RECYCLED WATER RISK MANAGEMENT PLAN

AUGUST 2023

ENVIRONMENTAL SUSTAINABILITY
DIVISION OF INFRASTRUCTURE AND COMMERCIAL

CONTENTS

1. COMMITMENT TO WATER QUALITY MANAGEMENT

This Risk Management Plan applies to the operation and management of the Hawkesbury Water Recycling Scheme (HWRS) at the Hawkesbury Campus of the Western Sydney University. Recycled water is for the exclusive use of the University and cannot be on supplied to any third party. The purpose of this Risk Management Plan is to provide operational support to the University's commitment to responsible use and management of recycled water in a manner which is consistent with the:

- Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (2006), and previous national guidelines such as National Water Quality Management Strategy (2000) "Guidelines for Sewerage Systems, Use of Reclaimed Water".
- The SWC-WSU Water Use Agreement, and associated objectives which address requirements under the Protection of the NSW Environment Operations (POEO) Act 1997 (Environmental Protection Licence number: 1726), and a requirement of the 'Load Calculation Protocol' referred to in the POEO (General) Regulations 1998.
- The NSW Water Industry Competition Act (2006) and other relevant NSW guidelines (e.g. DEC 2004).
- Water use agreements and associated risk management plans associated with the Hawkesbury Water Recycling Scheme and coordinated through the HWRS Risk Management Committee.

The policy context for the management and use of recycled water is through the Western Sydney University Environmental Sustainability Policy and associated Western Sydney University Environmental Sustainability Action Plan. The Action Plan incorporates a key program on Water Cycle Management, which states the objective of "...increasing water use efficiency and substituting alternative water resources for non-potable (non-drinking) water use needs". The format and structure of this Risk Management Plan is based upon the Risk Management Framework, as outlined in the 2006 national guidelines, providing:

1. "a mechanism for identifying major hazards, risks and appropriate preventative measures (treatment and on-site controls);
2. An operational monitoring approach designed to detect faults before use of recycled water;
3. The use of verification (compliance) monitoring to ensure that the management systems function effectively;
4. Establishment of incident controls;
5. Implementation of supporting requirements including training, community involvement, documentation and reporting" (EPHC 2006, p.15)

This document builds on historical management plans for the Hawkesbury Water Recycling Scheme including the HWRS Environmental Management Plan and the subsequent HWRS Reclaimed Water Management Plan. This document is also consistent with the Recycled Water Risk Management Plans of water users supplied through the Hawkesbury Water Recycling Scheme on the Hawkesbury campus of Western Sydney University.

2. ASSESSMENT OF THE HAWKESBURY WATER RECYCLING SCHEME

2.1 Intended uses and sources of recycled water

The Hawkesbury Water Recycling Scheme comprises reclaimed water supplied from Sydney Water Corporation's (SWC) Richmond Recycled Water Plant. The Permitted Uses as set out in the (2021) Western Sydney University Recycled Water Agreement (Irrigation) is for "Municipal use, with restricted access and application; and pasture or fodder crop irrigation (including hay, silage and commercial fodder production). Limited withholding period" and when used in conjunction with the Purchaser Controls set out at Schedule 4 of the Agreement.

Currently, permitted use does not include horticultural production to be consumed or distributed for human consumption. Details of Safe Operating Procedures based upon the Australian Guidelines for Water Recycling are provided in Attachment A for:

- Pasture and fodder crop production (SOP 1)
- Landscape and playing fields (SOP 2)

The Hawkesbury Water Recycling Scheme comprises two key resource streams, as described below and shown in Figures 1 and 2:

- Reclaimed water supplied from Sydney Water Corporation's (SWC) Richmond Recycled Water Plant, and
- Stormwater harvested from the campus and the suburbs of Richmond Township.

The intended use of the reclaimed water is primarily for agricultural and horticultural irrigation. There are a number of water users within the Hawkesbury campus, as outlined below. The intended use of the stormwater is primarily for landscape irrigation across the Hawkesbury campus.

Richmond STP treats effluent to a tertiary disinfected quality (termed reclaimed water) that is suitable for irrigation with uncontrolled public access as defined in NWQMS (2000). The treatment process includes ammonia and nitrogen removal using the Intermittently Decanted Extended Aeration Lagoons (IDAL) process, Alum dosing for chemical phosphorous removal, tertiary dual media deep bed filtration and pathogen removal. The reclaimed water quality is monitored by SWC at DECCW Licence Point 17 (Licence No: 1726 refer to Appendix A). Reclaimed water is reused for irrigation of university lands (DEC licence point 13), Richmond Golf Course (DECCW licence point 14), internal plant processes (DEC licence point 4), and tankering (DECCW licence point 18), with the remainder discharged to Rickabys Creek.

Reclaimed water is transferred directly to the first University storage, Turkey Nest Dam (capacity 93 ML). Any bypass flows are captured by the in-line stormwater detention pond (capacity 60ML), located approximately 1km further down the catchment. Once the treated effluent reaches the Turkey Nest Dam it becomes the responsibility of the University to manage in accordance with the provisions of this Risk Management Plan. This storage also provides a critical control point for any treatment issues or microbial issues such as blue green algal blooms.

