water

The uses of Class B and C recycled water within Western Water's service area as covered by this REIP are consistent with those allowable by EPA's Recycled Water Guidelines – see adapted table from the guidelines in Appendix E. The CSMPs issued by WW to its customers describe the onsite controls, access restrictions, operating and monitoring requirements that allow these fit for purpose uses in accordance with these EPA guidelines.

Uses of the recycled water that are not allowed by the EPA guidelines (unless specific EPA approval has been obtained by the customer) include:

- Human food crops with edible parts which are to be consumed raw, that are directly irrigated or exposed to recycled water (eg lettuce, tomatoes, capsicums, cabbage, spinach, carrots, onions);
- Washing down of dairy shed/milking equipment;
- Drinking water supply for pigs, or irrigation of grazing land or fodder for pigs;
- Aquaculture (fish farms, yabby farms) for human consumption;
- Recreational sites with unrestricted public access (eg. Public parklands, sporting fields);
- Industrial reuse with open systems, with high worker exposure potential;
- Fire protection systems- standby reticulated sprinkler systems, non emergency access situations.

8.3 Key Actions

- All new customers undertake the application and approval process in conjunction with Western Water including risk and land/soil suitability assessments for recycled water use. Prior to receiving recycled water for the first time, approved customers are issued with an individual CSC and CSMP for signing.
- Develop and maintain individual CSMPs (large or small version as relevant) in compliance with EPA guidelines.

8 Customer Site Management

- Annual internal audits conducted by WW for all customer sites for compliance with CSMP and environmental elements of the CSC, including review of Customer Annual Compliance Statements and customer soil testing results (if undertaken)
- Address non-compliances at Customer sites that may be identified by above activities.
- Provide induction training for new recycled water customers in health and environmental risk awareness, irrigation water efficiency, soil monitoring, and safe working practices. Provide refresher training to existing customers from time to time if required.
- Customer liaison program through a range of appropriate forums and communications such as recycled water customer group meetings, consultative committees, fact sheets, newsletters, advertising, field days, demonstrations, recycled water training on commencement, water use efficiency advice, etc.

8.4 Key References

- Western Water Recycled Water Strategy
- Registration Form - Expression of Interest, Gisborne and Riddells Creek Recycled Water Schemes
- Customer Application Instructions and Information Pack
- Class B and C Recycle Water Customer Folders
- Customer Site Management Plan (Pipeline Customers)
- Customer Supply Contract (Pipeline Customers).
- Site Specific Customer Site Management Plan (small or temporary sites)
- Temporary Customer Supply Contract (Trucking Customers).

Incident Management

9.1 General Procedures

9.1.1 Objective

- (a) To be adequately prepared in terms of staff training and equipment for any recycled water scheme incidents, and to effectively manage Western Water's response to ensure the risk to human health and the environment is minimised.
- (b) To ensure that Minor and Major incident response and reporting occurs in accordance with Western Water's Emergency Response Manual.

9.1.2 Background

Western Water has a high level of emergency preparedness, with contingency plans in place for the responsible management of all potential incidents associated with recycled water. All incidents whether minor or major are managed in accordance with WW's Emergency Response Manual (ERM) as part of the IMS/EMS. The ERM comprises a suite of general and specific emergency plans, procedures and tools - refer to WW's Emergency Response Procedure (WW ERP 002), Incident Escalation Procedure (WW ERP 003) and other key procedures listed in Appendix B.

A range of possible recycled water related incidents and risks have been identified including:

- recycled water supply quality limit exceedances (eg. E.Coli or other pathogens),
- offsite spills from recycled water supply pipelines and/or pump stations,
- offsite overflows from WW or customer recycled storage dams,
- irrigation runoff from customer sites,
- illegal public or livestock access to RWPs or customer sites,
- surface water or potable water supply quality impacts from offsite discharge incidents,
- soil salinity, sodicity, acidity or soil erosion problems or offsite spray drift at customer sites,
- native tree damage at or around reuse sites,
- blue green algal blooms in WW or customer recycled water storages,
- adjacent landowner or other public complaints,
- agricultural produce (food safety) contamination.

Response measures by Western Water to the above incidents could involve notification of EPA and emergency services, implementation of response procedures, activation of the emergency control centre and the issuing of warnings to affected landholders and other stakeholders.

Western Water acknowledges that incident management begins with prevention. The implementation of appropriate prevention measures, such as adequate staff training and adherence to scheduled maintenance serves to minimise likelihood and severity of unplanned incidents. The above potential incidents have been largely identified in the risk assessment framework for recycled water (see Appendix D), and have proactive mitigation management plans in place under WW's RWP and Depot operations manuals as well as this REIP to ensure significant human health or environmental impacts are minimised.

Customers are also required to prepare emergency plans and procedures to promptly deal with any accident, non-compliance or emergency that could occur at the reuse site. The CSMP template listed in Appendix B provides more detail about customer's responsibilities for implementing site specific emergency plans and procedures.

9 Incident Management

9.1.3 Minor and Major Incident Response and Reporting

The above listed potential incidents depending on the circumstances and downstream impacts are able to be quickly categorised as minor, major or crisis incident as defined by WW's *Incident Escalation Guidelines (WW ERP 003/5)* and *Incident Escalation Flowchart (WW ERP 003/4)*. Western Water uses both of these tools to assess an incident in conjunction with the *Incident Escalation Procedure WW ERP 003*.

In the event of an incident being declared all reporting takes place in accordance with the Incident Escalation Procedure WW ERP 003, requiring an *Incident Summary Sheet WW ERP 003/1* to be completed to record all details of the incident and trigger a debrief. All incidents are also recorded in WW's Incident Management Database.

9.1.4 Key Actions

- To proactively prepare for incidents and emergencies and ensure that staff are routinely trained in the Emergency Response Manual and associated procedures.
- Follow the Emergency Response Procedures, Incident Escalation Procedures and incident reporting processes in the event of an incident relating to recycled water schemes.
- Report all major incidents to EPA within a practicable timeline and provide details of response and corrective outcomes of incidents in EPA annual reports.

9.1.5 Key References

Western Water's Emergency response procedures including:

- Emergency Response Procedure (WW ERP 002)
- Incident Escalation Procedure (WW ERP 003)
- Incident Summary sheet (WW ERP-003/1)
- Duty Officer call sheet (WW ERP-003/2)
- Incident Manager's Checklist (WW ERP-003/3)
- Incident Escalation Flowchart (WW ERP 003/4)
- Incident Escalation Guidelines (WW ERP 003/5)
- Algae Management in recycled water storages ERP
- Recycled Water incident report document.

Note that WW standard operating and emergency response procedures including ERP numbers above may change from time to time as part on ongoing EMS reviews and improvements.

Monitoring and Recording Programs

10.1 Objectives

- (a) Ensure Western Water's recycled water quantity and quality monitoring programs provide transparent data to inform customers and EPA of the status of compliance with EPA Corporate Licence and recycled water guidelines.
- (b) Ensure Customer soil monitoring programs enable ongoing assessment of impacts and suitability of recycled water irrigation in the WW region.
- (c) Ensure WW's groundwater monitoring programs at RWPs enable ongoing assessment of impacts of RWPs on groundwater quality and status of compliance with SEPP (Groundwaters of Victoria)

10.2 Background

10.2.1 Recycled Water Volume

Western Water continuously measures and records volume of recycled water supplied throughout all of its recycled water schemes. Volume measurements typically occur at the point of discharge from each RWP into the various recycled water supply pipelines in the WW service area.

Volume of recycled water supplied to each customer site is also metered at the point of supply to the customer's property. These meters are read and recorded monthly by Western Water staff (or by the Customer if requested by WW).

Customers are also required to record recycled water use for irrigation or other uses at their property. Volume of irrigation use is measured and recorded by customers as part of irrigation scheduling programs and water balance calculations.

10.2.2 Recycled Water Quality

Western Water conducts extensive monitoring of recycled water from all of its RWPs. Table 10-1 lists the sampling and analyses program parameters and frequencies for each of the RWPs. This is based on the existing laboratory services contract between WW and the contracted NATA laboratory.

For the Sunbury Melton Scheme, Gisborne and Woodend ongoing verification testing is undertaken at selected points along the recycled water supply network to check for any changes in water quality within pipelines. This occurs quarterly throughout the year.

10 Monitoring and Recording Programs

Table 10-1 Recycled Water Monitoring Program at Western Water RWP

Water Quantity & Quality Parameter	Sampling Frequency						
	Sunbury	Melton (Class C)	Bacchus Marsh	Gisborne	Riddells Ck	Romsey	Woodend
Volume Flow Rate	Daily						
Microbiological (E.Coli organisms/ 100 mL)	Weekly	Monthly	Monthly	Weekly	Monthly	Monthly	Monthly
Biological Oxygen Demand (BOD)	Weekly	Monthly	Monthly	Weekly	Monthly	Monthly	Monthly
Suspended Solids (SS)	Weekly	Monthly		Weekly	Monthly	Monthly	Monthly
pH	Weekly	Monthly	Monthly	Weekly	Monthly	Monthly	Monthly
Total Kjeldahl Nitrogen (TKN)	Weekly						
Nitrate & Nitrite (NO _x as N)	Weekly			Two Monthly			
Total Nitrogen (as N)	Weekly	Quarterly	Quarterly		Quarterly	Quarterly	Quarterly
Total Phosphorous (P)	Weekly	Quarterly	Quarterly	Monthly	Quarterly	Quarterly	Quarterly
Total Residual Chlorine (TRC Cl ₂)	Weekly			Two Monthly			
Sulphate	Weekly						
Exchangeable Cations (Na ⁺ , Ca ²⁺ , Mg ²⁺ , K ⁺), SAR	Weekly	Quarterly	Quarterly		Quarterly		
Total Dissolved Solids (TDS) & Electrical Conductivity	Weekly	Monthly	Monthly	Two Monthly	Monthly	Monthly	Monthly
Turbidity (NTU)	Monthly						
Ammonia (as N)	Monthly			Monthly			Quarterly
Anionic Surfactants (Methylene Blue Active Substances)	Monthly						
Heavy metals (Hg, Cd, Pb, Mo, Cu, Zn, Ni, Cr)	Monthly						
Algae Monitoring (full screen, bio-volume, etc)	Fortnightly during summer months, Monthly during other seasons.						

10 Monitoring and Recording Programs

10.2.3 Soil monitoring

Table 10-2 lists the agronomic parameters to be tested in baseline, annual and audit soil monitoring programs. Customers arrange for baseline and annual soil testing to benchmark and assess the trends and impacts of recycled water irrigation. Western Water and the Customer will jointly arrange for testing for audit processes every 3 years.

Table 10-2 Soil Monitoring Programs at Customer Sites

Parameter	Frequency	Responsibility
pH	Test "Autumn-Baseline" conditions and thereafter at end of irrigation season. <ul style="list-style-type: none"> Annually 	Customer
Electrical Conductivity (EC _{1.5} , calculated EC _e)		
Exchangeable Cations (Na ⁺ , Ca ²⁺ , Mg ²⁺ , K ⁺) & ESP		
Soil Dispersion (Emerson Test)		
Organic Matter	Test "Autumn Baseline" conditions and thereafter at end of irrigation season: <ul style="list-style-type: none"> every 3 years 	Western Water & Customer
Total Nitrogen (N)		
Available Phosphorous (Cowell or Olsen P)		
Heavy metals (Hg, Cd, Pb, Mo, Cu, Zn, Ni, Cr)	Optional for Audit testing, subject to risk assessment	Western Water & Customer

Baseline soil sampling for each customer site must occur prior to commencement of recycled water supply and the results submitted to WW with the customer's recycled water use application.

Variability of soils and customer enterprises across the region will dictate soil sampling locations and profile depths. The following DPI *Agriculture Notes* provide practical soil sampling guidelines for a range of agricultural and recreational turf enterprises:

- *Sampling soils used for growing pastures, field and fodder crops (AG0375) (1998);*
- *How to sample soils used for flower, fruit, grape and vegetable production (AG0376) (1998);*
- *Sampling recreational turf or soil analysis (AG0395) (1998).*

Sampling of soils will be undertaken in accordance with good agricultural practice and submitted to recognised (NATA or Australasian Soil and Plant Analysis Council (ASPAC) registered) laboratories capable of performing agronomic soil analyses and providing basic agronomic interpretations (ie. soil salinity and sodicity, nutrient status, etc) for irrigated soils. Agricultural and/or soil science experts may be consulted from time to time to assist in design of soil monitoring programs and interpretation of results relevant to the specific soil conditions, crops and sensitivities at each customer site.

Independent audit soil tests may be arranged by Western Water from time to time and carried out on a rotational basis for high risk customers. Audit testing may involve more comprehensive soil analyses for build up of nutrients and heavy metals, subject to risk assessment of recycled water chemistry and potential contaminant loads. Customers will need to allow WW or its sampling contractors to collect soil samples from irrigated and non-irrigated areas.

Refer to the CSMP as listed in Appendix B for further details of customer soil monitoring programs and methods.

10 Monitoring and Recording Programs

10.2.4 Groundwater Monitoring

Customer Sites

The need for groundwater monitoring at individual customer sites is determined on a case by case basis, as part of the land capability assessment (LCA) process at approval stage of each customer's proposal. During the assessment phase, baseline groundwater impact assessment may be required based on desk top study of data from the Victorian Groundwater Database or other readily available groundwater information eg. WW bore monitoring data at RWPs.

To satisfy Western Water that groundwater monitoring is not needed as part of CSMP requirements, the Customer will need to demonstrate that:

- volume of recycled water use is less than or roughly equal to long term sustainable plant water demands and nutrient uptake rates as suggested in Table 6-2 (allowing for evaporative losses and usual root zone leaching requirements); and
- excessive leaching, groundwater contamination and high watertables will not occur.

Groundwater monitoring may become a later requirement for approved customer sites that:

- continue to have excessive irrigation or nutrient loadings consistently much higher than Table 6-2 values; and/or
- clearly exhibit signs of land degradation such as significant waterlogging, salinisation, crop or native flora damage, etc.

Where groundwater monitoring may be required, advice will be sought from consultants with expertise in groundwater to determine the appropriate location and number of groundwater bores, parameters to be tested and timing of sampling. These locations will be based on site specific assessment and focus on identified areas of waterlogging, high watertables (<2m), increased salinity, etc.

Groundwater Monitoring at Western Water RWP sites

Western Water has a network of 37 groundwater bores located at all seven RWPs. These bores are monitoring watertables and water quality trends near Recycled Water and storage facilities and (if relevant) onsite irrigation activities. To fulfil corporate licence requirements, Western Water arranges for annual groundwater sampling, NATA laboratory analyses, interpretations and reporting for all of its RWPs.

Groundwater is typically tested for key parameters such as depth to watertable, salinity (EC, TDS), pH, cations, anions, nitrogen forms (NO₃ and NH₃), phosphorus, E.coli, Faecal coliforms and suite of heavy metals.