Figure 1. Process flow diagram of reclaimed water

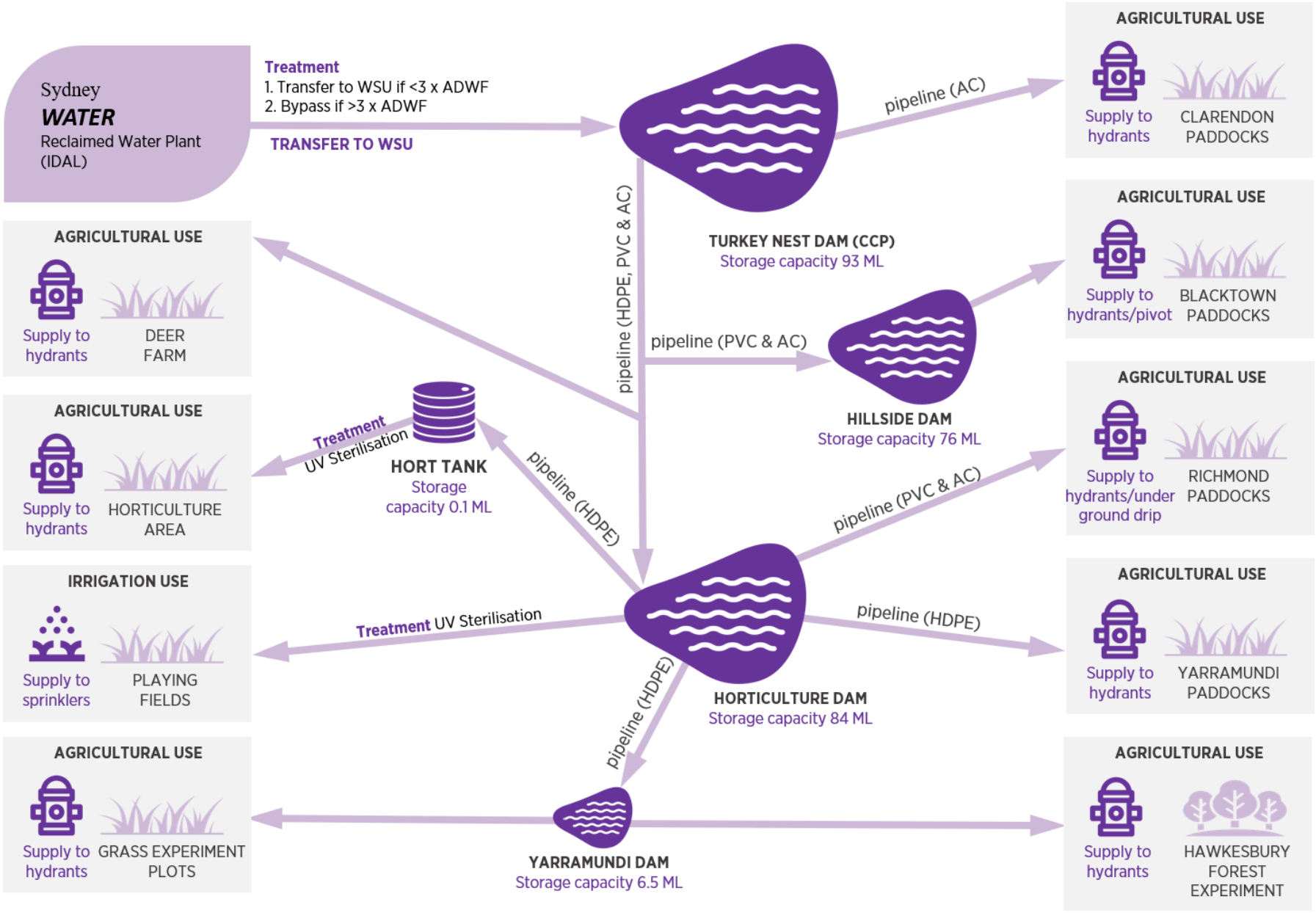
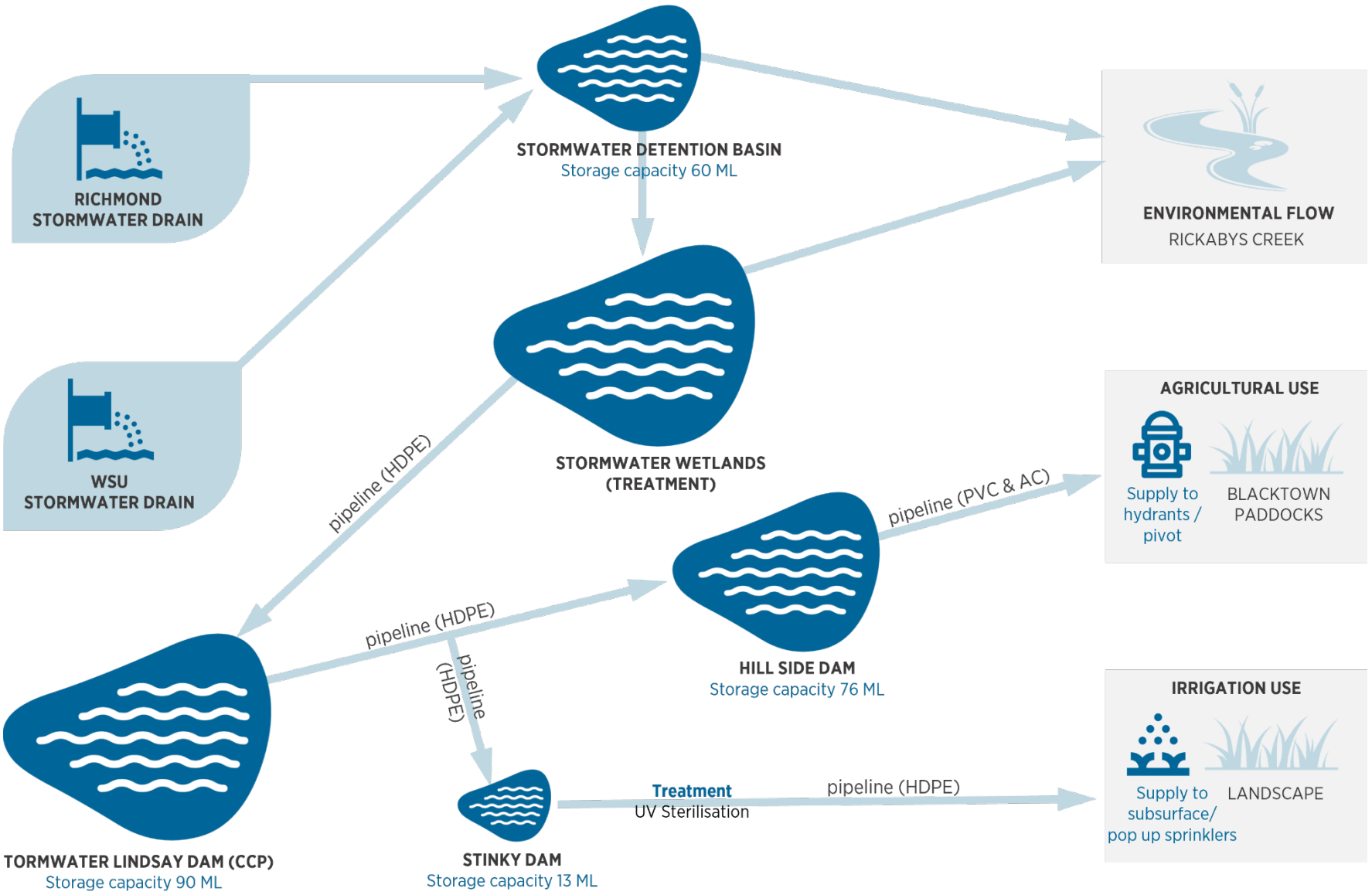


Figure 2. Process flow diagram of stormwater harvesting



Reclaimed water may be pumped from Turkey Nest Dam to a wide range of storages and irrigation locations including principally:

- Horticulture Dam (capacity 84 ML)
- Hillside Dam (capacity 76 ML)
- Stinky Dam (estimate capacity 13 ML)
- to the crop area north of Blacktown Rd,
- to the irrigation areas between Turkey Nest and Horticulture Dam, (where supply lines lead to the Deer Farm, Amenities Paddocks and Experimental Area)
- to irrigation areas beyond Hillside Dam and
- to irrigation areas along both sides of College Street, and

Supply lines from Horticulture Dam include:

- irrigation line past the soccer field and football oval
- irrigation line to paddocks south and east of Horticulture Dam
- transfer line to Yarramundi Dam (capacity 6.5 ML) and the Horticultural area via the Horticulture Tank.

The recycled water is used to irrigate portions of the 1332-hectare site, including: agricultural areas and grazing pasture and playing fields. A mapped aerial photo showing the different water users associated with the Scheme is shown in Figure 3 (a&b). The water users within the campus boundaries included:

- Western Sydney University (farm irrigation including grazing operation and horticulture precinct, irrigation of campus landscape and sports fields);

A 60ML Detention Basin has been constructed at the junction of the two main stormwater channels which drain the upper catchment of Rickabys Creek, from where stormwater is lifted from the Detention Basin to the stormwater constructed wetlands (four one-hectare wetlands each with a maximum capacity of 8ML). Discharge to 25 ML Pearce's Pond can either be pumped for storage to 90 ML Lindsay Dam or released to Rickabys Creek as environmental flows. From Lindsay Dam here the harvested and treated stormwater is transferred to Stinky Dam where there is further filtration and UV disinfection prior to irrigation of the campus landscape through an automated system of pop-up sprinklers across the historical precinct of the campus and the student residences.