Groundwater sampling is undertaken in accordance with EPA's *Groundwater Sampling Guidelines* (Pub No. 669, 2000) and samples submitted to NATA laboratories for water quality analyses.

10.2.5 Rainfall and Evaporation Monitoring

Western Water has weather stations which include rainfall and evaporation gauges at most of its RWPs, and carries out broad review of rainfall and evaporation occurring in the region including comparison of WW gauges with Bureau of Meteorology weather station data. This review is undertaken for end of year RWP and onsite irrigation water balance checks, including estimation of RWP storage pond evaporation losses.

10 Monitoring and Recording Programs

WW recommends to Customers to undertake rainfall and evaporation checks using Bureau of Meteorology weather stations as part of water demand estimating, irrigation scheduling programs and water budget calculations.

10.2.6 Record Keeping

All significant information regarding the monitoring of recycled water supply and use in the WW service region is recorded and maintained within the Western Water Data Management System. WW records which will be securely maintained for a period of at least 10 years include:

- RWP recycled water quantity and quality monitoring results
- Soil monitoring (baseline, annual and 3-year program) results and interpretations
- RWP Groundwater monitoring results and interpretations
- Recycled water customers – existing and those no longer using recycled water
- Internal and external audit reports
- Incident records including Incident Summary Sheets, Incident Register, follow up actions, etc
- IMS team meeting and Emergency Planning Committee meeting minutes.
- WW staff induction and training
- Customer liaison communication records
- Annual reports to EPA
- Other records required to be maintained by this REIP.

WW also maintain a duplicate folder to that held by its recycled water customers, including copies of CSMPs, CSCs, soil monitoring results, Annual Compliance Statements, customer induction training records, etc.

The results of all insitu and NATA laboratory analyses results are made available on request to Customers, authorised EPA officers, and to the public or other interested parties where appropriate.

Auditing and Reporting

11.1 Objectives of Auditing Program

The objectives of WW's auditing program are generally as follows:

- To assess the compliance of WW and its customers with the objectives and targets of this REIP, as well as the EPA guidelines, SEPPs, Environment Protection Act and other relevant regulatory requirements and guidelines;
- To determine the adequacy of risk management (environmental, human and stock health, food/produce safety/quality controls);
- Review objectives, targets and performance evaluation criteria on an annual basis;
- To address and resolve any adverse environmental impacts or publicity associated with any recycled water scheme;
- To facilitate the review of the REIP based on identified non-conformances of areas for improvement.
- Maintain IMS, including EMS accreditation to AS/NZS 14001, as well as QMS accreditation to AS/NZS 9001, and OH&S Management System accreditation to AS/NZS 4801.

11.2 Background to Western Water's Auditing Program

Western Water has developed an internal and external audit program for both the water recycling and supply system, and individual Customer sites.

Internal auditing is performed by Western Water staff who are suitably trained and qualified to conduct audits generally in accordance with the principles in *AS/NZS ISO 19011:2003 Guidelines for quality and/or environmental management systems auditing*.

External audits are also undertaken of recycled water schemes and customer sites from time to time by suitably qualified independent auditors such as an EPA approved Industrial Facilities Auditor (applicable for schemes capable of using >1MI/d).

All lead internal and external auditors have sufficient knowledge of water recycling, recycled water use and irrigation issues, EPA's guidelines and other relevant environmental rules and regulations.

11.2.1 Audit Criteria

The audit criteria would be generally based on the objectives and actions outlined in the REIP Action Plan and the following:

- Customer Site Management Plan
- Customer Supply Contract – ie. relevant environmental compliance conditions only
- EPA Corporate Licence No. CL62130
- Western Water's IMS including the EMS and various procedures and operating manuals associated with the management of the recycled water schemes;
- *Guidelines for Environmental Management - Use of Reclaimed Water* (EPA Victoria, Publication No. 464.2, June 2003).

11.2.2 Internal Auditing of Customer Sites

Western Water conducts regular internal audits of its recycled water customer sites. More frequent audits may be conducted if justified by significant non-conformances identified by internal auditing processes or Customer Annual Compliance Statements.

11 Auditing and Reporting

Western Water prepares and updates the annually internal audit schedule for its recycled water customer sites in advance of the planned start of site audits. Internal audits are also conducted on a site management or works “theme” basis to review specific elements such as signage, above ground assets, cross connections, compliance statements, review of irrigation and nutrient rates, etc.

Periodical auditing is also undertaken upon change in site ownership or major change in recycled water practices. This usually includes a review and update of the CSMP and CSC.

11.2.3 External Auditing

External audits of Western Water’s EMS are conducted up to twice per year as part of maintaining AS/NZS 14001 accreditation.

As part of the external EMS auditing program in any year, site specific compliance audits or system level reviews may be scheduled including for any one or all of the following elements:

- recycled water treatment plants (RWPs)
- recycled water storage and supply (transfer system) system, or
- individual Recycled Water Customer sites.

In the past WW has arranged for up to 4 customer sites per year for independent audit. Selection of sites was based on the level of risk associated with recycled water supply, similar uses and activities and associated potential impacts. These customer sites are audited during the yearly audit period.

In other years, only onsite irrigation activities at RWPs are normally subject to external audits. Soil testing and review is also sometimes conducted by an external consultant as part of independent audits to assess soil condition and trends on recycled water customer sites.

For its external customer site auditing WW will continue to rotate through different customer sites, with site selection focussing on the higher users of recycled water and/or those customers with higher potential risks. External audits of the selected customer sites are usually carried out annually.

11.2.4 Audit Report and Outcomes

Audit reports are prepared and submitted to Western Water management within the audit schedule timeframe presenting the audit findings including identification of any non-conformances and follow up actions. The follow up actions from the auditing program may involve:

1. Preparation of corrective action reports based on audit report findings, including risk ranking of non-conformances;
2. Implementation of corrective/preventative actions and a follow up audit to verify completion;
3. Relevant Western Water staff and customers are advised of audit non-conformances and are given directions to take corrective actions.
4. Western Water ensures that appropriate follow up actions are taken and the outcomes of the audit are documented and fed into the REIP review process.

11 Auditing and Reporting

11.3 Annual Reporting to EPA

11.3.1 Objectives

- (a) Transparent Reporting by WW to EPA and Customers.
- (b) All customers submit Annual Compliance Statements to WW by August each year

11.3.2 Background

Western Water will submit an annual environment report to EPA by end of October each year including details of performance of all recycled water schemes against the objectives of this REIP and compliance with EPA guidelines.

Western Water will collate all information relating to the recycled water schemes in its service area, including review of customer annual compliance statements. The annual environment report to EPA will include an overall summary of compliance information including the following:

- the quantity and quality of water supplied to each recycled water scheme,
- assessment and interpretation of recycled water quality against criteria specified in this REIP (Table 5-2),
- updated register of customers participating in the scheme, their locations, uses of recycled water, volumes used on each site, and status of compliance for each site,
- performance evaluation of last 12 months against REIP objectives, beneficial use targets, etc
- any major incidents or operational problems experienced and corrective actions undertaken,
- results of auditing of recycled water treatment and supply systems and customer sites (if undertaken in last 12 months),
- reviews and any modifications to the REIP objectives, targets, etc
- summary of significant expansions to recycled water schemes including RWP upgrades in the previous 12 months,
- major projects to be undertaken in next 12 months to facilitate increased reuse, including proposed pipeline extensions, new supply regions or customer sites expected to sign up to the scheme.