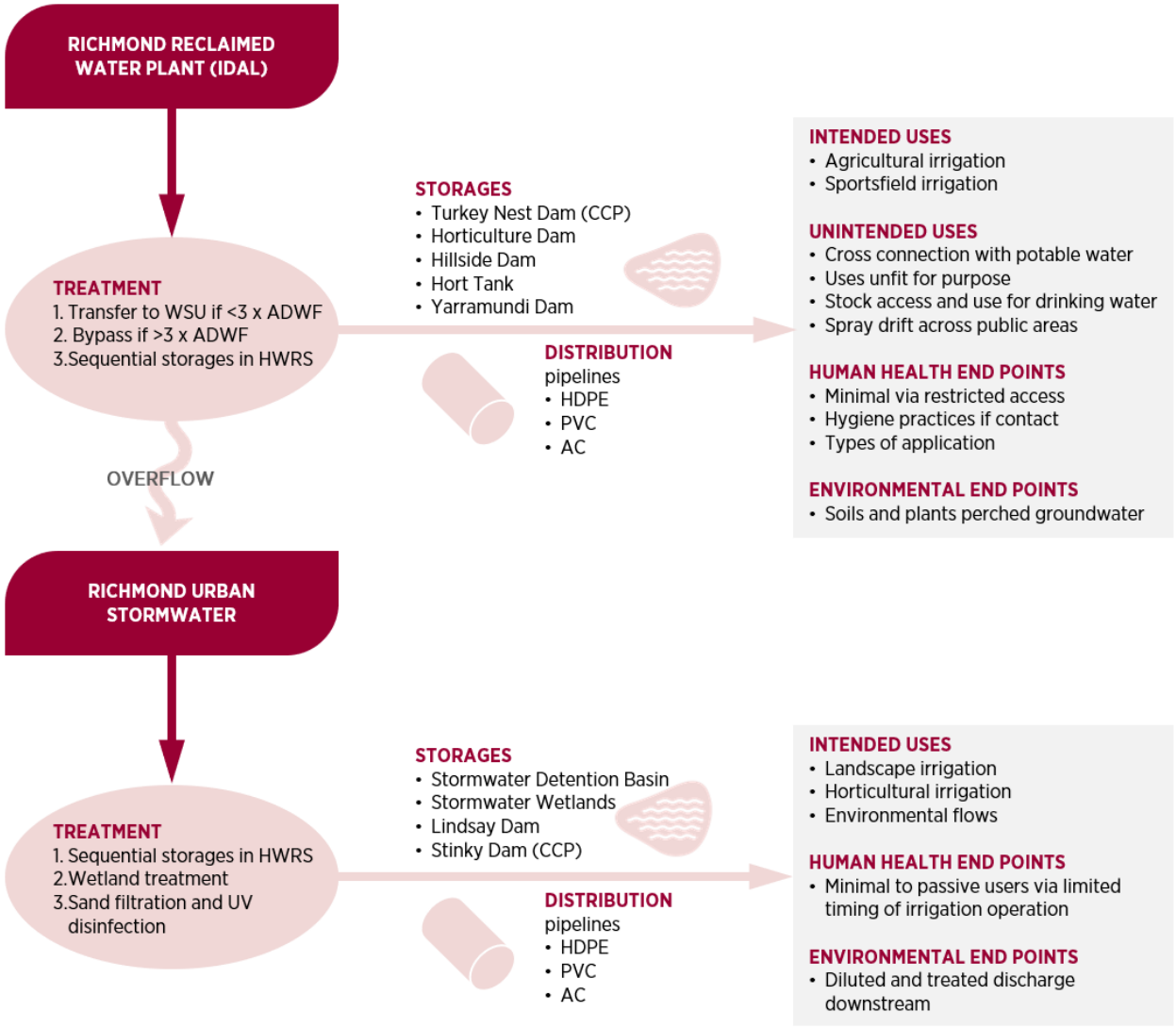
Figure 3a. These maps show the extent of the Hawkesbury Water Recycling Scheme and its users

Figure 3b. These maps show the extent of the Hawkesbury Water Recycling Scheme and its users

2.2 Recycled water systems analysis

A flow diagram of the treatment and end uses of reclaimed water and stormwater within the HWRS is shown below in Figure 4.

Figure 4. Flow diagram of sources, treatment and intended uses



2.3 Assessment of water quality data

Analysis of water quality is undertaken both by Sydney Water Corporation and Western Sydney University. Based on communication protocols established in our Recycled Water Management Plan, notification of a quality issue from SWC prevents transfer beyond the first storage dam of the University (Turkey Nest Dam), so this operates as a Critical Control Point (refer to Figure 1 for CCP).

Further monitoring points are established throughout the HWRS to monitor the quality of water transferred from these storages. Sampling taps are established for supply from the major storages (Turkey Nest Dam, Horticulture Dam).

The general suite of parameters and manner of assessment follows that developed in consultation with SWC as part of the established HWRS Reclaimed Water Management Plans, with analyses of samples undertaken by an accredited laboratory under standard conditions of a chain of custody The following parameters are monitored include the following (as detailed in Tables 5 and 6):

1. Microbiological parameters (Faecal coliforms)
2. Physical parameters (pH, Electrical Conductivity, TDS, TSS, BOD5)
3. Chemical parameters (Total Phosphorus, Total Nitrogen, Cations).

2.4 Hazard identification and risk assessment

As part of a 2016 SWC risk assessment workshop, a detailed hazard identification and risk assessment (HIDRA) was undertaken for reclaimed water supplied from the Richmond RWP to the University and Richmond Golf Club (SWC Human and Environmental Health HIDRA - Hazard Identification and Risk Assessment). Existing control measures for WSU consistent with the HIDRA summary include:

- Recycled water storage
- Restricted recycled water usage pattern
- Water quality monitoring program
- Communication protocols
- Plumbing controls for recycled water piping installations
- Labelling and identification of recycled water pipework
- Process and equipment
- General recycled water signage
- Programs for induction
- Provision RPZ valves
- Environmental Risk Register
- Site perimeter fencing and use of recycled water signage
- Flow monitoring on irrigation supply
- Soil testing program
- Design of irrigation systems.

Consistent with range of key tasks across the HWRS, hazards and associated risks are identified, and risk control measures implemented.

Table 1. Hazards and control measures for key tasks, HWRS

TASK	HAZARD	CONTROL MEASURES
Supply of reclaimed water	Supply specification issue	• Bypass to stormwater • Communication protocol • Containment at CCP
Storage / distribution	Public Health • Personal injury, or • Illness through ingestion • Toxic algal bloom	• Control of public access • Operational procedures • Signage in irrigation areas • Communication for staff • Water quality monitoring • Induction for staff contractors • Cross connection audit
	Supply disruption • Productivity / financial impact	• Maintenance / upgrade • Alternate stormwater supply
	Resource scarcity • Productivity / financial impact	• Water use budgeting • Alternate stormwater supply
Irrigation of: • Paddocks • Gardens • Lawns • Playing fields	Public Health • Personal injury, or • Illness through ingestion	• Additional treatment if unrestricted access • Signage and communication • Operational procedures • Method of application • Buffer zones
	Environmental impacts • Contamination / loading • Impact on ecological issues	• Monitoring soil / groundwater • Buffer zones

3. PREVENTATIVE MEASURES FOR RECYCLED WATER MANAGEMENT

3.1 Preventative measures and multiple barriers

Preventative measures for recycled water management across the Hawkesbury Water Recycling Scheme include:

- Complementary treatment processes for reclaimed water and stormwater
- Multiple barriers to public and environmental risk management
- Appropriate plumbing codes, signage, induction, and communication
- Controls of type and timing of application
- Backflow prevention and cross connection controls
- Promote best practice management of irrigation.

3.1.1. Complementary treatment processes for reclaimed water and stormwater

Reclaimed water is supplied from treatment in an IDAL plant then transferred between consecutive storages where ongoing ecological competition, and UV disinfection occurs. Depending upon seasonal conditions, stratification and algal growth in subsequent storages can generate variability in water quality, necessitating monitoring. Reclaimed water supplied at a rate greater than distribution or utilisation is collected and diluted in the stormwater system, then treated in wetland systems before being transferred between storages. In areas of the campus where stormwater is used for irrigation of public areas additional filtration and UV disinfection is utilised.

3.1.2. Multiple barriers to public and environmental risk management

A multiple barrier approach is applied to many aspects of the HWRS, including:

- Reduction of risk associated with discharges of reclaimed water being discharged to the environment due to subsequent capture, treatment, and reuse of stormwater
- Treatment trains for both reclaimed water and stormwater which incorporate sequential engineering and ecological treatment processes
- Changing degrees of public access and treatment through the Scheme, with reduced public access at earlier treatment and distribution stages of the Scheme
- Signage and induction processes for contractors and visitors to the site linked to differential levels of access.

3.1.3. Appropriate plumbing codes, signage, induction, and communication

Historically the distribution pipelines have utilised asbestos concrete (AC), PVC and more recent HDPE materials. All new works ensure that lilac striped HDPE pipeline is used for major and distribution lines. An ongoing program of works is decommissioning older pipeline materials such as AC lines. Signage has been put in place in entering the campus, areas where reclaimed water is used for irrigation, near water recycled water storages and plant, and where tap like

fittings for off take occur. A specific induction for access to areas where reclaimed water is utilised have been in place for a number of years and is now incorporated in I&C contractor inductions. Risk communication material interpreting water quality and hazard alerts are managed on an ongoing basis.

3.1.4. Controls of type and timing of application

Application depends upon the location, with:

- irrigation guns, pivot irrigation or sprinklers are used for pastures
- small irrigation guns or pop-up sprinklers used on playing fields
- pop up irrigation heads used to irrigate landscape areas and
- trickle irrigation systems in gardens.

Timing of application is managed for most areas through local farm or technical managers who oversee operations. In the case of landscape irrigation with stormwater, automated systems come on during the night to minimise contact.

3.1.5. Backflow prevention and cross connection controls

A comprehensive cross connection audit was undertaken with Sydney Water in 2007 with the result of several RPZ backflow prevention devices installed. All RPZ valves are checked annually by a certified plumbing contractor and repairs/replacements carried out under the direction I&C.

3.1.6. Promote best practice management of irrigation

The I&C management team continue to liaise with farm and technical managers and researchers to promote best practice management through appropriate planning and water use budgeting, the continuing improvement of appropriate technology, and improving the form of applications for which either reclaimed water or stormwater are used.

3.2 Critical control points and monitoring control points

For the supply of reclaimed water, the first receiving storage (Turkey Nest Dam) is a critical control point whereby transfers can be contained if a quality issue is identified which is associated with the supply of reclaimed water. Further monitoring control points are established at the off-take points of major storages to enable sampling and analysis of the recycled water transferred at these points. For the use of stormwater for irrigating public areas of the campus, a critical control point is established at Stinky Dam, whereby along with additional filtration and UV disinfection, irrigation controllers can disable further application when required.

These critical control points and monitoring control points are integrally liked to operational control strategies. The target criteria and critical limits for triggering operational control strategies are summaries below in Table 2.

Table 2. Triggers for operational control

CRITICAL CONTROL POINT AND LOCATION	CRITICAL LIMIT / TARGET CRITERIA	OPERATIONAL CONTROL
Supply inflow to Turkey Nest Dam	• SWC real-time monitoring • > 3 x ADWF	• Bypass diverted to capture, dilution and treatment in stormwater system
Turkey Nest Dam	• Communication from SWC • Observation of algal bloom	• Contain and monitor until condition stabilises • Communication with water users
Monitoring control points (pipeline transfer after Turkey Nest Dam and Horticulture Dam, Lindsay Dam)	• Sampling and analysis of product supplied as per standard suite of parameters	• Monitoring of trends
Other storages	• Observation of algal bloom	• Contain and monitor until condition stabilise • Communication with water users
Stinky Dam	• Observation of algal bloom	• Contain and monitor until condition stabilise • Alter irrigation controllers as appropriate

4. OPERATIONAL PROCEDURES AND PROCESS CONTROL

4.1 Key responsibilities and operational procedures

The following table summarises the key responsibilities for operational control and risk management procedures within the Hawkesbury Water Recycling Scheme (Table 3).