Western Water will also make available to its Customers, the recycled water quality monitoring reports undertaken in accordance with this EIP.

11.3.3 Customer Reporting to WW

All customers are required to submit to Western Water annual reports summarising their monitoring results and compliance statement for the previous 12 months including:

- water use monthly,
- annual water use ML/Ha,
- estimated crop water requirements from water budget calculations,
- uses of the recycled water (crop types, livestock access, etc),
- type and amount of supplementary irrigation water (eg. from river, dam, groundwater, etc),
- type and amount of any supplementary fertilisers used,
- soil and any groundwater or other environmental monitoring results and interpretations,
- inspection and maintenance programs and major maintenance work undertaken,
- any emergencies or other accidents experienced during the year and corrective actions undertaken,

11 Auditing and Reporting

- any changes are proposed to nature of reuse scheme in the next 12 months;
- a signed "Annual Compliance Statement" (see attached as Appendix D to the CSMP).

WW will review all Annual Compliance Statements and any soil test results as part of internal auditing processes and overall annual report preparation for EPA.

Annual Compliance Statements will also be made available for review by external auditors commissioned from time to time by WW.

11.4 Key Actions

Auditing Programs

- Internally audit the Recycled Water customer sites on a rotational basis, in accordance with the Western Water internal audit schedule,
- Undertake annual external audits of recycled water customer sites by a suitably qualified/accredited independent auditor;
- Carry out internal audits of water recycling systems and supply infrastructure as required in accordance with Western Water's auditing schedule;
- Carry out external surveillance audits of Western Water's EMS in accordance with Western Water's auditing schedule, to maintain accreditation to AS/NZS 14001 and other IMS relevant accreditations.

Annual Reporting

- Provide annual report to EPA included as part of overall WW Environment Report providing summary of performance of all recycled water schemes against the objectives of this REIP and compliance with EPA guidelines
- Receive, collate and review all Annual Compliance Statements and any soil test results as part of internal auditing processes and overall annual report preparation for EPA.

Appendices

- Appendix A Western Water Recycled Water Scheme Maps
- Appendix B References
- Appendix C Soil/Land Capability Assessments
- Appendix D Recycled Water Scheme Risk Assessment
- Appendix E Allowed Uses of Class B and C Recycled Water

Appendix A Western Water Recycled Water Scheme Maps

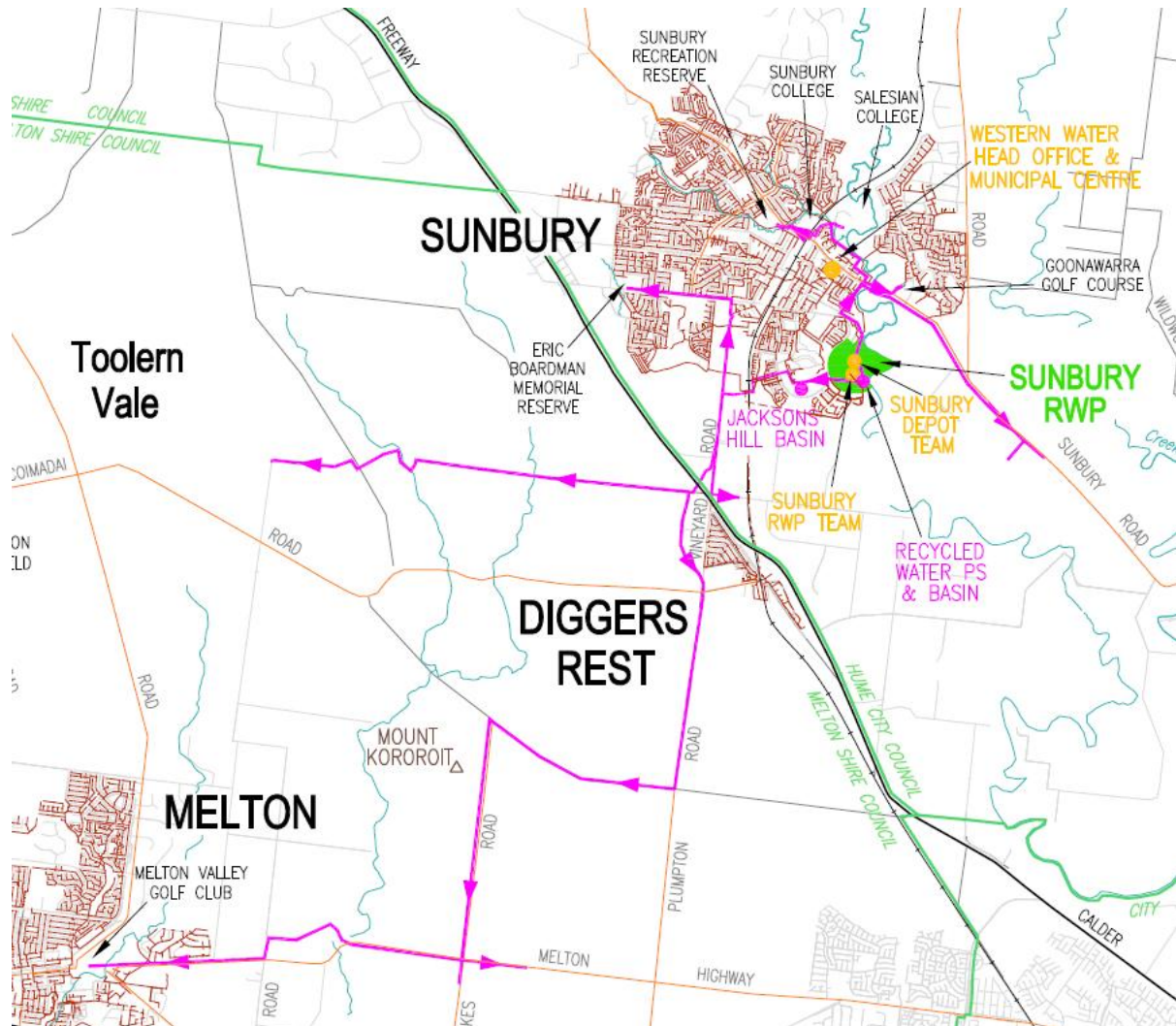
This appendix contains Western Water's overall recycled water asset plan showing location of all recycled water schemes in its service area.

This appendix also provides screen dumps extracted from the recycled water asset plan in order to show detail of each of the recycled water schemes more clearly.