Table 3. Key responsibilities and operational procedures

OPERATION / PROCESS	RESPONSIBILITY	PROCEDURES
Risk management coordination	• Senior Manager, Environmental Sustainability, I&C • Environmental Coordinator, I&C	• Coordinate oversight of risk management planning and operations
Infrastructure and maintenance	• Environmental Coordinator, I&C	• Project management of infrastructure • Oversight of maintenance
Operational monitoring / correction	• Environmental Coordinator, I&C	• Operational monitoring • Liaise on operational and risk management matters
Supply of reclaimed water	• Sydney Water Corporation	• Supply reclaimed water as per agreement • Alert communications if issue arises
Transfer and use of reclaimed water on University's farm	• Farm Production Coordinator, I&C	• Manage transfers between storages • Use according to best practice • Liaise on operational and risk management
Transfer and use of reclaimed water in University's horticulture	• Farm Production Coordinator, I&C	• Manage transfers between storages • Use according to best practice • Liaise on operational and risk management
Transfer and use of stormwater on campus	• Manager, Grounds/Landscaping I&C	• Manage transfers between storages • Use according to best practice • Liaise on operational and risk management

4.2 Operational procedures

General operational control procedures include the following:

- Coordination and operational liaison
- Project management and infrastructure maintenance
- Transfers of recycled water
- Application and associated risk management

4.1.1. Coordination with water users and HWRS Risk Management

Staff of Western Sydney University's Division of Infrastructure and Commercial (I&C) oversee the operation and processes of the Scheme, including ongoing operational liaison with Sydney Water Corporation (SWC), water users and other external or internal stakeholders. Regular meeting with SWC are convened to discuss any issues relating to the provision of recycled water, the WSU-SWC water use agreement, and associated risk management requirements. Currently no recycled water is on-supplied from the Scheme.

4.1.2. Project management and infrastructure maintenance

I&C oversee project management of the design and delivery of infrastructure upgrades across the Scheme, including extensions of the scheme and upgrade of plant and equipment. Reactive and scheduled maintenance is also managed by I&C as part of its standard maintenance procedures.

4.1.3. Transfers of recycled water

For the transfer of recycled water, the Environment Coordinator and Grounds/Landscape Manager oversee core transfers of stormwater, and automated transfers of reclaimed water through the Scheme. As the major user of reclaimed water, transfers of reclaimed water are mainly undertaken by Farm, the School of Natural Sciences and HIE to fit into their irrigation management.

4.1.4. Application and associated risk management

Operational and risk management matters including those relating to the type and timing of irrigation application is the responsibility of each water user. Along with this overarching HWRS Risk Management Plan, similar Risk Management Plans for each specific water user were developed, however on supply of recycled water does not currently occur. Any operational planning water users would include:

- Water use budgeting and identification of critical supply needs;
- Choice of application types and timing, and related risk management practices as appropriate to each water user.

4.3 Operational monitoring and corrective actions

Operational monitoring and corrective actions follow the systematic need for effective supply and distribution of recycled water resources of a quality fit for purpose to water users to enable appropriate application of this resource for irrigation use. The following table outlines each task of operational monitoring, the trigger for corrective action and management response.

Table 4. Operational monitoring, trigger for corrective action and management response

OPERATION MONITORING	TRIGGER FOR CORRECTIVE ACTION	MANAGEMENT RESPONSE
Supply from SWC to Western Sydney University	• Supply out of specification	• Bypass to stormwater • Communication SWC to WSU • Containment if required • Communication to water users
Monitoring of control points and observation of storages	• Analyses show trigger value • Observation of algal bloom	• Containment if required • Communication to water users
Effective equipment and infrastructure operation and performance	• Scheduled maintenance • Operational failure • Communication from water user	• Communicated to WSU • Systematic maintenance of key treatment elements such as UV disinfection • Repair response by maintenance contractors scheduled on basis of criticality • Redesign and upgrade
Break in pipeline or infrastructure	• Operational failure • Communication from water user	• Repair response by maintenance contractors scheduled on basis of criticality • Redesign and upgrade
Emerging need for new supply	• Extension of irrigation • New landscape precinct • New water user or changed practices	• Design and implementation of new infrastructure on basis of context and design procedures
Emergency / incident reported	• Incident (biological, natural, or human intervention)	• Containment if required • Communication to water users • Further communication as appropriate • Incident investigation
Access of staff / contractors	• New access required to areas of restricted public access	• Induction requirements • Access controls
Effective irrigation application	• Observation or reporting of irrigation fault	• I&C respond if stormwater • Water user addresses irrigation application
Risk management practices	• Risk communication • Development of Risk Mgt Plans	• Water users to identify and implement appropriate risk management actions • Liaison regarding operational and risk management responses
Access to operational control and monitoring	• Identification of hazards in accessing areas	• Induction and access controls • Slashing and mowing to ensure safe access

5. VERIFICATION OF RECYCLED WATER QUALITY AND ENVIRONMENTAL PERFORMANCE

5.1 Water quality monitoring and performance

The HWRS has an established series of control points whereby water samples can be taken for analysis of water quality. The water quality parameters are shown below (Table 5) for commonly analysed parameters. Sampling is undertaken as per a standard protocol with samples collected in bottles provided by an accredited laboratory that are used to undertake laboratory analyses of key water quality parameters. The use of an external NATA accredited laboratory and the utilisation of sample bottles provided addresses quality assurance requirements.

Table 5. Water quality parameters

ITEM	PARAMETERS TESTED
Faecal indicator bacteria (FIB)	Total Coliforms (TC), E coli (EC) and Enterococci (ENT) [MPN]
General algal indicator	Chlorophyll a
Blue-green algal count	Cyanobacterial count
Toxic blue-green algal count	Toxic cyanobacterial count
Physicochemical Indicators (PI)	Dissolved oxygen (DO), Turbidity (Turb), Conductivity (Cond), Salinity, pH, Temperature (T°C)
Biochemical Oxygen Demand	BOD5
Total Organic Carbon	TOC
Suspended Solids	SS
Nutrients	TN & TP, TKN, NH3, NO3, NO2, reactive phosphate (orthophosphate proxy)

As well as these standard water quality parameters the following monitoring occurs:

- Monitoring by SWC of supply quality by real time monitoring and scheduled monitoring
- Observational monitoring of storages, particularly in relation to potential algal blooms late in summer
- Observational monitoring by all water users, with communication to I&C if any concerns or issues are noticed
- Long term monitoring of soil conditions (Table 6) and groundwater in relation to soil type and application history
- Assessment of stormwater quality in relation to both public health requirements for irrigation and discharge downstream to creek environments
- Volumetric monitoring of transfers between storages and to water users through both volumetric meters and pump run times.

Table 6. Soil parameters

PARAMETER	TOPSOIL (0-500MM)	SUBSOIL (>500MM)
Soil pH in CaCl2	✓	✓
EC dSm	✓	✓
Cl mg/kg	✓	✓
Na % CEC	✓	✓
K % CEC	✓	✓
Ca % CEC	✓	✓
Mg % CEC	✓	✓
H % CEC	✓	✓
Al % CEC	✓	✓
eCEC meq/100g	✓	✓
NO3 mg/kg	✓	✓
PO4 mg/kg	✓	✓
K mg/kg	✓	✓
SO4 mg/kg	✓	✓
Ca mg/kg	✓	✓
Mg mg/kg	✓	✓
Fe mg/kg	✓	✓
Mn mg/kg	✓	✓
Cu mg/kg	✓	✓
B mg/kg	✓	✓
Zn mg/kg	✓	✓
Organic Matter %	✓	✓
Infiltration rate mm/hr	✓	✓
PRI mg/kg	✓	✓

5.2 Documentation and reliability

A clear and established strategy of sampling points (control points) is established for supply distribution of both reclaimed and stormwater. External laboratory assessment is undertaken to ensure valid assessment and quality assurance. Field based sampling equipment is regularly checked for appropriate measurement.

The data collected is summarised in relation to key trigger values, with yearly reporting associated with reclaimed water use provided to Sydney Water Corporation as a requirement of the WSU-SWC water use agreement.

5.3 Satisfaction of users

Satisfaction of water users is addressed through:

- Day to day operational liaison by I&C to operational issues identified by water users
- Strategic development of water use agreements and associated risk management plans for each water user, operating under this umbrella document and coordinated through the I&C.

Along with reporting and auditing of the Scheme and monitoring data by Sydney Water Corporation, the data collected is used by University researchers for publicly available research and peer reviewed publications. The use of the HWRS as a platform for teaching and research is a fundamental rationale, alongside the functional provision of recycled water resources, and is a core component of the ongoing adaptive management of the Scheme.

6. MANAGEMENT OF INCIDENTS AND EMERGENCIES

6.1 Incident response protocols and communication

Observation, monitoring, and day to day operational liaison with water users provide the basis for responses to minor operational incidents. For other incidents such seasonally occurring hazards (e.g. algal outbreaks) or other unexpected supply issues a standard incident response strategy is put in place:

1. Immediate communication with water users
2. Containment and cease distribution and application until the cause and effect of the incident are determined and likely impact assessed.

The key people outlined for the HWRS Risk Management Committee are the critical individuals contacted in relation to any emerging issue. If these individuals cannot be contacted immediately, I&C will take steps to mitigate and address the issue, most commonly through ceasing distribution and containment until cleared.

Awareness of the use of recycled water for the local general public is clearly indicated on public signage on Blacktown Road, along with signage at all entries to the campus.

6.2 Incident investigation

Most operational incidents are addressed as such, though I&C do have established incident investigation procedures which can be triggered if a serious incident occurs. As well as those procedures established through I&C there are also:

- Outdoor laboratory risk management procedures overseen by the School of Science and Hawkesbury Institute for the Environment (HIE)
- Broader contractor induction and campus access procedures established by WSU
- WHS Unit of the University with its roles and responsibilities in relation to general University staff

7. OPERATOR, CONTRACTOR AND END USER AWARENESS AND TRAINING

7.1 Mechanisms to promote awareness and involvement

Mechanisms and communication strategies for water users to promote awareness and involvement include day to day operational liaison and communication.

Participation by representative water users in the HWRS Risk Management Committee is being developed as the main forum for overseeing the design and implementation of operational and risk management strategies across the Scheme.

For contractors, aspects of working with recycled water are included in the I&C Contractor Induction required of all contractors who access the campus. This induction material includes general reference to WHS, safe working methods and risk management from a practical perspective.

Particular end users are actively involved in the design and implementation of improvements in the Scheme, and external specialist irrigation designers are provided through I&C.