Appendix A

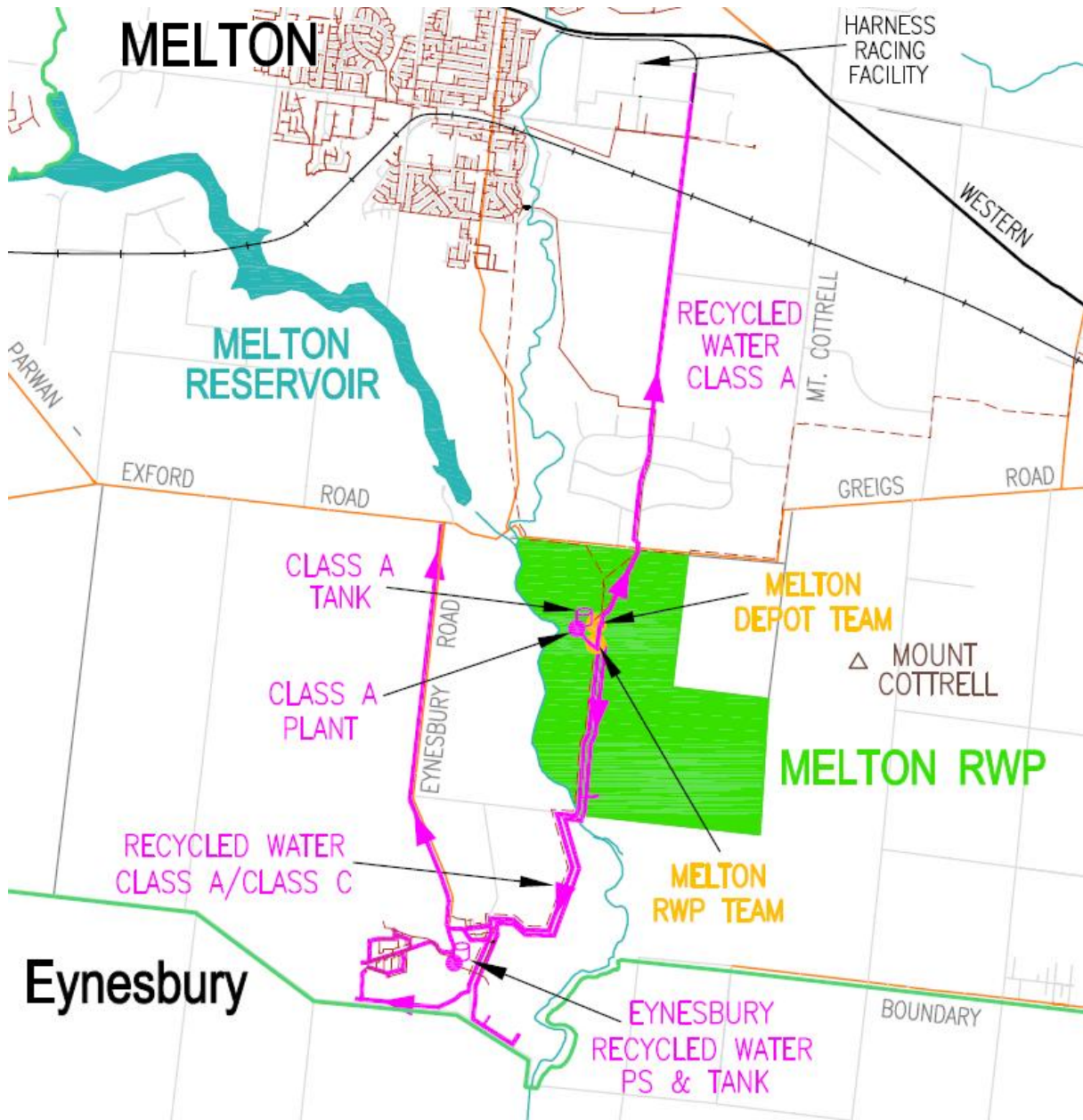
Appendix A

A.1 Sunbury Melton Recycled Water Scheme



Appendix A

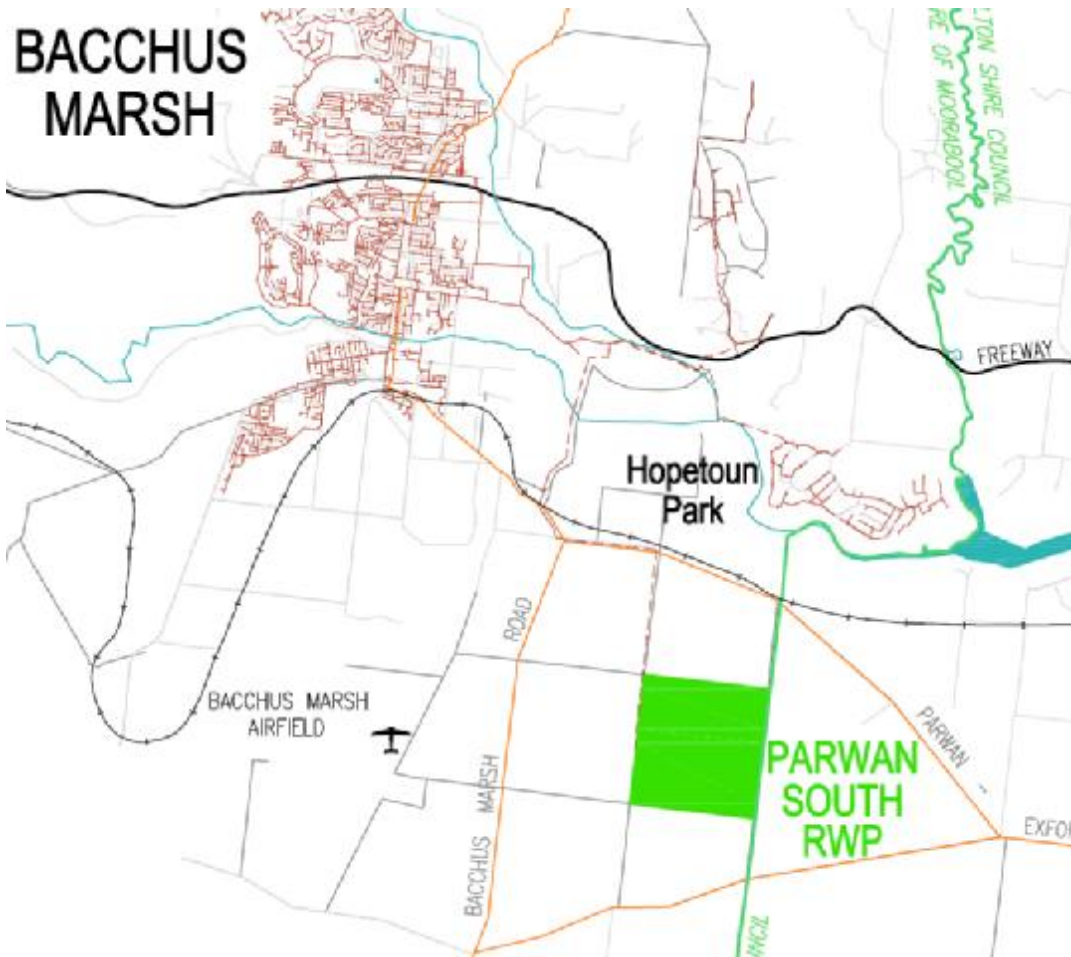
A.2 Melton South Recycled Water Scheme



NB: Melton South Class A Recycled Water Scheme including the Eynesbury and Harness Racing Victoria Schemes, are not in the scope of this REIP.