Risk communication material has also been previously developed for the Scheme for passive water users and laypeople, translating the monitoring undertaken into graphic representations similar to traffic light representations of log. Graphs of microbial counts and bush fire hazard representations of the risk of algal blooms. This along with information drawn from SDS material on recycled water has been provided as supporting material to induction procedures for staff, students and visitors being taken out to restricted access areas of the Scheme.

Research and teaching is also a critical means to increase participation and awareness by the broader campus community.

7.2 Training needs and resources

An increasing range of training areas and resources are being developed, including those relating to:

- Recycled water risk management planning
- Safe Operating Procedures based on Australian Guidelines for Recycled Water.

8. VALIDATION, RESEARCH AND DEVELOPMENT

8.1 Validation of processes

Continuous improvement of the effectiveness of the infrastructure to support distribution and use, and risk management processes across the range of water users within the HWRS continues to be a key focus. Research and development is a core focus of the Hawkesbury Water Recycling Scheme. This is undertaken in a number of ways, including:

- Engagement with University researchers in relation to both areas of direct relevance to risk management and emerging or developing areas of operational utilisation
- Continuing redesign and adaptation of the Scheme, responding to the development drivers within the campus, and building upon the strengths of the Scheme.

ATTACHMENT A: HWRS SAFE OPERATING PROCEDURES

SAFETY OPERATING PROCEDURES – USE OF RECYCLED WATER

SOP No: 1 – Pasture and fodder crop irrigated with recycled water

PURPOSE: Risk management procedures for irrigation with reclaimed water

SCOPE: Irrigation of pasture and fodder crops, Hawkesbury Farm

EQUIPMENT: Irrigation equipment

PERSONNEL: I&C environment and farm staff and infrastructure services, HWRS water users

PROCEDURES:

- Irrigation through centre pivot irrigators, along with irrigation guns in areas where spray drift and access can be managed.
- On-site preventative measures as per Table 3.9 AGWR "Pasture or fodder crop irrigation (including hay, silage and commercial fodder production). Limited withholding period.
    - Exclude lactating dairy cattle from pasture for four hours or until pasture is dry.
    - Fodder dried or ensiled (not for human consumption).
    - Public in vicinity of site
        - No access during irrigation
        - 25-30m buffer distance between irrigation and nearest public access point
        - spray drift control (e.g. through low – throw sprinklers, micro sprinklers, drippers, part circle sprinklers (180° inward throw), vegetation screening, or anemometer switching)." (NGWR 2006, Table 3.9, page 114)
- Additional purchaser controls as per Schedule 3, RWSA
    - Eg. Ensure all plumbing works comply with plumbing codes and standards

DATE OF RELEASE	REVIEW AND DISTRIBUTION	AUTHORS AND AUTHORISATION
November 2021	• To be reviewed November 2024 • I&C; Environment Coordinator; Farm Production Coordinator • HWRS Risk Management members • TRIM file: 15000547 Hawkesbury Water Recycling Scheme Risk Management Plan	• Roger Attwater • Authorised by Roger Attwater, Senior Manager, Environmental Sustainability

REFERENCES:

- (RWSA) Sydney Water Corporation and Western Sydney University, November 2021, Recycled Water Supply Agreement for Irrigation Use.
- (AGWR) Natural Resource Management Ministerial Council, Environment Protection and Heritage Council, Australian Health Ministers' Conference) 2006. Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1). NRMMC, EPHC, NHMRC, Canberra, ACT, Australia.

SAFETY OPERATING PROCEDURES – USE OF RECYCLED WATER

SOP No: 2 – Landscape and playing field irrigated with recycled water

PURPOSE: Risk management procedures for irrigation with reclaimed water

SCOPE: Irrigation of grounds and playing fields, Hawkesbury campus

EQUIPMENT: Irrigation equipment and treatment (e.g. UV disinfection)

PERSONNEL: I&C environment and farm staff and infrastructure services, HWRS water users

PROCEDURES:

- All campus landscape and playing fields have UV disinfection treatment at point of supply.
- Campus landscape is irrigated from stormwater treated through constructed wetlands.
- On-site preventative measures as per Table 3.8 AGWR Municipal use with restricted access and application.
    - "Restricted public access during irrigation and one of the following:
        - No access after irrigation, until dry (1-4 hours)
        - Minimum 25-30 m buffer to nearest point of public access
        - Spray drift control; for example, through low-throw sprinklers (180° inward throw), vegetation screening, or anemometer screening."
        - (NGWR 2006, Table 3.8 page 104)
- Irrigation application set for early am each day for pop up sprinklers.
- Clear signage established around playing fields stating:
    - Recycled water is used in this area
    - Not for drinking
    - No entry during irrigation. Authorised staff only.
- Additional purchaser controls as per Schedule 3, RWSA
    - Eg. Ensure all plumbing works comply with plumbing codes and standards

DATE OF RELEASE	REVIEW AND DISTRIBUTION	AUTHORS AND AUTHORISATION
November 2021	• To be reviewed November 2025 • I&C Environment Coordinator; I&C Landscape Manager • HWRS Risk Management members • TRIM file: 15000547 Hawkesbury Water Recycling Scheme Risk Management Plan	• Roger Attwater • Authorised by Roger Attwater, Senior Manager, Environmental Sustainability

REFERENCES:

- (RWSA) Sydney Water Corporation and Western Sydney University, November 2021, Recycled Water Supply Agreement for Irrigation Use.
- (AGWR) Natural Resource Management Ministerial Council, Environment Protection and Heritage Council, Australian Health Ministers' Conference) 2006. Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1). NRMMC, EPHC, NHMRC, Canberra, ACT, Australia.