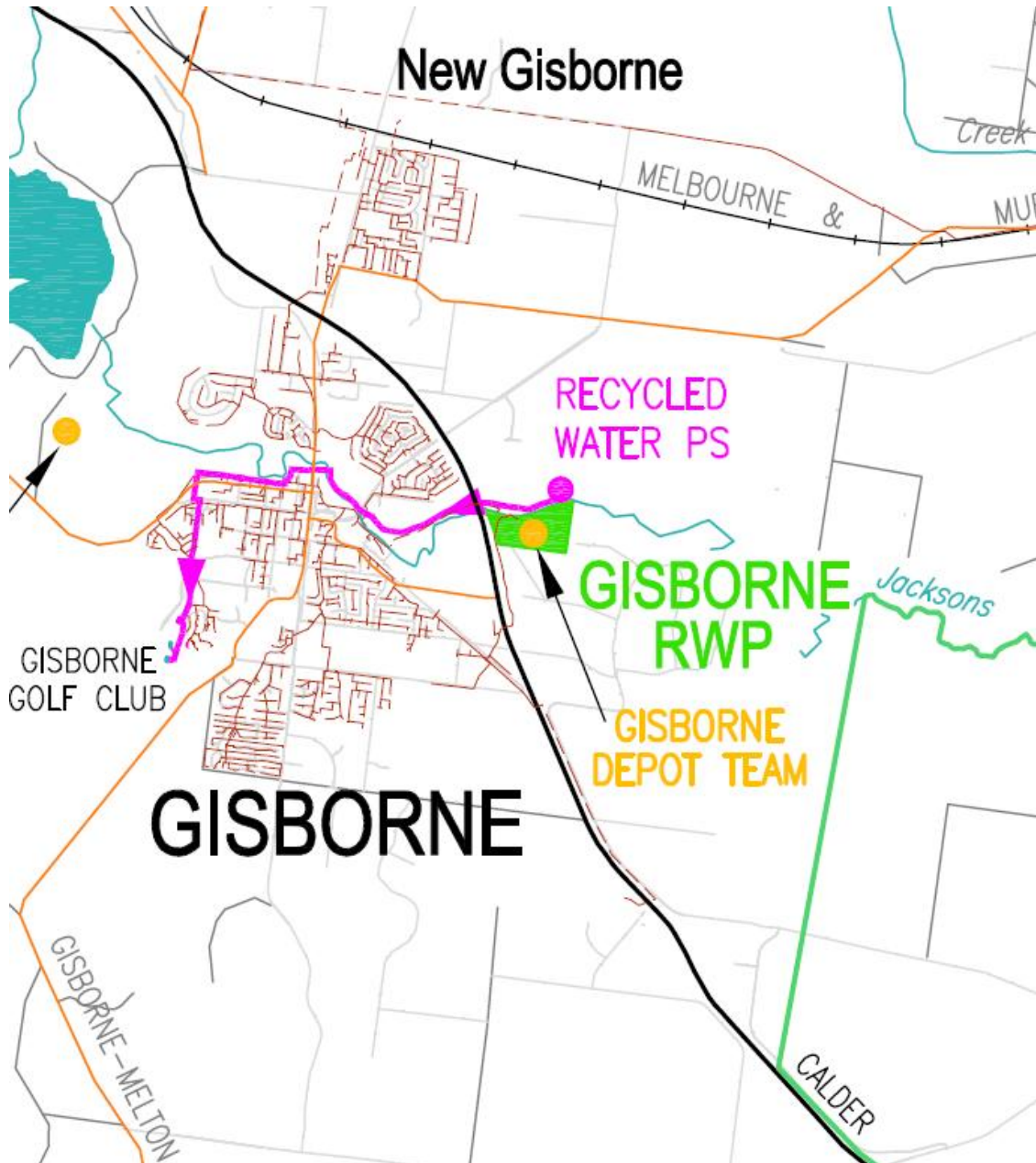
Appendix A

A.3 Bacchus Marsh Recycled Water Scheme (Parwan South)



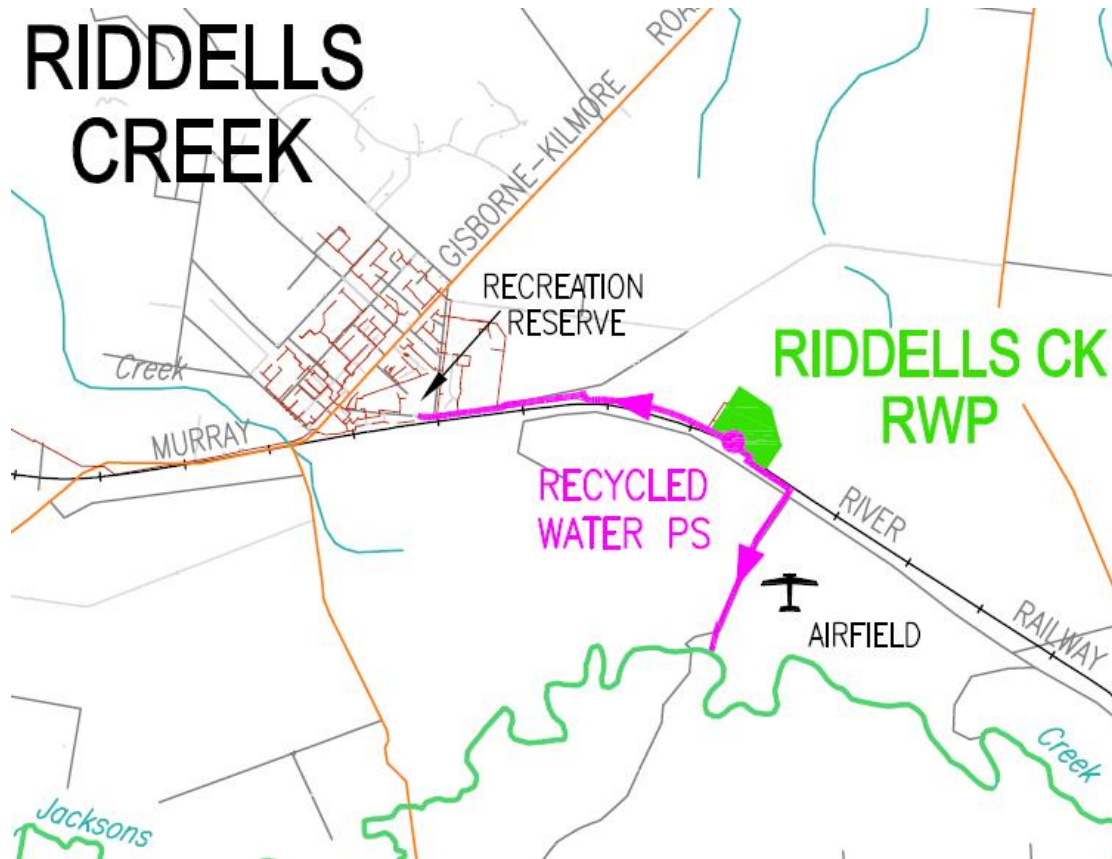
Appendix A

A.4 Gisborne Recycled Water Scheme



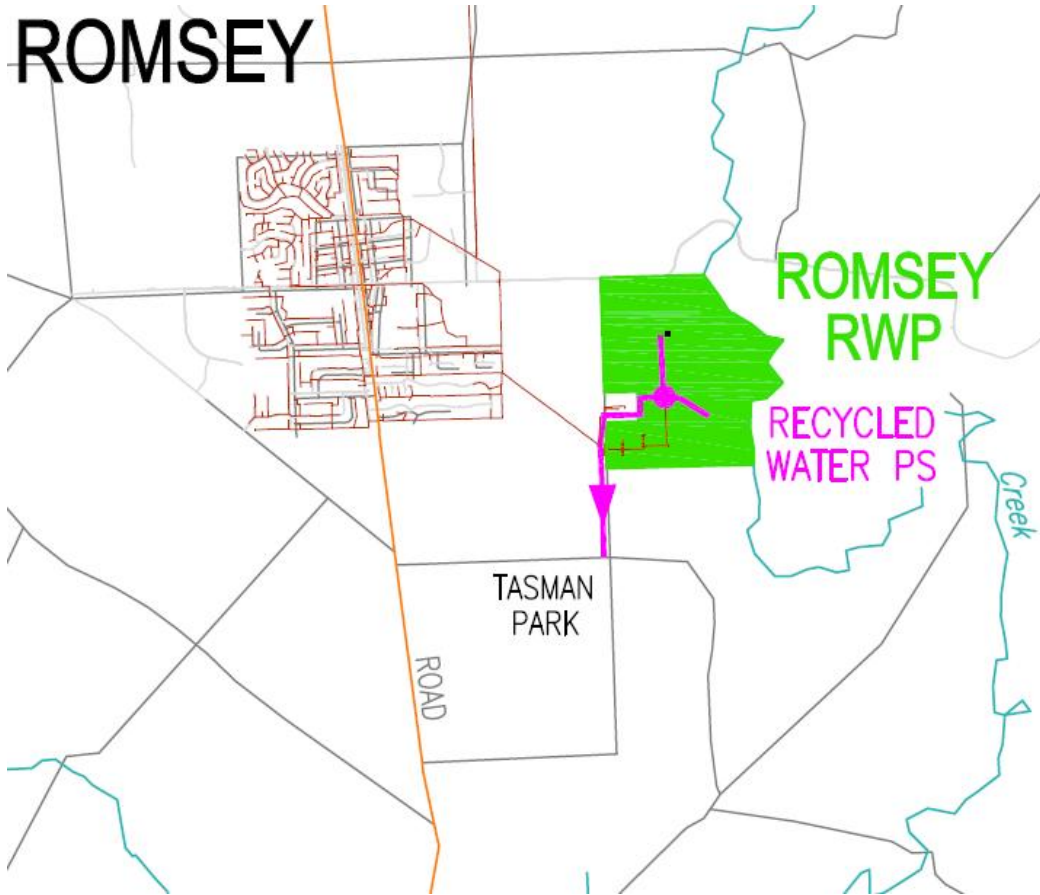
Appendix A

A.5 Riddells Creek Recycled Water Scheme



Appendix A

A.6 Romsey Recycled Water Scheme



Appendix A

A.7 Woodend Recycled Water Scheme



Appendix B Key References

Below is a list of Western Water's key policies, procedures, plans, instructions, references and documents linked to this REIP.

Western Water Integrated Management System Documentation

- Environmental Policy and Recycled Water Policy
- EPA Corporate Licence No. CL62130 (date first issued 21 May 2008)
- RWP Operation and Maintenance Manuals and Depot Operations Manuals
- Western Water's Emergency Response Plans (IMS controlled documents, Jan. 2010):
 - Western Water's Emergency Management Procedure (WW ERP-002)
 - Western Water's Incident Escalation Procedure (WW ERP-003)
 - Western Water's Incident Escalation Guidelines (WW ERP-003/5)
 - Western Water's Incident Escalation Procedure (Flowchart) (WW ERP-003/4)
 - Western Water's Incident Summary Sheet (WW ERP-003/1)
 - Western Water's Duty Officer Call Sheet (WW ERP-003/2)
 - Western Water's Incident Manager's Checklist (WW ERP-003/3)
 - ERP Algae Management in recycled water storages
- Western Water's Integrated Management Systems Manual (IMS)
- Water Plan 2008 - 2013 (Western Water 2008)
- Water Supply Demand Strategy 2006 to 2055 (Western Water & SKM 2007)
- Western Water Strategic Business and Corporate Plans (2009)

Recycled Water Customer Applications and Site Management Plans

- Current Customer Application Form and New Customer Application Form
- Customer Application Instructions and Information Pack
- Customer Site Management Plan (Schedule E to Customer Supply Contract)
[typically used for larger schemes ≥ 1 ML/day]
- Customer Supply Contract [for permanent pipeline schemes].
- Recycled Water Customer Site Management Plan. [Applicable for small schemes < 1 ML/Day]
- Registration Form - Expression of Interest
[used to register interest from potential customers for specific recycled water schemes]
- Western Water Recycled Water Carter Permit Application
- Western Water Recycled Water Strategy

Superseded REIP

- Draft Sunbury - Melton Recycled Water Scheme Regional Environmental Improvement Plan (Draft prepared by MWH for Western Water 2002).
[NB: The above REIP is superseded by Regional Environment Improvement Plan, Western Water's Recycled Water Schemes 2010.]

Appendix C Soil/Land Capability Assessments

Table C-1 Published Soil/Land Capability Assessments relevant to WW Service Area

Grant 1972	Terrain Classification for Engineering Purposes of the Melbourne Area, Victoria. Division of Applied Geomechanics Technical Paper No.11 CSIRO 1972.
Jeffrey, P.J 1981	A Study of the Land in the Catchments to the North of Melbourne. Soil Conservation Authority. Soil Conservation Authority, Victorian Government 1981.
Lorimer, M. S. 1987	A Study of the Land in the Campaspe River Catchment. Department of Conservation, Forests and Lands, Land Protection Division, Victorian Government 1987.

Table C-2 Soil/Land Capability Assessments and Investigations in WW Service Area

Scheme	Author	Date	Title
Sunbury-Melton	Rendell McGuckian	Feb-01	Soil Suitability Assessment for Sunbury-Melton Recycled Water Scheme
	RMCG	October 2007	Recycled Water Audits of Galli Vineyard & Melton Valley Golf Club & other Melton farms
Bacchus Marsh	Phillips Agribusiness	Aug-05	Farm Management Report
	RMCG	Nov-06	Parwan Audit Findings
	McMahons Agriculture and Co	Sep-03	Parwan Treatment Plant Site Management Plan for Recycled Water Irrigation
Melton (Surbiton Park)	Western Water	Mar-08	Melton RWP Stage 1a and 1b Upgrade EPA Works Approval Application
	RMCG	Nov-06	Surbiton Park Audit Findings
	MWH	Sept-02	Soils Testing at Melton Surbiton Park
Melton South	Van de Graaff and Associates	Oct-05	Land Capability Assessment of the Eynesbury Pastoral Estate Development for the purpose of irrigation with treated wastewater from the Surbiton park sewerage facility
Gisborne & Riddells Ck	URS	Sept-07	Land Capability Assessment Gisborne & Riddells Creek Recycled Water Project
Romsey	Western Water	Oct-03	Romsey Wastewater Treatment Plant Environmental Improvement Plan for Romsey Recycled Water Scheme
	Rendell McGuckian	Aug-02	Romsey Wastewater Reuse Soils Investigation
Woodend	MWH/Western Water	Nov-08	Works Approval Application Woodend Plant Upgrade
Sunbury-Melton, Gisborne, & Woodend	MWH	Oct-04	Audits of Recycled Water Use at Gisborne, Woodend and Goonawarra Golf Courses
	CPG Australia	Nov-08	Gardiner Reserve, Diggers Rest Reserve, Melton Recreation Reserve, Gilbert Gordon Oval Woodend.
All RWPs	Hyder	Feb-07	Review of Groundwater Quality at Recycled Water Plants
	MWH	May-07	Winter Storage Assessment

Appendix D Recycled Water Scheme Risk Assessment

This Appendix contains a summary risk matrix extracted from WW's EMS, which identifies key risks associated with the recycled water schemes. All identified risks are ranked for significance based on their likelihood, consequence and sensitivity, and taking into account existing management controls in place to reduce likelihood and mitigate residual risks to acceptable levels.

For each identified risk the three factors are assigned a score out of 5 (5 = highest, 1 = lowest). These individual scores are converted to a total score based on the following formula: Likelihood x Consequence x Sensitivity = Score.

The various management controls outlined in this REIP, as well as in individual CSMPs, TSA and WW's EMS procedures and emergency response plans ensure residual risks do not pose significant or adverse environmental impact. Adverse environmental impact is defined in SEPP as exceedance of water, soil or other environmental quality objectives and the resultant potential for adverse impacts on the beneficial uses of segments of the environment – ie. surface waters, groundwaters, soils or air.

Abbreviations in Table D-3 to follow on next page:

- "L" - Likelihood
- "C" - Consequence
- "S" - Sensitivity

Appendix D

Table D-3 Recycled Water Scheme Risk assessment Summary Matrix

Aspect	L	C	S	Score	Potential Cause	Potential Key Impacts	Potential Effects	REIP, CSMP & Other Management Controls in Place to Minimise Risk	Mitigated Risk Level
Excessive quantity of recycled water supplied	2	4	3	24	Excessive take by customer not in compliance with CSMP Infrastructure failure	soil erosion pollution of nearby waterways soil problems (physical/chemical, (salinity, sodicity, structure, excessive nutrient loads) run off to sensitive areas/ environments water logging on/off site stock access to unsuitable class	loss of biodiversity supply interruptions	Regular monitoring of rainfall and evaporation rates across region. Proper irrigation scheduling: volumes supplied to be based on soil moisture monitoring or approved water balance calculation method. Flow control/restrictions at customer offtake point.	Low
Excessive toxic (blue-green) algal growth in reuse site storages	3	4	3	36	Warmer temperatures & high levels of sunshine minimal aeration of water	livestock health depleted water quality pollution of sensitive areas	loss of biodiversity supply interruptions	Implement toxic (blue-green) algae emergency response plan. Customer promptly notifies WW, takes action to prevent livestock and human access, & ceases irrigation of food crops until algal levels reduce to safe level. WW notifies EPA and/or "blue green algae convening agency" as necessary Suspend supply until algal levels return to safe levels (verified by algal testing) or otherwise as directed by EPA or others Ensure customers receive fair warning of suspension of supply.	Moderate
Supplied water fails to meet required standards or criteria	2	4	3	24	Inflow quality Failure of infrastructure at recycled water plant	soil pollution Livestock health pollution of crop	loss of biodiversity supply interruptions loss of productivity	Regular monitoring and testing of water quality. 24 hour resample of any water quality results that exceed notification limit Cease supply 2 consecutive exceedance of notification limit	Low

Appendix D

Aspect	L	C	S	Score	Potential Cause	Potential Key Impacts	Potential Effects	REIP, CSMP & Other Management Controls in Place to Minimise Risk	Mitigated Risk Level
						pollution of storage		EPA immediately notified in accordance exceedance notification procedures Customers notified promptly of water not meeting standards.	
Contamination of potable water supplies	2	5	4	40	Cross connection	Human health Livestock health	drinking water supply interruptions Recycled water supply interruptions	Prevention of cross connections between recycled and potable supply systems, regular cross connection tests. Colour coding of all recycled water infrastructure in accordance with Aust. Standards	Low
Increased salinity, sodicity, acidity (onsite or offsite)	2	4	3	24	Water quality Application rates	soil pollution pollution of crops/ pasture	loss of biodiversity supply interruptions loss of productivity	Proper site selection and land capability assessment. Improve drainage Monitor soil moisture irrigation scheduling and provision for leaching fraction, application of suitable soil conditioners	Low
Increased heavy metal and/or chemical contamination of soil	2	4	3	24	Water quality Application rates	soil pollution pollution of crops/ pasture pollution of storage	loss of biodiversity supply interruptions loss of productivity	Soil monitoring (occasional) for heavy metals, organic chemicals, etc.	Low
Excessive soil nutrient build up onsite	2	4	3	24	Water quality Application rates	soil pollution pollution of crops/ pasture pollution of storage	loss of biodiversity supply interruptions loss of productivity	Soil monitoring (nitrogen forms, phosphorous, potassium, etc)	Low

Appendix D

Aspect	L	C	S	Score	Potential Cause	Potential Key Impacts	Potential Effects	REIP, CSMP & Other Management Controls in Place to Minimise Risk	Mitigated Risk Level
Groundwater contamination or excessive water table rise (onsite or offsite)	2	4	3	24	Application rates Non compliance with management plan	pollution of sensitive areas pollution of nearby waterways increase salinity	loss of biodiversity supply interruptions	Proper site selection and land capability assessment. Clay lining of recycled water storages. Groundwater monitoring (watertable depth, salinity, nutrients, etc)	Low
Pollution or Contamination of local waterways by customer's internal recycled water infrastructure or farm water supplies	3	4	3	36	Non compliance with management plan recycled water quality Application rates Pipeline burst, over irrigation, overflow of storage etc.	pollution of nearby waterways run off to sensitive areas/ environments water logging on/off site livestock health	loss of biodiversity livestock health	Reduce irrigation rates. Proper irrigation scheduling to prevent excessive irrigation & runoff Install runoff collection and recycling systems. Overflow prevention system for onsite storages (e.g. provide sufficient freeboard) Overflow prevention, response and notification system for recycled water supply pipes and pump stations (e.g.. Spillage, pipe bursts)	Low
Pollution or Contamination of local waterways by Western Water's recycled water infrastructure or farm water supplies	3	4	3	36	Pipeline burst Damage to infrastructure by third party	pollution of nearby waterways run off to sensitive areas/ environments water logging on/off site livestock health	loss of biodiversity livestock health	Online monitoring Depot Operations Manual Maintenance and Inspection programs Bulk and Individual Meter Reading	Low
Farm produce from reuse site fails to meet state/national food safety standards	2	5	4	40	Non compliance with management plan Water quality Application rates	pollution of crops/ pasture human health livestock health	loss of productivity human health livestock health	Adopt a food quality assurance or control system (e.g.. HACCP or SQF 2000) to monitor hazards, protect and ensure produce quality. Recycled water only supplied for fit for purpose use approved by EPA Guidelines Customer site management plan detailing acceptable management practise.	Low

Appendix E Allowed Uses of Class B and C Recycled Water

Allowable Uses of Class B Recycled Water

This Appendix contains summary table of the allowed uses of Class B and C Recycled Water. This table is derived from the EPA *Guidelines for Environmental Management Use of Reclaimed Water* (464.2 June 2003).

The reader should refer to EPA guidelines for more specific details on site access restrictions for humans and livestock, as well as human crop safety controls (described in Tables 3 and 5 of the guidelines).

Appendix E

Table E-1 Allowable Uses of Class B and C Recycled Water - Subject to Site Restrictions and Control (adapted from EPA 2003)

Recycled Water Class	Agricultural Uses					Urban Non-Potable Uses and Industrial Uses	
	<i>Raw Human Food Crops exposed to recycled water</i>	<i>Dairy Cattle grazing/fodder, livestock drinking (excluding pigs)</i>	<i>Cooked/Processed human food crops or selected crops not directly exposed to recycled water</i>	<i>Grazing/fodder for cattle, sheep, horses, goats, etc</i>	<i>Non-food crops, woodlots, turf, flowers</i>	<i>Residential unrestricted public access, open industrial systems</i>	<i>Restricted Public access, closed industrial systems</i>
B	X	ü	ü	ü	ü	X	ü (see note 2)
C	X	X (see note 1)	ü	ü (see note 1)	ü	X	ü (see note 2)

Notes to above Table:

1. Dairy Cattle grazing on land receiving Class C recycled water is allowed subject to a five-day withholding period after irrigation
2. Restricted public access during irrigation with Class B or C recycled water, and withhold period of 4 hours after irrigation.

Recycled water of this quality is generally acceptable for the corresponding uses, however, management controls may apply (Table 3 and 5 of EPA Guidelines)

Recycled water of this quality will generally not be acceptable for the corresponding uses under the EPA Guidelines



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